

# **APPENDIX D**

Appendix D includes sound studies for both the 2.5 MW layout and the alternative layout that includes eight 2.3 MW turbines

SOUND LEVEL ASSESSMENT  
REPORT GE 2.5 LAYOUT

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Dodge County Wind Project  
Dodge and Steele Counties, Minnesota

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December 17, 2018  
Revised September 4, 2019

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## 1.0 EXECUTIVE SUMMARY

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The Dodge County Wind Project (the Project) is a proposed wind power generation facility with a total capacity of approximately 170 megawatt (MW) and will consist of 68 wind turbines within an approximately 81 square mile region (Project Area) in Dodge and Steele Counties, Minnesota. The Project is being developed by Dodge County Wind, LLC (DCW), a wholly-owned indirect subsidiary of NextEra Energy Resources (NEER). Epsilon Associates, Inc. (Epsilon) has been retained by DCW through Atwell, LLC (Atwell) to conduct a sound level assessment for this Project. This report supersedes the previously prepared Sound Level Assessment report dated December 17, 2018 that was filed with the Minnesota Public Utilities Commission.

In general, this sound level assessment has been designed based on procedures identified in the Guidance for Large Wind Energy Conversion System, Noise Study Protocol and Report (LWECS Guidance) published by the Minnesota Department of Commerce, Energy Facility Permitting, dated October 8, 2012. The assessment included a sound monitoring program to determine existing sound levels in the vicinity of the Project, computer modeling to predict cumulative worst-case future L<sub>50</sub> sound levels from the Project, and a comparison of operational sound levels to regulatory limits. The analysis includes a total of 72 wind turbines (68 proposed + 4 alternates) all of which are GE 2.5-116 Low Noise Trailing Edge (LNTE) wind turbines. Previously the analysis included a combination of GE 2.5-116 Low Noise Trailing Edge (LNTE) wind turbines (60 proposed + 4 alternates) and GE 2.3 116 LNTE wind turbines (8 proposed). This Project is required to comply with Minnesota Pollution Control Agency (MPCA) State Noise Ordinance Standards, which are set forth in Section 4 of this report. For this analysis, all receptors with land use considered as Noise Area Classification 1 (NAC 1) were included in the modeling and evaluated as per Minn. Rule 7030.0040. The most restrictive of the noise limits is the nighttime L<sub>50</sub> sound level for NAC 1 of 50 dBA.

The worst-case sound levels produced by the Project were predicted through modeling. These modeled L<sub>50</sub> sound levels are below the MPCA limit of 50 dBA. Nighttime measurements showed non-wind-turbine ambient L<sub>50</sub> broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA L<sub>50</sub> nighttime limit of 50 dBA. The highest predicted worst-case Project Only L<sub>50</sub> sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA.

## 2.0 INTRODUCTION

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The proposed Project to be located in Dodge and Steele Counties, Minnesota will consist of 68 wind turbines. The proposed wind turbines are GE 2.5 MW units with a rotor diameter of 116 meters and a hub height of 90 meters. All wind turbines will be Low Noise Trailing Edge (LNTE) models. Of the 72 wind turbines included in the analysis (68 proposed + 4 alternates), 58 are located in Dodge County and 14 are located in Steele County. A collector substation is proposed for the Project with a 225 megavolt-ampere (MVA) transformer. The substation is located in Dodge County. Figure 2-1 shows the locations of the 68 proposed wind turbines, 4 alternate wind turbines, and substation transformer over aerial imagery in Dodge and Steele Counties.

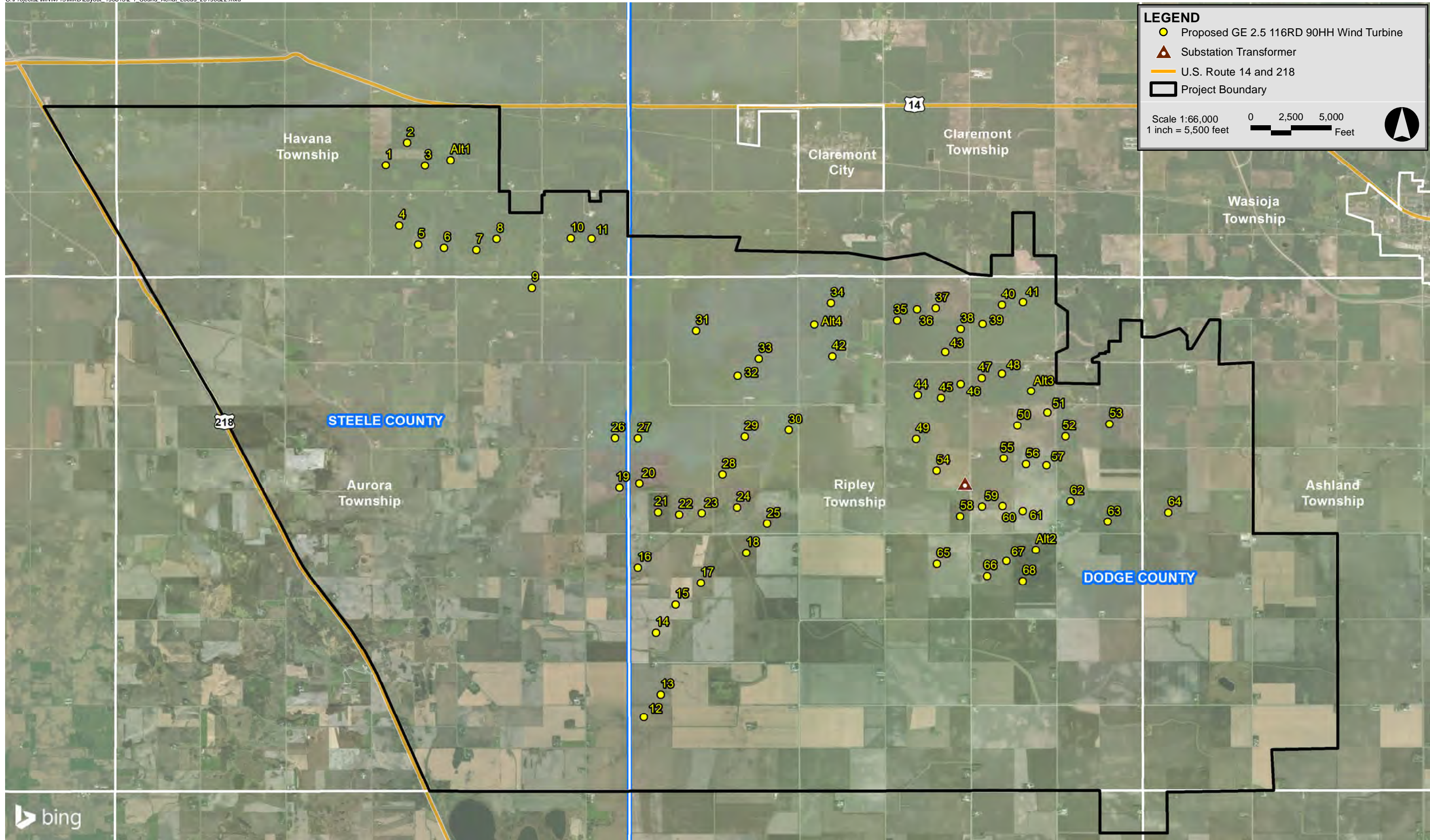
A detailed discussion of sound from wind turbines is presented in a white paper prepared by the Renewable Energy Research Laboratory.<sup>1</sup> A few points are repeated herein. Wind turbine sound can originate from two different sources: mechanical sound from the interaction of turbine components, and aerodynamic sound produced by the flow of air over the rotor blades. Prior to the 1990's, both were significant contributors to wind turbine sound. However, recent advances in wind turbine design have greatly reduced the contribution of mechanical sound. Aerodynamic sound has also been reduced from modern wind turbines due to slower rotational speeds and changes in materials of construction. Aerodynamic sound, in general, is broadband (has contributions from a wide range of frequencies). It originates from encounters of the wind turbine blades with localized airflow inhomogeneities and wakes from other turbine blades and from airflow across the surface of the blades, particularly the front and trailing edges. Aerodynamic sound generally increases with increasing wind speed up to a certain point, then typically remains constant, even with higher wind speeds. However, sound levels in general also increase with increasing wind speed with or without the presence of wind turbines.

This report presents the findings of an ambient measurement program and a sound level modeling analysis for the Project. The wind turbines were modeled in Cadna/A using sound data from a GE technical report provided by DCW through Atwell. The proposed substation transformer was also included in the model. The results of this analysis are found within this report.

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<sup>1</sup> Renewable Energy Research Laboratory, Department of Mechanical and Industrial Engineering, University of Massachusetts at Amherst, Wind Turbine Acoustic Noise, June 2002, amended January 2006.





Dodge County Wind Dodge & Steele Counties, MN



## 3.0 SOUND METRICS

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There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-decibel increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. Relative to this characteristic, a change in sound levels of less than 3 dB is imperceptible to the human ear.

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure sound is a standardized instrument.<sup>2</sup> It contains “weighting networks” (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as “pitch” or “tone”. The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as “dBA”. Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred to as “unweighted”. Sound pressure levels for some common indoor and outdoor environments are shown in Figure 3-1.

Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from a large number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during

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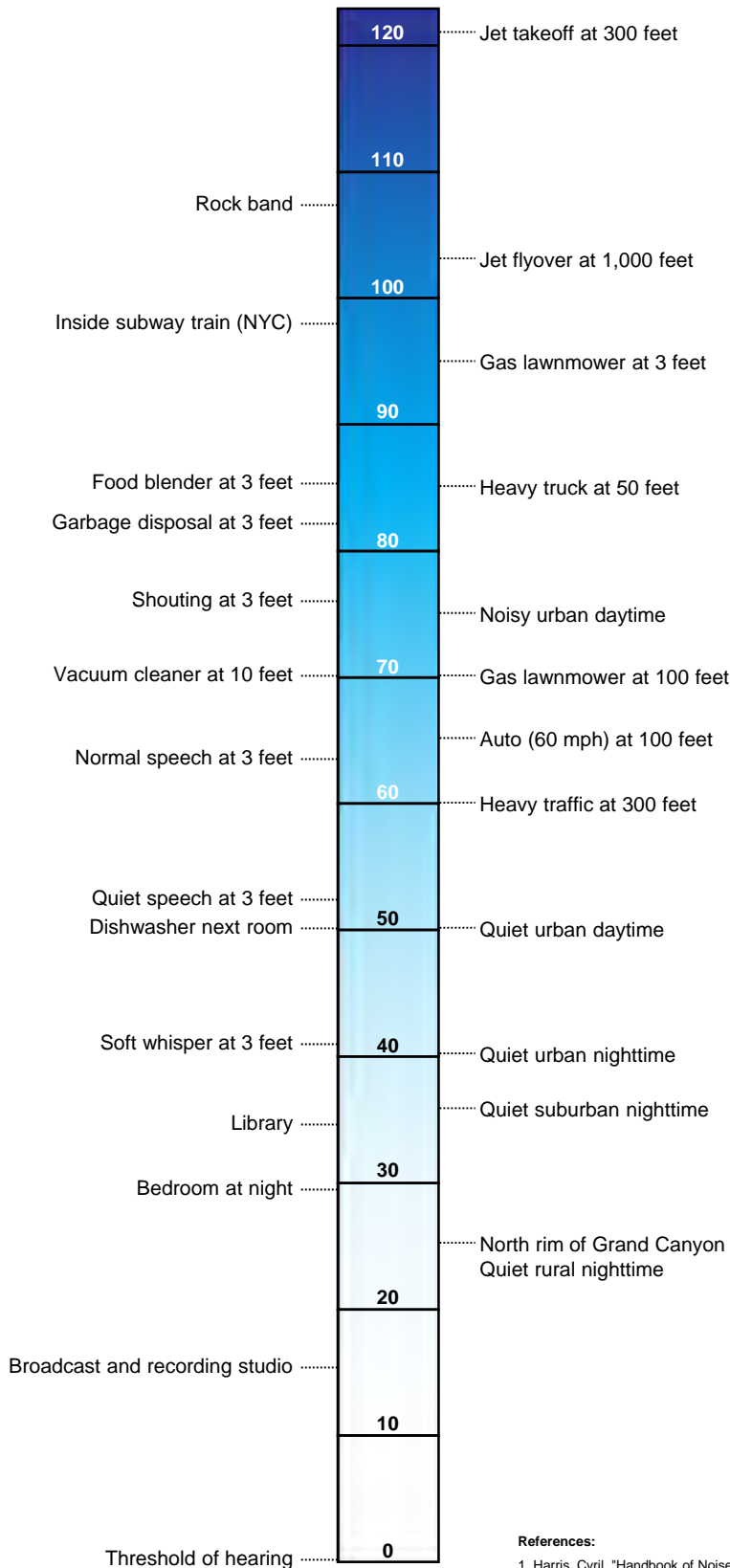
<sup>2</sup> *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983 (R2006), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

a measurement period. Exceedance levels are designated  $L_n$ , where  $n$  can have a value between 0 and 100 in terms of percentage. Several sound level metrics that are reported in community sound monitoring are described below.

- ◆  $L_{10}$  is the sound level exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The  $L_{10}$  is sometimes called the intrusive sound level because it is caused by occasional louder sounds like those from passing motor vehicles.
- ◆  $L_{50}$  is the sound level exceeded 50 percent of the time. It is the median level observed during the measurement period. The  $L_{50}$  is affected by occasional louder sounds like those from passing motor vehicles; however, it is often found comparable to the equivalent sound level under relatively steady sound level conditions.
- ◆  $L_{90}$  is the sound level exceeded 90 percent of the time during the measurement period. The  $L_{90}$  is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources.
- ◆  $L_{eq}$ , the equivalent level, is the level of a hypothetical steady sound that would have the same energy (*i.e.*, the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level is designated  $L_{eq}$  and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the  $L_{eq}$  is mostly determined by loud sounds if there are fluctuating sound levels.

Sound Pressure Level, dBA

**COMMON INDOOR SOUNDS** **COMMON OUTDOOR SOUNDS**



**References:**

- Harris, Cyril, "Handbook of Noise Acoustical Measurements and Noise Control", p 1-10., 1998
- "Controlling Noise", USAF, AFMC, AFDTIC, Elgin AFB, Fact Sheet, August 1996
- California Dept. of Trans., "Technical Noise Supplement", Oct, 1998

## 4.0 NOISE REGULATIONS

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### 4.1 Federal Regulations

There are no federal community noise regulations applicable to this Project.

### 4.2 Minnesota State Regulations

The proposed Dodge County Wind Project within Dodge and Steele Counties, MN is required to comply with MPCA's 7030.0040 sound standard, which states:

**Subpart 1. Scope.** These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of public health and welfare. These standards are consistent with speech, sleep, annoyance, and hearing conservation requirements for receivers within areas grouped according to land activities by the noise area classification (NAC) system established in part 7030.0050. However, these standards do not, by themselves, identify the limiting levels of impulsive noise needed for the preservation of public health and welfare. Noise standards in subpart 2 apply to all sources.

**Subpart 2. Noise Standards.**

Noise Area Classification	Daytime		Nighttime	
	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Minn. Rule 7030.0020 defines daytime hours as 7:00AM to 10:00PM and nighttime hours from 10:00PM to 7:00AM. All daytime and nighttime limits are expressed in A-weighted decibels (dBA) and are applicable over the duration of an hour. These are to be measured using the fast response characteristic of the measurement instrumentation per Minn. Rule 7030.0060.

Noise is defined by the State of Minnesota<sup>3</sup> as "any sound not occurring in the natural environment, including, but not limited to, sounds emanating from aircraft and highways, and industrial, commercial, and residential sources."

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<sup>3</sup> Minnesota Statutes 2017 Section 116.06



NAC 1<sup>4</sup> receptors are protected by the lowest sound level limits of the MPCA. Since wind turbines can operate under conditions resulting in maximum sound power during both the day and at night, the Project would need to comply during the period with more stringent limits, nighttime. Furthermore, because wind turbine sound is generally steady during a relatively constant wind speed there would be minimal difference, i.e. < 5 dBA, between the L<sub>50</sub> and L<sub>10</sub> sound levels due to a wind turbine. As the L<sub>50</sub> and L<sub>10</sub> noise limits differ by 5 decibels, the L<sub>50</sub> limit is more restrictive for a wind energy facility. Therefore, NAC 1 receptors have been evaluated against the L<sub>50</sub> sound level limit of 50 dBA in this analysis.

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<sup>4</sup> NAC 1 is defined per Rule 7030.0050 as household units (including farm houses); hotels, motels or other overnight lodging; mobile home parks or courts; other residential units; motion picture production; medical and other health services; correctional institutions; educational services; religious activities; cultural activities and nature exhibitions; entertainment assembly; camping and picnicking areas (designated); resorts and group camps; other cultural, entertainment, and recreational activities.

## 5.0 EXISTING SOUND LEVELS

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### 5.1 Overview

The Project is to be located in Dodge and Steele Counties, MN, to the south of Highway 14. The Project is proposed to have 68 GE wind turbines, all of which will be 2.5 MW units.

### 5.2 Sound Level Environment

An ambient sound level survey was conducted to characterize the current acoustical environment in the community within, and to the west of, the Project Area. Existing sound sources include: vehicles on Highway 14 (including trucks) and on other local roads, occasional trains to the north of the Project Area, wind, dogs, rustling vegetation, occasional distant aircraft, livestock and farm equipment, and geese along with other birds.

### 5.3 Sound Level Measurement Locations

Sound level measurement locations were originally selected based on the LWECs Guidance document which requires at least seven (7) days of measurements (“long-term”). The document specifies that measurements be performed within the Project Area at no fewer than three locations including the “worst-case” receptor predicted by the sound level model. The worst-case modeling receptor is monitoring Location L3, as determined by modeling results using a preliminary wind turbine layout.<sup>5</sup> This layout is documented in a pre-construction sound level measurement protocol (the Protocol) that was submitted to the MN DOC on March 14, 2018. The layout is shown on Figure 1 of the Protocol which is provided as Appendix A of this report. Under the current modeling, this location has a modeled broadband sound level equal to the worst-case modeled sound level at a residence and is considered to be non-participating.

Since this was a pre-construction program for DCW and Epsilon interprets subsections #1 and #2 in the LWECs Guidance to pertain to a post-construction evaluation, no off-site long-term monitoring locations were selected. However, supplemental short-term measurements were performed to the west of the Project Area, west of Highway 218. Details of the long-term and short-term locations are described below.

#### *5.3.1 Long-term Locations*

The selection of the sound monitoring locations was intended to be representative of receptors within the Project Boundary per the requirements of the LWECs Guidance document. Figure 5-1 shows the actual long-term measurement locations overlaid upon an

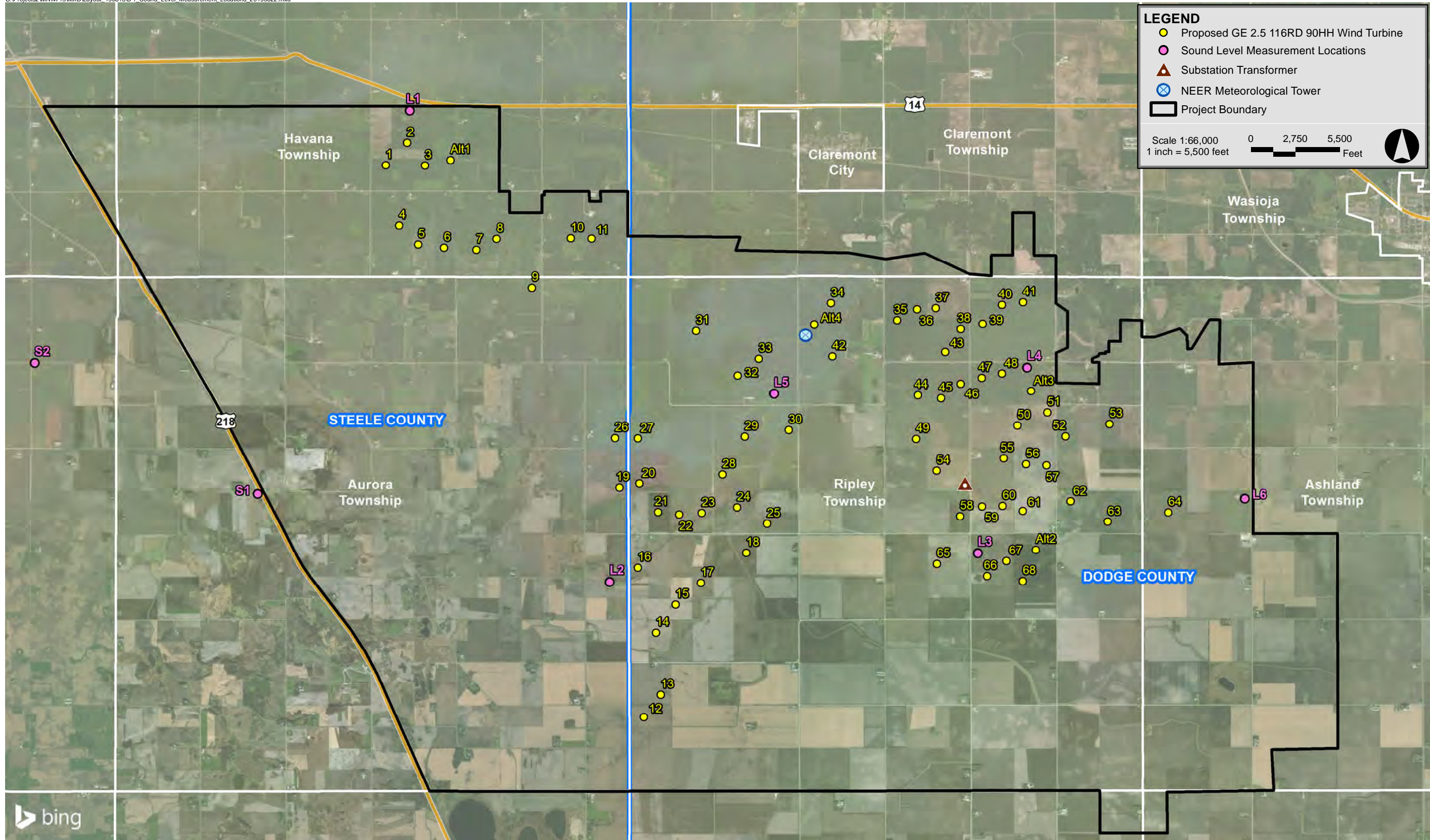
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<sup>5</sup> Under the current (190815) layout, this location still has the highest modeled sound level.

aerial photograph of the surrounding area. Each measurement location is described below. DCW coordinated access to private property prior to the commencement of the measurement program. The coordinates for the six long-term locations were obtained by Epsilon staff using Global Positioning System (GPS) instrumentation and are presented in latitude longitude coordinates in reference to the NAD83 datum in Table 5-1. All distances are rounded to the nearest 10 feet or shown in miles. Photographs of the six locations are included in Figures 5-2 through 5-7, respectively.

- ◆ Location L1 – Modeling Receptor #506
  - Approximately 2,020 feet to the closest proposed wind turbine (#2). This location is representative of the residences near Highway 14 in the northwest corner of the Project Area.
  
- ◆ Location L2 – Modeling Receptor #202
  - Approximately 1,950 feet to the closest proposed wind turbine (#16). This location is representative of residences in the southwest area of the Project and of the residences near proposed GE 1.7 wind turbines.
  
- ◆ Location L3 – Modeling Receptor #210
  - Approximately 1,520 feet to the closest proposed wind turbine (#66). This location is representative of the modeling receptor with the highest modeled sound level.
  
- ◆ Location L4 – Modeling Receptor #121
  - Approximately 1,470 feet to the closest proposed wind turbine (#Alt3). This location is representative of the residences in the northeast corner of the Project Area.
  
- ◆ Location L5 – Modeling Receptor #107
  - Approximately 2,370 feet to the closest proposed wind turbine (#33). This location is representative of the residences in the northern central part of the Project Area.
  
- ◆ Location L6 – Modeling Receptor #174
  - Approximately 4,810 feet to the closest proposed wind turbine (#64). This location is representative of the residences on the eastern end of the Project Area.





Dodge County Wind Dodge & Steele Counties, MN



Figure 5-2 Photo of Sound Level Measurement Location L1 (facing north)



Figure 5-3 Photo of Sound Level Measurement Location L2 (facing south)



Figure 5-4 Photo of Sound Level Measurement Location L3 (facing west)



Figure 5-5 Photo of Sound Level Measurement Location L4 (facing north)





Figure 5-6 Photo of Sound Level Measurement Location L5 (facing west)



Figure 5-7 Photo of Sound Level Measurement Location L6 (facing south)



**Table 5-1 GPS Coordinates – Long-term Sound Level Measurement Locations**

Location	Coordinates	
	Latitude (°)	Longitude (°)
L1	44.05075	93.09703
L2	43.97113	93.04990
L3	43.97566	92.96365
L4	44.00745	92.95164
L5	44.00298	93.01144
L6	43.98523	92.90135

**5.3.2 Short-term Locations**

A total of two (2) short-term measurement locations were utilized for the program. The specific locations were field-identified by the Epsilon engineer to capture sound levels representative of homes outside the Project Area near Route 218 and at a significant distance from Route 218. The earlier Figure 5-1 shows the actual short-term measurement locations with respect to the Project Area. Each measurement location is described herein. The coordinates for the two short-term locations were obtained by Epsilon staff using Global Positioning System (GPS) instrumentation and are presented in latitude longitude coordinates in reference to the NAD83 datum in Table 5-2. Photographs of the two locations are included in Figures 5-8 and 5-9, respectively.

- ◆ Location S1 – North side of SE 73<sup>rd</sup> Street approximately 130 feet west of the Highway 218 intersection
  - 3.5 miles from the nearest proposed wind turbine (#5). This location is representative of residences in close vicinity to Highway 218 along the western boundary of the Project Area.
  
- ◆ Location S2 – South side of SE 58<sup>th</sup> Street approximately 200 feet east of the SE 24<sup>th</sup> intersection
  - 4.6 miles from the nearest proposed wind turbine (#4). This location is representative of residences in agricultural areas to the west of the Project Area away from any highway.



Table 5-2 GPS Coordinates – Short-term Sound Level Measurement Locations

Location	Coordinates	
	Latitude (°)	Latitude (°)
S1	43.98647	93.13259
S2	44.00808	93.18485

Figure 5-8 Photo of Sound Level Measurement Location S1 (facing east)



Figure 5-9 Photo of Sound Level Measurement Location S2 (facing west)



## 5.4 Sound Measurement Methodology

### 5.4.1 *Long-term Measurement Methodology*

Programmable unattended sound level meters were placed at on-site Locations L1, L2, L3, L4, L5, and L6. These monitors continuously measured sound levels from generally Tuesday, March 20, 2018 to Thursday, March 29, 2018. Sound levels were measured at a height of approximately five feet above the ground at locations where there were no large reflective surfaces to affect the measured levels.

In addition to the collection of sound level data, ground-level wind speeds were continuously measured and logged at each location. Only hourly sound levels coupled with hourly-averaged ground level wind speeds have been summarized. Per the LWECs Guidance, sound levels measured under wind speeds above 11 mph were considered invalid and removed from the analysis.

A NEER on-site meteorological tower located approximately 822 feet southwest from proposed wind turbine #Alt4 measured and logged wind speeds during the sound level measurement period. The location of the on-site met tower is identified in Figure 5-1. Meteorological data collected during the measurement period at the Dodge Center Airport

National Weather Service (NWS) station in Dodge Center, MN were also archived from the National Centers for Environmental Information (NCEI). These data are included in Appendix B and were used to determine hourly precipitation periods during the measurement program during which the Guidance requires removal of measured sound levels from the results.

At Location L1, a continuous programmable unattended sound level meter was placed on the property at 6893 SE 28<sup>th</sup> St in Claremont. This measurement location is a residence with pending participation that is representative of residences in the northwest corner of the Project near Hwy 14. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 12:00 PM Tuesday, March 20 until 2:00 PM Thursday, March 29 for a total of 218 hours.

At Location L2, a continuous programmable unattended sound level meter was placed on the property at 8375 SE 89<sup>th</sup> Ave in Claremont. This measurement location is a residence that is representative of residences in the southwest corner of the Project Area and of the residences near proposed GE 1.7 wind turbines. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 2:00 PM Tuesday, March 20 until 11:00 AM Thursday, March 29 for a total of 213 hours.

At Location L3, a continuous programmable unattended sound level meter was placed on the property at 67214 140<sup>th</sup> Ave in Claremont. This measurement location is a residence with pending participation that has the highest modeled Project Only broadband sound level at a residence. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 6:00 PM Tuesday, March 20 until 10:00 AM Thursday, March 29 for a total of 208 hours.

At Location L4, a continuous programmable unattended sound level meter was placed on the property 14643 650<sup>th</sup> St in Claremont. This measurement location is a participating residence and is representative of residences in the northeast corner of the Project. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 9:00 AM Thursday, March 22 until 1:00 PM Thursday, March 29 for a total of 172 hours.

At Location L5, a continuous programmable unattended sound level meter was placed on the property at 11688 655<sup>th</sup> St in Claremont. This measurement location is a participating residence and is representative of residences around the northern center of the Project site. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 3:00 PM Tuesday, March 20 until 12:00 PM Thursday, March 29 for a total of 214 hours.

At Location L6, a continuous programmable unattended sound level meter was placed on the property at 66583 170<sup>th</sup> Ave in Dodge Center. This measurement location is a non-participating residence and is representative of residences on the eastern end of the Project site. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 9:00 AM Wednesday, March 21 until 9:00 AM Thursday, March 29 for a total of 192 hours.

In addition to A-weighted and Z-weighted sound levels, broadband equivalent C-weighted sound level data ( $LC_{eq}$ ) were also collected at each location. Sound observations were made at all six locations during daytime hours generally corresponding to equipment setups on March 20 and March 21. Sound observations were also made during nighttime hours from 10:30 PM to 12:30 AM on the night of March 21 to 22. An Epsilon engineer checked on the integrity of the long-term monitoring equipment no less than one time following the initial setup.

#### **5.4.2**        *Short-term Measurement Methodology*

In addition to the long-term data, short-term sound level measurements were made at Locations S1 and S2 at publicly accessible locations. One daytime and one nighttime sound level measurement, each 20-minutes in duration, was taken at each location during conditions when there was no precipitation<sup>6</sup> and ground-level wind speeds were less than 11 mph as measured by hand-held meteorological equipment. Sound observations were made during both periods at each location by the Epsilon engineer.

Sound levels were measured at a height of approximately five feet above the ground at locations where there were no large reflective surfaces to affect the measured levels. Below is a description of the measurement program for each location.

Short-term measurements were performed at Location S1 on the road edge approximately 100 feet to the west of the intersection of Hwy 218 and SE 73<sup>rd</sup> St. A tripod-mounted sound level meter measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics for 20 minutes starting at 1:06 PM for the daytime period on Wednesday, March 21 and at 12:34 AM on Thursday, March 22 for the nighttime period. Broadband equivalent C-weighted sound level data ( $LC_{eq}$ ) were also collected.

Short-term measurements were performed at Location S2 on the road edge approximately 200 feet to the east of the intersection of SE 58<sup>th</sup> St and SE 24<sup>th</sup> Ave. A tripod-mounted sound level meter measured and stored A-weighted broadband and Z-weighted one-third

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<sup>6</sup> Negligible snow flurry briefly occurred during daytime measurement at Location S2 with roads remaining dry

octave-band sound level statistics for 20 minutes starting at 12:06 PM for the daytime period on Wednesday, March 21 and at 1:09 AM on Thursday, March 22 for the nighttime period. Broadband equivalent C-weighted sound level data ( $LC_{eq}$ ) were also collected.

## 5.5 Measurement Equipment

### 5.5.1 *Sound Level Equipment*

Six Larson Davis (LD) model 831 sound level meters, equipped with PCB Piezotronics Type 1 preamplifiers, PCB 377B20 or 377C20 half-inch microphones, and environmental protection kits were used to collect continuous broadband A-weighted (dBA), broadband C-weighted equivalent ( $LC_{eq}$ ), and Z-weighted one-third octave-band sound pressure level data at Locations L1, L2, L3, L4, L5, and L6. Each microphone was tripod-mounted at a height of five feet above ground with a 7-inch diameter windscreen. The meters utilized fast response and were set to log data every hour along with a one-minute time history for A-weighted parameters including:  $L_1$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ , and  $L_{eq}$ .

One LD model 831 meter was used to collect short-term broadband A-weighted,  $LC_{eq}$ , and Z-weighted one-third octave-band sound pressure level data at Locations S1 and S2 for 20 minutes during daytime and nighttime hours. This meter was tripod-mounted at a height of five feet above ground with a 7-inch diameter windscreen. The meter utilized fast response and was set to log data every 20 minutes along with a one-second time history for the same A-weighted parameters as the long-term meters.

All meters meet Type 1 ANSI S1.4-1983 (R2006) standards for sound level meters and were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. These calibrations were conducted by an independent laboratory within the prior 12 months of the measurement program. Additionally, all sound level measurement equipment was calibrated in the field before and after the surveys with the manufacturer's acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI/ASA S1.40-2006 (R2016).

### 5.5.2 *Meteorological Equipment*

Wind speed can have a strong influence on ambient sound levels. In order to understand how the existing sound levels are influenced by wind speed and as per the LWECs Guidance, continuous wind speed data were recorded at each long-term location by Epsilon. A HOBO H21-002 micro-weather station (manufactured by Onset Computer Corporation) was used to continuously measure the ground-level wind speed. The wind sensor was mounted at a height of approximately five feet above the ground (microphone height) and data were logged every hour to be synced with the sound level measurements. These sensors have a measurement range of 0 to 44 m/s (99 mph) and an accuracy of  $\pm 1.1$  m/s (2.4 mph), or better. Depending on the model used, the starting threshold was  $\leq 1$  m/s (2.2 mph) or  $\leq 0.5$  m/s (1.1 mph). Wind direction data were additionally collected at

Location L4 and L5. The wind direction measurement range is 0 to 358 degrees (2-degree dead band), with an accuracy of  $\pm 5$  degrees. For the short-term measurements where weather station utilization was not practical, wind speeds were measured with a hand-held Davis Instruments TurboMeter electronic wind speed indicator.

In addition to Epsilon's portable weather stations, Dodge County Wind's on-site meteorological tower measured and logged wind speeds during the measurement program. These data were scaled to a height of 89 meters, to represent hub height wind speeds, and averaged over hourly periods to correlate with the sound data. The location of the meteorological tower is approximately 822 feet southwest of proposed wind turbine #Alt4 as shown in Figure 5-1.

Meteorological data collected during the measurement period at the Dodge Center Airport National Weather Service (NWS) station in Dodge Center, MN were also archived from the National Centers for Environmental Information (NCEI) and are included in Appendix B.

## 5.6 Measured and Calculated Sound Levels

A brief summary of the measured (A-weighted) and measured/calculated (C-weighted) sound levels and sound sources at each long-term and short-term location is provided in this section. Several weather events were notable during the approximately 7-day measurement program, including 47 hours of precipitation, as determined from the NCEI data. These periods were excluded from the analysis as per the LWECS Guidance but included in the graphical presentations in this section. Short-term measurements were performed during dry periods. Snow cover was either minimal or nonexistent during the entire measurement program. Since this was a pre-construction program for DCW and Epsilon interprets subsection #29 in the LWECS Guidance to pertain to a post-construction evaluation, no comparison of measured sound levels to the Minnesota limits is provided in this report.

### 5.6.1 *Long-term Sound Levels*

#### 5.6.1.1 Location L1

Based on personal observations, sound levels at Location L1 were influenced by vehicular traffic (including trucks) on Hwy 14, wind, occasional trains, and birds. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (8% of measurements), are summarized below. Ground level wind speeds did not exceed 11 mph at this location during the monitoring period. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-10 (A-weighted sound levels) and Figure 5-11 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by traffic on Hwy 14.

- ◆ The  $L_{10}$  A-weighted sound levels ranged from 41 to 61 dBA;

- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 29 to 55 dBA.

#### 5.6.1.2 Location L2

Based on personal observations, sound levels at Location L2 were influenced by farm vehicles, livestock, birds, wind, and some distant vehicles on local roads. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (7% of measurements), are summarized below. Ground level wind speeds did not exceed 11 mph at this location during the monitoring period. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-12 (A-weighted sound levels) and Figure 5-13 (C-weighted sound levels) as per the LWECs Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by farm activity and livestock on the property.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 27 to 69 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 20 to 53 dBA.

#### 5.6.1.3 Location L3

Based on personal observations, sound levels at Location L3 were influenced by wind, birds, a mechanical noise to the east (nighttime only), and distant vehicles on local roads and Hwy 14. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (6% of measurements), are summarized below. Ground level wind speeds did not exceed 11 mph at this location during the monitoring period. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-14 (A-weighted sound levels) and Figure 5-15 (C-weighted sound levels) as per the LWECs Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by the unknown and off-property mechanical noise at nighttime and by birds during the daytime.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 19 to 58 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 18 to 53 dBA.

In addition to broadband sound levels, one-third octave-band sound levels were collected at this location and are presented in this report. One-third octave-band data from an hourly period during representative wind speed conditions, interpreted by Epsilon as low ground-level wind speed and high hub-height wind speed, are presented for this location in Figure 5-16 for the worst-case modeled receptor<sup>7</sup> per the LWECs Guidance. Z-weighted, A-weighted, and C-weighted one-third octave-band frequency levels are included in the figure.

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<sup>7</sup> As identified in the Protocol (Appendix A)

#### 5.6.1.4 Location L4

Based on personal observations, sound levels at Location L4 were influenced by distant vehicles on local roads, wind, birds, and dogs. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (5% of measurements) and 22 hours when ground level wind speeds exceeded 11 mph (13% of measurements), are summarized below. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-17 (A-weighted sound levels) and Figure 5-18 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by wind conditions in the area.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 21 to 53 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 19 to 49 dBA.

#### 5.6.1.5 Location L5

Based on personal observations, sound levels at Location L5 were influenced by wind, birds, some automotive work at the residence, distant vehicles on Hwy 14, and an off-property mechanical noise (nighttime only). The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (7% of measurements) and 6 hours when ground level wind speeds exceeded 11 mph (3% of measurements), are summarized below. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-19 (A-weighted sound levels) and Figure 5-20 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by various sources.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 26 to 60 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 20 to 56 dBA.

#### 5.6.1.6 Location L6

Based on personal observations, sound levels at Location L6 were influenced by wind, distant vehicles, occasional trains, birds, dogs, mechanical noise from manufacturing facilities in various directions from the residence. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (5% of measurements) and 24 hours when ground level wind speeds exceeded 11 mph (12% of measurements), are summarized below. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-21 (A-weighted sound levels) and Figure 5-22 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by various sources.



Figure 5-10: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L1

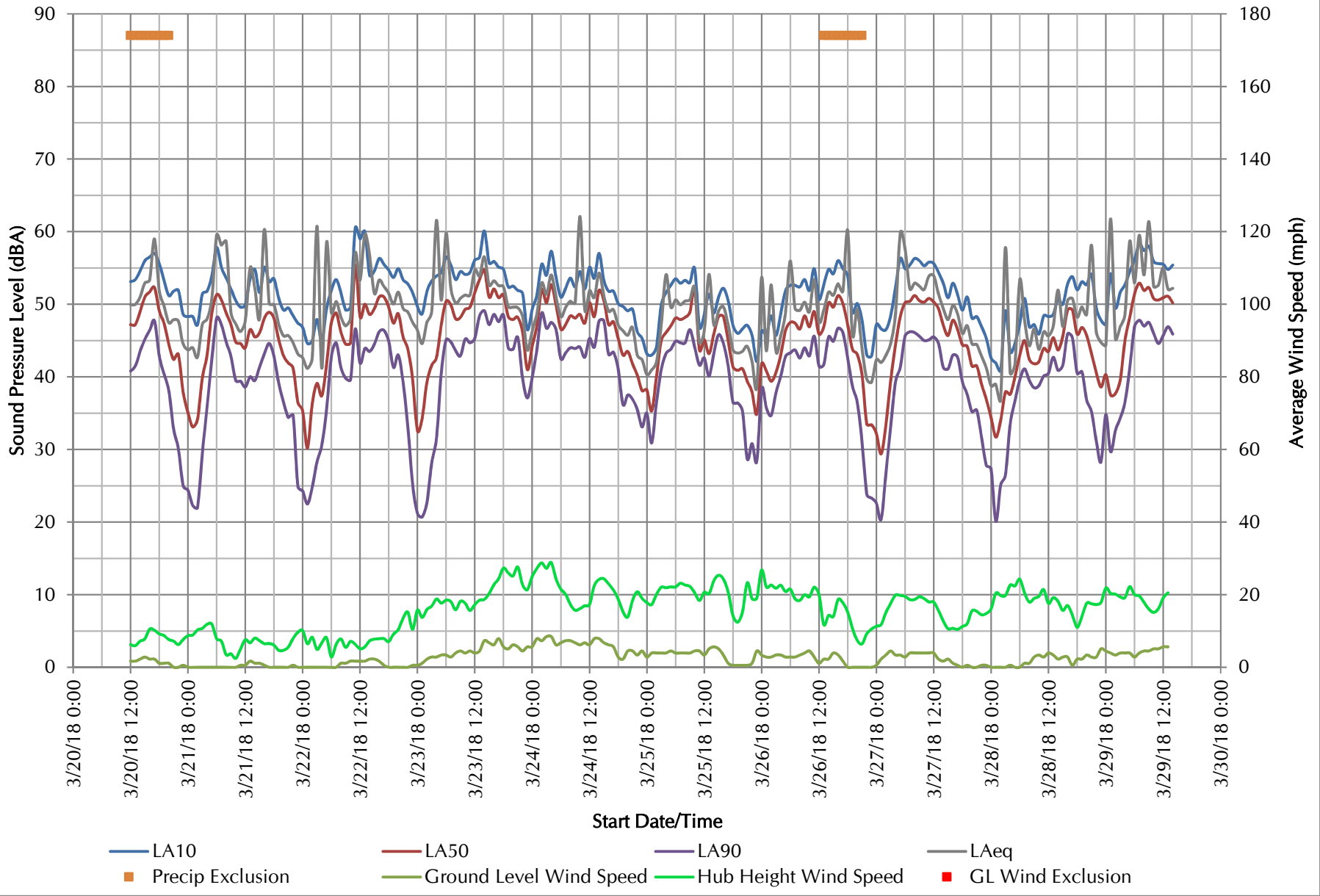


Figure 5-11: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L1

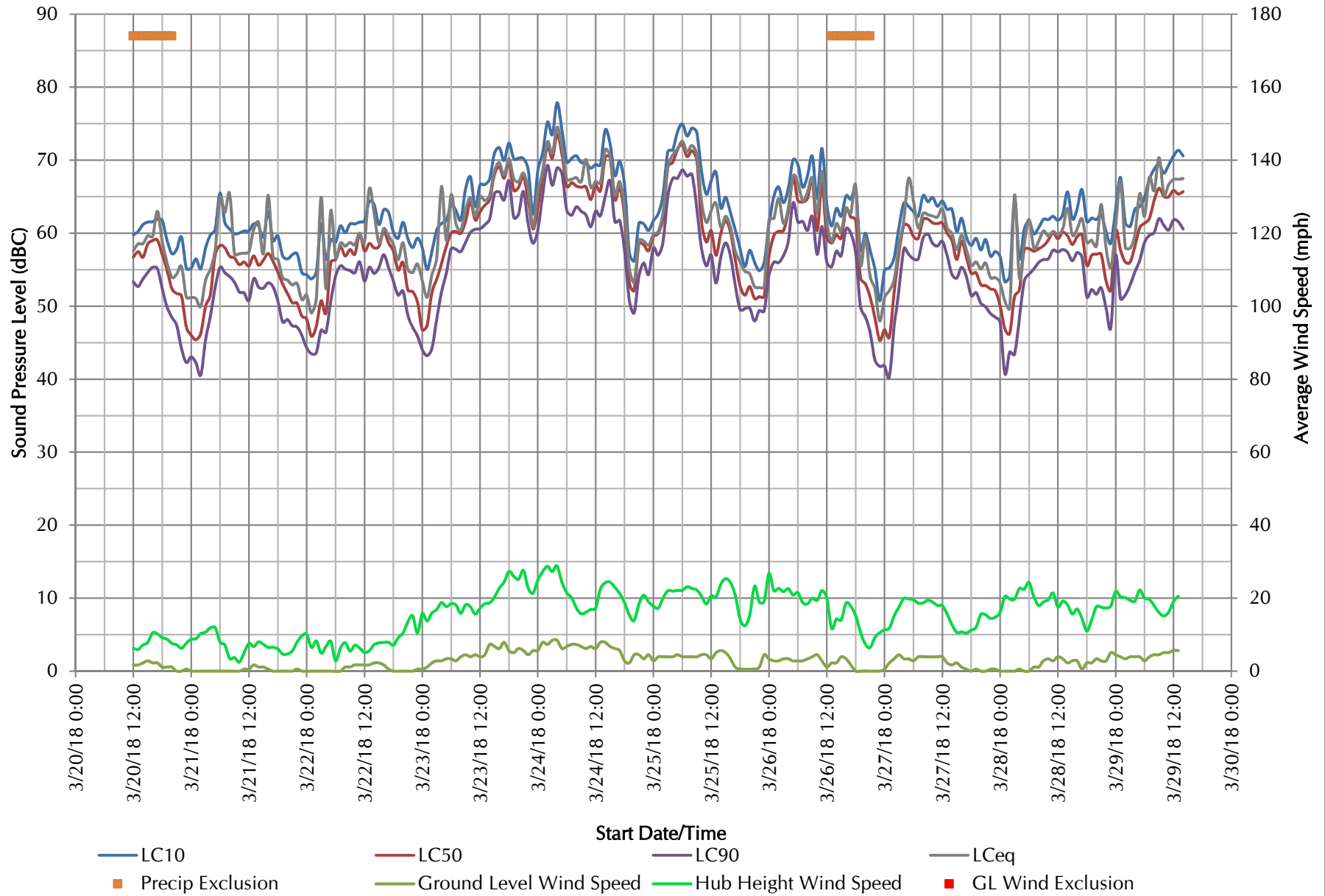


Figure 5-12: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L2

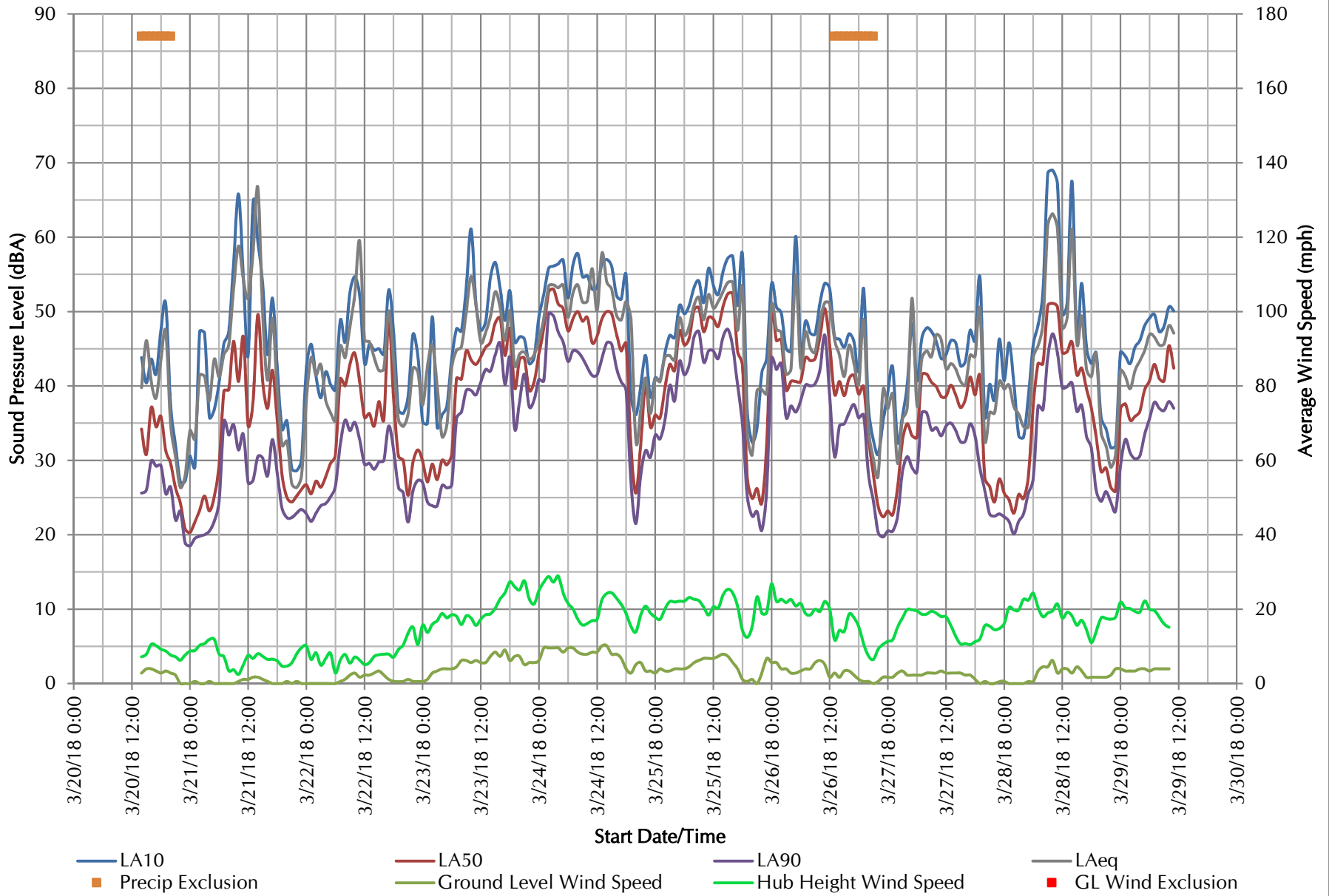


Figure 5-13: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L2

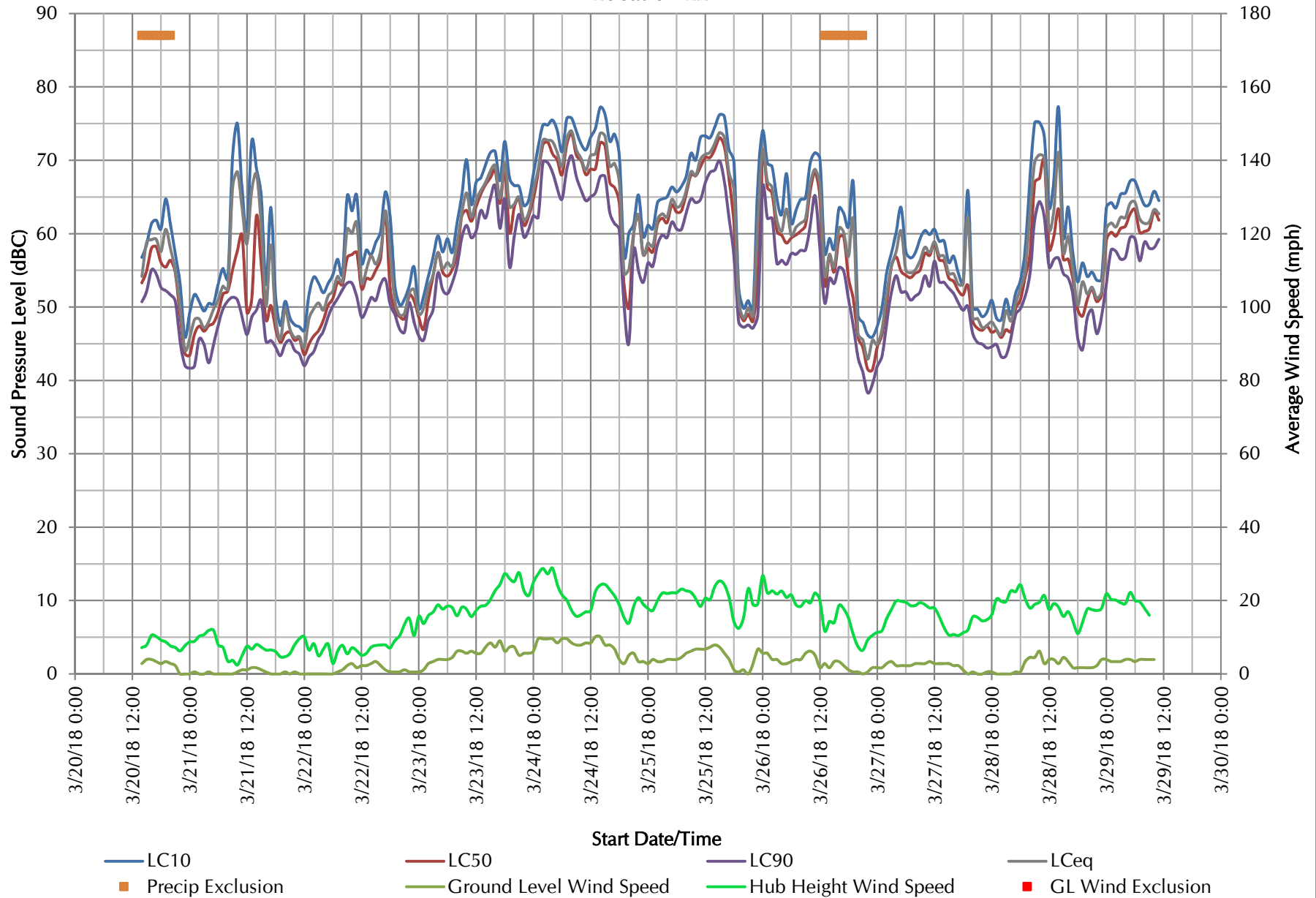


Figure 5-14: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L3

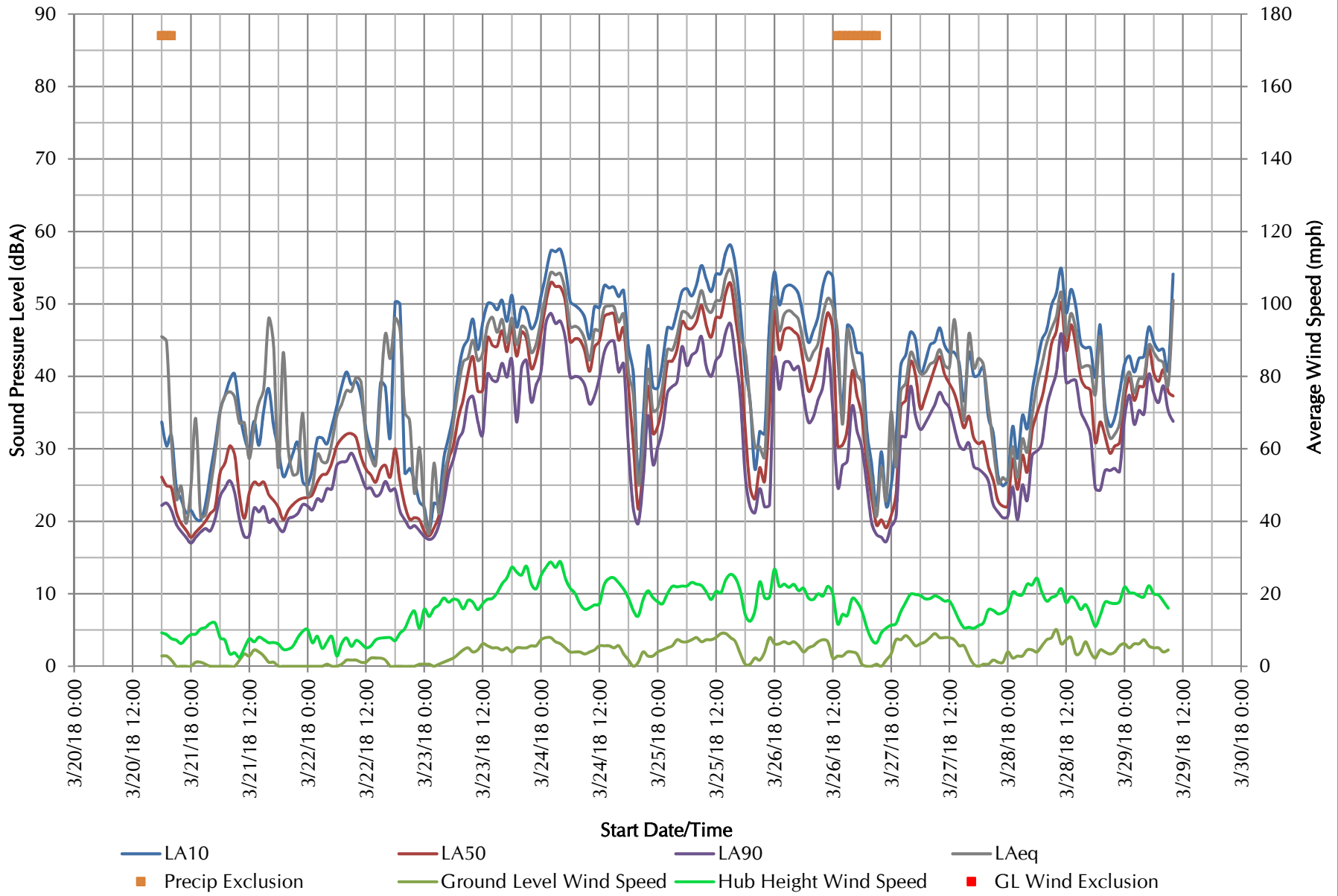


Figure 5-15: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L3

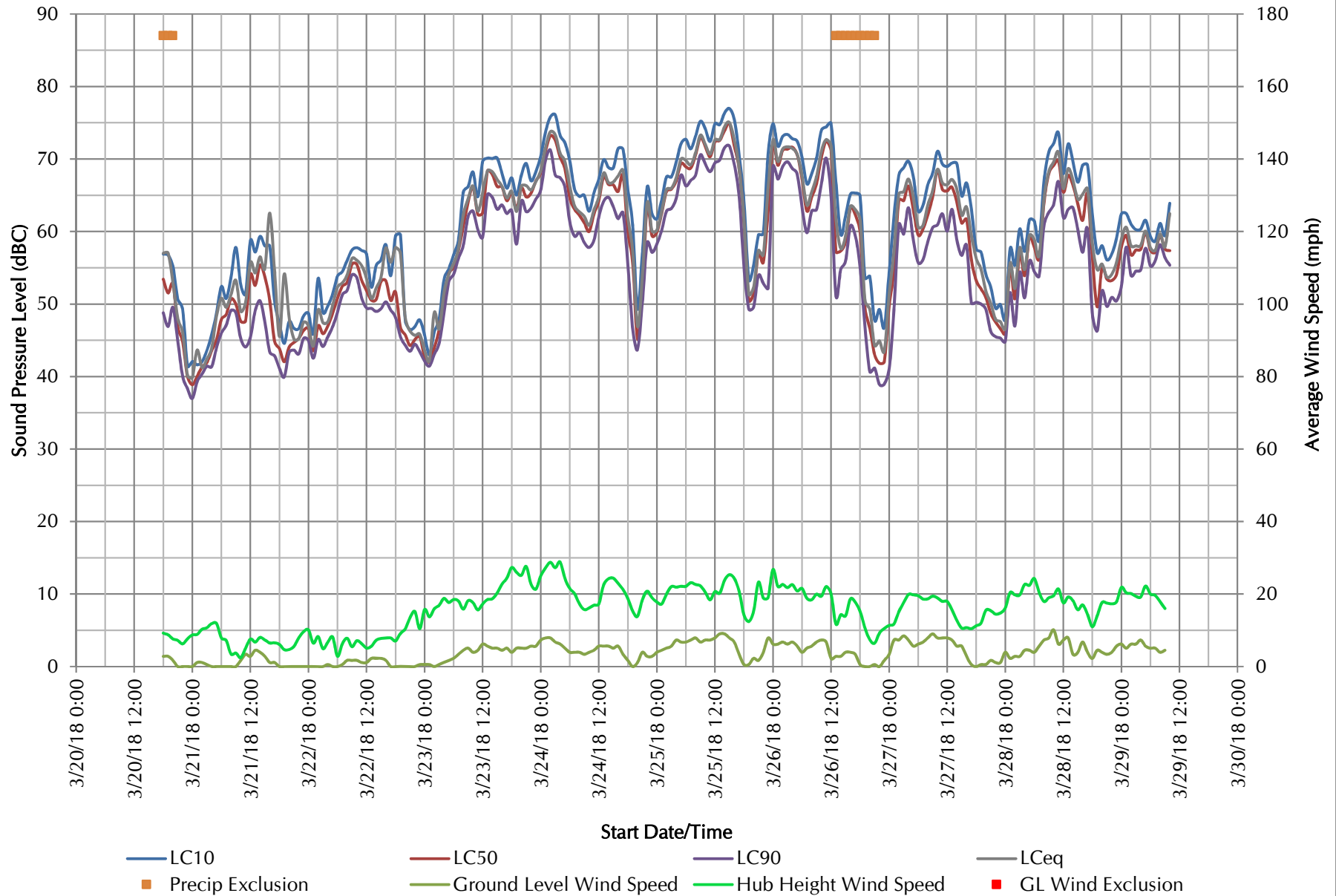


Figure 5-16: Measured One-Third Octave Band Sound Levels During A Representative Hub Height Wind Speed Period - Location L3

