

PAGE

FILE

PUCO EXHIBIT FILING

Date of Hearing: November 5, 2019

Case No. 17-2295-EL-BGN

PUCO Case Caption: In the Matter of the Application
of Republic Wind, LLC for a Certificate of
Environmental Compatibility and Public Need
for a Wind-Powered Electric Generating
Facility in Seneca and Sandusky Counties, Ohio

Volume II

List of exhibits being filed:

Local Residents 1, 9, 10, 11, 12

Reporter's Signature: Carolyn M. Burke

Date Submitted: 11/25/2019

1/8

2019 NOV 25 11:54

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Jack Van Kley

LR

EXHIBIT

tabbles

LR 1

From: Dalton Carr <dalton.carr@apexcleanenergy.com>
Sent: Friday, March 29, 2019 3:38 PM
To: Conway, Andrew; Parram, Devin; John Arehart III; Borchers, Dylan
Cc: Morrison, Eric
Subject: RE: Republic Wind, 17-2295-EL-BGN, data request (3/22/2019)
Attachments: REP_AgriculturalStructures_20190325.pdf

PUCO

2019 NOV 25 AM 11:55

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Andrew/Eric –

Please find our responses to the 29 data requests dated 3/22/19 and an additional note regarding the outstanding critical wind speed data request.

All Staff questions are highlighted with bold-text, while responses are bulleted.

Safety

1. **If a turbine is automatically shut down for non-emergency reasons (e.g. due to vibration, ice accumulation, lightning storm, collector or feeder line failure, or another issue) please describe your restart procedures to assure that the wind turbine is not a danger to the public upon restart.**
 - If an event described above takes a turbine or turbines out of service site representatives are dispatched to investigate. This includes if needed a climb uptower for investigation. Only after the site including turbines are safe to bring back on line will the site team initiate a restart.
 - Operational safety protocols are as follows:
 - Hurricanes
 - Follow hurricane procedure
 - Remote operations control center (ROCC) to operate the site
 - Conduct damage assessment of site
 - Report findings
 - Return site to normal operations
 - Tornadoes
 - Follow Tornado procedure
 - Remote Operations Control Center (ROCC) to operate the site
 - Conduct post storm damage assessment
 - Report findings
 - Return Site to Normal Operations
 - Adverse Weather Conditions
 - Icing
 - Follow turbine manufactures icing procedure
 - Determine whether work will stop or resume
 - Conduct site assessment

- Determine if equipment can continue normal operations
- High Winds
 - SCADA will monitor
 - 25mps will place turbine into pause (reference turbine manufacture for turbine specifications)
 - ROCC will monitor
- Snow
 - Conduct site assessment
 - Determine if equipment can continue normal operations
- High ambient –
 - Review previous event issues and lessons learned applied
 - Determine if coolant equipment is functional at the turbines Determine if coolant equipment is functional at the substation
 - Determine if all transformer oil levels have checked and refilled as necessary
 - Ensure that back-up generators have been tested for functionality (if applicable)
- Low ambient-
 - Review previous events issues and lessons learned applied
 - Determine if equipment or exposed components need additional insulation
 - Ensure all heaters are in proper working order
 - Determine if all cooling equipment has been disabled
 - Determine if all transformer oil levels have checked and refilled as necessary
 - Ensure that back-up generators have been tested for functionality (if applicable)

2. **Provide the name or resume of the professional engineer(s), structural engineer(s), or engineering firm(s) that will review and approve the project layout and turbine foundation design.**

- The final foundation design has not been awarded yet, but the typical firms we work with include Barr Engineering and RRC, both of which have licenses in the state of Ohio.

3. **Is the Applicant aware of any instance where the Vestas V150, Siemens Gamesa SG145, or Nordex N149 has been installed in North America? If so, provide the wind farm name and month/year of installation.**

- No.

4. **Referencing Data Request Number three (if applicable), what problems has the operator found regarding these models and how have they been corrected?**

- N/A

Foundations

5. **Please list any concrete standards/specifications that Republic Wind intends to adhere to for its foundation design.**

- Standards of the industry include: International Building Code (IBC) and American Concrete Institute (ACI) for reinforced concrete design, Post-Tension Institute (PTI) for anchor bolt design, and American Institute of steel Construction (AISC) for embedment plate design.
6. **Please describe common problems associated with the design of the spread footer and how are those problems are typically addressed?**
- In some instances, during the geotechnical investigation it is determined that the soils are unsuitable to support the spread foundation and an engineered solution may be required, such as; over excavation or rammed aggregate piers. This same problem with spread foundations can occur during construction when the turbine foundation is being excavated; at the bottom of the excavation if the soils are determined to be different than the Geotech or the subgrade fails testing than an engineered solution may be required, such as: over excavation and engineered approved fill.
7. **Please describe common problems associated with the design of the rock-anchored pile foundations and how are those problems are typically addressed?**
- Rock Anchor problems can occur during the post-tension and pull testing of the anchors once they have been installed. If during this testing they fail the anchor may need to be re-drilled into the rock or additional anchor(s) installed.

Underground Collection System

8. **In addition to NFPA 70E mentioned on p. 62 of the Application, please list any electrical standards/specifications that Republic Wind intends to adhere to when designing the underground collection system.**
- Standards we intend to meet are as follows:
 - Electrical components
 - Cable: ICEA, AEIC CS6 (EPR), AEIC CS8 (TRXLPE), NEMA, ASTM
 - Power Switchgear: ANSI C37
 - Lightning Arresters: ANSI C62
 - Insulators: ANSI C29
 - Apparatus Bushings: ANSI C76
 - Power and Instrument Transformers: ANSI C57
 - Grounding: IEEE 80
 - Rigid Bus: IEEE 605
 - Electrical Codes & Standards (in addition to the applicable Codes and Standards listed above, the following shall apply to the electrical work)
 - American Association of State and Highway Transportation Officials (AASHTO)
 - American Concrete Institute (ACI)
 - American National Standards Institute (ANSI)
 - American Society of Civil Engineers (ASCE)
 - American Society for Testing and Materials (ASTM)

- American Institute of Steel Construction (AISC)
- American Petroleum Institute (API)
- American Welding Society (AWS)
- Aluminum Association (AA)
- Association of Edison Illuminating Companies (AEIC)
- American Iron and Steel Institute (AISI)
- CRSI, Concrete Reinforcing Steel Institute • Edison Electric Institute (EEI)
- Environmental Protection Agency (EPA)
- Factory Mutual (FM)
- Institute of Electrical and Electronic Engineers (IEEE)
- Insulated Cable Engineers Association (ICEA)
- International Building Code (IBC)
- International Electrotechnical Commission (IEC)
- Illuminating Engineering Society of (IES)
- National Board of Fire Underwriters (NBFU)
- National Institute of Standards and Technology (NIST)
- National Electrical Safety Code ANSI/IEEE C2 (NESC)
- National Electrical Code NFPA-70 (NEC)
- National Electrical Manufacturers Association (NEMA)
- National Fire Protection Association (NFPA)
- National Ready Mixed Concrete Association (NRMCA)
- Research Council for Structural Connections (RCSC)
- Underwriters' Laboratories (UL)
- Uniform Building Code (UBC)/International Building Code (IBC)
- A.2 Concrete Works including Reinforcing
 - ACI 211.1 Recommended Practice for Selecting Proportions for Normal Weight Concrete.
 - ACI 301 Specification for Structural Concrete for Buildings.
 - ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
 - ACI 305 Recommended Practice for Hot Weather Concreting.
 - ACI 306 Recommended Practice for Cold Weather Concreting.
 - ACI 318 Building Code Requirements for Reinforced Concrete.
 - ACI 347 Recommended Practice for Concrete Formwork.
 - CRSI Manual of Standard Practice.
 - CRSI Recommended Practice for Placing Reinforcing Bars.

- CRSI Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature.
- CRSI Recommended Practice for Reinforcing Bar Splices.
- ASTM A82 Standard Specifications for Cold Drawn Steel Wire for Concrete Reinforcement
- ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement.
- ASTM A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- ASTM C31 Practice for Making and Curing Concrete Test Specimens in the Field.
- ASTM C33 Concrete Aggregates.
- ASTM C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- ASTM C42 Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- ASTM C94 Ready-Mixed Concrete
- ASTM C143 Test for Slump of Portland Cement Concrete.
- ASTM C150 Portland Cement.
- ASTM C171 Sheet Materials for Curing Concrete.
- ASTM C172 Method of Sampling Fresh Concrete.
- ASTM C192 Method of Making and Curing Concrete Test Specimens in the Laboratory.
- ASTM C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- ASTM C260 Air Entraining Admixtures for Concrete.
- ASTM C309 Liquid Membrane- Forming Compounds for Curing Concrete
- ASTM C494 Chemical Admixtures for Concrete.
- ACI 336.1 Specification for the Construction of Drilled Piers

Ecological Impacts

9. **Has the applicant conducted any surveys for the state endangered Engleman's Spike Rush as recommended by ODNR. If not, does the applicant have plans to conduct these surveys?**
 - ODNR has not requested surveys for Engleman's Spike Rush during meetings completed for the project to date, nor was a need for this survey mentioned in the survey recommendation letters provided by ODNR (the most recent of which was dated October 31, 2017). The project has been designed to avoid impacts to its potential habitat (e.g., mudflats along margins of ponds and lakes) and the Applicant is not planning to conduct Engleman's Spike Rush species-specific surveys.
10. **The applicant proposes to impact high quality (category 3) wetlands and the land adjacent to these wetlands. In concurrence with ODNR's recommendation, staff would recommend**

further survey work in these areas to assure impacts to the spotted turtle and Blanding's turtle are avoided. Has the applicant conducted or does the applicant plan to conduct further survey work for these species?

- The Applicant will complete a habitat suitability survey for spotted and Blanding's turtles if potentially suitable habitat is expected to be impacted during construction. If potentially suitable habitat is identified, then the Applicant will provide a qualified herpetologist to survey for spotted turtle and Blanding's turtle within these areas 48 hours prior to construction. If turtles are identified, a wildlife exclusion barrier (silt-fence) will be erected around the construction areas to keep turtles and other small wildlife from entering the construction areas. Any spotted or Blanding's turtles found will be reported to ODNR and relocated outside of the proposed work area.

11. Does the applicant plan to implement USFWS's recommended curtailment regime detailed in an email on February 24, 2016 to avoid impacts to listed bat species?

- Yes, the Applicant will adhere to USFWS's recommendations as outlined in the February 24, 2016 emails. In addition, the Applicant has requested a technical assistance letter (TAL) for federally listed bat species from USFWS on February 15, 2019.

12. Does the applicant intend to obtain an Incidental Take Permit? If yes, does the applicant intend to develop their own HCP or sign onto a regional one? If no, does the applicant intend to operate under a curtailment regime indefinitely?

- The future Project owner/operator may elect to pursue an Incidental Take Permit (ITP). Should an ITP be pursued, it would likely be based on an individual HCP as a regional HCP is not currently available.

13. Please provide the most recent coordination letter provide to the applicant from USFWS.

- The most recent coordination with USFWS was the February 15, 2019 email requesting a TAL.

14. The application states "To avoid impacts to roosting bats, any necessary tree clearing will be completed between October 1 and May 31 if located within 2.5 miles of the documented Indiana bat roost, and between August 1 and May 31 if located within 150 feet of a documented northern long eared bat roost." Please be aware that the standard recommendation of the OPSB staff and ODNR is the following:

- The Applicant shall adhere to seasonal cutting dates of October 1 through March 31 for removal of any trees greater than or equal to three inches in diameter, unless coordination efforts with the Ohio Department of Natural Resources and the U.S. Fish and Wildlife Service allow a different course of action.
- This applies to all trees 3 inches in diameter and larger and does not depend on the distance from roost trees.
- The Applicant understands the recommendation and will coordinate with USFWS and ODNR should the removal of trees greater than or equal to three inches in diameter be anticipated between April 1 through September 30.

15. How many bald eagle nests are currently in vicinity of the project? How close is the nearest nest? How recently was this information obtained through field work?

- There are no documented bald eagle nests within the project area. The closest documented bald eagle nest is approximately 1.9 miles SE of the nearest turbine, and this data was collected during 2018 raptor nest surveys.

16. **Which turbines are within 2.5 miles of Indiana and Northern long-eared bat roost trees?**
- There are 8 turbines within 2.5 miles of the Indiana bat roost tree - T24, T29, T31, T32, T33, T34, T35, T38. There is 1 turbine within 1000 ft (0.18 miles) of the northern long-eared bat roost trees - T16. Of note, northern long-eared bats are exempt from ESA take prohibitions under the 4(d) Rule.
17. **Does the project have the potential to impact any bat hibernacula, such as caves, sinkholes or abandoned mines?**
- Per USFWS, there are no known hibernacula within 100 miles of the project.
18. **How close is the nearby great blue heron rookery to the project area? What is the distance of the nearest project infrastructure to the rookery, and what is the distance to the nearest turbine?**
- The rookery was observed during the 2011 raptor nest survey report and, if it still exists, is located approximately 1.5 miles outside of the project boundary and over 2.2. miles from the nearest turbine.
19. **GIS provided by the applicant shows that wetland WOH-225 (category 2) would be impacted by a collection line, but is not discussed in the application. Please clarify the impacts associated with this wetland.**
- Based on current layout design, impacts to wetland WOH-225 are avoided as the collection line goes to the east of the wetland, therefore it was not included in the impact evaluation. Please see excerpt from Appendix B of the Republic Wetland Report (Appendix H of the Ecological Assessment Report). The collection line does cross DOH-211, an intermittent ditch, and will be open cut, as described in the Application.
20. **Wetland WOH-122 has an ORAM score of 60, meaning that it falls in the grey zone for category 2 and category 3. Staff would consider this to be a category 3 wetland. Staff would recommend that impacts to all category 3 wetland be avoided. It appears that impacts to wetlands WOH-122 and WOH-008 are easily avoidable with slight adjustment. Please clarify if there is any reason that these collection lines could not be shifted slightly to avoid impacts. If this is possible, then please incorporate the shift into the design and provide updated collection line GIS data. Staff would recommend that impacts to wetland WOH-236 be avoided through the use of HDD or other boring techniques. Please clarify if there is a reason that the use of HDD or other boring techniques to avoid impacts to this resource is not feasible.**
- Impacts to all Class III wetlands and streams will be avoided through facility design or HDD.
21. **Surface water resource impacts do not seem to consider crane paths. Please update tables 8-7 and 8-8 to consider crane path impacts and provide GIS data for the proposed crane paths.**
- Crane paths will be designed by the BOP contractor once we've finalized the bid process, and will be provided prior to the pre-construction conference for OPSB review. Impacts to surface waters will be minimized to the fullest extent possible; however, if there are impacts to surface waters from the crane paths they will be temporary in nature and will not affect the project's ability to authorize impacts to jurisdictional waters under a NWP 12.

Setbacks

22. **Please Identify the distance to the closest non-participating property line for each of the 50 proposed wind turbines contemplated for the Proposed Project, stating in each instance the turbine number, street address of the corresponding non-participating parcel, and the owner of the parcel.**
- Upon advisement of legal counsel, Republic is withholding response to this request until further discussion between OPSB staff legal counsel and Republic Wind legal counsel. After this discussion, we are prepared to provide this information, granted our concerns are addressed.

Agricultural District Lands

23. **Please submit to the docket figure 8-9.**
- Although Figure 08-9 is referenced once in the Amended Application, in Section 4906-4-08(E)(1), that was in error. There is no Figure 08-9. The sentence should be corrected to reference Figure 08-8 instead (i.e., "Figure 08-8 depicts agricultural land, agricultural district land, and land eligible for Current Agricultural Use Value program within the Project Area.").
24. **Please submit a map showing the location of agriculture-related structures. Please include the associated GIS data.**
- Document is attached.
25. **Please provide information on impacts to aerial crop dusting operations.**
- Crop dusting flights will continue through the duration of the project. The construction team works closely with land owners and pilots to determine flight schedules and to ensure the safety of all personnel. Construction schedules, that include worker and crane locations, and proposed turbine erection is shared with the pilots. The operations team maintains those relationships through life of the project. GPS coordinates of turbines are provided to local crop-dusting pilots through their companies. Safety management includes obtaining current Safety Data Sheets (SDS) for chemicals used, re-entry information, flight schedules, FAA lighting requirements, and comprehensive emergency response plans.
26. **Table 8-6 shows 49.5 acres of Agricultural land disturbed. Table 8-15 shows 50.5. Which one is correct?**
- Table 08-6 presents impacts to ecological communities based on ODNR data, whereas Table 08-15 presents impacts to agricultural land uses based on county parcel data. Different sources were used to derive these numbers because the Ohio Administrative Code (OAC) Rules require different information in these sections. As explained in the footnotes to Table 08-15, this results in minor discrepancies in the resulting numbers. ODNR data does not distinguish between specific agricultural uses, as required by OAC Rule 4906-4-08(E)(1), and the county parcel data does not distinguish between different ecological communities, such as forestland or scrub-shrub, but only between land uses such as residential and agricultural. The county parcel data classifies land use by parcel; each parcel is assigned a single land use code, even though a given parcel may contain multiple cover types (e.g., for a 40-acre parcel containing 35 acres of corn fields and a 5-acre woodlot, all 40 acres is classified as agricultural land use). However, the ODNR data does not consider parcel boundaries;

land cover is mapped according to the boundaries of each cover type or ecological community. So in the example of the 40-acre parcel with both corn fields and a woodlot, the ONDR data shows only 35 acres of agricultural land because the 5-acre woodlot is classified as a separate cover type: forestland. In both Tables 08-6 and 08-15, the total permanent impacts total 50.5 acres, because the actual impacts are the same. Table 08-15 shows all 50.5 acres impacted to be agricultural land, while Table 08-6 splits this impact out into 49.5 acres of impact to agricultural lands and 1.0 acre of impact to forestland. Like the example given above, the 1.0 acre of permanent impact to forestland is associated with access roads to be built through woodlots on parcels classified as agricultural land use. In other words, all 50.5 acres of the land to be permanently impacted is on parcels classified as agricultural land use, but of that 50.5 acres, only 49.5 acres is actively being farmed at this time.

Project Description

- 27. How many land owners are involved in the project?**
- There are a total of 226 signed agreements for properties within and immediately adjacent to the project boundary. These agreements represent 325 unique signees which have elected to be part of the Republic Wind Project, all owning property within and immediately adjacent to the project boundary.
- 28. Page 2 states up to 47 and 50 turbines will be constructed. Which one is it?**
- Republic's permit application presents 50 turbine locations for consideration, of which a maximum of 47 will be constructed. Depending on the turbine model which is selected, as well as a number of internal and external parameters, we intend to construct between 44 and 47 turbines. These numbers are calculated as a result of individual turbine capacity (from 4.2 to 4.5 MW). With a 200 MW nameplate capacity for the project, we can elect between 44 and 47 turbines of this generator capacity.
- 29. What is the applicant's plan to provide concrete to the jobsite? Will it be made onsite or offsite?**
- The current plan will be to utilize an temporary batch plant (with a secondary as back-up) that will be located on-site or nearby to provide concrete for the turbine foundations. Alternatively, a local existing concrete redimix batch plant may be used if it is able to meet the project requirements and schedule.

Additional note regarding the February data request for noise impacts on non-participating receptors for nighttime ambient critical wind speed design limits:

- We have been diligently working with a third party consultant to gather and finalize this data, and will provide a response by Wednesday of next week.



The contents of this e-mail and any attachments hereto are confidential and intended only for use by the addressee(s) named herein. The information may also be legally privileged. This transmission is sent in trust, for the sole purpose of delivery to the intended recipient. If you are not the intended recipient of this e-mail, any use reproduction or dissemination of this transmission is strictly prohibited. If you have received this e-mail in error, please notify me by replying to this message and permanently delete the original e-mail and its attachments, including any copies or printouts thereof.

From: andrew.conway@puco.ohio.gov <andrew.conway@puco.ohio.gov>
Sent: Friday, March 22, 2019 3:45 PM
To: Parram, Devin <dparram@bricker.com>; John Arehart III <john.arehart@apexcleanenergy.com>; Dalton Carr <dalton.carr@apexcleanenergy.com>; Borchers, Dylan <DBorchers@bricker.com>
Cc: Eric.Morrison@puco.ohio.gov
Subject: Republic Wind, 17-2295-EL-BGN, data request (3/22/2019)
Importance: High

Devin -

Please respond in seven days or advise of any issues.

Safety

1. If a turbine is automatically shut down for non-emergency reasons (e.g. due to vibration, ice accumulation, lightning storm, collector or feeder line failure, or another issue) please describe your restart procedures to assure that the wind turbine is not a danger to the public upon restart.
2. Provide the name or resume of the professional engineer(s), structural engineer(s), or engineering firm(s) that will review and approve the project layout and turbine foundation design.
3. Is the Applicant aware of any instance where the Vestas V150, Siemens Gamesa SG145, or Nordex N149 has been installed in North America? If so, provide the wind farm name and month/year of installation.
4. Referencing Data Request Number three (if applicable), what problems has the operator found regarding these models and how have they been corrected?

Foundations

5. Please list any concrete standards/specifications that Republic Wind intends to adhere to for its foundation design.
6. Please describe common problems associated with the design of the spread footer and how are those problems are typically addressed?
7. Please describe common problems associated with the design of the rock-anchored pile foundations and how are those problems are typically addressed?

Underground Collection System

8. In addition to NFPA 70E mentioned on p. 62 of the Application, please list any electrical standards/specifications that Republic Wind intends to adhere to when designing the underground collection system.

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12. Does the applicant intend to obtain an Incidental Take Permit? If yes, does the applicant intend to develop their own HCP or sign onto a regional one? If no, does the applicant intend to operate under a curtailment regime indefinitely?
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14. The application states "To avoid impacts to roosting bats, any necessary tree clearing will be completed between October 1 and May 31 if located within 2.5 miles of the documented Indiana bat roost, and between August 1 and May 31 if located within 150 feet of a documented northern long eared bat roost." Please be aware that the standard recommendation of the OPSB staff and ODNR is the following:
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17. Does the project have the potential to impact any bat hibernacula, such as caves, sinkholes or abandoned mines?
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29. What is the applicant's plan to provide concrete to the jobsite? Will it be made onsite or offsite?

Thanks.

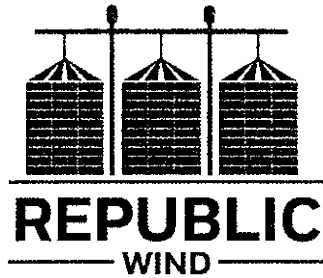
Sincerely,

Andrew Conway, P.E.

Ohio Power Siting Board
Engineering Specialist, Siting
(614) 466-5732
Email: Andrew.Conway@puco.ohio.gov
OPSB.ohio.gov



This message and any response to it may constitute a public record and thus may be publicly available to anyone who requests it.



Hello,

We at Apex would like to formally invite you to back-to-back, upcoming events for Republic Wind. Our support thus far has been instrumental in our progress, and we hope you will take the next step with us in showing the Ohio Power Siting Board that this county is ready for wind.

Your attendance is essential for our public meeting (11/29), and encouraged for our dinner (11/28).

We have entered the state permitting process, and are figuratively passing the torch to supporters like you, who will drive conversation with the Ohio Power Siting Board moving forward. If you can make it to our Public Community Meeting (11/29), you have a chance to discuss the project with members of the Power Siting Board and members of the community. If you would like some additional background on the project prior to our public meeting, we are having an update dinner one night prior (11/28).

Public Community Meeting (Open-House Format)

Wednesday, November 29th

6 – 7:30 PM

Veterans of Foreign Wars Post

5912 East County Road 44, Green Springs, OH 44836

Landowner/Supporter Dinner

Tuesday, November 28th

6 – 8 PM

Veterans of Foreign Wars Post

5912 East County Road 44, Green Springs, OH 44836

Please let us know whether you will make it to either the dinner or the public meeting, and we look forward to seeing you soon!

John Arehart

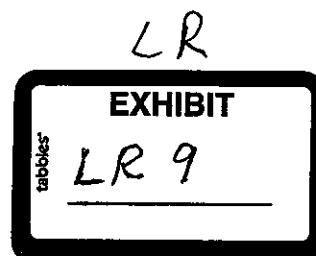
John.arehart@apexcleanenergy.com

(540) 241-5285

Dalton Carr

Dalton.carr@apexcleanenergy.com

(434) 996-3083



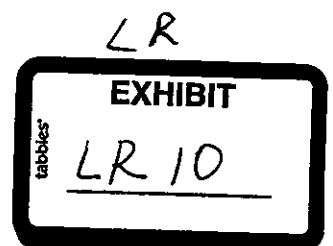
Republic_000797



Party in Your Plants!

A Planting Season Kickoff Update
for All Apex Project Landowners

Republic_001219



PLEASE JOIN US

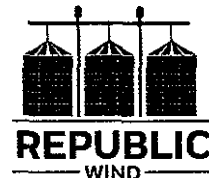
It's that time of year again, but everybody's gotta eat. Dinner's on us! All project landowners are welcome to join us for a cookout, where you'll receive an update on the Ohio wind industry and project news. Carryout will also be available. We hope to see you there!



**HONEY
CREEK
WIND**

**Thursday, May 17, 2018
5:30–7:30 p.m.
Attica Fairgrounds
15127 E Township Road 12
Attica, Ohio 44807**

RSVP to Neva Russo
neva.russo@apexcleanenergy.com
or (434) 282-2114



Republic_001220

Message

From: matthew.butler@puco.ohio.gov [matthew.butler@puco.ohio.gov]
Sent: 12/19/2017 10:31:29 AM
To: Dalton Carr [dalton.carr@apexcleanenergy.com]
Subject: RE: Republic Wind: Public Comment Entries

Any additional letters should be addressed more generally or to the Board.

Thanks,

Matt

From: Dalton Carr [mailto:dalton.carr@apexcleanenergy.com]
Sent: Tuesday, December 19, 2017 10:09 AM
To: Butler, Matthew <matthew.butler@puco.ohio.gov>
Subject: RE: Republic Wind: Public Comment Entries

Thanks for the feedback Matt –

I've attached those letters from entities addressed "to whom it may concern." Can we have these added to the public comment section of the docket?

Maybe my last question, and then I'll get out of your hair – I'm seeing a few addressed to John Arehart (our project manager), and even one resolution of support (from a school district board). **Are either of these acceptable for submission?**

DALTON CARR
Project Developer

Apex Clean Energy, Inc.
310 4th St. NE, Suite 200, Charlottesville, VA 22902
office: 434-270-7497 | cell: 434-996-3083 | fax: 434-220-3712
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From: matthew.butler@puco.ohio.gov [mailto:matthew.butler@puco.ohio.gov]
Sent: Tuesday, December 19, 2017 10:00 AM
To: Dalton Carr <dalton.carr@apexcleanenergy.com>
Subject: RE: Republic Wind: Public Comment Entries

Thanks for asking....

Addressed to the Board and including the case number is preferable, but we can generally figure out the case based on the content of the letter.

The local official letters should be fine addressed "to whom it may concern."



Republic_000845

RECEIVED-DOCKETING DIV
2019 NOV 25 AM 11:55
PUCO

From: Dalton Carr [<mailto:dalton.carr@apexcleanenergy.com>]
Sent: Tuesday, December 19, 2017 9:53 AM
To: Butler, Matthew <matthew.butler@puco.ohio.gov>
Subject: RE: Republic Wind: Public Comment Entries

Ah, I see – thank you for clarifying, Matt.

For my information, what your preferred method of directing each letter to the board (aside from an entity/landowner sending in the letter on their own)? To refine the question – will “to the Ohio Power Siting Board” suffice, or is it important that each entity/landowner reference the docket number?

For support letters crafted by local officials: these were written in a very open format, most directed “to whom it may concern.” Per your previous email, would these letters be out of place in our public comment section as they do not mention the OPSB directly?

Thanks for the information, Matt!

DALTON CARR
Project Developer

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From: matthew.butler@puco.ohio.gov [<mailto:matthew.butler@puco.ohio.gov>]
Sent: Monday, December 18, 2017 2:42 PM
To: Dalton Carr <dalton.carr@apexcleanenergy.com>
Cc: Bloomfield, Sally <sbloomfield@bricker.com>; Borchers, Dylan <DBorchers@bricker.com>; John Arehart III <john.arehart@apexcleanenergy.com>
Subject: RE: Republic Wind: Public Comment Entries

Hello Dalton,

I see that all of the letters are addressed to either the Seneca or Sandusky county commissioners, and on none of them is the Board copied. Additionally, comments are typically sent directly to the Board by commenters, rather than form letters forwarded to us by an applicant. I'm concerned about adding these letters in the docket under these circumstances. It would be more meaningful if individuals sent their letters to the Board themselves.