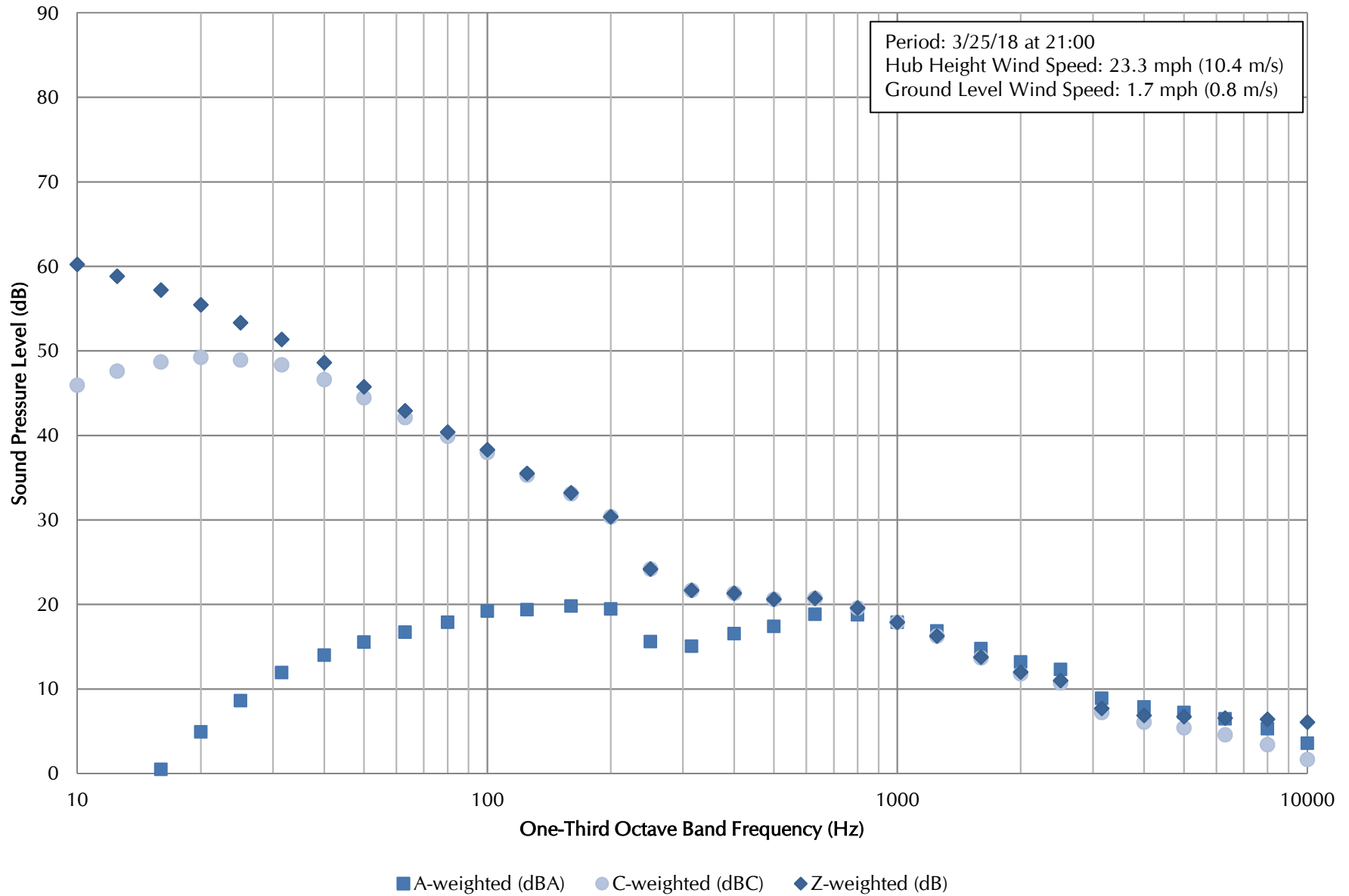
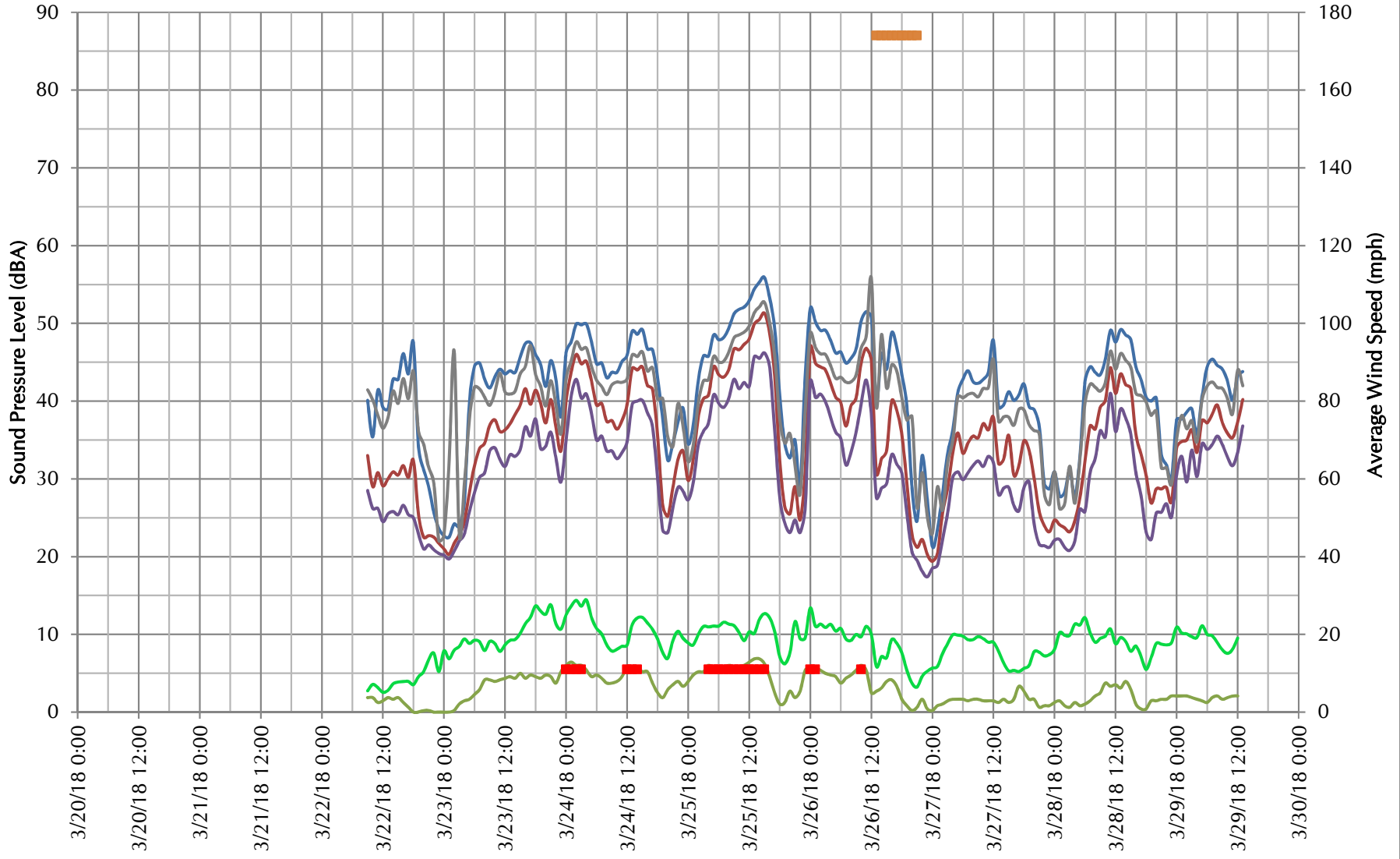


Figure 5-17: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L4



— LA10      — LA50      — LA90      — LAeq  
■ Precip Exclusion      — Ground Level Wind Speed      — Hub Height Wind Speed      ■ GL Wind Exclusion



Figure 5-18: Measured / Calculated Hourly C-Weighted Sound Pressure Levels (dBC) versus Met Data  
Location L4

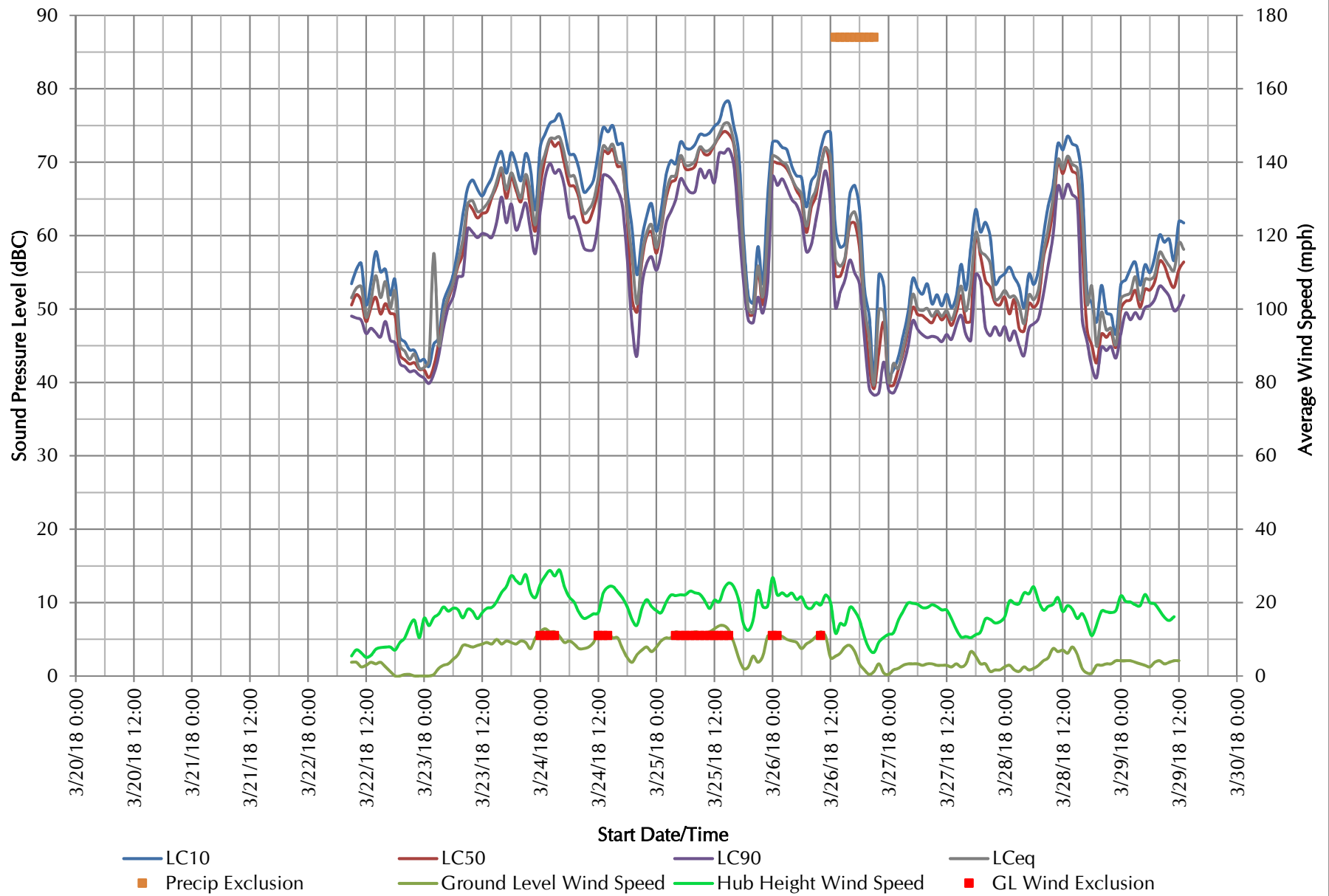


Figure 5-19: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L5

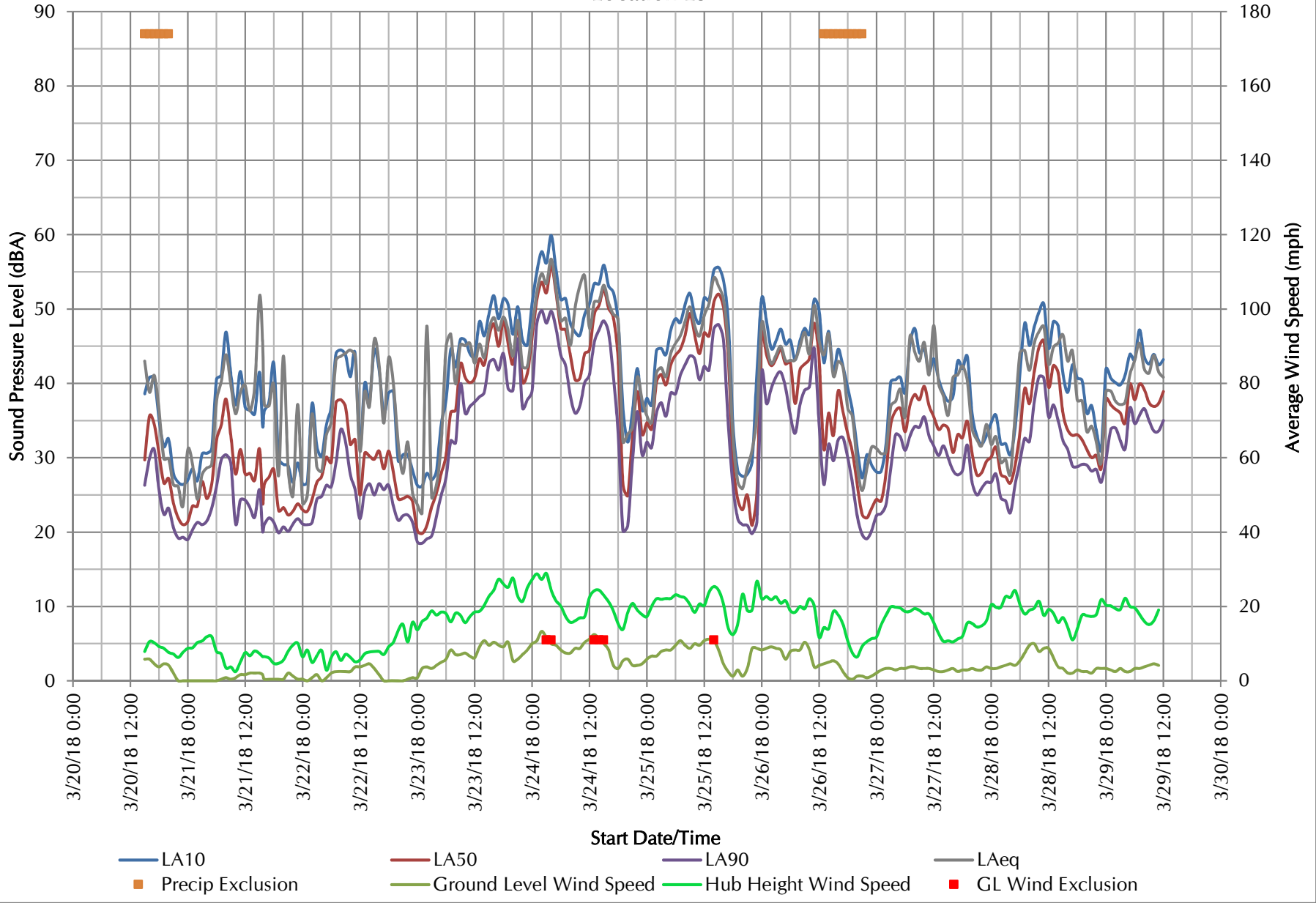


Figure 5-20: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L5

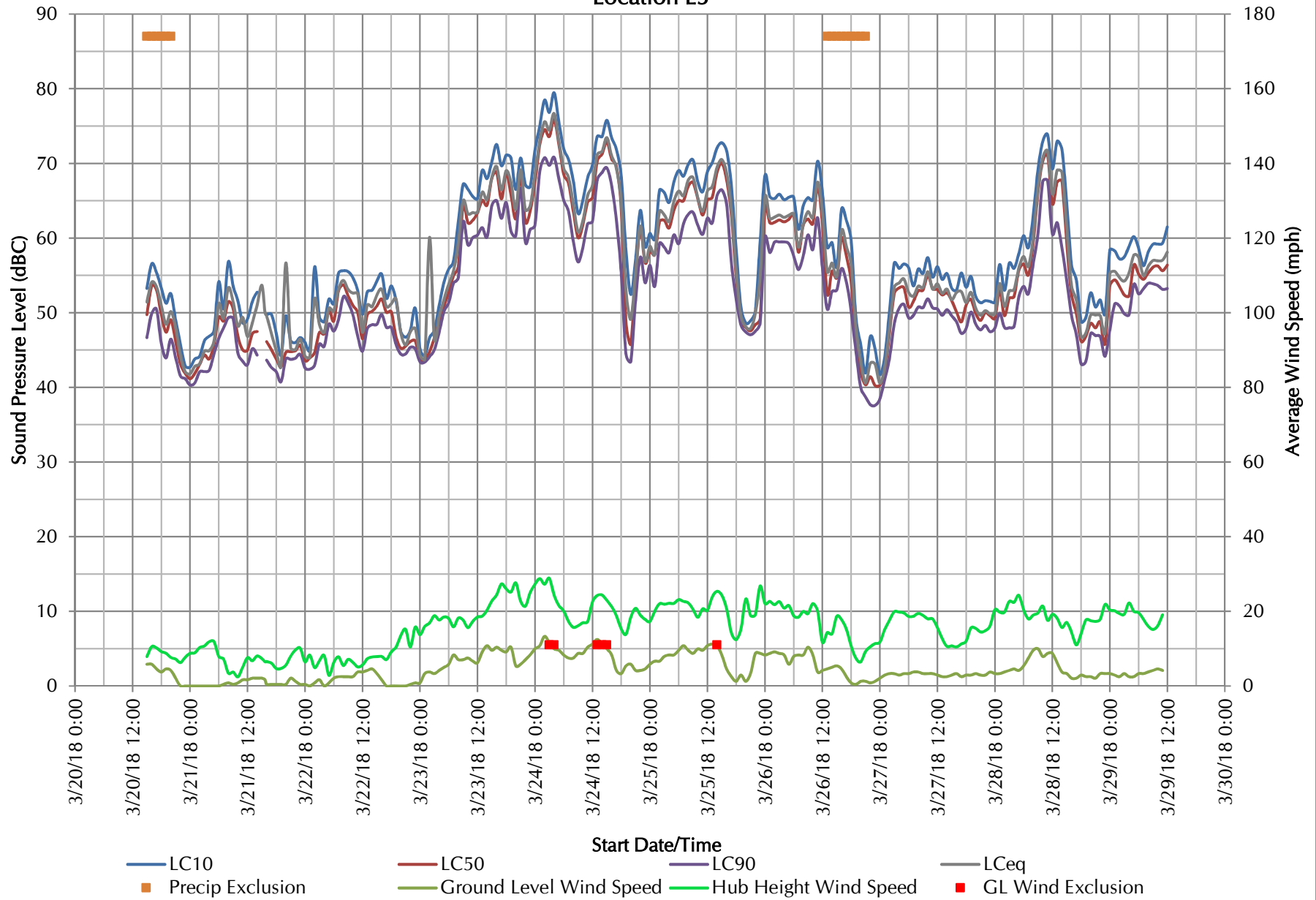


Figure 5-21: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L6

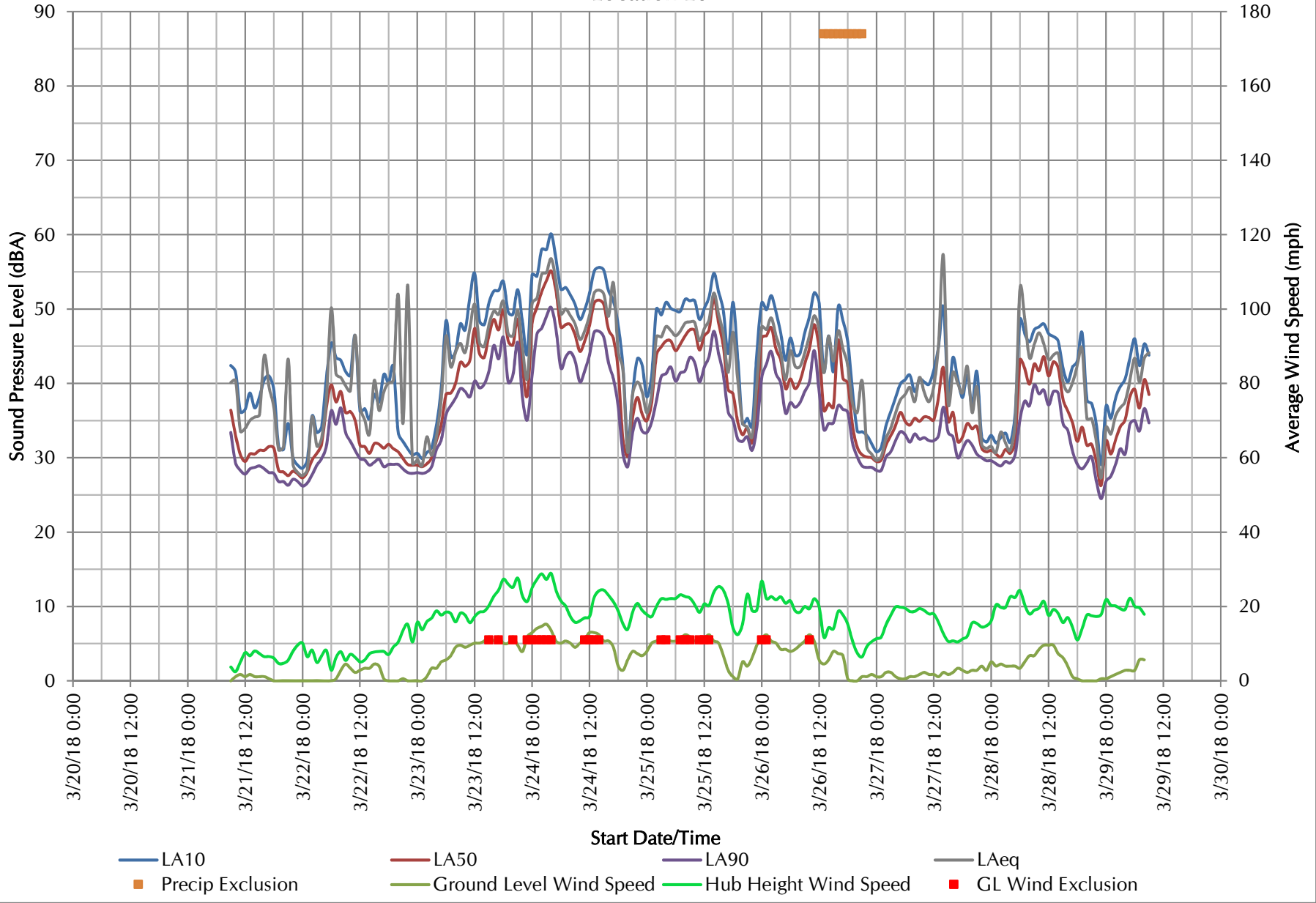
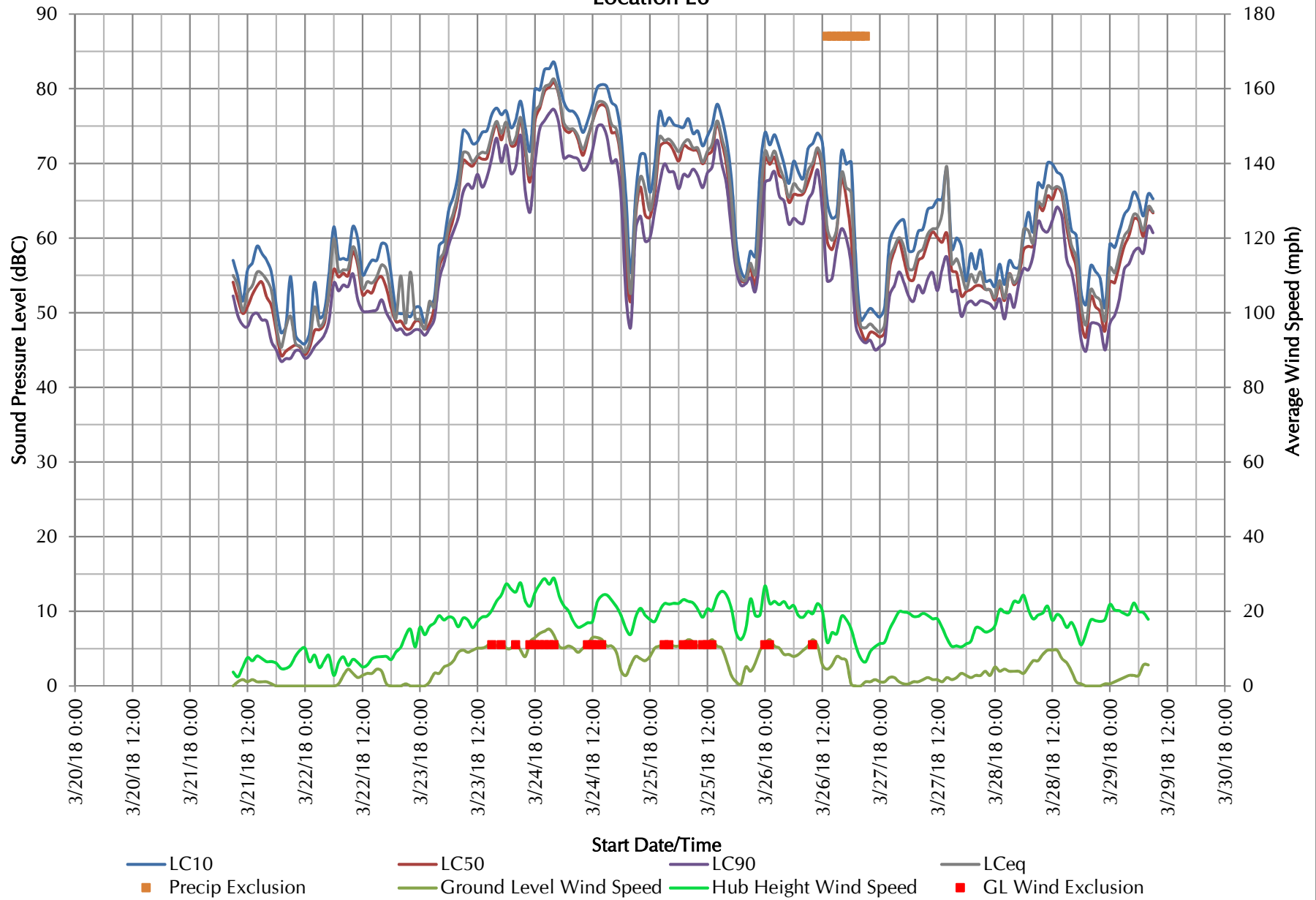


Figure 5-22: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L6



- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 29 to 57 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 26 to 52 dBA.

### **5.6.2        *Short-term Sound Levels***

Short-term sound levels were measured during the nighttime and daytime on March 20, 2018 and March 21, 2018, respectively. A brief summary of the measurement results is presented herein.

#### **5.6.2.1        Location S1**

Sound levels at Location S1 were influenced by vehicles on Hwy 218, distant vehicles on Hwy 14, occasional distant trains, dog, and high aircraft. Select results of the 20-minute measurements are shown below and additional details are presented in Appendix C.

- ◆ The L<sub>10</sub> A-weighted sound level was 53 dBA for both the daytime and nighttime measurements;
- ◆ The L<sub>50</sub> A-weighted sound levels were 41 dBA and 28 dBA for the daytime and nighttime measurements, respectively.

#### **5.6.2.2        Location S2**

Sound levels at Location S2 were influenced by birds, distant vehicles on local roads, dogs, and high aircraft. Select results of the 20-minute measurements are shown below and additional details are presented in Appendix C.

- ◆ The L<sub>10</sub> A-weighted sound level was 33 dBA for both the daytime and nighttime measurements;
- ◆ The L<sub>50</sub> A-weighted sound levels were 28 dBA and 29 dBA for the daytime and nighttime measurements, respectively.

## 6.0 MODELED SOUND LEVELS

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### 6.1 Sound Sources

#### 6.1.1 *Project Wind Turbines*

The sound level analysis for the Project conservatively includes 72 wind turbines, of which four (4) are considered alternate locations. All of these 72 wind turbines are GE 2.5-116 LNTE units with a hub height of 90 meters and a rotor diameter of 116 meters. A technical report from GE<sup>8</sup> was provided by DCW through Atwell which documented the expected sound power levels associated with the GE 2.5-116 LNTE wind turbine. The sound power levels are defined as “calculated apparent” by the turbine manufacturer and therefore do not include any uncertainty factor.

#### 6.1.2 *Substation Transformer*

In addition to the wind turbines, there will be a collector substation associated with the Project in Dodge County. The substation is proposed to be located north of wind turbine #58 as shown in Figure 6-1. One 225 megavolt-ampere (MVA) transformer is proposed for the substation. According to the specification sheet provided by the DCW, the sound pressure level for this unit will be 75 dBA. Epsilon has estimated octave-band sound power levels using the broadband sound pressure level provided and techniques in the Electric Power Plant Environmental Noise Guide (Edison Electric Institute), Table 4.5 Sound Power Levels of Transformers. Table 6-1 below summarizes the sound power level data used in the modeling.

**Table 6-1 Modeled Substation Transformer Sound Power Levels**

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Maximum Rating	Broadband dBA	Sound Power Levels per Octave-Band Center Frequency [Hz]								
		31.5 dB	63 dB	125 dB	250 dB	500 dB	1k dB	2k dB	4k dB	8k dB
225 MVA	95	92	98	100	95	95	89	84	79	72

### 6.2 Modeling Methodology

The sound impacts associated with the proposed wind turbines were predicted using the Cadna/A sound level calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a more refined set of computations due to the inclusion of

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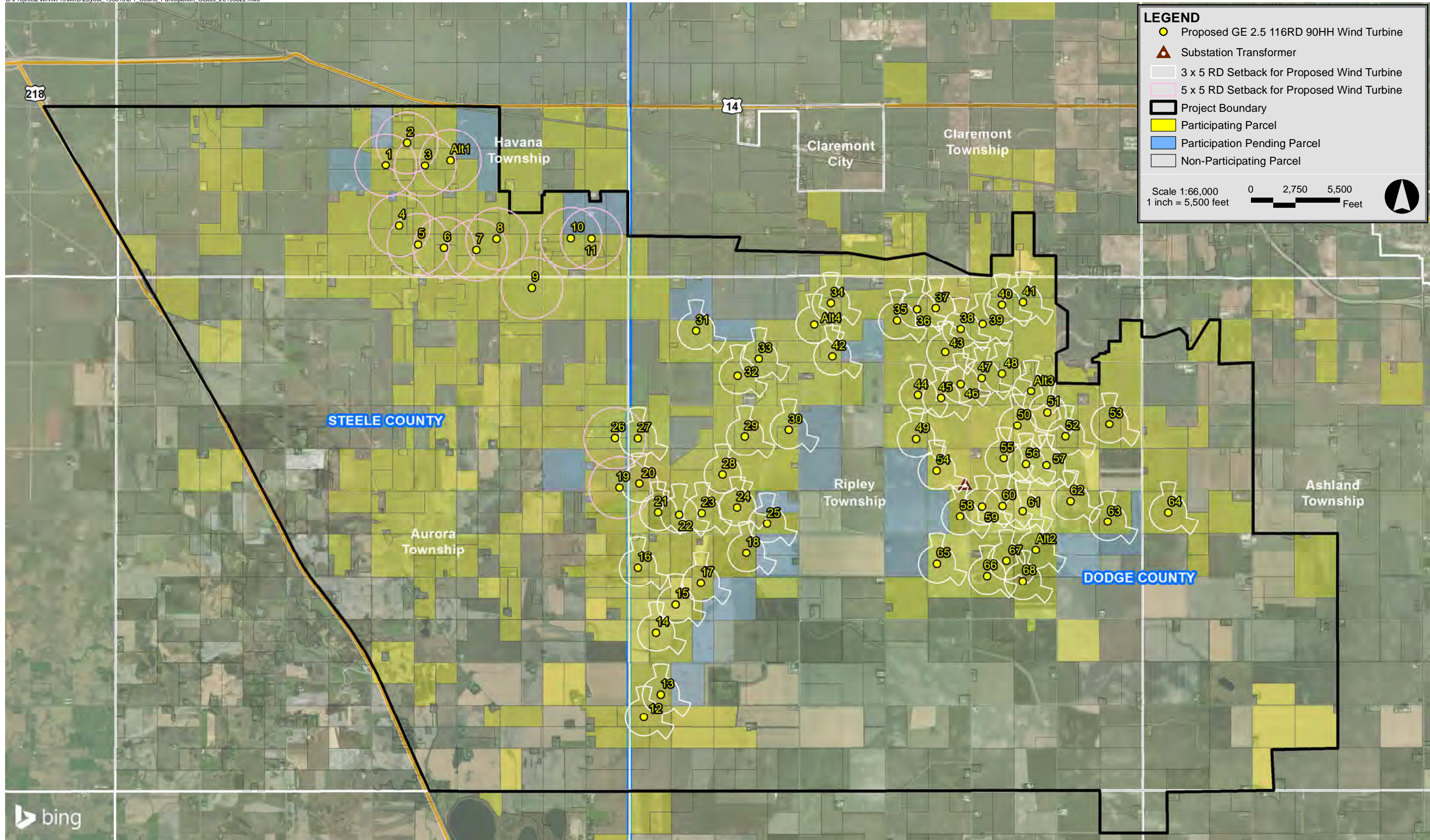
<sup>8</sup> General Electric Company, Technical Documentation Wind Turbine Generator Systems 2.5-116 with LNTE – 60 Hz Product Acoustic Specifications, 2016.

topography, ground attenuation, multiple building reflections (if applicable), drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of sound from multiple sources as well as computation of diffraction.

Inputs and significant parameters employed in the model are described below:

- ◆ *Project Layout:* A Project layout dated August 15, 2019 was provided by DCW. The 68 proposed wind turbines and 4 proposed alternates were conservatively input into the model. The Project will also have one 225 MVA transformer at a collector substation. The location of the substation transformer in the model was estimated based on plans received from DCW on July 14 and 18, 2017. The proposed wind turbines and substation are identified in Figure 6-1. Wind turbine location coordinates for the current layout are provided in Appendix D.
- ◆ *Parcel Participation:* A dataset containing participation status information for property parcels in the proximity of the Project was provided by Atwell on December 10, 2018. This information was supplemented by Atwell/DCW regarding a recent change to participation status for the parcel with Receptor #358 whole owner recently signed a participation agreement. Parcels identified as “LSE” within the dataset and the receptor #358 parcel are participating and are indicated as such on Figure 6-1. Consistent with the LWECS requirement, properties in Dodge County not participating in the Project will have turbines set back at least 3 rotor diameters (RD) from their property in non-prevailing wind directions and at least 5 RD from their property in prevailing wind directions from each wind turbine (5 by 3 setback). Therefore, any parcel located in Dodge County that is closer than these setbacks must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Dodge County closer than these setbacks has been assigned a “participation pending” status. Properties located in Steele County not participating in the Project will have turbines set back at least 5 rotor diameters from their property in any direction from a wind turbine (5 by 5 setback). Therefore, any parcel located in Steele County closer than this setback must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Steele County closer than the 5 by 5 setback has been assigned a “participation pending” status. A setback data layer was provided by Atwell and is shown on Figure 6-1. Participation status used throughout this analysis is shown in Figure 6-1.





Dodge County Wind Dodge & Steele Counties, MN

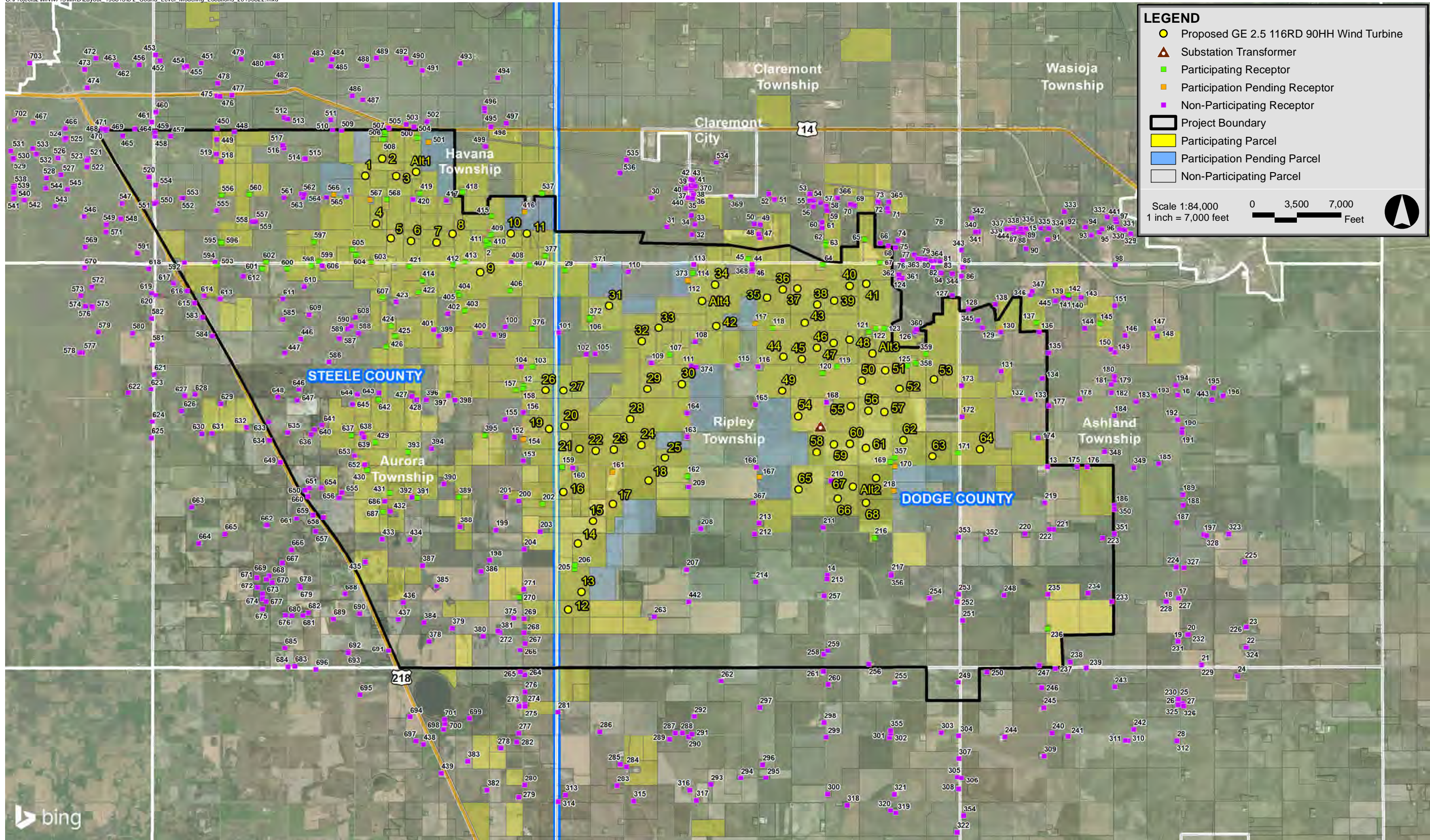


- ◆ *Modeling Receptor Locations:* A modeling receptor dataset dated June 15, 2017 was provided by Atwell. Receptors within 2 miles of the Project Area categorized as residential, mobile home, town, church, or municipal (694) were input into the Cadna/A model. These modeling receptors were modeled as discrete points at a height of 1.5 meters above ground level to mimic the ears of a typical standing person. Participation status for each modeling receptor was assigned as previously described. All modeling receptors are identified in Figure 6-2 and are distinguished as either participating, participation pending, or non-participating.

A modeling grid with 20-meter spacing was calculated for the entire Project Area. The grid was modeled at a height of 1.5 meters above ground level (AGL) for consistency with the discrete modeling points. This modeling grid allowed for the creation of sound level isolines.

- ◆ *Terrain Elevation:* Elevation contours for the modeling domain were directly imported into Cadna/A which allowed for consideration of terrain shielding where appropriate. The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.
- ◆ *Source Sound Levels:* Maximum broadband sound power levels for the GE 2.5-116 LNTE wind turbines provided in the technical report were input to the model. These sound levels represent “worst-case” operational sound level emissions. The substation transformer sound power levels as presented in Table 6-1 were input into the model.
- ◆ *Uncertainty factor:* No uncertainty factor was provided by the wind turbine manufacturer for the GE 2.5-116; however, based on experience with other wind turbine models and wind turbine sound level modeling, an uncertainty factor of 2.0 dBA was assumed and conservatively added to the sound power level for each modeled wind turbine.
- ◆ *Meteorological Conditions:* A temperature of 10°C (50°F) and a relative humidity of 70% was assumed in the model.
- ◆ *Ground Attenuation:* Spectral ground absorption was calculated using a G-factor of 0.5 which corresponds to “mixed ground” consisting of both hard and porous ground cover. This method yields more conservative results (i.e., higher sound levels) as the vast majority of the area is actually agricultural.





Dodge County Wind Dodge & Steele Counties, MN



Octave-band sound power levels corresponding to the highest available broadband sound power level for the proposed wind turbine type including uncertainty and estimated octave-band sound power levels from the proposed substation transformer were input into Cadna/A to model  $L_{eq}$  sound pressure levels during conditions when worst-case sound power levels are expected. Sound pressure levels were modeled at 694 receptors within 2 miles of the Project Area. In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of points, each spaced 20 meters apart to allow for the generation of sound level isolines in each modeling scenario.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the Cadna/A model to ensure conservative results (i.e., higher sound levels), and are described below:

- ◆ All modeled sources were assumed to be operating simultaneously and at the design wind speed corresponding to the greatest sound level impacts.
- ◆ As per ISO 9613-2, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night or equivalently downwind propagation.
- ◆ Meteorological conditions assumed in the model ( $T = 10^{\circ}\text{C}/\text{RH} = 70\%$ ) were selected to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave bands where the human ear is most sensitive.
- ◆ No additional attenuation due to tree shielding, air turbulence, or wind shadow effects was considered in the model.

### 6.3 Sound Level Modeling Results

All modeled sound levels, as output from Cadna/A are A-weighted equivalent sound levels ( $L_{eq}$ , dBA). Based on Epsilon's experience in conducting post-construction sound level measurement programs for wind energy facilities, the equivalent sound level has been comparable to the median ( $L_{50}$ , dBA) sound level when the wind turbine sound was prevalent and steady under ideal wind and operational conditions.<sup>9</sup> Therefore, the modeled sound levels for this Project may be considered as  $L_{50}$  sound levels and directly compared to the Minnesota  $L_{50}$  limit.

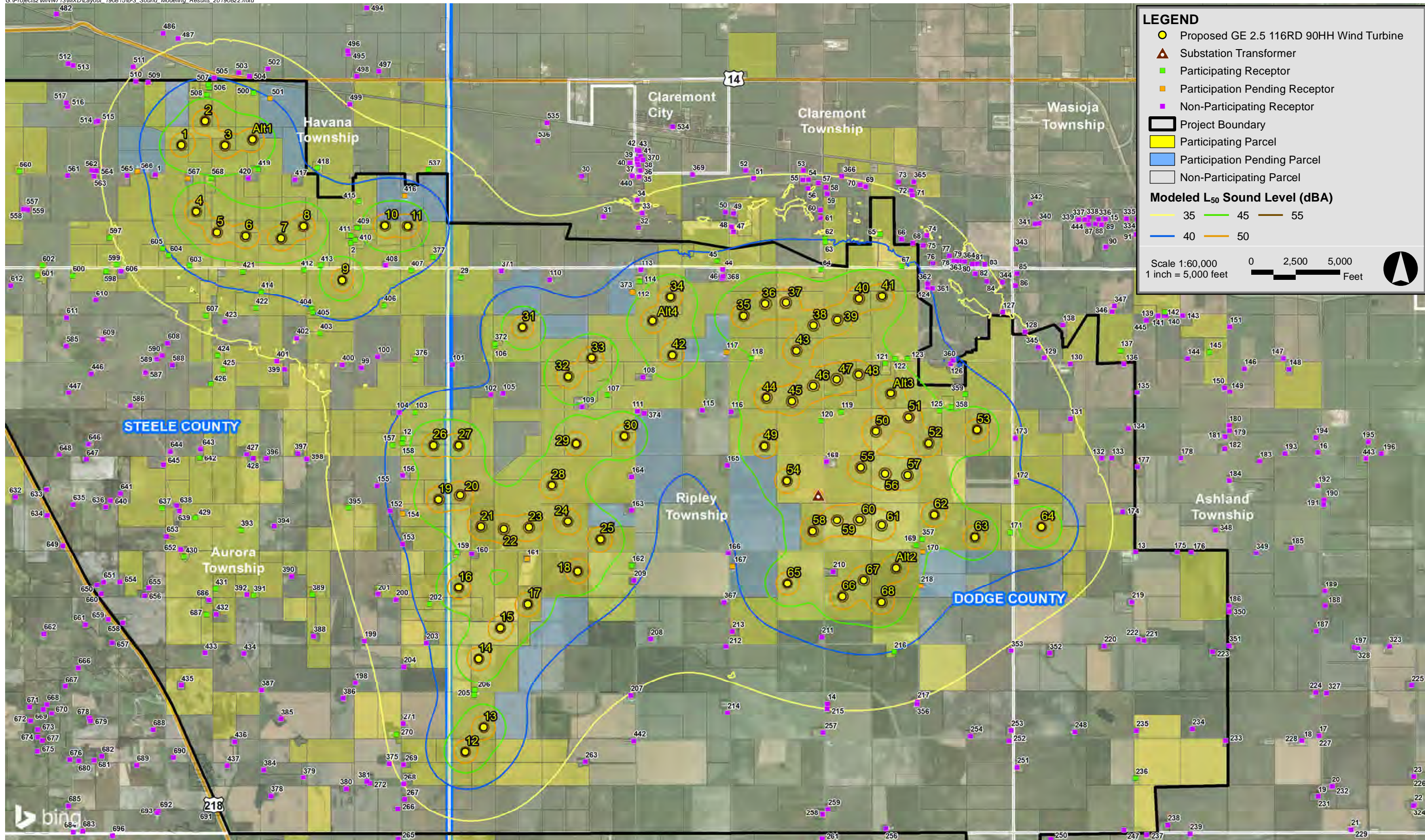
Table E-1 in Appendix E shows the predicted Project Only broadband (dBA) sound levels at the 694 Noise Area Classification 1 receptors modeled within 2 miles of the Project Area. These broadband  $L_{50}$  sound levels range from 17 to 47 dBA and represent the worst-case future  $L_{50}$  sound levels produced solely by wind turbines and substation associated with the

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<sup>9</sup> Within 0.4 decibels

Project. Four locations (#119, #120, #121, and #210) are modeled to have a sound level of 47 dBA. Location #210 is a non-participating receptor, while locations #119, #120, and #121 are participating. In addition to these discrete modeling points, sound level isolines generated from the modeling grid are presented in Figure 6-3.





Dodge County Wind Dodge & Steele Counties, MN



## 7.0 EVALUATION OF SOUND LEVELS

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The proposed Dodge County Wind Project within Dodge and Steele Counties, MN is required to comply with the sound level requirements in Minn. R. Ch. 7030 for Noise Pollution Control. NAC 1 (primarily residential) receptors are protected by the lowest sound level limits of the MPCA. Since wind turbines can operate under conditions resulting in maximum sound power, during both the day and at night, the Project would need to comply during the period with more stringent limits, nighttime. Furthermore, because wind turbine sound is generally steady, the L<sub>50</sub> (median) sound level is more likely to be affected by wind turbine sound than the L<sub>10</sub> which is controlled more by unsteady sound. The L<sub>50</sub> limit is also more restrictive than the L<sub>10</sub> limit. Therefore, NAC 1 receptors have been evaluated against the L<sub>50</sub> sound level limit of 50 dBA in this analysis.

The highest predicted worst-case Project Only L<sub>50</sub> sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA. This sound level is modeled at non-participating receptor #210 and participating receptors #119, #120, and #121. Nighttime measurements showed non-wind-turbine ambient L<sub>50</sub> broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA L<sub>50</sub> nighttime limit of 50 dBA. Project Only modeled sound levels sorted from high to low are presented in Table F-2 of Appendix F.

## 8.0 LOW FREQUENCY AND INFRASOUND

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An evaluation of low frequency (LF) and infrasound levels from a wind energy center at receptors is not required by the State of Minnesota. However, a discussion of LF and infrasound, as it pertains to wind turbines, is provided below for informational purposes.

Low frequency (LF) and infrasound are present in the environment due to other sources besides wind turbines. For example, refrigerators, air conditioners, and televisions generate infrasound and low frequency sound. The frequency range of low frequency sound is generally from 20 Hz to 200 Hz, and the range below 20 Hz is often described as “*infrasound*”. However, audibility can extend to frequencies below 20 Hz if the energy is high enough. Since there is no sharp change in hearing at 20 Hz, the division between “low-frequency sound” and “infrasound” should only be considered “practical and conventional.” The threshold of hearing is standardized for frequencies down to 20 Hz.<sup>10</sup> Based on extensive research and data, Watanabe and Moeller have proposed normal hearing thresholds for frequencies below 20 Hz.<sup>11</sup> These sound levels are so high that infrasound is generally considered inaudible. For example, the sound level at 8 Hz would need to be 100 dB to be audible.

A detailed infrasound and low frequency noise measurement program of wind turbines was conducted from 2013-2015 by the Ministry for the Environment, Climate and Energy of the Federal State of Baden-Wuerttemberg, Germany.<sup>12</sup> The conclusions of the German study were:

*“Infrasound and low-frequency noise are an everyday part of our technical and natural environment. Compared with other technical and natural sources, the level of infrasound caused by wind turbines is low. Already at a distance of 150 m (~ 500 ft), it is well below the human limits of perception. Accordingly, it is even lower at the usual distances from residential areas. Effects on health caused by infrasound below the perception thresholds have not been scientifically proven. Together with the health authorities, we in Baden-Württemberg have come to the conclusion that adverse effects relating to infrasound from wind turbines cannot be expected on the basis of the evidence at hand.”*

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<sup>10</sup> Acoustics - Normal equal-loudness-level contours, International Standard ISO 226:2003, International Organization for Standardization, Geneva, Switzerland, (2003).

<sup>11</sup> T. Watanabe, and H. Moeller, “Low Frequency Hearing Thresholds in Pressure Field and in Free Field”, J. Low Frequency Noise and Vibration, 9(3), 106-115, (1990).

<sup>12</sup> *Low frequency noise incl. infrasound from wind turbines and other sources*, LUBW, Baden-Wuerttemberg, Germany, September 2016.



The Massachusetts Department of Environmental Protection (MA DEP) and the Massachusetts Department of Public Health commissioned an expert panel who found that: “Claims infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically. Available evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system.”<sup>13</sup>

Health Canada, in collaboration with Statistics Canada, conducted one of the most extensive studies to understand the impacts of wind turbine noise to-date.<sup>14</sup> A cross-section epidemiological study was carried out in 2013 in the provinces of Ontario and Prince Edward Island on randomly selected participants living near and far from operating wind turbines. Many peer-reviewed publications have been written based on the Health Canada research, including an analysis of low frequency and infrasound data. For example, Keith et al concluded that there was no advantage of using C-weighting to measure low frequency sound since the relationship between A-weighting and C-weighting are so highly correlated.<sup>15</sup> In other words, acceptable A-weighted limits also eliminate low frequency and infrasound impacts.

Low frequency and infrasound has also been studied extensively in Japan. Tachibana et al conducted extensive measurements of 34 wind farms nationwide and concluded that infrasound from wind turbines is not audible/sensible, and that wind turbine noise is not a problem in the infrasound region.<sup>16</sup>

As noted in the 2011 NARUC report, “the widespread belief that wind turbines produce elevated or even harmful levels of low frequency and infrasonic sound is utterly untrue as proven repeatedly and independently by numerous investigators.”<sup>17</sup>

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<sup>13</sup> *Wind Turbine Health Impact Study: Review of Independent Expert Panel*, Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health, January 2012.

<sup>14</sup> Health Canada website: <http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php>

<sup>15</sup> *Wind turbine sound pressure level calculations at dwellings*, S. E. Keith et al, J. Acoustical Society of America, 139(3), March 2016.

<sup>16</sup> *Nationwide field measurements of wind turbine noise in Japan*, H. Tachibana et al, Noise Control Engineering Journal, 62(2), March-April 2014.

<sup>17</sup> *Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects*, NARUC, prepared by Hessler Associates, Inc., October 2011.

## 9.0 CONCLUSIONS

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A comprehensive sound level modeling assessment was conducted for the Dodge County Wind Project. In addition, ambient sound levels were measured to characterize the existing background sound levels within the area.

Nighttime measurements showed non-wind-turbine ambient  $L_{50}$  broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA  $L_{50}$  nighttime limit of 50 dBA. The highest predicted worst-case Project Only  $L_{50}$  sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA.

Appendix A

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DCW Sound Level Measurement Protocol

**Dodge County Wind Project  
Dodge and Steele Counties, MN**

**Sound Level Measurement Protocol**

**March 9, 2018**

**Introduction**

This protocol describes the methodology involved in measuring the ambient sound levels for the Dodge County Wind (“DCW”) Project. This Project is currently being developed by NextEra Energy Resources, LLC (NEER). DCW will be a wind power generation facility consisting of approximately 70 wind turbines located within Dodge and Steele Counties, Minnesota. Based on a preliminary 170MW layout dated December 12, 2017, the proposed wind turbines will be a combination of GE 1.7 and GE 2.5 megawatt (MW) wind turbines. The GE 1.7 MW wind turbines have a hub height of 80 meters and a rotor diameter of 103 meters. The GE 2.5 MW wind turbines have a hub height of 89 meters and a rotor diameter of 127 meters. Locations of the proposed wind turbines in the 170MW layout dated December 12, 2017 are presented in Figure 1.

As part of this effort, Epsilon will conduct a sound level measurement program to document existing ambient sound levels in the vicinity of the DCW Project. The purpose of this protocol is to describe the measurement methodology, identify acoustical and meteorological equipment proposed, and provide a schedule. Procedures identified in the Guidance for Large Wind Energy Conversion System, Noise Study Protocol and Report (“LWECS Guidance”) published by the Minnesota Department of Commerce (“DOC”), Energy Facility Permitting, dated October 8, 2012 were used in the development of this measurement protocol.

**Sound Level Measurement Methodology**

The Guidance advises measurement at a minimum of three (3) locations within the Project area where wind turbines are either not constructed or not operating to represent ambient sound level conditions. Broadband A-weighted (dBA) and one-third octave-band (dB) sound levels will be measured at a total of 8 locations in Dodge and Steele Counties to collect pre-construction sound level data. Six (6) of these locations will be long-term measurement locations within the Project Boundary. The long-term sound level measurement locations were selected based on LWECS Guidance, modeled sound levels, proximity of residential locations to the wind turbines, wind turbine types, and proximity to other measurement locations in the measurement program. Per the LWECS Guidance document, one (1) location has been selected to represent the receptor with the worst-case modeled sound level based on a preliminary modeling analysis.

The six (6) preferred long-term locations<sup>1</sup> and eight (8) alternate locations<sup>2</sup> in Dodge and Steele Counties are shown in Figure 1 and briefly described below. All long-term locations are proposed to be at a residence (exterior) with some on participating parcels and others on non-participating parcels. Non-participating homeowners may be unwilling to grant permission at a particular location; if permission is not granted, measurements will be conducted at an alternate location when practical. In addition, the alternate location may be selected if site conditions realized during setup warrant relocation. At the time of this Protocol, permission has not been obtained at the measurement locations. Additional alternative locations may be selected and/or the number of measurement locations reduced if permission cannot be obtained prior to the commencement of the measurement program.

#### Preferred Locations:

- ◆ **Location L1P:** Steele Co – One of three non-participating residences highlighted on the figure
- ◆ **Location L2P:** Steele Co – Participating Residence
- ◆ **Location L3P:** Dodge Co – Participating Residence
  - Highest modeled sound level at a participating residence
- ◆ **Location L4P:** Dodge Co – Non-participating Residence
  - Highest modeled sound level
- ◆ **Location L5P:** Dodge Co – Participating Residence
- ◆ **Location L6P:** Dodge Co – One of two non-participating residences highlighted on the figure

#### Alternate Locations:

- ◆ **Location L1A1:** Steele Co – Participating Residence
- ◆ **Location L1A2:** Steele Co – Participating Residence
- ◆ **Location L2A:** Steele Co – Participating Residence
- ◆ **Location L3A:** Steele Co – Participating Residence
- ◆ **Location L4A:** Dodge Co – Participating Residence
- ◆ **Location L5A:** Dodge Co – Participating Residence
- ◆ **Location L6A1:** Dodge Co – Participating Residence
- ◆ **Location L6A2:** Dodge Co – Participating Residence

Long-term measurements will be supplemented with short-term measurements at two (2) locations west of the Project Boundary. One daytime and one nighttime measurement will be taken for 20-minutes during environmental conditions with no precipitation and with ground-level wind speeds less than 11 mph (5 m/s). Sound observations will be made during both periods at each location by Epsilon staff. Publically accessible locations will be utilized and are briefly described below and shown on Figure 1.

- ◆ **Location S1:** Steele Co

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<sup>1</sup> Preferred long-term measurement locations are identified with a “P” in their ID.

<sup>2</sup> Alternate long-term measurement locations are identified with an “A” in their ID.

- Intersection of US Highway 218 and ST 73<sup>rd</sup> St
- ◆ **Location S2: Steele Co**
  - Intersection of SE 34<sup>th</sup> St and SE 58<sup>th</sup> St

### Measurement Equipment

The sound level measurements will be made using Larson Davis (LD) model 831 sound level meters (or equivalent). The model meets “Type 1 Precision” requirements set forth in American National Standards Institute (ANSI) S1.4-1983 standard for sound level meters. The meters will log values of various broadband A-weighted (dBA) sound level measurement parameters including the  $L_{eq}$ ,  $L_{max}$ ,  $L_{10}$ ,  $L_{50}$ , and  $L_{90}$ . Long-term meters will be programmed to log this statistical data on an hourly basis and short-term meters will log the complete 20-minute measurements. The LW ECS Guidance also requires C-weighted data collection. This will be calculated through post-processing analysis since simultaneous A-weighted and C-weighted collection is not possible with commonly available commercial instrumentation. One-minute time history data will be collected by the long-term meters and 1-second time history data will be collected by the short-term meter. The microphones will be tripod-mounted at a height of 1.5 meters (5 feet) above ground. A 7-inch windscreen will be placed on all microphones.

The measurement equipment will be calibrated in the field before and after the survey with the manufacturer’s acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. All calibrations will be within  $\pm 1.0$  dB from the most recent calibration otherwise the data collected during that period will be discarded. The meters are calibrated and certified as accurate to standards set by the National Institute of Standards and Technology by an independent laboratory within the past 12 months.

Since this is a wind turbine project, the wind speed during the noise study is significant in importance. The ground-level wind speed has a direct influence on the ambient sound levels. Ground-level wind speed data will be continuously measured at all long-term sound level measurement locations for the duration of the study per the LW ECS Guidance. A HOBO H21-002 micro-weather station (or similar) will be used at the monitoring locations. The wind sensors will be mounted at microphone height (1.5 meters) per the LW ECS Guidance and log data every hour. This wind instrument has a measurement range of 0 to 45 m/s (100 mph) and an accuracy of  $\pm 1.1$  m/s (2.4 mph). The starting threshold is  $\leq 1$  m/s (2.2 mph). For the short-term measurements where micro-weather station utilization is not practical, wind speeds will be measured for a subset of the measurement period with a hand-held Davis Instruments TurboMeter electronic wind speed indicator.

Additional meteorological parameters, e.g. temperature, precipitation, etc., will be collected through additional instrumentation deployed by Epsilon and/or will be downloaded from the closest National Weather Service station for the entire program.

In order to allow for the characterization of background sound levels during different wind regimes, which may be useful once the wind energy facility is operational, it would be necessary to know the wind speeds at higher heights (hub height, if possible) during the background sound level measurement program. If these data are available during the program, they will be incorporated into the report.

### Schedule

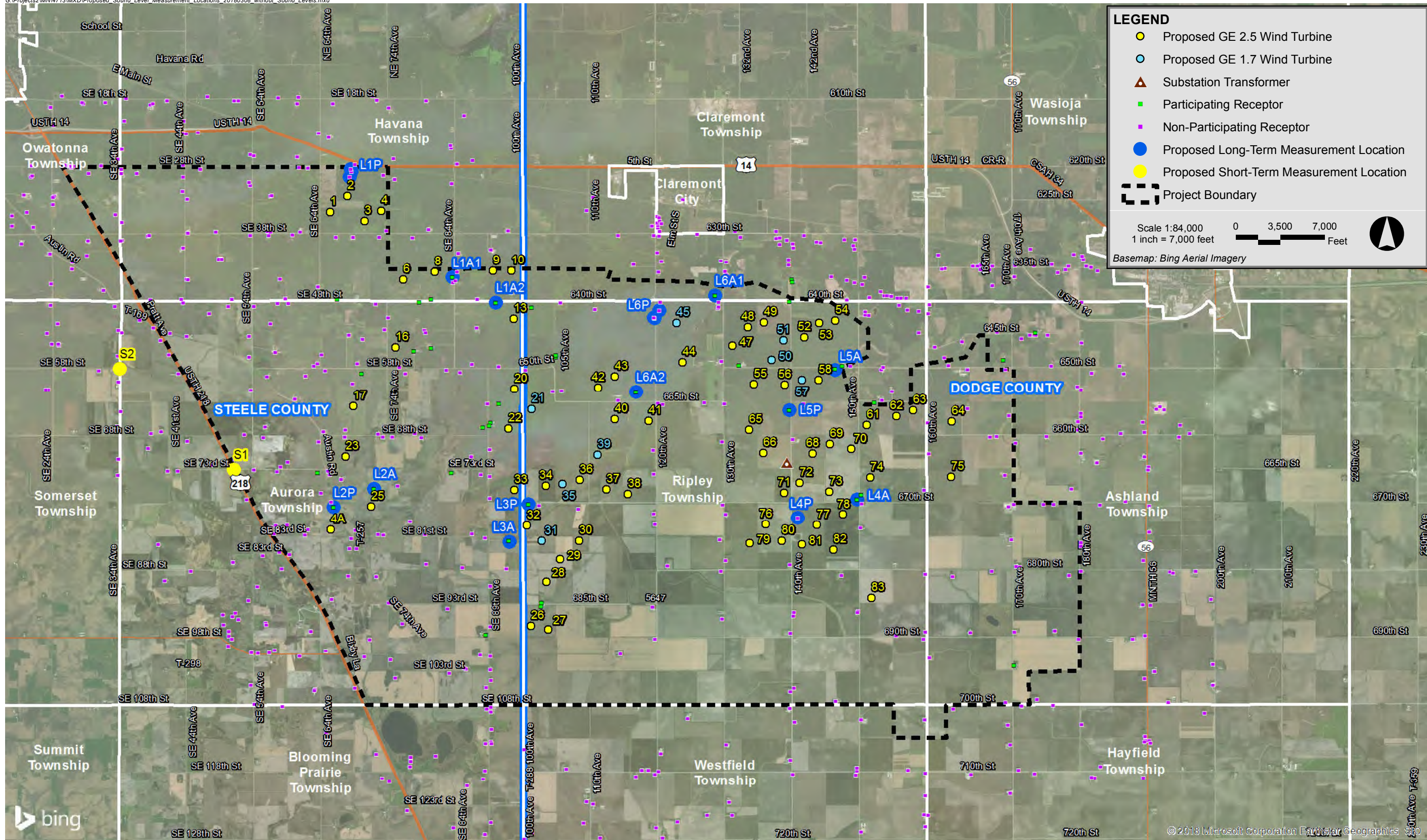
The sound level measurement program is planned to commence on Monday, March, 19, 2018. All equipment is expected to be operating by no later than Wednesday, March 21. Following the approach outlined in the Guidance document, the long-term measurements will last for at least 1 week. The equipment will not be staffed continuously; however, observations at the long-term locations will be made four times during the program (see below). The field technician will leave the site on March 21 or March 22 and return on March 28 or March 29. Continuous A-weighted measurements (24 hours/day) will be made concurrently at all long-term measurement locations over the approximately 7-day period. The observation periods will be as follows:

- ◆ Upon deployment (daytime),
- ◆ During the 1<sup>st</sup> night when all monitors are running (nighttime),
- ◆ During the day after the setup and/or night observations, and
- ◆ During the pick-up (daytime).

### Results/Report

The LWECs document will be used as a guide for sound level data processing, result summaries, and the report structure. No extraneous noise events will be excluded from the data. Hourly periods of recorded precipitation and periods with high wind speeds will be removed from the datasets. The percentage of the excluded data will be presented. Sound levels will be presented in graphical format as they were measured in relation to wind speed over the measurement duration. The report will include various figures and tables to effectively summarize the results of the measurement program.





Dodge County Wind Dodge & Steele Counties, MN



Appendix B

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NCEI Meteorological Data: NWS Station – Dodge Center Airport, Dodge  
Center, MN

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 0:15	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	20		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 0:35	FM-15	OVC:08 80	10		32	0	29	-1.4	25	-4	75	5	20		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 0:55	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	30		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 1:15	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	40		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 1:35	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	30		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 1:55	FM-15	SCT:04 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	3	360		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 2:15	FM-15	BKN:07 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	6	20		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 2:35	FM-15	BKN:07 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	7	30		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 2:55	FM-15	SCT:04 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	5	40		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 3:15	FM-15	OVC:08 80	10		32	0	30	-1	27	-3	80	6	60		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 3:35	FM-15	SCT:04 90	10		32	0	28	-2	21	-6	64	8	80		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 3:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	10	80		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 4:15	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	9	80		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 4:35	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	8	70		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 4:55	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	9	80		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 5:15	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	9	80		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 5:35	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	10	80		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 5:55	FM-15	SCT:04 50	10		30	-1	26	-3.2	19	-7	64	8	80		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 6:15	FM-15	SCT:04 50	10		28	-2	24	-4.4	16	-9	59	10	70		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 6:35	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	9	90		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 6:55	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	8	90		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 7:15	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	7	80		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 7:35	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	9	60		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 7:55	FM-15	SCT:04 46 BKN:07 50	10		28	-2	24	-4.4	16	-9	59	8	70		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 8:15	FM-15	BKN:07 35 OVC:08 43	10		28	-2	24	-4.4	16	-9	59	8	80		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 8:35	FM-15	OVC:08 35	10		28	-2	24	-4.4	16	-9	59	7	70		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 8:55	FM-15	SCT:04 22 BKN:07 28 OVC:08 35	5	-SN:03  SN:71	28	-2	25	-4	18	-8	64	7	40		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 9:15	FM-15	OVC:08 26	10	-SN:03  SN:71	27	-3	24	-4.4	18	-8	69	7	50		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 9:35	FM-15	BKN:07 26	7		28	-2	24	-4.4	16	-9	59	9	60		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 9:55	FM-15	SCT:04 24	7		28	-2	25	-4	18	-8	64	7	110		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 10:15	FM-15	SCT:04 20	7	-SN:03  SN:71	28	-2	25	-4	18	-8	64	3	90		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 10:35	FM-15	SCT:04 20	7		28	-2	25	-4	18	-8	64	7	80		28.64				30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 10:55	FM-15	SCT:04 14	7		28	-2	25	-4	18	-8	64	7	60		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 11:15	FM-15	SCT:04 14	10		28	-2	25	-3.9	19	-7	69	8	60		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 11:35	FM-15	CLR:00	7	UP:09	28	-2	25	-3.9	19	-7	69	5	20		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 11:55	FM-15	SCT:04 10	4	-SN:03  SN:71	28	-2	25	-3.9	19	-7	69	6	50		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 12:15	FM-15	SCT:04 8 SCT:04 13	4	-SN:03  SN:71	28	-2	26	-3.5	21	-6	74	6	60		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 12:35	FM-15	SCT:04 15	5	-SN:03  SN:71	28	-2	26	-3.5	21	-6	74	5	10		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 12:55	FM-15	SCT:04 15	7	-SN:03  SN:71	28	-2	26	-3.2	23	-5	80	5	20		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 13:15	FM-15	SCT:04 15	10		28	-2	26	-3.5	21	-6	74	6	30		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 13:35	FM-15	SCT:04 17	5	-SN:03  SN:71	28	-2	26	-3.2	23	-5	80	7	30		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 13:55	FM-15	SCT:04 15	4	-SN:03  SN:71	28	-2	26	-3.2	23	-5	80	7	10		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 14:15	FM-15	BKN:07 15	3	UP:09	28	-2	27	-2.8	25	-4	86	7	20		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 14:35	FM-15	BKN:07 15	3	UP:09	28	-2	27	-2.8	25	-4	86	7	10		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 14:55	FM-15	SCT:04 11 BKN:07 17	4	UP:09	28	-2	27	-2.8	25	-4	86	7	30		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 15:15	FM-15	SCT:04 15 BKN:07 19	4	UP:09	28	-2	27	-2.8	25	-4	86	9	20		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 15:35	FM-15	BKN:07 15	4	UP:09	28	-2	27	-2.8	25	-4	86	8	40		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 15:55	FM-15	SCT:04 15 SCT:04 20	4	UP:09	28	-2	27	-2.8	25	-4	86	10	30		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 16:15	FM-15	SCT:04 15 SCT:04 20	7	UP:09	28	-2	27	-2.8	25	-4	86	10	20		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 16:35	FM-15	SCT:04 21	7	UP:09	28	-2	27	-2.8	25	-4	86	8	30		28.59				29.98	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 16:55	FM-15	SCT:04 19	10	UP:09	28	-2	26	-3.2	23	-5	80	8	20		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 17:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	9	10		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 17:35	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	9	30		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 17:55	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	9	20		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 18:15	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	8	30		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 18:35	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	8	30		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 18:55	FM-15	CLR:00	10	UP:09	28	-2	26	-3.5	21	-6	74	9	20		28.62					30.01
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 19:15	FM-15	SCT:04 36 SCT:04 42	10	UP:09	28	-2	26	-3.5	21	-6	74	7	40		28.62					30.01
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 19:35	FM-15	SCT:04 27 BKN:07 34 OVC:08 42	7	SN:03  SN:71	27	-3	25	-3.9	21	-6	80	6	30		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 19:55	FM-15	BKN:07 23 BKN:07 29 OVC:08 40	7	UP:09	27	-3	25	-3.9	21	-6	80	6	20		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 20:15	FM-15	SCT:04 23 SCT:04 30 BKN:07 40	10	UP:09	27	-3	25	-3.9	21	-6	80	6	20		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 20:36	FM-15	SCT:04 35	10		27	-3	25	-3.9	21	-6	80	6	10		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 20:55	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	0	0		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 21:15	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	0	0		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 21:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 21:55	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 22:15	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	5	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 22:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 22:55	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	340		28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:15	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	5	350		28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	5	350		28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:55	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:59	SOD																			
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 0:15	FM-15	SCT:04 65	10		25	-4	23	-5	19	-7	80	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 0:35	FM-15	OVC:08 65	10		27	-3	25	-3.9	21	-6	80	5	350		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 0:55	FM-15	BKN:07 65	10		25	-4	23	-5	19	-7	80	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 1:15	FM-15	CLR:00	10		25	-4	24	-4.6	21	-6	86	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 1:35	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	5	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 1:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	3	360		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 2:15	FM-15	CLR:00	10		25	-4	24	-4.6	21	-6	86	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 2:35	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	5	330		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 2:55	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	6	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 3:15	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	3	350		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 3:35	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	5	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 3:55	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	5	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 4:15	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	3	360		28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 4:35	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	330		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 4:55	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	330		28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 5:15	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	330		28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 5:35	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	340		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 5:55	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	3	350		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 6:15	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	3	330		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 6:35	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	0	0		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 6:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	0	0		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 7:15	FM-15	BKN:07 50	10		25	-4	24	-4.6	21	-6	86	3	340		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 7:35	FM-15	OVC:08 50	10		25	-4	23	-5	19	-7	80	0	0		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 7:55	FM-15	OVC:08 50	10		25	-4	24	-4.6	21	-6	86	0	0		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 8:15	FM-15	OVC:08 50	10		27	-3	25	-3.9	21	-6	80	0	0		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 8:35	FM-15	OVC:08 50	10		27	-3	25	-3.9	21	-6	80	0	0		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 8:55	FM-15	OVC:08 50	10		28	-2	26	-3.5	21	-6	74	0	0		28.74					30.13

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULTEMPF	HOURLYDRYBULTEMPC	HOURLYWETBULTEMPF	HOURLYWETBULTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 9:15	FM-15	OVC:08 50	10		28	-2	25	-3.9	19	-7	69	0	0		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 9:35	FM-15	OVC:08 50	10		30	-1	26	-3.3	18	-8	59	0	0		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 9:55	FM-15	OVC:08 50	10		30	-1	26	-3.3	18	-8	59	0	0		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 10:15	FM-15	OVC:08 50	10		30	-1	26	-3.3	18	-8	59	0	0		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 10:35	FM-15	OVC:08 50	10		30	-1	25	-3.6	16	-9	55	3	280		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 10:55	FM-15	OVC:08 60	10		30	-1	26	-3.3	18	-8	59	7	280		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 11:15	FM-15	OVC:08 60	10		30	-1	26	-3.2	19	-7	64	6	270		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 11:35	FM-15	OVC:08 60	10		30	-1	26	-3.3	18	-8	59	8	250		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 11:55	FM-15	BKN:07 60	10		30	-1	26	-3.2	19	-7	64	8	240		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 12:15	FM-15	BKN:07 60	10		30	-1	26	-3.2	19	-7	64	6	240		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 12:35	FM-15	SCT:04 60	10		32	0	28	-2.5	19	-7	60	6	260		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 12:55	FM-15	BKN:07 60	10		34	1	29	-1.5	21	-6	60	6	280		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 13:15	FM-15	BKN:07 60	10		34	1	30	-1.1	23	-5	65	7	300		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 13:35	FM-15	SCT:04 41 BKN:07 60	10		34	1	30	-1.1	23	-5	65	10	290		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 13:55	FM-15	BKN:07 41	10		34	1	31	-0.8	25	-4	70	8	310		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 14:15	FM-15	SCT:04 25 SCT:04 43	10		34	2	31	-0.8	25	-4	70	6	260		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 14:35	FM-15	BKN:07 25	10		36	2	32	-0.1	25	-4	65	3	310		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 14:55	FM-15	SCT:04 25	10		36	2	33	0.3	27	-3	70	7	310		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 15:15	FM-15	CLR:00	10		36	2	33	0.3	27	-3	70	8	320		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 15:35	FM-15	SCT:04 25	10		36	2	33	0.3	27	-3	70	7	320		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 15:55	FM-15	SCT:04 23	10		36	2	33	0.3	27	-3	70	8	350		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 16:15	FM-15	SCT:04 23	10		34	1	31	-0.4	27	-3	75	7	330		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 16:35	FM-15	SCT:04 23	10		34	1	31	-0.4	27	-3	75	6	340		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 16:55	FM-15	SCT:04 23	10		34	1	31	-0.4	27	-3	75	8	340		28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 17:15	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	7	350		28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 17:35	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	5	330		28.81				30.2	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 17:55	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	5	350		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 18:15	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	5	340		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 18:35	FM-15	SCT:04 95	10		32	0	29	-1.4	25	-4	75	0	0		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 18:55	FM-15	SCT:04 27	10		30	-1	29	-1.7	27	-3	86	0	0		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 19:15	FM-15	SCT:04 27	10		32	0	29	-1.4	25	-4	75	0	0		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 19:35	FM-15	BKN:07 27	10		30	-1	28	-2.1	25	-4	80	0	0		28.82				30.22	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 19:55	FM-15	BKN:07 29	10		30	-1	28	-2.1	25	-4	80	0	0		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 20:15	FM-15	OVC:08 29	10		32	0	30	-1	27	-3	80	0	0		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 20:35	FM-15	OVC:08 29	10		32	0	30	-1	27	-3	80	3	80		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 20:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 21:15	FM-15	BKN:07 29	10		30	-1	29	-1.7	27	-3	86	3	70		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 21:35	FM-15	BKN:07 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 21:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 22:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 22:35	FM-15	OVC:08 29	10		30	-1	29	-1.5	28	-2	93	0	0		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 22:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	3	110		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 23:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	3	110		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 23:35	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	5	90		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 23:55	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 0:15	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 0:35	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	5	70		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 0:55	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 1:15	FM-15	BKN:07 31	10		30	-1	29	-1.7	27	-3	86	3	50		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 1:35	FM-15	SCT:04 31	10		30	-1	28	-2.1	25	-4	80	3	80		28.87				30.27	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMPF	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMPF	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 1:55	FM-15	SCT:04 31 SCT:04 100	10		28	-2	28	-2.4	27	-3	93	3	140		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 2:15	FM-15	BKN:07 31	10		28	-2	28	-2.4	27	-3	93	0	0		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 2:35	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 2:55	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 3:15	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 3:35	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 3:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 4:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	5	80		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 4:35	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 4:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	3	110		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 5:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 5:35	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 5:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 6:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 6:35	FM-15	OVC:08 29	7		30	-1	29	-1.5	28	-2	93	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 6:55	FM-15	OVC:08 29	7		30	-1	29	-1.5	28	-2	93	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 7:15	FM-15	OVC:08 27	7		30	-1	29	-1.5	28	-2	93	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 7:35	FM-15	BKN:07 27	7		32	0	30	-0.8	28	-2	87	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 7:55	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 8:15	FM-15	SCT:04 29	10		34	1	31	-0.7	25	-4	70	3	110		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 8:35	FM-15	SCT:04 29	7		34	1	31	-0.4	27	-3	75	6	100		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 8:55	FM-15	CLR:00	7		34	1	31	-0.4	27	-3	75	5	120		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 9:15	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	6	110		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 9:35	FM-15	CLR:00	7		36	2	33	0.3	27	-3	70	6	90		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 9:55	FM-15	CLR:00	10		36	2	33	0.3	27	-3	70	6	80		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 10:15	FM-15	CLR:00	10		36	2	33	0.3	27	-3	70	5	60		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 10:35	FM-15	CLR:00	10		37	3	33	0.8	28	-2	70	7	70		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 10:55	FM-15	CLR:00	10		37	3	33	0.6	27	-3	65	6	20		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 11:15	FM-15	CLR:00	10		37	3	33	0.6	27	-3	65	5	40		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 11:35	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	6	60		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 11:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	6	40		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 12:15	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	6	10		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 12:35	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	5	40		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 12:55	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	8	360		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 13:15	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	5	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 13:35	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	6	10		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 13:55	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	3	340		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 14:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 14:35	FM-15	CLR:00	10		39	4	35	1.9	30	-1	70	9	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 14:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	7	350		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 15:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	9	20		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 15:35	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	9	360		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 15:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	50		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 16:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	30		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 16:35	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	7	20		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 16:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	10		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 17:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	3	10		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 17:35	FM-15	SCT:04 55	10		39	4	35	1.5	28	-2	65	5	20		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 17:55	FM-15	BKN:07 50	10		37	3	33	0.8	28	-2	70	3	20		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 18:15	FM-15	BKN:07 50	10		37	3	33	0.8	28	-2	70	0	0		28.92					30.32

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 18:35	FM-15	SCT:04 50	10		36	2	33	0.5	28	-2	75	3	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 18:55	FM-15	SCT:04 100	10		36	2	33	0.5	28	-2	75	0	0		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 19:15	FM-15	CLR:00	10		36	2	33	0.5	28	-2	75	3	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 19:35	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	3	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 19:55	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	3	340		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 20:15	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	3	350		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 20:35	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	5	360		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 20:55	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	5	360		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 21:15	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	5	10		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 21:35	FM-15	CLR:00	10		30	-1	29	-1.7	27	-3	86	3	10		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 21:55	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	3	10		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 22:15	FM-15	CLR:00	10		32	0	29	-1.4	25	-4	75	0	0		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 22:35	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	6	20		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 22:55	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	3	10		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 23:15	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	3	10		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 23:35	FM-15	SCT:04 100	10		30	-1	28	-2.1	25	-4	80	5	20		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 23:55	FM-15	SCT:04 100	10		30	-1	28	-2.1	25	-4	80	5	20		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 0:15	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	5	30		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 0:35	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	3	20		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 0:55	FM-15	CLR:00	10		30	-1	28	-2.5	23	-5	75	5	10		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 1:15	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	5	10		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 1:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	30		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 1:55	FM-15	SCT:04 110	10		30	-1	27	-2.8	21	-6	69	3	30		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 2:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	5	50		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 2:35	FM-15	CLR:00	10		30	-1	28	-2.5	23	-5	75	5	40		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 2:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	5	50		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 3:15	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	5	70		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 3:35	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	6	70		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 3:55	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	7	60		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 4:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	60		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 4:35	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	5	80		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 4:55	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	3	80		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 5:15	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	7	80		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 5:35	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	7	80		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 5:55	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	7	70		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 6:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	8	70		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 6:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	8	80		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 6:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	9	80		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 7:15	FM-15	CLR:00	10		28	-2	25	-3.9	19	-7	69	9	90		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 7:35	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	8	100		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 7:55	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	10	90		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 8:15	FM-15	CLR:00	10		32	0	28	-2.5	19	-7	60	14	90		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 8:35	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	13	100		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 8:55	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	14	90		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 9:15	FM-15	CLR:00	10		34	1	29	-1.8	19	-7	56	15	80		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 9:35	FM-15	CLR:00	10		34	1	29	-1.8	19	-7	56	13	90		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 9:55	FM-15	CLR:00	10		34	1	29	-1.8	19	-7	56	10	80		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 10:15	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	9	90		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 10:35	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	11	100		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 10:55	FM-15	CLR:00	10		36	2	30	-1.1	19	-7	52	13	80		28.89					30.29



Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 11:15	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	13	80	28.88					30.28	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 11:35	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	15	90	28.88					30.28	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 11:55	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	13	90	28.87					30.27	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 12:15	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	13	90	28.87					30.27	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 12:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	16	90	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 12:55	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	14	100	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 13:15	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	14	90	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 13:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	15	80	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 13:55	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	14	80	28.82					30.22	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 14:15	FM-15	CLR:00	10		41	5	35	1.5	25	-4	53	15	80	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 14:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	18	70	28.81					30.2	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 14:55	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	17	90	28.8					30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 15:15	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	18	80	28.79					30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 15:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	18	80	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 15:55	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	18	80	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 16:15	FM-15	SCT:04 120	10		39	4	34	0.9	25	-4	56	20	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 16:35	FM-15	SCT:04 110	10		39	4	34	0.9	25	-4	56	15	80	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 16:55	FM-15	BKN:07 110	10		39	4	34	0.9	25	-4	56	16	90	28.75					30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 17:15	FM-15	OVC:08 110	10		37	3	32	0.2	25	-4	60	17	80	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 17:35	FM-15	OVC:08 100	10		37	3	32	0.2	25	-4	60	18	80	28.72					30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 17:55	FM-15	BKN:07 100	10		37	3	32	-0.1	23	-5	56	20	80	28.72					30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 18:15	FM-15	SCT:04s 100s	10		37	3	32	-0.1	23	-5	56	18	80	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 18:35	FM-15	SCT:04 100	10		37	3	31	-0.5	21	-6	52	20	90	28.71					30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 18:55	FM-15	SCT:04 100	10		37	3	31	-0.5	21	-6	52	14	90	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 19:15	FM-15	SCT:04 100	10		37	3	31	-0.5	21	-6	52	15	90	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 19:35	FM-15	SCT:04 100	10		36	2	31	-0.8	21	-6	56	15	90	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 19:56	FM-15	SCT:04 90	10		36	2	31	-0.8	21	-6	56	15	80	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 20:15	FM-15	SCT:04 90	10		36	2	31	-0.8	21	-6	56	17	90	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 20:35	FM-15	SCT:04 80	10		36	2	31	-0.8	21	-6	56	17	90	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 20:56	FM-15	SCT:04s 95s	10		36	2	31	-0.8	21	-6	56	16	100	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 21:15	FM-15	SCT:04 95	10		36	2	31	-0.8	21	-6	56	18	100	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 21:35	FM-15	SCT:04 80 BKN:07 95	10		36	2	31	-0.8	21	-6	56	13	100	28.76					30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 21:56	FM-15	SCT:04 95	10		36	2	31	-0.8	21	-6	56	11	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 22:15	FM-15	SCT:04 80 BKN:07 95	10		36	2	31	-0.8	21	-6	56	11	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 22:35	FM-15	SCT:04 80	10		36	2	31	-0.8	21	-6	56	13	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 22:55	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	14	100	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 23:15	FM-15	SCT:04 90	10		36	2	30	-1.1	19	-7	52	17	100	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 23:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	17	100	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 23:55	FM-15	SCT:04 80 SCT:04 90	10		34	1	29	-1.5	21	-6	60	17	100	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 0:15	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	17	100	28.76					30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 0:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	16	100	28.75					30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 0:55	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	20	100	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 1:15	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	20	100	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 1:35	FM-15	SCT:04 90	10		34	1	30	-1.1	23	-5	65	22	90	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 1:55	FM-15	SCT:04 80 SCT:04 90	10		32	0	28	-2.1	21	-6	64	17	90	28.72					30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 2:15	FM-15	SCT:04 80	10		32	0	28	-2.5	19	-7	60	22	90	28.7					30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 2:35	FM-15	SCT:04 80	10		32	0	27	-2.6	18	-8	55	23	90	28.69					30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 2:55	FM-15	OVC:08 80	10		32	0	27	-2.6	18	-8	55	22	90	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 3:15	FM-15	OVC:08 80	10		30	-1	26	-3.3	18	-8	59	23	80	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 3:35	FM-15	OVC:08 80	10		30	-1	25	-3.6	16	-9	55	21	90	28.67					30.06	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 3:55	FM-15	OVC:08 70	10		30	-1	26	-3.3	18	-8	59	22	80	26	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 4:15	FM-15	BKN:07 70 BKN:07 85	10		30	-1	25	-3.6	16	-9	55	18	80		28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 4:35	FM-15	SCT:04 60 SCT:04 85	10		28	-2	25	-4	18	-8	64	16	80	24	28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 4:55	FM-15	BKN:07 60	10		28	-2	25	-4	18	-8	64	20	80	26	28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 5:15	FM-15	BKN:07 60	10		28	-2	25	-3.9	19	-7	69	21	80		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 5:35	FM-15	SCT:04 70	10		28	-2	25	-3.9	19	-7	69	18	80	26	28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 5:55	FM-15	SCT:04 70	10		28	-2	25	-3.9	19	-7	69	20	80	26	28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 6:15	FM-15	SCT:04 80 SCT:04 95	10		28	-2	25	-3.9	19	-7	69	22	70		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 6:35	FM-15	SCT:04 90	10		28	-2	25	-3.9	19	-7	69	21	70	25	28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 6:55	FM-15	SCT:04 90	10		28	-2	25	-3.9	19	-7	69	17	60	21	28.75					30.14
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 7:15	FM-15	SCT:04 90	10		28	-2	25	-3.9	19	-7	69	17	60	24	28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 7:35	FM-15	SCT:04 80	10		28	-2	25	-3.9	19	-7	69	22	70	25	28.76					30.15
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 7:55	FM-15	SCT:04 80	10		28	-2	26	-3.5	21	-6	74	13	70	23	28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 8:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	14	60		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 8:35	FM-15	SCT:04 80	10		28	-2	26	-3.5	21	-6	74	16	60	20	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 8:55	FM-15	SCT:04 80	10		28	-2	26	-3.5	21	-6	74	16	70		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 9:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	16	60		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 9:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	17	70	22	28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 9:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	18	70		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 10:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	17	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 10:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	17	70		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 10:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	15	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 11:15	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	16	70		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 11:35	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	15	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 11:55	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	18	90	24	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 12:15	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	18	90	26	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 12:35	FM-15	SCT:04 80	10		36	2	31	-0.8	21	-6	56	23	90	26	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 12:55	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	18	80	25	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 13:15	FM-15	CLR:00	10		36	2	31	-0.4	23	-5	60	20	90		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 13:35	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	15	80	24	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 13:55	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	22	80	25	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 14:15	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	18	90	24	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 14:35	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	21	80	25	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 14:55	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	18	80		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 15:15	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	15	80		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 15:35	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	17	80	22	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 15:55	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	21	80	26	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 16:15	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	17	80	23	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 16:35	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	21	80		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 16:55	FM-15	SCT:04 90	10		39	4	33	0.5	23	-5	52	17	80		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 17:15	FM-15	BKN:07 90	10		37	3	32	-0.1	23	-5	56	16	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 17:35	FM-15	BKN:07 90	10		37	3	32	0.2	25	-4	60	9	90		28.81					30.2
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 17:55	FM-15	OVC:08 90	10		37	3	31	-0.5	21	-6	52	11	90		28.81					30.2
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 18:15	FM-15	OVC:08 90	10		36	2	31	-0.8	21	-6	56	9	90		28.82					30.21
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 18:35	FM-15	OVC:08 90	10		36	2	32	-0.1	25	-4	65	7	80		28.82					30.22
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 18:55	FM-15	OVC:08 90	10		34	1	31	-0.8	25	-4	70	7	80		28.84					30.23
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 19:16	FM-15	BKN:07 90	10		34	1	30	-1.1	23	-5	65	5	40		28.84					30.23
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 19:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	6	40		28.85					30.24
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 19:55	FM-15	SCT:04 90	10		34	1	31	-0.8	25	-4	70	9	60		28.84					30.23
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 20:15	FM-15	SCT:04 90	10		34	1	31	-0.8	25	-4	70	10	70		28.84					30.23

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTemp	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 20:35	FM-15	BKN:07 80	10		34	1	31	-0.8	25	-4	70	9	70	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 20:55	FM-15	SCT:04 80	10		32	0	29	-1.4	25	-4	75	8	80	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 21:15	FM-15	SCT:04 90	10		32	0	29	-1.4	25	-4	75	9	90	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 21:35	FM-15	SCT:04 90	10		32	0	29	-1.8	23	-5	69	11	100	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 21:55	FM-15	BKN:07 90	10		32	0	28	-2.1	21	-6	64	13	100	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 22:15	FM-15	OVC:08 90	10		32	0	28	-2.1	21	-6	64	13	100	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 22:35	FM-15	OVC:08 90	10		32	0	28	-2.1	21	-6	64	13	100	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 22:55	FM-15	SCT:04 90	10		30	-1	27	-2.8	21	-6	69	11	100	17	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 23:15	FM-15	BKN:07 80 BKN:07 90	10		30	-1	27	-2.8	21	-6	69	11	100	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 23:35	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	11	100	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 23:56	FM-15	OVC:08 80	10		30	-1	28	-2.5	23	-5	75	13	90	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 0:15	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	14	100	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 0:35	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	14	100	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 0:55	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	10	100	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 1:15	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	13	100	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 1:35	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	13	100	17	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 1:55	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	13	110	20	28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 2:15	FM-15	OVC:08 80	10		30	-1	26	-3.2	19	-7	64	17	110	22	28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 2:35	FM-15	OVC:08 80	10		30	-1	26	-3.2	19	-7	64	15	110	22	28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 2:55	FM-15	OVC:08 80	10		30	-1	26	-3.2	19	-7	64	16	110	22	28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 3:15	FM-15	BKN:07 70 OVC:08 80	10		28	-2	25	-3.9	19	-7	69	14	110	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 3:35	FM-15	OVC:08 70	10		28	-2	25	-3.9	19	-7	69	14	110	20	28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 3:55	FM-15	OVC:08 70	10		28	-2	25	-3.9	19	-7	69	14	110	18	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 4:15	FM-15	OVC:08 70	10		28	-2	25	-3.9	19	-7	69	16	110	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 4:35	FM-15	SCT:04 70	10		28	-2	25	-3.9	19	-7	69	15	120	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 4:55	FM-15	BKN:07 80	10		28	-2	25	-4	18	-8	64	18	120	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 5:15	FM-15	SCT:04 80	10		28	-2	25	-4	18	-8	64	15	110	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 5:35	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	17	110	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 5:55	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	16	110	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 6:15	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	21	120	25	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 6:35	FM-15	SCT:04 80	10		27	-3	24	-4.7	16	-9	64	20	110	23	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 6:55	FM-15	SCT:04 80	10		27	-3	24	-4.7	16	-9	64	18	110	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 7:15	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	15	110	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 7:35	FM-15	CLR:00	10		27	-3	24	-4.7	16	-9	64	15	110	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 7:55	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	17	110	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 8:15	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	20	120	24	28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 8:35	FM-15	CLR:00	10		28	-2	25	-4	18	-8	64	16	110	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 8:55	FM-15	CLR:00	10		30	-1	26	-3.3	18	-8	59	15	120	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 9:15	FM-15	CLR:00	10		30	-1	26	-3.3	18	-8	59	15	140	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 9:35	FM-15	SCT:04 90	10		32	0	27	-2.6	18	-8	55	16	130	20	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 9:55	FM-15	CLR:00	10		34	1	29	-1.9	18	-8	51	16	140	20	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 10:15	FM-15	SCT:04 100	10		34	1	29	-1.9	18	-8	51	17	130	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 10:35	FM-15	SCT:04 100	10		34	1	29	-1.9	18	-8	51	14	120	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 10:55	FM-15	SCT:04 100	10		36	2	30	-1.3	18	-8	48	11	120	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 11:15	FM-15	SCT:04 100	10		36	2	30	-1.3	18	-8	48	15	140	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 11:35	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	14	110	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 11:55	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	15	120	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 12:15	FM-15	SCT:04 90	10		39	4	32	-0.1	19	-7	45	17	130	23	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 12:35	FM-15	SCT:04 90	10		39	4	32	-0.3	18	-8	42	16	140	22	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 12:55	FM-15	SCT:04 90	10		39	4	32	-0.1	19	-7	45	16	130	28.82					30.22	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 13:15	FM-15	SCT:04 90	10		39	4	32	0.2	21	-6	48	15	130		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 13:35	FM-15	SCT:04 90	10		39	4	32	-0.1	19	-7	45	17	130	21	28.81				30.2	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 13:55	FM-15	SCT:04 90	10		39	4	32	-0.3	18	-8	42	18	140	24	28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 14:15	FM-15	BKN:07 80	10		39	4	32	-0.3	18	-8	42	17	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 14:35	FM-15	BKN:07 80	10		39	4	32	0.2	21	-6	48	17	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 14:55	FM-15	BKN:07 80	10		39	4	32	-0.1	19	-7	45	16	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 15:15	FM-15	OVC:08 80	10		39	4	33	0.5	23	-5	52	14	140		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 15:35	FM-15	OVC:08 80	10		39	4	33	0.5	23	-5	52	15	150		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 15:55	FM-15	BKN:07 80	10		41	5	35	1.5	25	-4	53	14	140	20	28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 16:15	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	13	140		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 16:35	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	9	140		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 16:55	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	10	140		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 17:15	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	8	150		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 17:35	FM-15	OVC:08 80	10		39	4	34	0.9	25	-4	56	8	150		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 17:55	FM-15	OVC:08 70	10		39	4	34	1.3	27	-3	61	6	160		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 18:15	FM-15	OVC:08 70	10		39	4	34	1.3	27	-3	61	6	150		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 18:35	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	5	150		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 18:55	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	5	140		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 19:15	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	6	140		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 19:35	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	6	130		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 19:55	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	7	130		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 20:15	FM-15	BKN:07 70 OVC:08 75	10		37	3	33	0.6	27	-3	65	7	130		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 20:35	FM-15	SCT:04 60 OVC:08 70	10		36	2	33	0.3	27	-3	70	8	120		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 20:55	FM-15	SCT:04 60 SCT:04 70	10		36	2	33	0.3	27	-3	70	8	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 21:15	FM-15	CLR:00	10		36	2	31	-0.4	23	-5	60	9	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 21:35	FM-15	CLR:00	10		36	2	32	-0.1	25	-4	65	9	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 21:55	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	11	130		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 22:15	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	11	140		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 22:35	FM-15	SCT:04 60	10		36	2	31	-0.8	21	-6	56	9	140		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 22:55	FM-15	CLR:00	10		34	1	31	-0.8	25	-4	70	6	150		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 23:15	FM-15	SCT:04 100	10		34	1	31	-0.8	25	-4	70	9	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 23:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	18	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 23:55	FM-15	SCT:04 43 SCT:04 50 BKN:07 65	10		34	1	29	-1.5	21	-6	60	15	140		28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 0:15	FM-15	SCT:04 47 SCT:04 60 OVC:08 80	10		34	1	29	-1.5	21	-6	60	16	140	22	28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 0:35	FM-15	OVC:08 80	10		34	1	29	-1.5	21	-6	60	11	130		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 0:55	FM-15	OVC:08 80	10		34	1	29	-1.5	21	-6	60	17	130	21	28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 1:15	FM-15	OVC:08 80	10		34	1	29	-1.5	21	-6	60	16	130		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 2:35	FM-15	SCT:04 90	10		32	0	28	-2.1	21	-6	64	13	120		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 2:55	FM-15	SCT:04 110	10		32	0	28	-2.1	21	-6	64	10	120		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 3:15	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	9	120		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 3:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	10	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 3:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	9	110		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 4:15	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	9	110		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 4:35	FM-15	OVC:08 100	10		30	-1	26	-3.2	19	-7	64	10	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 4:55	FM-15	OVC:08 100	10		30	-1	26	-3.2	19	-7	64	11	110		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 5:15	FM-15	OVC:08 100	10		30	-1	26	-3.2	19	-7	64	11	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 5:35	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 5:55	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	13	110		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 6:15	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	11	100		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 6:35	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	10	100		28.72				30.11	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTemp	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 6:55	FM-15	BKN:07 90	10		30	-1	27	-2.8	21	-6	69	13	110		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 7:15	FM-15	SCT:04 30 BKN:07 36 BKN:07 90	10		32	0	28	-2.1	21	-6	64	13	120		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 7:35	FM-15	SCT:04 30 OVC:08 36	10		32	0	28	-2.1	21	-6	64	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 7:55	FM-15	BKN:07 36	10		32	0	28	-2.1	21	-6	64	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 8:15	FM-15	BKN:07 32	10		32	0	28	-2.1	21	-6	64	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 8:35	FM-15	OVC:08 39	10		34	1	30	-1.1	23	-5	65	13	120		28.73				30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 8:55	FM-15	SCT:04 39 SCT:04 100	10		34	1	29	-1.5	21	-6	60	14	110		28.71				30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 9:15	FM-15	SCT:04 100	10		34	1	30	-1.1	23	-5	65	11	120		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 9:35	FM-15	SCT:04 38	10		34	1	29	-1.5	21	-6	60	15	140		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 9:55	FM-15	BKN:07 36	10		34	1	31	-0.8	25	-4	70	16	130		28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 10:15	FM-15	BKN:07 36	10		34	1	30	-1.1	23	-5	65	16	130	20	28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 10:35	FM-15	SCT:04 36	10		36	2	32	-0.1	25	-4	65	17	130	22	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 10:55	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	17	120		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 11:15	FM-15	SCT:04 70	10		36	2	32	-0.1	25	-4	65	16	130		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 11:35	FM-15	SCT:04 29 BKN:07 70	10		37	3	32	0.2	25	-4	60	15	130		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 11:55	FM-15	BKN:07 29 OVC:08 70	10		36	2	32	-0.1	25	-4	65	11	140		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 12:15	FM-15	OVC:08 31	10		37	3	32	0.2	25	-4	60	10	120		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 12:35	FM-15	OVC:08 31	10		37	3	32	0.2	25	-4	60	6	100		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 12:55	FM-15	OVC:08 29	10		37	3	32	0.2	25	-4	60	8	100		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 13:15	FM-15	OVC:08 29	7	RA:02   RA:61	37	3	33	0.6	27	-3	65	8	130		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 13:35	FM-15	OVC:08 33	3	RA:02   RA:61	36	2	33	0.5	28	-2	75	7	100		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 13:55	FM-15	OVC:08 33	10		37	3	34	1.2	30	-1	75	8	90		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 14:15	FM-15	OVC:08 33	10		37	3	33	0.8	28	-2	70	11	100		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 14:35	FM-15	OVC:08 33	10		37	3	33	0.8	28	-2	70	11	110		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 14:55	FM-15	OVC:08 29	10	RA:02   RA:61	37	3	34	1.2	30	-1	75	8	110		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 15:15	FM-15	OVC:08 29	10	RA:02   RA:61	37	3	33	0.8	28	-2	70	11	110		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 15:36	FM-15	BKN:07 27 OVC:08 44	3	RA:02   RA:62	36	2	34	0.9	30	-1	81	15	100		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 15:55	FM-15	BKN:07 27 OVC:08 35	4	RA:02   RA:61	36	2	34	0.9	30	-1	81	14	100		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 16:15	FM-15	OVC:08 25	2.50V	SN:03   SN:71	36	2	34	0.9	30	-1	81	10	110		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 16:35	FM-15	OVC:08 23	10	UP:09	36	2	34	0.9	30	-1	81	10	100		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 16:55	FM-15	BKN:07 16 OVC:08 21	7	DZ:01   DZ:51	36	2	34	0.9	30	-1	81	13	110	16	28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 17:15	FM-15	OVC:08 14	2.5	UP:09	34	1	33	0.7	32	0	93	13	110	16	28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 17:35	FM-15	OVC:08 12	2	UP:09	34	1	33	0.7	32	0	93	9	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 17:55	FM-15	OVC:08 7	1.25	UP:09	34	1	34	1.1	34	1	100	6	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 18:15	FM-15	OVC:08 7	2	UP:09	34	1	34	1.1	34	1	100	7	100		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 18:35	FM-15	OVC:08 7	2.5	UP:09	34	1	34	1.1	34	1	100	6	180		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 18:55	FM-15	OVC:08 7	2	UP:09	34	1	34	1.1	34	1	100	3	150		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 19:15	FM-15	SCT:04 7 OVC:08 15	2	UP:09	34	1	34	1.1	34	1	100	5	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 19:35	FM-15	BKN:07 3 BKN:07 7 OVC:08 14	2	UP:09	34	1	34	1.1	34	1	100	3	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 19:55	FM-15	OVC:08 3	1.75	BR:1	34	1	34	1.1	34	1	100	0	0		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 20:15	FM-15	OVC:08 3	1.5	BR:1	34	1	34	1.1	34	1	100	0	0		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 20:35	FM-15	OVC:08 3	1.5	UP:09	34	1	34	1.1	34	1	100	3	120		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 20:55	FM-15	OVC:08 5	2.5	BR:1	34	1	34	1.1	34	1	100	3	140		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 21:15	FM-15	OVC:08 7	3	BR:1	34	1	34	1.1	34	1	100	6	180		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 21:35	FM-15	OVC:08 7	5	UP:09	34	1	34	1.1	34	1	100	5	190		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 21:55	FM-15	OVC:08 7	5	BR:1	34	1	34	1.1	34	1	100	8	200		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 22:15	FM-15	OVC:08 7	2.5	BR:1	34	1	34	1.1	34	1	100	7	230		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 22:35	FM-15	OVC:08 5	2	BR:1	34	1	33	0.7	32	0	93	7	220		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 22:55	FM-15	OVC:08 5	1.75	BR:1	34	1	33	0.7	32	0	93	6	240		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:15	FM-15	OVC:08 3	2	BR:1	32	0	32	0	32	0	100	7	250		28.55				29.93	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:35	FM-15	OVC:08 5	2	BR:1	32	0	32	0	32	0	100	7	250		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:55	FM-15	OVC:08 3	2.5	BR:1	32	0	32	0	32	0	100	7	260		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:59	SOD																			
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 0:15	FM-15	OVC:08 3	2.5	BR:1	32	0	32	0	32	0	100	7	250		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 0:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	7	260		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 0:55	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	7	280		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 1:15	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	8	280		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 1:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	9	290		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 1:55	FM-15	OVC:08 3	2.5	BR:1	32	0	31	-0.4	30	-1	93	8	290		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 2:15	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	10	290		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 2:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	11	280		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 2:55	FM-15	OVC:08 3	2	BR:1	32	0	31	-0.4	30	-1	93	11	280		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 3:15	FM-15	OVC:08 3	2	BR:1	32	0	31	-0.4	30	-1	93	13	280	16	28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 3:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	10	290		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 3:55	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	14	300		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 4:15	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	15	300		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 4:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	13	310	18	28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 4:55	FM-15	OVC:08 5	3	BR:1	32	0	31	-0.4	30	-1	93	9	310		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 5:15	FM-15	OVC:08 5	4	BR:1	32	0	31	-0.4	30	-1	93	10	300		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 5:35	FM-15	OVC:08 7	4	BR:1	32	0	31	-0.4	30	-1	93	8	320		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 5:55	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	15	310		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 6:15	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	11	300		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 6:35	FM-15	OVC:08 9	5	BR:1	32	0	31	-0.4	30	-1	93	11	300	16	28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 6:55	FM-15	BKN:07 9 OVC:08 13	4	BR:1	32	0	31	-0.4	30	-1	93	10	300		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 7:15	FM-15	BKN:07 7 OVC:08 11	3	BR:1	32	0	31	-0.4	30	-1	93	8	290		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 7:35	FM-15	OVC:08 7	3	BR:1	32	0	31	-0.4	30	-1	93	13	310		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 7:55	FM-15	OVC:08 7	4	BR:1	32	0	31	-0.4	30	-1	93	13	300		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 8:15	FM-15	OVC:08 9	5	BR:1	32	0	31	-0.4	30	-1	93	13	320	17	28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 8:35	FM-15	OVC:08 9	4	BR:1	32	0	31	-0.4	30	-1	93	13	310		28.64				30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 8:55	FM-15	OVC:08 7	4	BR:1	32	0	31	-0.4	30	-1	93	11	300		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 9:15	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	15	310		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 9:35	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	11	290	17	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 9:55	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	10	280		28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 10:15	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	11	290		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 10:35	FM-15	OVC:08 7	5	BR:1	34	1	32	0.2	30	-1	87	13	300		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 10:55	FM-15	OVC:08 7	4	BR:1	34	1	32	0.2	30	-1	87	10	300		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 11:15	FM-15	OVC:08 7	5	BR:1	34	1	32	0.2	30	-1	87	8	310		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 11:35	FM-15	OVC:08 7	7		34	1	32	0.2	30	-1	87	11	300		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 11:55	FM-15	OVC:08 7	7		34	1	32	0.2	30	-1	87	13	280	16	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 12:15	FM-15	OVC:08 9	10		34	1	32	0.2	30	-1	87	11	270		28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 12:35	FM-15	OVC:08 11	10		36	2	34	0.9	30	-1	81	9	290		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 12:55	FM-15	OVC:08 11	10		36	2	34	0.9	30	-1	81	9	290		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 13:15	FM-15	OVC:08 13	10		37	3	35	1.6	32	0	81	11	310		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 13:35	FM-15	OVC:08 13	10		37	3	35	1.6	32	0	81	10	310		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 13:55	FM-15	OVC:08 13	10		37	3	35	1.6	32	0	81	9	270		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 14:15	FM-15	BKN:07 13	10		37	3	35	1.6	32	0	81	7	280		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 14:35	FM-15	SCT:04 15	10		39	4	36	2.3	32	0	75	8	260		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 14:55	FM-15	CLR:00	10		41	5	38	3.3	34	1	76	7	240		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 15:15	FM-15	CLR:00	10		41	5	37	2.9	32	0	70	6	260		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 15:35	FM-15	CLR:00	10		43	6	38	3.5	32	0	66	8	260		28.65				30.04	



Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMPF	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMPF	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 15:55	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	6	270	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 16:15	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	9	240	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 16:35	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	6	260	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 16:55	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	6	270	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 17:15	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	8	250	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 17:35	FM-15	CLR:00	10		43	6	40	4.4	36	2	76	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 17:55	FM-15	CLR:00	10		41	5	39	3.8	36	2	81	10	230	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 18:15	FM-15	CLR:00	10		39	4	37	2.7	34	1	81	8	240	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 18:35	FM-15	CLR:00	10		37	3	36	2.1	34	1	87	7	230	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 18:55	FM-15	CLR:00	10		36	2	34	1.3	32	0	87	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 19:15	FM-15	CLR:00	7		34	1	33	0.7	32	0	93	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 19:35	FM-15	CLR:00	10		34	1	32	0.2	30	-1	87	10	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 19:55	FM-15	SCT:04 85	7		34	1	32	0.2	30	-1	87	10	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 20:15	FM-15	SCT:04 85	7		34	1	32	0.2	30	-1	87	9	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 20:35	FM-15	CLR:00	7		32	0	30	-0.8	28	-2	87	9	230	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 20:55	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	8	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 21:15	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	7	210	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 21:35	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 21:55	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	8	210	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 22:35	FM-15	CLR:00	7		32	0	30	-0.8	28	-2	87	7	220	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 22:55	FM-15	SCT:04 85	7		30	-1	30	-1.1	30	-1	100	7	220	28.64					30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:15	FM-15	CLR:00	7		30	-1	30	-1.1	30	-1	100	7	210	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:35	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	6	210	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:55	FM-15	CLR:00	5	BR:1	30	-1	30	-1.1	30	-1	100	7	200	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:59	SOD																			
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 0:15	FM-15	CLR:00	7		30	-1	30	-1.1	30	-1	100	10	200	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 0:35	FM-15	CLR:00	5	BR:1	30	-1	29	-1.5	28	-2	93	7	200	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 0:55	FM-15	CLR:00	5	BR:1	30	-1	29	-1.5	28	-2	93	6	200	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 1:15	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	7	220	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 1:35	FM-15	CLR:00	7		30	-1	30	-1.1	30	-1	100	7	210	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 1:55	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	7	210	28.59					29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 2:15	FM-15	SCT:04 90	7		30	-1	29	-1.5	28	-2	93	7	200	28.58					29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 2:35	FM-15	SCT:04 90	7		30	-1	29	-1.5	28	-2	93	6	200	28.56					29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 2:55	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	9	180	28.56					29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 3:15	FM-15	CLR:00	10		30	-1	29	-1.5	28	-2	93	7	180	28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 3:35	FM-15	CLR:00	10		30	-1	29	-1.5	28	-2	93	8	180	28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 3:55	FM-15	CLR:00	10		30	-1	29	-1.5	28	-2	93	9	180	28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 4:15	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	9	170	28.55					29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 4:35	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	9	180	28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 4:55	FM-15	SCT:04 90	7		30	-1	29	-1.7	27	-3	86	8	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 5:15	FM-15	SCT:04 90	7		30	-1	29	-1.7	27	-3	86	6	190	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 5:35	FM-15	CLR:00	7		30	-1	29	-1.7	27	-3	86	9	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 5:55	FM-15	CLR:00	10		30	-1	29	-1.7	27	-3	86	8	180	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 6:15	FM-15	CLR:00	7		28	-2	28	-2.4	27	-3	93	9	170	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 6:35	FM-15	CLR:00	7		30	-1	29	-1.7	27	-3	86	8	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 6:55	FM-15	SCT:04 100	7		30	-1	29	-1.5	28	-2	93	8	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 7:15	FM-15	CLR:00	10		32	0	30	-0.8	28	-2	87	10	190	28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 7:35	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	13	180	28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 7:55	FM-15	CLR:00	10		36	2	33	0.5	28	-2	75	11	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 8:15	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	16	170	28.53					29.91	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 8:35	FM-15	CLR:00	10		36	2	33	0.5	28	-2	75	15	180		28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 8:55	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	17	170		28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 9:15	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	15	180		28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 9:35	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	18	180		28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 9:55	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	13	200		28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 10:15	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	21	190		28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 10:35	FM-15	SCT:04 100	10		37	3	36	2.1	34	1	87	16	180		28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 10:55	FM-15	CLR:00	10		37	3	36	2.1	34	1	87	14	190		28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 11:15	FM-15	CLR:00	10		39	4	37	2.7	34	1	81	11	190	20	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 11:35	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	16	210	22	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 11:55	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	17	210		28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 12:15	FM-15	CLR:00	10		43	6	38	3.1	30	-1	61	16	200		28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 12:35	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	20	190	23	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 12:55	FM-15	CLR:00	10		43	6	40	4.4	36	2	76	18	190	23	28.51					29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 13:15	FM-15	CLR:00	10		45	7	41	5	36	2	71	18	190		28.51					29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 13:35	FM-15	CLR:00	10		45	7	41	5	36	2	71	18	200	23	28.49					29.87	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 13:55	FM-15	CLR:00	10		45	7	41	5	36	2	71	16	210	20	28.48					29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:15	FM-15	CLR:00	10		45	7	41	5	36	2	71	13	210	20	28.48					29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:35	FM-15	CLR:00	10		46	8	41	5.3	36	2	66	14	220		28.48					29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:42	FM-15				46	8			36	2	66	11	230							29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:49	FM-15				46	8			37	3	71	10	210							29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:55	FM-15	CLR:00	10		46	8	41	5.3	36	2	66	13	220	17	28.47					29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 15:15	FM-15	CLR:00	10		46	8	42	5.5	37	3	71	14	230		28.46					29.84	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 15:35	FM-15	CLR:00	10		48	9	43	5.8	36	2	62	13	240		28.46					29.84	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 15:55	FM-15	CLR:00	10		48	9	43	6.1	37	3	66	16	250	20	28.46					29.84	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 16:15	FM-15	SCT:04 24	10		46	8	42	5.5	37	3	71	13	260		28.47					29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 16:35	FM-15	SCT:04 24	10		46	8	42	5.5	37	3	71	13	280		28.47					29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 16:55	FM-15	CLR:00	10		46	8	42	5.5	37	3	71	9	270		28.47					29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 17:15	FM-15	CLR:00	10		46	8	41	5.3	36	2	66	8	270		28.47					29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 17:35	FM-15	CLR:00	10		45	7	41	5	36	2	71	8	270		28.48					29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 17:55	FM-15	CLR:00	10		45	7	41	5	36	2	71	7	280		28.48					29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 18:15	FM-15	BKN:07 27	10		45	7	41	5	36	2	71	6	260		28.49					29.87	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 18:35	FM-15	OVC:08 25	10		43	6	40	4.6	37	3	81	5	250		28.49					29.87	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 18:55	FM-15	OVC:08 23	10		43	6	40	4.6	37	3	81	7	260		28.5					29.88	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 19:15	FM-15	OVC:08 23	10		43	6	40	4.6	37	3	81	5	290		28.5					29.88	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 19:35	FM-15	SCT:04 17 OVC:08 24	10		43	6	40	4.6	37	3	81	11	310		28.51					29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 19:55	FM-15	BKN:07 27 BKN:07 85	10		43	6	40	4.6	37	3	81	9	300		28.51					29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 20:15	FM-15	SCT:04 24 SCT:04 29 BKN:07 85	10		41	5	39	4	37	3	87	8	300		28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 20:35	FM-15	OVC:08 22	10		41	5	39	4	37	3	87	9	310		28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 20:55	FM-15	OVC:08 22	10		39	4	38	3.2	36	2	87	11	320		28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 21:15	FM-15	OVC:08 24	10		39	4	38	3.2	36	2	87	10	320		28.55					29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 21:35	FM-15	OVC:08 24	10		39	4	38	3.2	36	2	87	9	320		28.55					29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 21:55	FM-15	OVC:08 26	10		39	4	37	2.7	34	1	81	8	320		28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 22:15	FM-15	OVC:08 26	10		39	4	37	2.7	34	1	81	8	320		28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 22:35	FM-15	OVC:08 24	10		37	3	36	2.1	34	1	87	8	330		28.56					29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 22:55	FM-15	OVC:08 24	10		37	3	35	1.6	32	0	81	9	320		28.56					29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:15	FM-15	OVC:08 24	10		37	3	34	1.2	30	-1	75	11	330		28.58					29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:35	FM-15	BKN:07 24	10		36	2	33	0.5	28	-2	75	15	330		28.58					29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:55	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	13	320		28.59					29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:59	SOD																				

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULTEMPF	HOURLYDRYBULTEMPC	HOURLYWETBULTEMPF	HOURLYWETBULTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 0:15	FM-15	CLR:00	10		32	0	30	-0.8	28	-2	87	9	320		28.59					29.98
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 0:35	FM-15	CLR:00	10		30	-1	29	-1.7	27	-3	86	10	320		28.59					29.98
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 0:55	FM-15	SCT:04 95	10		30	-1	29	-1.7	27	-3	86	13	320		28.59					29.98
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 1:15	FM-15	SCT:04 95	10		30	-1	28	-2.1	25	-4	80	10	330	16	28.59					29.98
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 1:35	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	10	330		28.59					29.98
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 1:55	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	14	330	22	28.59					29.98
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 2:15	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	11	330	17	28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 2:35	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	14	330		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 2:55	FM-15	CLR:00	10		27	-3	26	-3.5	23	-5	86	15	340	21	28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 3:15	FM-15	SCT:04 95	10		27	-3	25	-3.9	21	-6	80	14	340	18	28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 3:35	FM-15	SCT:04 85	10		27	-3	25	-3.9	21	-6	80	11	340		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 3:55	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	14	340		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 4:15	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	15	340	24	28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 4:35	FM-15	SCT:04 85	10		27	-3	25	-3.9	21	-6	80	15	340		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 4:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	15	330		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 5:15	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	11	340		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 5:35	FM-15	SCT:04 85	10		25	-4	23	-5	19	-7	80	13	340	18	28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 5:55	FM-15	SCT:04 85	10		25	-4	23	-5	19	-7	80	11	340	17	28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 6:15	FM-15	SCT:04 85	10		25	-4	23	-5	19	-7	80	13	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 6:35	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	14	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 6:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	14	340		28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 7:35	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	16	340		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 7:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	14	350		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 8:15	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	13	340		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 8:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	13	340		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 8:55	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	13	350		28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 9:15	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	13	350		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 9:35	FM-15	CLR:00	10		28	-2	25	-3.9	19	-7	69	13	360		28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 9:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	13	340		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 10:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	14	330	18	28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 10:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	13	330	18	28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 10:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	15	340		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 11:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	14	340		28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 12:15	FM-15	CLR:00	10		34	1	30	-1.1	23	-5	65	15	340	18	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 12:35	FM-15	CLR:00	10		34	1	30	-1.1	23	-5	65	15	350		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 12:55	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	15	330	21	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 13:15	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	18	360	23	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 13:35	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	17	330	24	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 13:55	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	17	350	22	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 14:15	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	17	350	24	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 14:35	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	16	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 14:55	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	16	340	23	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 15:15	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	15	330	22	28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 15:35	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	15	340		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 15:55	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	16	340	21	28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 16:15	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	16	VRB	22	28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 16:35	FM-15	CLR:00	10		37	3	30	-0.9	18	-8	45	14	330		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 16:55	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	15	340	20	28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 17:15	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	14	330		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 17:35	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	11	330	16	28.72					30.11

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMPF	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMPF	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 17:55	FM-15	CLR:00	10		36	2	30	-1.1	19	-7	52	9	340		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 18:15	FM-15	CLR:00	10		36	2	30	-1.1	19	-7	52	8	330		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 18:35	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	7	330		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 18:55	FM-15	SCT:04 90	10		32	0	28	-2.1	21	-6	64	7	320		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 19:15	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	5	310		28.75					30.14
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 19:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	6	300		28.75					30.14
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 19:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	6	290		28.76					30.15
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 20:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 20:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 20:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 21:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	8	310		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 21:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 21:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	310		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 22:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	5	290		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 22:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	3	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 22:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	3	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 23:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	3	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 23:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	5	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 23:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	300		28.8					30.19

Appendix C

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Short-term Sound Level Measurement Data

Table C-1: Short-term Sound Level Measurement Results

S1	Sound Pressure Level							
	Leq	L10	L50	L90	Leq	L10	L50	L90
	dBA	dBA	dBA	dBA	dBC	dBC	dBC	dBC
Daytime	52	53	41	31	63	64	55	50
Nighttime	50	53	28	23	58	59	47	44
S2	Sound Pressure Level							
	Leq	L10	L50	L90	Leq	L10	L50	L90
	dBA	dBA	dBA	dBA	dBC	dBC	dBC	dBC
Daytime	30	33	28	24	48	49	47	46
Nighttime	30	33	29	26	47	49	47	46

Notes:

1. Daytime and nighttime measurements were on March 20, 2018 and March 21, 2018, respectively

Appendix D

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DCW Wind Turbine Coordinates



**Table D-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
1	491773.49	4876513.69
2	492177.40	4876929.74
3	492515.95	4876507.29
4	492027.69	4875376.03
5	492382.70	4875021.02
6	492872.33	4874956.90
7	493480.60	4874916.73
8	493862.85	4875124.65
9	494524.33	4874201.90
10	495256.04	4875133.97
11	495645.46	4875128.40
12	496632.97	4866120.24
13	496950.55	4866540.12
14	496863.02	4867708.41
15	497232.19	4868242.38
16	496520.92	4868936.19
17	497702.64	4868650.42
18	498559.17	4869213.08
19	496175.92	4870443.22
20	496546.68	4870518.48
21	496901.03	4869976.79
22	497294.89	4869935.28
23	497723.95	4869962.98
24	498388.48	4870067.35
25	498952.27	4869760.73
26	496087.93	4871373.26
27	496519.91	4871371.21
28	498114.74	4870686.08
29	498532.91	4871403.19
30	499356.88	4871529.00
31	497612.89	4873395.25
32	498398.28	4872549.54
33	498796.96	4872868.03
34	500149.90	4873911.23
35	501398.06	4873589.09
36	501770.29	4873795.69
37	502124.90	4873815.21
38	502595.92	4873426.22
39	503005.34	4873519.47
40	503372.12	4873881.51
41	503770.23	4873926.96
42	500177.97	4872914.07
43	502301.86	4872993.95
44	501790.90	4872182.22
45	502227.91	4872122.24
46	502591.63	4872391.24
47	502991.91	4872505.27
48	503371.39	4872585.69
49	501755.51	4871361.61
50	503662.93	4871608.22

**Table D-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
51	504224.94	4871855.24
52	504569.48	4871409.27
53	505395.56	4871637.86
54	502140.74	4870760.46
55	503404.54	4870993.37
56	503820.93	4870883.24
57	504206.39	4870859.18
58	502581.34	4869899.76
59	502997.22	4870084.96
60	503382.55	4870096.20
61	503764.41	4869999.27
62	504662.35	4870183.97
63	505359.94	4869797.24
64	506497.95	4869971.23
65	502147.93	4869004.19
66	503091.92	4868779.21
67	503453.82	4869064.27
68	503763.25	4868682.38
Alt1	492991.91	4876607.27
Alt2	504008.92	4869270.22
Alt3	503919.66	4872259.61
Alt4	499837.87	4873507.53

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Sound Level Modeling Results – Tabular – Sorted by Receptor ID

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
1	491323.97	4876003.31	Non-Participating	1	41
2	494675.74	4874843.64	Participating	1	44
12	495571.71	4871482.46	Participating	1	43
13	508114.34	4869543.75	Non-Participating	1	33
14	502838.46	4866942.77	Non-Participating	1	35
15	507596.16	4875246.28	Non-Participating	1	30
16	511230.91	4871253.21	Non-Participating	1	26
17	511252.81	4866394.34	Non-Participating	1	25
18	510963.01	4866310.55	Non-Participating	1	25
19	511236.15	4865354.84	Non-Participating	1	24
20	511469.59	4865525.69	Non-Participating	1	24
21	511803.28	4864790.87	Non-Participating	1	23
22	512882.51	4865215.73	Non-Participating	1	22
23	512873.66	4865696.43	Non-Participating	1	23
24	512672.12	4864525.97	Non-Participating	1	22
25	511249.27	4863981.03	Non-Participating	1	23
26	511259.59	4863882.99	Non-Participating	1	23
27	511344.96	4863873.64	Non-Participating	1	23
28	511215.66	4862975.26	Non-Participating	1	22
29	496552.23	4874244.46	Participating	1	38
30	498628.08	4875979.63	Non-Participating	1	34
31	499002.42	4875287.65	Non-Participating	1	36
32	499599.12	4875101.12	Non-Participating	1	37
33	499667.39	4875349.30	Non-Participating	1	36
34	499579.55	4875568.90	Non-Participating	1	35
35	499611.30	4875969.22	Non-Participating	1	34
36	499630.61	4876074.26	Non-Participating	1	34
37	499592.84	4876172.35	Non-Participating	1	33
38	499584.90	4876221.63	Non-Participating	1	34
39	499575.64	4876277.53	Non-Participating	1	33
40	499452.74	4876213.03	Non-Participating	1	34
41	499633.37	4876323.52	Non-Participating	1	33
42	499577.34	4876430.68	Non-Participating	1	33
43	499610.04	4876414.33	Non-Participating	1	33
44	501043.37	4874380.00	Non-Participating	1	42
45	500947.46	4874527.17	Participating	1	41
46	501031.13	4874231.83	Non-Participating	1	43
47	501227.06	4875030.65	Non-Participating	1	39
48	501197.62	4875115.32	Non-Participating	1	38
49	501230.36	4875345.51	Non-Participating	1	37
50	501090.13	4875362.70	Non-Participating	1	37
51	501571.15	4875944.50	Non-Participating	1	35
52	501438.59	4876074.41	Non-Participating	1	35
53	502423.50	4876077.06	Non-Participating	1	35
54	502510.29	4875920.42	Non-Participating	1	35
55	502413.98	4875915.66	Non-Participating	1	35
56	502502.88	4875773.32	Non-Participating	1	36
57	502679.62	4875863.27	Non-Participating	1	36

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
58	502810.85	4875788.66	Non-Participating	1	36
59	502831.49	4875681.24	Non-Participating	1	36
60	502714.55	4875399.19	Non-Participating	1	37
61	502721.16	4875266.90	Non-Participating	1	38
62	502793.92	4874915.01	Participating	1	40
63	502795.77	4874857.59	Participating	1	40
64	502728.04	4874380.81	Participating	1	44
65	503738.09	4874989.75	Participating	1	39
66	504105.86	4874905.08	Non-Participating	1	39
67	504104.11	4874434.02	Participating	1	42
68	504298.15	4874837.83	Non-Participating	1	38
69	503489.38	4875803.62	Non-Participating	1	35
70	503392.81	4875830.08	Non-Participating	1	35
71	504290.41	4875654.93	Non-Participating	1	35
72	504273.87	4875735.63	Non-Participating	1	35
73	504056.70	4875882.71	Non-Participating	1	34
74	504535.62	4874968.38	Non-Participating	1	37
75	504475.43	4874793.75	Non-Participating	1	38
76	504646.75	4874484.85	Non-Participating	1	38
77	504921.92	4874625.08	Non-Participating	1	37
78	505001.62	4874532.14	Non-Participating	1	37
79	505124.98	4874525.20	Non-Participating	1	36
80	505184.52	4874515.28	Non-Participating	1	36
81	505399.82	4874479.23	Non-Participating	1	35
82	505367.74	4874307.25	Non-Participating	1	36
83	505532.77	4874466.33	Non-Participating	1	35
84	505566.18	4874182.83	Non-Participating	1	36
85	506083.22	4874314.89	Non-Participating	1	34
86	506058.09	4874109.83	Non-Participating	1	34
87	507311.95	4875159.44	Non-Participating	1	30
88	507422.02	4875164.20	Non-Participating	1	30
89	507528.65	4875149.91	Non-Participating	1	30
90	507599.42	4874772.15	Non-Participating	1	30
91	508121.97	4874981.77	Non-Participating	1	29
92	508591.19	4875255.26	Non-Participating	1	28
93	509166.13	4875086.85	Non-Participating	1	28
94	509022.59	4875282.64	Non-Participating	1	27
95	509351.34	4875158.02	Non-Participating	1	27
96	509416.42	4875235.41	Non-Participating	1	22
97	509776.66	4875411.96	Non-Participating	1	27
98	509731.74	4874372.94	Non-Participating	1	27
99	494854.60	4872697.99	Non-Participating	1	36
100	495132.34	4872890.10	Non-Participating	1	37
101	496413.53	4872753.51	Non-Participating	1	39
102	497067.91	4872235.01	Non-Participating	1	41
103	495778.39	4871934.81	Participating	1	42
104	495507.06	4871937.58	Non-Participating	1	40
105	497277.52	4872254.03	Non-Participating	1	41

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
106	497138.35	4873069.61	Participating	1	42
107	499065.71	4872231.14	Participating	1	44
108	499677.17	4872538.85	Non-Participating	1	43
109	498632.85	4872029.26	Non-Participating	1	45
110	498077.69	4874206.61	Non-Participating	1	39
111	499582.38	4871957.52	Non-Participating	1	44
112	499505.52	4873983.70	Participation Pending	1	44
113	499640.46	4874375.81	Non-Participating	1	42
114	499618.58	4874177.48	Participating	1	43
115	500691.28	4871972.52	Non-Participating	1	42
116	501183.27	4871944.87	Non-Participating	1	44
117	501103.10	4872967.75	Participation Pending	1	44
118	501528.69	4872860.66	Participating	1	45
119	503071.21	4871942.22	Participating	1	47
120	502725.93	4871787.44	Participating	1	47
121	503827.13	4872773.68	Participating	1	47
122	503996.46	4872856.76	Participating	1	45
123	504201.25	4872856.23	Participating	1	44
124	504551.09	4874079.47	Non-Participating	1	40
125	504758.52	4871963.59	Participating	1	46
126	504942.08	4872768.12	Non-Participating	1	41
127	505837.17	4873650.51	Non-Participating	1	36
128	506220.82	4873313.16	Non-Participating	1	35
129	506549.56	4872868.13	Non-Participating	1	35
130	506996.44	4872762.57	Non-Participating	1	34
131	506998.03	4871828.06	Non-Participating	1	35
132	507534.25	4871148.65	Non-Participating	1	35
133	507702.53	4871154.60	Non-Participating	1	34
134	507988.15	4871657.51	Non-Participating	1	33
135	508141.14	4872275.11	Non-Participating	1	32
136	507912.94	4872763.80	Non-Participating	1	32
137	507852.51	4872992.61	Participating	1	32
138	506865.15	4873428.54	Non-Participating	1	34
139	508493.79	4873588.15	Non-Participating	1	30
140	508608.89	4873590.53	Non-Participating	1	30
141	508631.91	4873590.93	Non-Participating	1	30
142	508613.65	4873652.84	Participating	1	30
143	508917.66	4873593.31	Non-Participating	1	29
144	509004.04	4872856.29	Non-Participating	1	29
145	509375.92	4872966.88	Participating	1	29
146	509975.20	4872682.45	Non-Participating	1	28
147	510643.93	4872858.40	Non-Participating	1	27
148	510742.82	4872673.86	Non-Participating	1	27
149	509722.39	4872284.72	Non-Participating	1	29
150	509630.84	4872355.63	Non-Participating	1	29
151	509722.69	4873399.56	Non-Participating	1	28
152	495349.84	4870249.67	Non-Participating	1	40
153	495559.21	4869681.85	Non-Participating	1	40