Thanks,

Matt

--

Matt Butler
Siting, Efficiency, and Renewable Energy Division
Rates and Analysis Department
Public Utilities Commission of Ohio | Ohio Power Siting Board

614-644-7670

www.PUCO.ohio.gov | www.OPSB.ohio.gov



This message and any response to it may constitute a public record and thus may be publicly available to anyone who requests it.

From: Dalton Carr [<mailto:dalton.carr@apexcleanenergy.com>]

Sent: Monday, December 18, 2017 11:04 AM

To: Butler, Matthew <matthew.butler@puco.ohio.gov>

Cc: Bloomfield, Sally <sbloomfield@bricker.com>; Borchers, Dylan <DBorchers@bricker.com>; John Arehart III <john.arehart@apexcleanenergy.com>

Subject: Republic Wind: Public Comment Entries

Hi Matt!

I'm attaching letters we collected during a meeting with landowners, and would like them to be added to the public comment section of the docket, if possible.

Separately, we have several letters crafted by local government and representatives – would the public comment section of the docket be an appropriate forum for these letters?

In addition, we have several letters from landowners directed toward local state representative Bill Reineke. Would the public comment section of the docket be an appropriate forum for these letters?

Thank you!

DALTON CARR
Project Developer

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Republic_000847

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2019 NOV 25 AM 11:56

PUCO

Exhibit F: Noise Impact Assessment





REPUBLIC TRANSMISSION LINE

NOISE IMPACT ASSESSMENT

Report | August 9, 2019



55 Railroad Row
White River Junction, VT 05001
802.295.4999
www.rsginc.com

PREPARED FOR:
REPUBLIC TRANSMISSION LINE

SUBMITTED BY:
RSG



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INTRODUCTION

The Republic Wind project is a wind power project proposed by Apex Clean Energy, to be located in Seneca and Sandusky County, Ohio, between the towns of Bellevue and Republic. The project is proposed to have between 50 and 58 turbines and a nameplate capacity of at least 200 MW. To support the project, there will be a collector substation, transmission line, and Point of Interconnect (POI) substation. The proposed transmission line will be 138 kV and will span the approximately 7.6 kilometer (4.8 mile) distance between the collector and POI substation.

As part of the Ohio Power Siting Board (OPSB) permitting process, Apex Clean Energy retained RSG to conduct a pre-construction noise assessment of the transmission line. The assessment includes both long-term background sound level monitoring along the route of the transmission line and sound propagation modeling of noise emissions from the line. This report includes:

- A project description;
- Summary of sound level limits applicable to the project;
- Background sound level monitoring procedures and results;
- Discussion of acoustical concerns particular to electrical transmission lines;
- Sound propagation modeling procedures and results;
- Construction noise modeling;
- Discussion; and
- Conclusions.

1.0 SITE DESCRIPTION

The proposed Republic Wind Transmission Line ("Line") is proposed to run along and through the western part of the Republic Wind project area, starting in the collector substation, approximately 6.2 kilometers (3.9 miles) south-southeast of Green Springs, Ohio and running west to the Point of Interconnect (POI) substation, located approximately 3.3 kilometers southeast of Old Fort, Ohio and along the eastern bank of the Sandusky River. A map showing the transmission line in the surrounding area is shown in Figure 1. The closest horizontal distance between the proposed transmission line and any residence is a 24 meters (79 feet).

The Line is proposed to be 138 kV, with 3 phases, at average heights of 11.9, 16.0, and 20.0 meters (39.0, 52.5, and 65.6 feet, respectively). There are a total of three proposed routes, A1, A2, and Alt. B.



2.0 SOUND LEVEL LIMITS/GUIDELINES

The criteria for sound emissions from electrical transmission lines is found in Ohio Administrative Code Chapter 4906-5 in Section (7)(A)(4).

(4) The applicant shall provide an estimate of the effect of noise generation due to the construction, operation, and maintenance of the transmission line or pipeline and associated facilities. The applicant shall describe any equipment and procedures designed to mitigate noise emissions during site clearing, construction, operation, and maintenance of the facility to minimize noise impact, including limits on the time of day at which construction activities may occur. The applicant shall estimate the nature of any intermittent, recurring, or particularly annoying sounds from the following sources:

- (a) Blasting activities.
- (b) Operation of earth moving and excavating equipment.
- (c) Driving of piles, rock breaking or hammering, and horizontal directional drilling.
- (d) Erection of structures.
- (e) Truck traffic.
- (f) Installation of equipment.

No sound level limits are set, only requirements of the kinds of sources and activities that need to be considered in a noise analysis, with emphasis placed on construction noise.

Criteria for wind power projects are found in Ohio Administrative Code Chapter 4906-4 Section (9)(F)(2).

(2) The facility shall be operated so that the facility noise contribution does not result in noise levels at any non-participating sensitive receptor within one mile of the project boundary that exceed the project area ambient nighttime average sound level (Leq) by five A-weighted decibels (dBA). During daytime operation only (seven a.m. to ten p.m.), the facility may operate at the greater of: the project area ambient nighttime Leq plus five dBA; or the validly measured ambient Leq plus five dBA at the location of the sensitive receptor. After measured ambient Leq plus five dBA at the location of the sensitive receptor. After commencement of commercial operation, the applicant shall conduct further review of the impact and possible mitigation of all project-related noise complaints through its complaint resolution process. Non-participating, as used in this context, refers to a property for which the owner has not signed a waiver or otherwise agreed to be subject to a higher noise level.

This sets the sound level limit at the higher of the site-wide nighttime L_{eq} plus 5 dB or the location-specific L_{eq} plus 5 dB. While this does not directly apply to the transmission line, this is what applies to the Republic Wind power project.

3.0 PRECONSTRUCTION BACKGROUND SOUND LEVELS

3.1 LOCATION DESCRIPTIONS

Background sound level monitoring was performed at three locations near the proposed transmission line routes. Each site was chosen to characterize a soundscape along the transmission line route, allowing identification of both overall sound levels and the sound sources that contribute to local soundscapes. A map showing the monitor locations in relation to proposed transmission line routes and the Republic Wind project area is shown in Figure 1.

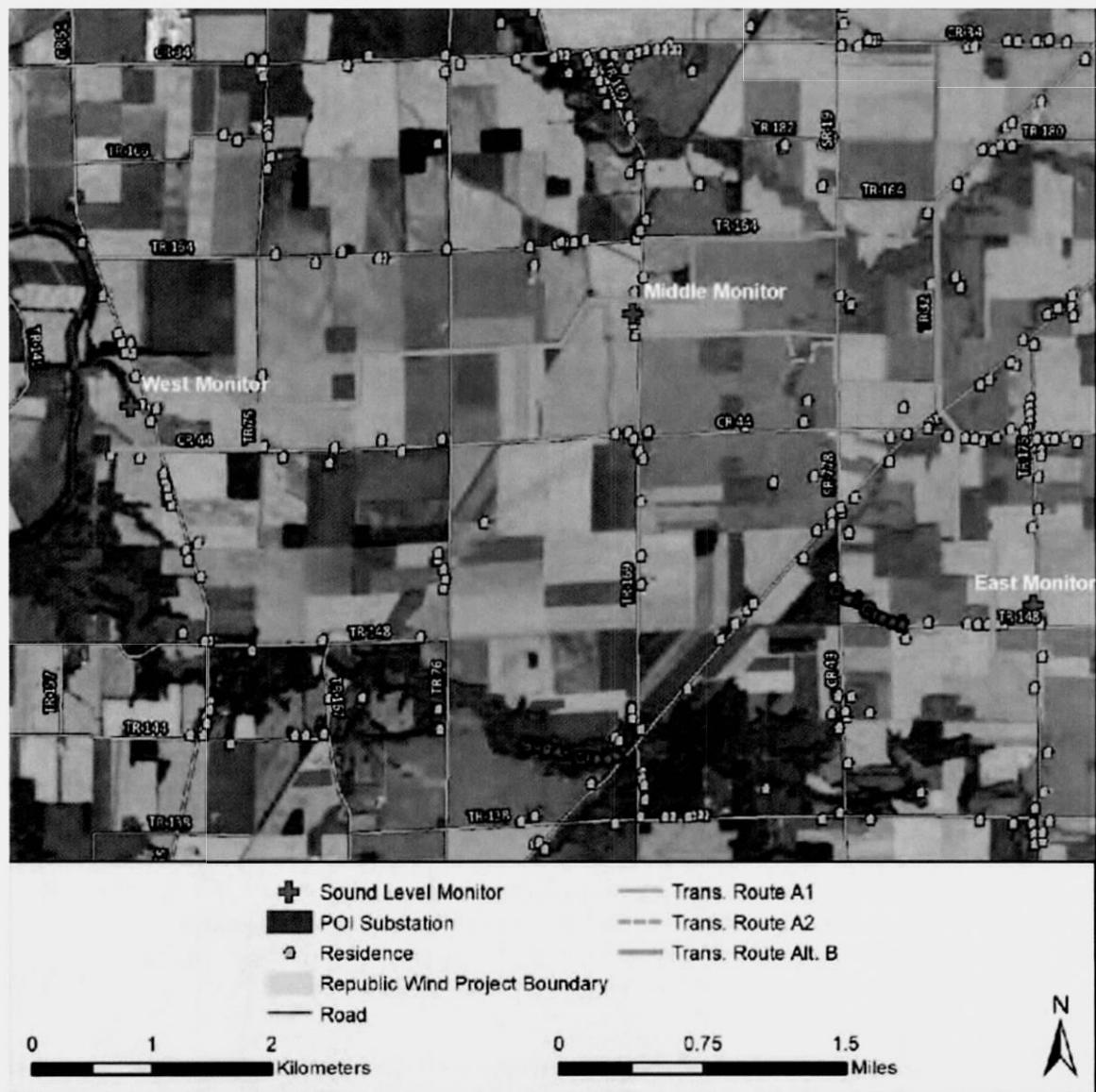


FIGURE 2: MONITOR LOCATIONS

West Monitor

The West Monitor was located on the edge of a farm field, next to a small wooded area. A map of the monitoring location is shown in Figure 3, and a picture of the setup is shown in Figure 4. The monitor was approximately 45 meters (148 feet) from the closest residence to the east and 212 meters (696 feet) from the closest residence to the southeast. County Road (CR) 15 was located approximately 130 meters (427 feet) to the east. The proposed POI substation was located approximately 302 meters (991 feet) to the southwest and the Sandusky River was located approximately 410 meters (1,345 feet) to the west.

The purpose of this monitor location was to capture the soundscape near the western extent of the transmission line, and at a relatively lower elevation (about 210 meters or 690 feet) near the Sandusky River. While this location is relatively far from a road, CR 15 is well traveled.

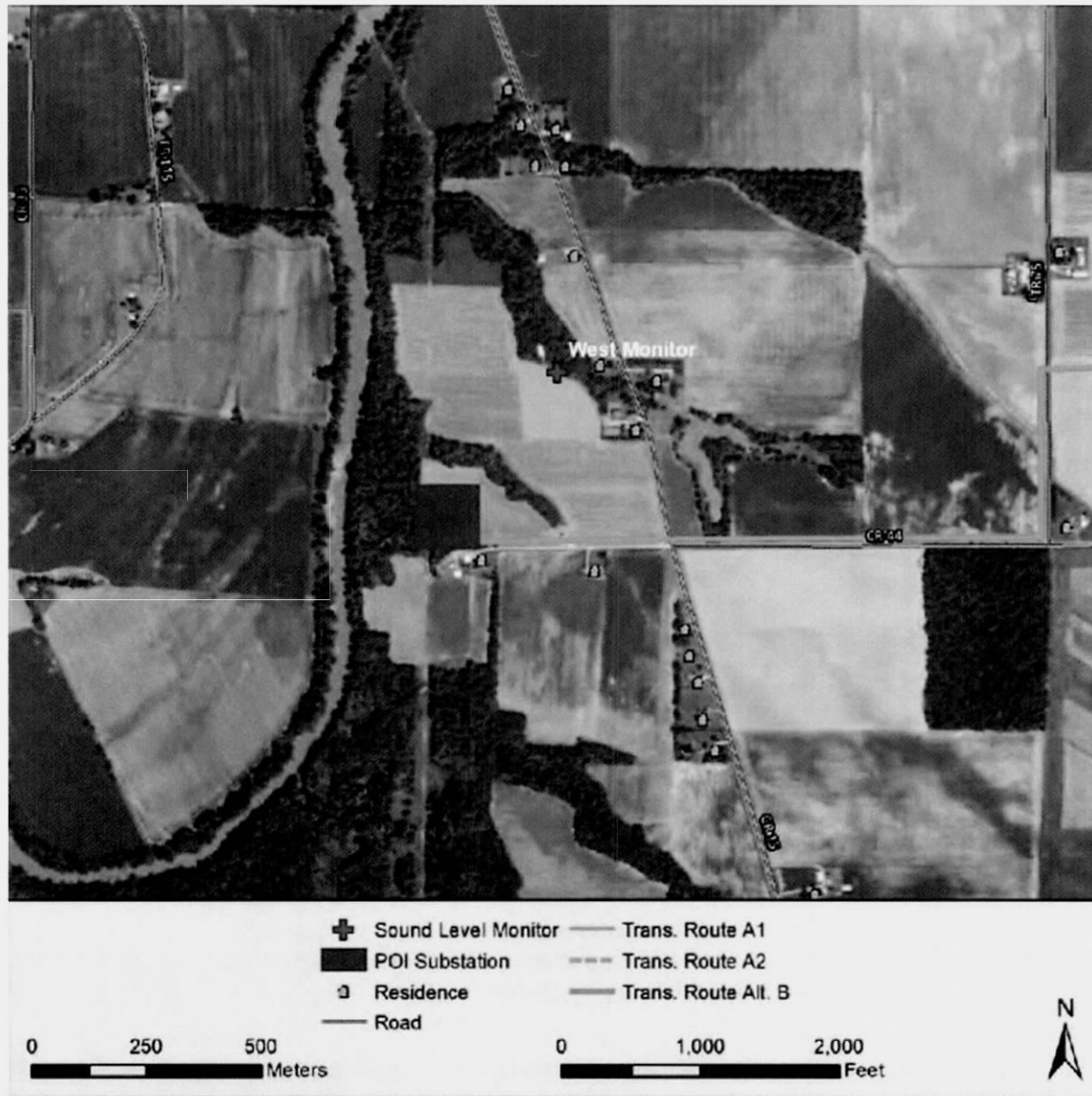


FIGURE 3: WESTERN MONITOR LOCATION MAP



FIGURE 4: WESTERN MONITOR LOCATION - LOOKING WEST

Middle Monitor

The Middle monitor was located approximately 64 meters (210 feet) west of Town Road (TR) 169 in the yard of a residence and adjacent to a farm field. A map of the monitoring location is shown in Figure 5, and a picture of the monitoring setup is shown in Figure 6. The intersection between TR 169 and TR 164 is approximately 610 meters (2,000 feet) to the north. The closest residence was located approximately 24 meters (79 feet) to the east-southeast.

The purpose of this monitoring location was to capture the soundscape along the middle of the transmission line path. Nearby TR 169 is well traveled, but not busy.

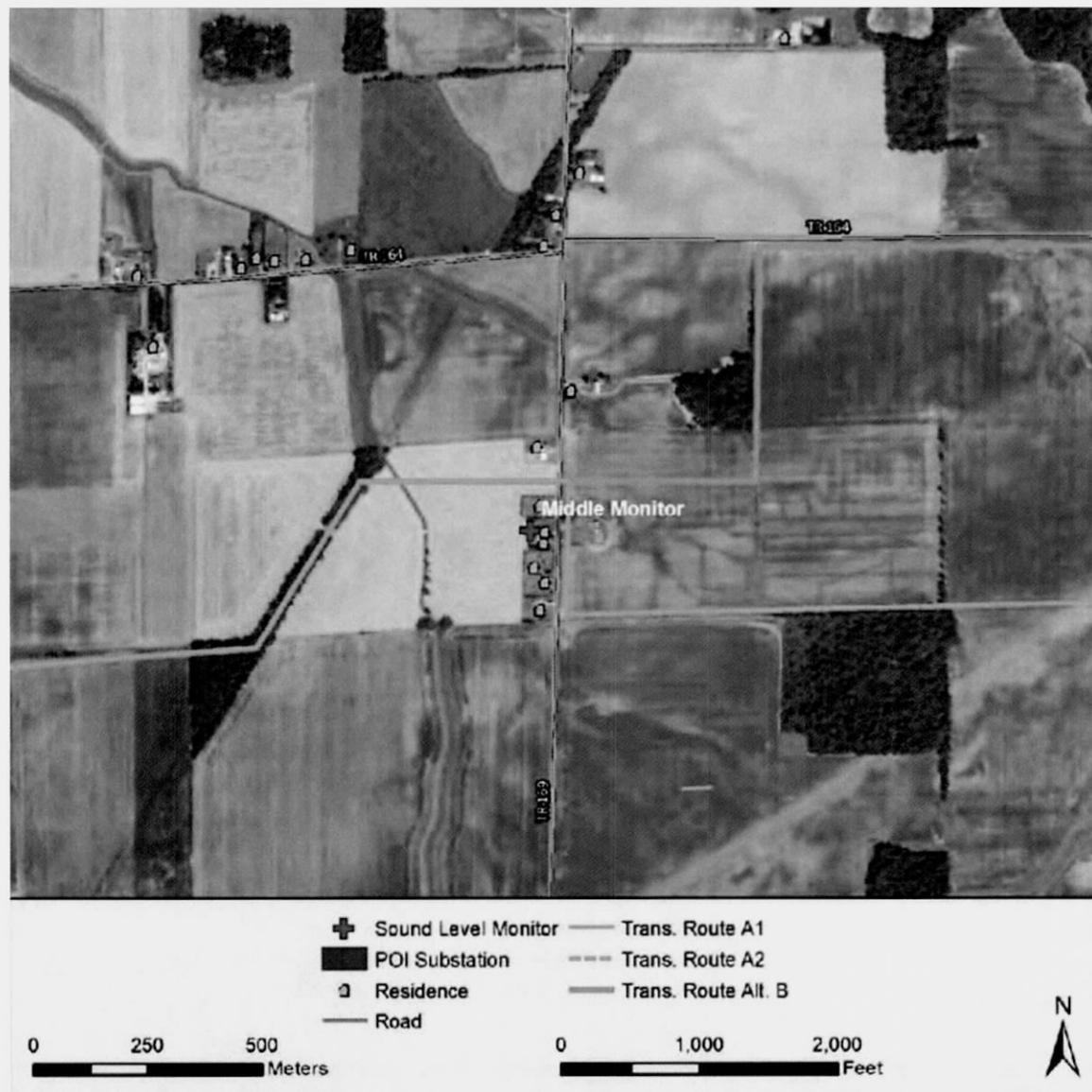


FIGURE 5: MIDDLE MONITOR LOCATION MAP



FIGURE 6: MIDDLE MONITOR LOCATION - LOOKING NORTHWEST

East Monitor

The East monitor was located along a small drainage ditch, between two farm fields and along a row of trees. A map of the monitoring location is shown in Figure 7, and a picture of the monitoring setup is shown in Figure 8. The monitor was located approximately 40 meters (131 feet) west of TR 175 and 167 meters (548 feet) from the closest residence to the southeast. The intersection of TR 148 and TR 175 was located approximately 187 meters (614 feet) to the south-southeast. The proposed collector substation location was approximately 550 meters (1,800 feet) to the southwest.

The purpose of this monitoring location was to capture the soundscape in the area along the eastern extent of the transmission line and near the proposed collector substation. The elevation here is approximately 240 meters (787 feet), about 30 meters (100 feet) higher than the western monitor.

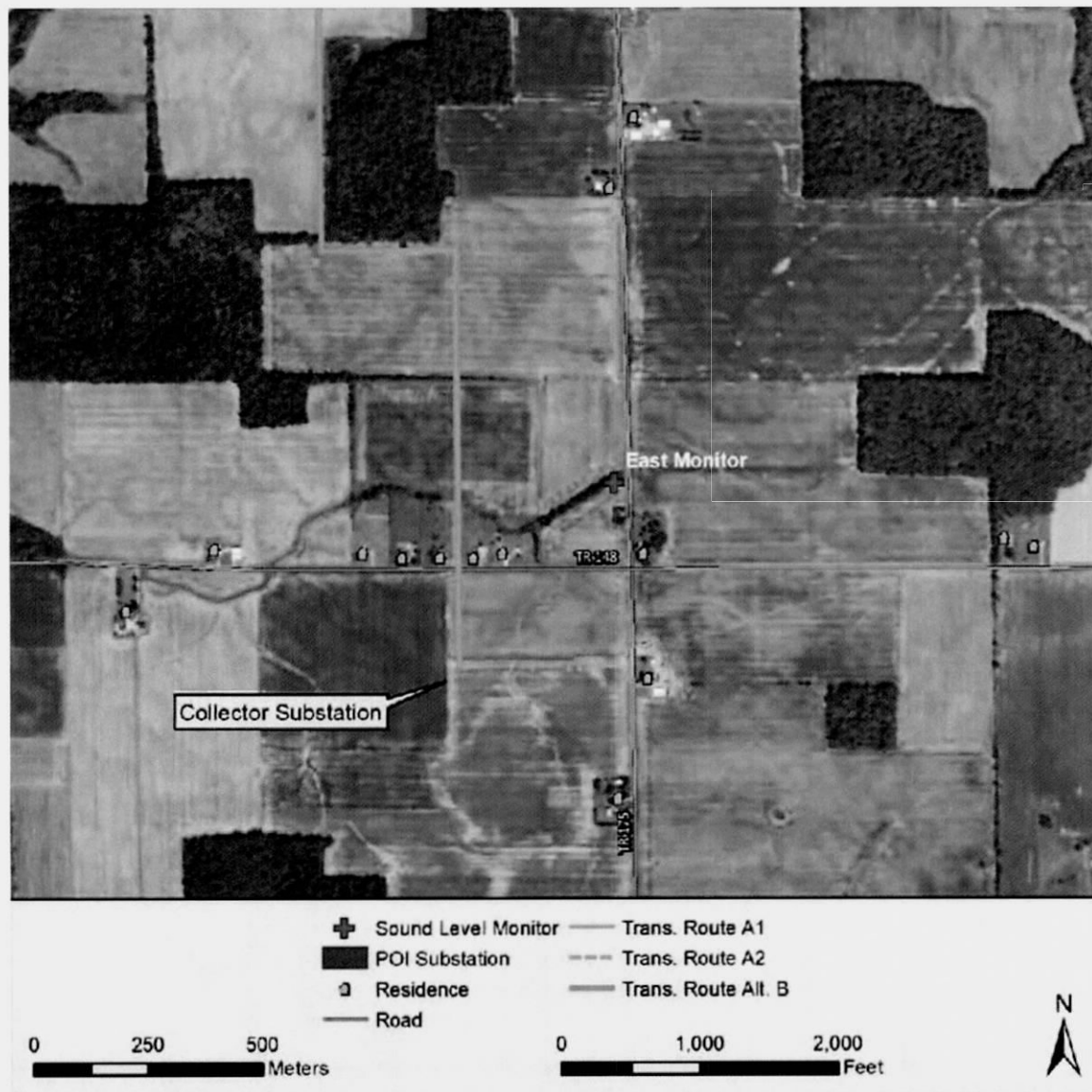


FIGURE 7: EASTERN MONITOR LOCATION MAP



FIGURE 8: EASTERN MONITOR LOCATION - LOOKING SOUTHWEST

3.2 PROCEDURES

Background sound level monitoring was performed at the site from September 13 to 26, 2018.

Sound levels were measured with Cesva SC310 ANSI/IEC Type 1 sound level meters set to record A-weighted and 1/3 octave band sound levels once each second. Sound level meters were connected to audio recorders to allow for sound source identification. Microphone sensitivity was calibrated before and after measurements using Cesva CB-5 or Brüel and Kjær 4231 calibrators. Microphones were mounted at a height of approximately 1.4 meters (4.6 feet) and covered with 7-inch hydrophobic wind screens to reduce the influence of wind-caused sound on measurements.

Wind speed measurements were collected concurrent with sound level measurements using Onset HOBO wind speed sensors and loggers. Anemometers were mounted on stakes, also at

a height of approximately 1.4 meters (4.6 feet). The logger at the Western monitor was also equipped with a temperature sensor. Precipitation data was obtained from the Iowa State ASOS (<https://mesonet.agron.iastate.edu/ASOS/>) site for Mansfield, Ohio.

Sound level measurements have been summarized into 10-minute and period-long intervals. Periods during measurements with measurable precipitation and wind speeds over 5 m/s (11 mph) were removed from the data set. This is due to these kinds of weather events inflating sound levels in a way that is not representative of the actual landscape. Additional noise events that were removed were interaction of people or animals with the equipment, seasonal sound sources (mowing, etc.), or excessively loud anomalous sources. Due to persistent insect noise during the monitoring period, ANS weighting was applied to background sound level monitoring results.¹

3.3 RESULTS

Western Monitor

Time-history graphs from the western monitor are shown in Figures 9, 10, and 11, and overall results are shown in Table 1. The overall daytime sound level was 42 dBA L_{eq} and 28 dBA L_{90} . The overall nighttime sound level is 37 dBA L_{eq} and 21 dBA L_{90} . This relatively wide-spread between the L_{eq} and L_{90} is due to the existence of transient sound sources. This site has a relatively minimal diurnal pattern, with only slight sound level decreases during the nighttime period most days, due to less frequent car pass-bys.

Common sound sources at this site include car pass-bys on nearby roads, airplane overflights, train pass-bys and horns, and farm equipment.

¹ *Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas - ANSI S12.100-2014*, Melville, NY: American National Standards Institute, Inc., 2014.