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
154	495562.38	4870204.93	Participation Pending	1	42
155	495124.76	4870677.40	Non-Participating	1	39
156	495559.28	4870851.63	Non-Participating	1	42
157	495387.82	4871379.34	Participating	1	41
158	495550.87	4871409.04	Participating	1	43
159	496488.82	4869537.11	Participating	1	45
160	496747.46	4869514.95	Non-Participating	1	46
161	497688.18	4869422.48	Participation Pending	1	46
162	499490.33	4869311.02	Participating	1	42
163	499484.18	4870256.98	Non-Participating	1	42
164	499480.74	4870826.96	Non-Participating	1	42
165	501120.03	4871028.07	Non-Participating	1	42
166	501137.73	4869524.71	Non-Participating	1	40
167	501212.34	4869298.23	Participation Pending	1	40
168	502822.20	4871087.25	Non-Participating	1	46
169	504355.79	4869657.97	Participating	1	46
170	504464.66	4869547.53	Participation Pending	1	46
171	505966.47	4869876.74	Participating	1	44
172	506068.12	4870744.95	Non-Participating	1	41
173	506052.46	4871492.14	Non-Participating	1	41
174	507891.98	4870234.05	Non-Participating	1	34
175	508823.64	4869539.44	Non-Participating	1	31
176	509063.51	4869535.71	Non-Participating	1	30
177	508143.94	4871002.25	Non-Participating	1	33
178	508887.77	4871155.48	Non-Participating	1	31
179	509716.92	4871621.42	Non-Participating	1	29
180	509716.39	4871712.56	Non-Participating	1	29
181	509642.37	4871517.50	Non-Participating	1	29
182	509638.57	4871313.88	Non-Participating	1	29
183	510238.58	4871099.40	Non-Participating	1	28
184	509715.57	4870766.88	Non-Participating	1	29
185	510779.47	4869615.18	Non-Participating	1	27
186	509710.09	4868616.84	Non-Participating	1	28
187	511208.69	4868187.15	Non-Participating	1	26
188	511358.45	4868626.10	Non-Participating	1	26
189	511354.81	4868870.63	Non-Participating	1	26
190	511340.26	4870437.24	Non-Participating	1	26
191	511328.61	4870357.34	Non-Participating	1	26
192	511231.78	4870673.51	Non-Participating	1	26
193	510669.32	4871235.95	Non-Participating	1	27
194	511198.71	4871506.32	Non-Participating	1	26
195	512094.54	4871434.48	Non-Participating	1	25
196	512320.76	4871236.81	Non-Participating	1	25
197	511855.79	4867910.86	Non-Participating	1	25
198	494754.88	4867302.15	Non-Participating	1	34
199	494905.17	4868021.02	Non-Participating	1	35
200	495449.94	4868724.88	Non-Participating	1	38
201	495138.07	4868819.47	Non-Participating	1	37



**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
202	496022.17	4868650.40	Participating	1	42
203	495966.21	4867985.63	Non-Participating	1	40
204	495581.29	4867570.63	Non-Participating	1	37
205	496788.12	4867093.39	Participating	1	44
206	496798.37	4867179.05	Participating	1	44
207	499466.54	4867083.00	Non-Participating	1	35
208	499809.28	4868052.25	Non-Participating	1	37
209	499522.27	4869059.69	Non-Participating	1	40
210	502932.76	4869206.67	Non-Participating	1	47
211	502739.87	4868086.02	Non-Participating	1	41
212	501100.51	4867929.92	Non-Participating	1	36
213	501205.69	4868183.52	Non-Participating	1	37
214	501126.31	4866789.30	Non-Participating	1	34
215	502829.57	4866859.28	Non-Participating	1	35
216	503980.77	4867832.68	Participating	1	40
217	504375.89	4866974.59	Non-Participating	1	35
218	504434.89	4868964.79	Participation Pending	1	45
219	508048.06	4868683.08	Non-Participating	1	32
220	507577.42	4867933.06	Non-Participating	1	32
221	508256.18	4868031.55	Non-Participating	1	30
222	508160.93	4868043.79	Non-Participating	1	31
223	509431.73	4867831.46	Non-Participating	1	28
224	511197.03	4867137.19	Non-Participating	1	25
225	512836.13	4867255.07	Non-Participating	1	23
226	512876.54	4865698.06	Non-Participating	1	23
227	511254.51	4866393.12	Non-Participating	1	25
228	510956.59	4866312.68	Non-Participating	1	25
229	511803.46	4864790.40	Non-Participating	1	23
230	511248.62	4863982.43	Non-Participating	1	23
231	511238.56	4865356.24	Non-Participating	1	24
232	511480.24	4865525.57	Non-Participating	1	24
233	509654.54	4866311.78	Non-Participating	1	26
234	509084.69	4866510.99	Non-Participating	1	27
235	508125.47	4866480.14	Non-Participating	1	29
236	508115.22	4865668.00	Participating	1	28
237	508300.10	4864702.93	Non-Participating	1	26
238	508661.25	4864863.00	Non-Participating	1	26
239	509043.52	4864717.00	Non-Participating	1	26
240	508220.95	4863160.03	Non-Participating	1	25
241	508608.56	4863085.28	Non-Participating	1	24
242	510181.05	4863250.58	Non-Participating	1	23
243	509723.76	4864264.38	Non-Participating	1	25
244	507091.02	4863071.04	Non-Participating	1	25
245	508023.68	4863776.16	Non-Participating	1	26
246	507972.08	4864241.82	Non-Participating	1	26
247	507911.18	4864780.64	Non-Participating	1	27
248	507075.09	4866460.06	Non-Participating	1	30
249	505979.98	4864375.54	Non-Participating	1	28

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
250	506660.75	4864623.72	Non-Participating	1	28
251	506083.96	4865856.15	Non-Participating	1	30
252	505944.82	4866307.39	Non-Participating	1	31
253	505982.60	4866485.83	Non-Participating	1	31
254	505286.95	4866388.36	Non-Participating	1	32
255	504453.20	4864368.89	Non-Participating	1	29
256	503837.48	4864808.63	Non-Participating	1	30
257	502759.65	4866448.52	Non-Participating	1	34
258	502756.62	4865044.88	Non-Participating	1	30
259	502847.64	4865132.72	Non-Participating	1	31
260	502861.92	4864320.45	Non-Participating	1	29
261	502744.45	4864637.95	Non-Participating	1	30
262	500293.87	4864408.55	Non-Participating	1	30
263	498693.14	4865949.36	Non-Participating	1	34
264	495594.27	4864552.69	Non-Participating	1	31
265	495484.80	4864629.42	Non-Participating	1	31
266	495481.67	4865143.24	Non-Participating	1	33
267	495597.95	4865308.34	Non-Participating	1	34
268	495580.09	4865567.90	Non-Participating	1	35
269	495577.97	4865900.74	Non-Participating	1	36
270	495457.06	4866413.77	Participating	1	36
271	495573.74	4866601.10	Non-Participating	1	37
272	494999.07	4865576.36	Non-Participating	1	33
273	495460.45	4863808.79	Non-Participating	1	29
274	495591.47	4863853.66	Non-Participating	1	29
275	495598.45	4863807.52	Non-Participating	1	29
276	495602.69	4864144.71	Non-Participating	1	30
277	495449.26	4863156.32	Non-Participating	1	28
278	495021.10	4862798.98	Non-Participating	1	27
279	495447.60	4861627.16	Non-Participating	1	25
280	495589.39	4861913.81	Non-Participating	1	26
281	496387.78	4863669.96	Non-Participating	1	30
282	495401.41	4862947.65	Non-Participating	1	27
283	497806.48	4861897.78	Non-Participating	1	26
284	498032.83	4862353.66	Non-Participating	1	27
285	497883.34	4862416.63	Non-Participating	1	27
286	497390.91	4863188.77	Non-Participating	1	29
287	499200.13	4863160.86	Non-Participating	1	28
288	499366.82	4863159.80	Non-Participating	1	28
289	499062.33	4863011.63	Non-Participating	1	28
290	499521.73	4863071.93	Non-Participating	1	28
291	499600.44	4863131.46	Non-Participating	1	28
292	499653.41	4863563.84	Non-Participating	1	29
293	500052.87	4861924.15	Non-Participating	1	26
294	500766.98	4862078.00	Non-Participating	1	26
295	501364.94	4862089.11	Non-Participating	1	26
296	501290.46	4862403.31	Non-Participating	1	27
297	501228.41	4863777.42	Non-Participating	1	29

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
298	502760.35	4863408.22	Non-Participating	1	28
299	502811.16	4863065.78	Non-Participating	1	27
300	502845.02	4861700.00	Non-Participating	1	26
301	504324.44	4863058.11	Non-Participating	1	27
302	504359.50	4863154.55	Non-Participating	1	27
303	505569.77	4863166.39	Non-Participating	1	26
304	505982.13	4863095.12	Non-Participating	1	26
305	505957.47	4862103.78	Non-Participating	1	25
306	506058.01	4862083.94	Non-Participating	1	25
307	505988.95	4862547.09	Non-Participating	1	25
308	505982.34	4861816.52	Non-Participating	1	25
309	508028.80	4862608.01	Non-Participating	1	24
310	510037.65	4862973.60	Non-Participating	1	23
311	509978.52	4862987.49	Non-Participating	1	23
312	511214.04	4862974.57	Non-Participating	1	22
313	496566.43	4861678.65	Non-Participating	1	26
314	496394.58	4861521.88	Non-Participating	1	26
315	498202.69	4861536.49	Non-Participating	1	26
316	499547.11	4861789.56	Non-Participating	1	26
317	499706.65	4861546.15	Non-Participating	1	26
318	503314.07	4861437.35	Non-Participating	1	25
319	504482.21	4861250.15	Non-Participating	1	25
320	504352.19	4861303.49	Non-Participating	1	25
321	504448.61	4861690.45	Non-Participating	1	25
322	505946.34	4860787.53	Non-Participating	1	24
323	512456.10	4867927.90	Non-Participating	1	24
324	512869.46	4865200.07	Non-Participating	1	22
325	511241.06	4863845.52	Non-Participating	1	23
326	511377.68	4863817.25	Non-Participating	1	23
327	511380.49	4867122.86	Non-Participating	1	19
328	511919.63	4867891.62	Non-Participating	1	25
329	510106.92	4875126.21	Non-Participating	1	26
330	509957.99	4875215.57	Non-Participating	1	27
331	509838.84	4875240.39	Non-Participating	1	26
332	509540.98	4875523.36	Non-Participating	1	27
333	508513.01	4875649.50	Non-Participating	1	24
334	508137.19	4875249.86	Non-Participating	1	29
335	507954.57	4875255.16	Non-Participating	1	29
336	507476.85	4875245.18	Non-Participating	1	30
337	507291.26	4875238.55	Non-Participating	1	30
338	507308.94	4875273.90	Non-Participating	1	30
339	507133.29	4875236.34	Non-Participating	1	31
340	506456.95	4875177.45	Non-Participating	1	32
341	506392.06	4875165.44	Non-Participating	1	32
342	506303.13	4875506.73	Non-Participating	1	32
343	506056.14	4874737.23	Non-Participating	1	33
344	505835.16	4874164.35	Non-Participating	1	35
345	506443.65	4873048.96	Non-Participating	1	35

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
346	507707.14	4873655.54	Non-Participating	1	29
347	507746.57	4873752.32	Non-Participating	1	29
348	509482.74	4869911.96	Non-Participating	1	29
349	510177.21	4869522.86	Non-Participating	1	28
350	509715.75	4868523.34	Non-Participating	1	28
351	509715.75	4867936.59	Non-Participating	1	28
352	506639.54	4867805.93	Non-Participating	1	33
353	505981.69	4867853.87	Non-Participating	1	35
354	506107.06	4861179.97	Non-Participating	1	24
355	504354.46	4863221.55	Non-Participating	1	27
356	504370.17	4866942.89	Non-Participating	1	35
357	504454.04	4869760.35	Participating	1	46
358	504953.18	4872026.30	Participating	1	45
359	505194.11	4872241.77	Participating	1	43
360	504982.82	4872823.99	Non-Participating	1	40
361	504632.53	4874064.72	Non-Participating	1	40
362	504550.66	4874140.13	Non-Participating	1	40
363	505058.05	4874529.02	Non-Participating	1	36
364	505317.29	4874471.44	Non-Participating	1	36
365	504311.78	4875881.90	Non-Participating	1	34
366	503080.23	4875981.03	Non-Participating	1	35
367	501067.74	4868680.68	Non-Participating	1	38
368	501045.42	4874262.69	Non-Participating	1	43
369	500526.98	4876004.95	Non-Participating	1	35
370	499677.17	4876262.10	Non-Participating	1	34
371	497251.94	4874354.41	Non-Participating	1	38
372	497140.70	4873107.83	Participating	1	42
373	499493.80	4874005.78	Participation Pending	1	43
374	499695.62	4871921.37	Non-Participating	1	44
375	495332.11	4865917.77	Non-Participating	1	35
376	495778.75	4872841.02	Participating	1	37
377	496079.55	4874600.17	Participating	1	41
378	493303.66	4865363.05	Non-Participating	1	28
379	493858.51	4865675.06	Non-Participating	1	30
380	494597.57	4865481.24	Non-Participating	1	31
381	494950.93	4865608.48	Non-Participating	1	33
382	494693.22	4861787.99	Non-Participating	1	25
383	494229.69	4862485.36	Non-Participating	1	25
384	493181.97	4865807.99	Non-Participating	1	29
385	493478.15	4866684.14	Non-Participating	1	30
386	494547.73	4867036.45	Non-Participating	1	33
387	493147.39	4867174.99	Non-Participating	1	30
388	494039.10	4868100.58	Non-Participating	1	33
389	494018.51	4868810.50	Participating	1	33
390	493659.28	4869128.74	Non-Participating	1	32
391	493009.42	4868795.04	Participating	1	31
392	492892.87	4868809.26	Non-Participating	1	30
393	492790.68	4869907.25	Participating	1	31

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
394	493362.95	4869980.97	Non-Participating	1	32
395	494639.05	4870297.72	Participating	1	36
396	493230.51	4871142.26	Non-Participating	1	33
397	493766.48	4871236.38	Non-Participating	1	34
398	493921.25	4871132.90	Non-Participating	1	34
399	493540.46	4872673.61	Non-Participating	1	34
400	494524.93	4872747.21	Non-Participating	1	36
401	493407.56	4872816.88	Non-Participating	1	35
402	493747.84	4873206.91	Non-Participating	1	37
403	494151.04	4873285.23	Participating	1	38
404	494002.17	4873709.27	Participating	1	40
405	494024.46	4873648.96	Participating	1	40
406	495243.19	4873764.68	Participating	1	39
407	495706.37	4874363.08	Participating	1	41
408	495270.39	4874448.85	Non-Participating	1	43
409	494786.51	4875095.87	Participating	1	44
410	494742.68	4874890.93	Participating	1	44
411	494673.38	4874964.89	Participating	1	43
412	493870.54	4874371.18	Participating	1	44
413	494159.74	4874451.58	Participating	1	45
414	493136.16	4874000.60	Participating	1	40
415	494807.37	4875552.26	Participating	1	42
416	495595.18	4875646.56	Participation Pending	1	43
417	493717.24	4875917.78	Non-Participating	1	42
418	494099.39	4876121.20	Participating	1	40
419	493086.55	4876093.83	Participating	1	44
420	492917.55	4875943.58	Non-Participating	1	44
421	492824.93	4874336.74	Participating	1	43
422	493045.90	4873720.17	Participating	1	38
423	492516.61	4873491.63	Non-Participating	1	36
424	492393.91	4872911.32	Participating	1	34
425	492485.00	4872667.59	Participating	1	34
426	492280.30	4872422.45	Participating	1	33
427	492886.93	4871221.63	Non-Participating	1	32
428	493003.05	4871142.66	Non-Participating	1	32
429	492012.71	4870131.27	Participating	1	30
430	491814.62	4869462.51	Participating	1	29
431	492354.77	4868912.11	Participating	1	30
432	492373.27	4868475.96	Non-Participating	1	30
433	492178.63	4867809.55	Non-Participating	1	28
434	492842.51	4867801.89	Non-Participating	1	30
435	491772.81	4867258.11	Non-Participating	1	27
436	492683.89	4866290.27	Non-Participating	1	28
437	492560.24	4865883.35	Non-Participating	1	28
438	493165.10	4862890.93	Non-Participating	1	26
439	493590.90	4862204.60	Non-Participating	1	25
440	499494.35	4875986.15	Non-Participating	1	34
441	509739.94	4875483.39	Non-Participating	1	27

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
442	499516.46	4866307.27	Non-Participating	1	33
443	512055.62	4871144.22	Non-Participating	1	25
444	507243.76	4875236.34	Non-Participating	1	30
445	508298.59	4873512.15	Non-Participating	1	30
446	490229.89	4872596.92	Non-Participating	1	30
447	489847.36	4872269.25	Non-Participating	1	28
448	488635.42	4877561.29	Non-Participating	1	28
449	488219.84	4877375.84	Non-Participating	1	27
450	488227.59	4877664.18	Non-Participating	1	27
451	487845.93	4879211.82	Non-Participating	1	25
452	486858.06	4879271.46	Non-Participating	1	24
453	486750.57	4879405.48	Non-Participating	1	24
454	487445.96	4879108.89	Non-Participating	1	25
455	487500.71	4879138.87	Non-Participating	1	25
456	486363.48	4879172.96	Non-Participating	1	23
457	487110.32	4877460.18	Non-Participating	1	25
458	486739.40	4877456.16	Non-Participating	1	25
459	486738.89	4877554.33	Non-Participating	1	25
460	486756.68	4878037.63	Non-Participating	1	24
461	486660.03	4877806.42	Non-Participating	1	24
462	485834.32	4879132.42	Non-Participating	1	23
463	485809.66	4879170.03	Non-Participating	1	23
464	486256.72	4877643.56	Non-Participating	1	24
465	485959.87	4877465.90	Non-Participating	1	24
466	484581.56	4877648.78	Non-Participating	1	22
467	483815.76	4877785.78	Non-Participating	1	21
468	485477.21	4877647.07	Non-Participating	1	23
469	485584.47	4877637.05	Non-Participating	1	23
470	485555.94	4877595.45	Non-Participating	1	23
471	485553.87	4877635.12	Non-Participating	1	23
472	485326.16	4879324.31	Non-Participating	1	22
473	485052.32	4879054.82	Non-Participating	1	22
474	485117.12	4878621.98	Non-Participating	1	21
475	488227.48	4878434.34	Non-Participating	1	26
476	488294.10	4878419.31	Non-Participating	1	27
477	488578.50	4878448.47	Non-Participating	1	27
478	488238.28	4878729.90	Non-Participating	1	26
479	488802.63	4879306.04	Non-Participating	1	26
480	489444.23	4879207.74	Non-Participating	1	28
481	489545.45	4879212.95	Non-Participating	1	28
482	489635.56	4878759.90	Non-Participating	1	29
483	490495.82	4879286.80	Non-Participating	1	29
484	490977.06	4879298.11	Non-Participating	1	30
485	490949.78	4879137.82	Non-Participating	1	30
486	491460.25	4878431.59	Non-Participating	1	33
487	491713.80	4878334.91	Non-Participating	1	34
488	491806.50	4879142.21	Non-Participating	1	31
489	492039.41	4879331.55	Non-Participating	1	30



**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
490	492860.00	4879226.20	Non-Participating	1	31
491	493142.48	4879036.43	Non-Participating	1	32
492	492758.53	4879319.56	Non-Participating	1	31
493	494040.55	4879209.90	Non-Participating	1	30
494	494946.88	4878858.40	Non-Participating	1	31
495	494631.87	4878070.88	Non-Participating	1	33
496	494622.23	4878130.23	Non-Participating	1	33
497	495153.30	4877779.20	Non-Participating	1	33
498	494779.88	4877690.16	Non-Participating	1	33
499	494656.56	4877212.33	Non-Participating	1	35
500	493010.05	4877412.07	Participating	1	41
501	493292.00	4877317.09	Participation Pending	1	40
502	493253.70	4877817.21	Non-Participating	1	37
503	492754.95	4877751.84	Non-Participating	1	39
504	492937.93	4877693.98	Non-Participating	1	39
505	492333.63	4877666.52	Non-Participating	1	40
506	492251.72	4877503.81	Participating	1	42
507	492234.18	4877555.41	Participating	1	41
508	492209.17	4877379.83	Participating	1	44
509	491204.57	4877592.32	Non-Participating	1	37
510	490993.10	4877604.29	Non-Participating	1	36
511	490950.33	4877852.19	Non-Participating	1	35
512	489835.40	4877912.18	Non-Participating	1	31
513	489914.98	4877880.09	Non-Participating	1	31
514	490320.50	4876915.99	Non-Participating	1	34
515	490345.19	4876928.97	Non-Participating	1	34
516	489824.65	4877177.26	Non-Participating	1	32
517	489798.47	4877241.24	Non-Participating	1	32
518	488326.68	4876849.62	Non-Participating	1	28
519	488211.66	4877034.73	Non-Participating	1	27
520	486597.05	4876484.54	Non-Participating	1	25
521	485139.90	4876925.87	Non-Participating	1	23
522	485112.68	4876718.66	Non-Participating	1	23
523	485111.73	4876886.12	Non-Participating	1	23
524	484576.48	4877381.31	Non-Participating	1	22
525	484604.14	4877406.38	Non-Participating	1	22
526	484415.46	4876945.29	Non-Participating	1	22
527	484482.97	4876529.89	Non-Participating	1	22
528	484133.35	4876454.25	Non-Participating	1	22
529	483354.68	4876911.14	Non-Participating	1	21
530	483340.51	4876941.40	Non-Participating	1	21
531	483284.50	4877111.89	Non-Participating	1	21
532	483894.45	4877038.60	Non-Participating	1	21
533	483805.65	4877165.29	Non-Participating	1	21
534	500183.35	4876832.93	Non-Participating	1	32
535	498032.98	4876897.85	Non-Participating	1	32
536	497876.00	4876576.62	Non-Participating	1	33
537	496003.73	4876090.86	Participating	1	38

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
538	483371.66	4876260.99	Non-Participating	1	21
539	483342.50	4876216.88	Non-Participating	1	21
540	483353.94	4876115.55	Non-Participating	1	21
541	483356.50	4875964.09	Non-Participating	1	21
542	483610.07	4875926.75	Non-Participating	1	21
543	484347.49	4875779.83	Non-Participating	1	22
544	484122.70	4876211.77	Non-Participating	1	22
545	484639.57	4876183.37	Non-Participating	1	22
546	485040.33	4875536.46	Non-Participating	1	23
547	485950.14	4875850.27	Non-Participating	1	24
548	485922.83	4875490.30	Non-Participating	1	24
549	485570.32	4875343.66	Non-Participating	1	24
550	486758.93	4875870.36	Non-Participating	1	25
551	486732.47	4875847.61	Non-Participating	1	25
552	487379.99	4875967.61	Non-Participating	1	26
553	487414.85	4875979.00	Non-Participating	1	26
554	486752.22	4876287.93	Non-Participating	1	25
555	488220.58	4875677.44	Non-Participating	1	28
556	488332.16	4876043.35	Participating	1	28
557	489116.44	4875427.96	Non-Participating	1	30
558	489070.22	4875417.85	Non-Participating	1	30
559	489141.82	4875405.73	Non-Participating	1	30
560	488998.60	4876062.19	Participating	1	30
561	489826.70	4875987.32	Non-Participating	1	32
562	490243.39	4876075.04	Non-Participating	1	34
563	490277.50	4875981.51	Non-Participating	1	34
564	490318.56	4876072.58	Non-Participating	1	35
565	490841.49	4875989.47	Non-Participating	1	38
566	491021.44	4876062.81	Participation Pending	1	39
567	491885.42	4875936.91	Participation Pending	1	45
568	492288.14	4875939.17	Participating	1	45
569	485068.52	4874814.15	Non-Participating	1	17
570	485049.92	4874303.42	Non-Participating	1	23
571	485562.84	4875163.93	Non-Participating	1	24
572	485226.22	4873854.62	Non-Participating	1	23
573	484962.06	4873636.11	Non-Participating	1	22
574	485076.63	4873384.34	Non-Participating	1	23
575	485248.40	4873345.47	Non-Participating	1	23
576	485233.04	4873372.20	Non-Participating	1	23
577	484992.60	4872278.33	Non-Participating	1	23
578	484936.10	4872282.95	Non-Participating	1	23
579	485379.31	4872761.19	Non-Participating	1	23
580	486198.35	4872740.10	Non-Participating	1	24
581	486676.17	4872464.77	Non-Participating	1	25
582	486655.64	4873090.69	Non-Participating	1	25
583	487877.11	4873120.91	Non-Participating	1	26
584	488112.71	4872671.02	Non-Participating	1	26
585	489802.42	4873070.99	Non-Participating	1	29

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
586	490903.77	4872050.05	Non-Participating	1	30
587	491158.49	4872615.01	Non-Participating	1	31
588	491617.71	4872744.89	Non-Participating	1	32
589	491351.60	4872844.56	Non-Participating	1	31
590	491439.59	4872911.18	Non-Participating	1	33
591	486316.80	4874665.05	Non-Participating	1	25
592	487443.29	4874431.59	Non-Participating	1	25
593	488227.77	4874362.55	Participating	1	27
594	488176.73	4874445.52	Non-Participating	1	27
595	488313.23	4874925.37	Participating	1	28
596	488330.19	4874908.78	Participating	1	28
597	490542.51	4874927.42	Participating	1	35
598	490484.06	4874350.37	Participating	1	33
599	490667.31	4874464.80	Participating	1	34
600	489910.19	4874274.68	Participating	1	31
601	489305.30	4874280.67	Participating	1	30
602	489395.90	4874448.33	Participating	1	30
603	491911.47	4874443.00	Participating	1	41
604	491551.67	4874626.99	Participating	1	40
605	491452.04	4874745.89	Participating	1	40
606	490742.07	4874350.00	Non-Participating	1	34
607	492196.54	4873592.10	Participating	1	36
608	491538.28	4873118.40	Non-Participating	1	33
609	490427.30	4873185.69	Non-Participating	1	31
610	490308.00	4873855.52	Non-Participating	1	32
611	489807.12	4873557.35	Non-Participating	1	30
612	488849.73	4874109.24	Non-Participating	1	29
613	488302.06	4873557.83	Non-Participating	1	27
614	487911.15	4873636.20	Non-Participating	1	27
615	487684.01	4873459.47	Non-Participating	1	26
616	487514.01	4873755.84	Non-Participating	1	26
617	487184.42	4873945.73	Non-Participating	1	26
618	486591.04	4874277.89	Non-Participating	1	25
619	486670.36	4873699.15	Non-Participating	1	25
620	486755.87	4873650.47	Non-Participating	1	25
621	486727.45	4871753.50	Non-Participating	1	20
622	486094.94	4871309.02	Non-Participating	1	23
623	486638.09	4871400.01	Non-Participating	1	24
624	486672.02	4870622.68	Non-Participating	1	24
625	486655.48	4870232.51	Non-Participating	1	24
626	487378.63	4870881.50	Non-Participating	1	23
627	487448.24	4871236.67	Non-Participating	1	25
628	487697.00	4871268.04	Non-Participating	1	25
629	488319.13	4871047.52	Non-Participating	1	26
630	487859.22	4870334.28	Non-Participating	1	25
631	488100.93	4870340.68	Non-Participating	1	25
632	488931.40	4870482.89	Non-Participating	1	26
633	489465.02	4870612.47	Non-Participating	1	25

**Table E-1: Project Only Results**

Receptor ID	Coordinates		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	UTM NAD83 Zone 15N X (m)	Y (m)			
634	489473.93	4870174.17	Non-Participating	1	24
635	489918.83	4870357.95	Non-Participating	1	26
636	490477.39	4870317.69	Non-Participating	1	26
637	491440.93	4870296.94	Participating	1	29
638	491691.36	4870338.51	Non-Participating	1	30
639	491742.59	4870251.31	Non-Participating	1	30
640	490556.45	4870428.90	Non-Participating	1	28
641	490729.74	4870543.54	Non-Participating	1	28
642	492088.16	4871151.03	Participating	1	30
643	492101.16	4871308.61	Non-Participating	1	31
644	491583.87	4871268.58	Non-Participating	1	30
645	491466.08	4871036.24	Non-Participating	1	30
646	490182.63	4871392.80	Non-Participating	1	28
647	490146.04	4871128.30	Non-Participating	1	28
648	489684.58	4871207.32	Non-Participating	1	28
649	489742.38	4869647.95	Non-Participating	1	26
650	490330.39	4868981.77	Non-Participating	1	27
651	490439.21	4869028.96	Non-Participating	1	27
652	491759.63	4869590.01	Non-Participating	1	29
653	491515.95	4869809.52	Non-Participating	1	27
654	490718.55	4869035.68	Non-Participating	1	28
655	491214.49	4868921.13	Non-Participating	1	28
656	491144.65	4868793.54	Non-Participating	1	28
657	490586.54	4867989.99	Non-Participating	1	25
658	490772.60	4868329.90	Non-Participating	1	26
659	490521.01	4868392.32	Non-Participating	1	26
660	490399.71	4868828.19	Non-Participating	1	27
661	490132.35	4868300.15	Non-Participating	1	20
662	489421.01	4868140.33	Non-Participating	1	24
663	487623.14	4868576.03	Non-Participating	1	24
664	487782.58	4867705.95	Non-Participating	1	24
665	488410.14	4867926.75	Non-Participating	1	24
666	490006.54	4867558.26	Non-Participating	1	24
667	489786.08	4867239.58	Non-Participating	1	23
668	489471.01	4866930.92	Non-Participating	1	19
669	489407.69	4866850.23	Non-Participating	1	24
670	489550.29	4866777.40	Non-Participating	1	23
671	489177.54	4866889.51	Non-Participating	1	24
672	489191.30	4866647.84	Non-Participating	1	24
673	489312.09	4866497.79	Non-Participating	1	25
674	489313.39	4866375.23	Non-Participating	1	25
675	489310.25	4866131.82	Non-Participating	1	24
676	489861.71	4865984.83	Non-Participating	1	25
677	489395.33	4866310.51	Non-Participating	1	25
678	490197.73	4866693.01	Non-Participating	1	24
679	490217.54	4866649.68	Non-Participating	1	24
680	490017.33	4865967.73	Non-Participating	1	25
681	490278.87	4865979.10	Non-Participating	1	25

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
682	490410.02	4866045.09	Non-Participating	1	25
683	490085.49	4864761.25	Non-Participating	1	23
684	489923.58	4864746.23	Non-Participating	1	23
685	489842.93	4865195.32	Non-Participating	1	24
686	492242.97	4868718.98	Non-Participating	1	30
687	492201.39	4868471.14	Participating	1	29
688	491286.85	4866494.23	Non-Participating	1	27
689	491009.28	4865891.24	Non-Participating	1	26
690	491637.21	4866020.30	Non-Participating	1	27
691	492326.88	4865129.44	Non-Participating	1	27
692	491378.79	4865103.88	Non-Participating	1	26
693	491360.33	4865074.29	Non-Participating	1	26
694	492846.71	4863545.15	Non-Participating	1	26
695	491647.96	4864076.25	Non-Participating	1	25
696	490594.15	4864686.77	Non-Participating	1	24
697	492988.35	4862968.51	Non-Participating	1	25
698	493649.83	4863248.87	Non-Participating	1	26
699	494269.33	4863513.13	Non-Participating	1	27
700	493677.47	4863383.00	Non-Participating	1	27
701	493669.38	4863482.76	Non-Participating	1	27
702	483374.01	4877839.13	Non-Participating	1	21
703	483734.01	4879213.02	Non-Participating	1	21



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Sound Level Modeling Results – Tabular - Sorted by Sound Level

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
119	503071.21	4871942.22	Participating	1	47
210	502932.76	4869206.67	Non-Participating	1	47
121	503827.13	4872773.68	Participating	1	47
120	502725.93	4871787.44	Participating	1	47
357	504454.04	4869760.35	Participating	1	46
169	504355.79	4869657.97	Participating	1	46
160	496747.46	4869514.95	Non-Participating	1	46
161	497688.18	4869422.48	Participation Pending	1	46
168	502822.20	4871087.25	Non-Participating	1	46
125	504758.52	4871963.59	Participating	1	46
170	504464.66	4869547.53	Participation Pending	1	46
118	501528.69	4872860.66	Participating	1	45
122	503996.46	4872856.76	Participating	1	45
159	496488.82	4869537.11	Participating	1	45
568	492288.14	4875939.17	Participating	1	45
413	494159.74	4874451.58	Participating	1	45
109	498632.85	4872029.26	Non-Participating	1	45
358	504953.18	4872026.30	Participating	1	45
218	504434.89	4868964.79	Participation Pending	1	45
567	491885.42	4875936.91	Participation Pending	1	45
419	493086.55	4876093.83	Participating	1	44
409	494786.51	4875095.87	Participating	1	44
111	499582.38	4871957.52	Non-Participating	1	44
107	499065.71	4872231.14	Participating	1	44
117	501103.10	4872967.75	Participation Pending	1	44
123	504201.25	4872856.23	Participating	1	44
420	492917.55	4875943.58	Non-Participating	1	44
508	492209.17	4877379.83	Participating	1	44
410	494742.68	4874890.93	Participating	1	44
116	501183.27	4871944.87	Non-Participating	1	44
171	505966.47	4869876.74	Participating	1	44
206	496798.37	4867179.05	Participating	1	44
2	494675.74	4874843.64	Participating	1	44
112	499505.52	4873983.70	Participation Pending	1	44
205	496788.12	4867093.39	Participating	1	44
374	499695.62	4871921.37	Non-Participating	1	44
64	502728.04	4874380.81	Participating	1	44
108	499677.17	4872538.85	Non-Participating	1	43
412	493870.54	4874371.18	Participating	1	44
411	494673.38	4874964.89	Participating	1	43
416	495595.18	4875646.56	Participation Pending	1	43
373	499493.80	4874005.78	Participation Pending	1	43
114	499618.58	4874177.48	Participating	1	43
12	495571.71	4871482.46	Participating	1	43
46	501031.13	4874231.83	Non-Participating	1	43
421	492824.93	4874336.74	Participating	1	43
158	495550.87	4871409.04	Participating	1	43
359	505194.11	4872241.77	Participating	1	43

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
368	501045.42	4874262.69	Non-Participating	1	43
408	495270.39	4874448.85	Non-Participating	1	43
156	495559.28	4870851.63	Non-Participating	1	42
202	496022.17	4868650.40	Participating	1	42
165	501120.03	4871028.07	Non-Participating	1	42
164	499480.74	4870826.96	Non-Participating	1	42
415	494807.37	4875552.26	Participating	1	42
67	504104.11	4874434.02	Participating	1	42
44	501043.37	4874380.00	Non-Participating	1	42
163	499484.18	4870256.98	Non-Participating	1	42
372	497140.70	4873107.83	Participating	1	42
506	492251.72	4877503.81	Participating	1	42
154	495562.38	4870204.93	Participation Pending	1	42
106	497138.35	4873069.61	Participating	1	42
115	500691.28	4871972.52	Non-Participating	1	42
162	499490.33	4869311.02	Participating	1	42
103	495778.39	4871934.81	Participating	1	42
113	499640.46	4874375.81	Non-Participating	1	42
417	493717.24	4875917.78	Non-Participating	1	42
1	491323.97	4876003.31	Non-Participating	1	41
211	502739.87	4868086.02	Non-Participating	1	41
507	492234.18	4877555.41	Participating	1	41
45	500947.46	4874527.17	Participating	1	41
157	495387.82	4871379.34	Participating	1	41
173	506052.46	4871492.14	Non-Participating	1	41
126	504942.08	4872768.12	Non-Participating	1	41
407	495706.37	4874363.08	Participating	1	41
603	491911.47	4874443.00	Participating	1	41
377	496079.55	4874600.17	Participating	1	41
105	497277.52	4872254.03	Non-Participating	1	41
172	506068.12	4870744.95	Non-Participating	1	41
102	497067.91	4872235.01	Non-Participating	1	41
209	499522.27	4869059.69	Non-Participating	1	40
500	493010.05	4877412.07	Participating	1	41
124	504551.09	4874079.47	Non-Participating	1	40
360	504982.82	4872823.99	Non-Participating	1	40
63	502795.77	4874857.59	Participating	1	40
404	494002.17	4873709.27	Participating	1	40
152	495349.84	4870249.67	Non-Participating	1	40
362	504550.66	4874140.13	Non-Participating	1	40
414	493136.16	4874000.60	Participating	1	40
153	495559.21	4869681.85	Non-Participating	1	40
501	493292.00	4877317.09	Participation Pending	1	40
505	492333.63	4877666.52	Non-Participating	1	40
62	502793.92	4874915.01	Participating	1	40
104	495507.06	4871937.58	Non-Participating	1	40
216	503980.77	4867832.68	Participating	1	40
405	494024.46	4873648.96	Participating	1	40

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
167	501212.34	4869298.23	Participation Pending	1	40
203	495966.21	4867985.63	Non-Participating	1	40
361	504632.53	4874064.72	Non-Participating	1	40
418	494099.39	4876121.20	Participating	1	40
605	491452.04	4874745.89	Participating	1	40
166	501137.73	4869524.71	Non-Participating	1	40
604	491551.67	4874626.99	Participating	1	40
406	495243.19	4873764.68	Participating	1	39
155	495124.76	4870677.40	Non-Participating	1	39
566	491021.44	4876062.81	Participation Pending	1	39
65	503738.09	4874989.75	Participating	1	39
110	498077.69	4874206.61	Non-Participating	1	39
47	501227.06	4875030.65	Non-Participating	1	39
66	504105.86	4874905.08	Non-Participating	1	39
101	496413.53	4872753.51	Non-Participating	1	39
503	492754.95	4877751.84	Non-Participating	1	39
504	492937.93	4877693.98	Non-Participating	1	39
68	504298.15	4874837.83	Non-Participating	1	38
367	501067.74	4868680.68	Non-Participating	1	38
48	501197.62	4875115.32	Non-Participating	1	38
200	495449.94	4868724.88	Non-Participating	1	38
422	493045.90	4873720.17	Participating	1	38
61	502721.16	4875266.90	Non-Participating	1	38
76	504646.75	4874484.85	Non-Participating	1	38
75	504475.43	4874793.75	Non-Participating	1	38
371	497251.94	4874354.41	Non-Participating	1	38
403	494151.04	4873285.23	Participating	1	38
29	496552.23	4874244.46	Participating	1	38
565	490841.49	4875989.47	Non-Participating	1	38
60	502714.55	4875399.19	Non-Participating	1	37
376	495778.75	4872841.02	Participating	1	37
537	496003.73	4876090.86	Participating	1	38
213	501205.69	4868183.52	Non-Participating	1	37
49	501230.36	4875345.51	Non-Participating	1	37
204	495581.29	4867570.63	Non-Participating	1	37
32	499599.12	4875101.12	Non-Participating	1	37
50	501090.13	4875362.70	Non-Participating	1	37
74	504535.62	4874968.38	Non-Participating	1	37
100	495132.34	4872890.10	Non-Participating	1	37
77	504921.92	4874625.08	Non-Participating	1	37
201	495138.07	4868819.47	Non-Participating	1	37
271	495573.74	4866601.10	Non-Participating	1	37
402	493747.84	4873206.91	Non-Participating	1	37
502	493253.70	4877817.21	Non-Participating	1	37
509	491204.57	4877592.32	Non-Participating	1	37
78	505001.62	4874532.14	Non-Participating	1	37
208	499809.28	4868052.25	Non-Participating	1	37
99	494854.60	4872697.99	Non-Participating	1	36

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
212	501100.51	4867929.92	Non-Participating	1	36
363	505058.05	4874529.02	Non-Participating	1	36
423	492516.61	4873491.63	Non-Participating	1	36
395	494639.05	4870297.72	Participating	1	36
607	492196.54	4873592.10	Participating	1	36
33	499667.39	4875349.30	Non-Participating	1	36
59	502831.49	4875681.24	Non-Participating	1	36
79	505124.98	4874525.20	Non-Participating	1	36
400	494524.93	4872747.21	Non-Participating	1	36
80	505184.52	4874515.28	Non-Participating	1	36
269	495577.97	4865900.74	Non-Participating	1	36
270	495457.06	4866413.77	Participating	1	36
82	505367.74	4874307.25	Non-Participating	1	36
56	502502.88	4875773.32	Non-Participating	1	36
58	502810.85	4875788.66	Non-Participating	1	36
127	505837.17	4873650.51	Non-Participating	1	36
364	505317.29	4874471.44	Non-Participating	1	36
31	499002.42	4875287.65	Non-Participating	1	36
510	490993.10	4877604.29	Non-Participating	1	36
57	502679.62	4875863.27	Non-Participating	1	36
84	505566.18	4874182.83	Non-Participating	1	36
81	505399.82	4874479.23	Non-Participating	1	35
131	506998.03	4871828.06	Non-Participating	1	35
54	502510.29	4875920.42	Non-Participating	1	35
55	502413.98	4875915.66	Non-Participating	1	35
69	503489.38	4875803.62	Non-Participating	1	35
70	503392.81	4875830.08	Non-Participating	1	35
128	506220.82	4873313.16	Non-Participating	1	35
14	502838.46	4866942.77	Non-Participating	1	35
129	506549.56	4872868.13	Non-Participating	1	35
345	506443.65	4873048.96	Non-Participating	1	35
51	501571.15	4875944.50	Non-Participating	1	35
83	505532.77	4874466.33	Non-Participating	1	35
34	499579.55	4875568.90	Non-Participating	1	35
268	495580.09	4865567.90	Non-Participating	1	35
71	504290.41	4875654.93	Non-Participating	1	35
199	494905.17	4868021.02	Non-Participating	1	35
215	502829.57	4866859.28	Non-Participating	1	35
366	503080.23	4875981.03	Non-Participating	1	35
53	502423.50	4876077.06	Non-Participating	1	35
207	499466.54	4867083.00	Non-Participating	1	35
217	504375.89	4866974.59	Non-Participating	1	35
344	505835.16	4874164.35	Non-Participating	1	35
401	493407.56	4872816.88	Non-Participating	1	35
499	494656.56	4877212.33	Non-Participating	1	35
52	501438.59	4876074.41	Non-Participating	1	35
356	504370.17	4866942.89	Non-Participating	1	35
72	504273.87	4875735.63	Non-Participating	1	35



**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
353	505981.69	4867853.87	Non-Participating	1	35
375	495332.11	4865917.77	Non-Participating	1	35
597	490542.51	4874927.42	Participating	1	35
132	507534.25	4871148.65	Non-Participating	1	35
369	500526.98	4876004.95	Non-Participating	1	35
564	490318.56	4876072.58	Non-Participating	1	35
73	504056.70	4875882.71	Non-Participating	1	34
511	490950.33	4877852.19	Non-Participating	1	35
86	506058.09	4874109.83	Non-Participating	1	34
399	493540.46	4872673.61	Non-Participating	1	34
487	491713.80	4878334.91	Non-Participating	1	34
563	490277.50	4875981.51	Non-Participating	1	34
606	490742.07	4874350.00	Non-Participating	1	34
515	490345.19	4876928.97	Non-Participating	1	34
562	490243.39	4876075.04	Non-Participating	1	34
130	506996.44	4872762.57	Non-Participating	1	34
267	495597.95	4865308.34	Non-Participating	1	34
365	504311.78	4875881.90	Non-Participating	1	34
514	490320.50	4876915.99	Non-Participating	1	34
174	507891.98	4870234.05	Non-Participating	1	34
263	498693.14	4865949.36	Non-Participating	1	34
398	493921.25	4871132.90	Non-Participating	1	34
424	492393.91	4872911.32	Participating	1	34
440	499494.35	4875986.15	Non-Participating	1	34
85	506083.22	4874314.89	Non-Participating	1	34
133	507702.53	4871154.60	Non-Participating	1	34
198	494754.88	4867302.15	Non-Participating	1	34
214	501126.31	4866789.30	Non-Participating	1	34
397	493766.48	4871236.38	Non-Participating	1	34
30	498628.08	4875979.63	Non-Participating	1	34
35	499611.30	4875969.22	Non-Participating	1	34
257	502759.65	4866448.52	Non-Participating	1	34
599	490667.31	4874464.80	Participating	1	34
38	499584.90	4876221.63	Non-Participating	1	34
40	499452.74	4876213.03	Non-Participating	1	34
138	506865.15	4873428.54	Non-Participating	1	34
370	499677.17	4876262.10	Non-Participating	1	34
425	492485.00	4872667.59	Participating	1	34
36	499630.61	4876074.26	Non-Participating	1	34
41	499633.37	4876323.52	Non-Participating	1	33
343	506056.14	4874737.23	Non-Participating	1	33
442	499516.46	4866307.27	Non-Participating	1	33
486	491460.25	4878431.59	Non-Participating	1	33
498	494779.88	4877690.16	Non-Participating	1	33
598	490484.06	4874350.37	Participating	1	33
352	506639.54	4867805.93	Non-Participating	1	33
608	491538.28	4873118.40	Non-Participating	1	33
39	499575.64	4876277.53	Non-Participating	1	33

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
42	499577.34	4876430.68	Non-Participating	1	33
43	499610.04	4876414.33	Non-Participating	1	33
266	495481.67	4865143.24	Non-Participating	1	33
389	494018.51	4868810.50	Participating	1	33
37	499592.84	4876172.35	Non-Participating	1	33
13	508114.34	4869543.75	Non-Participating	1	33
386	494547.73	4867036.45	Non-Participating	1	33
426	492280.30	4872422.45	Participating	1	33
134	507988.15	4871657.51	Non-Participating	1	33
177	508143.94	4871002.25	Non-Participating	1	33
396	493230.51	4871142.26	Non-Participating	1	33
495	494631.87	4878070.88	Non-Participating	1	33
536	497876.00	4876576.62	Non-Participating	1	33
272	494999.07	4865576.36	Non-Participating	1	33
388	494039.10	4868100.58	Non-Participating	1	33
497	495153.30	4877779.20	Non-Participating	1	33
381	494950.93	4865608.48	Non-Participating	1	33
390	493659.28	4869128.74	Non-Participating	1	32
496	494622.23	4878130.23	Non-Participating	1	33
534	500183.35	4876832.93	Non-Participating	1	32
590	491439.59	4872911.18	Non-Participating	1	33
561	489826.70	4875987.32	Non-Participating	1	32
394	493362.95	4869980.97	Non-Participating	1	32
428	493003.05	4871142.66	Non-Participating	1	32
588	491617.71	4872744.89	Non-Participating	1	32
254	505286.95	4866388.36	Non-Participating	1	32
427	492886.93	4871221.63	Non-Participating	1	32
535	498032.98	4876897.85	Non-Participating	1	32
341	506392.06	4875165.44	Non-Participating	1	32
136	507912.94	4872763.80	Non-Participating	1	32
219	508048.06	4868683.08	Non-Participating	1	32
340	506456.95	4875177.45	Non-Participating	1	32
610	490308.00	4873855.52	Non-Participating	1	32
135	508141.14	4872275.11	Non-Participating	1	32
220	507577.42	4867933.06	Non-Participating	1	32
342	506303.13	4875506.73	Non-Participating	1	32
516	489824.65	4877177.26	Non-Participating	1	32
491	493142.48	4879036.43	Non-Participating	1	32
137	507852.51	4872992.61	Participating	1	32
253	505982.60	4866485.83	Non-Participating	1	31
265	495484.80	4864629.42	Non-Participating	1	31
517	489798.47	4877241.24	Non-Participating	1	32
264	495594.27	4864552.69	Non-Participating	1	31
600	489910.19	4874274.68	Participating	1	31
252	505944.82	4866307.39	Non-Participating	1	31
380	494597.57	4865481.24	Non-Participating	1	31
393	492790.68	4869907.25	Participating	1	31
490	492860.00	4879226.20	Non-Participating	1	31

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
391	493009.42	4868795.04	Participating	1	31
492	492758.53	4879319.56	Non-Participating	1	31
513	489914.98	4877880.09	Non-Participating	1	31
587	491158.49	4872615.01	Non-Participating	1	31
589	491351.60	4872844.56	Non-Participating	1	31
609	490427.30	4873185.69	Non-Participating	1	31
175	508823.64	4869539.44	Non-Participating	1	31
178	508887.77	4871155.48	Non-Participating	1	31
222	508160.93	4868043.79	Non-Participating	1	31
259	502847.64	4865132.72	Non-Participating	1	31
339	507133.29	4875236.34	Non-Participating	1	31
488	491806.50	4879142.21	Non-Participating	1	31
643	492101.16	4871308.61	Non-Participating	1	31
87	507311.95	4875159.44	Non-Participating	1	30
90	507599.42	4874772.15	Non-Participating	1	30
221	508256.18	4868031.55	Non-Participating	1	30
258	502756.62	4865044.88	Non-Participating	1	30
444	507243.76	4875236.34	Non-Participating	1	30
493	494040.55	4879209.90	Non-Participating	1	30
494	494946.88	4878858.40	Non-Participating	1	31
512	489835.40	4877912.18	Non-Participating	1	31
337	507291.26	4875238.55	Non-Participating	1	30
88	507422.02	4875164.20	Non-Participating	1	30
338	507308.94	4875273.90	Non-Participating	1	30
489	492039.41	4879331.55	Non-Participating	1	30
251	506083.96	4865856.15	Non-Participating	1	30
385	493478.15	4866684.14	Non-Participating	1	30
602	489395.90	4874448.33	Participating	1	30
89	507528.65	4875149.91	Non-Participating	1	30
176	509063.51	4869535.71	Non-Participating	1	30
336	507476.85	4875245.18	Non-Participating	1	30
445	508298.59	4873512.15	Non-Participating	1	30
139	508493.79	4873588.15	Non-Participating	1	30
248	507075.09	4866460.06	Non-Participating	1	30
276	495602.69	4864144.71	Non-Participating	1	30
387	493147.39	4867174.99	Non-Participating	1	30
429	492012.71	4870131.27	Participating	1	30
434	492842.51	4867801.89	Non-Participating	1	30
485	490949.78	4879137.82	Non-Participating	1	30
557	489116.44	4875427.96	Non-Participating	1	30
559	489141.82	4875405.73	Non-Participating	1	30
644	491583.87	4871268.58	Non-Participating	1	30
15	507596.16	4875246.28	Non-Participating	1	30
379	493858.51	4865675.06	Non-Participating	1	30
431	492354.77	4868912.11	Participating	1	30
586	490903.77	4872050.05	Non-Participating	1	30
611	489807.12	4873557.35	Non-Participating	1	30
140	508608.89	4873590.53	Non-Participating	1	30

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
141	508631.91	4873590.93	Non-Participating	1	30
142	508613.65	4873652.84	Participating	1	30
256	503837.48	4864808.63	Non-Participating	1	30
261	502744.45	4864637.95	Non-Participating	1	30
262	500293.87	4864408.55	Non-Participating	1	30
558	489070.22	4875417.85	Non-Participating	1	30
601	489305.30	4874280.67	Participating	1	30
642	492088.16	4871151.03	Participating	1	30
392	492892.87	4868809.26	Non-Participating	1	30
560	488998.60	4876062.19	Participating	1	30
639	491742.59	4870251.31	Non-Participating	1	30
645	491466.08	4871036.24	Non-Participating	1	30
281	496387.78	4863669.96	Non-Participating	1	30
432	492373.27	4868475.96	Non-Participating	1	30
484	490977.06	4879298.11	Non-Participating	1	30
638	491691.36	4870338.51	Non-Participating	1	30
686	492242.97	4868718.98	Non-Participating	1	30
446	490229.89	4872596.92	Non-Participating	1	30
144	509004.04	4872856.29	Non-Participating	1	29
274	495591.47	4863853.66	Non-Participating	1	29
335	507954.57	4875255.16	Non-Participating	1	29
91	508121.97	4874981.77	Non-Participating	1	29
143	508917.66	4873593.31	Non-Participating	1	29
347	507746.57	4873752.32	Non-Participating	1	29
348	509482.74	4869911.96	Non-Participating	1	29
430	491814.62	4869462.51	Participating	1	29
585	489802.42	4873070.99	Non-Participating	1	29
637	491440.93	4870296.94	Participating	1	29
652	491759.63	4869590.01	Non-Participating	1	29
687	492201.39	4868471.14	Participating	1	29
260	502861.92	4864320.45	Non-Participating	1	29
275	495598.45	4863807.52	Non-Participating	1	29
346	507707.14	4873655.54	Non-Participating	1	29
273	495460.45	4863808.79	Non-Participating	1	29
334	508137.19	4875249.86	Non-Participating	1	29
181	509642.37	4871517.50	Non-Participating	1	29
182	509638.57	4871313.88	Non-Participating	1	29
184	509715.57	4870766.88	Non-Participating	1	29
145	509375.92	4872966.88	Participating	1	29
483	490495.82	4879286.80	Non-Participating	1	29
179	509716.92	4871621.42	Non-Participating	1	29
180	509716.39	4871712.56	Non-Participating	1	29
255	504453.20	4864368.89	Non-Participating	1	29
384	493181.97	4865807.99	Non-Participating	1	29
150	509630.84	4872355.63	Non-Participating	1	29
235	508125.47	4866480.14	Non-Participating	1	29
286	497390.91	4863188.77	Non-Participating	1	29
292	499653.41	4863563.84	Non-Participating	1	29

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
297	501228.41	4863777.42	Non-Participating	1	29
149	509722.39	4872284.72	Non-Participating	1	29
482	489635.56	4878759.90	Non-Participating	1	29
612	488849.73	4874109.24	Non-Participating	1	29
92	508591.19	4875255.26	Non-Participating	1	28
436	492683.89	4866290.27	Non-Participating	1	28
641	490729.74	4870543.54	Non-Participating	1	28
646	490182.63	4871392.80	Non-Participating	1	28
186	509710.09	4868616.84	Non-Participating	1	28
223	509431.73	4867831.46	Non-Participating	1	28
287	499200.13	4863160.86	Non-Participating	1	28
288	499366.82	4863159.80	Non-Participating	1	28
350	509715.75	4868523.34	Non-Participating	1	28
447	489847.36	4872269.25	Non-Participating	1	28
640	490556.45	4870428.90	Non-Participating	1	28
655	491214.49	4868921.13	Non-Participating	1	28
151	509722.69	4873399.56	Non-Participating	1	28
291	499600.44	4863131.46	Non-Participating	1	28
378	493303.66	4865363.05	Non-Participating	1	28
647	490146.04	4871128.30	Non-Participating	1	28
146	509975.20	4872682.45	Non-Participating	1	28
183	510238.58	4871099.40	Non-Participating	1	28
289	499062.33	4863011.63	Non-Participating	1	28
290	499521.73	4863071.93	Non-Participating	1	28
448	488635.42	4877561.29	Non-Participating	1	28
656	491144.65	4868793.54	Non-Participating	1	28
249	505979.98	4864375.54	Non-Participating	1	28
277	495449.26	4863156.32	Non-Participating	1	28
349	510177.21	4869522.86	Non-Participating	1	28
555	488220.58	4875677.44	Non-Participating	1	28
93	509166.13	4875086.85	Non-Participating	1	28
298	502760.35	4863408.22	Non-Participating	1	28
351	509715.75	4867936.59	Non-Participating	1	28
437	492560.24	4865883.35	Non-Participating	1	28
518	488326.68	4876849.62	Non-Participating	1	28
236	508115.22	4865668.00	Participating	1	28
250	506660.75	4864623.72	Non-Participating	1	28
481	489545.45	4879212.95	Non-Participating	1	28
556	488332.16	4876043.35	Participating	1	28
648	489684.58	4871207.32	Non-Participating	1	28
654	490718.55	4869035.68	Non-Participating	1	28
95	509351.34	4875158.02	Non-Participating	1	27
98	509731.74	4874372.94	Non-Participating	1	27
282	495401.41	4862947.65	Non-Participating	1	27
433	492178.63	4867809.55	Non-Participating	1	28
480	489444.23	4879207.74	Non-Participating	1	28
519	488211.66	4877034.73	Non-Participating	1	27
595	488313.23	4874925.37	Participating	1	28

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
596	488330.19	4874908.78	Participating	1	28
94	509022.59	4875282.64	Non-Participating	1	27
234	509084.69	4866510.99	Non-Participating	1	27
299	502811.16	4863065.78	Non-Participating	1	27
699	494269.33	4863513.13	Non-Participating	1	27
285	497883.34	4862416.63	Non-Participating	1	27
449	488219.84	4877375.84	Non-Participating	1	27
613	488302.06	4873557.83	Non-Participating	1	27
193	510669.32	4871235.95	Non-Participating	1	27
284	498032.83	4862353.66	Non-Participating	1	27
651	490439.21	4869028.96	Non-Participating	1	27
355	504354.46	4863221.55	Non-Participating	1	27
450	488227.59	4877664.18	Non-Participating	1	27
593	488227.77	4874362.55	Participating	1	27
594	488176.73	4874445.52	Non-Participating	1	27
650	490330.39	4868981.77	Non-Participating	1	27
653	491515.95	4869809.52	Non-Participating	1	27
302	504359.50	4863154.55	Non-Participating	1	27
477	488578.50	4878448.47	Non-Participating	1	27
691	492326.88	4865129.44	Non-Participating	1	27
147	510643.93	4872858.40	Non-Participating	1	27
185	510779.47	4869615.18	Non-Participating	1	27
278	495021.10	4862798.98	Non-Participating	1	27
301	504324.44	4863058.11	Non-Participating	1	27
332	509540.98	4875523.36	Non-Participating	1	27
148	510742.82	4872673.86	Non-Participating	1	27
247	507911.18	4864780.64	Non-Participating	1	27
296	501290.46	4862403.31	Non-Participating	1	27
688	491286.85	4866494.23	Non-Participating	1	27
690	491637.21	4866020.30	Non-Participating	1	27
97	509776.66	4875411.96	Non-Participating	1	27
441	509739.94	4875483.39	Non-Participating	1	27
614	487911.15	4873636.20	Non-Participating	1	27
701	493669.38	4863482.76	Non-Participating	1	27
330	509957.99	4875215.57	Non-Participating	1	27
476	488294.10	4878419.31	Non-Participating	1	27
700	493677.47	4863383.00	Non-Participating	1	27
233	509654.54	4866311.78	Non-Participating	1	26
283	497806.48	4861897.78	Non-Participating	1	26
303	505569.77	4863166.39	Non-Participating	1	26
329	510106.92	4875126.21	Non-Participating	1	26
435	491772.81	4867258.11	Non-Participating	1	27
660	490399.71	4868828.19	Non-Participating	1	27
16	511230.91	4871253.21	Non-Participating	1	26
192	511231.78	4870673.51	Non-Participating	1	26
194	511198.71	4871506.32	Non-Participating	1	26
237	508300.10	4864702.93	Non-Participating	1	26
294	500766.98	4862078.00	Non-Participating	1	26



**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
295	501364.94	4862089.11	Non-Participating	1	26
475	488227.48	4878434.34	Non-Participating	1	26
583	487877.11	4873120.91	Non-Participating	1	26
698	493649.83	4863248.87	Non-Participating	1	26
293	500052.87	4861924.15	Non-Participating	1	26
553	487414.85	4875979.00	Non-Participating	1	26
190	511340.26	4870437.24	Non-Participating	1	26
191	511328.61	4870357.34	Non-Participating	1	26
238	508661.25	4864863.00	Non-Participating	1	26
304	505982.13	4863095.12	Non-Participating	1	26
316	499547.11	4861789.56	Non-Participating	1	26
478	488238.28	4878729.90	Non-Participating	1	26
552	487379.99	4875967.61	Non-Participating	1	26
584	488112.71	4872671.02	Non-Participating	1	26
246	507972.08	4864241.82	Non-Participating	1	26
616	487514.01	4873755.84	Non-Participating	1	26
658	490772.60	4868329.90	Non-Participating	1	26
313	496566.43	4861678.65	Non-Participating	1	26
315	498202.69	4861536.49	Non-Participating	1	26
689	491009.28	4865891.24	Non-Participating	1	26
694	492846.71	4863545.15	Non-Participating	1	26
280	495589.39	4861913.81	Non-Participating	1	26
317	499706.65	4861546.15	Non-Participating	1	26
615	487684.01	4873459.47	Non-Participating	1	26
629	488319.13	4871047.52	Non-Participating	1	26
187	511208.69	4868187.15	Non-Participating	1	26
189	511354.81	4868870.63	Non-Participating	1	26
479	488802.63	4879306.04	Non-Participating	1	26
692	491378.79	4865103.88	Non-Participating	1	26
693	491360.33	4865074.29	Non-Participating	1	26
188	511358.45	4868626.10	Non-Participating	1	26
239	509043.52	4864717.00	Non-Participating	1	26
635	489918.83	4870357.95	Non-Participating	1	26
659	490521.01	4868392.32	Non-Participating	1	26
245	508023.68	4863776.16	Non-Participating	1	26
300	502845.02	4861700.00	Non-Participating	1	26
314	496394.58	4861521.88	Non-Participating	1	26
331	509838.84	4875240.39	Non-Participating	1	26
636	490477.39	4870317.69	Non-Participating	1	26
649	489742.38	4869647.95	Non-Participating	1	26
244	507091.02	4863071.04	Non-Participating	1	25
279	495447.60	4861627.16	Non-Participating	1	25
307	505988.95	4862547.09	Non-Participating	1	25
438	493165.10	4862890.93	Non-Participating	1	26
617	487184.42	4873945.73	Non-Participating	1	26
632	488931.40	4870482.89	Non-Participating	1	26
697	492988.35	4862968.51	Non-Participating	1	25
383	494229.69	4862485.36	Non-Participating	1	25

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
592	487443.29	4874431.59	Non-Participating	1	25
633	489465.02	4870612.47	Non-Participating	1	25
457	487110.32	4877460.18	Non-Participating	1	25
631	488100.93	4870340.68	Non-Participating	1	25
682	490410.02	4866045.09	Non-Participating	1	25
695	491647.96	4864076.25	Non-Participating	1	25
195	512094.54	4871434.48	Non-Participating	1	25
224	511197.03	4867137.19	Non-Participating	1	25
318	503314.07	4861437.35	Non-Participating	1	25
321	504448.61	4861690.45	Non-Participating	1	25
443	512055.62	4871144.22	Non-Participating	1	25
550	486758.93	4875870.36	Non-Participating	1	25
628	487697.00	4871268.04	Non-Participating	1	25
382	494693.22	4861787.99	Non-Participating	1	25
551	486732.47	4875847.61	Non-Participating	1	25
554	486752.22	4876287.93	Non-Participating	1	25
18	510963.01	4866310.55	Non-Participating	1	25
228	510956.59	4866312.68	Non-Participating	1	25
305	505957.47	4862103.78	Non-Participating	1	25
306	506058.01	4862083.94	Non-Participating	1	25
451	487845.93	4879211.82	Non-Participating	1	25
630	487859.22	4870334.28	Non-Participating	1	25
680	490017.33	4865967.73	Non-Participating	1	25
196	512320.76	4871236.81	Non-Participating	1	25
676	489861.71	4865984.83	Non-Participating	1	25
197	511855.79	4867910.86	Non-Participating	1	25
240	508220.95	4863160.03	Non-Participating	1	25
320	504352.19	4861303.49	Non-Participating	1	25
439	493590.90	4862204.60	Non-Participating	1	25
520	486597.05	4876484.54	Non-Participating	1	25
681	490278.87	4865979.10	Non-Participating	1	25
17	511252.81	4866394.34	Non-Participating	1	25
227	511254.51	4866393.12	Non-Participating	1	25
319	504482.21	4861250.15	Non-Participating	1	25
328	511919.63	4867891.62	Non-Participating	1	25
454	487445.96	4879108.89	Non-Participating	1	25
455	487500.71	4879138.87	Non-Participating	1	25
458	486739.40	4877456.16	Non-Participating	1	25
459	486738.89	4877554.33	Non-Participating	1	25
619	486670.36	4873699.15	Non-Participating	1	25
620	486755.87	4873650.47	Non-Participating	1	25
243	509723.76	4864264.38	Non-Participating	1	25
582	486655.64	4873090.69	Non-Participating	1	25
657	490586.54	4867989.99	Non-Participating	1	25
673	489312.09	4866497.79	Non-Participating	1	25
677	489395.33	4866310.51	Non-Participating	1	25
241	508608.56	4863085.28	Non-Participating	1	24
308	505982.34	4861816.52	Non-Participating	1	25

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
581	486676.17	4872464.77	Non-Participating	1	25
591	486316.80	4874665.05	Non-Participating	1	25
618	486591.04	4874277.89	Non-Participating	1	25
627	487448.24	4871236.67	Non-Participating	1	25
662	489421.01	4868140.33	Non-Participating	1	24
674	489313.39	4866375.23	Non-Participating	1	25
309	508028.80	4862608.01	Non-Participating	1	24
460	486756.68	4878037.63	Non-Participating	1	24
461	486660.03	4877806.42	Non-Participating	1	24
671	489177.54	4866889.51	Non-Participating	1	24
675	489310.25	4866131.82	Non-Participating	1	24
634	489473.93	4870174.17	Non-Participating	1	24
665	488410.14	4867926.75	Non-Participating	1	24
19	511236.15	4865354.84	Non-Participating	1	24
231	511238.56	4865356.24	Non-Participating	1	24
323	512456.10	4867927.90	Non-Participating	1	24
623	486638.09	4871400.01	Non-Participating	1	24
672	489191.30	4866647.84	Non-Participating	1	24
685	489842.93	4865195.32	Non-Participating	1	24
354	506107.06	4861179.97	Non-Participating	1	24
547	485950.14	4875850.27	Non-Participating	1	24
548	485922.83	4875490.30	Non-Participating	1	24
580	486198.35	4872740.10	Non-Participating	1	24
20	511469.59	4865525.69	Non-Participating	1	24
232	511480.24	4865525.57	Non-Participating	1	24
333	508513.01	4875649.50	Non-Participating	1	24
464	486256.72	4877643.56	Non-Participating	1	24
624	486672.02	4870622.68	Non-Participating	1	24
663	487623.14	4868576.03	Non-Participating	1	24
669	489407.69	4866850.23	Non-Participating	1	24
452	486858.06	4879271.46	Non-Participating	1	24
678	490197.73	4866693.01	Non-Participating	1	24
679	490217.54	4866649.68	Non-Participating	1	24
696	490594.15	4864686.77	Non-Participating	1	24
322	505946.34	4860787.53	Non-Participating	1	24
625	486655.48	4870232.51	Non-Participating	1	24
666	490006.54	4867558.26	Non-Participating	1	24
453	486750.57	4879405.48	Non-Participating	1	24
465	485959.87	4877465.90	Non-Participating	1	24
549	485570.32	4875343.66	Non-Participating	1	24
571	485562.84	4875163.93	Non-Participating	1	24
622	486094.94	4871309.02	Non-Participating	1	23
664	487782.58	4867705.95	Non-Participating	1	24
225	512836.13	4867255.07	Non-Participating	1	23
242	510181.05	4863250.58	Non-Participating	1	23
311	509978.52	4862987.49	Non-Participating	1	23
310	510037.65	4862973.60	Non-Participating	1	23
456	486363.48	4879172.96	Non-Participating	1	23

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
667	489786.08	4867239.58	Non-Participating	1	23
21	511803.28	4864790.87	Non-Participating	1	23
229	511803.46	4864790.40	Non-Participating	1	23
670	489550.29	4866777.40	Non-Participating	1	23
25	511249.27	4863981.03	Non-Participating	1	23
26	511259.59	4863882.99	Non-Participating	1	23
230	511248.62	4863982.43	Non-Participating	1	23
469	485584.47	4877637.05	Non-Participating	1	23
470	485555.94	4877595.45	Non-Participating	1	23
471	485553.87	4877635.12	Non-Participating	1	23
579	485379.31	4872761.19	Non-Participating	1	23
27	511344.96	4863873.64	Non-Participating	1	23
325	511241.06	4863845.52	Non-Participating	1	23
468	485477.21	4877647.07	Non-Participating	1	23
575	485248.40	4873345.47	Non-Participating	1	23
576	485233.04	4873372.20	Non-Participating	1	23
326	511377.68	4863817.25	Non-Participating	1	23
546	485040.33	4875536.46	Non-Participating	1	23
570	485049.92	4874303.42	Non-Participating	1	23
574	485076.63	4873384.34	Non-Participating	1	23
683	490085.49	4864761.25	Non-Participating	1	23
521	485139.90	4876925.87	Non-Participating	1	23
522	485112.68	4876718.66	Non-Participating	1	23
523	485111.73	4876886.12	Non-Participating	1	23
684	489923.58	4864746.23	Non-Participating	1	23
23	512873.66	4865696.43	Non-Participating	1	23
226	512876.54	4865698.06	Non-Participating	1	23
462	485834.32	4879132.42	Non-Participating	1	23
463	485809.66	4879170.03	Non-Participating	1	23
572	485226.22	4873854.62	Non-Participating	1	23
577	484992.60	4872278.33	Non-Participating	1	23
626	487378.63	4870881.50	Non-Participating	1	23
22	512882.51	4865215.73	Non-Participating	1	22
28	511215.66	4862975.26	Non-Participating	1	22
312	511214.04	4862974.57	Non-Participating	1	22
324	512869.46	4865200.07	Non-Participating	1	22
578	484936.10	4872282.95	Non-Participating	1	23
24	512672.12	4864525.97	Non-Participating	1	22
545	484639.57	4876183.37	Non-Participating	1	22
573	484962.06	4873636.11	Non-Participating	1	22
472	485326.16	4879324.31	Non-Participating	1	22
527	484482.97	4876529.89	Non-Participating	1	22
543	484347.49	4875779.83	Non-Participating	1	22
466	484581.56	4877648.78	Non-Participating	1	22
524	484576.48	4877381.31	Non-Participating	1	22
525	484604.14	4877406.38	Non-Participating	1	22
473	485052.32	4879054.82	Non-Participating	1	22
528	484133.35	4876454.25	Non-Participating	1	22

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
544	484122.70	4876211.77	Non-Participating	1	22
526	484415.46	4876945.29	Non-Participating	1	22
96	509416.42	4875235.41	Non-Participating	1	22
532	483894.45	4877038.60	Non-Participating	1	21
474	485117.12	4878621.98	Non-Participating	1	21
533	483805.65	4877165.29	Non-Participating	1	21
542	483610.07	4875926.75	Non-Participating	1	21
467	483815.76	4877785.78	Non-Participating	1	21
538	483371.66	4876260.99	Non-Participating	1	21
539	483342.50	4876216.88	Non-Participating	1	21
540	483353.94	4876115.55	Non-Participating	1	21
541	483356.50	4875964.09	Non-Participating	1	21
529	483354.68	4876911.14	Non-Participating	1	21
530	483340.51	4876941.40	Non-Participating	1	21
531	483284.50	4877111.89	Non-Participating	1	21
702	483374.01	4877839.13	Non-Participating	1	21
703	483734.01	4879213.02	Non-Participating	1	21
661	490132.35	4868300.15	Non-Participating	1	20
621	486727.45	4871753.50	Non-Participating	1	20
327	511380.49	4867122.86	Non-Participating	1	19
668	489471.01	4866930.92	Non-Participating	1	19
569	485068.52	4874814.15	Non-Participating	1	17

SOUND LEVEL ASSESSMENT REPORT  
COMBINED GE 2.3 AND GE 2.5 LAYOUT

---

Dodge County Wind Project  
Dodge and Steele Counties, Minnesota

*Prepared for:*

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December 17, 2018  
Revised September 4, 2019



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## 1.0 EXECUTIVE SUMMARY

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The Dodge County Wind Project (the Project) is a proposed wind power generation facility with a total capacity of approximately 170 megawatt (MW) and will consist of 68 wind turbines within an approximately 81 square mile region (Project Area) in Dodge and Steele Counties, Minnesota. The Project is being developed by Dodge County Wind, LLC (DCW), a wholly-owned indirect subsidiary of NextEra Energy Resources (NEER). Epsilon Associates, Inc. (Epsilon) has been retained by DCW through Atwell, LLC (Atwell) to conduct a sound level assessment for this Project.

In general, this sound level assessment has been designed based on procedures identified in the Guidance for Large Wind Energy Conversion System, Noise Study Protocol and Report (LWECS Guidance) published by the Minnesota Department of Commerce, Energy Facility Permitting, dated October 8, 2012. The assessment included a sound monitoring program to determine existing sound levels in the vicinity of the Project, computer modeling to predict cumulative worst-case future L<sub>50</sub> sound levels from the Project, and a comparison of operational sound levels to regulatory limits. The analysis includes a total of 72 wind turbines (68 proposed + 4 alternates) of which 64 are GE 2.5-116 Low Noise Trailing Edge (LNTE) wind turbines (4 alts) and eight (8) are GE 2.3-116 LNTE wind turbines. This Project is required to comply with Minnesota Pollution Control Agency (MPCA) State Noise Ordinance Standards, which are set forth in Section 4 of this report. For this analysis, all receptors with land use considered as Noise Area Classification 1 (NAC 1) were included in the modeling and evaluated as per Minn. Rule 7030.0040. The most restrictive of the noise limits is the nighttime L<sub>50</sub> sound level for NAC 1 of 50 dBA.

The worst-case sound levels produced by the Project were predicted through modeling. These modeled L<sub>50</sub> sound levels are below the MPCA limit of 50 dBA. Nighttime measurements showed non-wind-turbine ambient L<sub>50</sub> broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA L<sub>50</sub> nighttime limit of 50 dBA. The highest predicted worst-case Project Only L<sub>50</sub> sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA.

## 2.0 INTRODUCTION

---

The proposed Project to be located in Dodge and Steele Counties, Minnesota will consist of 68 wind turbines. The proposed wind turbines are a combination of GE 2.5 MW and GE 2.3 MW units with rotor diameters of 116 meters for each, and hub heights of 90 and 80 meters, respectively. All wind turbines will be Low Noise Trailing Edge (LNTE) models. Of the 72 wind turbines included in the analysis (68 proposed + 4 alternates), 58 are located in Dodge County and 14 are located in Steele County. A collector substation is proposed for the Project with a 225 megavolt-ampere (MVA) transformer. The substation is located in Dodge County. Figure 2-1 shows the locations of the 68 proposed wind turbines, 4 alternate wind turbines, and substation transformer over aerial imagery in Dodge and Steele Counties.

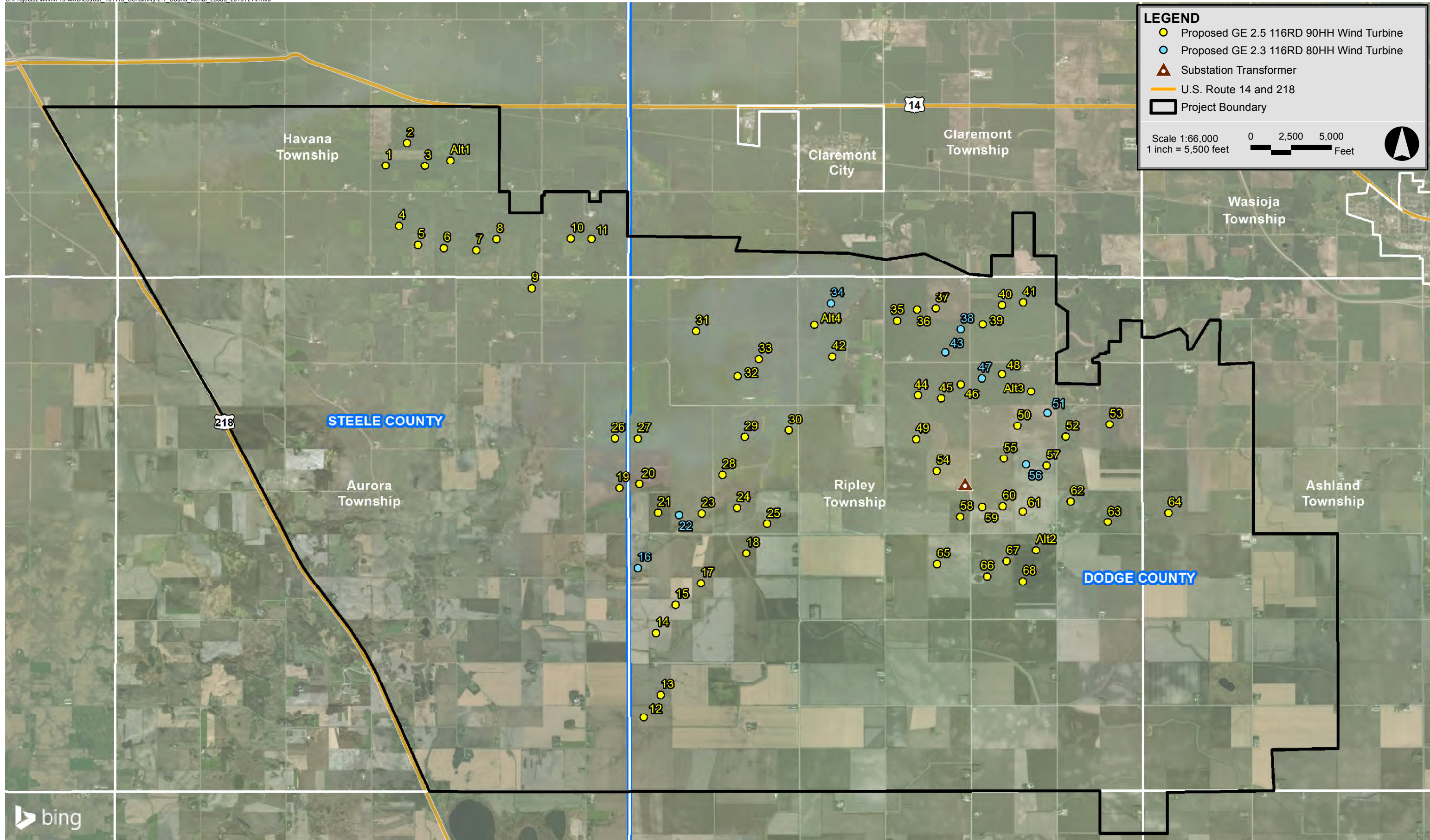
A detailed discussion of sound from wind turbines is presented in a white paper prepared by the Renewable Energy Research Laboratory.<sup>1</sup> A few points are repeated herein. Wind turbine sound can originate from two different sources: mechanical sound from the interaction of turbine components, and aerodynamic sound produced by the flow of air over the rotor blades. Prior to the 1990's, both were significant contributors to wind turbine sound. However, recent advances in wind turbine design have greatly reduced the contribution of mechanical sound. Aerodynamic sound has also been reduced from modern wind turbines due to slower rotational speeds and changes in materials of construction. Aerodynamic sound, in general, is broadband (has contributions from a wide range of frequencies). It originates from encounters of the wind turbine blades with localized airflow inhomogeneities and wakes from other turbine blades and from airflow across the surface of the blades, particularly the front and trailing edges. Aerodynamic sound generally increases with increasing wind speed up to a certain point, then typically remains constant, even with higher wind speeds. However, sound levels in general also increase with increasing wind speed with or without the presence of wind turbines.

This report presents the findings of an ambient measurement program and a sound level modeling analysis for the Project. The wind turbines were modeled in Cadna/A using sound data from a GE technical report provided by DCW through Atwell. The proposed substation transformer was also included in the model. The results of this analysis are found within this report.

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<sup>1</sup> Renewable Energy Research Laboratory, Department of Mechanical and Industrial Engineering, University of Massachusetts at Amherst, Wind Turbine Acoustic Noise, June 2002, amended January 2006.





Dodge County Wind Dodge & Steele Counties, MN



## 3.0 SOUND METRICS

---

There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-decibel increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. Relative to this characteristic, a change in sound levels of less than 3 dB is imperceptible to the human ear.

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure sound is a standardized instrument.<sup>2</sup> It contains “weighting networks” (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as “pitch” or “tone”. The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as “dBA”. Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred to as “unweighted”. Sound pressure levels for some common indoor and outdoor environments are shown in Figure 3-1.

Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from a large number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during

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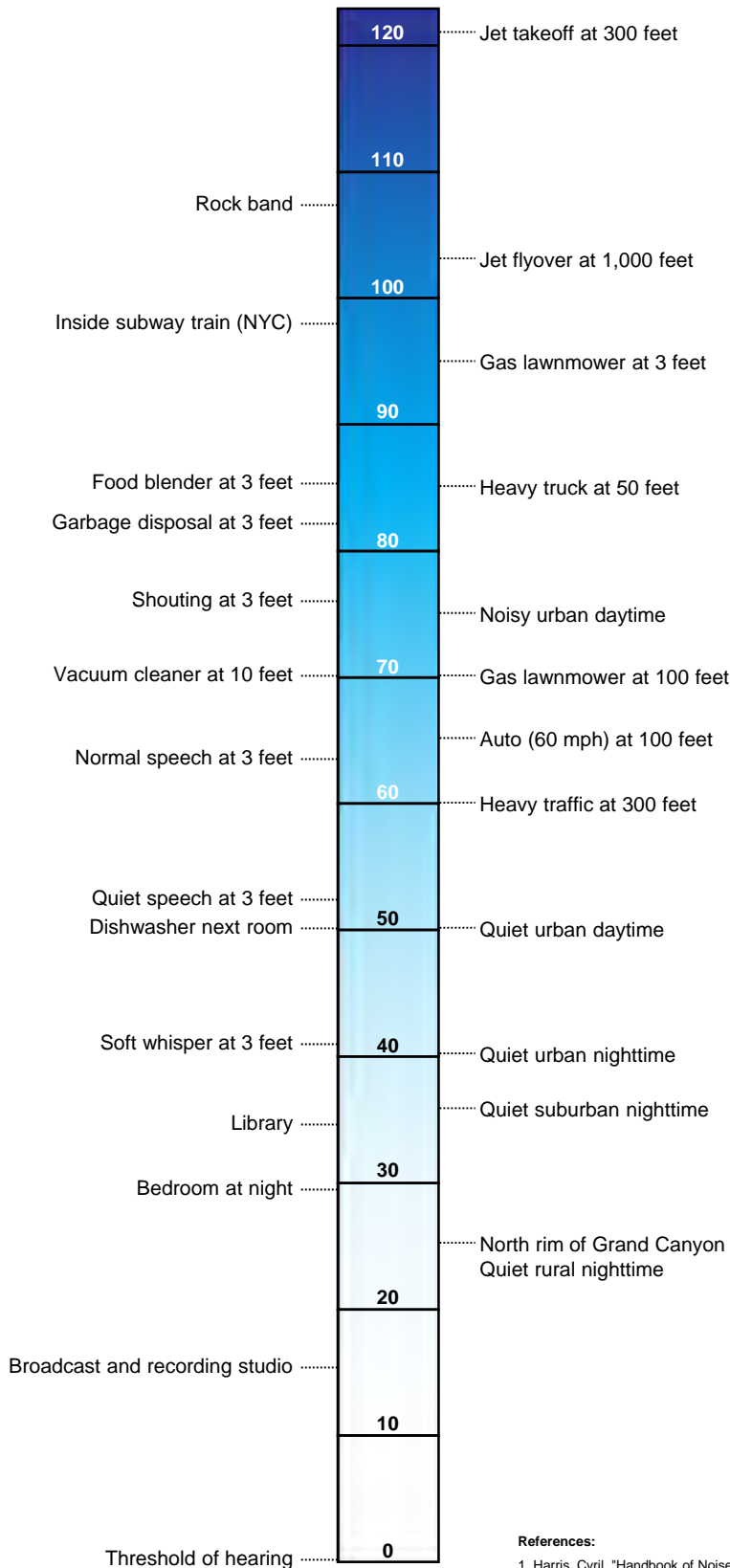
<sup>2</sup> *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983 (R2006), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

a measurement period. Exceedance levels are designated  $L_n$ , where  $n$  can have a value between 0 and 100 in terms of percentage. Several sound level metrics that are reported in community sound monitoring are described below.

- ◆  $L_{10}$  is the sound level exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The  $L_{10}$  is sometimes called the intrusive sound level because it is caused by occasional louder sounds like those from passing motor vehicles.
- ◆  $L_{50}$  is the sound level exceeded 50 percent of the time. It is the median level observed during the measurement period. The  $L_{50}$  is affected by occasional louder sounds like those from passing motor vehicles; however, it is often found comparable to the equivalent sound level under relatively steady sound level conditions.
- ◆  $L_{90}$  is the sound level exceeded 90 percent of the time during the measurement period. The  $L_{90}$  is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources.
- ◆  $L_{eq}$ , the equivalent level, is the level of a hypothetical steady sound that would have the same energy (*i.e.*, the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level is designated  $L_{eq}$  and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the  $L_{eq}$  is mostly determined by loud sounds if there are fluctuating sound levels.

Sound Pressure Level, dBA

**COMMON INDOOR SOUNDS** **COMMON OUTDOOR SOUNDS**



**References:**

- Harris, Cyril, "Handbook of Noise Acoustical Measurements and Noise Control", p 1-10., 1998
- "Controlling Noise", USAF, AFMC, AFDTIC, Elgin AFB, Fact Sheet, August 1996
- California Dept. of Trans., "Technical Noise Supplement", Oct, 1998

## 4.0 NOISE REGULATIONS

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### 4.1 Federal Regulations

There are no federal community noise regulations applicable to this Project.

### 4.2 Minnesota State Regulations

The proposed Dodge County Wind Project within Dodge and Steele Counties, MN is required to comply with MPCA's 7030.0040 sound standard, which states:

**Subpart 1. Scope.** These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of public health and welfare. These standards are consistent with speech, sleep, annoyance, and hearing conservation requirements for receivers within areas grouped according to land activities by the noise area classification (NAC) system established in part 7030.0050. However, these standards do not, by themselves, identify the limiting levels of impulsive noise needed for the preservation of public health and welfare. Noise standards in subpart 2 apply to all sources.

**Subpart 2. Noise Standards.**

Noise Area Classification	Daytime		Nighttime	
	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Minn. Rule 7030.0020 defines daytime hours as 7:00AM to 10:00PM and nighttime hours from 10:00PM to 7:00AM. All daytime and nighttime limits are expressed in A-weighted decibels (dBA) and are applicable over the duration of an hour. These are to be measured using the fast response characteristic of the measurement instrumentation per Minn. Rule 7030.0060.

Noise is defined by the State of Minnesota<sup>3</sup> as "any sound not occurring in the natural environment, including, but not limited to, sounds emanating from aircraft and highways, and industrial, commercial, and residential sources."

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<sup>3</sup> Minnesota Statutes 2017 Section 116.06

NAC 1<sup>4</sup> receptors are protected by the lowest sound level limits of the MPCA. Since wind turbines can operate under conditions resulting in maximum sound power during both the day and at night, the Project would need to comply during the period with more stringent limits, nighttime. Furthermore, because wind turbine sound is generally steady during a relatively constant wind speed there would be minimal difference, i.e. < 5 dBA, between the L<sub>50</sub> and L<sub>10</sub> sound levels due to a wind turbine. As the L<sub>50</sub> and L<sub>10</sub> noise limits differ by 5 decibels, the L<sub>50</sub> limit is more restrictive for a wind energy facility. Therefore, NAC 1 receptors have been evaluated against the L<sub>50</sub> sound level limit of 50 dBA in this analysis.

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<sup>4</sup> NAC 1 is defined per Rule 7030.0050 as household units (including farm houses); hotels, motels or other overnight lodging; mobile home parks or courts; other residential units; motion picture production; medical and other health services; correctional institutions; educational services; religious activities; cultural activities and nature exhibitions; entertainment assembly; camping and picnicking areas (designated); resorts and group camps; other cultural, entertainment, and recreational activities.

## 5.0 EXISTING SOUND LEVELS

---

### 5.1 Overview

The Project is to be located in Dodge and Steele Counties, MN, to the south of Highway 14. The Project is proposed to have 68 GE wind turbines, a portion of which will be 2.5 MW units, with the remainder 2.3 MW units.

### 5.2 Sound Level Environment

An ambient sound level survey was conducted to characterize the current acoustical environment in the community within, and to the west of, the Project Area. Existing sound sources include: vehicles on Highway 14 (including trucks) and on other local roads, occasional trains to the north of the Project Area, wind, dogs, rustling vegetation, occasional distant aircraft, livestock and farm equipment, and geese along with other birds.

### 5.3 Sound Level Measurement Locations

Sound level measurement locations were originally selected based on the LWECs Guidance document which requires at least seven (7) days of measurements (“long-term”). The document specifies that measurements be performed within the Project Area at no fewer than three locations including the “worst-case” receptor predicted by the sound level model. The worst-case modeling receptor is monitoring Location L3, as determined by modeling results using a preliminary wind turbine layout.<sup>5</sup> This layout is documented in a pre-construction sound level measurement protocol (the Protocol) that was submitted to the MN DOC on March 14, 2018. The layout is shown on Figure 1 of the Protocol which is provided as Appendix A of this report. Under the current modeling, this location has a modeled broadband sound level equal to the worst-case modeled sound level at a residence and is considered to be non-participating.

Since this was a pre-construction program for DCW and Epsilon interprets subsections #1 and #2 in the LWECs Guidance to pertain to a post-construction evaluation, no off-site long-term monitoring locations were selected. However, supplemental short-term measurements were performed to the west of the Project Area, west of Highway 218. Details of the long-term and short-term locations are described below.

#### *5.3.1 Long-term Locations*

The selection of the sound monitoring locations was intended to be representative of receptors within the Project Boundary per the requirements of the LWECs Guidance document. Figure 5-1 shows the actual long-term measurement locations overlaid upon an

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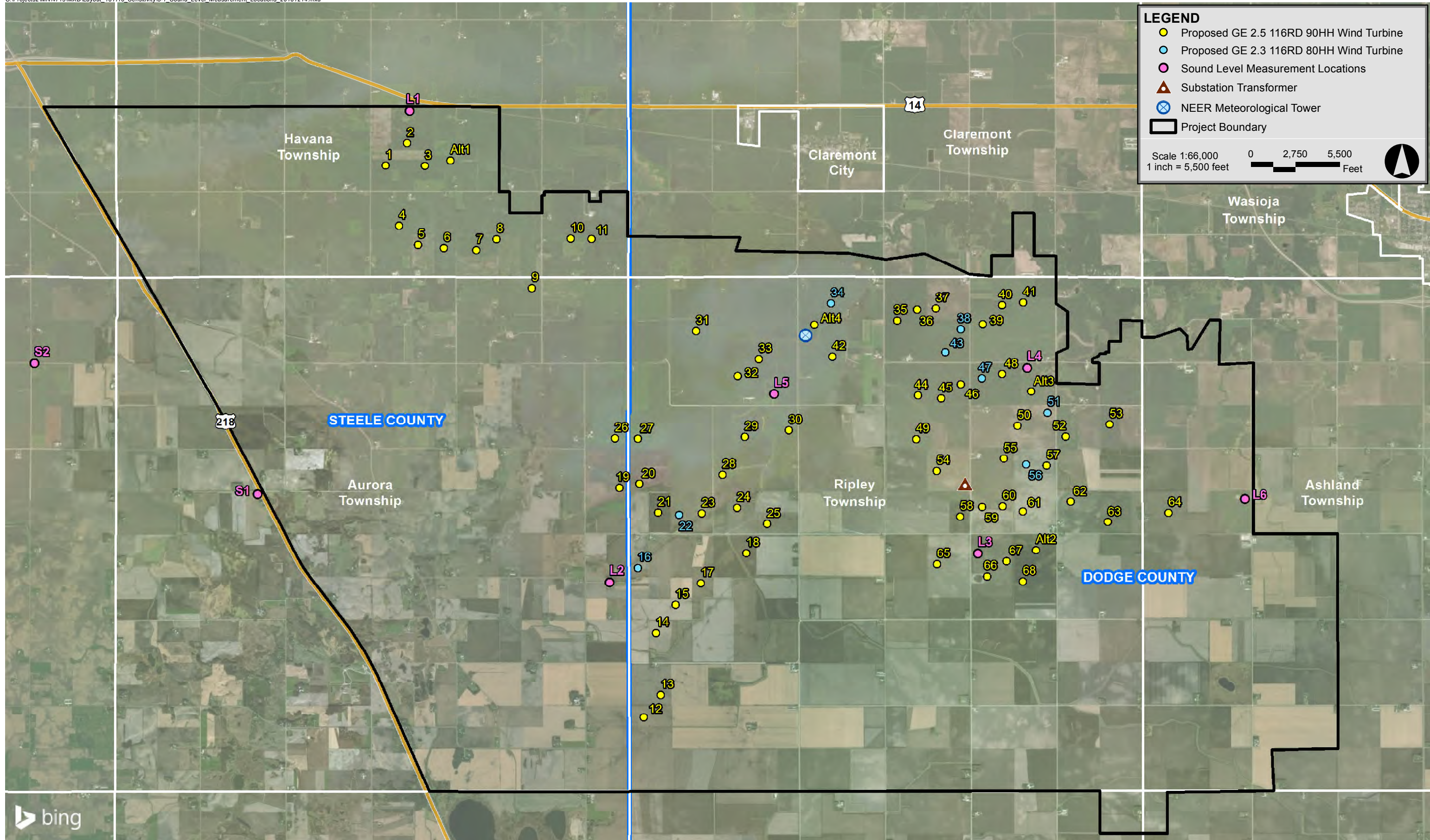
<sup>5</sup> Under the current (181116) layout, this location still has the highest modeled sound level.



aerial photograph of the surrounding area. Each measurement location is described below. DCW coordinated access to private property prior to the commencement of the measurement program. The coordinates for the six long-term locations were obtained by Epsilon staff using Global Positioning System (GPS) instrumentation and are presented in latitude longitude coordinates in reference to the NAD83 datum in Table 5-1. All distances are rounded to the nearest 10 feet or shown in miles. Photographs of the six locations are included in Figures 5-2 through 5-7, respectively.

- ◆ Location L1 – Modeling Receptor #506
  - Approximately 2,020 feet to the closest proposed wind turbine (#2). This location is representative of the residences near Highway 14 in the northwest corner of the Project Area.
- ◆ Location L2 – Modeling Receptor #202
  - Approximately 1,950 feet to the closest proposed wind turbine (#16). This location is representative of residences in the southwest area of the Project and of the residences near proposed GE 1.7 wind turbines.
- ◆ Location L3 – Modeling Receptor #210
  - Approximately 1,520 feet to the closest proposed wind turbine (#66). This location is representative of the modeling receptor with the highest modeled sound level.
- ◆ Location L4 – Modeling Receptor #121
  - Approximately 1,470 feet to the closest proposed wind turbine (#Alt3). This location is representative of the residences in the northeast corner of the Project Area.
- ◆ Location L5 – Modeling Receptor #107
  - Approximately 2,370 feet to the closest proposed wind turbine (#33). This location is representative of the residences in the northern central part of the Project Area.
- ◆ Location L6 – Modeling Receptor #174
  - Approximately 4,810 feet to the closest proposed wind turbine (#64). This location is representative of the residences on the eastern end of the Project Area.





Dodge County Wind Dodge & Steele Counties, MN



Figure 5-2 Photo of Sound Level Measurement Location L1 (facing north)



Figure 5-3 Photo of Sound Level Measurement Location L2 (facing south)





Figure 5-4 Photo of Sound Level Measurement Location L3 (facing west)



Figure 5-5 Photo of Sound Level Measurement Location L4 (facing north)





Figure 5-6 Photo of Sound Level Measurement Location L5 (facing west)



Figure 5-7 Photo of Sound Level Measurement Location L6 (facing south)



**Table 5-1 GPS Coordinates – Long-term Sound Level Measurement Locations**

Location	Coordinates	
	Latitude (°)	Longitude (°)
L1	44.05075	93.09703
L2	43.97113	93.04990
L3	43.97566	92.96365
L4	44.00745	92.95164
L5	44.00298	93.01144
L6	43.98523	92.90135

**5.3.2 Short-term Locations**

A total of two (2) short-term measurement locations were utilized for the program. The specific locations were field-identified by the Epsilon engineer to capture sound levels representative of homes outside the Project Area near Route 218 and at a significant distance from Route 218. The earlier Figure 5-1 shows the actual short-term measurement locations with respect to the Project Area. Each measurement location is described herein. The coordinates for the two short-term locations were obtained by Epsilon staff using Global Positioning System (GPS) instrumentation and are presented in latitude longitude coordinates in reference to the NAD83 datum in Table 5-2. Photographs of the two locations are included in Figures 5-8 and 5-9, respectively.

- ◆ Location S1 – North side of SE 73<sup>rd</sup> Street approximately 130 feet west of the Highway 218 intersection
  - 3.5 miles from the nearest proposed wind turbine (#5). This location is representative of residences in close vicinity to Highway 218 along the western boundary of the Project Area.
  
- ◆ Location S2 – South side of SE 58<sup>th</sup> Street approximately 200 feet east of the SE 24<sup>th</sup> intersection
  - 4.6 miles from the nearest proposed wind turbine (#4). This location is representative of residences in agricultural areas to the west of the Project Area away from any highway.



**Table 5-2**      **GPS Coordinates – Short-term Sound Level Measurement Locations**

---

Location	Coordinates	
	Latitude (°)	Longitude (°)
S1	43.98647	93.13259
S2	44.00808	93.18485

Figure 5-8      Photo of Sound Level Measurement Location S1 (facing east)



Figure 5-9 Photo of Sound Level Measurement Location S2 (facing west)



## 5.4 Sound Measurement Methodology

### 5.4.1 *Long-term Measurement Methodology*

Programmable unattended sound level meters were placed at on-site Locations L1, L2, L3, L4, L5, and L6. These monitors continuously measured sound levels from generally Tuesday, March 20, 2018 to Thursday, March 29, 2018. Sound levels were measured at a height of approximately five feet above the ground at locations where there were no large reflective surfaces to affect the measured levels.

In addition to the collection of sound level data, ground-level wind speeds were continuously measured and logged at each location. Only hourly sound levels coupled with hourly-averaged ground level wind speeds have been summarized. Per the LWECs Guidance, sound levels measured under wind speeds above 11 mph were considered invalid and removed from the analysis.

A NEER on-site meteorological tower located approximately 822 feet southwest from proposed wind turbine #Alt4 measured and logged wind speeds during the sound level measurement period. The location of the on-site met tower is identified in Figure 5-1. Meteorological data collected during the measurement period at the Dodge Center Airport

National Weather Service (NWS) station in Dodge Center, MN were also archived from the National Centers for Environmental Information (NCEI). These data are included in Appendix B and were used to determine hourly precipitation periods during the measurement program during which the Guidance requires removal of measured sound levels from the results.

At Location L1, a continuous programmable unattended sound level meter was placed on the property at 6893 SE 28<sup>th</sup> St in Claremont. This measurement location is a residence with pending participation that is representative of residences in the northwest corner of the Project near Hwy 14. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 12:00 PM Tuesday, March 20 until 2:00 PM Thursday, March 29 for a total of 218 hours.

At Location L2, a continuous programmable unattended sound level meter was placed on the property at 8375 SE 89<sup>th</sup> Ave in Claremont. This measurement location is a residence that is representative of residences in the southwest corner of the Project Area and of the residences near proposed GE 1.7 wind turbines. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 2:00 PM Tuesday, March 20 until 11:00 AM Thursday, March 29 for a total of 213 hours.

At Location L3, a continuous programmable unattended sound level meter was placed on the property at 67214 140<sup>th</sup> Ave in Claremont. This measurement location is a residence with pending participation that has the highest modeled Project Only broadband sound level at a residence. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 6:00 PM Tuesday, March 20 until 10:00 AM Thursday, March 29 for a total of 208 hours.

At Location L4, a continuous programmable unattended sound level meter was placed on the property 14643 650<sup>th</sup> St in Claremont. This measurement location is a participating residence and is representative of residences in the northeast corner of the Project. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 9:00 AM Thursday, March 22 until 1:00 PM Thursday, March 29 for a total of 172 hours.

At Location L5, a continuous programmable unattended sound level meter was placed on the property at 11688 655<sup>th</sup> St in Claremont. This measurement location is a participating residence and is representative of residences around the northern center of the Project site. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 3:00 PM Tuesday, March 20 until 12:00 PM Thursday, March 29 for a total of 214 hours.

At Location L6, a continuous programmable unattended sound level meter was placed on the property at 66583 170<sup>th</sup> Ave in Dodge Center. This measurement location is a non-participating residence and is representative of residences on the eastern end of the Project site. The sound level meter continuously measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics from 9:00 AM Wednesday, March 21 until 9:00 AM Thursday, March 29 for a total of 192 hours.

In addition to A-weighted and Z-weighted sound levels, broadband equivalent C-weighted sound level data ( $LC_{eq}$ ) were also collected at each location. Sound observations were made at all six locations during daytime hours generally corresponding to equipment setups on March 20 and March 21. Sound observations were also made during nighttime hours from 10:30 PM to 12:30 AM on the night of March 21 to 22. An Epsilon engineer checked on the integrity of the long-term monitoring equipment no less than one time following the initial setup.

#### **5.4.2**        *Short-term Measurement Methodology*

In addition to the long-term data, short-term sound level measurements were made at Locations S1 and S2 at publicly accessible locations. One daytime and one nighttime sound level measurement, each 20-minutes in duration, was taken at each location during conditions when there was no precipitation<sup>6</sup> and ground-level wind speeds were less than 11 mph as measured by hand-held meteorological equipment. Sound observations were made during both periods at each location by the Epsilon engineer.

Sound levels were measured at a height of approximately five feet above the ground at locations where there were no large reflective surfaces to affect the measured levels. Below is a description of the measurement program for each location.

Short-term measurements were performed at Location S1 on the road edge approximately 100 feet to the west of the intersection of Hwy 218 and SE 73<sup>rd</sup> St. A tripod-mounted sound level meter measured and stored A-weighted broadband and Z-weighted one-third octave-band sound level statistics for 20 minutes starting at 1:06 PM for the daytime period on Wednesday, March 21 and at 12:34 AM on Thursday, March 22 for the nighttime period. Broadband equivalent C-weighted sound level data ( $LC_{eq}$ ) were also collected.

Short-term measurements were performed at Location S2 on the road edge approximately 200 feet to the east of the intersection of SE 58<sup>th</sup> St and SE 24<sup>th</sup> Ave. A tripod-mounted sound level meter measured and stored A-weighted broadband and Z-weighted one-third

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<sup>6</sup> Negligible snow flurry briefly occurred during daytime measurement at Location S2 with roads remaining dry

octave-band sound level statistics for 20 minutes starting at 12:06 PM for the daytime period on Wednesday, March 21 and at 1:09 AM on Thursday, March 22 for the nighttime period. Broadband equivalent C-weighted sound level data ( $LC_{eq}$ ) were also collected.

## 5.5 Measurement Equipment

### 5.5.1 *Sound Level Equipment*

Six Larson Davis (LD) model 831 sound level meters, equipped with PCB Piezotronics Type 1 preamplifiers, PCB 377B20 or 377C20 half-inch microphones, and environmental protection kits were used to collect continuous broadband A-weighted (dBA), broadband C-weighted equivalent ( $LC_{eq}$ ), and Z-weighted one-third octave-band sound pressure level data at Locations L1, L2, L3, L4, L5, and L6. Each microphone was tripod-mounted at a height of five feet above ground with a 7-inch diameter windscreen. The meters utilized fast response and were set to log data every hour along with a one-minute time history for A-weighted parameters including:  $L_1$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ , and  $L_{eq}$ .

One LD model 831 meter was used to collect short-term broadband A-weighted,  $LC_{eq}$ , and Z-weighted one-third octave-band sound pressure level data at Locations S1 and S2 for 20 minutes during daytime and nighttime hours. This meter was tripod-mounted at a height of five feet above ground with a 7-inch diameter windscreen. The meter utilized fast response and was set to log data every 20 minutes along with a one-second time history for the same A-weighted parameters as the long-term meters.

All meters meet Type 1 ANSI S1.4-1983 (R2006) standards for sound level meters and were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. These calibrations were conducted by an independent laboratory within the prior 12 months of the measurement program. Additionally, all sound level measurement equipment was calibrated in the field before and after the surveys with the manufacturer's acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI/ASA S1.40-2006 (R2016).

### 5.5.2 *Meteorological Equipment*

Wind speed can have a strong influence on ambient sound levels. In order to understand how the existing sound levels are influenced by wind speed and as per the LWECs Guidance, continuous wind speed data were recorded at each long-term location by Epsilon. A HOBO H21-002 micro-weather station (manufactured by Onset Computer Corporation) was used to continuously measure the ground-level wind speed. The wind sensor was mounted at a height of approximately five feet above the ground (microphone height) and data were logged every hour to be synced with the sound level measurements. These sensors have a measurement range of 0 to 44 m/s (99 mph) and an accuracy of  $\pm 1.1$  m/s (2.4 mph), or better. Depending on the model used, the starting threshold was  $\leq 1$  m/s (2.2 mph) or  $\leq 0.5$  m/s (1.1 mph). Wind direction data were additionally collected at

Location L4 and L5. The wind direction measurement range is 0 to 358 degrees (2-degree dead band), with an accuracy of  $\pm 5$  degrees. For the short-term measurements where weather station utilization was not practical, wind speeds were measured with a hand-held Davis Instruments TurboMeter electronic wind speed indicator.

In addition to Epsilon's portable weather stations, Dodge County Wind's on-site meteorological tower measured and logged wind speeds during the measurement program. These data were scaled to a height of 89 meters, to represent hub height wind speeds, and averaged over hourly periods to correlate with the sound data. The location of the meteorological tower is approximately 822 feet southwest of proposed wind turbine #Alt4 as shown in Figure 5-1.

Meteorological data collected during the measurement period at the Dodge Center Airport National Weather Service (NWS) station in Dodge Center, MN were also archived from the National Centers for Environmental Information (NCEI) and are included in Appendix B.

## 5.6 Measured and Calculated Sound Levels

A brief summary of the measured (A-weighted) and measured/calculated (C-weighted) sound levels and sound sources at each long-term and short-term location is provided in this section. Several weather events were notable during the approximately 7-day measurement program, including 47 hours of precipitation, as determined from the NCEI data. These periods were excluded from the analysis as per the LWECS Guidance but included in the graphical presentations in this section. Short-term measurements were performed during dry periods. Snow cover was either minimal or nonexistent during the entire measurement program. Since this was a pre-construction program for DCW and Epsilon interprets subsection #29 in the LWECS Guidance to pertain to a post-construction evaluation, no comparison of measured sound levels to the Minnesota limits is provided in this report.

### 5.6.1 *Long-term Sound Levels*

#### 5.6.1.1 Location L1

Based on personal observations, sound levels at Location L1 were influenced by vehicular traffic (including trucks) on Hwy 14, wind, occasional trains, and birds. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (8% of measurements), are summarized below. Ground level wind speeds did not exceed 11 mph at this location during the monitoring period. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-10 (A-weighted sound levels) and Figure 5-11 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by traffic on Hwy 14.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 41 to 61 dBA;



- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 29 to 55 dBA.

#### 5.6.1.2 Location L2

Based on personal observations, sound levels at Location L2 were influenced by farm vehicles, livestock, birds, wind, and some distant vehicles on local roads. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (7% of measurements), are summarized below. Ground level wind speeds did not exceed 11 mph at this location during the monitoring period. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-12 (A-weighted sound levels) and Figure 5-13 (C-weighted sound levels) as per the LWECs Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by farm activity and livestock on the property.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 27 to 69 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 20 to 53 dBA.

#### 5.6.1.3 Location L3

Based on personal observations, sound levels at Location L3 were influenced by wind, birds, a mechanical noise to the east (nighttime only), and distant vehicles on local roads and Hwy 14. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (6% of measurements), are summarized below. Ground level wind speeds did not exceed 11 mph at this location during the monitoring period. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-14 (A-weighted sound levels) and Figure 5-15 (C-weighted sound levels) as per the LWECs Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by the unknown and off-property mechanical noise at nighttime and by birds during the daytime.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 19 to 58 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 18 to 53 dBA.

In addition to broadband sound levels, one-third octave-band sound levels were collected at this location and are presented in this report. One-third octave-band data from an hourly period during representative wind speed conditions, interpreted by Epsilon as low ground-level wind speed and high hub-height wind speed, are presented for this location in Figure 5-16 for the worst-case modeled receptor<sup>7</sup> per the LWECs Guidance. Z-weighted, A-weighted, and C-weighted one-third octave-band frequency levels are included in the figure.

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<sup>7</sup> As identified in the Protocol (Appendix A)

#### 5.6.1.4 Location L4

Based on personal observations, sound levels at Location L4 were influenced by distant vehicles on local roads, wind, birds, and dogs. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (5% of measurements) and 22 hours when ground level wind speeds exceeded 11 mph (13% of measurements), are summarized below. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-17 (A-weighted sound levels) and Figure 5-18 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by wind conditions in the area.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 21 to 53 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 19 to 49 dBA.

#### 5.6.1.5 Location L5

Based on personal observations, sound levels at Location L5 were influenced by wind, birds, some automotive work at the residence, distant vehicles on Hwy 14, and an off-property mechanical noise (nighttime only). The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (7% of measurements) and 6 hours when ground level wind speeds exceeded 11 mph (3% of measurements), are summarized below. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-19 (A-weighted sound levels) and Figure 5-20 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by various sources.

- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 26 to 60 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 20 to 56 dBA.

#### 5.6.1.6 Location L6

Based on personal observations, sound levels at Location L6 were influenced by wind, distant vehicles, occasional trains, birds, dogs, mechanical noise from manufacturing facilities in various directions from the residence. The range of A-weighted sound levels from the continuous measurements, neglecting periods of precipitation (5% of measurements) and 24 hours when ground level wind speeds exceeded 11 mph (12% of measurements), are summarized below. A complete set of the measured sound levels and meteorological considerations are presented graphically in Figure 5-21 (A-weighted sound levels) and Figure 5-22 (C-weighted sound levels) as per the LWECS Guidance. Based on the personal observations at the site, the sound levels at this location are primarily controlled by various sources.

Figure 5-10: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L1

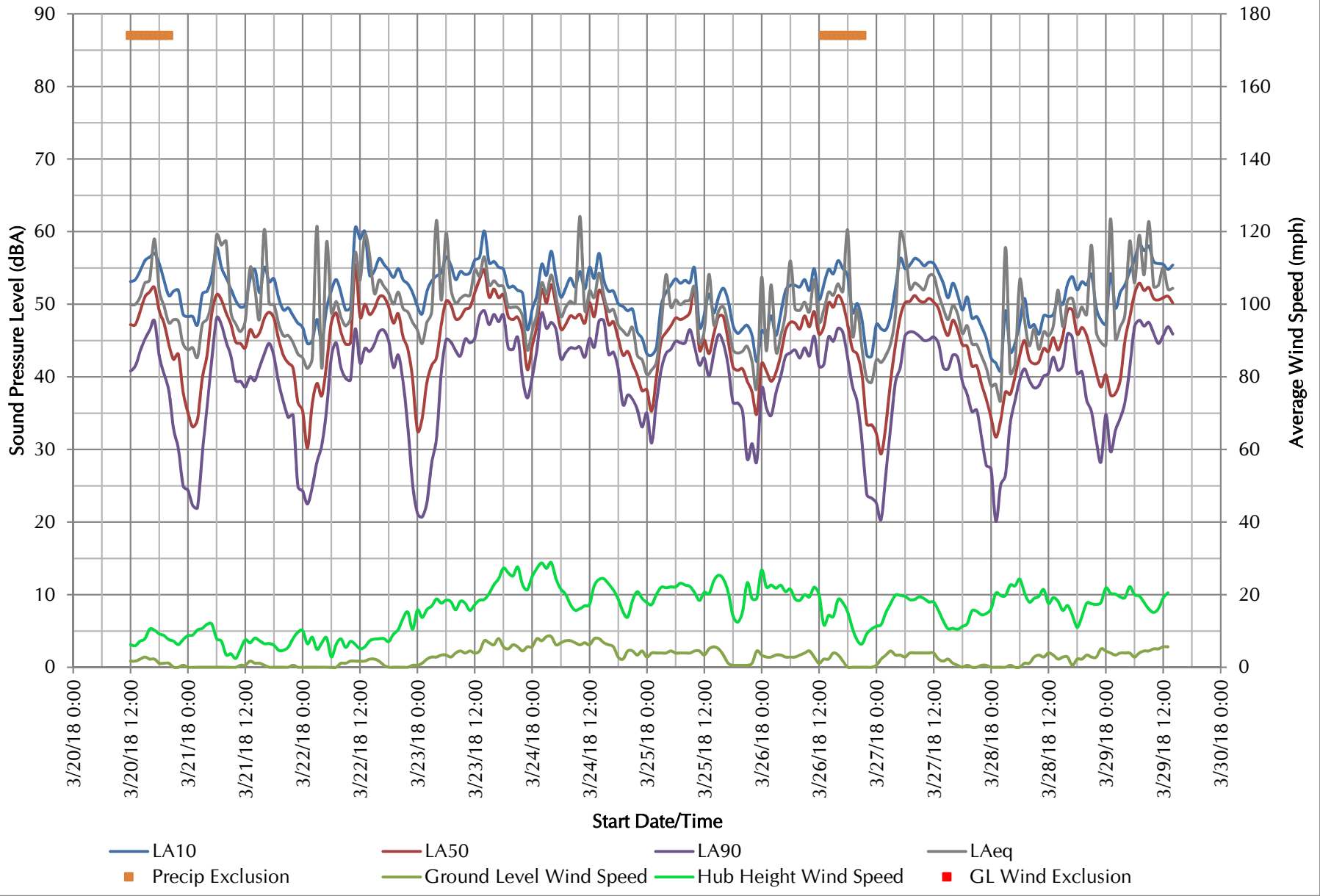


Figure 5-11: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L1

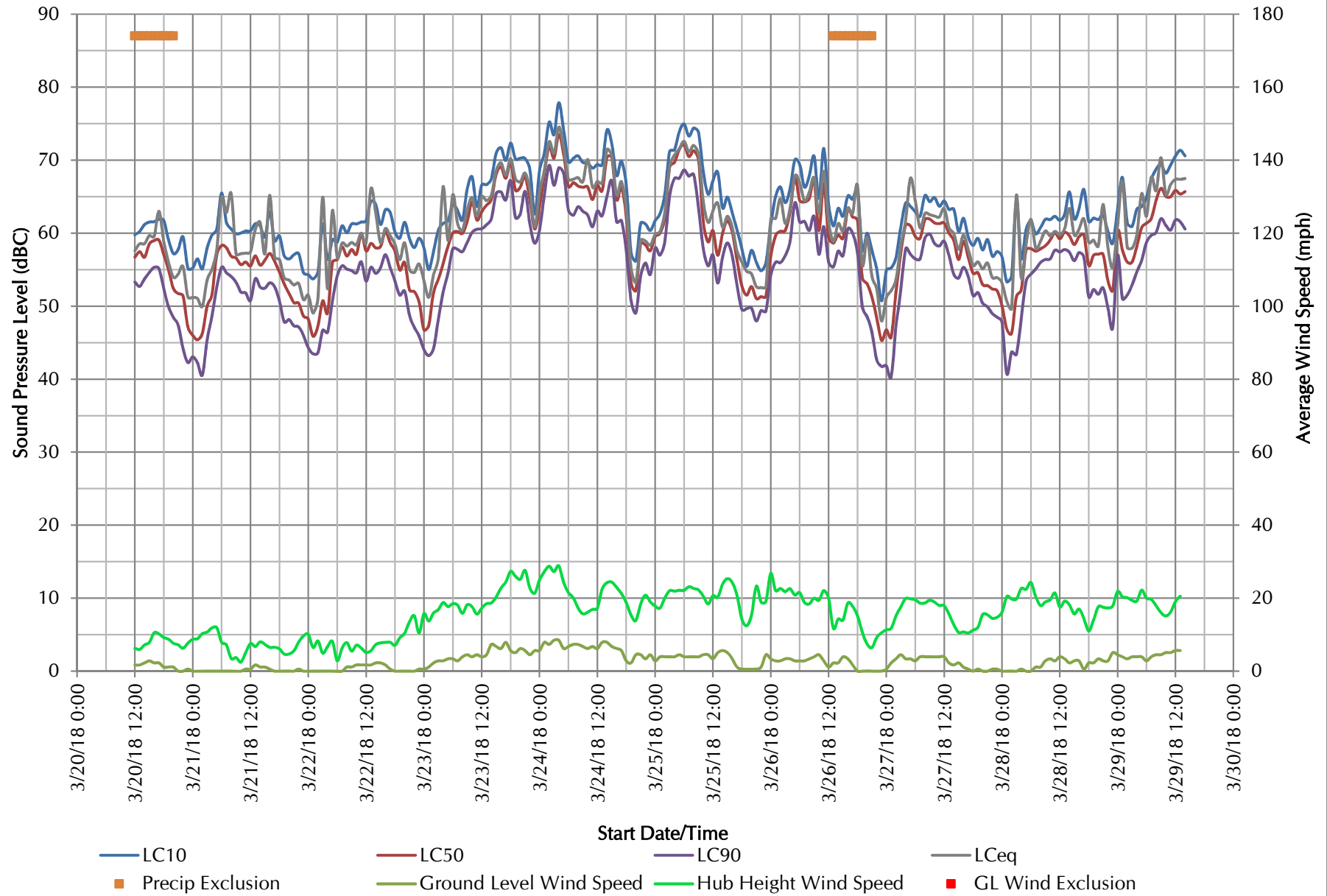


Figure 5-12: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L2

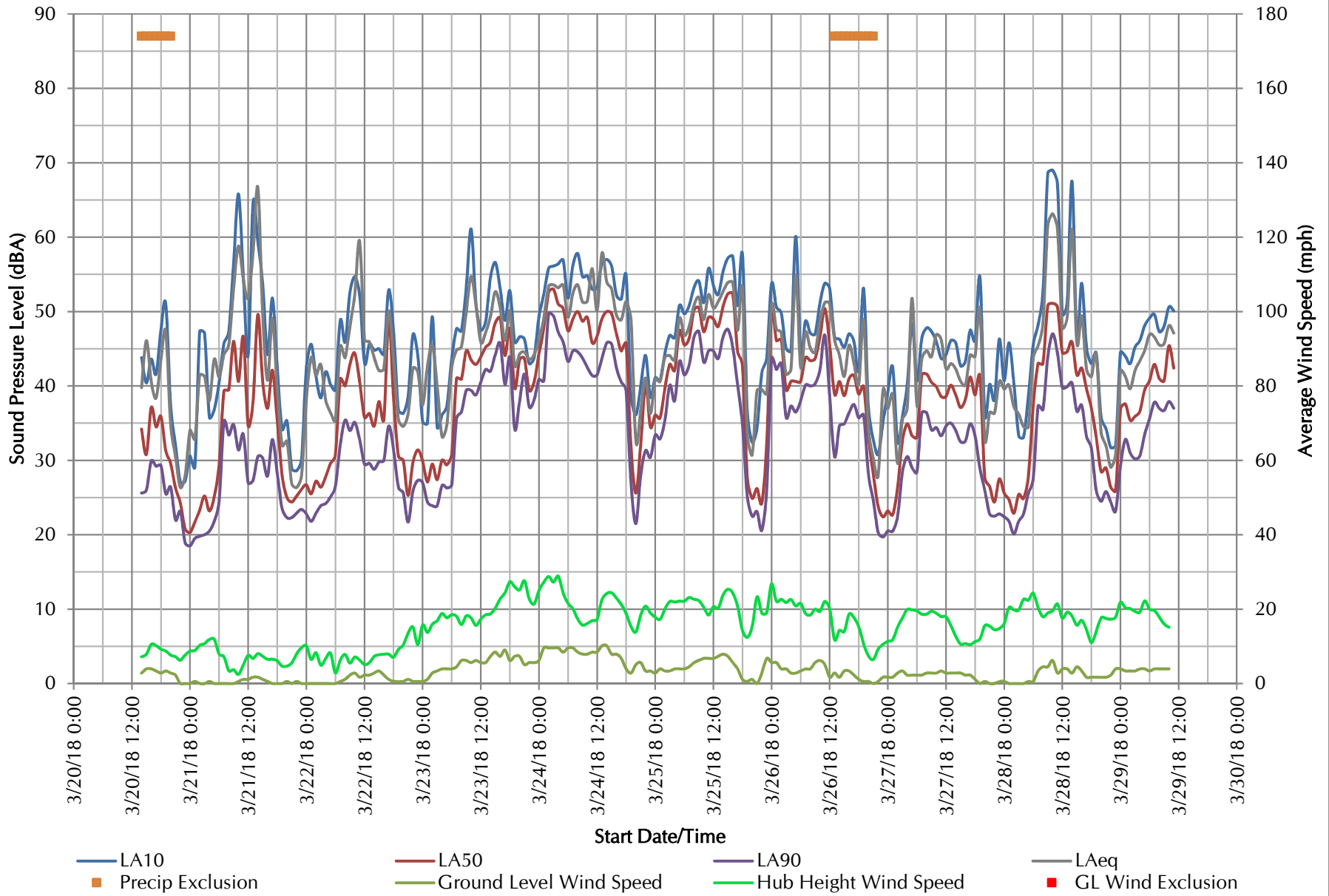


Figure 5-13: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L2

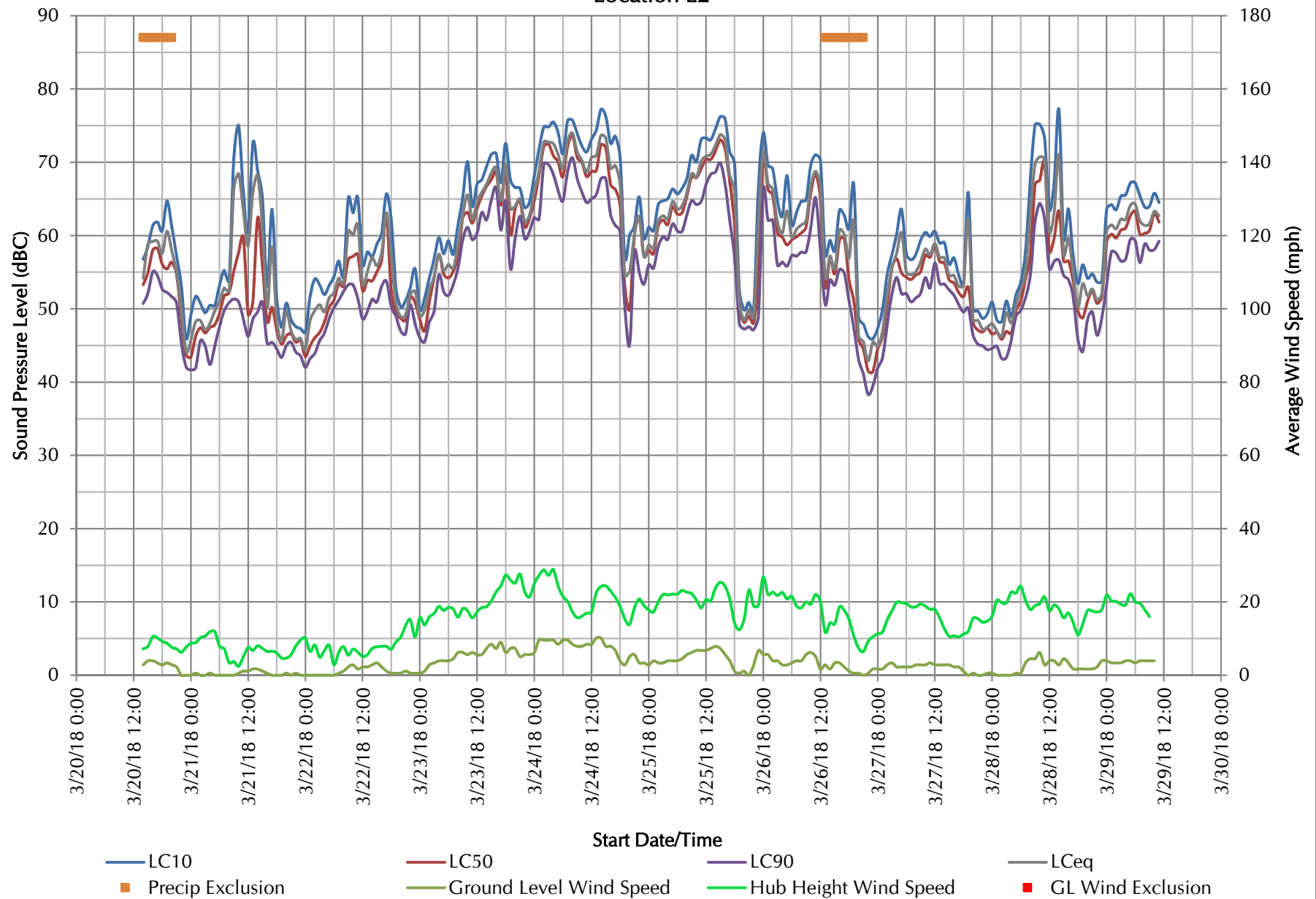




Figure 5-14: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L3

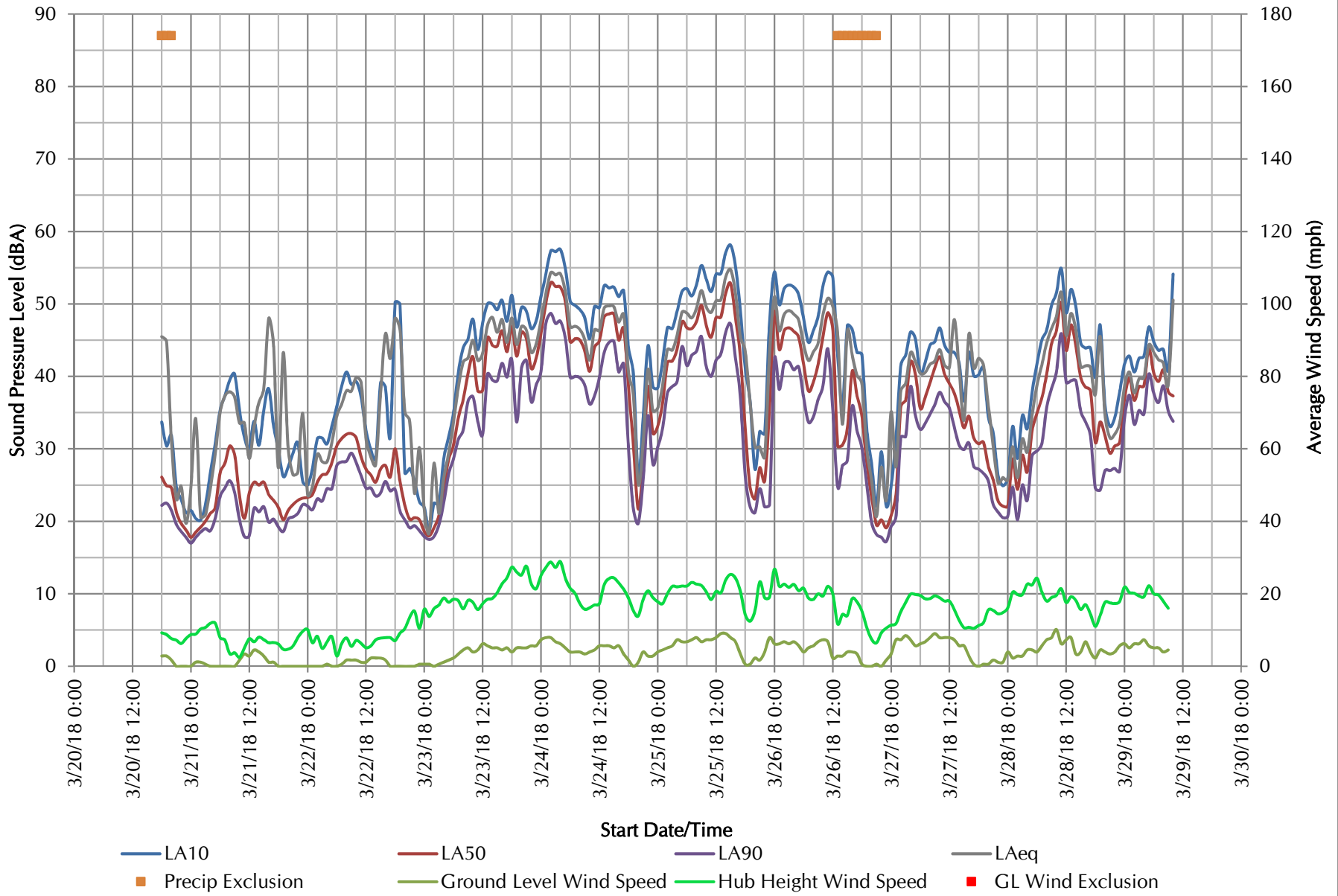


Figure 5-15: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L3

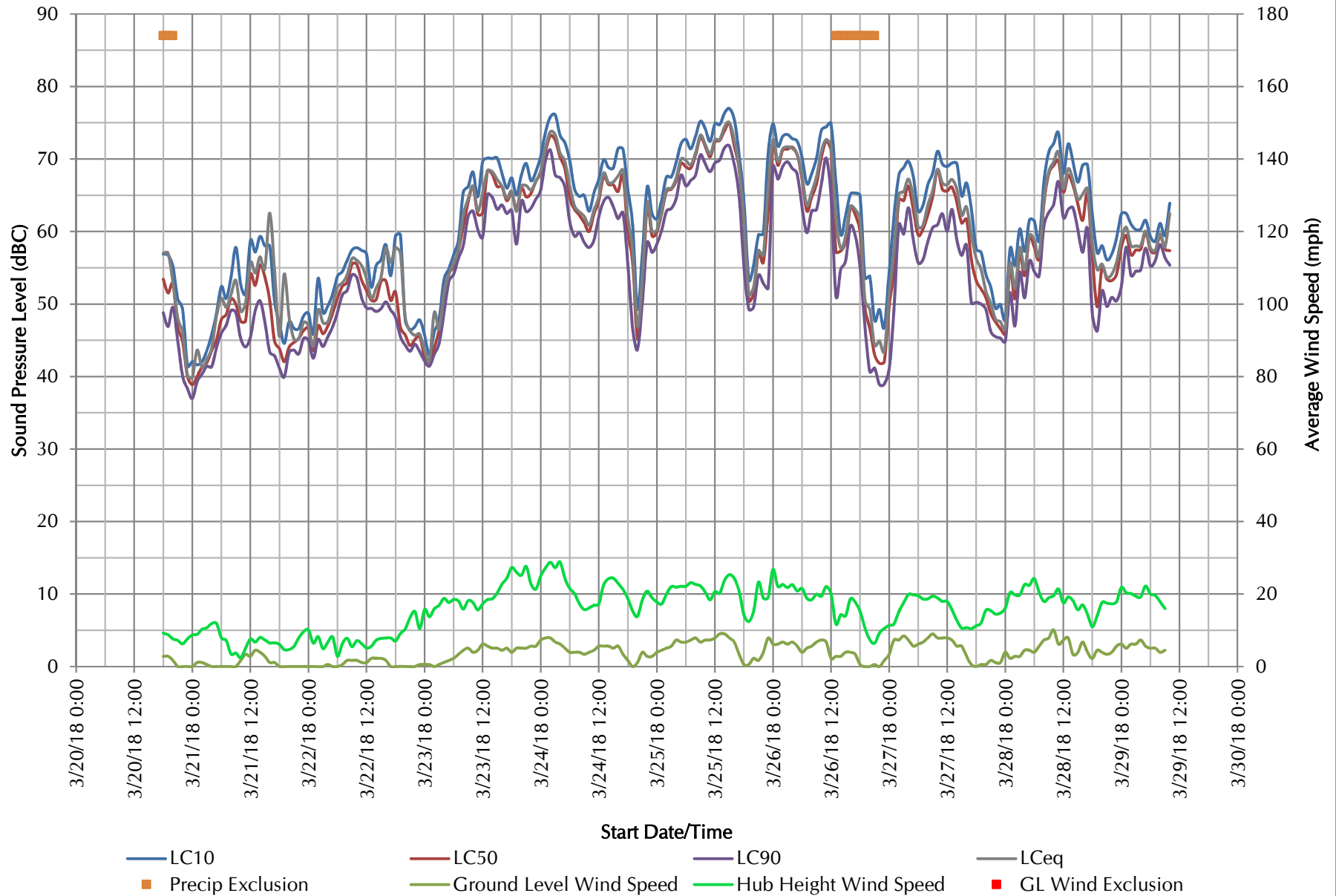


Figure 5-16: Measured One-Third Octave Band Sound Levels During A Representative Hub Height Wind Speed Period - Location L3