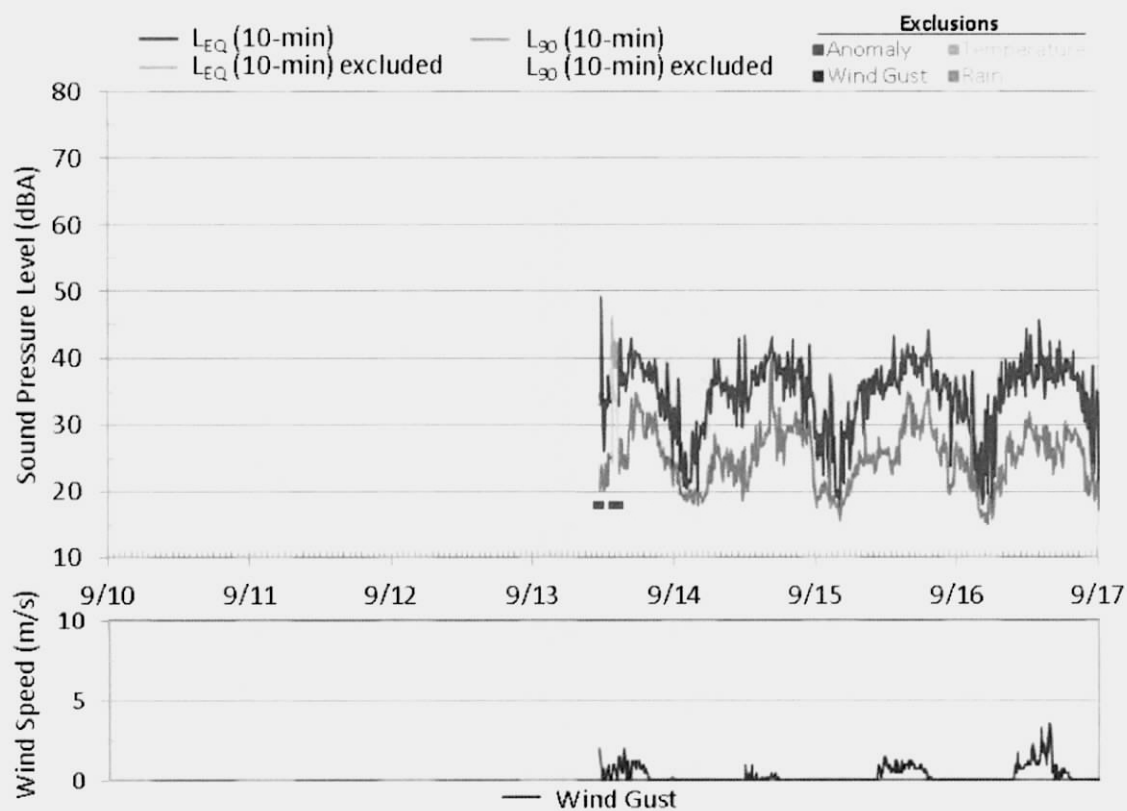


FIGURE 9: WESTERN MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 1

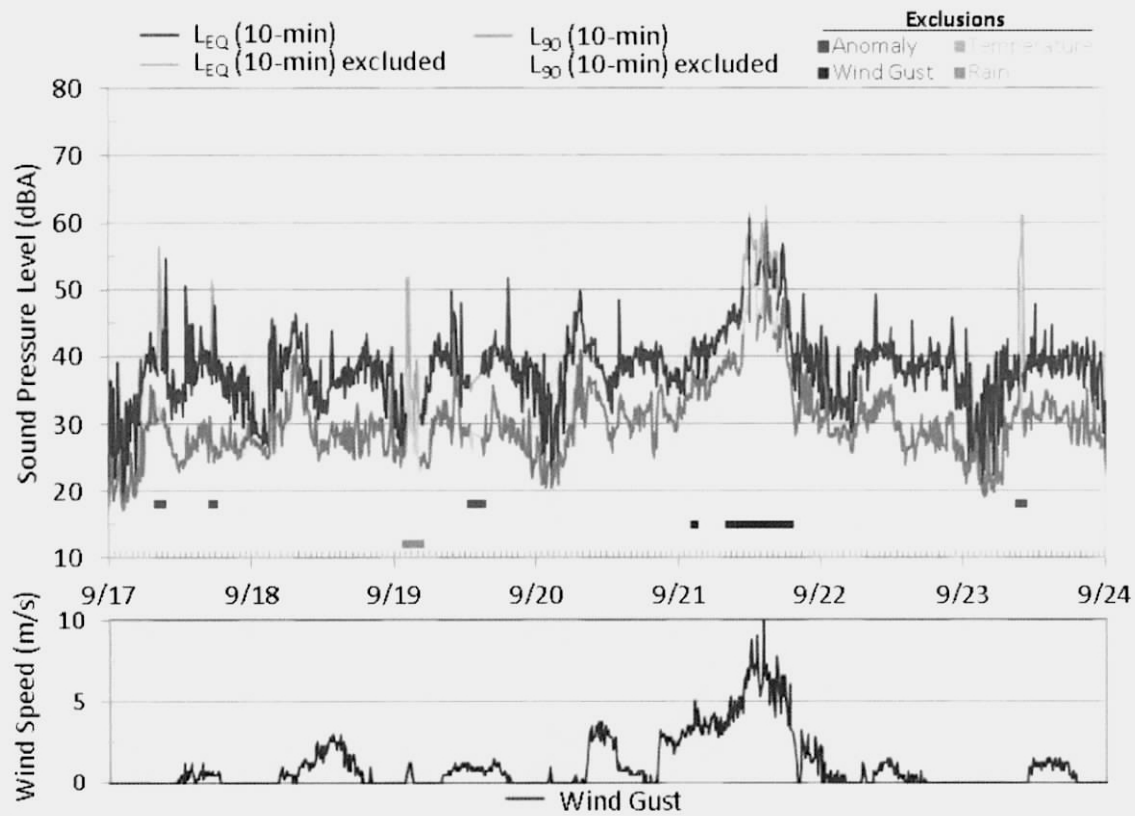


FIGURE 10: WESTERN MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 2

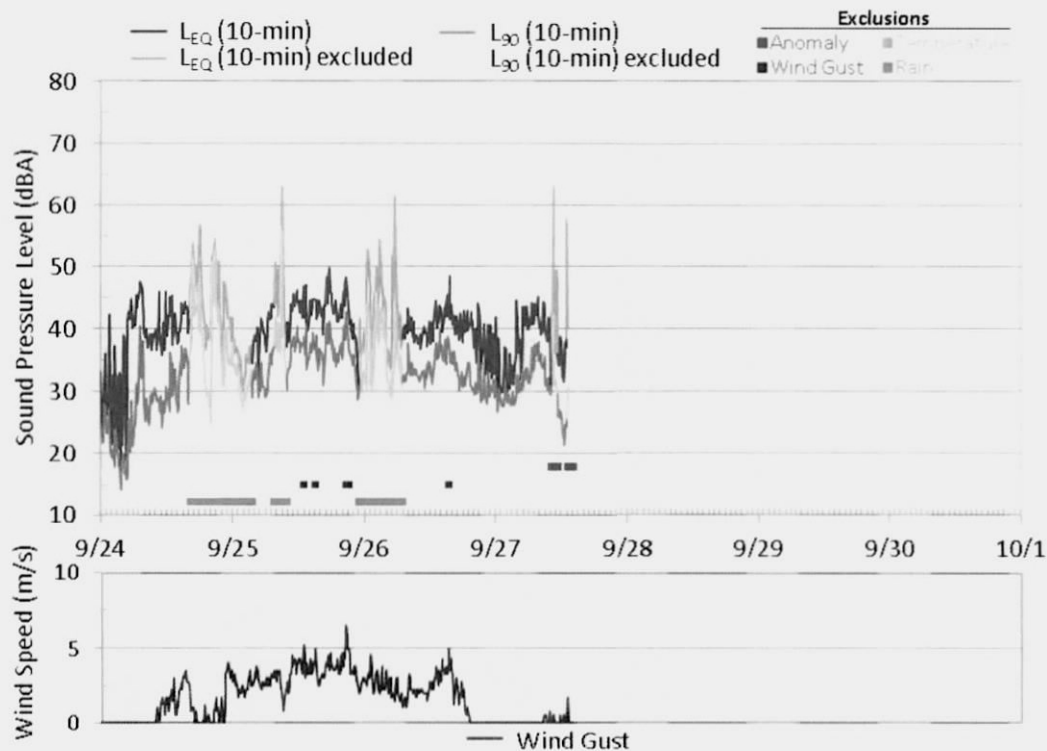


FIGURE 11: WESTERN MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 3

Middle Monitor

Time-history graphs from the middle monitor are shown in Figure 12, 13, and 14 with overall results shown in Table 1. Overall daytime sound levels are 38 dBA L_{eq} and 25 dBA L_{90} and overall nighttime sound levels are 35 dBA L_{eq} and 20 dBA L_{90} . Similar to the west monitor, this site has a minimal diurnal pattern, which seems to be driven primarily by a decrease in traffic volumes at night. The spread between the L_{eq} and L_{90} is relatively large, just not as large as at the Western monitor, due to the prevalence of transient sounds such as car pass-bys.

The most common sound sources at this site are car pass-bys, train pass-bys, airplane overflights, sounds from home maintenance, dogs, and farm equipment.

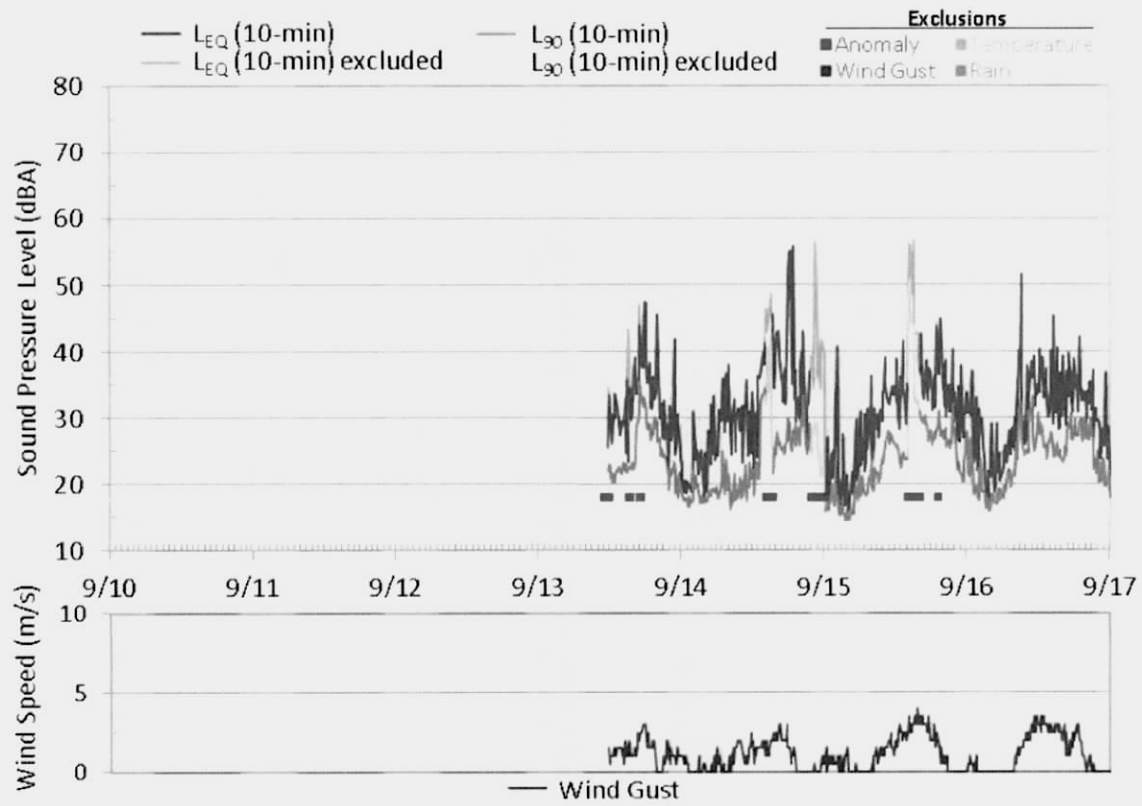


FIGURE 12: MIDDLE MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 1

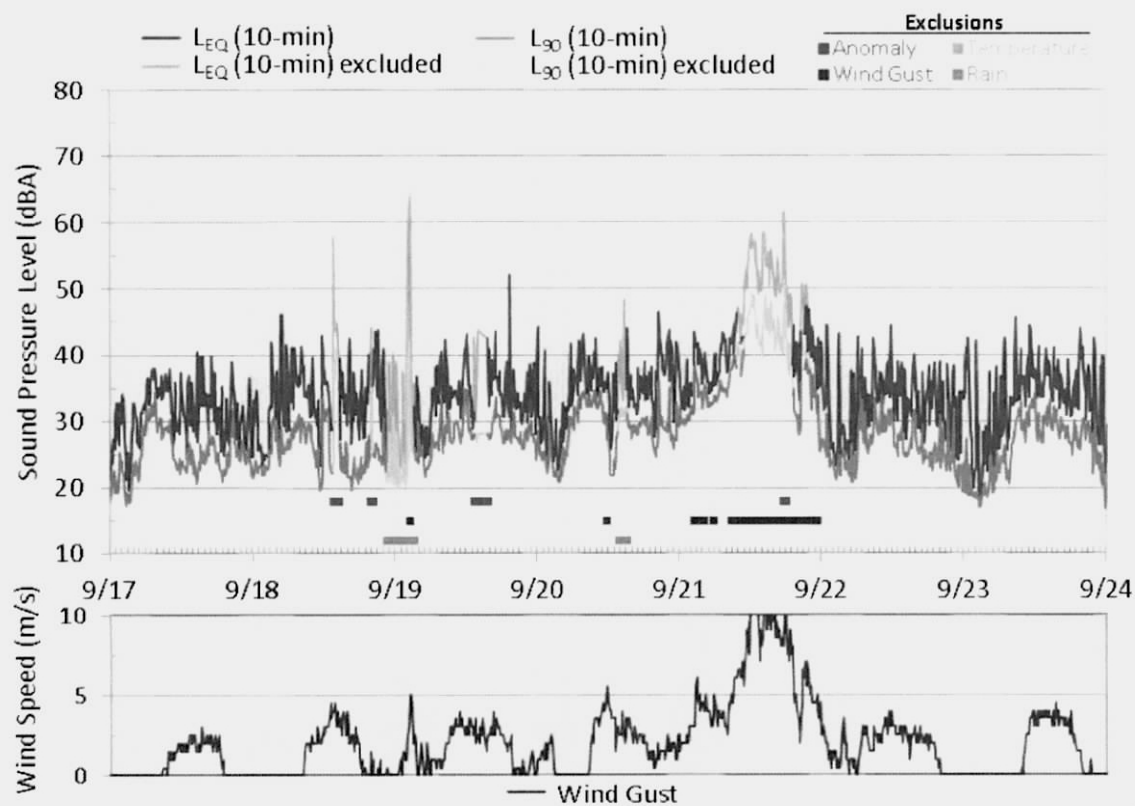


FIGURE 13: MIDDLE MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 2

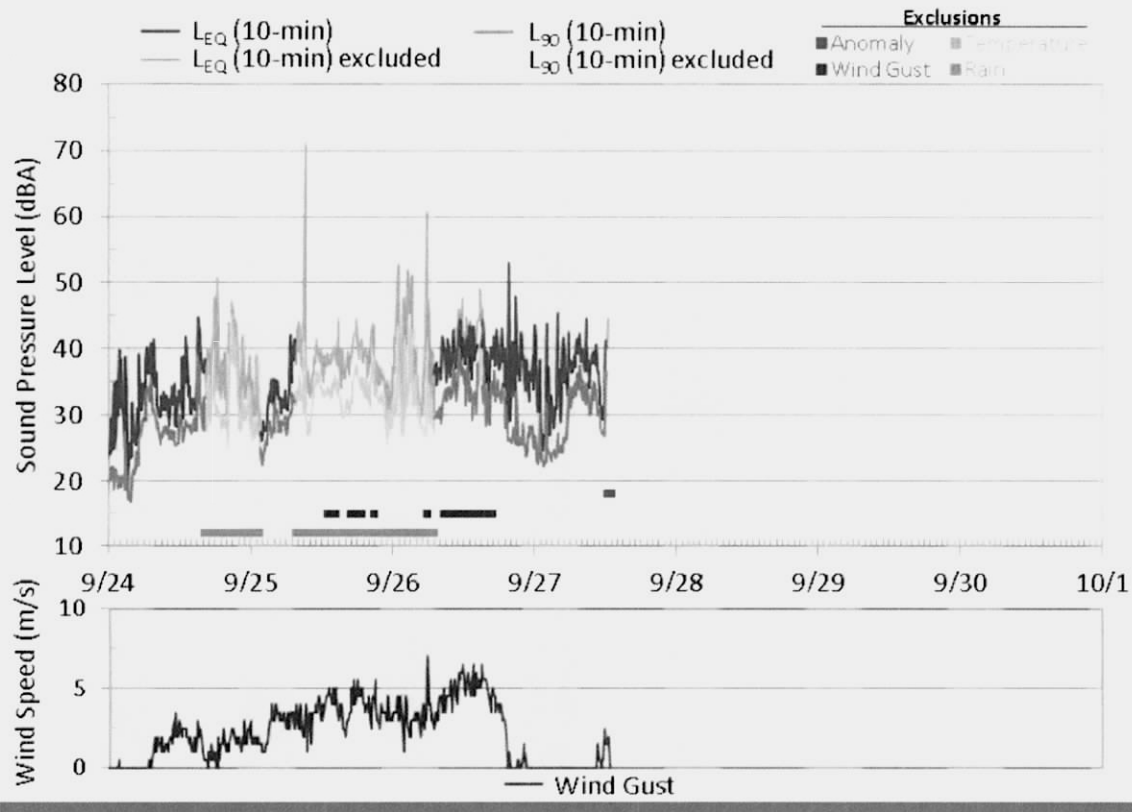


FIGURE 14: MIDDLE MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 3

Eastern Monitor

Time-history graphs from the western monitor are shown Figures 15, 16, and 17, and overall results are shown in Table 1. Overall daytime sound levels are 43 dBA L_{eq} and 26 dBA L_{90} and nighttime overall sound levels are 37 dBA L_{eq} and 20 dBA L_{90} . Similar to the other sites, the soundscape is dominated by transient sound and there is minimal diurnal pattern to sound levels.

The most common sound sources at this location are airplane overflights, car pass-bys, farm, equipment, a few gunshots, and trains.

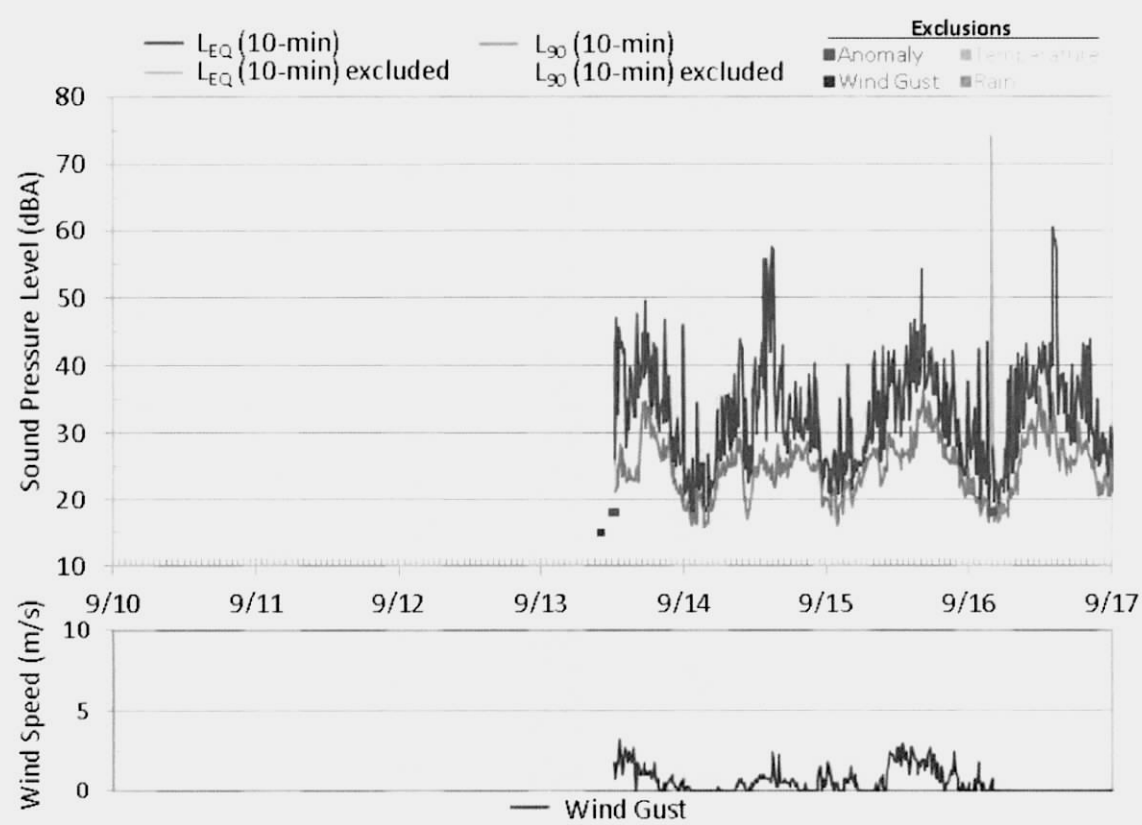


FIGURE 15: EASTERN MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 1

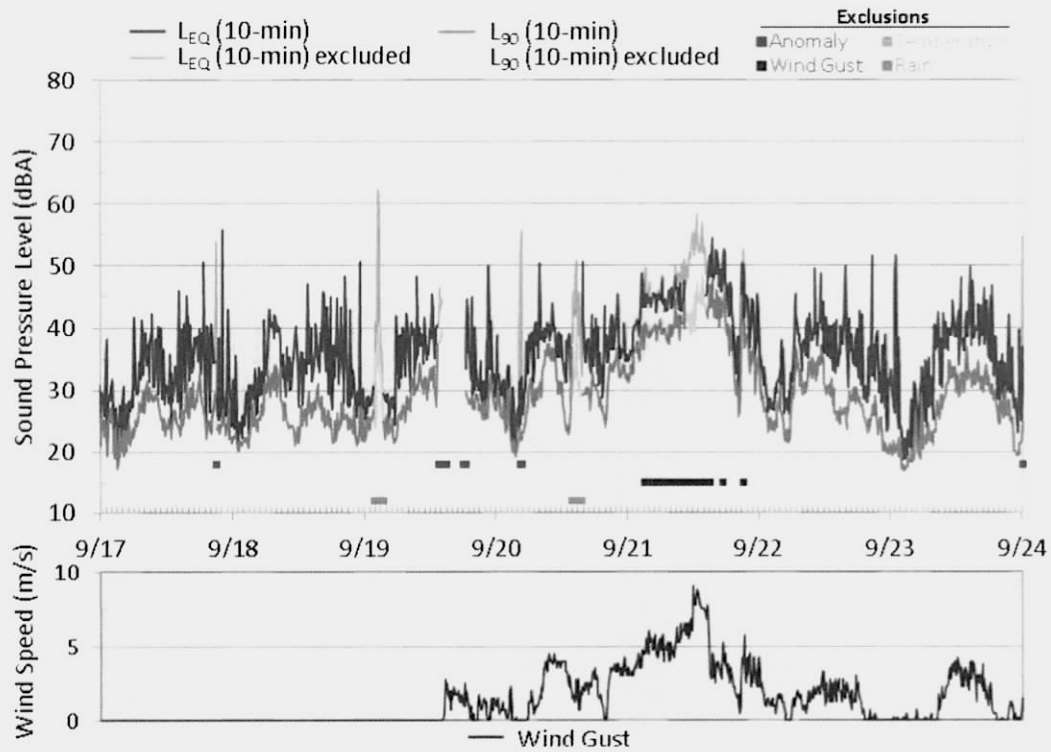


FIGURE 16: EASTERN MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 2

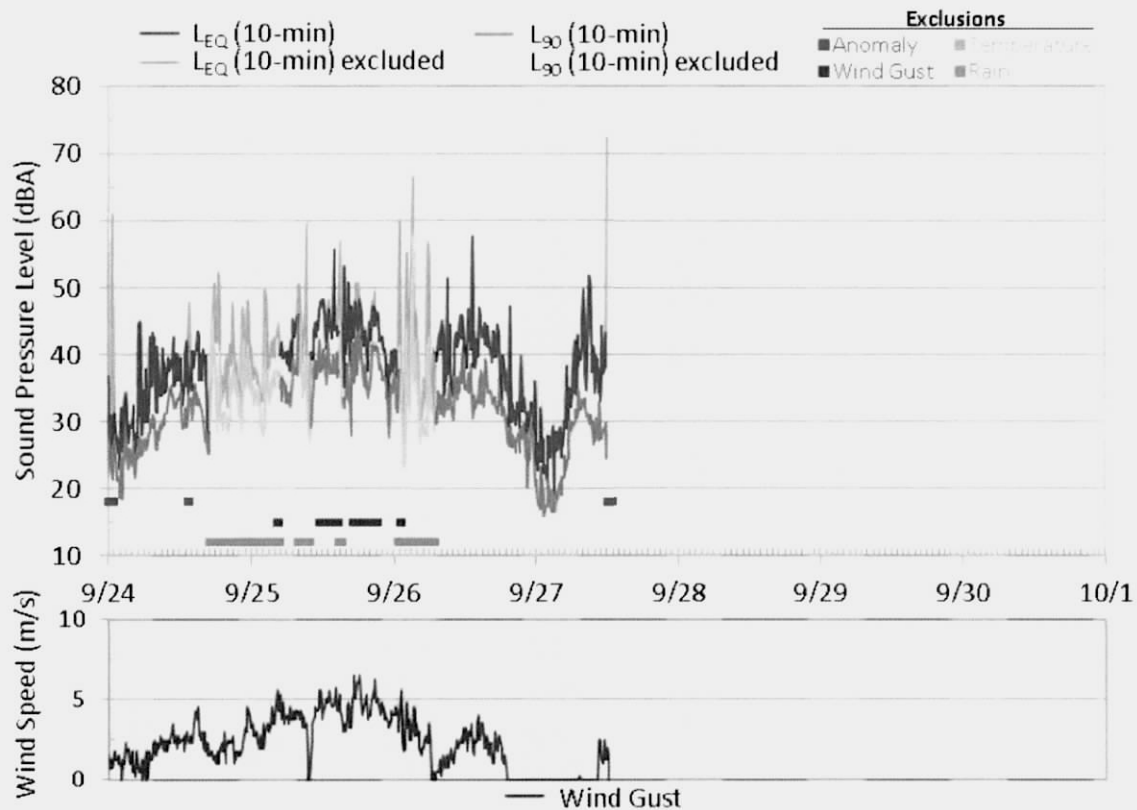


FIGURE 17: EASTERN MONITOR SOUND LEVEL TIME-HISTORY RESULTS - WEEK 3

Summary

A summary of background sound levels is shown in Table 1 and a summary of meteorological data is shown in Table 2. The windiest site is the middle site, with an average 1.5 meter wind speed of 0.6 m/s or 1.2 mph. Temperatures range between 6.4 and 34.3 °C (43.6 and 93.7 °F). Rain fell on September 18, 20, 24, and 25.

Results show that sound levels between the three sites are relatively consistent, particularly at night. All three locations were rural, with no major sound sources, other than traffic on nearby roads, which is an intermittent sound source. This can be seen by the relatively large differences between the L_{eq} s and L_{90} s for certain time periods. The arithmetic average of the nighttime L_{eq} s is 36 dBA.

TABLE 1: BACKGROUND SOUND LEVEL SUMMARY BY LOCATION

Monitor Location	Sound Pressure Level (dBA)											
	Overall				Day				Night			
	L _{eq}	L ₉₀	L ₅₀	L ₁₀	L _{eq}	L ₉₀	L ₅₀	L ₁₀	L _{eq}	L ₉₀	L ₅₀	L ₁₀
Middle Monitor	37	22	30	38	38	25	31	39	35	20	27	37
East Monitor	43	23	31	41	43	26	33	43	37	20	27	38
West Monitor	40	24	34	44	42	28	36	44	37	21	30	41
Arithmetic Average	36											

TABLE 2: METEOROLOGICAL DATA SUMMARY

Monitor Location	Wind Speed				Temperature					
	m/s		mph		Fahrenheit			Celsius		
	Max. Gust	Avg.	Max. Gust	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
Western	11.3	0.3	25.3	0.7	43.6	93.7	69.3	6.4	34.3	20.7
Middle	12.6	0.6	28.1	1.2	-	-	-	-	-	-
Eastern	9.1	0.2	20.3	0.6	-	-	-	-	-	-

4.0 ELECTRICAL TRANSMISSION LINE NOISE

Transmission lines, such as those proposed here, can generate noise during corona discharges. This occurs primarily in foul weather when water droplets form on the conductors. The types of foul weather that create the most audible noise are rain, fog, snow, and temperatures below the dew point. Dirty conductors can also lead to corona discharge.

Corona noise is generated through the discharge of electrons into neutral air molecules. These pulses occur randomly in time and space, generally resulting in a broadband noise spectrum. However, given that the peak voltage is synchronized with the supply voltage, there can also be a resultant pure tone at twice the supply frequency ($60 \text{ Hz} \times 2 = 120 \text{ Hz}$). Harmonics of this tone may also be present, but to a much lesser extent. For this study, we use a spectral shape based on the arithmetic average from three 525 to 534 kV power line corona noise measurements (Figure 18) which includes both broadband and tonal components.²

² From Chartier, V.L., and Stearns, R.D., "Formulas for predicting audible noise from overhead high voltage AC and DC lines," IEEE Transactions on Power Apparatus and Systems, Vol. PAS-100, No. 1, 1981.

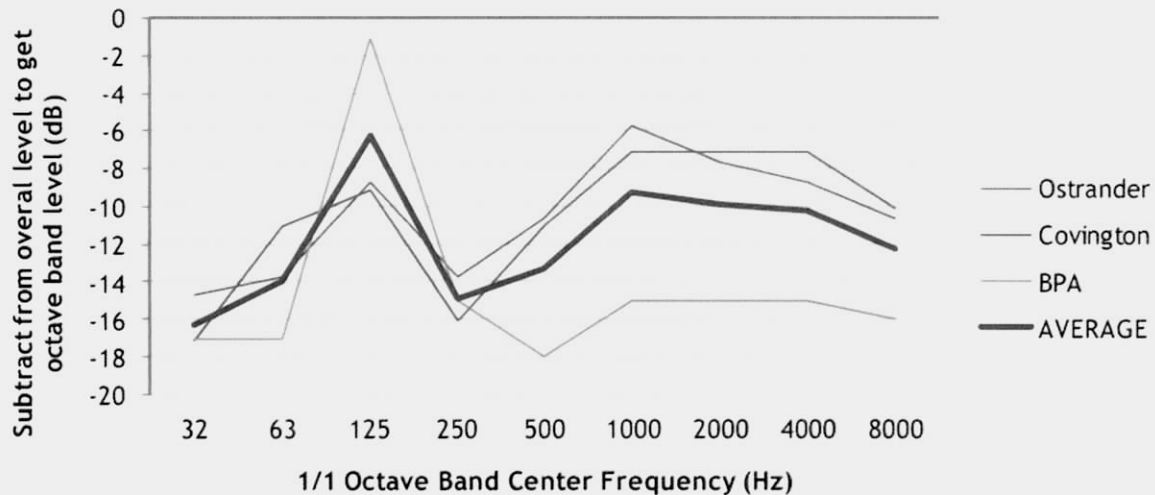


FIGURE 18: DIFFERENCE BETWEEN OVERALL LEVEL AND OCTAVE BAND LEVEL FOR THREE SITES, IN UNWEIGHTED dB

4.1 PREDICTING AUDIBLE NOISE FROM TRANSMISSION LINES

Methodology

Predicting audible noise from overhead power lines has been done primarily through empirical formulas based on measurements of existing power lines. In a 2000 review of ten empirical equations,³ the "BPA formula"⁴ was found to be the most accurate. This equation is as follows:

$$AN = 120 \log(g) + 26.4 \log(n) + 55 \log(d) - 11.4 \log(r) - 128.4 + K$$

Where

AN is the 50th percentile audible noise level (L_{50}) in dB(A) for foul weather

g is the average maximum bundle surface electric field gradient in kV/cm

n is the number of conductors per bundle

d is the sub-conductor diameter, and

r is the distance between the bundle and the observer

³ Yang, K, Lee, D., "New formulas for predicting audible noise from overhead HVAC lines using evolutionary computations," IEEE Transactions on power delivery, Vol. 15, No. 4, 2000

⁴ Chartier and Stearns (1981) (see above). See also IEEE Committee Report, "A comparison of methods for calculating audible noise of high voltage transmission lines," IEEE Trans., Vol PAS-101, 1982

$K = 0$ for L_{50} in foul weather, -25 for L_{50} in fair weather, $+3.5$ for L_{50} in heavy rain, and $A/0.3$ for high altitudes, where A is the altitude above sea level in kilometers.

The total audible noise is the sum of audible noise from each conductor bundle.

For a typical line source, the distance term is $-10 \log(r)$. The use of $-11.4 \log(r)$ in the BPA formula is to take into account the effects of atmospheric absorption, which, at the time, was a difficult calculation to make. However, since we can now accurately calculate atmospheric absorption using ISO 9613-1,⁵ we chose to replace the BPA $-11.3 \log(r)$ with $-10 \log(r) - A_{\text{atm}}$, where A_{atm} is the atmospheric attenuation (by octave band) for 10°C , 1 atmosphere, and 70% humidity as a function of distance to the receiver.

For this project, we assumed the average normal conductor height above ground per phase.

⁵ "Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere," ISO 9613-1, 1993.

5.0 SOUND PROPAGATION MODELING

5.1 PROCEDURES

Modeling for the project was in accordance with the standard ISO 9613-2, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." The ISO standard states,

This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level ... under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation ... or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The model takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain. The acoustical modeling software used here was CadnaA®, from Datakustik GmbH. CadnaA® is a widely accepted acoustical propagation modeling tool, used by many noise control professionals in the United States and internationally.

ISO 9613-2 also assumes downwind sound propagation between every source and every receiver, consequently, all wind directions, including the prevailing wind directions, are considered.

The sound sources modeled for this project are the transmission lines, except in the cumulative case where turbines for the Republic Wind project are included along with the collector substation transformer. The Point of Interconnect (POI) substation includes breakers, relays, a control building, batteries, and current transformers. Breakers rarely emit sound and the other equipment is not expected to be a major sound source. As a result, no equipment in the POI substation is modeled.

5.2 RESULTS

Modeling results for all three proposed power line routes are shown in Figures 19 to 21.

Modeling results show the maximum corona noise for the new 138 kV transmission line, under foul weather, was 29 dBA right under the power line and 23 dBA at 34 meters, the approximate distance of the closest receiver for each route. For reference the nighttime background L_{eq} measured for the three monitoring sites described above was 36 dBA and 35 dBA at the

quietest location. This indicates that corona sound levels will be below the background sound levels at most, if not all, locations.

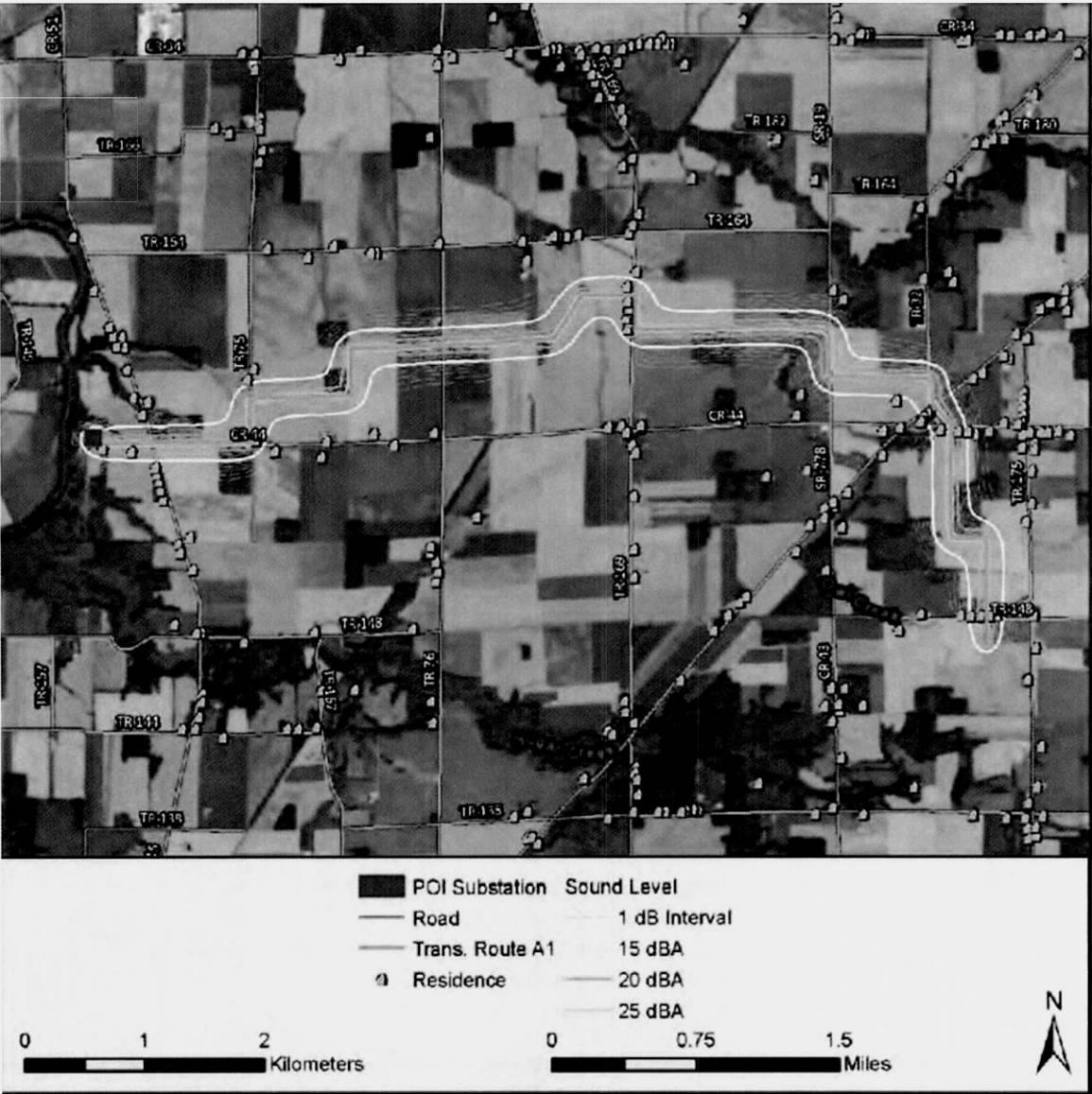


FIGURE 19: SOUND PROPAGATION MODELING RESULTS - ROUTE A1

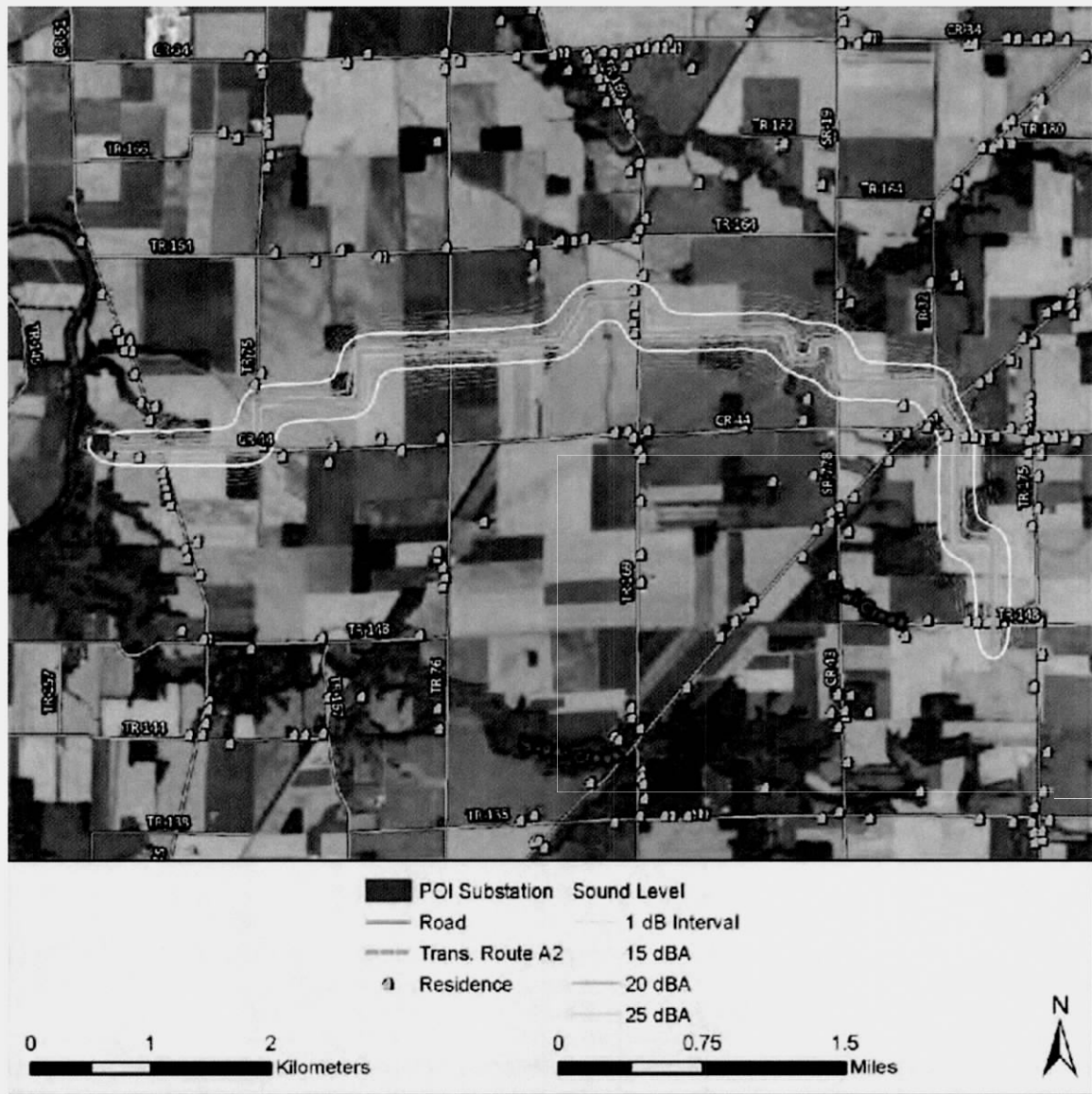


FIGURE 20: SOUND PROPAGATION MODELING RESULTS - ROUTE A2

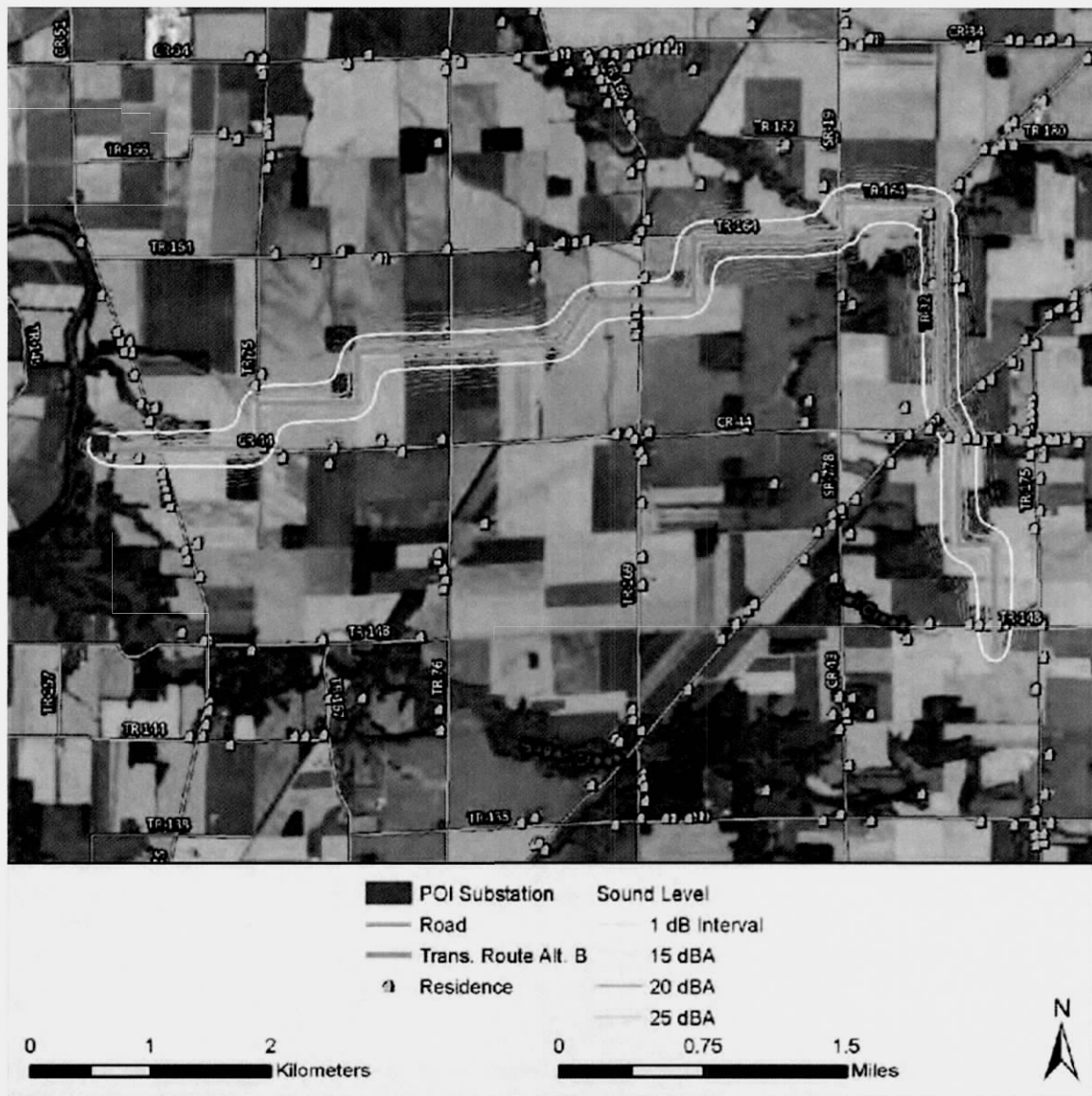


FIGURE 21: SOUND PROPAGATION MODELING RESULTS - ROUTE ALT. B

5.3 CUMULATIVE

Cumulative sound propagation modeling was performed to include the proposed Republic Wind power project, along with the proposed transmission line. Modeling was performed, assuming the turbine array presented in RSG's December 2018 report *Noise Impact Assessment for Republic Wind – Seneca and Sandusky County, Ohio*. The turbine modeled was the worst-case presented in that report, the Siemens-Gamesa SG4.5-145, with the same Noise Reduced

Operations (NROs) implemented. A graphic of the sound propagation modeling results is shown for Route A1 in Figure 22 and the other routes are shown in Figures 33 and 34 in Appendix D. Discrete modeling results are also shown in Table 6 of Appendix D.

Results indicate that, with the transmission line included, the highest sound level at a nonparticipating residence is 46 dBA, which is the sound level limit for the Republic Wind project.

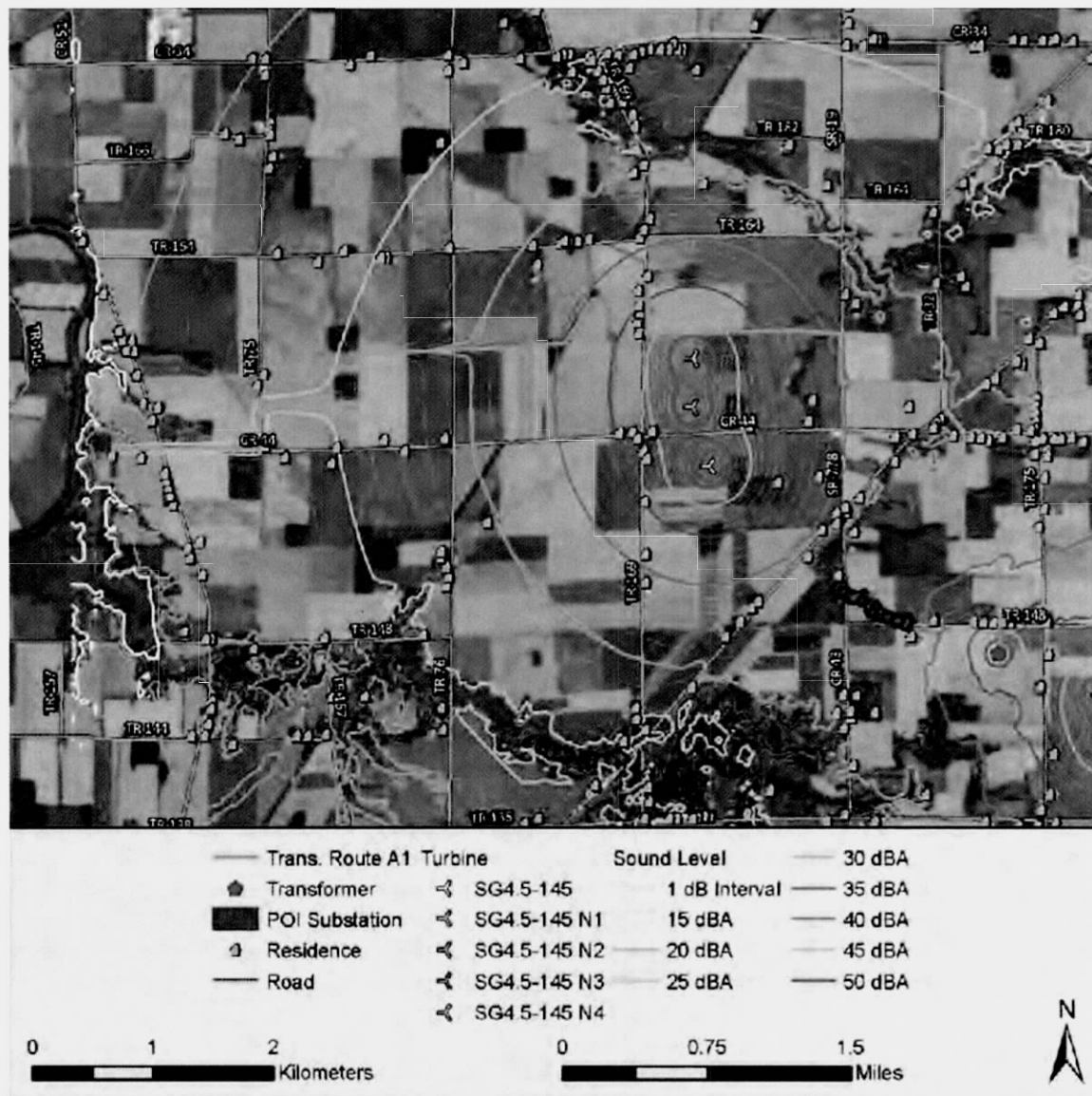


FIGURE 22: CUMULATIVE SOUND PROPAGATION MODELING RESULTS - ROUTE A1, SIEMENS-GAMESA SG4.5-145 TURBINES

6.0 CONSTRUCTION NOISE MODELING

Construction will be located at the Point of Interconnect (POI) substation and along the transmission line route. Most construction along the route of the transmission line will be relatively brief, involving installation of poles and conductors.

Equipment used for construction will vary. We modeled the 28 loudest sound sources that are expected to be used. These are shown in Table 3 along with the modeled maximum sound pressure level at 34 meters or 112 feet (the closest residence to the transmission line), 25 meters or 82 feet (the closest residence to the POI substation), reference sound levels at 15.2 meters (50 feet), and at 257 meters or 842 feet (the distance of the next closest residence to the POI substation).

The method used for modeling construction noise impacts is the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM). The sound levels shown below are those typically used within the RCNM, unless RSG has measured a sound source of that type. Ground was assumed to be non-porous near the sound sources and porous near the receivers.

Major construction work, such as drilling, will occur during the day. Some construction activity such as extended concrete pours, and minor construction work may extend earlier or later. Construction is expected to be intermittent.

Work on the POI substation will be at least 25 meters (82 feet) from the nearest residence.

TABLE 3: CONSTRUCTION NOISE MODELING RESULTS

Equipment Type	Sound Pressure Level (dBA)			
	50 feet (15.2 meters)	82 feet (25 meters)	112 feet (34 meters)	842 feet (257 meters)
Loader	79	75	72	49
Backhoe	80	76	73	51
Auger Drill Rig	88	84	80	59
Bucket Truck	78	74	70	48
Cable Tensioner	80	76	72	50
Chain Saw	85	81	77	56
Compactor	82	78	74	53
Concrete Mixer	85	81	78	56
Concrete Pump	82	78	75	53
Crane	88	84	81	59
Dozer	85	81	78	56
Drill Rig	88	84	81	59
Excavator	83	79	76	54
Generator	81	77	74	52
Gradall	86	82	79	57
Grader	77	72	70	47
Hydro Mulcher	78	74	70	48
Impact Pile Driver	101	97	94	72
Jackhammer	89	85	81	60
Rock Drill	98	94	91	69
Roller	80	76	73	51
Forklift	68	64	61	39
Scraper	89	85	82	60
Slurry Machine	91	87	84	62
Small Track Crane	87	83	80	58
Tractor Trailer	83	79	75	53
Utility Truck	78	74	70	48
Vacuum Excavator	85	81	78	56

7.0 SUMMARY AND CONCLUSIONS

The Republic Wind project is a wind power project proposed by Apex Clean Energy, to be located in Seneca and Sandusky County, Ohio, between the towns of Bellevue and Republic. The project is proposed to have between 50 and 58 turbines and a nameplate capacity of at least 200 MW. To support the project, there will be a collector substation, transmission line, and Point of Interconnect (POI) substation. The proposed transmission line will be 138 kV and will span the approximately 7.6 kilometer (4.8 mile) distance between the collector and Point of Interconnect (POI) substation.

As part of the Ohio Power Siting Board (OPSB) permitting process, Apex Clean Energy retained RSG to conduct a pre-construction noise assessment of the transmission line.

Conclusions are as follows:

- The sound level limit specified in Ohio Administrative Code Section 4906-4-09(F) for wind power facilities has set the applicable nighttime noise limit at a home to 5 dBA above the facility area nighttime ambient sound levels (L_{eq}). This is not directly applicable to electrical transmission lines. There are no sound level limits applicable to electrical transmission lines. Instead, requirements in Ohio Administrative Code Chapter 4906-5 Section (7)(A)(4) focus on what needs to be taken into account by noise studies.
- Background sound level monitoring was performed at three locations along the proposed power line routes. Daytime and nighttime equivalent continuous sound levels (L_{eq}) ranged from 38 to 43 dBA and 35 to 37 dBA respectively. Daytime and nighttime lower tenth-percentile sound levels (L_{90}) ranged from 25 to 38 dBA and 20 to 21 dBA respectively.
- Sound propagation modeling was performed in accordance with international standard ISO 9613-2 at 623 discrete receivers that surround the project. Transmission line sound emissions were determined using the BPA formula for audible corona noise. Modeling was performed assuming half hard and half porous ground ($G=0.5$). Three total transmission line routes were modeled: A1, A2, and Alt. B. The breakers in the POI substation will only intermittently emit sound and no other major noise sources are expected to be located in the POI substation.
- The highest modeled sound level at any residence from the transmission line alone is 23 dBA. If Republic Wind power project is included in modeling, the highest sound level at any residence is modeled to be 46 dBA.
- Other than extended concrete pours and similar events, major construction will take place during normal business hours. Construction activities that increase sound

above ambient levels at sensitive receptors will be limited to the hours of 7 AM to 7 PM or dusk, whichever is later. Extended duration construction will only occur in and around the Point of Interconnect (POI) substation. Construction for pole placements and conductor installation will be short duration.

APPENDIX A. ACOUSTICS PRIMER

This report uses a variety of terms used to describe sound levels. Since sound can have many characteristics, there are many different ways to describe sound.

A.1 | SOUND AS A WAVE

Sound is the rapid oscillation of particles in any medium. Using this definition, the sound we experience day-to-day is the rapid vibration of air that we can sense with our ears. However, sound can also propagate through solids such as steel, rock, or wood and through liquids such as water.

Through air, sound propagates as a compression wave. That is, sound travels as fluctuations of air pressure above and below the atmospheric pressure. Sound can also be described in terms of vibrating of air particles where, at certain points along the wave, air particles are compressed and, at other points, the air particles are spread out.

Figure 23 illustrates two ways of describing sound. The blue section at the bottom shows an example of a compression wave, with air particles represented in blue. The green at the top of the figure shows a transverse wave. A transverse wave is similar to a vibrating string. While sound does not physically propagate as a transverse wave, the transverse wave can be used to describe the two main properties of waves in general: amplitude and wavelength.

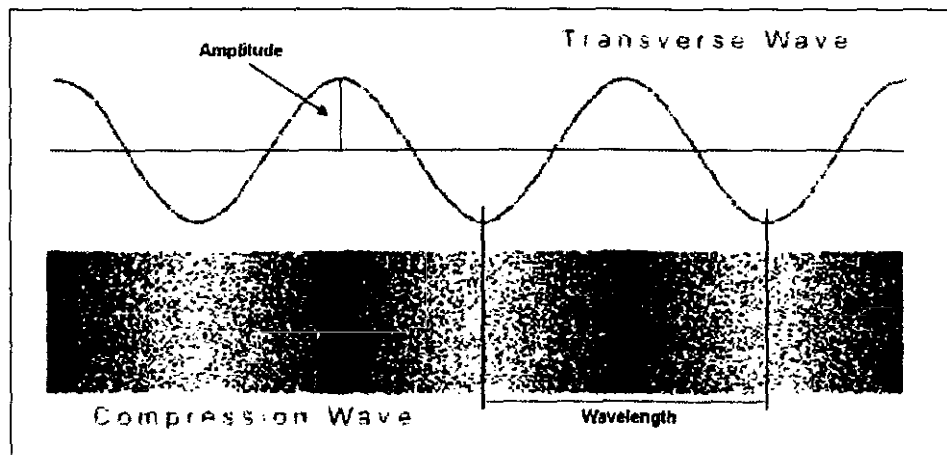


FIGURE 23: SOUND AS A WAVE

In reference to sound, amplitude is what we perceive as the sound pressure level or how loud a source is. The higher the amplitude of the sound wave, the louder it is. Physically, sound amplitude is a measure of the extent to which the air pressure, due to a sound wave, fluctuates

above and below atmospheric pressure. In terms of the compression wave shown in Figure 23, amplitude is expressed by how compressed or spread out the air particles are at the various points along the sound wave.