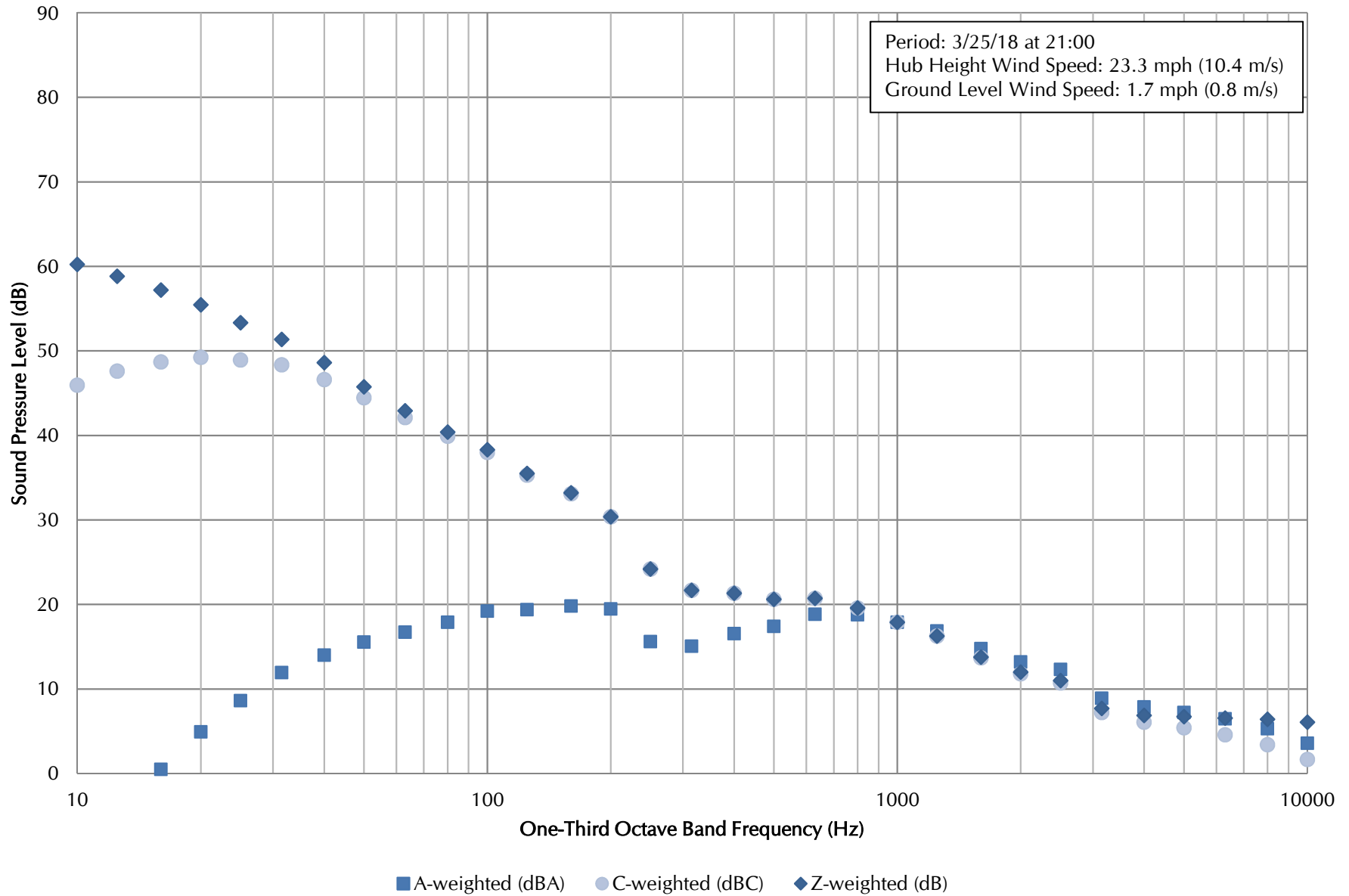
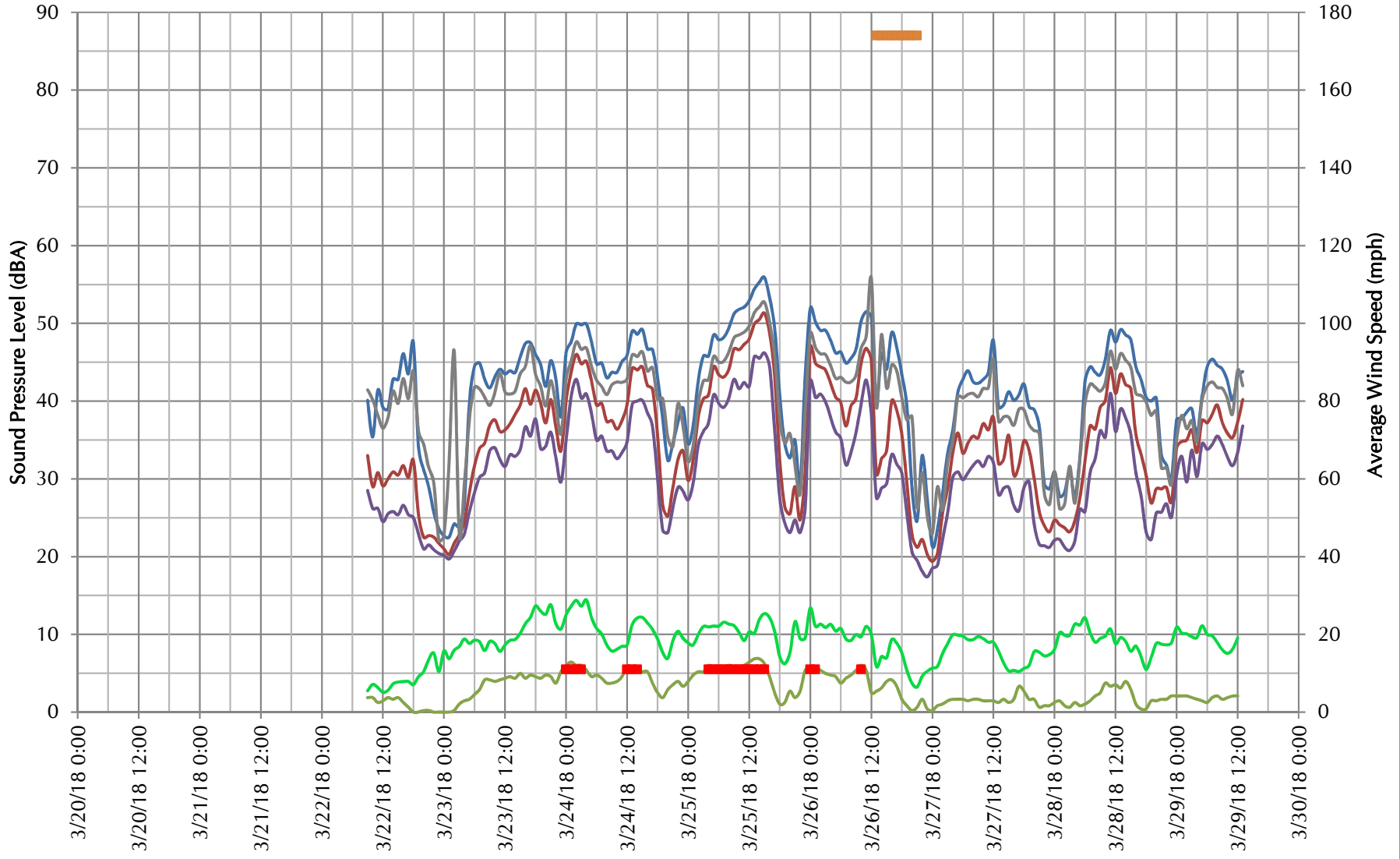


Figure 5-17: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L4



— LA10      — LA50      — LA90      — LAeq  
■ Precip Exclusion      — Ground Level Wind Speed      — Hub Height Wind Speed      ■ GL Wind Exclusion

Figure 5-18: Measured / Calculated Hourly C-Weighted Sound Pressure Levels (dBC) versus Met Data  
Location L4

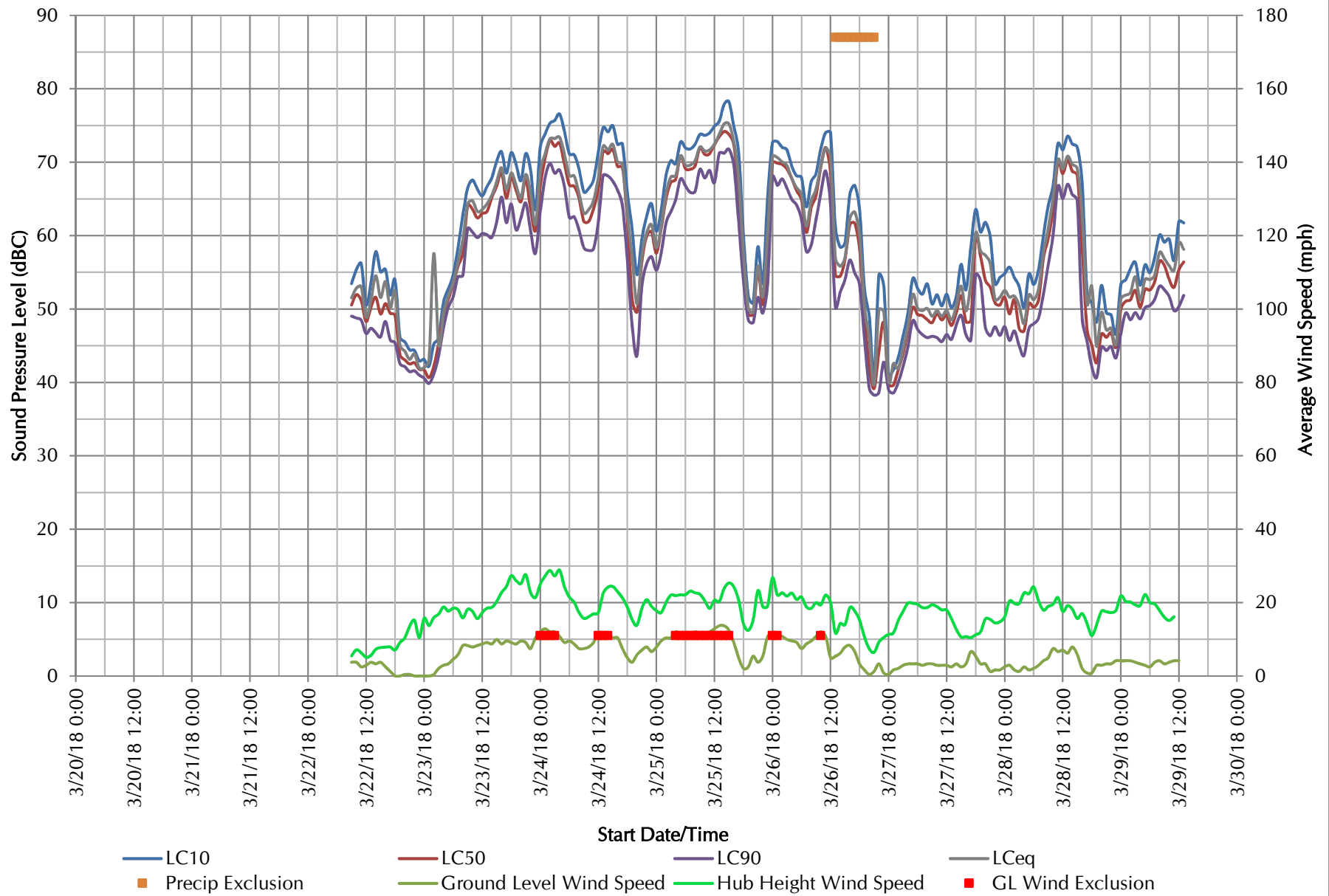


Figure 5-19: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L5

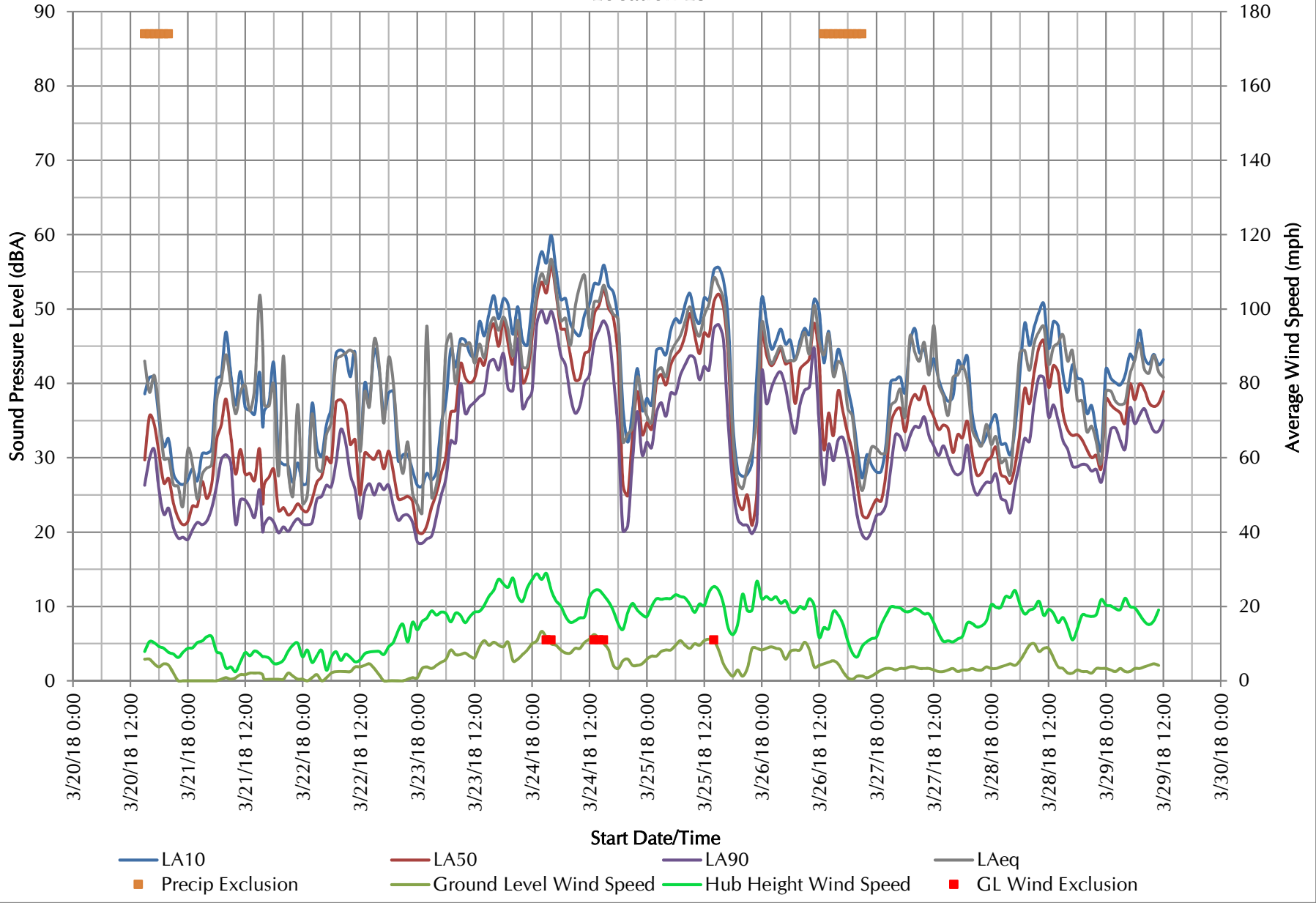




Figure 5-20: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L5

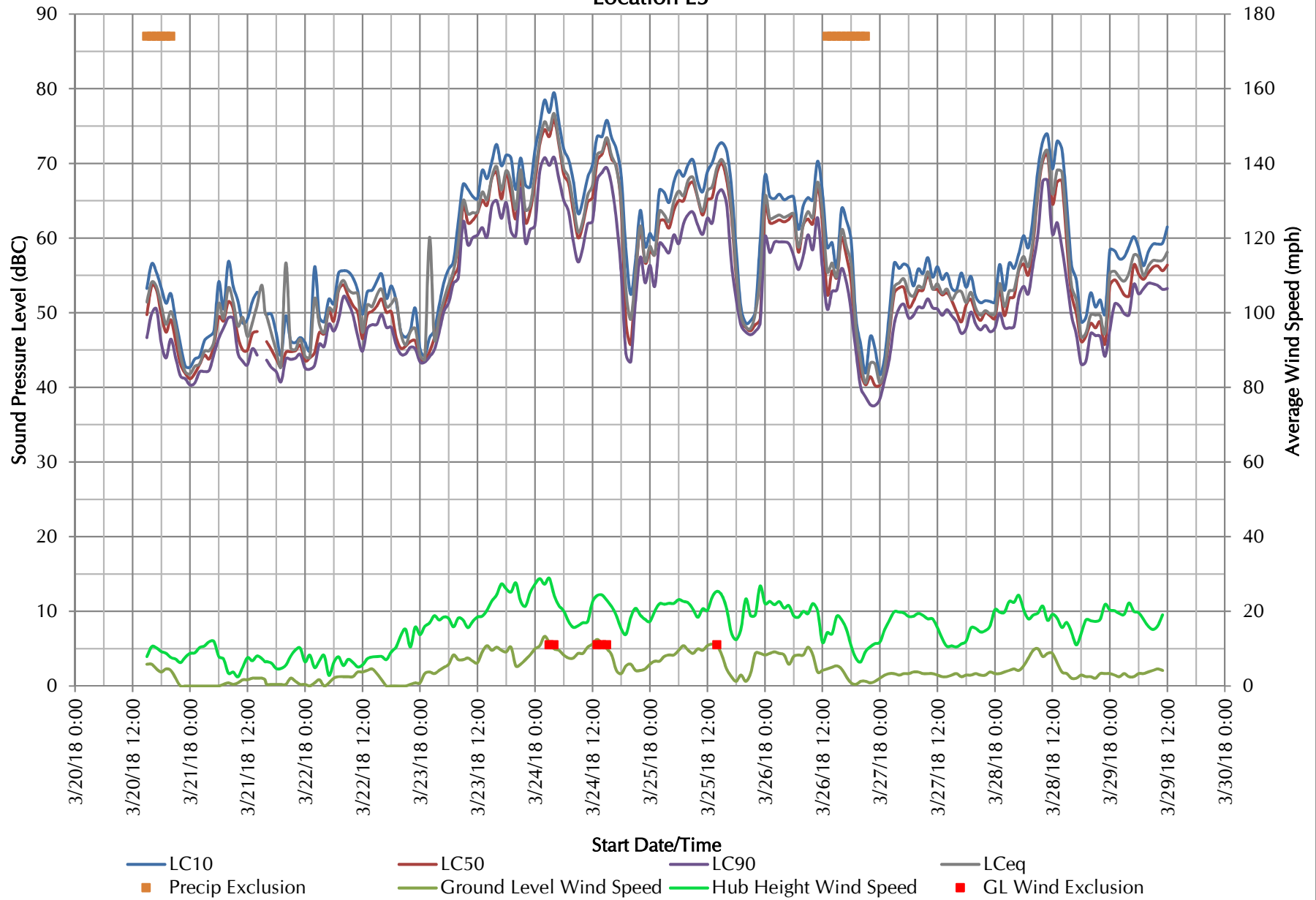


Figure 5-21: Measured Hourly A-weighted Sound Pressure Levels (dBA) versus Met Data  
Location L6

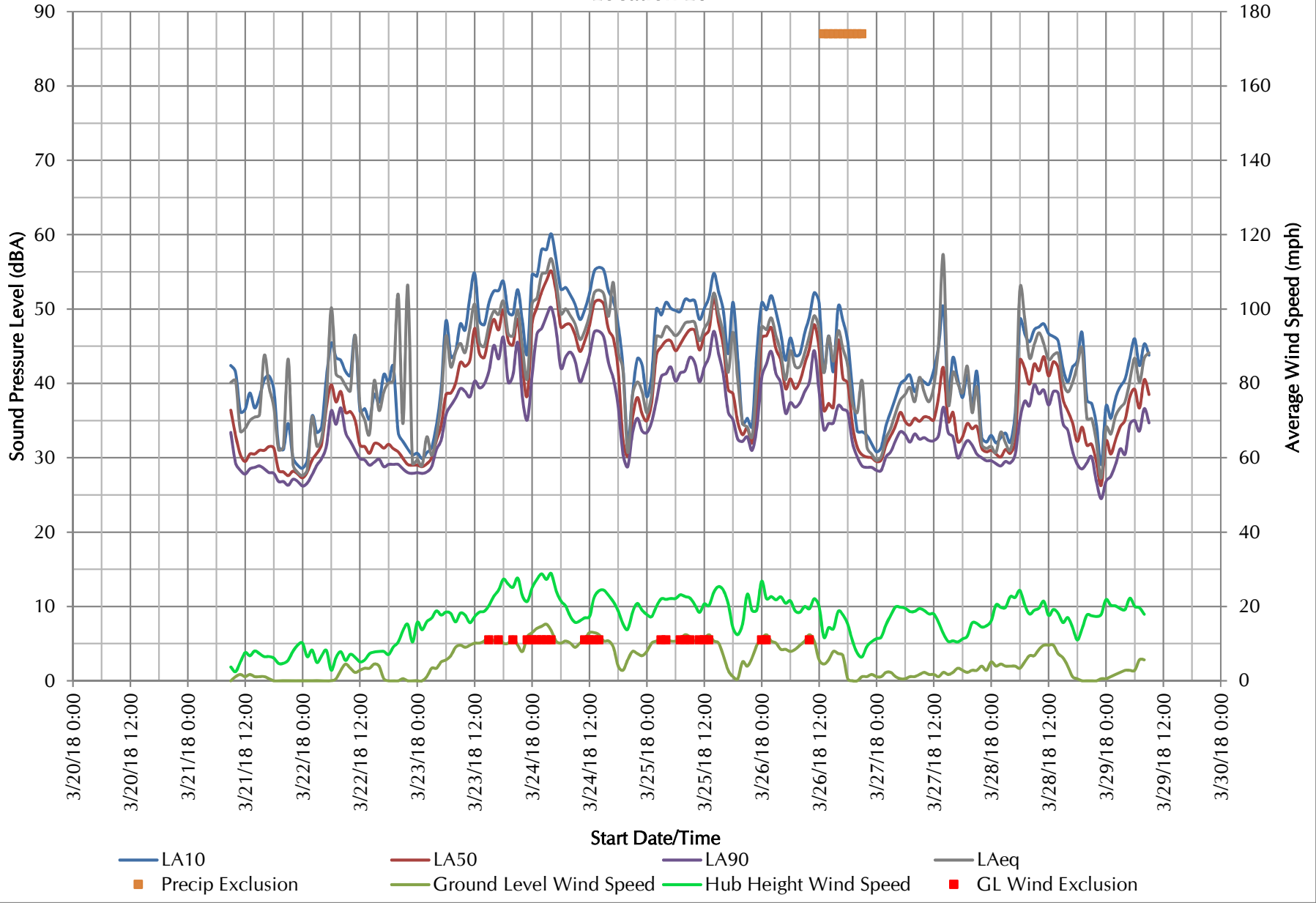
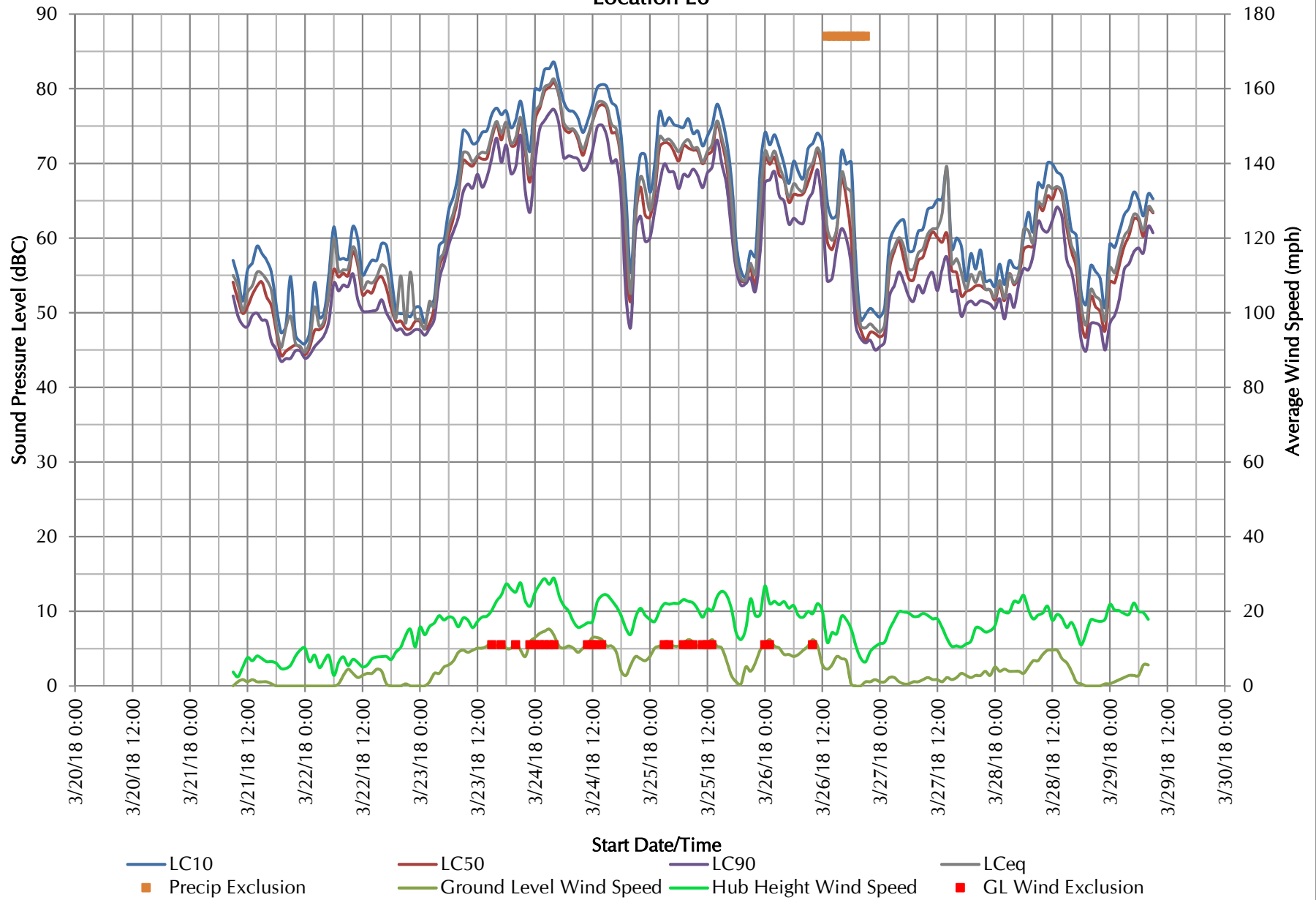


Figure 5-22: Measured / Calculated Hourly C-weighted Sound Pressure Levels (dBC) versus Met Data  
Location L6



- ◆ The L<sub>10</sub> A-weighted sound levels ranged from 29 to 57 dBA;
- ◆ The L<sub>50</sub> A-weighted sound levels ranged from 26 to 52 dBA.

### **5.6.2        *Short-term Sound Levels***

Short-term sound levels were measured during the nighttime and daytime on March 20, 2018 and March 21, 2018, respectively. A brief summary of the measurement results is presented herein.

#### **5.6.2.1        Location S1**

Sound levels at Location S1 were influenced by vehicles on Hwy 218, distant vehicles on Hwy 14, occasional distant trains, dog, and high aircraft. Select results of the 20-minute measurements are shown below and additional details are presented in Appendix C.

- ◆ The L<sub>10</sub> A-weighted sound level was 53 dBA for both the daytime and nighttime measurements;
- ◆ The L<sub>50</sub> A-weighted sound levels were 41 dBA and 28 dBA for the daytime and nighttime measurements, respectively.

#### **5.6.2.2        Location S2**

Sound levels at Location S2 were influenced by birds, distant vehicles on local roads, dogs, and high aircraft. Select results of the 20-minute measurements are shown below and additional details are presented in Appendix C.

- ◆ The L<sub>10</sub> A-weighted sound level was 33 dBA for both the daytime and nighttime measurements;
- ◆ The L<sub>50</sub> A-weighted sound levels were 28 dBA and 29 dBA for the daytime and nighttime measurements, respectively.

## 6.0 MODELED SOUND LEVELS

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### 6.1 Sound Sources

#### 6.1.1 *Project Wind Turbines*

The sound level analysis for the Project conservatively includes 72 wind turbines, of which four (4) are considered alternate locations. Of these 72 wind turbines, 64 wind turbines are GE 2.5-116 LNTE units and eight (8) are GE 2.3-116 LNTE units. All 64 GE 2.5-116 wind turbines have a hub height of 90 meters and a rotor diameter of 116 meters. All eight GE 2.3-116 wind turbines have a hub height of 80 meters and a rotor diameter of 116 meters. A technical report from GE<sup>8</sup> was provided by DCW through Atwell which documented the expected sound power levels associated with the GE 2.5-116 LNTE wind turbine. A similar technical report from GE<sup>9</sup> was provided by DCW through Atwell that documented the expected sound power levels associated with the GE 2.3-116 LNTE wind turbine. These sound power levels are defined as “calculated apparent” by the turbine manufacturer and therefore do not include any uncertainty factor.

#### 6.1.2 *Substation Transformer*

In addition to the wind turbines, there will be a collector substation associated with the Project in Dodge County. The substation is proposed to be located north of wind turbine #58 as shown in Figure 6-1. One 225 megavolt-ampere (MVA) transformer is proposed for the substation. According to the specification sheet provided by the DCW, the sound pressure level for this unit will be 75 dBA. Epsilon has estimated octave-band sound power levels using the broadband sound pressure level provided and techniques in the Electric Power Plant Environmental Noise Guide (Edison Electric Institute), Table 4.5 Sound Power Levels of Transformers. Table 6-1 below summarizes the sound power level data used in the modeling.

**Table 6-1 Modeled Substation Transformer Sound Power Levels**

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Maximum Rating	Broadband dBA	Sound Power Levels per Octave-Band Center Frequency [Hz]								
		31.5 dB	63 dB	125 dB	250 dB	500 dB	1k dB	2k dB	4k dB	8k dB
225 MVA	95	92	98	100	95	95	89	84	79	72

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<sup>8</sup> General Electric Company, Technical Documentation Wind Turbine Generator Systems 2.5-116 with LNTE – 60 Hz Product Acoustic Specifications, 2016.

<sup>9</sup> General Electric Company, Technical Documentation Wind Turbine Generator Systems 2.3-116 with LNTE – 50 Hz and 60 Hz Product Acoustic Specifications, 2015.

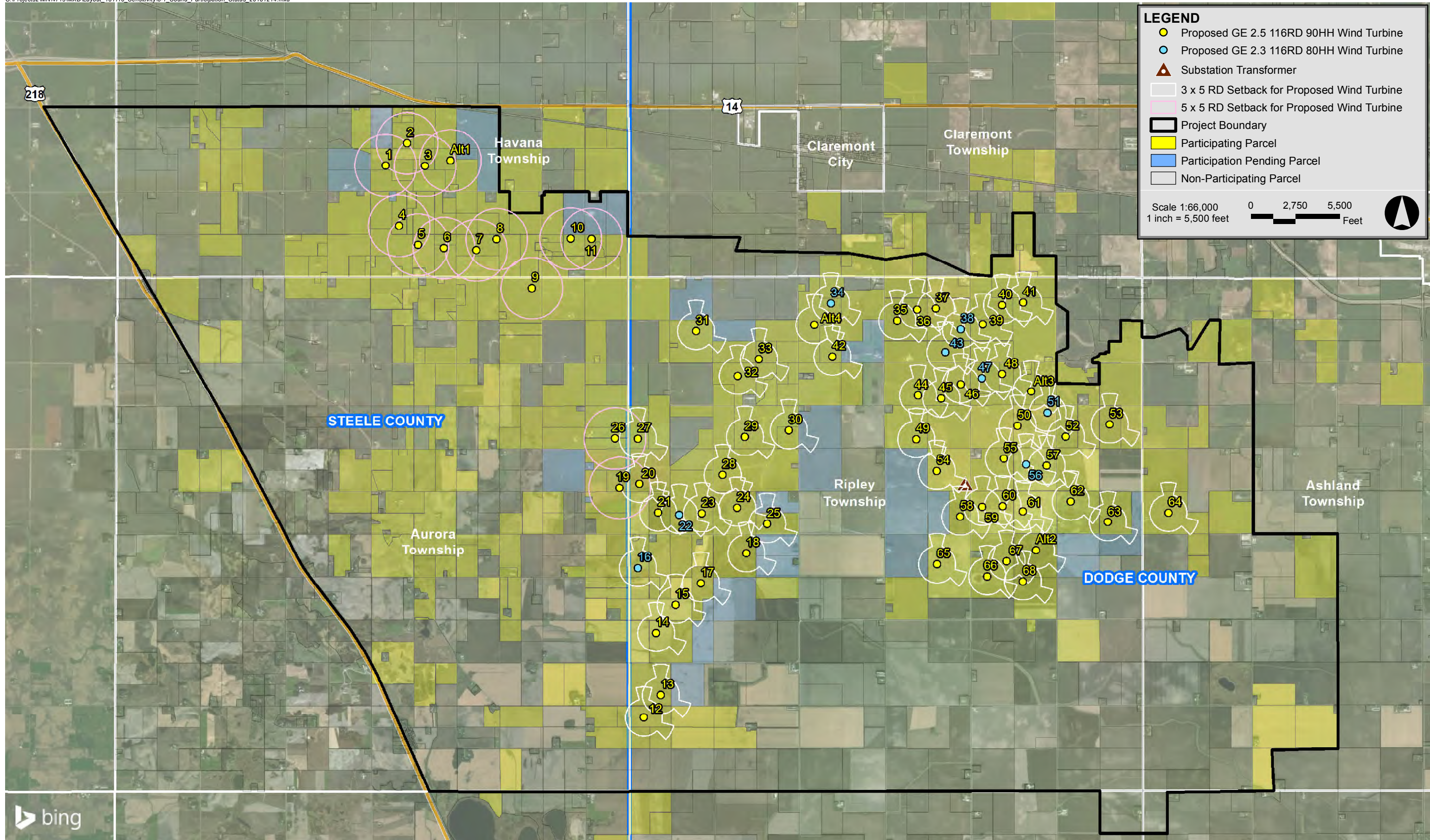
## 6.2 Modeling Methodology

The sound impacts associated with the proposed wind turbines were predicted using the Cadna/A sound level calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections (if applicable), drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of sound from multiple sources as well as computation of diffraction.

Inputs and significant parameters employed in the model are described below:

- ◆ *Project Layout:* A Project layout dated November 16, 2018 was provided by Atwell. The 68 proposed wind turbines and 4 proposed alternates were conservatively input into the model. The Project will also have one 225 MVA transformer at a collector substation. The location of the substation transformer in the model was estimated based on plans received from DCW on July 14 and 18, 2017. The proposed wind turbines and substation are identified in Figure 6-1. Wind turbine location coordinates for the current layout are provided in Appendix D.
- ◆ *Parcel Participation:* A dataset containing participation status information for property parcels in the proximity of the Project was provided by Atwell on December 10, 2018. This information was supplemented by Atwell/DCW regarding a recent change to participation status for the parcel with Receptor #358 whole owner recently signed a participation agreement. Parcels identified as “LSE” within the dataset and the receptor #358 parcel are participating and are indicated as such on Figure 6-1. Consistent with the LWECS requirement, properties in Dodge County not participating in the Project will have turbines set back at least 3 rotor diameters (RD) from their property in non-prevailing wind directions and at least 5 RD from their property in prevailing wind directions from each wind turbine (5 by 3 setback). Therefore, any parcel located in Dodge County that is closer than these setbacks must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Dodge County closer than these setbacks has been assigned a “participation pending” status. Properties located in Steele County not participating in the Project will have turbines set back at least 5 rotor diameters from their property in any direction from a wind turbine (5 by 5 setback). Therefore, any parcel located in Steele County closer than this setback must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Steele County closer than the 5 by 5 setback has been assigned a “participation pending” status. A setback data layer was provided by Atwell and is shown on Figure 6-1. Participation status used throughout this analysis is shown in Figure 6-1.





Dodge County Wind Dodge & Steele Counties, MN

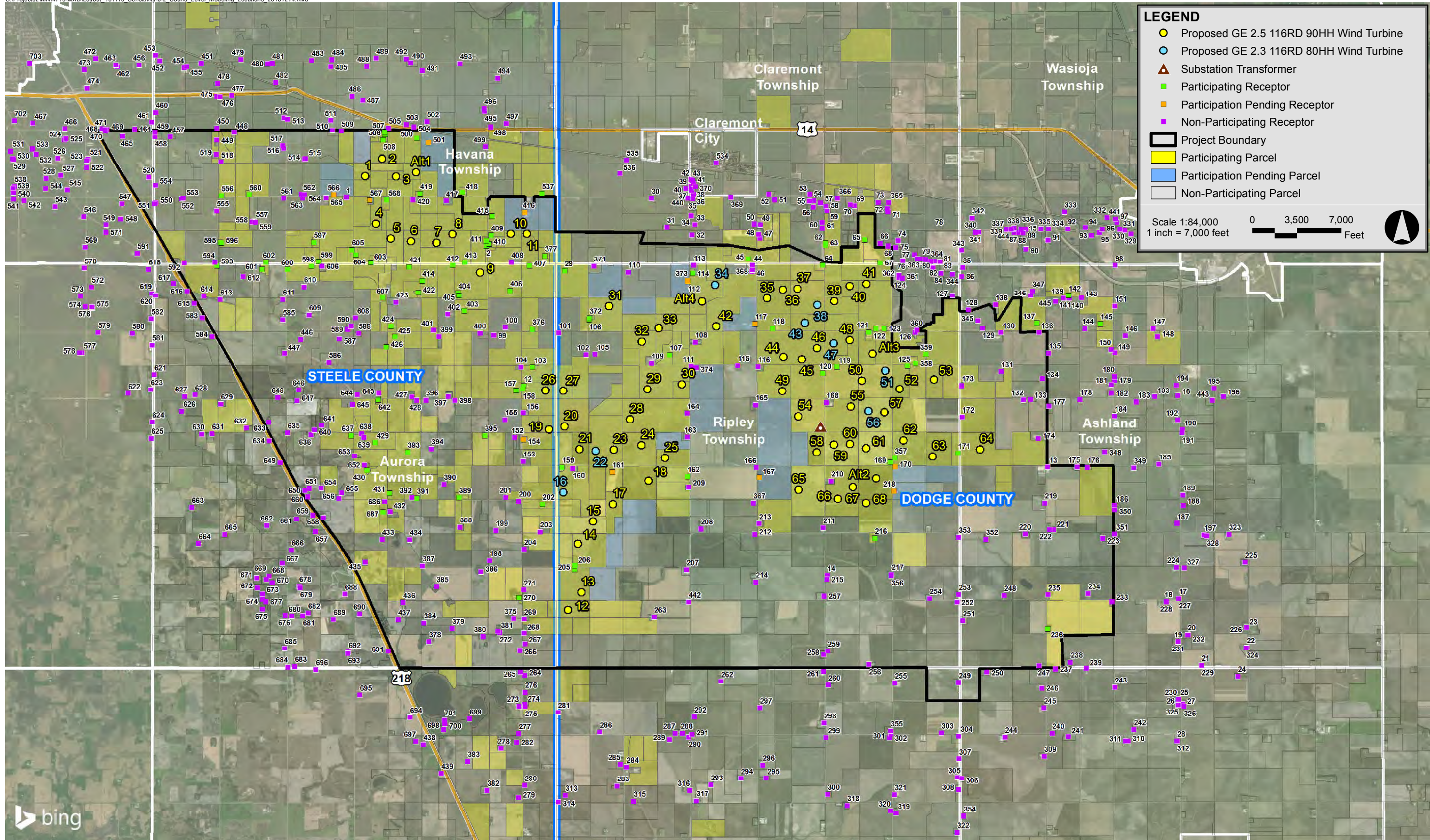


- ◆ *Modeling Receptor Locations:* A modeling receptor dataset dated June 15, 2017 was provided by Atwell. Receptors within 2 miles of the Project Area categorized as residential, mobile home, town, church, or municipal (694) were input into the Cadna/A model. These modeling receptors were modeled as discrete points at a height of 1.5 meters above ground level to mimic the ears of a typical standing person. Participation status for each modeling receptor was assigned as previously described. All modeling receptors are identified in Figure 6-2 and are distinguished as either participating, participation pending, or non-participating.

A modeling grid with 20-meter spacing was calculated for the entire Project Area. The grid was modeled at a height of 1.5 meters above ground level (AGL) for consistency with the discrete modeling points. This modeling grid allowed for the creation of sound level isolines.

- ◆ *Terrain Elevation:* Elevation contours for the modeling domain were directly imported into Cadna/A which allowed for consideration of terrain shielding where appropriate. The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.
- ◆ *Source Sound Levels:* Maximum broadband sound power levels for the GE 2.5-116 LNTE and GE 2.3-116 LNTE wind turbines provided in technical reports were input to the model. These sound levels represent “worst-case” operational sound level emissions. The substation transformer sound power levels as presented in Table 6-1 were input into the model.
- ◆ *Uncertainty factor:* No uncertainty factor was provided by the wind turbine manufacturer for the GE 2.5-116; however, an uncertainty factor was provided for the GE 2.3-116 unit. An uncertainty factor of 2 dBA was assumed for the GE 2.5-116 unit based on the GE 2.3-116 uncertainty factor and prior experience with wind turbine sound modeling. Therefore, 2 dBA was added to the sound power level for each modeled wind turbine.
- ◆ *Meteorological Conditions:* A temperature of 10°C (50°F) and a relative humidity of 70% was assumed in the model.
- ◆ *Ground Attenuation:* Spectral ground absorption was calculated using a G-factor of 0.5 which corresponds to “mixed ground” consisting of both hard and porous ground cover. This method yields more conservative results (i.e., higher sound levels) as the vast majority of the area is actually agricultural.





Dodge County Wind Dodge & Steele Counties, MN



Octave-band sound power levels corresponding to the highest available broadband sound power level for each wind turbine type including uncertainty and estimated octave-band sound power levels from the proposed substation transformer were input into Cadna/A to model  $L_{eq}$  sound pressure levels during conditions when worst-case sound power levels are expected. Sound pressure levels were modeled at 694 receptors within 2 miles of the Project Area. In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of points, each spaced 20 meters apart to allow for the generation of sound level isolines in each modeling scenario.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the Cadna/A model to ensure conservative results (i.e., higher sound levels), and are described below:

- ◆ All modeled sources were assumed to be operating simultaneously and at the design wind speed corresponding to the greatest sound level impacts.
- ◆ As per ISO 9613-2, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night or equivalently downwind propagation.
- ◆ Meteorological conditions assumed in the model ( $T = 10^{\circ}\text{C}/\text{RH} = 70\%$ ) were selected to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave bands where the human ear is most sensitive.
- ◆ No additional attenuation due to tree shielding, air turbulence, or wind shadow effects was considered in the model.

### 6.3 Sound Level Modeling Results

All modeled sound levels, as output from Cadna/A are A-weighted equivalent sound levels ( $L_{eq}$ , dBA). Based on Epsilon's experience in conducting post-construction sound level measurement programs for wind energy facilities, the equivalent sound level has been comparable to the median ( $L_{50}$ , dBA) sound level when the wind turbine sound was prevalent and steady under ideal wind and operational conditions.<sup>10</sup> Therefore, the modeled sound levels for this Project may be considered as  $L_{50}$  sound levels and directly compared to the Minnesota  $L_{50}$  limit.

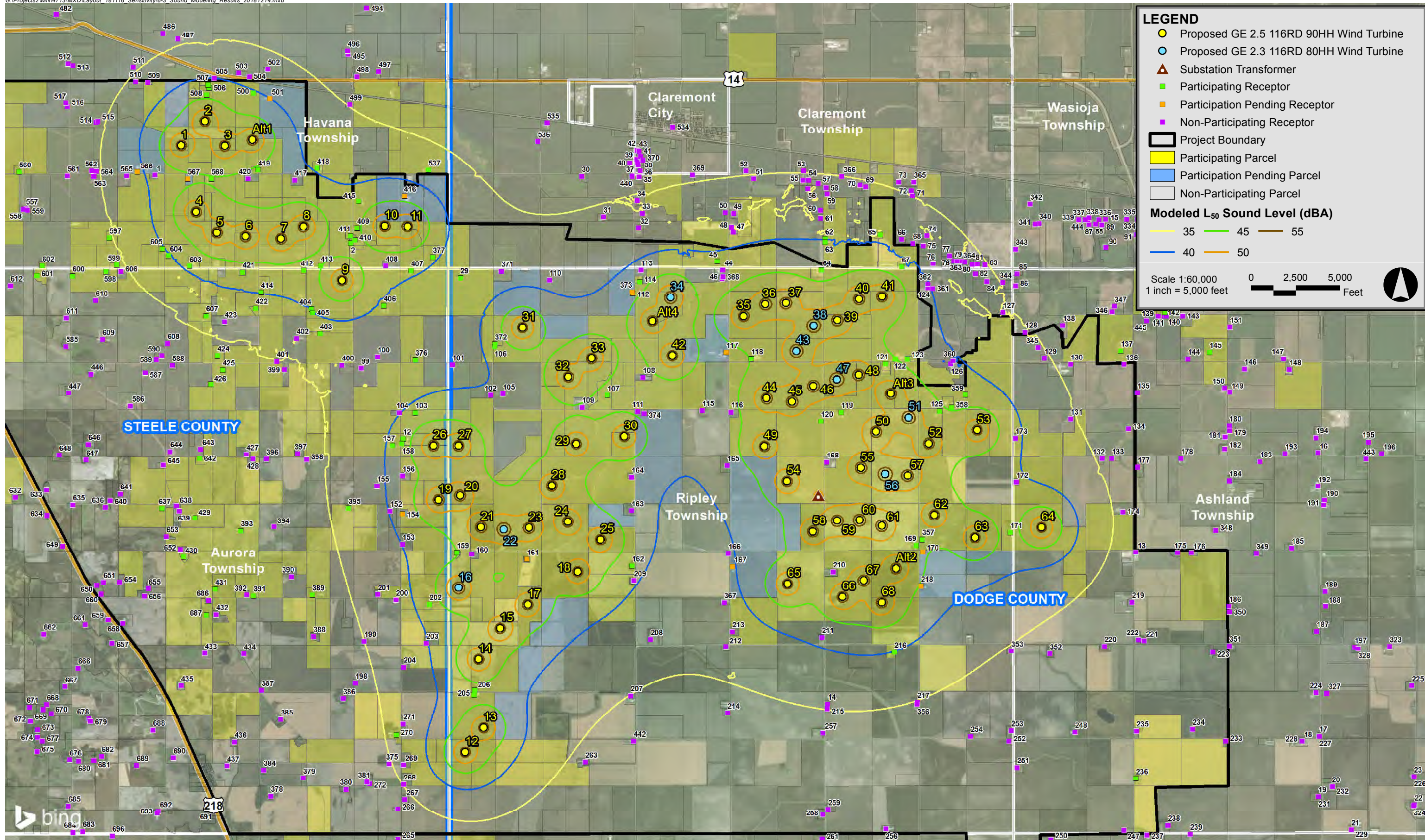
Table E-1 in Appendix E shows the predicted Project Only broadband (dBA) sound levels at the 694 Noise Area Classification 1 receptors modeled within 2 miles of the Project Area. These broadband  $L_{50}$  sound levels range from 17 to 47 dBA and represent the worst-case future  $L_{50}$  sound levels produced solely by wind turbines and substation associated with the

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<sup>10</sup> Within 0.4 decibels

Project. Four locations (#120, #121, #210 and #119) are modeled to have a sound level of 47 dBA. Location #210 is a non-participating receptor, while locations #119, #120, and #121 are participating. In addition to these discrete modeling points, sound level isolines generated from the modeling grid are presented in Figure 6-3.





Dodge County Wind Dodge & Steele Counties, MN



## 7.0 EVALUATION OF SOUND LEVELS

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The proposed Dodge County Wind Project within Dodge and Steele Counties, MN is required to comply with the sound level requirements in Minn. R. Ch. 7030 for Noise Pollution Control. NAC 1 (primarily residential) receptors are protected by the lowest sound level limits of the MPCA. Since wind turbines can operate under conditions resulting in maximum sound power, during both the day and at night, the Project would need to comply during the period with more stringent limits, nighttime. Furthermore, because wind turbine sound is generally steady, the L<sub>50</sub> (median) sound level is more likely to be affected by wind turbine sound than the L<sub>10</sub> which is controlled more by unsteady sound. The L<sub>50</sub> limit is also more restrictive than the L<sub>10</sub> limit. Therefore, NAC 1 receptors have been evaluated against the L<sub>50</sub> sound level limit of 50 dBA in this analysis.

The highest predicted worst-case Project Only L<sub>50</sub> sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA. This sound level is modeled at non-participating receptor #210 and participating receptors #119, #120, and #121. Nighttime measurements showed non-wind-turbine ambient L<sub>50</sub> broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA L<sub>50</sub> nighttime limit of 50 dBA. Project Only modeled sound levels sorted from high to low are presented in Table F-2 of Appendix F.

## 8.0 LOW FREQUENCY AND INFRASOUND

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An evaluation of low frequency (LF) and infrasound levels from a wind energy center at receptors is not required by the State of Minnesota. However, a discussion of LF and infrasound, as it pertains to wind turbines, is provided below for informational purposes.

Low frequency (LF) and infrasound are present in the environment due to other sources besides wind turbines. For example, refrigerators, air conditioners, and televisions generate infrasound and low frequency sound. The frequency range of low frequency sound is generally from 20 Hz to 200 Hz, and the range below 20 Hz is often described as “*infrasound*”. However, audibility can extend to frequencies below 20 Hz if the energy is high enough. Since there is no sharp change in hearing at 20 Hz, the division between “low-frequency sound” and “infrasound” should only be considered “practical and conventional.” The threshold of hearing is standardized for frequencies down to 20 Hz.<sup>11</sup> Based on extensive research and data, Watanabe and Moeller have proposed normal hearing thresholds for frequencies below 20 Hz.<sup>12</sup> These sound levels are so high that infrasound is generally considered inaudible. For example, the sound level at 8 Hz would need to be 100 dB to be audible.

A detailed infrasound and low frequency noise measurement program of wind turbines was conducted from 2013-2015 by the Ministry for the Environment, Climate and Energy of the Federal State of Baden-Wuerttemberg, Germany.<sup>13</sup> The conclusions of the German study were:

*“Infrasound and low-frequency noise are an everyday part of our technical and natural environment. Compared with other technical and natural sources, the level of infrasound caused by wind turbines is low. Already at a distance of 150 m (~ 500 ft), it is well below the human limits of perception. Accordingly, it is even lower at the usual distances from residential areas. Effects on health caused by infrasound below the perception thresholds have not been scientifically proven. Together with the health authorities, we in Baden-Württemberg have come to the conclusion that adverse effects relating to infrasound from wind turbines cannot be expected on the basis of the evidence at hand.”*

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<sup>11</sup> Acoustics - Normal equal-loudness-level contours, International Standard ISO 226:2003, International Organization for Standardization, Geneva, Switzerland, (2003).

<sup>12</sup> T. Watanabe, and H. Moeller, “Low Frequency Hearing Thresholds in Pressure Field and in Free Field”, J. Low Frequency Noise and Vibration, 9(3), 106-115, (1990).

<sup>13</sup> *Low frequency noise incl. infrasound from wind turbines and other sources*, LUBW, Baden-Wuerttemberg, Germany, September 2016.

The Massachusetts Department of Environmental Protection (MA DEP) and the Massachusetts Department of Public Health commissioned an expert panel who found that: “Claims infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically. Available evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system.”<sup>14</sup>

Health Canada, in collaboration with Statistics Canada, conducted one of the most extensive studies to understand the impacts of wind turbine noise to-date.<sup>15</sup> A cross-section epidemiological study was carried out in 2013 in the provinces of Ontario and Prince Edward Island on randomly selected participants living near and far from operating wind turbines. Many peer-reviewed publications have been written based on the Health Canada research, including an analysis of low frequency and infrasound data. For example, Keith et al concluded that there was no advantage of using C-weighting to measure low frequency sound since the relationship between A-weighting and C-weighting are so highly correlated.<sup>16</sup> In other words, acceptable A-weighted limits also eliminate low frequency and infrasound impacts.

Low frequency and infrasound has also been studied extensively in Japan. Tachibana et al conducted extensive measurements of 34 wind farms nationwide and concluded that infrasound from wind turbines is not audible/sensible, and that wind turbine noise is not a problem in the infrasound region.<sup>17</sup>

As noted in the 2011 NARUC report, “the widespread belief that wind turbines produce elevated or even harmful levels of low frequency and infrasonic sound is utterly untrue as proven repeatedly and independently by numerous investigators.”<sup>18</sup>

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<sup>14</sup> *Wind Turbine Health Impact Study: Review of Independent Expert Panel*, Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health, January 2012.

<sup>15</sup> Health Canada website: <http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php>

<sup>16</sup> *Wind turbine sound pressure level calculations at dwellings*, S. E. Keith et al, J. Acoustical Society of America, 139(3), March 2016.

<sup>17</sup> *Nationwide field measurements of wind turbine noise in Japan*, H. Tachibana et al, Noise Control Engineering Journal, 62(2), March-April 2014.

<sup>18</sup> *Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects*, NARUC, prepared by Hessler Associates, Inc., October 2011.

## 9.0 CONCLUSIONS

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A comprehensive sound level modeling assessment was conducted for the Dodge County Wind Project. In addition, ambient sound levels were measured to characterize the existing background sound levels within the area.

Nighttime measurements showed non-wind-turbine ambient  $L_{50}$  broadband sound levels range from 25 to 56 dBA when ground-level wind speeds were at or below 11 mph and winds at hub height corresponded to conditions in the modeling. These measured sound levels exceeded 50 dBA at five (5) of the six (6) locations during the measurement program. Ambient sound levels in the Project Area fluctuate due to sound sources such as ground-level winds and vegetation rustle, both of which can cause ambient sound levels to exceed the MPCA  $L_{50}$  nighttime limit of 50 dBA. The highest predicted worst-case Project Only  $L_{50}$  sound level at a modeling receptor is 47 dBA, and, therefore, is below the most restrictive MPCA sound limit of 50 dBA.

Appendix A

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DCW Sound Level Measurement Protocol



**Dodge County Wind Project  
Dodge and Steele Counties, MN**

**Sound Level Measurement Protocol**

**March 9, 2018**

**Introduction**

This protocol describes the methodology involved in measuring the ambient sound levels for the Dodge County Wind (“DCW”) Project. This Project is currently being developed by NextEra Energy Resources, LLC (NEER). DCW will be a wind power generation facility consisting of approximately 70 wind turbines located within Dodge and Steele Counties, Minnesota. Based on a preliminary 170MW layout dated December 12, 2017, the proposed wind turbines will be a combination of GE 1.7 and GE 2.5 megawatt (MW) wind turbines. The GE 1.7 MW wind turbines have a hub height of 80 meters and a rotor diameter of 103 meters. The GE 2.5 MW wind turbines have a hub height of 89 meters and a rotor diameter of 127 meters. Locations of the proposed wind turbines in the 170MW layout dated December 12, 2017 are presented in Figure 1.

As part of this effort, Epsilon will conduct a sound level measurement program to document existing ambient sound levels in the vicinity of the DCW Project. The purpose of this protocol is to describe the measurement methodology, identify acoustical and meteorological equipment proposed, and provide a schedule. Procedures identified in the Guidance for Large Wind Energy Conversion System, Noise Study Protocol and Report (“LWECS Guidance”) published by the Minnesota Department of Commerce (“DOC”), Energy Facility Permitting, dated October 8, 2012 were used in the development of this measurement protocol.

**Sound Level Measurement Methodology**

The Guidance advises measurement at a minimum of three (3) locations within the Project area where wind turbines are either not constructed or not operating to represent ambient sound level conditions. Broadband A-weighted (dBA) and one-third octave-band (dB) sound levels will be measured at a total of 8 locations in Dodge and Steele Counties to collect pre-construction sound level data. Six (6) of these locations will be long-term measurement locations within the Project Boundary. The long-term sound level measurement locations were selected based on LWECS Guidance, modeled sound levels, proximity of residential locations to the wind turbines, wind turbine types, and proximity to other measurement locations in the measurement program. Per the LWECS Guidance document, one (1) location has been selected to represent the receptor with the worst-case modeled sound level based on a preliminary modeling analysis.

The six (6) preferred long-term locations<sup>1</sup> and eight (8) alternate locations<sup>2</sup> in Dodge and Steele Counties are shown in Figure 1 and briefly described below. All long-term locations are proposed to be at a residence (exterior) with some on participating parcels and others on non-participating parcels. Non-participating homeowners may be unwilling to grant permission at a particular location; if permission is not granted, measurements will be conducted at an alternate location when practical. In addition, the alternate location may be selected if site conditions realized during setup warrant relocation. At the time of this Protocol, permission has not been obtained at the measurement locations. Additional alternative locations may be selected and/or the number of measurement locations reduced if permission cannot be obtained prior to the commencement of the measurement program.

#### Preferred Locations:

- ◆ **Location L1P:** Steele Co – One of three non-participating residences highlighted on the figure
- ◆ **Location L2P:** Steele Co – Participating Residence
- ◆ **Location L3P:** Dodge Co – Participating Residence
  - Highest modeled sound level at a participating residence
- ◆ **Location L4P:** Dodge Co – Non-participating Residence
  - Highest modeled sound level
- ◆ **Location L5P:** Dodge Co – Participating Residence
- ◆ **Location L6P:** Dodge Co – One of two non-participating residences highlighted on the figure

#### Alternate Locations:

- ◆ **Location L1A1:** Steele Co – Participating Residence
- ◆ **Location L1A2:** Steele Co – Participating Residence
- ◆ **Location L2A:** Steele Co – Participating Residence
- ◆ **Location L3A:** Steele Co – Participating Residence
- ◆ **Location L4A:** Dodge Co – Participating Residence
- ◆ **Location L5A:** Dodge Co – Participating Residence
- ◆ **Location L6A1:** Dodge Co – Participating Residence
- ◆ **Location L6A2:** Dodge Co – Participating Residence

Long-term measurements will be supplemented with short-term measurements at two (2) locations west of the Project Boundary. One daytime and one nighttime measurement will be taken for 20-minutes during environmental conditions with no precipitation and with ground-level wind speeds less than 11 mph (5 m/s). Sound observations will be made during both periods at each location by Epsilon staff. Publically accessible locations will be utilized and are briefly described below and shown on Figure 1.

- ◆ **Location S1:** Steele Co

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<sup>1</sup> Preferred long-term measurement locations are identified with a “P” in their ID.

<sup>2</sup> Alternate long-term measurement locations are identified with an “A” in their ID.

- Intersection of US Highway 218 and ST 73<sup>rd</sup> St
- ◆ **Location S2: Steele Co**
  - Intersection of SE 34<sup>th</sup> St and SE 58<sup>th</sup> St

### Measurement Equipment

The sound level measurements will be made using Larson Davis (LD) model 831 sound level meters (or equivalent). The model meets “Type 1 Precision” requirements set forth in American National Standards Institute (ANSI) S1.4-1983 standard for sound level meters. The meters will log values of various broadband A-weighted (dBA) sound level measurement parameters including the  $L_{eq}$ ,  $L_{max}$ ,  $L_{10}$ ,  $L_{50}$ , and  $L_{90}$ . Long-term meters will be programmed to log this statistical data on an hourly basis and short-term meters will log the complete 20-minute measurements. The LWECs Guidance also requires C-weighted data collection. This will be calculated through post-processing analysis since simultaneous A-weighted and C-weighted collection is not possible with commonly available commercial instrumentation. One-minute time history data will be collected by the long-term meters and 1-second time history data will be collected by the short-term meter. The microphones will be tripod-mounted at a height of 1.5 meters (5 feet) above ground. A 7-inch windscreen will be placed on all microphones.

The measurement equipment will be calibrated in the field before and after the survey with the manufacturer’s acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. All calibrations will be within  $\pm 1.0$  dB from the most recent calibration otherwise the data collected during that period will be discarded. The meters are calibrated and certified as accurate to standards set by the National Institute of Standards and Technology by an independent laboratory within the past 12 months.