Wavelength is the distance between two maximum compression locations in a sound wave. One wavelength is one complete cycle of the sound wave. Wavelength is important because it is directly related to the frequency of the sound, which is what the human ear perceives as pitch. Sounds with longer wavelengths are lower in frequency, and shorter wavelengths are higher in frequency. Frequency is dealt with in greater depth in Section A.3 | Spectral Sound Levels.

A.2 | SOUND PRESSURE LEVEL

The level of a sound is typically quantified by the pressure it exerts. The air pressures from sound that humans can hear range from 20 μPa to over 10,000,000 μPa . In order to scale the range down and better approximate the human perception of relative loudness, we use a logarithmic scale for sound pressure level. The unit used for the logarithmic scale is the decibel (dB).

The lower threshold of human hearing is 0 dB at 1000 Hz and the threshold of pain is around 130 dB. A typical conversation in a room is between 50 and 60 dBA ("dBA" indicates that these levels are A-weighted. A-weighting is discussed in Section A.3 | Spectral Sound Levels).

Sound is difficult to describe in individual instantaneous measurements, which gives the sound pressure level at an exact moment in time. The level reading could be 62 dB, but a second later it could be 57 dB. Sound pressure levels are constantly changing. It is for this reason that it makes sense to describe sound levels over time.

Take as an example, the sound levels measured over time shown in Figure 24. Instantaneous measurements are shown as a ragged grey line. The sound levels that occur over this time can be described verbally, but it is much easier to describe the recorded levels statistically. This is done using a variety of "levels" which are described below.

L_{\min} and L_{\max}

L_{\min} and L_{\max} are simply the minimum and maximum sound level, respectively, monitored over a period of time. Note that "maximum" is not the same as "peak". Peak levels have a different meaning, which is more applicable to sounds which can create hearing damage, which is not dealt with here.

Percentile Sound Level - L_N

L_N is the sound level exceeded N percent of the time. This type of statistical sound level, also shown in Figure 24, gives us information about the distribution of sound levels. For example, the L_{10} is the sound level that is exceeded 10 percent of the time, while the L_{90} is the sound level

exceeded 90 percent of the time. The L50 is the median and is exceeded half the time. The L90 is often described as the “residual” level, describing a condition when most short-term contaminating sources are removed.

Equivalent Continuous Sound Level - L_{EQ}

One of the most common ways of describing noise levels is in terms of the equivalent continuous sound level (L_{EQ}). The L_{EQ} is the average of the sound *pressure* over an entire monitoring period and expressed as a decibel:

$$Leq_T = 10 * \log_{10} \left(\frac{1}{T} \int_0^T p_A^2(t) dt / p_0^2 \right)$$

where p_0^2 is the squared instantaneous weighted sound pressure signal, as a function of elapsed time t , p_0 is the reference pressure of 20 μ Pa, and T is the stated time interval.

The monitoring period, T , can be for any amount of time. It could be one second ($L_{eq \text{ 1-sec}}$), one hour ($L_{eq(1)}$), or 24 hours ($L_{eq(24)}$). Because L_{EQ} is a logarithmic function of the average pressure, loud and infrequent sounds have a greater effect on the resulting L_{EQ} than quieter and more frequent sounds. For example, in Figure 24, the L_{50} (median) is about 47 dB, but the L_{eq} is 53 dB. Because it tends to weight the higher sound levels and is representative of sound that takes place over time, the L_{EQ} is the most commonly used descriptor in noise standards and regulations.

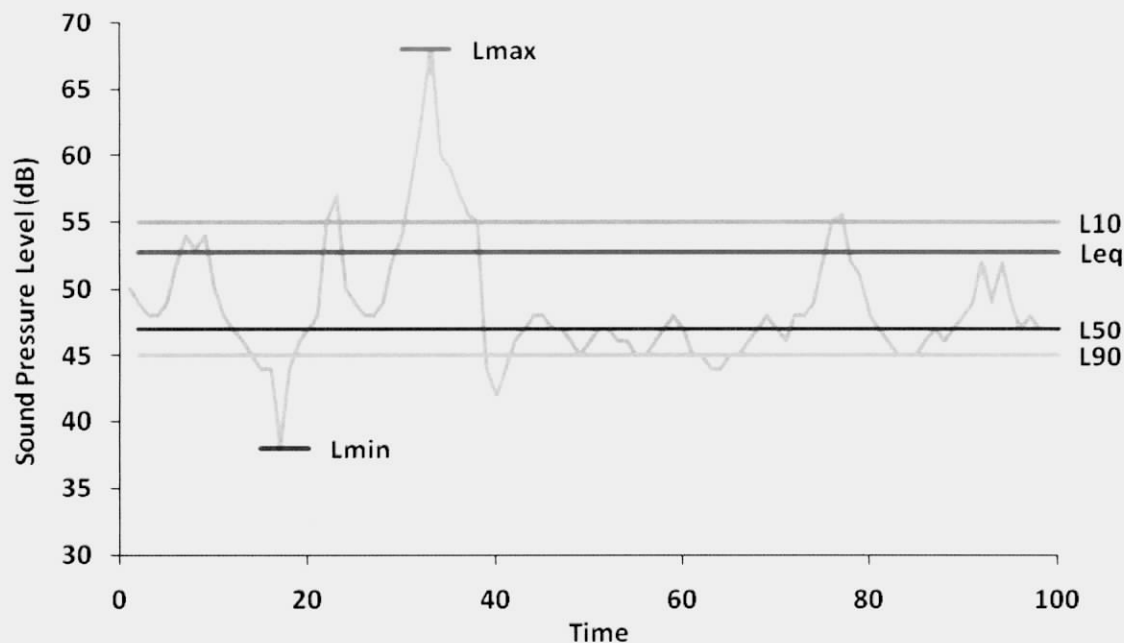


FIGURE 24: EXAMPLE OF DESCRIPTIVE TERMS OF SOUND MEASUREMENT OVER TIME

A.3 | SPECTRAL SOUND LEVELS

As previously stated, frequency is inversely related to wavelength. The unit used for frequency is cycles per second or hertz (Hz). The relationship between wavelength and frequency is dependent on the speed of sound.

$$\lambda = \frac{c}{f}$$

where λ is wavelength, c is the speed of sound, and f is frequency.

Figure 25 shows corresponding wavelengths and frequencies for sound in air at 68°F. People can generally hear sounds at frequencies between 20 and 20,000 Hz (also designated as 20 kHz). As shown, wavelengths in the range of human hearing vary considerably from 56 feet at 20 Hz, to less than an inch at 20 kHz.

Sound below 20 Hz is known as infrasound. Sometimes, we can perceive frequencies below 20 Hz, but that is typically due to our sense of vibration rather than hearing or if the levels are very high. Infrasound wavelengths are very long, with sound at 1 Hz having a wavelength of just over 1,000 feet. Sound above 20 kHz is called ultrasound and is not perceptible by the human ear.

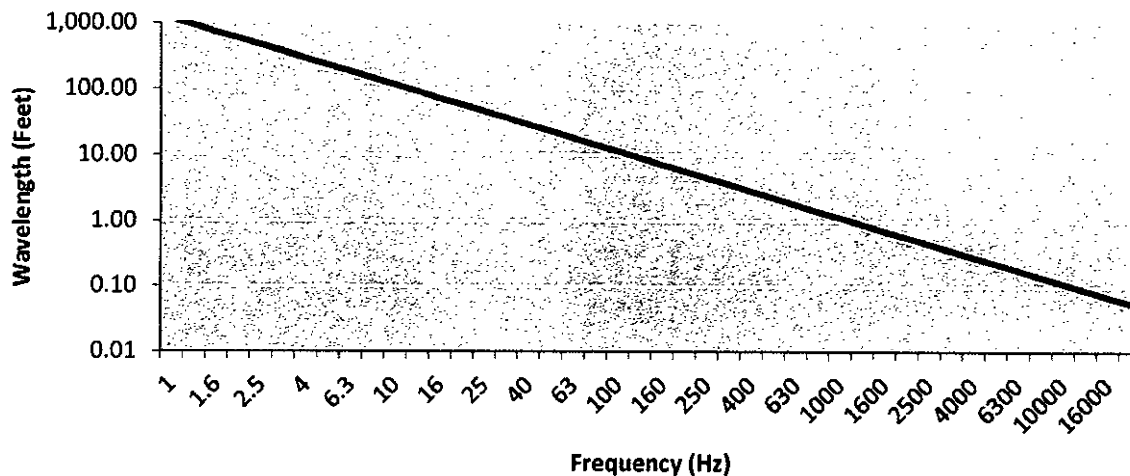


FIGURE 25: RELATIONSHIP BETWEEN FREQUENCY AND WAVELENGTH

Most sources are complex and composed of a wide range of frequencies at different sound levels. The range of frequencies and their corresponding sound levels is called a frequency spectrum.

Some sources are tonal, like the individual notes on a piano. Others are broadband, like fans. Human speech typically occurs between 200 Hz and 5 kHz.

Octave Bands

For analysis purposes, sound is typically broken down into different frequency divisions, or bands. The most common division is the standard octave band. An octave is a band of frequencies whose lower frequency limit is half of the upper frequency limit. An octave band is identified by its center frequency. As an example, the 500 Hz octave band contains all frequencies between 360 Hz and 720 Hz. An octave higher would be twice this. That is, it would be centered at 1,000 Hz with a range between 720 and 1,440 Hz. The range of human hearing is divided into 10 standardized octave bands: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz. For analyses that require even further frequency detail, each octave band is often broken down into parts, such as 1/3 octave bands.

Frequency Weighting

As previously mentioned, sound pressure levels are expressed in terms of decibels. Since the human ear is not sensitive to all frequencies equally, some frequencies, despite being the same decibel level, seem louder than others. For example, a 500 Hz tone at 80 dB sounds louder than a 63 Hz tone at 80 dB. For this reason, frequency weightings are applied to sound levels (Figure 26). The most common weighting scale used in environmental noise analysis is the A-weight,

which more accurately represents the sensitivity of the human ear at low to moderate sound energy. An A-weighted sound level is usually denoted with the unit dBA or dB(A).

The C-weighting is often used for high-energy sounds such as explosions. It weights low-frequency sounds more than the A-weighting. The Z-weighting is used to designate no weighting.

Recently, a new weighting has been proposed – the ANS weighting.⁶ This is the A-weighted sound level with all sound above 1,250 Hz eliminated. This weighting is intended to be used to filter out biogenic sound that occurs at high frequencies, such as insects and birds.

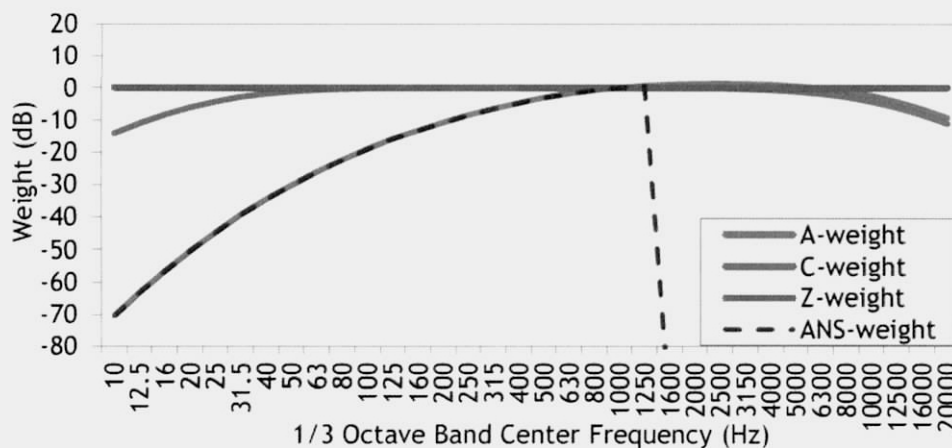


FIGURE 26: SOUND WEIGHTING SCHEMES

A.4 | SOUND LEVEL METER RESPONSE

As noted in Section 0.2, sound levels vary over time. In fact, the variation is so fast, that one would not be able to reliably read the level on a sound level meter. For that reason, the level shown on sound level meters is often subject to exponential time response, which dampens the reading shown on the meter display to make it readable.

There are three responses available on most sound level meters: slow, fast, and impulse. These levels are denoted as L_s , L_f , and L_i , respectively. These may also be designated with a weighting, such as L_{Af} for A-weighted fast-response level. Fast response has a time constant of 125 ms. This response is similar to the response of the human ear. The slow response has a time constant of 1 second. This is often used in environmental noise measurement in that it has a slow rise and fall time, which eliminates very short spikes in noise that are not related to the measurement. The impulse response has a very fast rise time of 35 ms and a slow decay time

⁶ *Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas - ANSI S12.100-2014*, Melville, NY: American National Standards Institute, Inc., 2014.

of 1.5 seconds. It is rarely used in environmental noise measurements, but can be used with other metrics to evaluate the impulsivity of a sound event.

Fast, slow, and impulse sound levels cannot be averaged, since they are not representative of the actual sound level over time – they are simply applied to the actual sound level to slow the meter reading. So, an integration of fast, slow, or impulse sound levels will not give an accurate representation of the energy average sound level over time. However, percentiles can be used when this is needed. A true energy average, or equivalent average sound level can be calculated using the L_{EQ} metric, which is independent of the sound level meter response setting.

APPENDIX B. MODELING INFORMATION

TABLE 4: SOUND PROPGATION MODELING PARAMETERS

Parameter	Setting
Ground Absorption	Spectral for all sources, Mixed Ground (G=0.5)
Atmospheric Attenuation	Based on 10 Degrees Celsius, 70% Relative Humidity
Reflections	None
Receiver Height	4 meters for residences, 1.5 meters for grid
Search Distance	10,000 meters

APPENDIX C. RECEIVER INFORMATION

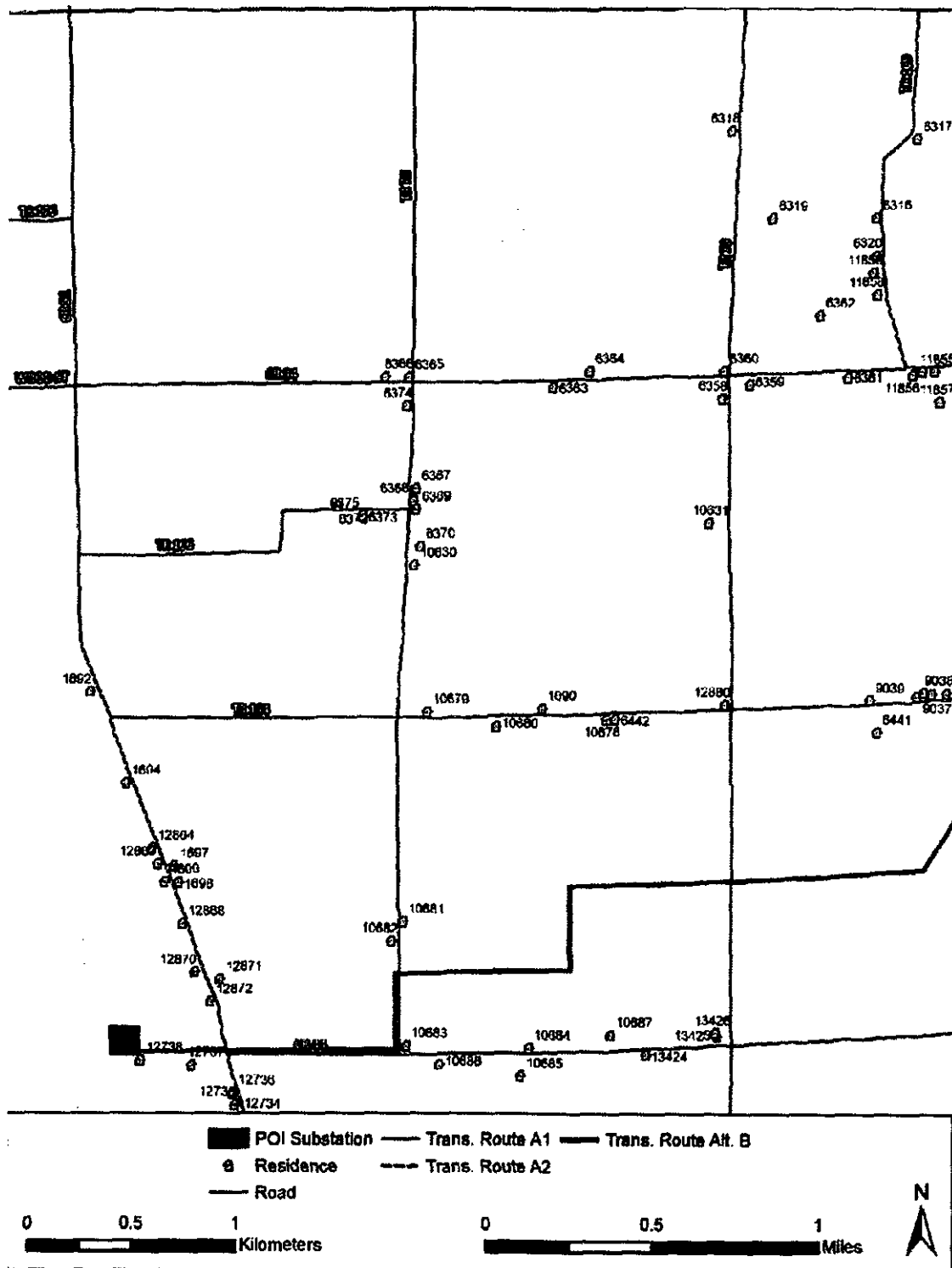


FIGURE 27: MODELED RECEIVERS - NORTHWEST CORNER



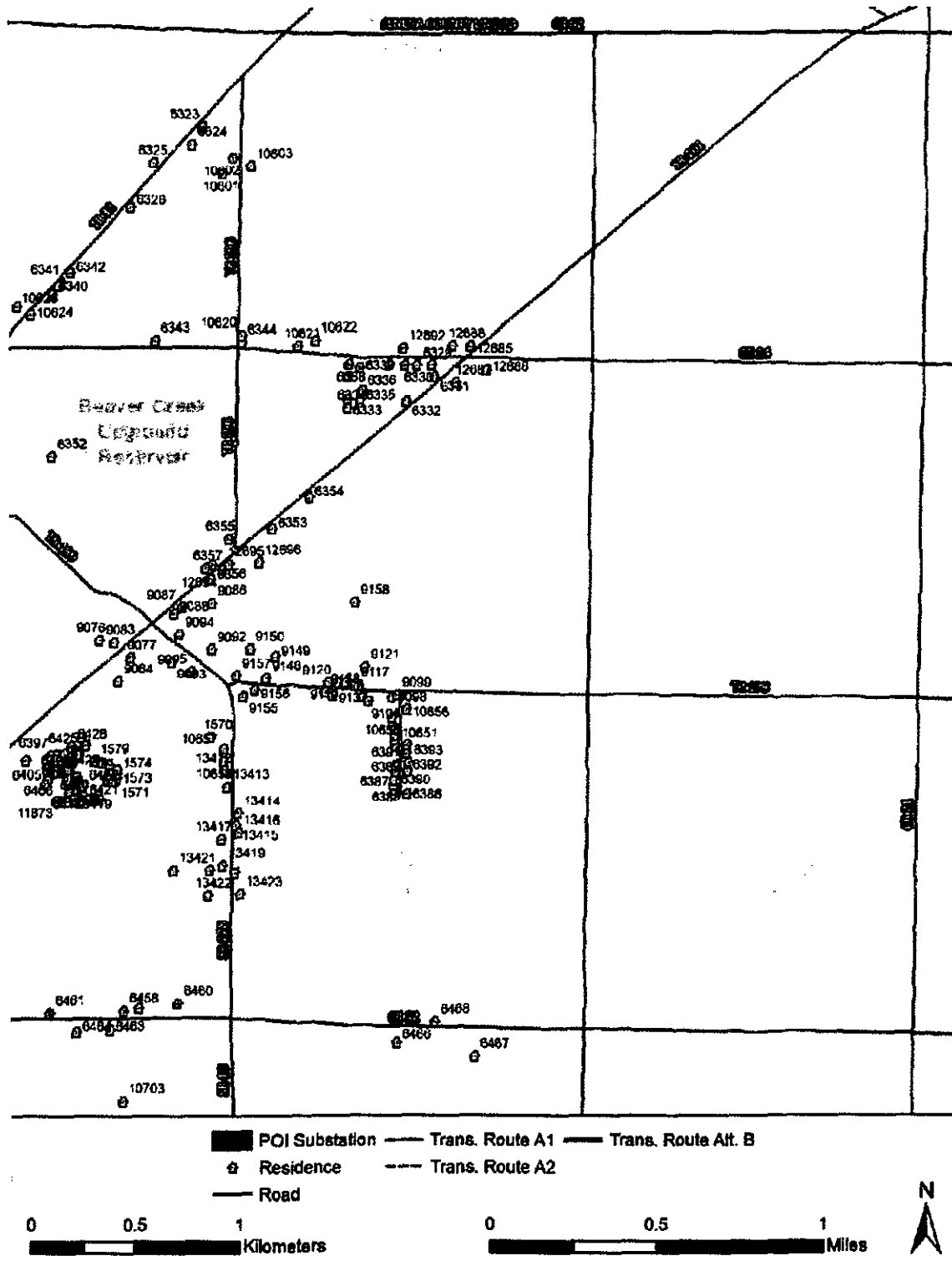


FIGURE 29: MODELED RECEIVERS - NORTHEAST CORNER

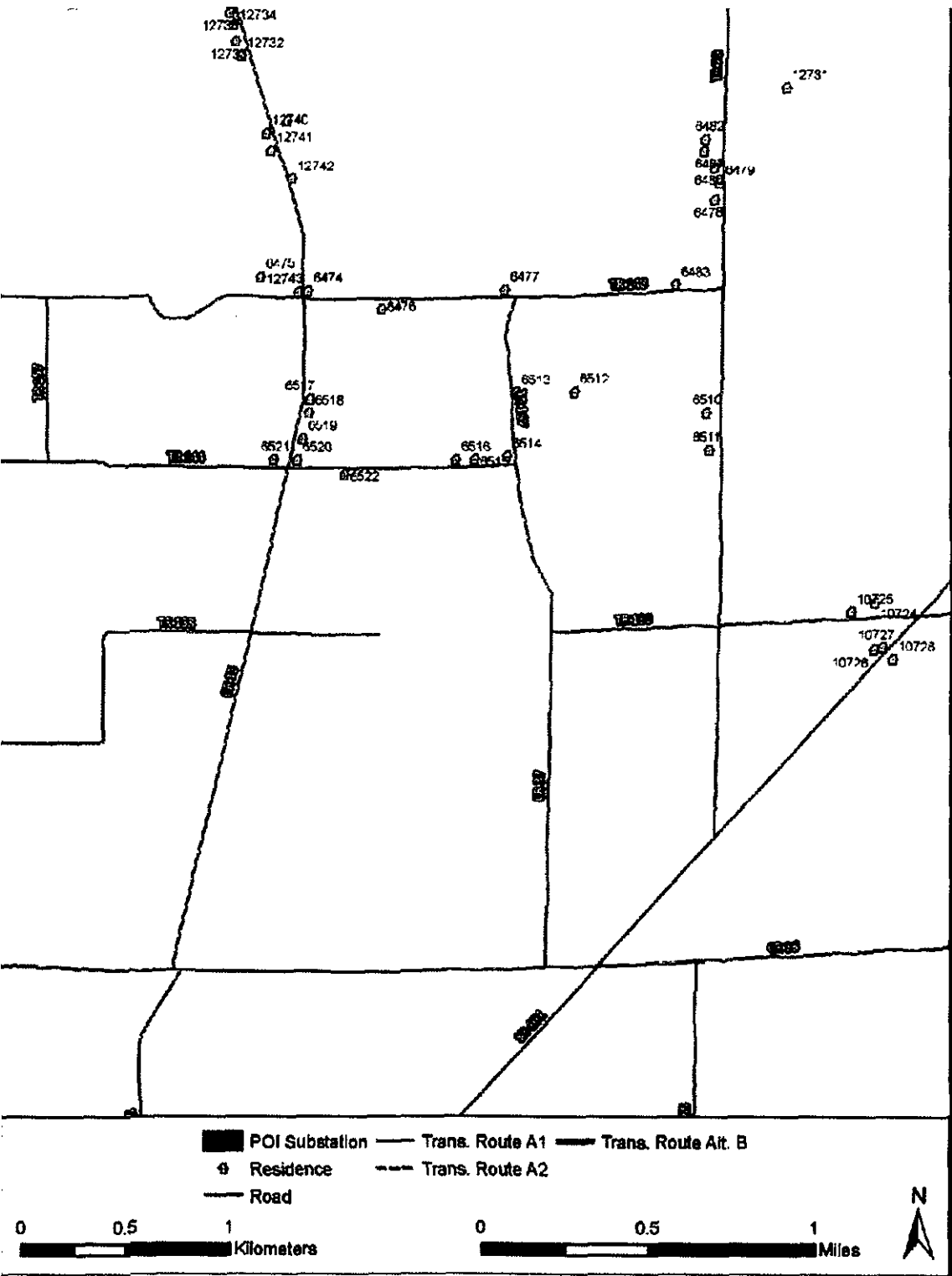


FIGURE 30: MODELED RECEIVERS - SOUTHWEST CORNER

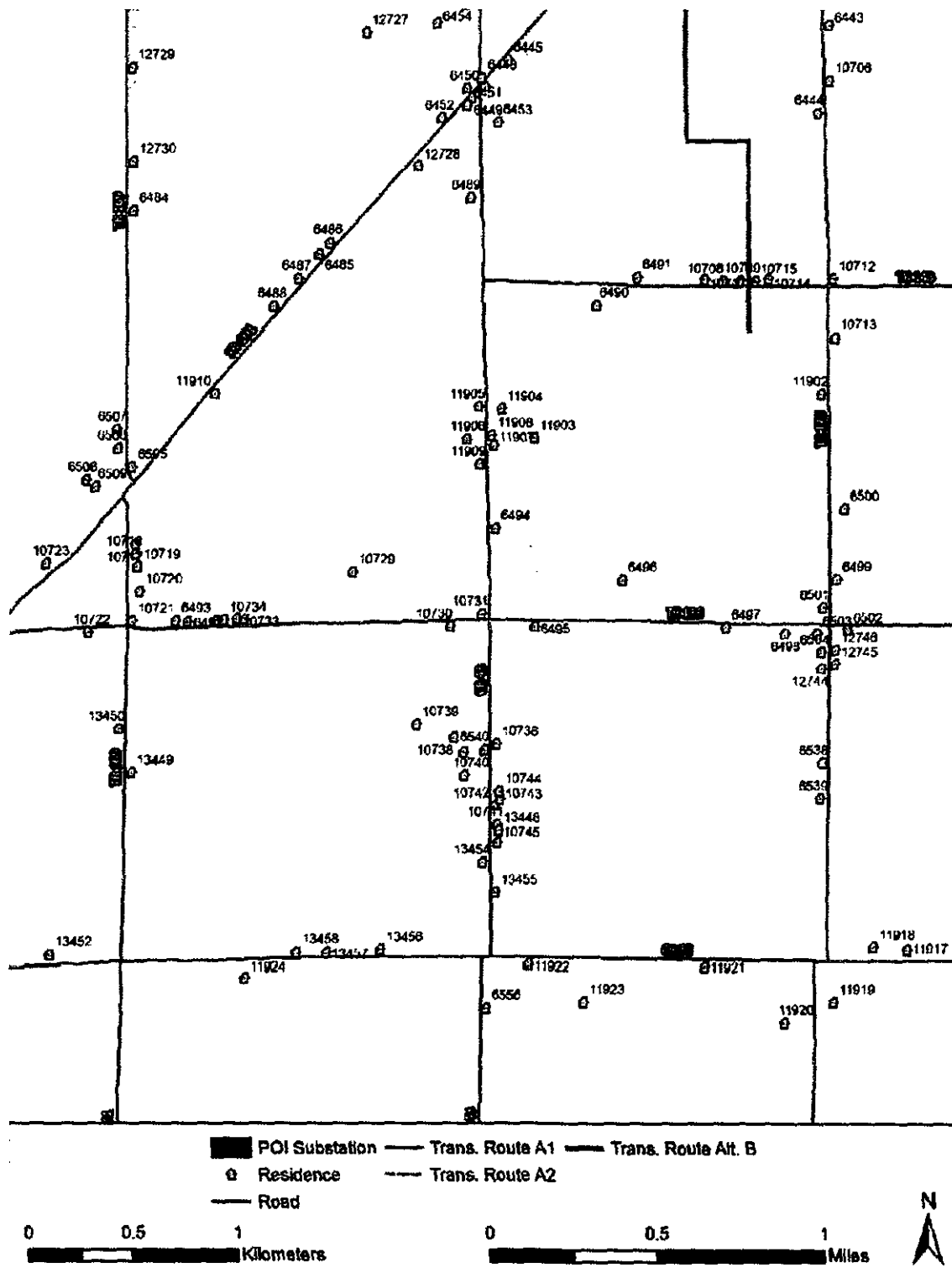


FIGURE 31: MODELED RECEIVERS - CENTER SOUTH

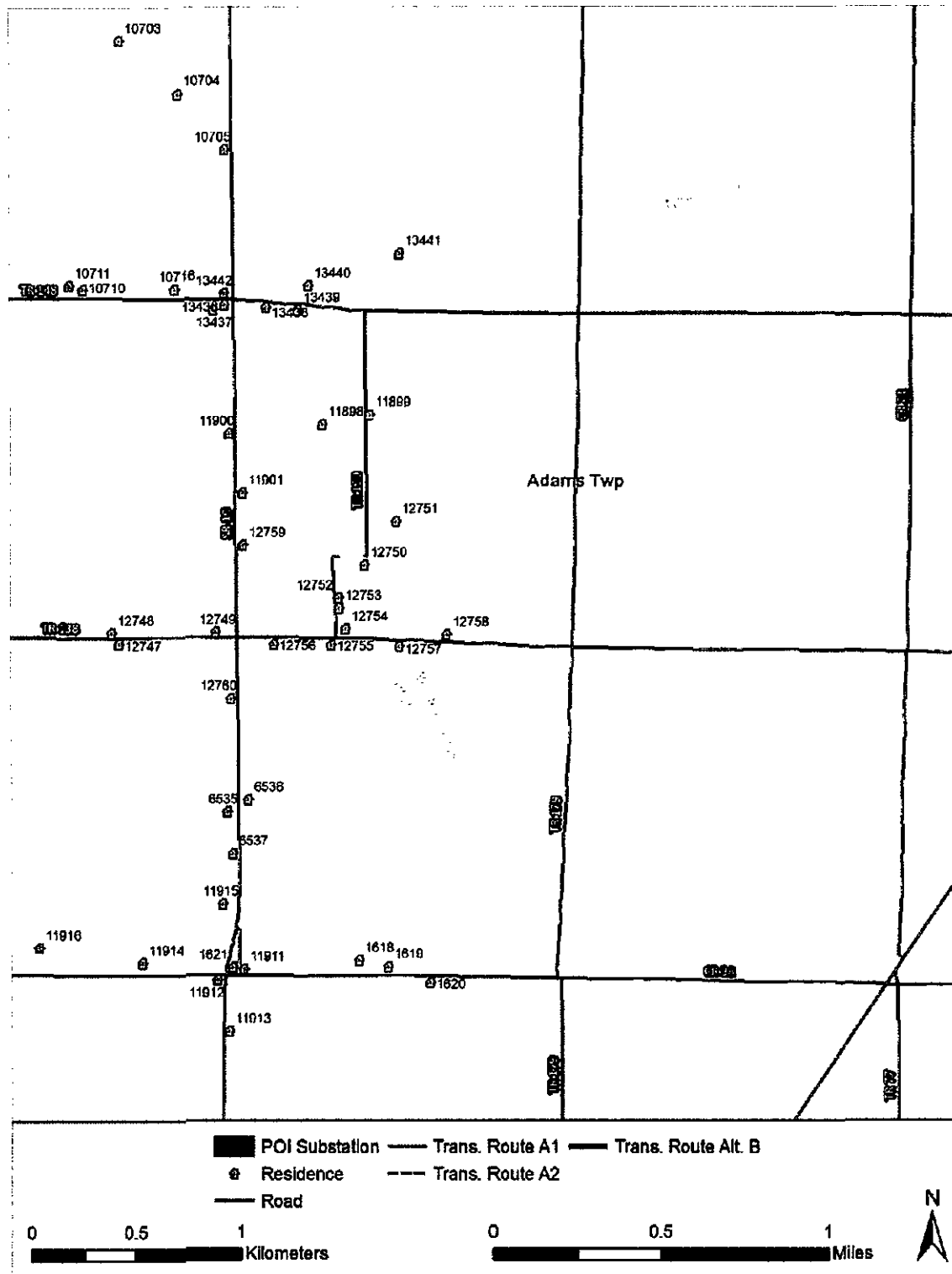


FIGURE 32: MODELED RECEIVERS - SOUTHEAST CORNER

TABLE 5: DISCRETE RECEIVER SOUND PROPAGATION MODELING RESULTS – TRANSMISSION LINE OPERATIONAL SOUND

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
1557	0	0	0	4	553576	175421	220
1558	0	0	0	4	553575	175473	219
1559	0	0	0	4	553498	175461	220
1560	0	0	0	4	552797	175257	219
1561	0	0	0	4	552191	175058	217
1562	0	0	0	4	552306	174887	219
1563	0	0	0	4	552147	175058	217
1564	0	0	0	4	552111	175106	216
1565	0	0	0	4	552072	175059	216
1566	0	0	0	4	552010	175060	216
1567	0	0	0	4	551915	175053	216
1568	0	0	0	4	551849	175039	216
1569	0	0	0	4	551784	175014	216
1570	0	0	0	4	556696	173215	242
1571	0	0	0	4	556238	173009	244
1572	0	0	0	4	556248	173020	244
1573	0	0	0	4	556248	173042	244
1574	0	0	0	4	556251	173061	243
1575	0	0	0	4	556213	173085	242
1576	0	0	0	4	556180	173093	241
1577	0	0	0	4	556164	173096	241
1578	0	0	0	4	556147	173103	240
1579	0	0	0	4	556142	173103	240
1580	0	0	0	4	556200	173022	243
1581	0	0	0	4	556204	173011	243
1582	0	0	0	4	556225	173002	243
1583	9	9	7	4	553969	171821	234
1584	10	12	2	4	553280	172133	227
1585	4	4	6	4	555027	172433	242
1586	4	4	6	4	554980	172451	240
1587	6	6	8	4	554802	172311	241
1588	9	9	10	4	554724	172264	241

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
1589	3	3	4	4	555145	172145	242
1590	4	4	5	4	555135	172082	242
1591	4	4	4	4	555144	172024	242
1592	4	4	4	4	555143	171952	242
1593	5	5	5	4	555128	171896	241
1594	5	5	5	4	555095	171880	241
1595	7	7	7	4	554982	171888	241
1618	0	0	0	4	557406	167057	256
1619	0	0	0	4	557546	167027	255
1620	0	0	0	4	557748	166949	252
1621	0	0	0	4	556800	167023	255
1690	2	2	2	4	549358	173377	215
1692	0	0	0	4	547181	173454	213
1694	0	0	0	4	547351	173011	214
1697	0	0	0	4	547583	172615	214
1698	1	1	1	4	547603	172536	214
1699	2	2	2	4	547536	172539	214
5987	0	0	0	4	553627	176080	220
5988	0	0	0	4	553630	176094	220
5989	0	0	0	4	553653	176134	220
5990	0	0	0	4	553570	176048	219
5991	0	0	0	4	553583	176089	219
5992	0	0	0	4	553591	176125	220
5993	0	0	0	4	553603	176153	220
5994	0	0	0	4	553624	176208	220
5995	0	0	0	4	553647	176231	220
5999	0	0	0	4	553672	176168	220
6000	0	0	0	4	553693	176232	220
6033	0	0	0	4	553511	175851	218
6034	0	0	0	4	553508	175815	218
6316	0	0	0	4	550968	175753	212
6317	0	0	0	4	551163	176130	211
6318	0	0	0	4	550270	176164	211

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6319	0	0	0	4	550467	175749	210
6320	0	0	0	4	550967	175570	214
6323	0	0	0	4	556671	176158	228
6324	0	0	0	4	556620	176075	227
6325	0	0	0	4	556439	175986	226
6326	0	0	0	4	556325	175769	228
6327	0	0	0	4	557565	175012	235
6328	0	0	0	4	557641	175009	236
6329	0	0	0	4	557702	175010	238
6330	0	0	0	4	557771	175013	239
6331	0	0	0	4	557785	174956	240
6332	0	0	0	4	557647	174838	241
6333	0	0	0	4	557362	174848	236
6334	0	0	0	4	557362	174805	236
6335	0	0	0	4	557425	174848	237
6336	0	0	0	4	557433	174890	236
6337	0	0	0	4	557368	174954	234
6338	0	0	0	4	557371	175014	234
6339	0	0	0	4	557425	174999	234
6340	0	0	0	4	555945	175350	228
6341	0	0	0	4	555984	175408	228
6342	0	0	0	4	556031	175451	228
6343	0	0	0	4	556439	175131	228
6344	0	0	0	4	556855	175121	230
6345	0	0	5	4	553061	174259	221
6346	0	0	3	4	554835	174222	227
6347	0	0	0	4	554899	174264	224
6348	0	0	1	4	554993	174256	226
6349	0	0	0	4	554944	174420	227
6350	0	0	0	4	554995	174454	228
6351	0	0	0	4	555238	174634	229
6352	0	0	0	4	555938	174576	228
6353	0	0	0	4	557000	174225	240

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6354	0	0	0	4	557178	174376	241
6355	0	0	0	4	556790	174177	238
6356	0	0	0	4	556706	174053	238
6357	0	0	0	4	556677	174035	238
6358	0	0	0	4	550223	174879	213
6359	0	0	0	4	550357	174946	214
6360	0	0	0	4	550231	175013	213
6361	0	0	0	4	550831	174982	214
6362	0	0	0	4	550697	175282	213
6363	0	0	0	4	549406	174934	212
6364	0	0	0	4	549581	175009	212
6365	0	0	0	4	548706	174976	212
6366	0	0	0	4	548593	174979	211
6367	0	0	0	4	548743	174440	214
6368	0	0	0	4	548731	174381	214
6369	0	0	0	4	548742	174342	214
6370	0	0	0	4	548762	174163	213
6371	0	0	0	4	548489	174304	214
6372	0	0	0	4	548363	174355	214
6373	0	0	0	4	548483	174310	214
6374	0	0	0	4	548696	174840	212
6375	0	0	0	4	548485	174309	214
6386	0	0	0	4	557645	172936	246
6387	0	0	0	4	557586	172955	245
6388	0	0	0	4	557579	172981	245
6389	0	0	0	4	557581	173006	245
6390	0	0	0	4	557590	173045	245
6391	0	0	0	4	557592	173077	244
6392	0	0	0	4	557647	173045	244
6393	0	0	0	4	557654	173086	244
6394	0	0	0	4	556009	173138	237
6395	0	0	0	4	555969	173130	236
6396	0	0	0	4	555957	173130	236

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6397	0	0	0	4	555933	173127	235
6398	0	0	0	4	555936	173107	236
6399	0	0	0	4	555957	173108	236
6400	0	0	0	4	555983	173107	238
6401	0	0	0	4	556009	173108	239
6402	0	0	0	4	556021	173115	239
6403	0	0	0	4	555917	173075	239
6404	0	0	0	4	555916	173058	239
6405	0	0	0	4	555916	173044	239
6406	0	0	0	4	555921	173019	240
6407	0	0	0	4	556042	172972	242
6408	0	0	0	4	556041	172982	242
6409	0	0	0	4	556041	172997	242
6410	0	0	0	4	556041	173008	241
6411	0	0	0	4	556041	173020	241
6412	0	0	0	4	556058	173020	240
6413	0	0	0	4	556058	173003	241
6414	0	0	0	4	556058	172997	242
6415	0	0	0	4	556058	172985	242
6416	0	0	0	4	556057	172977	242
6417	0	0	0	4	556056	172969	242
6418	0	0	0	4	556055	172953	242
6419	0	0	0	4	556055	172937	241
6420	0	0	0	4	556055	172927	241
6421	0	0	0	4	556087	172976	242
6422	0	0	0	4	556086	172986	242
6423	0	0	0	4	556017	173043	241
6424	0	0	0	4	556000	173043	241
6425	0	0	0	4	556074	173150	238
6426	0	0	0	4	556033	173170	232
6427	2	2	13	4	554563	173082	228
6428	2	2	15	4	554519	173167	229
6429	1	1	21	4	554310	173106	226

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6430	9	8	8	4	553550	173013	228
6431	10	9	6	4	553633	172914	226
6432	9	8	7	4	553639	172938	226
6433	20	20	12	4	551826	172685	220
6434	22	22	13	4	551837	172745	220
6435	20	20	14	4	551813	172778	220
6436	22	22	16	4	551833	172832	220
6437	22	22	17	4	551837	172855	220
6438	23	23	21	4	551826	172914	220
6439	19	19	19	4	551819	173043	219
6440	12	12	14	4	551895	173166	219
6441	6	6	6	4	550977	173263	219
6442	3	3	4	4	549710	173323	216
6443	5	5	5	4	555213	171486	241
6444	8	8	8	4	555161	171067	243
6445	4	4	3	4	553671	171316	239
6446	2	2	1	4	553518	171159	239
6447	2	2	1	4	553561	171193	239
6448	2	2	0	4	553545	171231	239
6449	2	2	1	4	553498	171135	239
6450	2	2	0	4	553474	171179	238
6451	1	1	0	4	553475	171098	238
6452	1	1	0	4	553352	171040	238
6453	2	2	1	4	553622	171019	240
6454	3	4	0	4	553331	171492	235
6455	4	4	1	4	553461	171578	234
6456	5	5	5	4	555130	171687	241
6457	0	0	0	4	556349	171909	243
6458	0	0	0	4	556277	171896	243
6459	2	2	2	4	555435	171826	243
6460	0	0	0	4	556538	171930	243
6461	0	0	0	4	555921	171886	242
6462	0	0	1	4	555543	171782	242

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6463	0	0	0	4	556211	171805	239
6464	0	0	0	4	556050	171794	241
6465	5	5	5	4	555139	171786	242
6466	0	0	0	4	557591	171742	246
6467	0	0	0	4	557968	171675	246
6468	0	0	0	4	557777	171840	245
6474	0	0	0	4	548246	170125	219
6475	0	0	0	4	548019	170194	220
6476	0	0	0	4	548600	170040	221
6477	0	0	0	4	549194	170130	223
6478	0	0	0	4	550211	170565	226
6479	0	0	0	4	550232	170643	224
6480	0	0	0	4	550208	170720	226
6481	0	0	0	4	550160	170804	227
6482	0	0	0	4	550164	170860	226
6483	0	0	0	4	550018	170156	227
6484	0	0	0	4	551875	170593	230
6485	0	0	0	4	552763	170380	239
6486	0	0	0	4	552815	170439	240
6487	0	0	0	4	552662	170268	239
6488	0	0	0	4	552544	170136	240
6489	0	0	0	4	553492	170653	243
6490	2	2	2	4	554096	170142	242
6491	5	5	5	4	554291	170277	243
6492	0	0	0	4	552135	168626	242
6493	0	0	0	4	552075	168630	242
6494	0	0	0	4	553611	169077	245
6495	0	0	0	4	553802	168606	244
6496	0	0	0	4	554221	168831	244
6497	0	0	0	4	554720	168602	245
6498	0	0	0	4	555001	168573	245
6499	0	0	0	4	555252	168834	245
6500	0	0	0	4	555288	169172	242

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6501	0	0	0	4	555184	168699	244
6502	0	0	0	4	555305	168591	241
6503	0	0	0	4	555158	168573	243
6504	0	0	0	4	555180	168483	244
6505	0	0	0	4	551868	169369	225
6506	0	0	0	4	551798	169460	234
6507	0	0	0	4	551794	169550	236
6508	0	0	0	4	551650	169306	236
6509	0	0	0	4	551694	169274	236
6510	0	0	0	4	550167	169548	224
6511	0	0	0	4	550181	169369	230
6512	0	0	0	4	549529	169645	221
6513	0	0	0	4	549247	169641	226
6514	0	0	0	4	549206	169336	222
6515	0	0	0	4	549049	169320	227
6516	0	0	0	4	548959	169318	227
6517	0	0	0	4	548255	169610	220
6518	0	0	0	4	548251	169543	218
6519	0	0	0	4	548221	169419	220
6520	0	0	0	4	548195	169317	222
6521	0	0	0	4	548079	169321	222
6522	0	0	0	4	548422	169249	222
6535	0	0	0	4	556776	167767	251
6536	0	0	0	4	556875	167825	251
6537	0	0	0	4	556801	167567	250
6538	0	0	0	4	555188	167947	245
6539	0	0	0	4	555175	167778	245
6540	0	0	0	4	553560	168008	244
6556	0	0	0	4	553568	166769	246
9035	6	6	6	4	551312	173455	216
9036	6	6	6	4	551242	173452	217
9037	5	5	5	4	551169	173437	218
9038	5	5	5	4	551203	173458	217

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
9039	4	4	4	4	550941	173418	218
9048	6	6	6	4	551410	173476	217
9049	4	4	8	4	551914	173642	219
9050	6	6	9	4	551835	173484	219
9051	5	5	8	4	551863	173552	219
9056	0	0	22	4	554286	173699	227
9063	0	0	12	4	553401	173921	220
9076	0	0	0	4	556167	173688	237
9077	0	0	0	4	556313	173602	233
9083	0	0	0	4	556237	173678	236
9084	0	0	0	4	556255	173487	229
9086	0	0	0	4	556708	173867	239
9087	0	0	0	4	556562	173847	240
9088	0	0	0	4	556525	173817	240
9092	0	0	0	4	556705	173643	235
9093	0	0	0	4	556513	173581	229
9094	0	0	0	4	556549	173714	239
9095	0	0	0	4	556606	173534	230
9098	0	0	0	4	557577	173407	241
9099	0	0	0	4	557598	173413	240
9100	0	0	0	4	557429	173406	243
9101	0	0	0	4	557462	173387	242
9116	0	0	0	4	557414	173460	240
9117	0	0	0	4	557395	173466	238
9118	0	0	0	4	557351	173474	241
9119	0	0	0	4	557310	173481	243
9120	0	0	0	4	557265	173478	244
9121	0	0	0	4	557441	173555	240
9137	0	0	0	4	557289	173414	242
9138	0	0	0	4	557252	173432	244
9148	0	0	0	4	556967	173500	243
9149	0	0	0	4	557010	173609	239
9150	0	0	0	4	556889	173644	240

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
9155	0	0	0	4	556857	173411	238
9156	0	0	0	4	556914	173444	241
9157	0	0	0	4	556823	173514	237
9158	0	0	0	4	557397	173866	238
10393	0	0	0	4	553850	176170	220
10394	0	0	0	4	553815	176181	220
10395	0	0	0	4	553791	176182	220
10396	0	0	0	4	553757	176216	220
10397	0	0	0	4	553800	176220	220
10425	0	0	0	4	553516	176119	220
10426	0	0	0	4	553527	176153	220
10601	0	0	0	4	556767	175931	229
10602	0	0	0	4	556820	176009	228
10603	0	0	0	4	556904	175969	231
10620	0	0	0	4	556856	175155	229
10621	0	0	0	4	557124	175103	232
10622	0	0	0	4	557207	175128	233
10623	0	0	0	4	555776	175289	225
10624	0	0	0	4	555841	175252	228
10625	0	0	0	4	555607	174985	228
10626	0	0	0	4	555973	175394	228
10627	0	0	0	4	555452	175125	224
10628	0	0	0	4	555271	175124	222
10629	0	0	0	4	555307	175141	223
10630	0	0	0	4	548736	174071	213
10631	0	0	0	4	550164	174279	214
10632	0	0	0	4	551618	174771	216
10633	0	0	0	4	551634	174736	216
10634	0	0	0	4	551650	174708	216
10635	0	0	0	4	551661	174680	217
10636	0	0	0	4	551677	174650	217
10637	0	0	0	4	551698	174615	217
10638	0	0	0	4	551586	174605	215

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
10639	0	0	0	4	551556	174733	215
10640	0	0	0	4	551773	174509	217
10641	0	0	0	4	551792	174419	214
10642	0	0	3	4	551864	174099	219
10643	0	0	3	4	551782	174036	219
10644	0	0	6	4	553402	174264	218
10645	0	0	5	4	553490	174326	220
10646	0	0	4	4	553075	174266	221
10647	0	0	5	4	553073	174240	220
10648	0	0	5	4	553084	174260	221
10649	0	0	0	4	557644	173132	244
10650	0	0	0	4	557646	173174	244
10651	0	0	0	4	557591	173168	244
10652	0	0	0	4	557586	173200	244
10653	0	0	0	4	557586	173221	244
10654	0	0	0	4	557586	173248	243
10655	0	0	0	4	557573	173305	243
10656	0	0	0	4	557647	173346	243
10657	0	0	0	4	556764	173159	242
10658	0	0	0	4	556763	173100	242
10659	0	0	0	4	555986	173045	241
10660	0	0	0	4	555969	173045	241
10661	0	0	0	4	555945	173046	240
10662	0	0	0	4	555933	173053	240
10663	0	0	0	4	555948	173054	241
10664	0	0	0	4	555961	173052	241
10665	0	0	0	4	555980	173052	241
10666	0	0	0	4	555991	173054	241
10667	0	0	0	4	556004	173057	241
10668	0	0	0	4	556014	173059	241
10669	0	0	0	4	556034	173092	239
10670	0	0	0	4	556037	173102	239
10671	0	0	0	4	556043	173113	238

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
10672	0	0	0	4	556053	173121	238
10673	0	0	0	4	556063	173132	238
10674	0	0	0	4	556043	173150	237
10675	0	0	0	4	556035	173149	237
10676	0	0	0	4	556020	173143	236
10677	0	0	0	4	555998	173137	236
10678	2	2	2	4	549667	173324	216
10679	0	0	0	4	548801	173358	214
10680	1	1	1	4	549137	173286	215
10681	11	11	12	4	548685	172347	217
10682	14	14	14	4	548627	172253	217
10683	20	20	21	4	548700	171747	218
10684	9	9	10	4	549293	171737	220
10685	8	8	8	4	549256	171603	220
10686	12	12	12	4	548862	171656	219
10687	8	8	8	4	549690	171800	220
10703	0	0	0	4	556271	171463	237
10704	0	0	0	4	556547	171206	245
10705	0	0	0	4	556770	170937	247
10706	6	6	6	4	555215	171221	243
10707	12	12	12	4	554616	170268	243
10708	16	16	16	4	554701	170258	244
10709	22	22	22	4	554785	170259	244
10710	0	0	0	4	556093	170281	247
10711	0	0	0	4	556028	170300	247
10712	6	6	6	4	555234	170268	244
10713	5	5	5	4	555244	169991	245
10714	17	17	17	4	554924	170268	243
10715	23	23	23	4	554860	170258	243
10716	0	0	0	4	556533	170283	245
10717	0	0	0	4	551887	168998	240
10718	0	0	0	4	551882	168951	241
10719	0	0	0	4	551894	168891	241

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
10720	0	0	0	4	551904	168772	243
10721	0	0	0	4	551867	168629	239
10722	0	0	0	4	551654	168575	240
10723	0	0	0	4	551455	168907	241
10724	0	0	0	4	550975	168631	235
10725	0	0	0	4	550860	168590	233
10726	0	0	0	4	550973	168405	239
10727	0	0	0	4	551013	168417	241
10728	0	0	0	4	551064	168360	237
10729	0	0	0	4	552924	168864	242
10730	0	0	0	4	553394	168606	243
10731	0	0	0	4	553544	168665	242
10732	0	0	0	4	552407	168637	244
10733	0	0	0	4	552369	168641	244
10734	0	0	0	4	552307	168637	242
10735	0	0	0	4	552268	168630	242
10736	0	0	0	4	553618	168036	245
10737	0	0	0	4	553460	167997	245
10738	0	0	0	4	553416	168069	246
10739	0	0	0	4	553235	168131	246
10740	0	0	0	4	553463	167884	245
10741	0	0	0	4	553619	167646	246
10742	0	0	0	4	553610	167739	246
10743	0	0	0	4	553635	167774	245
10744	0	0	0	4	553632	167808	245
10745	0	0	0	4	553624	167559	246
11843	0	0	0	4	551746	174903	216
11844	0	0	0	4	551612	174864	216
11845	0	0	0	4	551582	174882	215
11846	0	0	0	4	551552	174890	215
11847	0	0	0	4	551562	175021	215
11848	0	0	0	4	551653	175009	215
11849	0	0	0	4	551417	175006	213

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
11850	0	0	0	4	551435	174963	214
11851	0	0	0	4	551485	174869	212
11852	0	0	0	4	551526	174799	215
11853	0	0	0	4	551608	174812	216
11854	0	0	0	4	551246	175014	214
11855	0	0	0	4	551188	175012	214
11856	0	0	0	4	551142	174994	211
11857	0	0	0	4	551273	174868	212
11858	0	0	0	4	550972	175382	214
11859	0	0	0	4	550955	175486	213
11860	0	0	0	4	556165	172913	241
11861	0	0	0	4	556141	172914	241
11862	0	0	0	4	556130	172915	241
11863	0	0	0	4	556117	172915	241
11864	0	0	0	4	556105	172915	240
11865	0	0	0	4	556083	172908	240
11866	0	0	0	4	556071	172897	239
11867	0	0	0	4	556048	172905	240
11868	0	0	0	4	556035	172902	239
11869	0	0	0	4	556019	172902	239
11870	0	0	0	4	556008	172902	239
11871	0	0	0	4	555984	172902	238
11872	0	0	0	4	555969	172903	238
11873	0	0	0	4	555955	172907	238
11874	0	0	0	4	556043	172939	241
11875	0	0	0	4	556042	172954	242
11876	0	0	0	4	556042	172963	242
11877	9	9	9	4	554859	171816	239
11878	12	12	12	4	554744	171791	240
11879	14	14	14	4	554678	171814	239
11880	19	19	19	4	554600	171817	239
11881	20	20	20	4	554450	171832	239
11882	22	22	22	4	554367	171992	238

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
11883	19	19	19	4	554340	171969	238
11884	16	16	16	4	554304	171939	239
11885	15	15	14	4	554287	171902	239
11886	15	15	10	4	554078	172079	235
11887	11	11	9	4	554109	171851	236
11888	7	7	6	4	553961	171622	239
11889	4	4	4	4	555204	171806	242
11890	3	3	3	4	555297	171808	243
11891	3	3	3	4	555352	171811	243
11892	4	4	4	4	555239	171717	242
11893	4	4	4	4	555237	171672	241
11898	0	0	0	4	557235	169631	248
11899	0	0	0	4	557463	169677	248
11900	0	0	0	4	556789	169590	247
11901	0	0	0	4	556853	169304	248
11902	3	3	3	4	555177	169725	245
11903	0	0	0	4	553798	169513	243
11904	0	0	0	4	553641	169649	243
11905	0	0	0	4	553531	169660	243
11906	0	0	0	4	553474	169505	241
11907	0	0	0	4	553602	169474	243
11908	0	0	0	4	553593	169522	241
11909	0	0	0	4	553537	169382	242
11910	0	0	0	4	552264	169720	240
11911	0	0	0	4	556854	167016	255
11912	0	0	0	4	556729	166963	254
11913	0	0	0	4	556784	166717	254
11914	0	0	0	4	556369	167050	253
11915	0	0	0	4	556754	167328	252
11916	0	0	0	4	555877	167123	250
11917	0	0	0	4	555593	167045	247
11918	0	0	0	4	555432	167058	249
11919	0	0	0	4	555240	166800	246

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
11920	0	0	0	4	555003	166703	247
11921	0	0	0	4	554621	166969	245
11922	0	0	0	4	553771	166974	246
11923	0	0	0	4	554036	166800	248
11924	0	0	0	4	552408	166912	247
12590	0	0	0	4	553502	175785	218
12685	0	0	0	4	557956	175101	243
12686	0	0	0	4	557870	175101	241
12687	0	0	0	4	557889	174926	242
12688	0	0	0	4	558035	174986	243
12692	0	0	0	4	557633	175091	236
12693	0	0	0	4	556702	173982	239
12694	0	0	0	4	556759	174027	240
12695	0	0	0	4	556788	174055	240
12696	0	0	0	4	556934	174061	241
12710	0	0	0	4	555916	173006	240
12711	0	0	0	4	555902	172987	241
12712	0	0	0	4	556019	172954	241
12713	0	0	0	4	556015	172990	242
12714	0	0	0	4	556015	172998	242
12715	0	0	0	4	556012	173013	241
12716	0	0	0	4	555813	173101	230
12717	0	0	0	4	555494	172927	239
12718	0	0	0	4	555514	172847	238
12719	0	0	1	4	555500	173013	241
12720	0	0	2	4	555178	172605	241
12721	2	2	5	4	555084	172646	240
12722	0	0	1	4	555333	172875	241
12723	0	0	0	4	555380	172909	241
12724	0	0	2	4	555292	172853	240
12725	0	0	0	4	556081	173214	234
12726	0	0	0	4	556100	173179	237
12727	2	2	0	4	552990	171445	230