Since this is a wind turbine project, the wind speed during the noise study is significant in importance. The ground-level wind speed has a direct influence on the ambient sound levels. Ground-level wind speed data will be continuously measured at all long-term sound level measurement locations for the duration of the study per the LWECs Guidance. A HOBO H21-002 micro-weather station (or similar) will be used at the monitoring locations. The wind sensors will be mounted at microphone height (1.5 meters) per the LWECs Guidance and log data every hour. This wind instrument has a measurement range of 0 to 45 m/s (100 mph) and an accuracy of  $\pm 1.1$  m/s (2.4 mph). The starting threshold is  $\leq 1$  m/s (2.2 mph). For the short-term measurements where micro-weather station utilization is not practical, wind speeds will be measured for a subset of the measurement period with a hand-held Davis Instruments TurboMeter electronic wind speed indicator.

Additional meteorological parameters, e.g. temperature, precipitation, etc., will be collected through additional instrumentation deployed by Epsilon and/or will be downloaded from the closest National Weather Service station for the entire program.

In order to allow for the characterization of background sound levels during different wind regimes, which may be useful once the wind energy facility is operational, it would be necessary to know the wind speeds at higher heights (hub height, if possible) during the background sound level measurement program. If these data are available during the program, they will be incorporated into the report.

### **Schedule**

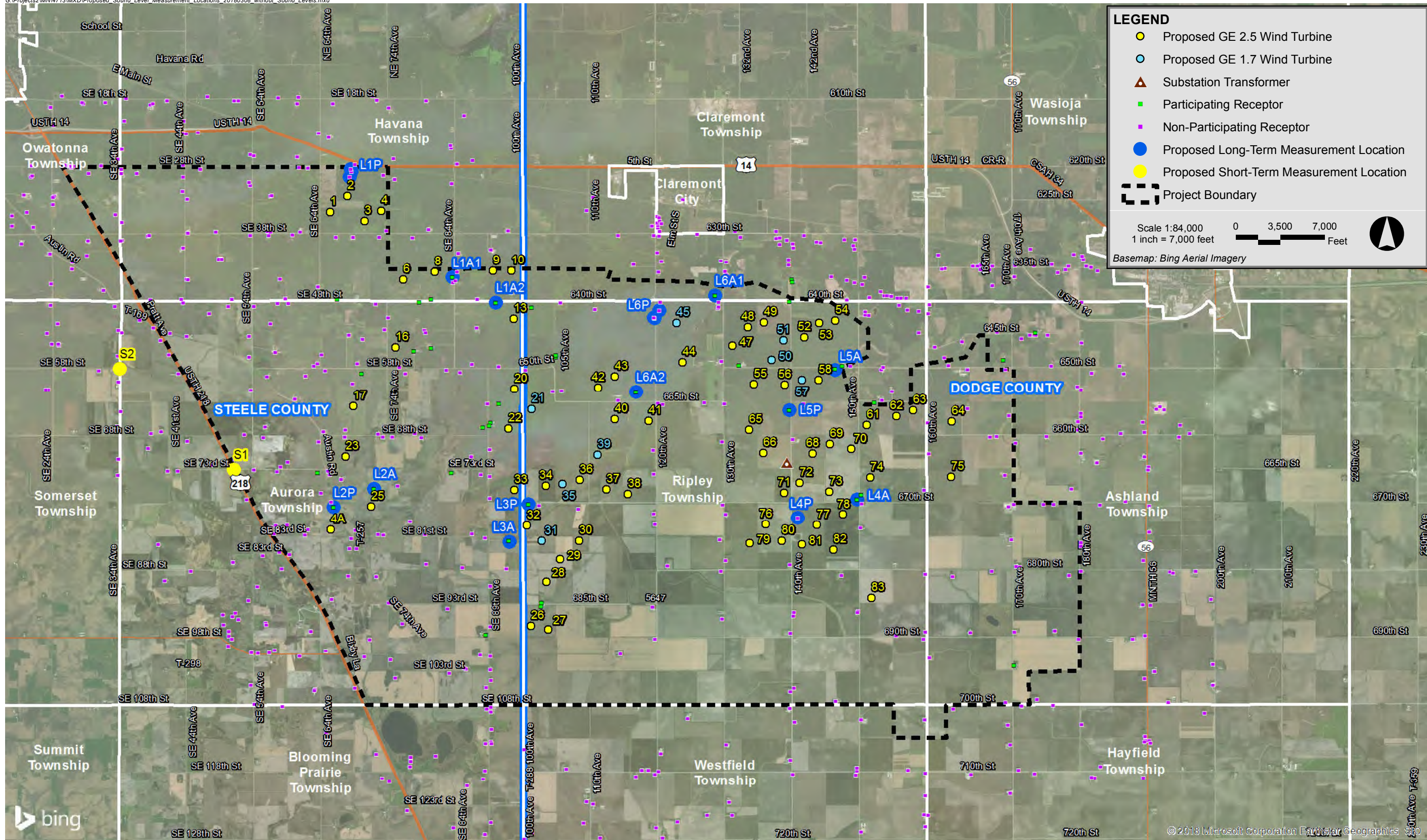
The sound level measurement program is planned to commence on Monday, March, 19, 2018. All equipment is expected to be operating by no later than Wednesday, March 21. Following the approach outlined in the Guidance document, the long-term measurements will last for at least 1 week. The equipment will not be staffed continuously; however, observations at the long-term locations will be made four times during the program (see below). The field technician will leave the site on March 21 or March 22 and return on March 28 or March 29. Continuous A-weighted measurements (24 hours/day) will be made concurrently at all long-term measurement locations over the approximately 7-day period. The observation periods will be as follows:

- ◆ Upon deployment (daytime),
- ◆ During the 1<sup>st</sup> night when all monitors are running (nighttime),
- ◆ During the day after the setup and/or night observations, and
- ◆ During the pick-up (daytime).

### **Results/Report**

The LWECs document will be used as a guide for sound level data processing, result summaries, and the report structure. No extraneous noise events will be excluded from the data. Hourly periods of recorded precipitation and periods with high wind speeds will be removed from the datasets. The percentage of the excluded data will be presented. Sound levels will be presented in graphical format as they were measured in relation to wind speed over the measurement duration. The report will include various figures and tables to effectively summarize the results of the measurement program.





Dodge County Wind Dodge & Steele Counties, MN



Appendix B

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NCEI Meteorological Data: NWS Station – Dodge Center Airport, Dodge  
Center, MN

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 0:15	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	20	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 0:35	FM-15	OVC:08 80	10		32	0	29	-1.4	25	-4	75	5	20	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 0:55	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	30	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 1:15	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	40	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 1:35	FM-15	OVC:08 80	10		34	1	31	-0.8	25	-4	70	6	30	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 1:55	FM-15	SCT:04 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	3	360	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 2:15	FM-15	BKN:07 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	6	20	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 2:35	FM-15	BKN:07 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	7	30	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 2:55	FM-15	SCT:04 70 OVC:08 80	10		32	0	29	-1.4	25	-4	75	5	40	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 3:15	FM-15	OVC:08 80	10		32	0	30	-1	27	-3	80	6	60	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 3:35	FM-15	SCT:04 90	10		32	0	28	-2	21	-6	64	8	80	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 3:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	10	80	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 4:15	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	9	80	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 4:35	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	8	70	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 4:55	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	9	80	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 5:15	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	9	80	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 5:35	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	10	80	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 5:55	FM-15	SCT:04 50	10		30	-1	26	-3.2	19	-7	64	8	80	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 6:15	FM-15	SCT:04 50	10		28	-2	24	-4.4	16	-9	59	10	70	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 6:35	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	9	90	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 6:55	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	8	90	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 7:15	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	7	80	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 7:35	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	9	60	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 7:55	FM-15	SCT:04 46 BKN:07 50	10		28	-2	24	-4.4	16	-9	59	8	70	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 8:15	FM-15	BKN:07 35 OVC:08 43	10		28	-2	24	-4.4	16	-9	59	8	80	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 8:35	FM-15	OVC:08 35	10		28	-2	24	-4.4	16	-9	59	7	70	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 8:55	FM-15	SCT:04 22 BKN:07 28 OVC:08 35	5	-SN:03  SN:71	28	-2	25	-4	18	-8	64	7	40	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 9:15	FM-15	OVC:08 26	10	-SN:03  SN:71	27	-3	24	-4.4	18	-8	69	7	50	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 9:35	FM-15	BKN:07 26	7		28	-2	24	-4.4	16	-9	59	9	60	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 9:55	FM-15	SCT:04 24	7		28	-2	25	-4	18	-8	64	7	110	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 10:15	FM-15	SCT:04 20	7	-SN:03  SN:71	28	-2	25	-4	18	-8	64	3	90	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 10:35	FM-15	SCT:04 20	7		28	-2	25	-4	18	-8	64	7	80	28.64					30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 10:55	FM-15	SCT:04 14	7		28	-2	25	-4	18	-8	64	7	60	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 11:15	FM-15	SCT:04 14	10		28	-2	25	-3.9	19	-7	69	8	60	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 11:35	FM-15	CLR:00	7	UP:09	28	-2	25	-3.9	19	-7	69	5	20	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 11:55	FM-15	SCT:04 10	4	-SN:03  SN:71	28	-2	25	-3.9	19	-7	69	6	50	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 12:15	FM-15	SCT:04 8 SCT:04 13	4	-SN:03  SN:71	28	-2	26	-3.5	21	-6	74	6	60	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 12:35	FM-15	SCT:04 15	5	-SN:03  SN:71	28	-2	26	-3.5	21	-6	74	5	10	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 12:55	FM-15	SCT:04 15	7	-SN:03  SN:71	28	-2	26	-3.2	23	-5	80	5	20	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 13:15	FM-15	SCT:04 15	10		28	-2	26	-3.5	21	-6	74	6	30	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 13:35	FM-15	SCT:04 17	5	-SN:03  SN:71	28	-2	26	-3.2	23	-5	80	7	30	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 13:55	FM-15	SCT:04 15	4	-SN:03  SN:71	28	-2	26	-3.2	23	-5	80	7	10	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 14:15	FM-15	BKN:07 15	3	UP:09	28	-2	27	-2.8	25	-4	86	7	20	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 14:35	FM-15	BKN:07 15	3	UP:09	28	-2	27	-2.8	25	-4	86	7	10	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 14:55	FM-15	SCT:04 11 BKN:07 17	4	UP:09	28	-2	27	-2.8	25	-4	86	7	30	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 15:15	FM-15	SCT:04 15 BKN:07 19	4	UP:09	28	-2	27	-2.8	25	-4	86	9	20	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 15:35	FM-15	BKN:07 15	4	UP:09	28	-2	27	-2.8	25	-4	86	8	40	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 15:55	FM-15	SCT:04 15 SCT:04 20	4	UP:09	28	-2	27	-2.8	25	-4	86	10	30	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 16:15	FM-15	SCT:04 15 SCT:04 20	7	UP:09	28	-2	27	-2.8	25	-4	86	10	20	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 16:35	FM-15	SCT:04 21	7	UP:09	28	-2	27	-2.8	25	-4	86	8	30	28.59					29.98	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 16:55	FM-15	SCT:04 19	10	UP:09	28	-2	26	-3.2	23	-5	80	8	20		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 17:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	9	10		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 17:35	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	9	30		28.61					29.99
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 17:55	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	9	20		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 18:15	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	8	30		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 18:35	FM-15	CLR:00	10	UP:09	28	-2	25	-3.9	19	-7	69	8	30		28.61					30
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 18:55	FM-15	CLR:00	10	UP:09	28	-2	26	-3.5	21	-6	74	9	20		28.62					30.01
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 19:15	FM-15	SCT:04 36 SCT:04 42	10	UP:09	28	-2	26	-3.5	21	-6	74	7	40		28.62					30.01
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 19:35	FM-15	SCT:04 27 BKN:07 34 OVC:08 42	7	SN:03  SN:71	27	-3	25	-3.9	21	-6	80	6	30		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 19:55	FM-15	BKN:07 23 BKN:07 29 OVC:08 40	7	UP:09	27	-3	25	-3.9	21	-6	80	6	20		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 20:15	FM-15	SCT:04 23 SCT:04 30 BKN:07 40	10	UP:09	27	-3	25	-3.9	21	-6	80	6	20		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 20:36	FM-15	SCT:04 35	10		27	-3	25	-3.9	21	-6	80	6	10		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 20:55	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	0	0		28.63					30.02
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 21:15	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	0	0		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 21:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 21:55	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 22:15	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	5	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 22:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	330		28.64					30.03
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 22:55	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	3	340		28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:15	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	5	350		28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	5	350		28.65					30.04
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:55	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/20/2018 23:59	SOD																			
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 0:15	FM-15	SCT:04 65	10		25	-4	23	-5	19	-7	80	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 0:35	FM-15	OVC:08 65	10		27	-3	25	-3.9	21	-6	80	5	350		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 0:55	FM-15	BKN:07 65	10		25	-4	23	-5	19	-7	80	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 1:15	FM-15	CLR:00	10		25	-4	24	-4.6	21	-6	86	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 1:35	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	5	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 1:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	3	360		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 2:15	FM-15	CLR:00	10		25	-4	24	-4.6	21	-6	86	5	340		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 2:35	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	5	330		28.66					30.05
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 2:55	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	6	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 3:15	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	3	350		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 3:35	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	5	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 3:55	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	5	340		28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 4:15	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	3	360		28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 4:35	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	330		28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 4:55	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	330		28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 5:15	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	330		28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 5:35	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	5	340		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 5:55	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	3	350		28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 6:15	FM-15	CLR:00	10		21	-6	20	-6.5	19	-7	93	3	330		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 6:35	FM-15	CLR:00	10		23	-5	22	-5.7	19	-7	86	0	0		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 6:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	0	0		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 7:15	FM-15	BKN:07 50	10		25	-4	24	-4.6	21	-6	86	3	340		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 7:35	FM-15	OVC:08 50	10		25	-4	23	-5	19	-7	80	0	0		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 7:55	FM-15	OVC:08 50	10		25	-4	24	-4.6	21	-6	86	0	0		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 8:15	FM-15	OVC:08 50	10		27	-3	25	-3.9	21	-6	80	0	0		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 8:35	FM-15	OVC:08 50	10		27	-3	25	-3.9	21	-6	80	0	0		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 8:55	FM-15	OVC:08 50	10		28	-2	26	-3.5	21	-6	74	0	0		28.74					30.13

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULTEMP	HOURLYDRYBULTEMPC	HOURLYWETBULTEMP	HOURLYWETBULTEMPC	HOURLYDewPointTemp	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 9:15	FM-15	OVC:08 50	10		28	-2	25	-3.9	19	-7	69	0	0	28.75					30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 9:35	FM-15	OVC:08 50	10		30	-1	26	-3.3	18	-8	59	0	0	28.75					30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 9:55	FM-15	OVC:08 50	10		30	-1	26	-3.3	18	-8	59	0	0	28.76					30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 10:15	FM-15	OVC:08 50	10		30	-1	26	-3.3	18	-8	59	0	0	28.76					30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 10:35	FM-15	OVC:08 50	10		30	-1	25	-3.6	16	-9	55	3	280	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 10:55	FM-15	OVC:08 60	10		30	-1	26	-3.3	18	-8	59	7	280	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 11:15	FM-15	OVC:08 60	10		30	-1	26	-3.2	19	-7	64	6	270	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 11:35	FM-15	OVC:08 60	10		30	-1	26	-3.3	18	-8	59	8	250	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 11:55	FM-15	BKN:07 60	10		30	-1	26	-3.2	19	-7	64	8	240	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 12:15	FM-15	BKN:07 60	10		30	-1	26	-3.2	19	-7	64	6	240	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 12:35	FM-15	SCT:04 60	10		32	0	28	-2.5	19	-7	60	6	260	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 12:55	FM-15	BKN:07 60	10		34	1	29	-1.5	21	-6	60	6	280	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 13:15	FM-15	BKN:07 60	10		34	1	30	-1.1	23	-5	65	7	300	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 13:35	FM-15	SCT:04 41 BKN:07 60	10		34	1	30	-1.1	23	-5	65	10	290	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 13:55	FM-15	BKN:07 41	10		34	1	31	-0.8	25	-4	70	8	310	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 14:15	FM-15	SCT:04 25 SCT:04 43	10		34	2	31	-0.8	25	-4	70	6	260	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 14:35	FM-15	BKN:07 25	10		36	2	32	-0.1	25	-4	65	3	310	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 14:55	FM-15	SCT:04 25	10		36	2	33	0.3	27	-3	70	7	310	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 15:15	FM-15	CLR:00	10		36	2	33	0.3	27	-3	70	8	320	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 15:35	FM-15	SCT:04 25	10		36	2	33	0.3	27	-3	70	7	320	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 15:55	FM-15	SCT:04 23	10		36	2	33	0.3	27	-3	70	8	350	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 16:15	FM-15	SCT:04 23	10		34	1	31	-0.4	27	-3	75	7	330	28.79					30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 16:35	FM-15	SCT:04 23	10		34	1	31	-0.4	27	-3	75	6	340	28.79					30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 16:55	FM-15	SCT:04 23	10		34	1	31	-0.4	27	-3	75	8	340	28.8					30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 17:15	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	7	350	28.8					30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 17:35	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	5	330	28.81					30.2	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 17:55	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	5	350	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 18:15	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	5	340	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 18:35	FM-15	SCT:04 95	10		32	0	29	-1.4	25	-4	75	0	0	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 18:55	FM-15	SCT:04 27	10		30	-1	29	-1.7	27	-3	86	0	0	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 19:15	FM-15	SCT:04 27	10		32	0	29	-1.4	25	-4	75	0	0	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 19:35	FM-15	BKN:07 27	10		30	-1	28	-2.1	25	-4	80	0	0	28.82					30.22	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 19:55	FM-15	BKN:07 29	10		30	-1	28	-2.1	25	-4	80	0	0	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 20:15	FM-15	OVC:08 29	10		32	0	30	-1	27	-3	80	0	0	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 20:35	FM-15	OVC:08 29	10		32	0	30	-1	27	-3	80	3	80	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 20:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0	28.84					30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 21:15	FM-15	BKN:07 29	10		30	-1	29	-1.7	27	-3	86	3	70	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 21:35	FM-15	BKN:07 29	10		30	-1	29	-1.7	27	-3	86	0	0	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 21:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 22:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 22:35	FM-15	OVC:08 29	10		30	-1	29	-1.5	28	-2	93	0	0	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 22:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	3	110	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 23:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	3	110	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 23:35	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	5	90	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/21/2018 23:55	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 0:15	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 0:35	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	5	70	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 0:55	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 1:15	FM-15	BKN:07 31	10		30	-1	29	-1.7	27	-3	86	3	50	28.87					30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 1:35	FM-15	SCT:04 31	10		30	-1	28	-2.1	25	-4	80	3	80	28.87					30.27	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMPF	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMPF	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 1:55	FM-15	SCT:04 31 SCT:04 100	10		28	-2	28	-2.4	27	-3	93	3	140		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 2:15	FM-15	BKN:07 31	10		28	-2	28	-2.4	27	-3	93	0	0		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 2:35	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 2:55	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.87					30.27
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 3:15	FM-15	OVC:08 31	10		30	-1	29	-1.7	27	-3	86	0	0		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 3:35	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 3:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 4:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	5	80		28.88					30.28
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 4:35	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 4:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	3	110		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 5:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 5:35	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 5:55	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 6:15	FM-15	OVC:08 29	10		30	-1	29	-1.7	27	-3	86	0	0		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 6:35	FM-15	OVC:08 29	7		30	-1	29	-1.5	28	-2	93	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 6:55	FM-15	OVC:08 29	7		30	-1	29	-1.5	28	-2	93	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 7:15	FM-15	OVC:08 27	7		30	-1	29	-1.5	28	-2	93	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 7:35	FM-15	BKN:07 27	7		32	0	30	-0.8	28	-2	87	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 7:55	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	0	0		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 8:15	FM-15	SCT:04 29	10		34	1	31	-0.7	25	-4	70	3	110		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 8:35	FM-15	SCT:04 29	7		34	1	31	-0.4	27	-3	75	6	100		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 8:55	FM-15	CLR:00	7		34	1	31	-0.4	27	-3	75	5	120		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 9:15	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	6	110		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 9:35	FM-15	CLR:00	7		36	2	33	0.3	27	-3	70	6	90		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 9:55	FM-15	CLR:00	10		36	2	33	0.3	27	-3	70	6	80		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 10:15	FM-15	CLR:00	10		36	2	33	0.3	27	-3	70	5	60		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 10:35	FM-15	CLR:00	10		37	3	33	0.8	28	-2	70	7	70		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 10:55	FM-15	CLR:00	10		37	3	33	0.6	27	-3	65	6	20		28.95					30.35
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 11:15	FM-15	CLR:00	10		37	3	33	0.6	27	-3	65	5	40		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 11:35	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	6	60		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 11:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	6	40		28.94					30.34
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 12:15	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	6	10		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 12:35	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	5	40		28.93					30.33
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 12:55	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	8	360		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 13:15	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	5	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 13:35	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	6	10		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 13:55	FM-15	SCT:04 25	10		39	4	35	1.5	28	-2	65	3	340		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 14:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 14:35	FM-15	CLR:00	10		39	4	35	1.9	30	-1	70	9	350		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 14:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	7	350		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 15:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	9	20		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 15:35	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	9	360		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 15:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	50		28.89					30.29
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 16:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	30		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 16:35	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	7	20		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 16:55	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	8	10		28.9					30.3
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 17:15	FM-15	CLR:00	10		39	4	35	1.5	28	-2	65	3	10		28.91					30.31
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 17:35	FM-15	SCT:04 55	10		39	4	35	1.5	28	-2	65	5	20		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 17:55	FM-15	BKN:07 50	10		37	3	33	0.8	28	-2	70	3	20		28.92					30.32
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 18:15	FM-15	BKN:07 50	10		37	3	33	0.8	28	-2	70	0	0		28.92					30.32



Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 18:35	FM-15	SCT:04 50	10		36	2	33	0.5	28	-2	75	3	350	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 18:55	FM-15	SCT:04 100	10		36	2	33	0.5	28	-2	75	0	0	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 19:15	FM-15	CLR:00	10		36	2	33	0.5	28	-2	75	3	350	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 19:35	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	3	350	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 19:55	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	3	340	28.93					30.33	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 20:15	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	3	350	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 20:35	FM-15	CLR:00	10		34	1	31	-0.4	27	-3	75	5	360	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 20:55	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	5	360	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 21:15	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	5	10	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 21:35	FM-15	CLR:00	10		30	-1	29	-1.7	27	-3	86	3	10	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 21:55	FM-15	CLR:00	10		32	0	30	-1	27	-3	80	3	10	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 22:15	FM-15	CLR:00	10		32	0	29	-1.4	25	-4	75	0	0	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 22:35	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	6	20	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 22:55	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	3	10	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 23:15	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	3	10	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 23:35	FM-15	SCT:04 100	10		30	-1	28	-2.1	25	-4	80	5	20	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/22/2018 23:55	FM-15	SCT:04 100	10		30	-1	28	-2.1	25	-4	80	5	20	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 0:15	FM-15	CLR:00	10		30	-1	28	-2.1	25	-4	80	5	30	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 0:35	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	3	20	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 0:55	FM-15	CLR:00	10		30	-1	28	-2.5	23	-5	75	5	10	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 1:15	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	5	10	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 1:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	30	28.95					30.35	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 1:55	FM-15	SCT:04 110	10		30	-1	27	-2.8	21	-6	69	3	30	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 2:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	5	50	28.94					30.34	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 2:35	FM-15	CLR:00	10		30	-1	28	-2.5	23	-5	75	5	40	28.93					30.33	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 2:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	5	50	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 3:15	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	5	70	28.93					30.33	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 3:35	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	6	70	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 3:55	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	7	60	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 4:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	60	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 4:35	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	5	80	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 4:55	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	3	80	28.92					30.32	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 5:15	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	7	80	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 5:35	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	7	80	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 5:55	FM-15	SCT:04 90	10		28	-2	26	-3.5	21	-6	74	7	70	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 6:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	8	70	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 6:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	8	80	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 6:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	9	80	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 7:15	FM-15	CLR:00	10		28	-2	25	-3.9	19	-7	69	9	90	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 7:35	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	8	100	28.91					30.31	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 7:55	FM-15	CLR:00	10		30	-1	26	-3.2	19	-7	64	10	90	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 8:15	FM-15	CLR:00	10		32	0	28	-2.5	19	-7	60	14	90	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 8:35	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	13	100	28.89					30.29	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 8:55	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	14	90	28.89					30.29	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 9:15	FM-15	CLR:00	10		34	1	29	-1.8	19	-7	56	15	80	28.89					30.29	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 9:35	FM-15	CLR:00	10		34	1	29	-1.8	19	-7	56	13	90	28.89					30.29	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 9:55	FM-15	CLR:00	10		34	1	29	-1.8	19	-7	56	10	80	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 10:15	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	9	90	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 10:35	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	11	100	28.9					30.3	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 10:55	FM-15	CLR:00	10		36	2	30	-1.1	19	-7	52	13	80	28.89					30.29	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 11:15	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	13	80	28.88					30.28	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 11:35	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	15	90	28.88					30.28	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 11:55	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	13	90	28.87					30.27	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 12:15	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	13	90	28.87					30.27	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 12:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	16	90	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 12:55	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	14	100	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 13:15	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	14	90	28.85					30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 13:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	15	80	28.85					30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 13:55	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	14	80	28.82					30.22	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 14:15	FM-15	CLR:00	10		41	5	35	1.5	25	-4	53	15	80	28.82					30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 14:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	18	70	28.81					30.2	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 14:55	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	17	90	28.8					30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 15:15	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	18	80	28.79					30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 15:35	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	18	80	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 15:55	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	18	80	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 16:15	FM-15	SCT:04 120	10		39	4	34	0.9	25	-4	56	20	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 16:35	FM-15	SCT:04 110	10		39	4	34	0.9	25	-4	56	15	80	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 16:55	FM-15	BKN:07 110	10		39	4	34	0.9	25	-4	56	16	90	28.75					30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 17:15	FM-15	OVC:08 110	10		37	3	32	0.2	25	-4	60	17	80	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 17:35	FM-15	OVC:08 100	10		37	3	32	0.2	25	-4	60	18	80	28.72					30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 17:55	FM-15	BKN:07 100	10		37	3	32	-0.1	23	-5	56	20	80	28.72					30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 18:15	FM-15	SCT:04s 100s	10		37	3	32	-0.1	23	-5	56	18	80	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 18:35	FM-15	SCT:04 100	10		37	3	31	-0.5	21	-6	52	20	90	28.71					30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 18:55	FM-15	SCT:04 100	10		37	3	31	-0.5	21	-6	52	14	90	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 19:15	FM-15	SCT:04 100	10		37	3	31	-0.5	21	-6	52	15	90	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 19:35	FM-15	SCT:04 100	10		36	2	31	-0.8	21	-6	56	15	90	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 19:56	FM-15	SCT:04 90	10		36	2	31	-0.8	21	-6	56	15	80	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 20:15	FM-15	SCT:04 90	10		36	2	31	-0.8	21	-6	56	17	90	28.73					30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 20:35	FM-15	SCT:04 80	10		36	2	31	-0.8	21	-6	56	17	90	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 20:56	FM-15	SCT:04s 95s	10		36	2	31	-0.8	21	-6	56	16	100	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 21:15	FM-15	SCT:04 95	10		36	2	31	-0.8	21	-6	56	18	100	28.74					30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 21:35	FM-15	SCT:04 80 BKN:07 95	10		36	2	31	-0.8	21	-6	56	13	100	28.76					30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 21:56	FM-15	SCT:04 95	10		36	2	31	-0.8	21	-6	56	11	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 22:15	FM-15	SCT:04 80 BKN:07 95	10		36	2	31	-0.8	21	-6	56	11	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 22:35	FM-15	SCT:04 80	10		36	2	31	-0.8	21	-6	56	13	90	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 22:55	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	14	100	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 23:15	FM-15	SCT:04 90	10		36	2	30	-1.1	19	-7	52	17	100	28.78					30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 23:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	17	100	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/23/2018 23:55	FM-15	SCT:04 80 SCT:04 90	10		34	1	29	-1.5	21	-6	60	17	100	28.77					30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 0:15	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	17	100	28.76					30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 0:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	16	100	28.75					30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 0:55	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	20	100	25	28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 1:15	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	20	100	26	28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 1:35	FM-15	SCT:04 90	10		34	1	30	-1.1	23	-5	65	22	90	25	28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 1:55	FM-15	SCT:04 80 SCT:04 90	10		32	0	28	-2.1	21	-6	64	17	90	28	28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 2:15	FM-15	SCT:04 80	10		32	0	28	-2.5	19	-7	60	22	90	28.7					30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 2:35	FM-15	SCT:04 80	10		32	0	27	-2.6	18	-8	55	23	90	30	28.69					30.08
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 2:55	FM-15	OVC:08 80	10		32	0	27	-2.6	18	-8	55	22	90	28	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 3:15	FM-15	OVC:08 80	10		30	-1	26	-3.3	18	-8	59	23	80	28	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 3:35	FM-15	OVC:08 80	10		30	-1	25	-3.6	16	-9	55	21	90	30	28.67					30.06

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 3:55	FM-15	OVC:08 70	10		30	-1	26	-3.3	18	-8	59	22	80	26	28.67					30.06
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 4:15	FM-15	BKN:07 70 BKN:07 85	10		30	-1	25	-3.6	16	-9	55	18	80		28.68					30.07
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 4:35	FM-15	SCT:04 60 SCT:04 85	10		28	-2	25	-4	18	-8	64	16	80	24	28.7					30.09
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 4:55	FM-15	BKN:07 60	10		28	-2	25	-4	18	-8	64	20	80	26	28.71					30.1
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 5:15	FM-15	BKN:07 60	10		28	-2	25	-3.9	19	-7	69	21	80		28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 5:35	FM-15	SCT:04 70	10		28	-2	25	-3.9	19	-7	69	18	80	26	28.72					30.11
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 5:55	FM-15	SCT:04 70	10		28	-2	25	-3.9	19	-7	69	20	80	26	28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 6:15	FM-15	SCT:04 80 SCT:04 95	10		28	-2	25	-3.9	19	-7	69	22	70		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 6:35	FM-15	SCT:04 90	10		28	-2	25	-3.9	19	-7	69	21	70	25	28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 6:55	FM-15	SCT:04 90	10		28	-2	25	-3.9	19	-7	69	17	60	21	28.75					30.14
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 7:15	FM-15	SCT:04 90	10		28	-2	25	-3.9	19	-7	69	17	60	24	28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 7:35	FM-15	SCT:04 80	10		28	-2	25	-3.9	19	-7	69	22	70	25	28.76					30.15
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 7:55	FM-15	SCT:04 80	10		28	-2	26	-3.5	21	-6	74	13	70	23	28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 8:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	14	60		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 8:35	FM-15	SCT:04 80	10		28	-2	26	-3.5	21	-6	74	16	60	20	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 8:55	FM-15	SCT:04 80	10		28	-2	26	-3.5	21	-6	74	16	70		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 9:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	16	60		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 9:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	17	70	22	28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 9:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	18	70		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 10:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	17	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 10:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	17	70		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 10:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	15	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 11:15	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	16	70		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 11:35	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	15	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 11:55	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	18	90	24	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 12:15	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	18	90	26	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 12:35	FM-15	SCT:04 80	10		36	2	31	-0.8	21	-6	56	23	90	26	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 12:55	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	18	80	25	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 13:15	FM-15	CLR:00	10		36	2	31	-0.4	23	-5	60	20	90		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 13:35	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	15	80	24	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 13:55	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	22	80	25	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 14:15	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	18	90	24	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 14:35	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	21	80	25	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 14:55	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	18	80		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 15:15	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	15	80		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 15:35	FM-15	CLR:00	10		37	3	32	-0.1	23	-5	56	17	80	22	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 15:55	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	21	80	26	28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 16:15	FM-15	CLR:00	10		39	4	34	0.9	25	-4	56	17	80	23	28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 16:35	FM-15	CLR:00	10		39	4	33	0.5	23	-5	52	21	80		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 16:55	FM-15	SCT:04 90	10		39	4	33	0.5	23	-5	52	17	80		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 17:15	FM-15	BKN:07 90	10		37	3	32	-0.1	23	-5	56	16	80		28.8					30.19
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 17:35	FM-15	BKN:07 90	10		37	3	32	0.2	25	-4	60	9	90		28.81					30.2
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 17:55	FM-15	OVC:08 90	10		37	3	31	-0.5	21	-6	52	11	90		28.81					30.2
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 18:15	FM-15	OVC:08 90	10		36	2	31	-0.8	21	-6	56	9	90		28.82					30.21
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 18:35	FM-15	OVC:08 90	10		36	2	32	-0.1	25	-4	65	7	80		28.82					30.22
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 18:55	FM-15	OVC:08 90	10		34	1	31	-0.8	25	-4	70	7	80		28.84					30.23
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 19:16	FM-15	BKN:07 90	10		34	1	30	-1.1	23	-5	65	5	40		28.84					30.23
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 19:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	6	40		28.85					30.24
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 19:55	FM-15	SCT:04 90	10		34	1	31	-0.8	25	-4	70	9	60		28.84					30.23
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 20:15	FM-15	SCT:04 90	10		34	1	31	-0.8	25	-4	70	10	70		28.84					30.23

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTemp	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 20:35	FM-15	BKN:07 80	10		34	1	31	-0.8	25	-4	70	9	70		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 20:55	FM-15	SCT:04 80	10		32	0	29	-1.4	25	-4	75	8	80		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 21:15	FM-15	SCT:04 90	10		32	0	29	-1.4	25	-4	75	9	90		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 21:35	FM-15	SCT:04 90	10		32	0	29	-1.8	23	-5	69	11	100		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 21:55	FM-15	BKN:07 90	10		32	0	28	-2.1	21	-6	64	13	100		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 22:15	FM-15	OVC:08 90	10		32	0	28	-2.1	21	-6	64	13	100		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 22:35	FM-15	OVC:08 90	10		32	0	28	-2.1	21	-6	64	13	100		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 22:55	FM-15	SCT:04 90	10		30	-1	27	-2.8	21	-6	69	11	100	17	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 23:15	FM-15	BKN:07 80 BKN:07 90	10		30	-1	27	-2.8	21	-6	69	11	100		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 23:35	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	11	100		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/24/2018 23:56	FM-15	OVC:08 80	10		30	-1	28	-2.5	23	-5	75	13	90		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 0:15	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	14	100		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 0:35	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	14	100		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 0:55	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	10	100		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 1:15	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	13	100		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 1:35	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	13	100	17	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 1:55	FM-15	OVC:08 80	10		30	-1	27	-2.8	21	-6	69	13	110	20	28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 2:15	FM-15	OVC:08 80	10		30	-1	26	-3.2	19	-7	64	17	110	22	28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 2:35	FM-15	OVC:08 80	10		30	-1	26	-3.2	19	-7	64	15	110	22	28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 2:55	FM-15	OVC:08 80	10		30	-1	26	-3.2	19	-7	64	16	110	22	28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 3:15	FM-15	BKN:07 70 OVC:08 80	10		28	-2	25	-3.9	19	-7	69	14	110		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 3:35	FM-15	OVC:08 70	10		28	-2	25	-3.9	19	-7	69	14	110	20	28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 3:55	FM-15	OVC:08 70	10		28	-2	25	-3.9	19	-7	69	14	110	18	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 4:15	FM-15	OVC:08 70	10		28	-2	25	-3.9	19	-7	69	16	110		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 4:35	FM-15	SCT:04 70	10		28	-2	25	-3.9	19	-7	69	15	120		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 4:55	FM-15	BKN:07 80	10		28	-2	25	-4	18	-8	64	18	120		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 5:15	FM-15	SCT:04 80	10		28	-2	25	-4	18	-8	64	15	110		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 5:35	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	17	110		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 5:55	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	16	110		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 6:15	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	21	120	25	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 6:35	FM-15	SCT:04 80	10		27	-3	24	-4.7	16	-9	64	20	110	23	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 6:55	FM-15	SCT:04 80	10		27	-3	24	-4.7	16	-9	64	18	110		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 7:15	FM-15	CLR:00	10		27	-3	24	-4.4	18	-8	69	15	110		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 7:35	FM-15	CLR:00	10		27	-3	24	-4.7	16	-9	64	15	110		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 7:55	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	17	110		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 8:15	FM-15	CLR:00	10		28	-2	24	-4.4	16	-9	59	20	120	24	28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 8:35	FM-15	CLR:00	10		28	-2	25	-4	18	-8	64	16	110		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 8:55	FM-15	CLR:00	10		30	-1	26	-3.3	18	-8	59	15	120		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 9:15	FM-15	CLR:00	10		30	-1	26	-3.3	18	-8	59	15	140		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 9:35	FM-15	SCT:04 90	10		32	0	27	-2.6	18	-8	55	16	130	20	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 9:55	FM-15	CLR:00	10		34	1	29	-1.9	18	-8	51	16	140	20	28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 10:15	FM-15	SCT:04 100	10		34	1	29	-1.9	18	-8	51	17	130		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 10:35	FM-15	SCT:04 100	10		34	1	29	-1.9	18	-8	51	14	120		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 10:55	FM-15	SCT:04 100	10		36	2	30	-1.3	18	-8	48	11	120		28.87				30.26	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 11:15	FM-15	SCT:04 100	10		36	2	30	-1.3	18	-8	48	15	140		28.85				30.25	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 11:35	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	14	110		28.85				30.24	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 11:55	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	15	120		28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 12:15	FM-15	SCT:04 90	10		39	4	32	-0.1	19	-7	45	17	130	23	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 12:35	FM-15	SCT:04 90	10		39	4	32	-0.3	18	-8	42	16	140	22	28.84				30.23	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 12:55	FM-15	SCT:04 90	10		39	4	32	-0.1	19	-7	45	16	130		28.82				30.22	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 13:15	FM-15	SCT:04 90	10		39	4	32	0.2	21	-6	48	15	130		28.82				30.21	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 13:35	FM-15	SCT:04 90	10		39	4	32	-0.1	19	-7	45	17	130	21	28.81				30.2	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 13:55	FM-15	SCT:04 90	10		39	4	32	-0.3	18	-8	42	18	140	24	28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 14:15	FM-15	BKN:07 80	10		39	4	32	-0.3	18	-8	42	17	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 14:35	FM-15	BKN:07 80	10		39	4	32	0.2	21	-6	48	17	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 14:55	FM-15	BKN:07 80	10		39	4	32	-0.1	19	-7	45	16	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 15:15	FM-15	OVC:08 80	10		39	4	33	0.5	23	-5	52	14	140		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 15:35	FM-15	OVC:08 80	10		39	4	33	0.5	23	-5	52	15	150		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 15:55	FM-15	BKN:07 80	10		41	5	35	1.5	25	-4	53	14	140	20	28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 16:15	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	13	140		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 16:35	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	9	140		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 16:55	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	10	140		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 17:15	FM-15	OVC:08 80	10		41	5	35	1.5	25	-4	53	8	150		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 17:35	FM-15	OVC:08 80	10		39	4	34	0.9	25	-4	56	8	150		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 17:55	FM-15	OVC:08 70	10		39	4	34	1.3	27	-3	61	6	160		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 18:15	FM-15	OVC:08 70	10		39	4	34	1.3	27	-3	61	6	150		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 18:35	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	5	150		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 18:55	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	5	140		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 19:15	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	6	140		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 19:35	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	6	130		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 19:55	FM-15	OVC:08 70	10		37	3	33	0.8	28	-2	70	7	130		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 20:15	FM-15	BKN:07 70 OVC:08 75	10		37	3	33	0.6	27	-3	65	7	130		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 20:35	FM-15	SCT:04 60 OVC:08 70	10		36	2	33	0.3	27	-3	70	8	120		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 20:55	FM-15	SCT:04 60 SCT:04 70	10		36	2	33	0.3	27	-3	70	8	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 21:15	FM-15	CLR:00	10		36	2	31	-0.4	23	-5	60	9	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 21:35	FM-15	CLR:00	10		36	2	32	-0.1	25	-4	65	9	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 21:55	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	11	130		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 22:15	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	11	140		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 22:35	FM-15	SCT:04 60	10		36	2	31	-0.8	21	-6	56	9	140		28.78				30.17	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 22:55	FM-15	CLR:00	10		34	1	31	-0.8	25	-4	70	6	150		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 23:15	FM-15	SCT:04 100	10		34	1	31	-0.8	25	-4	70	9	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 23:35	FM-15	SCT:04 90	10		34	1	29	-1.5	21	-6	60	18	140		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/25/2018 23:55	FM-15	SCT:04 43 SCT:04 50 BKN:07 65	10		34	1	29	-1.5	21	-6	60	15	140		28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 0:15	FM-15	SCT:04 47 SCT:04 60 OVC:08 80	10		34	1	29	-1.5	21	-6	60	16	140	22	28.8				30.19	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 0:35	FM-15	OVC:08 80	10		34	1	29	-1.5	21	-6	60	11	130		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 0:55	FM-15	OVC:08 80	10		34	1	29	-1.5	21	-6	60	17	130	21	28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 1:15	FM-15	OVC:08 80	10		34	1	29	-1.5	21	-6	60	16	130		28.79				30.18	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 2:35	FM-15	SCT:04 90	10		32	0	28	-2.1	21	-6	64	13	120		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 2:55	FM-15	SCT:04 110	10		32	0	28	-2.1	21	-6	64	10	120		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 3:15	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	9	120		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 3:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	10	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 3:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	9	110		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 4:15	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	9	110		28.77				30.16	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 4:35	FM-15	OVC:08 100	10		30	-1	26	-3.2	19	-7	64	10	120		28.76				30.15	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 4:55	FM-15	OVC:08 100	10		30	-1	26	-3.2	19	-7	64	11	110		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 5:15	FM-15	OVC:08 100	10		30	-1	26	-3.2	19	-7	64	11	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 5:35	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 5:55	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	13	110		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 6:15	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	11	100		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 6:35	FM-15	BKN:07 100	10		30	-1	27	-2.8	21	-6	69	10	100		28.72				30.11	



Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULTEMPF	HOURLYDRYBULTEMPC	HOURLYWETBULTEMPF	HOURLYWETBULTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 6:55	FM-15	BKN:07 90	10		30	-1	27	-2.8	21	-6	69	13	110		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 7:15	FM-15	SCT:04 30 BKN:07 36 BKN:07 90	10		32	0	28	-2.1	21	-6	64	13	120		28.75				30.14	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 7:35	FM-15	SCT:04 30 OVC:08 36	10		32	0	28	-2.1	21	-6	64	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 7:55	FM-15	BKN:07 36	10		32	0	28	-2.1	21	-6	64	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 8:15	FM-15	BKN:07 32	10		32	0	28	-2.1	21	-6	64	13	120		28.74				30.13	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 8:35	FM-15	OVC:08 39	10		34	1	30	-1.1	23	-5	65	13	120		28.73				30.12	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 8:55	FM-15	SCT:04 39 SCT:04 100	10		34	1	29	-1.5	21	-6	60	14	110		28.71				30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 9:15	FM-15	SCT:04 100	10		34	1	30	-1.1	23	-5	65	11	120		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 9:35	FM-15	SCT:04 38	10		34	1	29	-1.5	21	-6	60	15	140		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 9:55	FM-15	BKN:07 36	10		34	1	31	-0.8	25	-4	70	16	130		28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 10:15	FM-15	BKN:07 36	10		34	1	30	-1.1	23	-5	65	16	130	20	28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 10:35	FM-15	SCT:04 36	10		36	2	32	-0.1	25	-4	65	17	130	22	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 10:55	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	17	120		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 11:15	FM-15	SCT:04 70	10		36	2	32	-0.1	25	-4	65	16	130		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 11:35	FM-15	SCT:04 29 BKN:07 70	10		37	3	32	0.2	25	-4	60	15	130		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 11:55	FM-15	BKN:07 29 OVC:08 70	10		36	2	32	-0.1	25	-4	65	11	140		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 12:15	FM-15	OVC:08 31	10		37	3	32	0.2	25	-4	60	10	120		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 12:35	FM-15	OVC:08 31	10		37	3	32	0.2	25	-4	60	6	100		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 12:55	FM-15	OVC:08 29	10		37	3	32	0.2	25	-4	60	8	100		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 13:15	FM-15	OVC:08 29	7	RA:02   RA:61	37	3	33	0.6	27	-3	65	8	130		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 13:35	FM-15	OVC:08 33	3	RA:02   RA:61	36	2	33	0.5	28	-2	75	7	100		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 13:55	FM-15	OVC:08 33	10		37	3	34	1.2	30	-1	75	8	90		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 14:15	FM-15	OVC:08 33	10		37	3	33	0.8	28	-2	70	11	100		28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 14:35	FM-15	OVC:08 33	10		37	3	33	0.8	28	-2	70	11	110		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 14:55	FM-15	OVC:08 29	10	RA:02   RA:61	37	3	34	1.2	30	-1	75	8	110		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 15:15	FM-15	OVC:08 29	10	RA:02   RA:61	37	3	33	0.8	28	-2	70	11	110		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 15:36	FM-15	BKN:07 27 OVC:08 44	3	RA:02   RA:62	36	2	34	0.9	30	-1	81	15	100		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 15:55	FM-15	BKN:07 27 OVC:08 35	4	RA:02   RA:61	36	2	34	0.9	30	-1	81	14	100		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 16:15	FM-15	OVC:08 25	2.50V	SN:03   SN:71	36	2	34	0.9	30	-1	81	10	110		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 16:35	FM-15	OVC:08 23	10	UP:09	36	2	34	0.9	30	-1	81	10	100		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 16:55	FM-15	BKN:07 16 OVC:08 21	7	DZ:01   DZ:51	36	2	34	0.9	30	-1	81	13	110	16	28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 17:15	FM-15	OVC:08 14	2.5	UP:09	34	1	33	0.7	32	0	93	13	110	16	28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 17:35	FM-15	OVC:08 12	2	UP:09	34	1	33	0.7	32	0	93	9	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 17:55	FM-15	OVC:08 7	1.25	UP:09	34	1	34	1.1	34	1	100	6	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 18:15	FM-15	OVC:08 7	2	UP:09	34	1	34	1.1	34	1	100	7	100		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 18:35	FM-15	OVC:08 7	2.5	UP:09	34	1	34	1.1	34	1	100	6	180		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 18:55	FM-15	OVC:08 7	2	UP:09	34	1	34	1.1	34	1	100	3	150		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 19:15	FM-15	SCT:04 7 OVC:08 15	2	UP:09	34	1	34	1.1	34	1	100	5	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 19:35	FM-15	BKN:07 3 BKN:07 7 OVC:08 14	2	UP:09	34	1	34	1.1	34	1	100	3	110		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 19:55	FM-15	OVC:08 3	1.75	BR:1	34	1	34	1.1	34	1	100	0	0		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 20:15	FM-15	OVC:08 3	1.5	BR:1	34	1	34	1.1	34	1	100	0	0		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 20:35	FM-15	OVC:08 3	1.5	UP:09	34	1	34	1.1	34	1	100	3	120		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 20:55	FM-15	OVC:08 5	2.5	BR:1	34	1	34	1.1	34	1	100	3	140		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 21:15	FM-15	OVC:08 7	3	BR:1	34	1	34	1.1	34	1	100	6	180		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 21:35	FM-15	OVC:08 7	5	UP:09	34	1	34	1.1	34	1	100	5	190		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 21:55	FM-15	OVC:08 7	5	BR:1	34	1	34	1.1	34	1	100	8	200		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 22:15	FM-15	OVC:08 7	2.5	BR:1	34	1	34	1.1	34	1	100	7	230		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 22:35	FM-15	OVC:08 5	2	BR:1	34	1	33	0.7	32	0	93	7	220		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 22:55	FM-15	OVC:08 5	1.75	BR:1	34	1	33	0.7	32	0	93	6	240		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:15	FM-15	OVC:08 3	2	BR:1	32	0	32	0	32	0	100	7	250		28.55				29.93	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:35	FM-15	OVC:08 5	2	BR:1	32	0	32	0	32	0	100	7	250		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:55	FM-15	OVC:08 3	2.5	BR:1	32	0	32	0	32	0	100	7	260		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/26/2018 23:59	SOD																			
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 0:15	FM-15	OVC:08 3	2.5	BR:1	32	0	32	0	32	0	100	7	250		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 0:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	7	260		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 0:55	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	7	280		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 1:15	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	8	280		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 1:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	9	290		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 1:55	FM-15	OVC:08 3	2.5	BR:1	32	0	31	-0.4	30	-1	93	8	290		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 2:15	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	10	290		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 2:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	11	280		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 2:55	FM-15	OVC:08 3	2	BR:1	32	0	31	-0.4	30	-1	93	11	280		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 3:15	FM-15	OVC:08 3	2	BR:1	32	0	31	-0.4	30	-1	93	13	280	16	28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 3:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	10	290		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 3:55	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	14	300		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 4:15	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	15	300		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 4:35	FM-15	OVC:08 3	3	BR:1	32	0	31	-0.4	30	-1	93	13	310	18	28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 4:55	FM-15	OVC:08 5	3	BR:1	32	0	31	-0.4	30	-1	93	9	310		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 5:15	FM-15	OVC:08 5	4	BR:1	32	0	31	-0.4	30	-1	93	10	300		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 5:35	FM-15	OVC:08 7	4	BR:1	32	0	31	-0.4	30	-1	93	8	320		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 5:55	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	15	310		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 6:15	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	11	300		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 6:35	FM-15	OVC:08 9	5	BR:1	32	0	31	-0.4	30	-1	93	11	300	16	28.62				30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 6:55	FM-15	BKN:07 9 OVC:08 13	4	BR:1	32	0	31	-0.4	30	-1	93	10	300		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 7:15	FM-15	BKN:07 7 OVC:08 11	3	BR:1	32	0	31	-0.4	30	-1	93	8	290		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 7:35	FM-15	OVC:08 7	3	BR:1	32	0	31	-0.4	30	-1	93	13	310		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 7:55	FM-15	OVC:08 7	4	BR:1	32	0	31	-0.4	30	-1	93	13	300		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 8:15	FM-15	OVC:08 9	5	BR:1	32	0	31	-0.4	30	-1	93	13	320	17	28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 8:35	FM-15	OVC:08 9	4	BR:1	32	0	31	-0.4	30	-1	93	13	310		28.64				30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 8:55	FM-15	OVC:08 7	4	BR:1	32	0	31	-0.4	30	-1	93	11	300		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 9:15	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	15	310		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 9:35	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	11	290	17	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 9:55	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	10	280		28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 10:15	FM-15	OVC:08 7	5	BR:1	32	0	31	-0.4	30	-1	93	11	290		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 10:35	FM-15	OVC:08 7	5	BR:1	34	1	32	0.2	30	-1	87	13	300		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 10:55	FM-15	OVC:08 7	4	BR:1	34	1	32	0.2	30	-1	87	10	300		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 11:15	FM-15	OVC:08 7	5	BR:1	34	1	32	0.2	30	-1	87	8	310		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 11:35	FM-15	OVC:08 7	7		34	1	32	0.2	30	-1	87	11	300		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 11:55	FM-15	OVC:08 7	7		34	1	32	0.2	30	-1	87	13	280	16	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 12:15	FM-15	OVC:08 9	10		34	1	32	0.2	30	-1	87	11	270		28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 12:35	FM-15	OVC:08 11	10		36	2	34	0.9	30	-1	81	9	290		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 12:55	FM-15	OVC:08 11	10		36	2	34	0.9	30	-1	81	9	290		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 13:15	FM-15	OVC:08 13	10		37	3	35	1.6	32	0	81	11	310		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 13:35	FM-15	OVC:08 13	10		37	3	35	1.6	32	0	81	10	310		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 13:55	FM-15	OVC:08 13	10		37	3	35	1.6	32	0	81	9	270		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 14:15	FM-15	BKN:07 13	10		37	3	35	1.6	32	0	81	7	280		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 14:35	FM-15	SCT:04 15	10		39	4	36	2.3	32	0	75	8	260		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 14:55	FM-15	CLR:00	10		41	5	38	3.3	34	1	76	7	240		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 15:15	FM-15	CLR:00	10		41	5	37	2.9	32	0	70	6	260		28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 15:35	FM-15	CLR:00	10		43	6	38	3.5	32	0	66	8	260		28.65				30.04	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMPF	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMPF	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 15:55	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	6	270	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 16:15	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	9	240	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 16:35	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	6	260	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 16:55	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	6	270	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 17:15	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	8	250	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 17:35	FM-15	CLR:00	10		43	6	40	4.4	36	2	76	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 17:55	FM-15	CLR:00	10		41	5	39	3.8	36	2	81	10	230	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 18:15	FM-15	CLR:00	10		39	4	37	2.7	34	1	81	8	240	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 18:35	FM-15	CLR:00	10		37	3	36	2.1	34	1	87	7	230	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 18:55	FM-15	CLR:00	10		36	2	34	1.3	32	0	87	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 19:15	FM-15	CLR:00	7		34	1	33	0.7	32	0	93	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 19:35	FM-15	CLR:00	10		34	1	32	0.2	30	-1	87	10	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 19:55	FM-15	SCT:04 85	7		34	1	32	0.2	30	-1	87	10	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 20:15	FM-15	SCT:04 85	7		34	1	32	0.2	30	-1	87	9	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 20:35	FM-15	CLR:00	7		32	0	30	-0.8	28	-2	87	9	230	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 20:55	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	8	220	28.67					30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 21:15	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	7	210	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 21:35	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	9	220	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 21:55	FM-15	CLR:00	7		32	0	31	-0.4	30	-1	93	8	210	28.66					30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 22:35	FM-15	CLR:00	7		32	0	30	-0.8	28	-2	87	7	220	28.65					30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 22:55	FM-15	SCT:04 85	7		30	-1	30	-1.1	30	-1	100	7	220	28.64					30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:15	FM-15	CLR:00	7		30	-1	30	-1.1	30	-1	100	7	210	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:35	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	6	210	28.63					30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:55	FM-15	CLR:00	5	BR:1	30	-1	30	-1.1	30	-1	100	7	200	28.62					30.01	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/27/2018 23:59	SOD																			
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 0:15	FM-15	CLR:00	7		30	-1	30	-1.1	30	-1	100	10	200	28.61					30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 0:35	FM-15	CLR:00	5	BR:1	30	-1	29	-1.5	28	-2	93	7	200	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 0:55	FM-15	CLR:00	5	BR:1	30	-1	29	-1.5	28	-2	93	6	200	28.61					29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 1:15	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	7	220	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 1:35	FM-15	CLR:00	7		30	-1	30	-1.1	30	-1	100	7	210	28.59					29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 1:55	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	7	210	28.59					29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 2:15	FM-15	SCT:04 90	7		30	-1	29	-1.5	28	-2	93	7	200	28.58					29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 2:35	FM-15	SCT:04 90	7		30	-1	29	-1.5	28	-2	93	6	200	28.56					29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 2:55	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	9	180	28.56					29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 3:15	FM-15	CLR:00	10		30	-1	29	-1.5	28	-2	93	7	180	28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 3:35	FM-15	CLR:00	10		30	-1	29	-1.5	28	-2	93	8	180	28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 3:55	FM-15	CLR:00	10		30	-1	29	-1.5	28	-2	93	9	180	28.56					29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 4:15	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	9	170	28.55					29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 4:35	FM-15	CLR:00	7		30	-1	29	-1.5	28	-2	93	9	180	28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 4:55	FM-15	SCT:04 90	7		30	-1	29	-1.7	27	-3	86	8	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 5:15	FM-15	SCT:04 90	7		30	-1	29	-1.7	27	-3	86	6	190	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 5:35	FM-15	CLR:00	7		30	-1	29	-1.7	27	-3	86	9	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 5:55	FM-15	CLR:00	10		30	-1	29	-1.7	27	-3	86	8	180	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 6:15	FM-15	CLR:00	7		28	-2	28	-2.4	27	-3	93	9	170	28.52					29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 6:35	FM-15	CLR:00	7		30	-1	29	-1.7	27	-3	86	8	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 6:55	FM-15	SCT:04 100	7		30	-1	29	-1.5	28	-2	93	8	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 7:15	FM-15	CLR:00	10		32	0	30	-0.8	28	-2	87	10	190	28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 7:35	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	13	180	28.54					29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 7:55	FM-15	CLR:00	10		36	2	33	0.5	28	-2	75	11	180	28.53					29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 8:15	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	16	170	28.53					29.91	

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 8:35	FM-15	CLR:00	10		36	2	33	0.5	28	-2	75	15	180		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 8:55	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	17	170		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 9:15	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	15	180		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 9:35	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	18	180		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 9:55	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	13	200		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 10:15	FM-15	CLR:00	10		36	2	34	0.9	30	-1	81	21	190		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 10:35	FM-15	SCT:04 100	10		37	3	36	2.1	34	1	87	16	180		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 10:55	FM-15	CLR:00	10		37	3	36	2.1	34	1	87	14	190		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 11:15	FM-15	CLR:00	10		39	4	37	2.7	34	1	81	11	190	20	28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 11:35	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	16	210	22	28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 11:55	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	17	210		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 12:15	FM-15	CLR:00	10		43	6	38	3.1	30	-1	61	16	200		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 12:35	FM-15	CLR:00	10		43	6	39	3.9	34	1	71	20	190	23	28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 12:55	FM-15	CLR:00	10		43	6	40	4.4	36	2	76	18	190	23	28.51				29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 13:15	FM-15	CLR:00	10		45	7	41	5	36	2	71	18	190		28.51				29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 13:35	FM-15	CLR:00	10		45	7	41	5	36	2	71	18	200	23	28.49				29.87	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 13:55	FM-15	CLR:00	10		45	7	41	5	36	2	71	16	210	20	28.48				29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:15	FM-15	CLR:00	10		45	7	41	5	36	2	71	13	210	20	28.48				29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:35	FM-15	CLR:00	10		46	8	41	5.3	36	2	66	14	220		28.48				29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:42	FM-15				46	8			36	2	66	11	230						29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:49	FM-15				46	8			37	3	71	10	210						29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 14:55	FM-15	CLR:00	10		46	8	41	5.3	36	2	66	13	220	17	28.47				29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 15:15	FM-15	CLR:00	10		46	8	42	5.5	37	3	71	14	230		28.46				29.84	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 15:35	FM-15	CLR:00	10		48	9	43	5.8	36	2	62	13	240		28.46				29.84	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 15:55	FM-15	CLR:00	10		48	9	43	6.1	37	3	66	16	250	20	28.46				29.84	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 16:15	FM-15	SCT:04 24	10		46	8	42	5.5	37	3	71	13	260		28.47				29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 16:35	FM-15	SCT:04 24	10		46	8	42	5.5	37	3	71	13	280		28.47				29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 16:55	FM-15	CLR:00	10		46	8	42	5.5	37	3	71	9	270		28.47				29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 17:15	FM-15	CLR:00	10		46	8	41	5.3	36	2	66	8	270		28.47				29.85	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 17:35	FM-15	CLR:00	10		45	7	41	5	36	2	71	8	270		28.48				29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 17:55	FM-15	CLR:00	10		45	7	41	5	36	2	71	7	280		28.48				29.86	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 18:15	FM-15	BKN:07 27	10		45	7	41	5	36	2	71	6	260		28.49				29.87	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 18:35	FM-15	OVC:08 25	10		43	6	40	4.6	37	3	81	5	250		28.49				29.87	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 18:55	FM-15	OVC:08 23	10		43	6	40	4.6	37	3	81	7	260		28.5				29.88	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 19:15	FM-15	OVC:08 23	10		43	6	40	4.6	37	3	81	5	290		28.5				29.88	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 19:35	FM-15	SCT:04 17 OVC:08 24	10		43	6	40	4.6	37	3	81	11	310		28.51				29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 19:55	FM-15	BKN:07 27 BKN:07 85	10		43	6	40	4.6	37	3	81	9	300		28.51				29.89	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 20:15	FM-15	SCT:04 24 SCT:04 29 BKN:07 85	10		41	5	39	4	37	3	87	8	300		28.52				29.9	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 20:35	FM-15	OVC:08 22	10		41	5	39	4	37	3	87	9	310		28.53				29.91	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 20:55	FM-15	OVC:08 22	10		39	4	38	3.2	36	2	87	11	320		28.54				29.92	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 21:15	FM-15	OVC:08 24	10		39	4	38	3.2	36	2	87	10	320		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 21:35	FM-15	OVC:08 24	10		39	4	38	3.2	36	2	87	9	320		28.55				29.93	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 21:55	FM-15	OVC:08 26	10		39	4	37	2.7	34	1	81	8	320		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 22:15	FM-15	OVC:08 26	10		39	4	37	2.7	34	1	81	8	320		28.56				29.94	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 22:35	FM-15	OVC:08 24	10		37	3	36	2.1	34	1	87	8	330		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 22:55	FM-15	OVC:08 24	10		37	3	35	1.6	32	0	81	9	320		28.56				29.95	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:15	FM-15	OVC:08 24	10		37	3	34	1.2	30	-1	75	11	330		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:35	FM-15	BKN:07 24	10		36	2	33	0.5	28	-2	75	15	330		28.58				29.96	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:55	FM-15	CLR:00	10		34	1	32	-0.2	28	-2	81	13	320		28.59				29.97	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/28/2018 23:59	SOD																			

Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMP	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMP	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 0:15	FM-15	CLR:00	10		32	0	30	-0.8	28	-2	87	9	320		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 0:35	FM-15	CLR:00	10		30	-1	29	-1.7	27	-3	86	10	320		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 0:55	FM-15	SCT:04 95	10		30	-1	29	-1.7	27	-3	86	13	320		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 1:15	FM-15	SCT:04 95	10		30	-1	28	-2.1	25	-4	80	10	330	16	28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 1:35	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	10	330		28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 1:55	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	14	330	22	28.59				29.98	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 2:15	FM-15	CLR:00	10		28	-2	27	-2.8	25	-4	86	11	330	17	28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 2:35	FM-15	CLR:00	10		28	-2	26	-3.2	23	-5	80	14	330		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 2:55	FM-15	CLR:00	10		27	-3	26	-3.5	23	-5	86	15	340	21	28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 3:15	FM-15	SCT:04 95	10		27	-3	25	-3.9	21	-6	80	14	340	18	28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 3:35	FM-15	SCT:04 85	10		27	-3	25	-3.9	21	-6	80	11	340		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 3:55	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	14	340		28.61				29.99	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 4:15	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	15	340	24	28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 4:35	FM-15	SCT:04 85	10		27	-3	25	-3.9	21	-6	80	15	340		28.61				30	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 4:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	15	330		28.63				30.02	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 5:15	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	11	340		28.64				30.03	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 5:35	FM-15	SCT:04 85	10		25	-4	23	-5	19	-7	80	13	340	18	28.65				30.04	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 5:55	FM-15	SCT:04 85	10		25	-4	23	-5	19	-7	80	11	340	17	28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 6:15	FM-15	SCT:04 85	10		25	-4	23	-5	19	-7	80	13	340		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 6:35	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	14	340		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 6:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	14	340		28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 7:35	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	16	340		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 7:55	FM-15	CLR:00	10		25	-4	23	-5	19	-7	80	14	350		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 8:15	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	13	340		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 8:35	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	13	340		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 8:55	FM-15	CLR:00	10		27	-3	25	-3.9	21	-6	80	13	350		28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 9:15	FM-15	CLR:00	10		27	-3	24	-4.2	19	-7	74	13	350		28.71				30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 9:35	FM-15	CLR:00	10		28	-2	25	-3.9	19	-7	69	13	360		28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 9:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	13	340		28.71				30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 10:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	14	330	18	28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 10:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	13	330	18	28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 10:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	15	340		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 11:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	14	340		28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 12:15	FM-15	CLR:00	10		34	1	30	-1.1	23	-5	65	15	340	18	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 12:35	FM-15	CLR:00	10		34	1	30	-1.1	23	-5	65	15	350		28.66				30.05	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 12:55	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	15	330	21	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 13:15	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	18	360	23	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 13:35	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	17	330	24	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 13:55	FM-15	CLR:00	10		36	2	31	-0.5	23	-5	60	17	350	22	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 14:15	FM-15	CLR:00	10		36	2	31	-0.8	21	-6	56	17	350	24	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 14:35	FM-15	CLR:00	10		37	3	31	-0.5	21	-6	52	16	340		28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 14:55	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	16	340	23	28.67				30.06	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 15:15	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	15	330	22	28.68				30.07	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 15:35	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	15	340		28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 15:55	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	16	340	21	28.69				30.08	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 16:15	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	16	VRB	22	28.7				30.09	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 16:35	FM-15	CLR:00	10		37	3	30	-0.9	18	-8	45	14	330		28.71				30.1	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 16:55	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	15	340	20	28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 17:15	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	14	330		28.72				30.11	
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 17:35	FM-15	CLR:00	10		37	3	31	-0.8	19	-7	48	11	330	16	28.72				30.11	