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
12728	0	0	0	4	553239	170811	239
12729	0	0	0	4	551869	171278	228
12730	0	0	0	4	551875	170831	228
12731	0	0	0	4	550555	171106	227
12732	7	7	7	4	547930	171256	219
12733	8	8	8	4	547903	171325	218
12734	10	10	10	4	547892	171407	218
12735	11	11	12	4	547874	171463	218
12736	13	13	13	4	547865	171520	218
12737	20	20	20	4	547666	171651	217
12738	22	22	23	4	547419	171674	217
12739	3	3	3	4	548149	170941	220
12740	2	2	2	4	548048	170885	219
12741	1	1	1	4	548072	170800	219
12742	0	0	0	4	548171	170662	220
12743	0	0	0	4	548202	170121	219
12744	0	0	0	4	555184	168402	246
12745	0	0	0	4	555248	168426	245
12746	0	0	0	4	555246	168495	244
12747	0	0	0	4	556262	168583	248
12748	0	0	0	4	556224	168633	248
12749	0	0	0	4	556723	168634	250
12750	0	0	0	4	557436	168956	249
12751	0	0	0	4	557588	169166	250
12752	0	0	0	4	557312	168799	249
12753	0	0	0	4	557315	168748	250
12754	0	0	0	4	557346	168649	251
12755	0	0	0	4	557276	168574	250
12756	0	0	0	4	557001	168576	251
12757	0	0	0	4	557605	168569	249
12758	0	0	0	4	557833	168621	253
12759	0	0	0	4	556854	169054	248
12760	0	0	0	4	556797	168313	250

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
12863	0	0	0	4	547505	172624	213
12864	0	0	0	4	547477	172702	214
12868	5	5	5	4	547622	172338	215
12870	8	8	8	4	547680	172101	215
12871	9	9	9	4	547803	172069	216
12872	12	12	12	4	547757	171960	216
12880	3	3	3	4	550241	173397	217
13316	0	0	0	4	553360	176170	218
13400	0	0	0	4	555196	175128	222
13401	0	0	0	4	555040	175128	222
13402	0	0	0	4	554955	175135	221
13403	0	0	0	4	554626	175081	220
13404	0	0	0	4	554679	175089	220
13405	0	0	0	4	554593	175211	220
13406	0	0	0	4	553859	175139	219
13407	0	0	0	4	553828	175136	219
13408	0	0	0	4	553785	175143	219
13409	0	0	0	4	553701	175092	219
13410	0	0	0	4	553562	175097	219
13411	0	0	0	4	553580	175277	218
13412	0	0	0	4	556769	173054	242
13413	0	0	0	4	556777	172975	244
13414	0	0	0	4	556831	172843	243
13415	0	0	0	4	556820	172788	242
13416	0	0	0	4	556831	172748	241
13417	0	0	0	4	556748	172719	240
13418	0	0	0	4	556817	172558	240
13419	0	0	0	4	556756	172592	239
13420	0	0	0	4	556695	172571	239
13421	0	0	0	4	556520	172569	236
13422	0	0	0	4	556681	172449	243
13423	0	0	0	4	556837	172454	244
13424	6	6	6	4	549859	171704	221

Receiver ID	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
	Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
13425	5	5	5	4	550206	171794	221
13426	5	5	5	4	550197	171810	221
13427	3	3	2	4	551663	171852	225
13428	3	3	2	4	551769	171863	227
13429	1	2	0	4	551930	171846	227
13430	0	1	0	4	551859	171704	227
13431	0	0	0	4	551893	171638	225
13432	2	3	0	4	551936	171871	228
13433	2	2	0	4	551814	171806	228
13434	7	8	1	4	553242	171954	228
13435	5	5	0	4	552751	171913	227
13436	0	0	0	4	556772	170204	244
13437	0	0	0	4	556719	170181	245
13438	0	0	0	4	556968	170191	241
13439	0	0	0	4	557122	170179	243
13440	0	0	0	4	557173	170294	245
13441	0	0	0	4	557609	170445	247
13442	0	0	0	4	556768	170259	246
13448	0	0	0	4	553627	167618	246
13449	0	0	0	4	551867	167897	244
13450	0	0	0	4	551807	168107	244
13452	0	0	0	4	551475	167020	245
13454	0	0	0	4	553552	167466	246
13455	0	0	0	4	553612	167321	246
13456	0	0	0	4	553060	167044	246
13457	0	0	0	4	552800	167031	246
13458	0	0	0	4	552656	167032	247
14025	1	1	7	4	552366	173936	219
14028	0	0	10	4	554535	173940	228
14029	0	0	3	4	554745	174226	227

APPENDIX D. CUMULATIVE SOUND PROPAGATION MODELING RESULTS

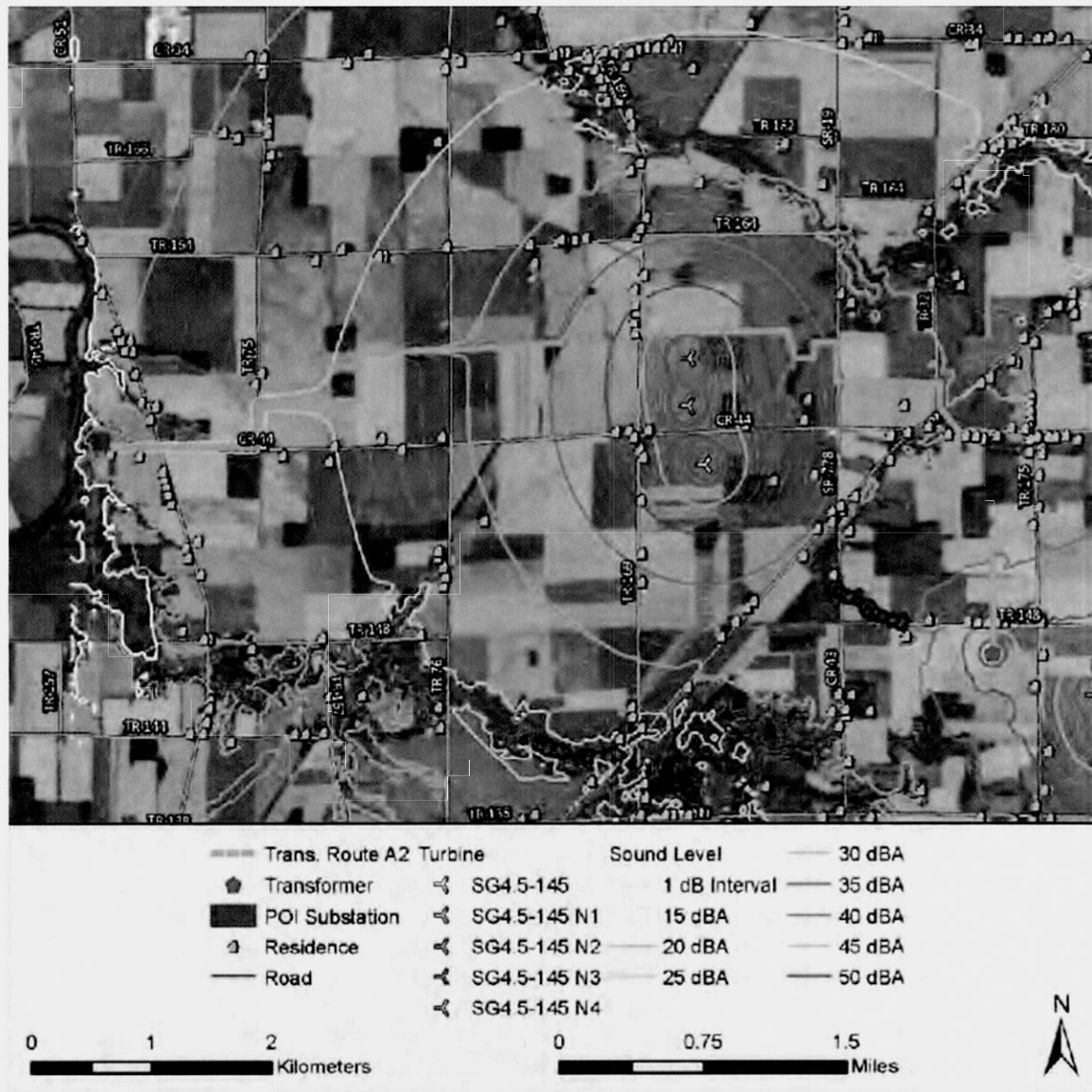


FIGURE 33: CUMULATIVE SOUND PROPAGATION MODELING RESULTS - ROUTE A2, SIEMENS-GAMESA SG4.5-145 TURBINES

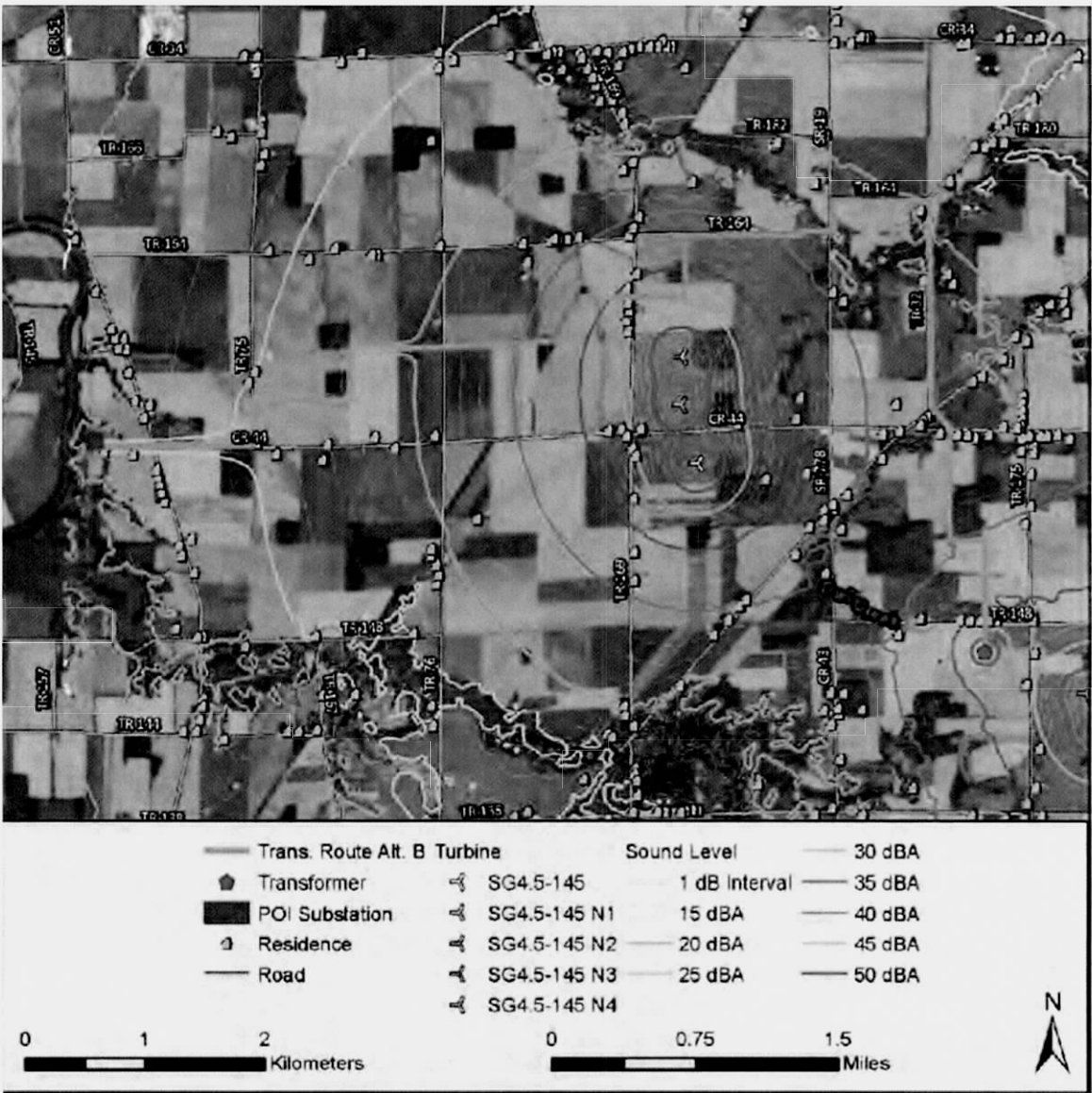


FIGURE 34: CUMULATIVE SOUND PROPAGATION MODELING RESULTS - ROUTE ALT. B, SIEMENS-GAMESA SG4.5-145 TURBINES

TABLE 6: DISCRETE RECEIVER SOUND PROPAGATION MODELING RESULTS - INCLUDING SIEMENS-GAMESA SG 4.5-145 TURBINES

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
1557	248	Non-Part.	27	27	27	4	553576	175421	220
1558	249	Non-Part.	27	27	27	4	553575	175473	219
1559	250	Non-Part.	26	26	26	4	553498	175461	220
1560	251	Non-Part.	28	28	28	4	552797	175257	219
1561	252	Non-Part.	29	29	29	4	552191	175058	217
1562	253	Non-Part.	29	29	29	4	552306	174887	219
1563	254	Non-Part.	29	29	29	4	552147	175058	217
1564	255	Non-Part.	28	28	28	4	552111	175106	216
1565	256	Non-Part.	29	29	29	4	552072	175059	216
1566	257	Non-Part.	29	29	29	4	552010	175060	216
1567	258	Non-Part.	29	29	29	4	551915	175053	216
1568	259	Non-Part.	29	29	29	4	551849	175039	216
1569	260	Non-Part.	29	29	29	4	551784	175014	216
1570	261	Non-Part.	31	31	31	4	556696	173215	242
1571	262	Non-Part.	31	31	31	4	556238	173009	244
1572	263	Non-Part.	31	31	31	4	556248	173020	244
1573	264	Non-Part.	31	31	31	4	556248	173042	244
1574	265	Non-Part.	31	31	31	4	556251	173061	243
1575	266	Non-Part.	30	30	30	4	556213	173085	242
1576	267	Non-Part.	30	30	30	4	556180	173093	241
1577	268	Non-Part.	30	30	30	4	556164	173096	241
1578	269	Non-Part.	29	29	29	4	556147	173103	240
1579	270	Non-Part.	29	29	29	4	556142	173103	240
1580	271	Non-Part.	31	31	31	4	556200	173022	243
1581	272	Non-Part.	31	31	31	4	556204	173011	243
1582	273	Non-Part.	31	31	31	4	556225	173002	243
1583	274	Non-Part.	36	36	36	4	553969	171821	234
1584	3920	Part.	40	40	40	4	553280	172133	227
1585	275	Non-Part.	33	33	33	4	555027	172433	242
1586	276	Non-Part.	32	32	32	4	554980	172451	240
1587	277	Non-Part.	33	33	33	4	554802	172311	241

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
1588	278	Non-Part.	33	33	33	4	554724	172264	241
1589	279	Non-Part.	33	33	33	4	555145	172145	242
1590	280	Non-Part.	33	33	33	4	555135	172082	242
1591	281	Non-Part.	34	34	34	4	555144	172024	242
1592	282	Non-Part.	34	34	34	4	555143	171952	242
1593	283	Non-Part.	34	34	34	4	555128	171896	241
1594	284	Non-Part.	34	34	34	4	555095	171880	241
1595	285	Non-Part.	34	34	34	4	554982	171888	241
1618	307	Non-Part.	46	46	46	4	557406	167057	256
1619	3966	Part.	45	45	45	4	557546	167027	255
1620	308	Non-Part.	44	44	44	4	557748	166949	252
1621	309	Non-Part.	43	43	43	4	556800	167023	255
1690	369	Non-Part.	27	27	27	4	549358	173377	215
1692	370	Non-Part.	20	20	20	4	547181	173454	213
1694	371	Non-Part.	22	22	22	4	547351	173011	214
1697	372	Non-Part.	23	23	23	4	547583	172615	214
1698	373	Non-Part.	23	23	23	4	547603	172536	214
1699	374	Non-Part.	23	23	23	4	547536	172539	214
5987	885	Non-Part.	25	25	25	4	553627	176080	220
5988	886	Non-Part.	25	25	25	4	553630	176094	220
5989	887	Non-Part.	25	25	25	4	553653	176134	220
5990	888	Non-Part.	26	26	26	4	553570	176048	219
5991	889	Non-Part.	25	25	25	4	553583	176089	219
5992	890	Non-Part.	25	25	25	4	553591	176125	220
5993	891	Non-Part.	25	25	25	4	553603	176153	220
5994	892	Non-Part.	25	25	25	4	553624	176208	220
5995	893	Non-Part.	25	25	25	4	553647	176231	220
5999	897	Non-Part.	25	25	25	4	553672	176168	220
6000	898	Non-Part.	25	25	25	4	553693	176232	220
6033	931	Non-Part.	26	26	26	4	553511	175851	218
6034	932	Non-Part.	26	26	26	4	553508	175815	218
6316	1213	Non-Part.	25	25	25	4	550968	175753	212
6317	1214	Non-Part.	24	24	24	4	551163	176130	211

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6318	1215	Non-Part.	23	23	23	4	550270	176164	211
6319	1216	Non-Part.	22	22	22	4	550467	175749	210
6320	1217	Non-Part.	26	26	26	4	550967	175570	214
6323	1220	Non-Part.	23	23	23	4	556671	176158	228
6324	1221	Non-Part.	23	23	23	4	556620	176075	227
6325	1222	Non-Part.	21	21	21	4	556439	175986	226
6326	1223	Non-Part.	25	25	25	4	556325	175769	228
6327	3942	Part.	25	25	25	4	557565	175012	235
6328	1224	Non-Part.	23	23	23	4	557641	175009	236
6329	1225	Non-Part.	24	24	24	4	557702	175010	238
6330	1226	Non-Part.	24	24	24	4	557771	175013	239
6331	1227	Non-Part.	26	26	26	4	557785	174956	240
6332	1228	Non-Part.	27	27	27	4	557647	174838	241
6333	1229	Non-Part.	25	25	25	4	557362	174848	236
6334	1230	Non-Part.	26	26	26	4	557362	174805	236
6335	1231	Non-Part.	26	26	26	4	557425	174848	237
6336	1232	Non-Part.	24	24	24	4	557433	174890	236
6337	1233	Non-Part.	24	24	24	4	557368	174954	234
6338	1234	Non-Part.	25	25	25	4	557371	175014	234
6339	1235	Non-Part.	25	25	25	4	557425	174999	234
6340	1236	Non-Part.	25	25	25	4	555945	175350	228
6341	1237	Non-Part.	25	25	25	4	555984	175408	228
6342	1238	Non-Part.	26	26	26	4	556031	175451	228
6343	1239	Non-Part.	21	21	21	4	556439	175131	228
6344	1240	Non-Part.	25	25	25	4	556855	175121	230
6345	4051	Part.	32	32	32	4	553061	174259	221
6346	1241	Non-Part.	29	29	29	4	554835	174222	227
6347	1242	Non-Part.	27	27	27	4	554899	174264	224
6348	4052	Part.	29	29	29	4	554993	174256	226
6349	4053	Part.	27	27	27	4	554944	174420	227
6350	4054	Part.	27	27	27	4	554995	174454	228
6351	1243	Non-Part.	27	27	27	4	555238	174634	229
6352	1244	Non-Part.	27	27	27	4	555938	174576	228

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6353	1245	Non-Part.	28	28	28	4	557000	174225	240
6354	1246	Non-Part.	28	28	28	4	557178	174376	241
6355	1247	Non-Part.	26	26	26	4	556790	174177	238
6356	1248	Non-Part.	27	27	27	4	556706	174053	238
6357	1249	Non-Part.	27	27	27	4	556677	174035	238
6358	1250	Non-Part.	26	26	26	4	550223	174879	213
6359	1251	Non-Part.	27	27	27	4	550357	174946	214
6360	1252	Non-Part.	26	26	26	4	550231	175013	213
6361	1253	Non-Part.	28	28	28	4	550831	174982	214
6362	1254	Non-Part.	26	26	26	4	550697	175282	213
6363	1255	Non-Part.	25	25	25	4	549406	174934	212
6364	1256	Non-Part.	25	25	25	4	549581	175009	212
6365	1257	Non-Part.	23	23	23	4	548706	174976	212
6366	1258	Non-Part.	23	23	23	4	548593	174979	211
6367	1259	Non-Part.	24	24	24	4	548743	174440	214
6368	1260	Non-Part.	24	24	24	4	548731	174381	214
6369	1261	Non-Part.	24	24	24	4	548742	174342	214
6370	1262	Non-Part.	25	25	25	4	548762	174163	213
6371	1263	Non-Part.	24	24	24	4	548489	174304	214
6372	1264	Non-Part.	22	22	22	4	548363	174355	214
6373	1265	Non-Part.	24	24	24	4	548483	174310	214
6374	1266	Non-Part.	23	23	23	4	548696	174840	212
6375	1267	Non-Part.	24	24	24	4	548485	174309	214
6386	1278	Non-Part.	31	31	31	4	557645	172936	246
6387	1279	Non-Part.	31	31	31	4	557586	172955	245
6388	1280	Non-Part.	31	31	31	4	557579	172981	245
6389	1281	Non-Part.	31	31	31	4	557581	173006	245
6390	1282	Non-Part.	31	31	31	4	557590	173045	245
6391	1283	Non-Part.	31	31	31	4	557592	173077	244
6392	1284	Non-Part.	31	31	31	4	557647	173045	244
6393	1285	Non-Part.	31	31	31	4	557654	173086	244
6394	1286	Non-Part.	28	28	28	4	556009	173138	237
6395	1287	Non-Part.	28	28	28	4	555969	173130	236

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6396	1288	Non-Part.	28	28	28	4	555957	173130	236
6397	1289	Non-Part.	27	27	27	4	555933	173127	235
6398	1290	Non-Part.	27	27	27	4	555936	173107	236
6399	1291	Non-Part.	27	27	27	4	555957	173108	236
6400	1292	Non-Part.	29	29	29	4	555983	173107	238
6401	1293	Non-Part.	29	29	29	4	556009	173108	239
6402	1294	Non-Part.	30	30	30	4	556021	173115	239
6403	1295	Non-Part.	30	30	30	4	555917	173075	239
6404	1296	Non-Part.	30	30	30	4	555916	173058	239
6405	1297	Non-Part.	30	30	30	4	555916	173044	239
6406	1298	Non-Part.	30	30	30	4	555921	173019	240
6407	1299	Non-Part.	31	31	31	4	556042	172972	242
6408	1300	Non-Part.	31	31	31	4	556041	172982	242
6409	1301	Non-Part.	31	31	31	4	556041	172997	242
6410	1302	Non-Part.	30	30	30	4	556041	173008	241
6411	1303	Non-Part.	30	30	30	4	556041	173020	241
6412	1304	Non-Part.	30	30	30	4	556058	173020	240
6413	1305	Non-Part.	30	30	30	4	556058	173003	241
6414	1306	Non-Part.	31	31	31	4	556058	172997	242
6415	1307	Non-Part.	31	31	31	4	556058	172985	242
6416	1308	Non-Part.	31	31	31	4	556057	172977	242
6417	1309	Non-Part.	31	31	31	4	556056	172969	242
6418	1310	Non-Part.	31	31	31	4	556055	172953	242
6419	1311	Non-Part.	31	31	31	4	556055	172937	241
6420	1312	Non-Part.	31	31	31	4	556055	172927	241
6421	1313	Non-Part.	31	31	31	4	556087	172976	242
6422	1314	Non-Part.	31	31	31	4	556086	172986	242
6423	1315	Non-Part.	31	31	31	4	556017	173043	241
6424	1316	Non-Part.	31	31	31	4	556000	173043	241
6425	1317	Non-Part.	30	30	30	4	556074	173150	238
6426	1318	Non-Part.	27	27	27	4	556033	173170	232
6427	4055	Part.	32	32	32	4	554563	173082	228
6428	4056	Part.	32	32	32	4	554519	173167	229

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6429	1319	Non-Part.	32	32	32	4	554310	173106	226
6430	1320	Non-Part.	36	36	36	4	553550	173013	228
6431	1321	Non-Part.	36	36	36	4	553633	172914	226
6432	1322	Non-Part.	36	36	36	4	553639	172938	226
6433	1323	Non-Part.	45	45	45	4	551826	172685	220
6434	1324	Non-Part.	45	45	45	4	551837	172745	220
6435	1325	Non-Part.	44	44	44	4	551813	172778	220
6436	4057	Part.	44	44	44	4	551833	172832	220
6437	4058	Part.	44	44	44	4	551837	172855	220
6438	1326	Non-Part.	43	43	43	4	551826	172914	220
6439	1327	Non-Part.	42	42	42	4	551819	173043	219
6440	1328	Non-Part.	41	41	41	4	551895	173166	219
6441	1329	Non-Part.	35	35	35	4	550977	173263	219
6442	1330	Non-Part.	29	29	29	4	549710	173323	216
6443	1331	Non-Part.	35	35	35	4	555213	171486	241
6444	1332	Non-Part.	37	37	37	4	555161	171067	243
6445	1333	Non-Part.	37	37	37	4	553671	171316	239
6446	1334	Non-Part.	38	38	38	4	553518	171159	239
6447	1335	Non-Part.	37	37	37	4	553561	171193	239
6448	1336	Non-Part.	38	38	38	4	553545	171231	239
6449	1337	Non-Part.	38	38	38	4	553498	171135	239
6450	1338	Non-Part.	38	38	38	4	553474	171179	238
6451	1339	Non-Part.	37	37	37	4	553475	171098	238
6452	1340	Non-Part.	38	38	38	4	553352	171040	238
6453	1341	Non-Part.	37	37	37	4	553622	171019	240
6454	1342	Non-Part.	40	40	40	4	553331	171492	235
6455	1343	Non-Part.	39	39	39	4	553461	171578	234
6456	1344	Non-Part.	34	34	34	4	555130	171687	241
6457	1345	Non-Part.	36	36	36	4	556349	171909	243
6458	1346	Non-Part.	35	35	35	4	556277	171896	243
6459	1347	Non-Part.	34	34	34	4	555435	171826	243
6460	1348	Non-Part.	36	36	36	4	556538	171930	243
6461	1349	Non-Part.	35	35	35	4	555921	171886	242

Republic Transmission Line

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6462	1350	Non-Part.	35	35	35	4	555543	171782	242
6463	1351	Non-Part.	36	36	36	4	556211	171805	239
6464	1352	Non-Part.	36	36	36	4	556050	171794	241
6465	1353	Non-Part.	34	34	34	4	555139	171786	242
6466	1354	Non-Part.	37	37	37	4	557591	171742	246
6467	4059	Part.	36	36	36	4	557968	171675	246
6468	1355	Non-Part.	36	36	36	4	557777	171840	245
6474	1361	Non-Part.	21	21	21	4	548246	170125	219
6475	1362	Non-Part.	24	24	24	4	548019	170194	220
6476	1363	Non-Part.	25	25	25	4	548600	170040	221
6477	4060	Part.	27	27	27	4	549194	170130	223
6478	1364	Non-Part.	30	30	30	4	550211	170565	226
6479	1365	Non-Part.	30	30	30	4	550232	170643	224
6480	1366	Non-Part.	31	31	31	4	550208	170720	226
6481	1367	Non-Part.	31	31	31	4	550160	170804	227
6482	1368	Non-Part.	31	31	31	4	550164	170860	226
6483	1369	Non-Part.	29	29	29	4	550018	170156	227
6484	1370	Non-Part.	37	37	37	4	551875	170593	230
6485	1371	Non-Part.	36	36	36	4	552763	170380	239
6486	1372	Non-Part.	37	37	37	4	552815	170439	240
6487	1373	Non-Part.	36	36	36	4	552662	170268	239
6488	1374	Non-Part.	35	35	35	4	552544	170136	240
6489	1375	Non-Part.	35	35	35	4	553492	170653	243
6490	4061	Part.	36	36	36	4	554096	170142	242
6491	1376	Non-Part.	37	37	37	4	554291	170277	243
6492	1377	Non-Part.	30	30	30	4	552135	168626	242
6493	1378	Non-Part.	30	30	30	4	552075	168630	242
6494	1379	Non-Part.	34	34	34	4	553611	169077	245
6495	4062	Part.	34	34	34	4	553802	168606	244
6496	1380	Non-Part.	36	36	36	4	554221	168831	244
6497	1381	Non-Part.	38	38	38	4	554720	168602	245
6498	1382	Non-Part.	39	39	39	4	555001	168573	245
6499	1383	Non-Part.	42	42	42	4	555252	168834	245

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
6500	1384	Non-Part.	45	45	45	4	555288	169172	242
6501	1385	Non-Part.	41	41	41	4	555184	168699	244
6502	1386	Non-Part.	41	41	41	4	555305	168591	241
6503	1387	Non-Part.	40	40	40	4	555158	168573	243
6504	1388	Non-Part.	40	40	40	4	555180	168483	244
6505	1389	Non-Part.	28	28	28	4	551868	169369	225
6506	1390	Non-Part.	31	31	31	4	551798	169460	234
6507	1391	Non-Part.	32	32	32	4	551794	169550	236
6508	1392	Non-Part.	31	31	31	4	551650	169306	236
6509	1393	Non-Part.	30	30	30	4	551694	169274	236
6510	1394	Non-Part.	26	26	26	4	550167	169548	224
6511	1395	Non-Part.	28	28	28	4	550181	169369	230
6512	1396	Non-Part.	27	27	27	4	549529	169645	221
6513	1397	Non-Part.	26	26	26	4	549247	169641	226
6514	1398	Non-Part.	26	26	26	4	549206	169336	222
6515	1399	Non-Part.	25	25	25	4	549049	169320	227
6516	1400	Non-Part.	25	25	25	4	548959	169318	227
6517	1401	Non-Part.	24	24	24	4	548255	169610	220
6518	1402	Non-Part.	22	22	22	4	548251	169543	218
6519	1403	Non-Part.	23	23	23	4	548221	169419	220
6520	1404	Non-Part.	24	24	24	4	548195	169317	222
6521	1405	Non-Part.	24	24	24	4	548079	169321	222
6522	1406	Non-Part.	22	22	22	4	548422	169249	222
6535	1413	Non-Part.	45	45	45	4	556776	167767	251
6536	1414	Non-Part.	46	46	46	4	556875	167825	251
6537	4069	Part.	45	45	45	4	556801	167567	250
6538	1415	Non-Part.	39	39	39	4	555188	167947	245
6539	4070	Part.	38	38	38	4	555175	167778	245
6540	1416	Non-Part.	32	32	32	4	553560	168008	244
6556	1429	Non-Part.	30	30	30	4	553568	166769	246
9035	1652	Non-Part.	35	35	35	4	551312	173455	216
9036	1653	Non-Part.	35	35	35	4	551242	173452	217
9037	1654	Non-Part.	35	35	35	4	551169	173437	218

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
9038	1655	Non-Part.	35	35	35	4	551203	173458	217
9039	1656	Non-Part.	34	34	34	4	550941	173418	218
9048	1657	Non-Part.	36	36	36	4	551410	173476	217
9049	1658	Non-Part.	36	36	36	4	551914	173642	219
9050	1659	Non-Part.	37	37	37	4	551835	173484	219
9051	1660	Non-Part.	37	37	37	4	551863	173552	219
9056	1661	Non-Part.	31	31	32	4	554286	173699	227
9063	1662	Non-Part.	32	32	32	4	553401	173921	220
9076	4088	Part.	30	30	30	4	556167	173688	237
9077	1663	Non-Part.	28	28	28	4	556313	173602	233
9083	4089	Part.	29	29	29	4	556237	173678	236
9084	1664	Non-Part.	24	24	24	4	556255	173487	229
9086	1665	Non-Part.	28	28	28	4	556708	173867	239
9087	1666	Non-Part.	28	28	28	4	556562	173847	240
9088	1667	Non-Part.	28	28	28	4	556525	173817	240
9092	1668	Non-Part.	29	29	29	4	556705	173643	235
9093	4090	Part.	27	27	27	4	556513	173581	229
9094	1669	Non-Part.	29	29	29	4	556549	173714	239
9095	1670	Non-Part.	24	24	24	4	556606	173534	230
9098	1671	Non-Part.	27	27	27	4	557577	173407	241
9099	1672	Non-Part.	27	27	27	4	557598	173413	240
9100	1673	Non-Part.	30	30	30	4	557429	173406	243
9101	1674	Non-Part.	30	30	30	4	557462	173387	242
9116	1675	Non-Part.	27	27	27	4	557414	173460	240
9117	1676	Non-Part.	26	26	26	4	557395	173466	238
9118	1677	Non-Part.	29	29	29	4	557351	173474	241
9119	1678	Non-Part.	30	30	30	4	557310	173481	243
9120	1679	Non-Part.	30	30	30	4	557265	173478	244
9121	1680	Non-Part.	28	28	28	4	557441	173555	240
9137	1681	Non-Part.	30	30	30	4	557289	173414	242
9138	1682	Non-Part.	30	30	30	4	557252	173432	244
9148	1683	Non-Part.	30	30	30	4	556967	173500	243
9149	1684	Non-Part.	27	27	27	4	557010	173609	239

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
9150	1685	Non-Part.	28	28	28	4	556889	173644	240
9155	1686	Non-Part.	27	27	27	4	556857	173411	238
9156	1687	Non-Part.	29	29	29	4	556914	173444	241
9157	1688	Non-Part.	29	29	29	4	556823	173514	237
9158	1689	Non-Part.	28	28	28	4	557397	173866	238
10393	1953	Non-Part.	25	25	25	4	553850	176170	220
10394	1954	Non-Part.	25	25	25	4	553815	176181	220
10395	1955	Non-Part.	25	25	25	4	553791	176182	220
10396	1956	Non-Part.	25	25	25	4	553757	176216	220
10397	1957	Non-Part.	25	25	25	4	553800	176220	220
10425	1985	Non-Part.	25	25	25	4	553516	176119	220
10426	1986	Non-Part.	25	25	25	4	553527	176153	220
10601	2161	Non-Part.	25	25	25	4	556767	175931	229
10602	2162	Non-Part.	23	23	23	4	556820	176009	228
10603	2163	Non-Part.	25	25	25	4	556904	175969	231
10620	2180	Non-Part.	25	25	25	4	556856	175155	229
10621	2181	Non-Part.	25	25	25	4	557124	175103	232
10622	4141	Part.	26	26	26	4	557207	175128	233
10623	2182	Non-Part.	24	24	24	4	555776	175289	225
10624	2183	Non-Part.	25	25	25	4	555841	175252	228
10625	4142	Part.	27	27	27	4	555607	174985	228
10626	2184	Non-Part.	25	25	25	4	555973	175394	228
10627	2185	Non-Part.	26	26	26	4	555452	175125	224
10628	2186	Non-Part.	26	26	26	4	555271	175124	222
10629	2187	Non-Part.	26	26	26	4	555307	175141	223
10630	2188	Non-Part.	25	25	25	4	548736	174071	213
10631	2189	Non-Part.	28	28	28	4	550164	174279	214
10632	2190	Non-Part.	30	30	30	4	551618	174771	216
10633	2191	Non-Part.	30	30	30	4	551634	174736	216
10634	2192	Non-Part.	30	30	30	4	551650	174708	216
10635	2193	Non-Part.	30	30	30	4	551661	174680	217
10636	2194	Non-Part.	30	30	30	4	551677	174650	217
10637	2195	Non-Part.	30	30	30	4	551698	174615	217

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
10638	2196	Non-Part.	30	30	30	4	551586	174605	215
10639	2197	Non-Part.	29	29	29	4	551556	174733	215
10640	2198	Non-Part.	31	31	31	4	551773	174509	217
10641	2199	Non-Part.	31	31	31	4	551792	174419	214
10642	2200	Non-Part.	33	33	33	4	551864	174099	219
10643	2201	Non-Part.	33	33	33	4	551782	174036	219
10644	2202	Non-Part.	31	31	31	4	553402	174264	218
10645	4143	Part.	31	31	31	4	553490	174326	220
10646	4144	Part.	32	32	32	4	553075	174266	221
10647	4145	Part.	32	32	32	4	553073	174240	220
10648	4146	Part.	32	32	32	4	553084	174260	221
10649	2203	Non-Part.	30	30	30	4	557644	173132	244
10650	2204	Non-Part.	31	31	31	4	557646	173174	244
10651	2205	Non-Part.	31	31	31	4	557591	173168	244
10652	2206	Non-Part.	30	30	30	4	557586	173200	244
10653	2207	Non-Part.	30	30	30	4	557586	173221	244
10654	2208	Non-Part.	30	30	30	4	557586	173248	243
10655	2209	Non-Part.	30	30	30	4	557573	173305	243
10656	2210	Non-Part.	30	30	30	4	557647	173346	243
10657	2211	Non-Part.	30	30	30	4	556764	173159	242
10658	2212	Non-Part.	31	31	31	4	556763	173100	242
10659	2213	Non-Part.	31	31	31	4	555986	173045	241
10660	2214	Non-Part.	31	31	31	4	555969	173045	241
10661	2215	Non-Part.	31	31	31	4	555945	173046	240
10662	2216	Non-Part.	30	30	30	4	555933	173053	240
10663	2217	Non-Part.	30	30	30	4	555948	173054	241
10664	2218	Non-Part.	31	31	31	4	555961	173052	241
10665	2219	Non-Part.	31	31	31	4	555980	173052	241
10666	2220	Non-Part.	30	30	30	4	555991	173054	241
10667	2221	Non-Part.	30	30	30	4	556004	173057	241
10668	2222	Non-Part.	30	30	30	4	556014	173059	241
10669	2223	Non-Part.	29	29	29	4	556034	173092	239
10670	2224	Non-Part.	30	30	30	4	556037	173102	239

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
10671	2225	Non-Part.	29	29	29	4	556043	173113	238
10672	2226	Non-Part.	29	29	29	4	556053	173121	238
10673	2227	Non-Part.	30	30	30	4	556063	173132	238
10674	2228	Non-Part.	29	29	29	4	556043	173150	237
10675	2229	Non-Part.	29	29	29	4	556035	173149	237
10676	2230	Non-Part.	28	28	28	4	556020	173143	236
10677	2231	Non-Part.	28	28	28	4	555998	173137	236
10678	2232	Non-Part.	29	29	29	4	549667	173324	216
10679	2233	Non-Part.	26	26	26	4	548801	173358	214
10680	2234	Non-Part.	27	27	27	4	549137	173286	215
10681	2235	Non-Part.	26	26	26	4	548685	172347	217
10682	2236	Non-Part.	26	26	26	4	548627	172253	217
10683	2237	Non-Part.	27	27	27	4	548700	171747	218
10684	2238	Non-Part.	28	28	28	4	549293	171737	220
10685	2239	Non-Part.	28	28	28	4	549256	171603	220
10686	2240	Non-Part.	27	27	27	4	548862	171656	219
10687	2241	Non-Part.	30	30	30	4	549690	171800	220
10703	2249	Non-Part.	37	37	37	4	556271	171463	237
10704	3914	Part.	41	41	41	4	556547	171206	245
10705	2250	Non-Part.	45	45	45	4	556770	170937	247
10706	2251	Non-Part.	36	36	36	4	555215	171221	243
10707	2252	Non-Part.	41	41	41	4	554616	170268	243
10708	2253	Non-Part.	42	42	42	4	554701	170258	244
10709	2254	Non-Part.	44	44	44	4	554785	170259	244
10710	2255	Non-Part.	45	45	45	4	556093	170281	247
10711	4155	Part.	44	44	44	4	556028	170300	247
10712	2256	Non-Part.	43	43	43	4	555234	170268	244
10713	4156	Part.	45	45	45	4	555244	169991	245
10714	2257	Non-Part.	43	43	43	4	554924	170268	243
10715	2258	Non-Part.	44	44	44	4	554860	170258	243
10716	4157	Part.	44	44	44	4	556533	170283	245
10717	2259	Non-Part.	30	30	30	4	551887	168998	240
10718	2260	Non-Part.	30	30	30	4	551882	168951	241

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
10719	2261	Non-Part.	29	29	29	4	551894	168891	241
10720	2262	Non-Part.	30	30	30	4	551904	168772	243
10721	2263	Non-Part.	29	29	29	4	551867	168629	239
10722	2264	Non-Part.	29	29	29	4	551654	168575	240
10723	2265	Non-Part.	29	29	29	4	551455	168907	241
10724	2266	Non-Part.	27	27	27	4	550975	168631	235
10725	2267	Non-Part.	27	27	27	4	550860	168590	233
10726	2268	Non-Part.	26	26	26	4	550973	168405	239
10727	2269	Non-Part.	27	27	27	4	551013	168417	241
10728	2270	Non-Part.	24	24	24	4	551064	168360	237
10729	2271	Non-Part.	32	32	32	4	552924	168864	242
10730	2272	Non-Part.	32	32	32	4	553394	168606	243
10731	2273	Non-Part.	33	33	33	4	553544	168665	242
10732	2274	Non-Part.	30	30	30	4	552407	168637	244
10733	2275	Non-Part.	30	30	30	4	552369	168641	244
10734	2276	Non-Part.	30	30	30	4	552307	168637	242
10735	2277	Non-Part.	30	30	30	4	552268	168630	242
10736	2278	Non-Part.	32	32	32	4	553618	168036	245
10737	2279	Non-Part.	32	32	32	4	553460	167997	245
10738	2280	Non-Part.	32	32	32	4	553416	168069	246
10739	2281	Non-Part.	31	31	31	4	553235	168131	246
10740	2282	Non-Part.	32	32	32	4	553463	167884	245
10741	2283	Non-Part.	32	32	32	4	553619	167646	246
10742	2284	Non-Part.	32	32	32	4	553610	167739	246
10743	2285	Non-Part.	32	32	32	4	553635	167774	245
10744	2286	Non-Part.	32	32	32	4	553632	167808	245
10745	2287	Non-Part.	32	32	32	4	553624	167559	246
11843	2746	Non-Part.	29	29	29	4	551746	174903	216
11844	2747	Non-Part.	29	29	29	4	551612	174864	216
11845	2748	Non-Part.	29	29	29	4	551582	174882	215
11846	2749	Non-Part.	29	29	29	4	551552	174890	215
11847	2750	Non-Part.	28	28	28	4	551562	175021	215
11848	2751	Non-Part.	29	29	29	4	551653	175009	215

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
11849	2752	Non-Part.	28	28	28	4	551417	175006	213
11850	2753	Non-Part.	28	28	28	4	551435	174963	214
11851	2754	Non-Part.	28	28	28	4	551485	174869	212
11852	2755	Non-Part.	29	29	29	4	551526	174799	215
11853	2756	Non-Part.	29	29	29	4	551608	174812	216
11854	2757	Non-Part.	28	28	28	4	551246	175014	214
11855	2758	Non-Part.	28	28	28	4	551188	175012	214
11856	2759	Non-Part.	28	28	28	4	551142	174994	211
11857	2760	Non-Part.	29	29	29	4	551273	174868	212
11858	2761	Non-Part.	27	27	27	4	550972	175382	214
11859	2762	Non-Part.	24	24	24	4	550955	175486	213
11860	2763	Non-Part.	31	31	31	4	556165	172913	241
11861	2764	Non-Part.	31	31	31	4	556141	172914	241
11862	2765	Non-Part.	31	31	31	4	556130	172915	241
11863	2766	Non-Part.	31	31	31	4	556117	172915	241
11864	2767	Non-Part.	31	31	31	4	556105	172915	240
11865	2768	Non-Part.	31	31	31	4	556083	172908	240
11866	2769	Non-Part.	31	31	31	4	556071	172897	239
11867	2770	Non-Part.	31	31	31	4	556048	172905	240
11868	2771	Non-Part.	31	31	31	4	556035	172902	239
11869	2772	Non-Part.	31	31	31	4	556019	172902	239
11870	2773	Non-Part.	31	31	31	4	556008	172902	239
11871	2774	Non-Part.	31	31	31	4	555984	172902	238
11872	2775	Non-Part.	30	30	30	4	555969	172903	238
11873	2776	Non-Part.	30	30	30	4	555955	172907	238
11874	2777	Non-Part.	31	31	31	4	556043	172939	241
11875	2778	Non-Part.	31	31	31	4	556042	172954	242
11876	2779	Non-Part.	31	31	31	4	556042	172963	242
11877	2780	Non-Part.	34	34	34	4	554859	171816	239
11878	4202	Part.	34	34	34	4	554744	171791	240
11879	2781	Non-Part.	34	34	34	4	554678	171814	239
11880	2782	Non-Part.	34	34	34	4	554600	171817	239
11881	2783	Non-Part.	34	34	34	4	554450	171832	239

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
11882	2784	Non-Part.	34	34	34	4	554367	171992	238
11883	2785	Non-Part.	35	35	35	4	554340	171969	238
11884	2786	Non-Part.	35	35	35	4	554304	171939	239
11885	2787	Non-Part.	34	34	34	4	554287	171902	239
11886	4203	Part.	35	35	35	4	554078	172079	235
11887	2788	Non-Part.	35	35	35	4	554109	171851	236
11888	2789	Non-Part.	36	36	36	4	553961	171622	239
11889	2790	Non-Part.	34	34	34	4	555204	171806	242
11890	2791	Non-Part.	34	34	34	4	555297	171808	243
11891	2792	Non-Part.	34	34	34	4	555352	171811	243
11892	2793	Non-Part.	35	35	35	4	555239	171717	242
11893	2794	Non-Part.	35	35	35	4	555237	171672	241
11898	4206	Part.	42	42	42	4	557235	169631	248
11899	2797	Non-Part.	41	41	41	4	557463	169677	248
11900	2798	Non-Part.	46	46	46	4	556789	169590	247
11901	2799	Non-Part.	45	45	45	4	556853	169304	248
11902	2800	Non-Part.	46	46	46	4	555177	169725	245
11903	2801	Non-Part.	35	35	35	4	553798	169513	243
11904	2802	Non-Part.	35	35	35	4	553641	169649	243
11905	2803	Non-Part.	34	34	34	4	553531	169660	243
11906	2804	Non-Part.	34	34	34	4	553474	169505	241
11907	2805	Non-Part.	34	34	34	4	553602	169474	243
11908	2806	Non-Part.	34	34	34	4	553593	169522	241
11909	2807	Non-Part.	34	34	34	4	553537	169382	242
11910	2808	Non-Part.	33	33	33	4	552264	169720	240
11911	2809	Non-Part.	44	44	44	4	556854	167016	255
11912	2810	Non-Part.	43	43	43	4	556729	166963	254
11913	4207	Part.	44	44	44	4	556784	166717	254
11914	2811	Non-Part.	41	41	41	4	556369	167050	253
11915	2812	Non-Part.	44	44	44	4	556754	167328	252
11916	4208	Part.	40	40	40	4	555877	167123	250
11917	2813	Non-Part.	38	38	38	4	555593	167045	247
11918	2814	Non-Part.	37	37	37	4	555432	167058	249

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
11919	2815	Non-Part.	35	35	35	4	555240	166800	246
11920	2816	Non-Part.	34	34	34	4	555003	166703	247
11921	2817	Non-Part.	34	34	34	4	554621	166969	245
11922	2818	Non-Part.	31	31	31	4	553771	166974	246
11923	2819	Non-Part.	32	32	32	4	554036	166800	248
11924	2820	Non-Part.	28	28	28	4	552408	166912	247
12590	3086	Non-Part.	26	26	26	4	553502	175785	218
12685	3181	Non-Part.	27	27	27	4	557956	175101	243
12686	3182	Non-Part.	26	26	26	4	557870	175101	241
12687	3183	Non-Part.	27	27	27	4	557889	174926	242
12688	3184	Non-Part.	27	27	27	4	558035	174986	243
12692	3188	Non-Part.	24	24	24	4	557633	175091	236
12693	3189	Non-Part.	29	29	29	4	556702	173982	239
12694	3190	Non-Part.	29	29	29	4	556759	174027	240
12695	3191	Non-Part.	28	28	28	4	556788	174055	240
12696	3192	Non-Part.	28	28	28	4	556934	174061	241
12710	3206	Non-Part.	30	30	30	4	555916	173006	240
12711	3207	Non-Part.	30	30	30	4	555902	172987	241
12712	3208	Non-Part.	31	31	31	4	556019	172954	241
12713	3209	Non-Part.	31	31	31	4	556015	172990	242
12714	3210	Non-Part.	31	31	31	4	556015	172998	242
12715	3211	Non-Part.	30	30	30	4	556012	173013	241
12716	4247	Part.	28	28	28	4	555813	173101	230
12717	3212	Non-Part.	31	31	31	4	555494	172927	239
12718	3213	Non-Part.	29	29	29	4	555514	172847	238
12719	3214	Non-Part.	31	31	31	4	555500	173013	241
12720	4248	Part.	32	32	32	4	555178	172605	241
12721	3215	Non-Part.	32	32	32	4	555084	172646	240
12722	3216	Non-Part.	31	31	31	4	555333	172875	241
12723	4249	Part.	31	31	31	4	555380	172909	241
12724	4250	Part.	31	31	31	4	555292	172853	240
12725	3217	Non-Part.	28	28	28	4	556081	173214	234
12726	3218	Non-Part.	30	30	30	4	556100	173179	237

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			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
12727	4251	Part.	43	43	43	4	552990	171445	230
12728	3219	Non-Part.	37	37	37	4	553239	170811	239
12729	4252	Part.	43	43	43	4	551869	171278	228
12730	3220	Non-Part.	39	39	39	4	551875	170831	228
12731	3221	Non-Part.	33	33	33	4	550555	171106	227
12732	3222	Non-Part.	24	24	24	4	547930	171256	219
12733	3223	Non-Part.	24	24	24	4	547903	171325	218
12734	3224	Non-Part.	24	24	24	4	547892	171407	218
12735	3225	Non-Part.	24	24	24	4	547874	171463	218
12736	3226	Non-Part.	24	24	24	4	547865	171520	218
12737	3227	Non-Part.	25	25	25	4	547666	171651	217
12738	3228	Non-Part.	26	26	26	4	547419	171674	217
12739	3229	Part.	25	25	25	4	548149	170941	220
12740	3230	Non-Part.	23	23	23	4	548048	170885	219
12741	3231	Non-Part.	24	24	24	4	548072	170800	219
12742	3232	Non-Part.	25	25	25	4	548171	170662	220
12743	3233	Non-Part.	24	24	24	4	548202	170121	219
12744	3234	Non-Part.	40	40	40	4	555184	168402	246
12745	3235	Non-Part.	40	40	40	4	555248	168426	245
12746	3236	Non-Part.	40	40	40	4	555246	168495	244
12747	3237	Non-Part.	44	44	44	4	556262	168583	248
12748	3238	Non-Part.	45	45	45	4	556224	168633	248
12749	4253	Part.	44	44	44	4	556723	168634	250
12750	3239	Non-Part.	42	42	42	4	557436	168956	249
12751	3240	Non-Part.	41	41	41	4	557588	169166	250
12752	3241	Non-Part.	43	43	43	4	557312	168799	249
12753	3242	Non-Part.	43	43	43	4	557315	168748	250
12754	3243	Non-Part.	44	44	44	4	557346	168649	251
12755	3244	Non-Part.	45	45	45	4	557276	168574	250
12756	4254	Part.	44	44	44	4	557001	168576	251
12757	3245	Non-Part.	46	46	46	4	557605	168569	249
12758	3246	Non-Part.	44	44	44	4	557833	168621	253
12759	3247	Non-Part.	44	44	44	4	556854	169054	248

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
12760	3248	Non-Part.	44	44	44	4	556797	168313	250
12863	3320	Non-Part.	21	21	21	4	547505	172624	213
12864	3321	Non-Part.	23	23	23	4	547477	172702	214
12868	3322	Non-Part.	23	23	23	4	547622	172338	215
12870	3323	Non-Part.	22	22	22	4	547680	172101	215
12871	4259	Part.	24	24	24	4	547803	172069	216
12872	4260	Part.	24	24	24	4	547757	171960	216
12880	3324	Non-Part.	31	31	31	4	550241	173397	217
13316	3440	Non-Part.	25	25	25	4	553360	176170	218
13400	3524	Non-Part.	27	27	27	4	555196	175128	222
13401	3525	Non-Part.	27	27	27	4	555040	175128	222
13402	3526	Non-Part.	27	27	27	4	554955	175135	221
13403	3527	Non-Part.	26	26	26	4	554626	175081	220
13404	3528	Non-Part.	27	27	27	4	554679	175089	220
13405	3529	Non-Part.	27	27	27	4	554593	175211	220
13406	3530	Non-Part.	28	28	28	4	553859	175139	219
13407	3531	Non-Part.	27	27	27	4	553828	175136	219
13408	3532	Non-Part.	27	27	27	4	553785	175143	219
13409	3533	Non-Part.	28	28	28	4	553701	175092	219
13410	4291	Part.	28	28	28	4	553562	175097	219
13411	3534	Non-Part.	28	28	28	4	553580	175277	218
13412	3535	Non-Part.	31	31	31	4	556769	173054	242
13413	3536	Non-Part.	32	32	32	4	556777	172975	244
13414	3537	Non-Part.	32	32	32	4	556831	172843	243
13415	3538	Non-Part.	32	32	32	4	556820	172788	242
13416	3539	Non-Part.	32	32	32	4	556831	172748	241
13417	3540	Non-Part.	32	32	32	4	556748	172719	240
13418	3541	Non-Part.	32	32	32	4	556817	172558	240
13419	3542	Non-Part.	31	31	31	4	556756	172592	239
13420	3543	Non-Part.	31	31	31	4	556695	172571	239
13421	3544	Non-Part.	31	31	31	4	556520	172569	236
13422	3545	Non-Part.	33	33	33	4	556681	172449	243
13423	3546	Non-Part.	34	34	34	4	556837	172454	244

Receiver ID	Republic Receiver ID	Republic Receiver Status	Sound Pressure Level (dBA)			Relative Height (m)	Coordinates (Ohio State Plane North)		
			Route A1	Route A2	Route Alt B		X (m)	Y (m)	Z (m)
13424	3547	Non-Part.	31	31	31	4	549859	171704	221
13425	3548	Non-Part.	32	32	32	4	550206	171794	221
13426	3549	Non-Part.	32	32	32	4	550197	171810	221
13427	3550	Non-Part.	44	44	44	4	551663	171852	225
13428	3912	Part.	45	45	45	4	551769	171863	227
13429	3902	Part.	48	48	48	4	551930	171846	227
13430	4292	Part.	46	46	46	4	551859	171704	227
13431	4293	Part.	46	46	46	4	551893	171638	225
13432	3901	Part.	48	48	48	4	551936	171871	228
13433	3551	Non-Part.	46	46	46	4	551814	171806	228
13434	3919	Part.	41	41	41	4	553242	171954	228
13435	3906	Part.	47	47	47	4	552751	171913	227
13436	3552	Non-Part.	44	44	44	4	556772	170204	244
13437	3553	Non-Part.	44	44	44	4	556719	170181	245
13438	3554	Non-Part.	44	44	44	4	556968	170191	241
13439	3555	Non-Part.	44	44	44	4	557122	170179	243
13440	4294	Part.	45	45	45	4	557173	170294	245
13441	3556	Non-Part.	44	44	44	4	557609	170445	247
13442	3557	Non-Part.	44	44	44	4	556768	170259	246
13448	3561	Non-Part.	32	32	32	4	553627	167618	246
13449	3562	Non-Part.	28	28	28	4	551867	167897	244
13450	3563	Non-Part.	29	29	29	4	551807	168107	244
13452	3565	Non-Part.	27	27	27	4	551475	167020	245
13454	3567	Non-Part.	31	31	31	4	553552	167466	246
13455	3568	Non-Part.	31	31	31	4	553612	167321	246
13456	3569	Non-Part.	29	29	29	4	553060	167044	246
13457	3570	Non-Part.	29	29	29	4	552800	167031	246
13458	3571	Non-Part.	29	29	29	4	552656	167032	247
14025	NA	NA	35	35	35	4	552366	173936	219
14028	NA	NA	30	30	30	4	554535	173940	228
14029	NA	NA	28	28	28	4	554745	174226	227



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