Table B-1

STATION	STATION_NAME	ELEVATION	LATITUDE	LONGITUDE	DATE	REPORTTYPE	HOURLYSKYCONDITIONS	HOURLYVISIBILITY	HOURLYPRESENTWEATHERTYPE	HOURLYDRYBULBTEMPF	HOURLYDRYBULBTEMPC	HOURLYWETBULBTEMPF	HOURLYWETBULBTEMPC	HOURLYDewPointTempF	HOURLYDewPointTempC	HOURLYRelativeHumidity	HOURLYWindSpeed	HOURLYWindDirection	HOURLYWindGustSpeed	HOURLYStationPressure	HOURLYPressureTendency	HOURLYPressureChange	HOURLYSeaLevelPressure	HOURLYPrecip	HOURLYAltimeterSetting
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 17:55	FM-15	CLR:00	10		36	2	30	-1.1	19	-7	52	9	340		28.73					30.12
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 18:15	FM-15	CLR:00	10		36	2	30	-1.1	19	-7	52	8	330		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 18:35	FM-15	CLR:00	10		34	1	29	-1.5	21	-6	60	7	330		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 18:55	FM-15	SCT:04 90	10		32	0	28	-2.1	21	-6	64	7	320		28.74					30.13
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 19:15	FM-15	CLR:00	10		32	0	28	-2.1	21	-6	64	5	310		28.75					30.14
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 19:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	6	300		28.75					30.14
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 19:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	6	290		28.76					30.15
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 20:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 20:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.77					30.16
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 20:55	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.78					30.17
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 21:15	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	8	310		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 21:35	FM-15	CLR:00	10		30	-1	27	-2.8	21	-6	69	7	310		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 21:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	310		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 22:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	5	290		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 22:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	3	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 22:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	3	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 23:15	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	3	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 23:35	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	5	300		28.79					30.18
WBAN:04978	DODGE CENTER AIRPORT MN US	397.8	44.01778	-92.83139	3/29/2018 23:55	FM-15	CLR:00	10		28	-2	26	-3.5	21	-6	74	6	300		28.8					30.19

Appendix C

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Short-term Sound Level Measurement Data

Table C-1: Short-term Sound Level Measurement Results

S1	Sound Pressure Level							
	Leq	L10	L50	L90	Leq	L10	L50	L90
	dBA	dBA	dBA	dBA	dBC	dBC	dBC	dBC
Daytime	52	53	41	31	63	64	55	50
Nighttime	50	53	28	23	58	59	47	44
S2	Sound Pressure Level							
	Leq	L10	L50	L90	Leq	L10	L50	L90
	dBA	dBA	dBA	dBA	dBC	dBC	dBC	dBC
Daytime	30	33	28	24	48	49	47	46
Nighttime	30	33	29	26	47	49	47	46

Notes:

1. Daytime and nighttime measurements were on March 20, 2018 and March 21, 2018, respectively

Appendix D

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DCW Wind Turbine Coordinates

**Table D-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
1	491773.49	4876513.69
2	492177.40	4876929.74
3	492515.95	4876507.29
4	492027.69	4875376.03
5	492382.70	4875021.02
6	492872.33	4874956.90
7	493480.60	4874916.73
8	493862.85	4875124.65
9	494524.33	4874201.90
10	495256.04	4875133.97
11	495645.46	4875128.40
12	496632.97	4866120.24
13	496950.55	4866540.12
14	496863.02	4867708.41
15	497232.19	4868242.38
16	496520.92	4868936.19
17	497702.64	4868650.42
18	498559.17	4869213.08
19	496175.92	4870443.22
20	496546.68	4870518.48
21	496901.03	4869976.79
22	497294.89	4869935.28
23	497723.95	4869962.98
24	498388.48	4870067.35
25	498952.27	4869760.73
26	496087.93	4871373.26
27	496519.91	4871371.21
28	498114.74	4870686.08
29	498532.91	4871403.19
30	499356.88	4871529.00
31	497612.89	4873395.25
32	498398.28	4872549.54
33	498796.96	4872868.03
34	500149.90	4873911.23
35	501398.06	4873589.09
36	501770.29	4873795.69
37	502124.90	4873815.21
38	502595.92	4873426.22
39	503005.34	4873519.47
40	503372.12	4873881.51
41	503770.23	4873926.96
42	500177.97	4872914.07
43	502301.86	4872993.95
44	501790.90	4872182.22
45	502227.91	4872122.24
46	502591.63	4872391.24
47	502991.91	4872505.27
48	503371.39	4872585.69
49	501755.51	4871361.61
50	503662.93	4871608.22

**Table D-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
51	504224.94	4871855.24
52	504569.48	4871409.27
53	505395.56	4871637.86
54	502140.74	4870760.46
55	503404.54	4870993.37
56	503820.93	4870883.24
57	504206.39	4870859.18
58	502581.34	4869899.76
59	502997.22	4870084.96
60	503382.55	4870096.20
61	503764.41	4869999.27
62	504662.35	4870183.97
63	505359.94	4869797.24
64	506497.95	4869971.23
65	502147.93	4869004.19
66	503091.92	4868779.21
67	503453.82	4869064.27
68	503763.25	4868682.38
Alt1	492991.91	4876607.27
Alt2	504008.92	4869270.22
Alt3	503919.66	4872259.61
Alt4	499837.87	4873507.53



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Sound Level Modeling Results – Tabular – Sorted by Receptor ID

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
1	491323.97	4876003.31	Non-Participating	1	41
2	494675.74	4874843.64	Participating	1	44
12	495571.71	4871482.46	Participating	1	43
13	508114.34	4869543.75	Non-Participating	1	33
14	502838.46	4866942.77	Non-Participating	1	35
15	507596.16	4875246.28	Non-Participating	1	30
16	511230.91	4871253.21	Non-Participating	1	26
17	511252.81	4866394.34	Non-Participating	1	25
18	510963.01	4866310.55	Non-Participating	1	25
19	511236.15	4865354.84	Non-Participating	1	24
20	511469.59	4865525.69	Non-Participating	1	24
21	511803.28	4864790.87	Non-Participating	1	23
22	512882.51	4865215.73	Non-Participating	1	23
23	512873.66	4865696.43	Non-Participating	1	23
24	512672.12	4864525.97	Non-Participating	1	22
25	511249.27	4863981.03	Non-Participating	1	23
26	511259.59	4863882.99	Non-Participating	1	23
27	511344.96	4863873.64	Non-Participating	1	23
28	511215.66	4862975.26	Non-Participating	1	23
29	496552.23	4874244.46	Participating	1	38
30	498628.08	4875979.63	Non-Participating	1	34
31	499002.42	4875287.65	Non-Participating	1	36
32	499599.12	4875101.12	Non-Participating	1	37
33	499667.39	4875349.30	Non-Participating	1	36
34	499579.55	4875568.90	Non-Participating	1	35
35	499611.30	4875969.22	Non-Participating	1	34
36	499630.61	4876074.26	Non-Participating	1	34
37	499592.84	4876172.35	Non-Participating	1	33
38	499584.90	4876221.63	Non-Participating	1	34
39	499575.64	4876277.53	Non-Participating	1	33
40	499452.74	4876213.03	Non-Participating	1	34
41	499633.37	4876323.52	Non-Participating	1	33
42	499577.34	4876430.68	Non-Participating	1	33
43	499610.04	4876414.33	Non-Participating	1	33
44	501043.37	4874380.00	Non-Participating	1	42
45	500947.46	4874527.17	Participating	1	41
46	501031.13	4874231.83	Non-Participating	1	43
47	501227.06	4875030.65	Non-Participating	1	39
48	501197.62	4875115.32	Non-Participating	1	38
49	501230.36	4875345.51	Non-Participating	1	37
50	501090.13	4875362.70	Non-Participating	1	37
51	501571.15	4875944.50	Non-Participating	1	35
52	501438.59	4876074.41	Non-Participating	1	35
53	502423.50	4876077.06	Non-Participating	1	35
54	502510.29	4875920.42	Non-Participating	1	35
55	502413.98	4875915.66	Non-Participating	1	35
56	502502.88	4875773.32	Non-Participating	1	36

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
57	502679.62	4875863.27	Non-Participating	1	36
58	502810.85	4875788.66	Non-Participating	1	36
59	502831.49	4875681.24	Non-Participating	1	36
60	502714.55	4875399.19	Non-Participating	1	38
61	502721.16	4875266.90	Non-Participating	1	38
62	502793.92	4874915.01	Participating	1	40
63	502795.77	4874857.59	Participating	1	40
64	502728.04	4874380.81	Participating	1	44
65	503738.09	4874989.75	Participating	1	39
66	504105.86	4874905.08	Non-Participating	1	39
67	504104.11	4874434.02	Participating	1	42
68	504298.15	4874837.83	Non-Participating	1	38
69	503489.38	4875803.62	Non-Participating	1	35
70	503392.81	4875830.08	Non-Participating	1	35
71	504290.41	4875654.93	Non-Participating	1	35
72	504273.87	4875735.63	Non-Participating	1	35
73	504056.70	4875882.71	Non-Participating	1	35
74	504535.62	4874968.38	Non-Participating	1	37
75	504475.43	4874793.75	Non-Participating	1	38
76	504646.75	4874484.85	Non-Participating	1	38
77	504921.92	4874625.08	Non-Participating	1	37
78	505001.62	4874532.14	Non-Participating	1	37
79	505124.98	4874525.20	Non-Participating	1	36
80	505184.52	4874515.28	Non-Participating	1	36
81	505399.82	4874479.23	Non-Participating	1	36
82	505367.74	4874307.25	Non-Participating	1	36
83	505532.77	4874466.33	Non-Participating	1	35
84	505566.18	4874182.83	Non-Participating	1	36
85	506083.22	4874314.89	Non-Participating	1	34
86	506058.09	4874109.83	Non-Participating	1	34
87	507311.95	4875159.44	Non-Participating	1	31
88	507422.02	4875164.20	Non-Participating	1	30
89	507528.65	4875149.91	Non-Participating	1	30
90	507599.42	4874772.15	Non-Participating	1	31
91	508121.97	4874981.77	Non-Participating	1	29
92	508591.19	4875255.26	Non-Participating	1	28
93	509166.13	4875086.85	Non-Participating	1	28
94	509022.59	4875282.64	Non-Participating	1	27
95	509351.34	4875158.02	Non-Participating	1	28
96	509416.42	4875235.41	Non-Participating	1	22
97	509776.66	4875411.96	Non-Participating	1	27
98	509731.74	4874372.94	Non-Participating	1	28
99	494854.60	4872697.99	Non-Participating	1	37
100	495132.34	4872890.10	Non-Participating	1	37
101	496413.53	4872753.51	Non-Participating	1	39
102	497067.91	4872235.01	Non-Participating	1	41
103	495778.39	4871934.81	Participating	1	42

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
104	495507.06	4871937.58	Non-Participating	1	40
105	497277.52	4872254.03	Non-Participating	1	41
106	497138.35	4873069.61	Participating	1	42
107	499065.71	4872231.14	Participating	1	44
108	499677.17	4872538.85	Non-Participating	1	44
109	498632.85	4872029.26	Non-Participating	1	45
110	498077.69	4874206.61	Non-Participating	1	39
111	499582.38	4871957.52	Non-Participating	1	44
112	499505.52	4873983.70	Participation Pending	1	44
113	499640.46	4874375.81	Non-Participating	1	42
114	499618.58	4874177.48	Participating	1	43
115	500691.28	4871972.52	Non-Participating	1	42
116	501183.27	4871944.87	Non-Participating	1	44
117	501103.10	4872967.75	Participation Pending	1	44
118	501528.69	4872860.66	Participating	1	45
119	503071.21	4871942.22	Participating	1	47
120	502725.93	4871787.44	Participating	1	47
121	503827.13	4872773.68	Participating	1	47
122	503996.46	4872856.76	Participating	1	45
123	504201.25	4872856.23	Participating	1	44
124	504551.09	4874079.47	Non-Participating	1	40
125	504758.52	4871963.59	Participating	1	46
126	504942.08	4872768.12	Non-Participating	1	41
127	505837.17	4873650.51	Non-Participating	1	36
128	506220.82	4873313.16	Non-Participating	1	35
129	506549.56	4872868.13	Non-Participating	1	35
130	506996.44	4872762.57	Non-Participating	1	34
131	506998.03	4871828.06	Non-Participating	1	36
132	507534.25	4871148.65	Non-Participating	1	35
133	507702.53	4871154.60	Non-Participating	1	34
134	507988.15	4871657.51	Non-Participating	1	33
135	508141.14	4872275.11	Non-Participating	1	32
136	507912.94	4872763.80	Non-Participating	1	32
137	507852.51	4872992.61	Participating	1	32
138	506865.15	4873428.54	Non-Participating	1	34
139	508493.79	4873588.15	Non-Participating	1	30
140	508608.89	4873590.53	Non-Participating	1	30
141	508631.91	4873590.93	Non-Participating	1	30
142	508613.65	4873652.84	Participating	1	30
143	508917.66	4873593.31	Non-Participating	1	29
144	509004.04	4872856.29	Non-Participating	1	29
145	509375.92	4872966.88	Participating	1	29
146	509975.20	4872682.45	Non-Participating	1	28
147	510643.93	4872858.40	Non-Participating	1	27
148	510742.82	4872673.86	Non-Participating	1	27
149	509722.39	4872284.72	Non-Participating	1	29
150	509630.84	4872355.63	Non-Participating	1	29

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
151	509722.69	4873399.56	Non-Participating	1	28
152	495349.84	4870249.67	Non-Participating	1	40
153	495559.21	4869681.85	Non-Participating	1	40
154	495562.38	4870204.93	Participation Pending	1	42
155	495124.76	4870677.40	Non-Participating	1	39
156	495559.28	4870851.63	Non-Participating	1	42
157	495387.82	4871379.34	Participating	1	41
158	495550.87	4871409.04	Participating	1	43
159	496488.82	4869537.11	Participating	1	45
160	496747.46	4869514.95	Non-Participating	1	46
161	497688.18	4869422.48	Participation Pending	1	46
162	499490.33	4869311.02	Participating	1	42
163	499484.18	4870256.98	Non-Participating	1	42
164	499480.74	4870826.96	Non-Participating	1	42
165	501120.03	4871028.07	Non-Participating	1	42
166	501137.73	4869524.71	Non-Participating	1	40
167	501212.34	4869298.23	Participation Pending	1	40
168	502822.20	4871087.25	Non-Participating	1	46
169	504355.79	4869657.97	Participating	1	46
170	504464.66	4869547.53	Participation Pending	1	46
171	505966.47	4869876.74	Participating	1	44
172	506068.12	4870744.95	Non-Participating	1	41
173	506052.46	4871492.14	Non-Participating	1	41
174	507891.98	4870234.05	Non-Participating	1	34
175	508823.64	4869539.44	Non-Participating	1	31
176	509063.51	4869535.71	Non-Participating	1	30
177	508143.94	4871002.25	Non-Participating	1	33
178	508887.77	4871155.48	Non-Participating	1	31
179	509716.92	4871621.42	Non-Participating	1	29
180	509716.39	4871712.56	Non-Participating	1	29
181	509642.37	4871517.50	Non-Participating	1	29
182	509638.57	4871313.88	Non-Participating	1	29
183	510238.58	4871099.40	Non-Participating	1	28
184	509715.57	4870766.88	Non-Participating	1	29
185	510779.47	4869615.18	Non-Participating	1	27
186	509710.09	4868616.84	Non-Participating	1	28
187	511208.69	4868187.15	Non-Participating	1	26
188	511358.45	4868626.10	Non-Participating	1	26
189	511354.81	4868870.63	Non-Participating	1	26
190	511340.26	4870437.24	Non-Participating	1	26
191	511328.61	4870357.34	Non-Participating	1	26
192	511231.78	4870673.51	Non-Participating	1	26
193	510669.32	4871235.95	Non-Participating	1	27
194	511198.71	4871506.32	Non-Participating	1	26
195	512094.54	4871434.48	Non-Participating	1	25
196	512320.76	4871236.81	Non-Participating	1	25
197	511855.79	4867910.86	Non-Participating	1	25

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
198	494754.88	4867302.15	Non-Participating	1	34
199	494905.17	4868021.02	Non-Participating	1	35
200	495449.94	4868724.88	Non-Participating	1	38
201	495138.07	4868819.47	Non-Participating	1	37
202	496022.17	4868650.40	Participating	1	42
203	495966.21	4867985.63	Non-Participating	1	40
204	495581.29	4867570.63	Non-Participating	1	37
205	496788.12	4867093.39	Participating	1	44
206	496798.37	4867179.05	Participating	1	44
207	499466.54	4867083.00	Non-Participating	1	35
208	499809.28	4868052.25	Non-Participating	1	37
209	499522.27	4869059.69	Non-Participating	1	41
210	502932.76	4869206.67	Non-Participating	1	47
211	502739.87	4868086.02	Non-Participating	1	41
212	501100.51	4867929.92	Non-Participating	1	37
213	501205.69	4868183.52	Non-Participating	1	37
214	501126.31	4866789.30	Non-Participating	1	34
215	502829.57	4866859.28	Non-Participating	1	35
216	503980.77	4867832.68	Participating	1	40
217	504375.89	4866974.59	Non-Participating	1	35
218	504434.89	4868964.79	Participation Pending	1	45
219	508048.06	4868683.08	Non-Participating	1	32
220	507577.42	4867933.06	Non-Participating	1	32
221	508256.18	4868031.55	Non-Participating	1	31
222	508160.93	4868043.79	Non-Participating	1	31
223	509431.73	4867831.46	Non-Participating	1	28
224	511197.03	4867137.19	Non-Participating	1	25
225	512836.13	4867255.07	Non-Participating	1	23
226	512876.54	4865698.06	Non-Participating	1	23
227	511254.51	4866393.12	Non-Participating	1	25
228	510956.59	4866312.68	Non-Participating	1	25
229	511803.46	4864790.40	Non-Participating	1	23
230	511248.62	4863982.43	Non-Participating	1	23
231	511238.56	4865356.24	Non-Participating	1	24
232	511480.24	4865525.57	Non-Participating	1	24
233	509654.54	4866311.78	Non-Participating	1	27
234	509084.69	4866510.99	Non-Participating	1	27
235	508125.47	4866480.14	Non-Participating	1	29
236	508115.22	4865668.00	Participating	1	28
237	508300.10	4864702.93	Non-Participating	1	26
238	508661.25	4864863.00	Non-Participating	1	26
239	509043.52	4864717.00	Non-Participating	1	26
240	508220.95	4863160.03	Non-Participating	1	25
241	508608.56	4863085.28	Non-Participating	1	25
242	510181.05	4863250.58	Non-Participating	1	23
243	509723.76	4864264.38	Non-Participating	1	25
244	507091.02	4863071.04	Non-Participating	1	26



**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
245	508023.68	4863776.16	Non-Participating	1	26
246	507972.08	4864241.82	Non-Participating	1	26
247	507911.18	4864780.64	Non-Participating	1	27
248	507075.09	4866460.06	Non-Participating	1	30
249	505979.98	4864375.54	Non-Participating	1	28
250	506660.75	4864623.72	Non-Participating	1	28
251	506083.96	4865856.15	Non-Participating	1	30
252	505944.82	4866307.39	Non-Participating	1	31
253	505982.60	4866485.83	Non-Participating	1	32
254	505286.95	4866388.36	Non-Participating	1	32
255	504453.20	4864368.89	Non-Participating	1	29
256	503837.48	4864808.63	Non-Participating	1	30
257	502759.65	4866448.52	Non-Participating	1	34
258	502756.62	4865044.88	Non-Participating	1	31
259	502847.64	4865132.72	Non-Participating	1	31
260	502861.92	4864320.45	Non-Participating	1	29
261	502744.45	4864637.95	Non-Participating	1	30
262	500293.87	4864408.55	Non-Participating	1	30
263	498693.14	4865949.36	Non-Participating	1	34
264	495594.27	4864552.69	Non-Participating	1	31
265	495484.80	4864629.42	Non-Participating	1	32
266	495481.67	4865143.24	Non-Participating	1	33
267	495597.95	4865308.34	Non-Participating	1	34
268	495580.09	4865567.90	Non-Participating	1	35
269	495577.97	4865900.74	Non-Participating	1	36
270	495457.06	4866413.77	Participating	1	36
271	495573.74	4866601.10	Non-Participating	1	37
272	494999.07	4865576.36	Non-Participating	1	33
273	495460.45	4863808.79	Non-Participating	1	29
274	495591.47	4863853.66	Non-Participating	1	29
275	495598.45	4863807.52	Non-Participating	1	29
276	495602.69	4864144.71	Non-Participating	1	30
277	495449.26	4863156.32	Non-Participating	1	28
278	495021.10	4862798.98	Non-Participating	1	27
279	495447.60	4861627.16	Non-Participating	1	26
280	495589.39	4861913.81	Non-Participating	1	26
281	496387.78	4863669.96	Non-Participating	1	30
282	495401.41	4862947.65	Non-Participating	1	28
283	497806.48	4861897.78	Non-Participating	1	27
284	498032.83	4862353.66	Non-Participating	1	27
285	497883.34	4862416.63	Non-Participating	1	27
286	497390.91	4863188.77	Non-Participating	1	29
287	499200.13	4863160.86	Non-Participating	1	28
288	499366.82	4863159.80	Non-Participating	1	28
289	499062.33	4863011.63	Non-Participating	1	28
290	499521.73	4863071.93	Non-Participating	1	28
291	499600.44	4863131.46	Non-Participating	1	28

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
292	499653.41	4863563.84	Non-Participating	1	29
293	500052.87	4861924.15	Non-Participating	1	26
294	500766.98	4862078.00	Non-Participating	1	26
295	501364.94	4862089.11	Non-Participating	1	26
296	501290.46	4862403.31	Non-Participating	1	27
297	501228.41	4863777.42	Non-Participating	1	29
298	502760.35	4863408.22	Non-Participating	1	28
299	502811.16	4863065.78	Non-Participating	1	27
300	502845.02	4861700.00	Non-Participating	1	26
301	504324.44	4863058.11	Non-Participating	1	27
302	504359.50	4863154.55	Non-Participating	1	27
303	505569.77	4863166.39	Non-Participating	1	27
304	505982.13	4863095.12	Non-Participating	1	26
305	505957.47	4862103.78	Non-Participating	1	25
306	506058.01	4862083.94	Non-Participating	1	25
307	505988.95	4862547.09	Non-Participating	1	26
308	505982.34	4861816.52	Non-Participating	1	25
309	508028.80	4862608.01	Non-Participating	1	24
310	510037.65	4862973.60	Non-Participating	1	23
311	509978.52	4862987.49	Non-Participating	1	23
312	511214.04	4862974.57	Non-Participating	1	23
313	496566.43	4861678.65	Non-Participating	1	26
314	496394.58	4861521.88	Non-Participating	1	26
315	498202.69	4861536.49	Non-Participating	1	26
316	499547.11	4861789.56	Non-Participating	1	26
317	499706.65	4861546.15	Non-Participating	1	26
318	503314.07	4861437.35	Non-Participating	1	25
319	504482.21	4861250.15	Non-Participating	1	25
320	504352.19	4861303.49	Non-Participating	1	25
321	504448.61	4861690.45	Non-Participating	1	25
322	505946.34	4860787.53	Non-Participating	1	24
323	512456.10	4867927.90	Non-Participating	1	24
324	512869.46	4865200.07	Non-Participating	1	23
325	511241.06	4863845.52	Non-Participating	1	23
326	511377.68	4863817.25	Non-Participating	1	23
327	511380.49	4867122.86	Non-Participating	1	19
328	511919.63	4867891.62	Non-Participating	1	25
329	510106.92	4875126.21	Non-Participating	1	27
330	509957.99	4875215.57	Non-Participating	1	27
331	509838.84	4875240.39	Non-Participating	1	26
332	509540.98	4875523.36	Non-Participating	1	27
333	508513.01	4875649.50	Non-Participating	1	24
334	508137.19	4875249.86	Non-Participating	1	29
335	507954.57	4875255.16	Non-Participating	1	29
336	507476.85	4875245.18	Non-Participating	1	30
337	507291.26	4875238.55	Non-Participating	1	30
338	507308.94	4875273.90	Non-Participating	1	30

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
339	507133.29	4875236.34	Non-Participating	1	31
340	506456.95	4875177.45	Non-Participating	1	32
341	506392.06	4875165.44	Non-Participating	1	32
342	506303.13	4875506.73	Non-Participating	1	32
343	506056.14	4874737.23	Non-Participating	1	33
344	505835.16	4874164.35	Non-Participating	1	35
345	506443.65	4873048.96	Non-Participating	1	35
346	507707.14	4873655.54	Non-Participating	1	29
347	507746.57	4873752.32	Non-Participating	1	29
348	509482.74	4869911.96	Non-Participating	1	29
349	510177.21	4869522.86	Non-Participating	1	28
350	509715.75	4868523.34	Non-Participating	1	28
351	509715.75	4867936.59	Non-Participating	1	28
352	506639.54	4867805.93	Non-Participating	1	33
353	505981.69	4867853.87	Non-Participating	1	35
354	506107.06	4861179.97	Non-Participating	1	24
355	504354.46	4863221.55	Non-Participating	1	27
356	504370.17	4866942.89	Non-Participating	1	35
357	504454.04	4869760.35	Participating	1	46
358	504953.18	4872026.30	Participating	1	45
359	505194.11	4872241.77	Participating	1	43
360	504982.82	4872823.99	Non-Participating	1	40
361	504632.53	4874064.72	Non-Participating	1	40
362	504550.66	4874140.13	Non-Participating	1	40
363	505058.05	4874529.02	Non-Participating	1	36
364	505317.29	4874471.44	Non-Participating	1	36
365	504311.78	4875881.90	Non-Participating	1	34
366	503080.23	4875981.03	Non-Participating	1	35
367	501067.74	4868680.68	Non-Participating	1	38
368	501045.42	4874262.69	Non-Participating	1	43
369	500526.98	4876004.95	Non-Participating	1	35
370	499677.17	4876262.10	Non-Participating	1	34
371	497251.94	4874354.41	Non-Participating	1	38
372	497140.70	4873107.83	Participating	1	42
373	499493.80	4874005.78	Participation Pending	1	43
374	499695.62	4871921.37	Non-Participating	1	44
375	495332.11	4865917.77	Non-Participating	1	35
376	495778.75	4872841.02	Participating	1	38
377	496079.55	4874600.17	Participating	1	41
378	493303.66	4865363.05	Non-Participating	1	28
379	493858.51	4865675.06	Non-Participating	1	30
380	494597.57	4865481.24	Non-Participating	1	31
381	494950.93	4865608.48	Non-Participating	1	33
382	494693.22	4861787.99	Non-Participating	1	25
383	494229.69	4862485.36	Non-Participating	1	25
384	493181.97	4865807.99	Non-Participating	1	29
385	493478.15	4866684.14	Non-Participating	1	30

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
386	494547.73	4867036.45	Non-Participating	1	33
387	493147.39	4867174.99	Non-Participating	1	30
388	494039.10	4868100.58	Non-Participating	1	33
389	494018.51	4868810.50	Participating	1	33
390	493659.28	4869128.74	Non-Participating	1	33
391	493009.42	4868795.04	Participating	1	31
392	492892.87	4868809.26	Non-Participating	1	30
393	492790.68	4869907.25	Participating	1	31
394	493362.95	4869980.97	Non-Participating	1	32
395	494639.05	4870297.72	Participating	1	36
396	493230.51	4871142.26	Non-Participating	1	33
397	493766.48	4871236.38	Non-Participating	1	34
398	493921.25	4871132.90	Non-Participating	1	34
399	493540.46	4872673.61	Non-Participating	1	34
400	494524.93	4872747.21	Non-Participating	1	36
401	493407.56	4872816.88	Non-Participating	1	35
402	493747.84	4873206.91	Non-Participating	1	37
403	494151.04	4873285.23	Participating	1	38
404	494002.17	4873709.27	Participating	1	40
405	494024.46	4873648.96	Participating	1	40
406	495243.19	4873764.68	Participating	1	39
407	495706.37	4874363.08	Participating	1	41
408	495270.39	4874448.85	Non-Participating	1	43
409	494786.51	4875095.87	Participating	1	44
410	494742.68	4874890.93	Participating	1	44
411	494673.38	4874964.89	Participating	1	43
412	493870.54	4874371.18	Participating	1	44
413	494159.74	4874451.58	Participating	1	45
414	493136.16	4874000.60	Participating	1	40
415	494807.37	4875552.26	Participating	1	42
416	495595.18	4875646.56	Participation Pending	1	43
417	493717.24	4875917.78	Non-Participating	1	42
418	494099.39	4876121.20	Participating	1	40
419	493086.55	4876093.83	Participating	1	44
420	492917.55	4875943.58	Non-Participating	1	44
421	492824.93	4874336.74	Participating	1	43
422	493045.90	4873720.17	Participating	1	38
423	492516.61	4873491.63	Non-Participating	1	36
424	492393.91	4872911.32	Participating	1	34
425	492485.00	4872667.59	Participating	1	34
426	492280.30	4872422.45	Participating	1	33
427	492886.93	4871221.63	Non-Participating	1	32
428	493003.05	4871142.66	Non-Participating	1	32
429	492012.71	4870131.27	Participating	1	30
430	491814.62	4869462.51	Participating	1	29
431	492354.77	4868912.11	Participating	1	30
432	492373.27	4868475.96	Non-Participating	1	30

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
433	492178.63	4867809.55	Non-Participating	1	28
434	492842.51	4867801.89	Non-Participating	1	30
435	491772.81	4867258.11	Non-Participating	1	27
436	492683.89	4866290.27	Non-Participating	1	28
437	492560.24	4865883.35	Non-Participating	1	28
438	493165.10	4862890.93	Non-Participating	1	26
439	493590.90	4862204.60	Non-Participating	1	25
440	499494.35	4875986.15	Non-Participating	1	34
441	509739.94	4875483.39	Non-Participating	1	27
442	499516.46	4866307.27	Non-Participating	1	33
443	512055.62	4871144.22	Non-Participating	1	25
444	507243.76	4875236.34	Non-Participating	1	31
445	508298.59	4873512.15	Non-Participating	1	30
446	490229.89	4872596.92	Non-Participating	1	30
447	489847.36	4872269.25	Non-Participating	1	28
448	488635.42	4877561.29	Non-Participating	1	28
449	488219.84	4877375.84	Non-Participating	1	27
450	488227.59	4877664.18	Non-Participating	1	27
451	487845.93	4879211.82	Non-Participating	1	25
452	486858.06	4879271.46	Non-Participating	1	24
453	486750.57	4879405.48	Non-Participating	1	24
454	487445.96	4879108.89	Non-Participating	1	25
455	487500.71	4879138.87	Non-Participating	1	25
456	486363.48	4879172.96	Non-Participating	1	23
457	487110.32	4877460.18	Non-Participating	1	25
458	486739.40	4877456.16	Non-Participating	1	25
459	486738.89	4877554.33	Non-Participating	1	25
460	486756.68	4878037.63	Non-Participating	1	24
461	486660.03	4877806.42	Non-Participating	1	24
462	485834.32	4879132.42	Non-Participating	1	23
463	485809.66	4879170.03	Non-Participating	1	23
464	486256.72	4877643.56	Non-Participating	1	24
465	485959.87	4877465.90	Non-Participating	1	24
466	484581.56	4877648.78	Non-Participating	1	22
467	483815.76	4877785.78	Non-Participating	1	21
468	485477.21	4877647.07	Non-Participating	1	23
469	485584.47	4877637.05	Non-Participating	1	23
470	485555.94	4877595.45	Non-Participating	1	23
471	485553.87	4877635.12	Non-Participating	1	23
472	485326.16	4879324.31	Non-Participating	1	22
473	485052.32	4879054.82	Non-Participating	1	22
474	485117.12	4878621.98	Non-Participating	1	21
475	488227.48	4878434.34	Non-Participating	1	26
476	488294.10	4878419.31	Non-Participating	1	27
477	488578.50	4878448.47	Non-Participating	1	27
478	488238.28	4878729.90	Non-Participating	1	26
479	488802.63	4879306.04	Non-Participating	1	26

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
480	489444.23	4879207.74	Non-Participating	1	28
481	489545.45	4879212.95	Non-Participating	1	28
482	489635.56	4878759.90	Non-Participating	1	29
483	490495.82	4879286.80	Non-Participating	1	29
484	490977.06	4879298.11	Non-Participating	1	30
485	490949.78	4879137.82	Non-Participating	1	30
486	491460.25	4878431.59	Non-Participating	1	33
487	491713.80	4878334.91	Non-Participating	1	34
488	491806.50	4879142.21	Non-Participating	1	31
489	492039.41	4879331.55	Non-Participating	1	30
490	492860.00	4879226.20	Non-Participating	1	31
491	493142.48	4879036.43	Non-Participating	1	32
492	492758.53	4879319.56	Non-Participating	1	31
493	494040.55	4879209.90	Non-Participating	1	31
494	494946.88	4878858.40	Non-Participating	1	31
495	494631.87	4878070.88	Non-Participating	1	33
496	494622.23	4878130.23	Non-Participating	1	33
497	495153.30	4877779.20	Non-Participating	1	33
498	494779.88	4877690.16	Non-Participating	1	33
499	494656.56	4877212.33	Non-Participating	1	35
500	493010.05	4877412.07	Participating	1	41
501	493292.00	4877317.09	Participation Pending	1	40
502	493253.70	4877817.21	Non-Participating	1	37
503	492754.95	4877751.84	Non-Participating	1	39
504	492937.93	4877693.98	Non-Participating	1	39
505	492333.63	4877666.52	Non-Participating	1	40
506	492251.72	4877503.81	Participating	1	42
507	492234.18	4877555.41	Participating	1	41
508	492209.17	4877379.83	Participating	1	44
509	491204.57	4877592.32	Non-Participating	1	37
510	490993.10	4877604.29	Non-Participating	1	36
511	490950.33	4877852.19	Non-Participating	1	35
512	489835.40	4877912.18	Non-Participating	1	31
513	489914.98	4877880.09	Non-Participating	1	31
514	490320.50	4876915.99	Non-Participating	1	34
515	490345.19	4876928.97	Non-Participating	1	34
516	489824.65	4877177.26	Non-Participating	1	32
517	489798.47	4877241.24	Non-Participating	1	32
518	488326.68	4876849.62	Non-Participating	1	28
519	488211.66	4877034.73	Non-Participating	1	28
520	486597.05	4876484.54	Non-Participating	1	25
521	485139.90	4876925.87	Non-Participating	1	23
522	485112.68	4876718.66	Non-Participating	1	23
523	485111.73	4876886.12	Non-Participating	1	23
524	484576.48	4877381.31	Non-Participating	1	22
525	484604.14	4877406.38	Non-Participating	1	22
526	484415.46	4876945.29	Non-Participating	1	22



**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
527	484482.97	4876529.89	Non-Participating	1	22
528	484133.35	4876454.25	Non-Participating	1	22
529	483354.68	4876911.14	Non-Participating	1	21
530	483340.51	4876941.40	Non-Participating	1	21
531	483284.50	4877111.89	Non-Participating	1	21
532	483894.45	4877038.60	Non-Participating	1	21
533	483805.65	4877165.29	Non-Participating	1	21
534	500183.35	4876832.93	Non-Participating	1	33
535	498032.98	4876897.85	Non-Participating	1	32
536	497876.00	4876576.62	Non-Participating	1	33
537	496003.73	4876090.86	Participating	1	38
538	483371.66	4876260.99	Non-Participating	1	21
539	483342.50	4876216.88	Non-Participating	1	21
540	483353.94	4876115.55	Non-Participating	1	21
541	483356.50	4875964.09	Non-Participating	1	21
542	483610.07	4875926.75	Non-Participating	1	21
543	484347.49	4875779.83	Non-Participating	1	22
544	484122.70	4876211.77	Non-Participating	1	22
545	484639.57	4876183.37	Non-Participating	1	22
546	485040.33	4875536.46	Non-Participating	1	23
547	485950.14	4875850.27	Non-Participating	1	24
548	485922.83	4875490.30	Non-Participating	1	24
549	485570.32	4875343.66	Non-Participating	1	24
550	486758.93	4875870.36	Non-Participating	1	25
551	486732.47	4875847.61	Non-Participating	1	25
552	487379.99	4875967.61	Non-Participating	1	26
553	487414.85	4875979.00	Non-Participating	1	26
554	486752.22	4876287.93	Non-Participating	1	25
555	488220.58	4875677.44	Non-Participating	1	28
556	488332.16	4876043.35	Participating	1	28
557	489116.44	4875427.96	Non-Participating	1	30
558	489070.22	4875417.85	Non-Participating	1	30
559	489141.82	4875405.73	Non-Participating	1	30
560	488998.60	4876062.19	Participating	1	30
561	489826.70	4875987.32	Non-Participating	1	32
562	490243.39	4876075.04	Non-Participating	1	34
563	490277.50	4875981.51	Non-Participating	1	34
564	490318.56	4876072.58	Non-Participating	1	35
565	490841.49	4875989.47	Non-Participating	1	38
566	491021.44	4876062.81	Participation Pending	1	39
567	491885.42	4875936.91	Participation Pending	1	45
568	492288.14	4875939.17	Participating	1	45
569	485068.52	4874814.15	Non-Participating	1	17
570	485049.92	4874303.42	Non-Participating	1	23
571	485562.84	4875163.93	Non-Participating	1	24
572	485226.22	4873854.62	Non-Participating	1	23
573	484962.06	4873636.11	Non-Participating	1	22

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
574	485076.63	4873384.34	Non-Participating	1	23
575	485248.40	4873345.47	Non-Participating	1	23
576	485233.04	4873372.20	Non-Participating	1	23
577	484992.60	4872278.33	Non-Participating	1	23
578	484936.10	4872282.95	Non-Participating	1	23
579	485379.31	4872761.19	Non-Participating	1	23
580	486198.35	4872740.10	Non-Participating	1	24
581	486676.17	4872464.77	Non-Participating	1	25
582	486655.64	4873090.69	Non-Participating	1	25
583	487877.11	4873120.91	Non-Participating	1	26
584	488112.71	4872671.02	Non-Participating	1	26
585	489802.42	4873070.99	Non-Participating	1	29
586	490903.77	4872050.05	Non-Participating	1	30
587	491158.49	4872615.01	Non-Participating	1	31
588	491617.71	4872744.89	Non-Participating	1	32
589	491351.60	4872844.56	Non-Participating	1	31
590	491439.59	4872911.18	Non-Participating	1	33
591	486316.80	4874665.05	Non-Participating	1	25
592	487443.29	4874431.59	Non-Participating	1	25
593	488227.77	4874362.55	Participating	1	27
594	488176.73	4874445.52	Non-Participating	1	27
595	488313.23	4874925.37	Participating	1	28
596	488330.19	4874908.78	Participating	1	28
597	490542.51	4874927.42	Participating	1	35
598	490484.06	4874350.37	Participating	1	33
599	490667.31	4874464.80	Participating	1	34
600	489910.19	4874274.68	Participating	1	31
601	489305.30	4874280.67	Participating	1	30
602	489395.90	4874448.33	Participating	1	30
603	491911.47	4874443.00	Participating	1	41
604	491551.67	4874626.99	Participating	1	40
605	491452.04	4874745.89	Participating	1	40
606	490742.07	4874350.00	Non-Participating	1	34
607	492196.54	4873592.10	Participating	1	36
608	491538.28	4873118.40	Non-Participating	1	33
609	490427.30	4873185.69	Non-Participating	1	31
610	490308.00	4873855.52	Non-Participating	1	32
611	489807.12	4873557.35	Non-Participating	1	30
612	488849.73	4874109.24	Non-Participating	1	29
613	488302.06	4873557.83	Non-Participating	1	27
614	487911.15	4873636.20	Non-Participating	1	27
615	487684.01	4873459.47	Non-Participating	1	26
616	487514.01	4873755.84	Non-Participating	1	26
617	487184.42	4873945.73	Non-Participating	1	26
618	486591.04	4874277.89	Non-Participating	1	25
619	486670.36	4873699.15	Non-Participating	1	25
620	486755.87	4873650.47	Non-Participating	1	25

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
621	486727.45	4871753.50	Non-Participating	1	20
622	486094.94	4871309.02	Non-Participating	1	24
623	486638.09	4871400.01	Non-Participating	1	24
624	486672.02	4870622.68	Non-Participating	1	24
625	486655.48	4870232.51	Non-Participating	1	24
626	487378.63	4870881.50	Non-Participating	1	23
627	487448.24	4871236.67	Non-Participating	1	25
628	487697.00	4871268.04	Non-Participating	1	25
629	488319.13	4871047.52	Non-Participating	1	26
630	487859.22	4870334.28	Non-Participating	1	25
631	488100.93	4870340.68	Non-Participating	1	25
632	488931.40	4870482.89	Non-Participating	1	26
633	489465.02	4870612.47	Non-Participating	1	25
634	489473.93	4870174.17	Non-Participating	1	24
635	489918.83	4870357.95	Non-Participating	1	26
636	490477.39	4870317.69	Non-Participating	1	26
637	491440.93	4870296.94	Participating	1	29
638	491691.36	4870338.51	Non-Participating	1	30
639	491742.59	4870251.31	Non-Participating	1	30
640	490556.45	4870428.90	Non-Participating	1	28
641	490729.74	4870543.54	Non-Participating	1	28
642	492088.16	4871151.03	Participating	1	30
643	492101.16	4871308.61	Non-Participating	1	31
644	491583.87	4871268.58	Non-Participating	1	30
645	491466.08	4871036.24	Non-Participating	1	30
646	490182.63	4871392.80	Non-Participating	1	28
647	490146.04	4871128.30	Non-Participating	1	28
648	489684.58	4871207.32	Non-Participating	1	28
649	489742.38	4869647.95	Non-Participating	1	26
650	490330.39	4868981.77	Non-Participating	1	27
651	490439.21	4869028.96	Non-Participating	1	27
652	491759.63	4869590.01	Non-Participating	1	29
653	491515.95	4869809.52	Non-Participating	1	27
654	490718.55	4869035.68	Non-Participating	1	28
655	491214.49	4868921.13	Non-Participating	1	28
656	491144.65	4868793.54	Non-Participating	1	28
657	490586.54	4867989.99	Non-Participating	1	25
658	490772.60	4868329.90	Non-Participating	1	26
659	490521.01	4868392.32	Non-Participating	1	26
660	490399.71	4868828.19	Non-Participating	1	27
661	490132.35	4868300.15	Non-Participating	1	20
662	489421.01	4868140.33	Non-Participating	1	25
663	487623.14	4868576.03	Non-Participating	1	24
664	487782.58	4867705.95	Non-Participating	1	24
665	488410.14	4867926.75	Non-Participating	1	24
666	490006.54	4867558.26	Non-Participating	1	24
667	489786.08	4867239.58	Non-Participating	1	23

**Table E-1: Project Only Results**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
668	489471.01	4866930.92	Non-Participating	1	19
669	489407.69	4866850.23	Non-Participating	1	24
670	489550.29	4866777.40	Non-Participating	1	23
671	489177.54	4866889.51	Non-Participating	1	24
672	489191.30	4866647.84	Non-Participating	1	24
673	489312.09	4866497.79	Non-Participating	1	25
674	489313.39	4866375.23	Non-Participating	1	25
675	489310.25	4866131.82	Non-Participating	1	24
676	489861.71	4865984.83	Non-Participating	1	25
677	489395.33	4866310.51	Non-Participating	1	25
678	490197.73	4866693.01	Non-Participating	1	24
679	490217.54	4866649.68	Non-Participating	1	24
680	490017.33	4865967.73	Non-Participating	1	25
681	490278.87	4865979.10	Non-Participating	1	25
682	490410.02	4866045.09	Non-Participating	1	25
683	490085.49	4864761.25	Non-Participating	1	23
684	489923.58	4864746.23	Non-Participating	1	23
685	489842.93	4865195.32	Non-Participating	1	24
686	492242.97	4868718.98	Non-Participating	1	30
687	492201.39	4868471.14	Participating	1	29
688	491286.85	4866494.23	Non-Participating	1	27
689	491009.28	4865891.24	Non-Participating	1	26
690	491637.21	4866020.30	Non-Participating	1	27
691	492326.88	4865129.44	Non-Participating	1	27
692	491378.79	4865103.88	Non-Participating	1	26
693	491360.33	4865074.29	Non-Participating	1	26
694	492846.71	4863545.15	Non-Participating	1	26
695	491647.96	4864076.25	Non-Participating	1	25
696	490594.15	4864686.77	Non-Participating	1	24
697	492988.35	4862968.51	Non-Participating	1	26
698	493649.83	4863248.87	Non-Participating	1	26
699	494269.33	4863513.13	Non-Participating	1	27
700	493677.47	4863383.00	Non-Participating	1	27
701	493669.38	4863482.76	Non-Participating	1	27
702	483374.01	4877839.13	Non-Participating	1	21
703	483734.01	4879213.02	Non-Participating	1	21

Appendix F

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Sound Level Modeling Results – Tabular - Sorted by Sound Level

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
119	503071.21	4871942.22	Participating	1	47
210	502932.76	4869206.67	Non-Participating	1	47
121	503827.13	4872773.68	Participating	1	47
120	502725.93	4871787.44	Participating	1	47
357	504454.04	4869760.35	Participating	1	46
169	504355.79	4869657.97	Participating	1	46
160	496747.46	4869514.95	Non-Participating	1	46
161	497688.18	4869422.48	Participation Pending	1	46
168	502822.20	4871087.25	Non-Participating	1	46
125	504758.52	4871963.59	Participating	1	46
170	504464.66	4869547.53	Participation Pending	1	46
118	501528.69	4872860.66	Participating	1	45
122	503996.46	4872856.76	Participating	1	45
159	496488.82	4869537.11	Participating	1	45
568	492288.14	4875939.17	Participating	1	45
413	494159.74	4874451.58	Participating	1	45
109	498632.85	4872029.26	Non-Participating	1	45
358	504953.18	4872026.30	Participating	1	45
218	504434.89	4868964.79	Participation Pending	1	45
567	491885.42	4875936.91	Participation Pending	1	45
419	493086.55	4876093.83	Participating	1	44
409	494786.51	4875095.87	Participating	1	44
111	499582.38	4871957.52	Non-Participating	1	44
107	499065.71	4872231.14	Participating	1	44
117	501103.10	4872967.75	Participation Pending	1	44
123	504201.25	4872856.23	Participating	1	44
420	492917.55	4875943.58	Non-Participating	1	44
508	492209.17	4877379.83	Participating	1	44
410	494742.68	4874890.93	Participating	1	44
116	501183.27	4871944.87	Non-Participating	1	44
171	505966.47	4869876.74	Participating	1	44
206	496798.37	4867179.05	Participating	1	44
2	494675.74	4874843.64	Participating	1	44
112	499505.52	4873983.70	Participation Pending	1	44
205	496788.12	4867093.39	Participating	1	44
374	499695.62	4871921.37	Non-Participating	1	44
64	502728.04	4874380.81	Participating	1	44
108	499677.17	4872538.85	Non-Participating	1	44
412	493870.54	4874371.18	Participating	1	44
411	494673.38	4874964.89	Participating	1	43
416	495595.18	4875646.56	Participation Pending	1	43
373	499493.80	4874005.78	Participation Pending	1	43
114	499618.58	4874177.48	Participating	1	43
12	495571.71	4871482.46	Participating	1	43
46	501031.13	4874231.83	Non-Participating	1	43
421	492824.93	4874336.74	Participating	1	43
158	495550.87	4871409.04	Participating	1	43



**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
359	505194.11	4872241.77	Participating	1	43
368	501045.42	4874262.69	Non-Participating	1	43
408	495270.39	4874448.85	Non-Participating	1	43
156	495559.28	4870851.63	Non-Participating	1	42
202	496022.17	4868650.40	Participating	1	42
165	501120.03	4871028.07	Non-Participating	1	42
164	499480.74	4870826.96	Non-Participating	1	42
415	494807.37	4875552.26	Participating	1	42
67	504104.11	4874434.02	Participating	1	42
44	501043.37	4874380.00	Non-Participating	1	42
163	499484.18	4870256.98	Non-Participating	1	42
372	497140.70	4873107.83	Participating	1	42
506	492251.72	4877503.81	Participating	1	42
154	495562.38	4870204.93	Participation Pending	1	42
106	497138.35	4873069.61	Participating	1	42
115	500691.28	4871972.52	Non-Participating	1	42
162	499490.33	4869311.02	Participating	1	42
103	495778.39	4871934.81	Participating	1	42
113	499640.46	4874375.81	Non-Participating	1	42
417	493717.24	4875917.78	Non-Participating	1	42
1	491323.97	4876003.31	Non-Participating	1	41
211	502739.87	4868086.02	Non-Participating	1	41
507	492234.18	4877555.41	Participating	1	41
45	500947.46	4874527.17	Participating	1	41
157	495387.82	4871379.34	Participating	1	41
173	506052.46	4871492.14	Non-Participating	1	41
126	504942.08	4872768.12	Non-Participating	1	41
407	495706.37	4874363.08	Participating	1	41
603	491911.47	4874443.00	Participating	1	41
377	496079.55	4874600.17	Participating	1	41
105	497277.52	4872254.03	Non-Participating	1	41
172	506068.12	4870744.95	Non-Participating	1	41
102	497067.91	4872235.01	Non-Participating	1	41
209	499522.27	4869059.69	Non-Participating	1	41
500	493010.05	4877412.07	Participating	1	41
124	504551.09	4874079.47	Non-Participating	1	40
360	504982.82	4872823.99	Non-Participating	1	40
63	502795.77	4874857.59	Participating	1	40
404	494002.17	4873709.27	Participating	1	40
152	495349.84	4870249.67	Non-Participating	1	40
362	504550.66	4874140.13	Non-Participating	1	40
414	493136.16	4874000.60	Participating	1	40
153	495559.21	4869681.85	Non-Participating	1	40
501	493292.00	4877317.09	Participation Pending	1	40
505	492333.63	4877666.52	Non-Participating	1	40
62	502793.92	4874915.01	Participating	1	40
104	495507.06	4871937.58	Non-Participating	1	40

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
216	503980.77	4867832.68	Participating	1	40
405	494024.46	4873648.96	Participating	1	40
167	501212.34	4869298.23	Participation Pending	1	40
203	495966.21	4867985.63	Non-Participating	1	40
361	504632.53	4874064.72	Non-Participating	1	40
418	494099.39	4876121.20	Participating	1	40
605	491452.04	4874745.89	Participating	1	40
166	501137.73	4869524.71	Non-Participating	1	40
604	491551.67	4874626.99	Participating	1	40
406	495243.19	4873764.68	Participating	1	39
155	495124.76	4870677.40	Non-Participating	1	39
566	491021.44	4876062.81	Participation Pending	1	39
65	503738.09	4874989.75	Participating	1	39
110	498077.69	4874206.61	Non-Participating	1	39
47	501227.06	4875030.65	Non-Participating	1	39
66	504105.86	4874905.08	Non-Participating	1	39
101	496413.53	4872753.51	Non-Participating	1	39
503	492754.95	4877751.84	Non-Participating	1	39
504	492937.93	4877693.98	Non-Participating	1	39
68	504298.15	4874837.83	Non-Participating	1	38
367	501067.74	4868680.68	Non-Participating	1	38
48	501197.62	4875115.32	Non-Participating	1	38
200	495449.94	4868724.88	Non-Participating	1	38
422	493045.90	4873720.17	Participating	1	38
61	502721.16	4875266.90	Non-Participating	1	38
76	504646.75	4874484.85	Non-Participating	1	38
75	504475.43	4874793.75	Non-Participating	1	38
371	497251.94	4874354.41	Non-Participating	1	38
403	494151.04	4873285.23	Participating	1	38
29	496552.23	4874244.46	Participating	1	38
565	490841.49	4875989.47	Non-Participating	1	38
60	502714.55	4875399.19	Non-Participating	1	38
376	495778.75	4872841.02	Participating	1	38
537	496003.73	4876090.86	Participating	1	38
213	501205.69	4868183.52	Non-Participating	1	37
49	501230.36	4875345.51	Non-Participating	1	37
204	495581.29	4867570.63	Non-Participating	1	37
32	499599.12	4875101.12	Non-Participating	1	37
50	501090.13	4875362.70	Non-Participating	1	37
74	504535.62	4874968.38	Non-Participating	1	37
100	495132.34	4872890.10	Non-Participating	1	37
77	504921.92	4874625.08	Non-Participating	1	37
201	495138.07	4868819.47	Non-Participating	1	37
271	495573.74	4866601.10	Non-Participating	1	37
402	493747.84	4873206.91	Non-Participating	1	37
502	493253.70	4877817.21	Non-Participating	1	37
509	491204.57	4877592.32	Non-Participating	1	37

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
78	505001.62	4874532.14	Non-Participating	1	37
208	499809.28	4868052.25	Non-Participating	1	37
99	494854.60	4872697.99	Non-Participating	1	37
212	501100.51	4867929.92	Non-Participating	1	37
363	505058.05	4874529.02	Non-Participating	1	36
423	492516.61	4873491.63	Non-Participating	1	36
395	494639.05	4870297.72	Participating	1	36
607	492196.54	4873592.10	Participating	1	36
33	499667.39	4875349.30	Non-Participating	1	36
59	502831.49	4875681.24	Non-Participating	1	36
79	505124.98	4874525.20	Non-Participating	1	36
400	494524.93	4872747.21	Non-Participating	1	36
80	505184.52	4874515.28	Non-Participating	1	36
269	495577.97	4865900.74	Non-Participating	1	36
270	495457.06	4866413.77	Participating	1	36
82	505367.74	4874307.25	Non-Participating	1	36
56	502502.88	4875773.32	Non-Participating	1	36
58	502810.85	4875788.66	Non-Participating	1	36
127	505837.17	4873650.51	Non-Participating	1	36
364	505317.29	4874471.44	Non-Participating	1	36
31	499002.42	4875287.65	Non-Participating	1	36
510	490993.10	4877604.29	Non-Participating	1	36
57	502679.62	4875863.27	Non-Participating	1	36
84	505566.18	4874182.83	Non-Participating	1	36
81	505399.82	4874479.23	Non-Participating	1	36
131	506998.03	4871828.06	Non-Participating	1	36
54	502510.29	4875920.42	Non-Participating	1	35
55	502413.98	4875915.66	Non-Participating	1	35
69	503489.38	4875803.62	Non-Participating	1	35
70	503392.81	4875830.08	Non-Participating	1	35
128	506220.82	4873313.16	Non-Participating	1	35
14	502838.46	4866942.77	Non-Participating	1	35
129	506549.56	4872868.13	Non-Participating	1	35
345	506443.65	4873048.96	Non-Participating	1	35
51	501571.15	4875944.50	Non-Participating	1	35
83	505532.77	4874466.33	Non-Participating	1	35
34	499579.55	4875568.90	Non-Participating	1	35
268	495580.09	4865567.90	Non-Participating	1	35
71	504290.41	4875654.93	Non-Participating	1	35
199	494905.17	4868021.02	Non-Participating	1	35
215	502829.57	4866859.28	Non-Participating	1	35
366	503080.23	4875981.03	Non-Participating	1	35
53	502423.50	4876077.06	Non-Participating	1	35
207	499466.54	4867083.00	Non-Participating	1	35
217	504375.89	4866974.59	Non-Participating	1	35
344	505835.16	4874164.35	Non-Participating	1	35
401	493407.56	4872816.88	Non-Participating	1	35

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
499	494656.56	4877212.33	Non-Participating	1	35
52	501438.59	4876074.41	Non-Participating	1	35
356	504370.17	4866942.89	Non-Participating	1	35
72	504273.87	4875735.63	Non-Participating	1	35
353	505981.69	4867853.87	Non-Participating	1	35
375	495332.11	4865917.77	Non-Participating	1	35
597	490542.51	4874927.42	Participating	1	35
132	507534.25	4871148.65	Non-Participating	1	35
369	500526.98	4876004.95	Non-Participating	1	35
564	490318.56	4876072.58	Non-Participating	1	35
73	504056.70	4875882.71	Non-Participating	1	35
511	490950.33	4877852.19	Non-Participating	1	35
86	506058.09	4874109.83	Non-Participating	1	34
399	493540.46	4872673.61	Non-Participating	1	34
487	491713.80	4878334.91	Non-Participating	1	34
563	490277.50	4875981.51	Non-Participating	1	34
606	490742.07	4874350.00	Non-Participating	1	34
515	490345.19	4876928.97	Non-Participating	1	34
562	490243.39	4876075.04	Non-Participating	1	34
130	506996.44	4872762.57	Non-Participating	1	34
267	495597.95	4865308.34	Non-Participating	1	34
365	504311.78	4875881.90	Non-Participating	1	34
514	490320.50	4876915.99	Non-Participating	1	34
174	507891.98	4870234.05	Non-Participating	1	34
263	498693.14	4865949.36	Non-Participating	1	34
398	493921.25	4871132.90	Non-Participating	1	34
424	492393.91	4872911.32	Participating	1	34
440	499494.35	4875986.15	Non-Participating	1	34
85	506083.22	4874314.89	Non-Participating	1	34
133	507702.53	4871154.60	Non-Participating	1	34
198	494754.88	4867302.15	Non-Participating	1	34
214	501126.31	4866789.30	Non-Participating	1	34
397	493766.48	4871236.38	Non-Participating	1	34
30	498628.08	4875979.63	Non-Participating	1	34
35	499611.30	4875969.22	Non-Participating	1	34
257	502759.65	4866448.52	Non-Participating	1	34
599	490667.31	4874464.80	Participating	1	34
38	499584.90	4876221.63	Non-Participating	1	34
40	499452.74	4876213.03	Non-Participating	1	34
138	506865.15	4873428.54	Non-Participating	1	34
370	499677.17	4876262.10	Non-Participating	1	34
425	492485.00	4872667.59	Participating	1	34
36	499630.61	4876074.26	Non-Participating	1	34
41	499633.37	4876323.52	Non-Participating	1	33
343	506056.14	4874737.23	Non-Participating	1	33
442	499516.46	4866307.27	Non-Participating	1	33
486	491460.25	4878431.59	Non-Participating	1	33

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
498	494779.88	4877690.16	Non-Participating	1	33
598	490484.06	4874350.37	Participating	1	33
352	506639.54	4867805.93	Non-Participating	1	33
608	491538.28	4873118.40	Non-Participating	1	33
39	499575.64	4876277.53	Non-Participating	1	33
42	499577.34	4876430.68	Non-Participating	1	33
43	499610.04	4876414.33	Non-Participating	1	33
266	495481.67	4865143.24	Non-Participating	1	33
389	494018.51	4868810.50	Participating	1	33
37	499592.84	4876172.35	Non-Participating	1	33
13	508114.34	4869543.75	Non-Participating	1	33
386	494547.73	4867036.45	Non-Participating	1	33
426	492280.30	4872422.45	Participating	1	33
134	507988.15	4871657.51	Non-Participating	1	33
177	508143.94	4871002.25	Non-Participating	1	33
396	493230.51	4871142.26	Non-Participating	1	33
495	494631.87	4878070.88	Non-Participating	1	33
536	497876.00	4876576.62	Non-Participating	1	33
272	494999.07	4865576.36	Non-Participating	1	33
388	494039.10	4868100.58	Non-Participating	1	33
497	495153.30	4877779.20	Non-Participating	1	33
381	494950.93	4865608.48	Non-Participating	1	33
390	493659.28	4869128.74	Non-Participating	1	33
496	494622.23	4878130.23	Non-Participating	1	33
534	500183.35	4876832.93	Non-Participating	1	33
590	491439.59	4872911.18	Non-Participating	1	33
561	489826.70	4875987.32	Non-Participating	1	32
394	493362.95	4869980.97	Non-Participating	1	32
428	493003.05	4871142.66	Non-Participating	1	32
588	491617.71	4872744.89	Non-Participating	1	32
254	505286.95	4866388.36	Non-Participating	1	32
427	492886.93	4871221.63	Non-Participating	1	32
535	498032.98	4876897.85	Non-Participating	1	32
341	506392.06	4875165.44	Non-Participating	1	32
136	507912.94	4872763.80	Non-Participating	1	32
219	508048.06	4868683.08	Non-Participating	1	32
340	506456.95	4875177.45	Non-Participating	1	32
610	490308.00	4873855.52	Non-Participating	1	32
135	508141.14	4872275.11	Non-Participating	1	32
220	507577.42	4867933.06	Non-Participating	1	32
342	506303.13	4875506.73	Non-Participating	1	32
516	489824.65	4877177.26	Non-Participating	1	32
491	493142.48	4879036.43	Non-Participating	1	32
137	507852.51	4872992.61	Participating	1	32
253	505982.60	4866485.83	Non-Participating	1	32
265	495484.80	4864629.42	Non-Participating	1	32
517	489798.47	4877241.24	Non-Participating	1	32

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
264	495594.27	4864552.69	Non-Participating	1	31
600	489910.19	4874274.68	Participating	1	31
252	505944.82	4866307.39	Non-Participating	1	31
380	494597.57	4865481.24	Non-Participating	1	31
393	492790.68	4869907.25	Participating	1	31
490	492860.00	4879226.20	Non-Participating	1	31
391	493009.42	4868795.04	Participating	1	31
492	492758.53	4879319.56	Non-Participating	1	31
513	489914.98	4877880.09	Non-Participating	1	31
587	491158.49	4872615.01	Non-Participating	1	31
589	491351.60	4872844.56	Non-Participating	1	31
609	490427.30	4873185.69	Non-Participating	1	31
175	508823.64	4869539.44	Non-Participating	1	31
178	508887.77	4871155.48	Non-Participating	1	31
222	508160.93	4868043.79	Non-Participating	1	31
259	502847.64	4865132.72	Non-Participating	1	31
339	507133.29	4875236.34	Non-Participating	1	31
488	491806.50	4879142.21	Non-Participating	1	31
643	492101.16	4871308.61	Non-Participating	1	31
87	507311.95	4875159.44	Non-Participating	1	31
90	507599.42	4874772.15	Non-Participating	1	31
221	508256.18	4868031.55	Non-Participating	1	31
258	502756.62	4865044.88	Non-Participating	1	31
444	507243.76	4875236.34	Non-Participating	1	31
493	494040.55	4879209.90	Non-Participating	1	31
494	494946.88	4878858.40	Non-Participating	1	31
512	489835.40	4877912.18	Non-Participating	1	31
337	507291.26	4875238.55	Non-Participating	1	30
88	507422.02	4875164.20	Non-Participating	1	30
338	507308.94	4875273.90	Non-Participating	1	30
489	492039.41	4879331.55	Non-Participating	1	30
251	506083.96	4865856.15	Non-Participating	1	30
385	493478.15	4866684.14	Non-Participating	1	30
602	489395.90	4874448.33	Participating	1	30
89	507528.65	4875149.91	Non-Participating	1	30
176	509063.51	4869535.71	Non-Participating	1	30
336	507476.85	4875245.18	Non-Participating	1	30
445	508298.59	4873512.15	Non-Participating	1	30
139	508493.79	4873588.15	Non-Participating	1	30
248	507075.09	4866460.06	Non-Participating	1	30
276	495602.69	4864144.71	Non-Participating	1	30
387	493147.39	4867174.99	Non-Participating	1	30
429	492012.71	4870131.27	Participating	1	30
434	492842.51	4867801.89	Non-Participating	1	30
485	490949.78	4879137.82	Non-Participating	1	30
557	489116.44	4875427.96	Non-Participating	1	30
559	489141.82	4875405.73	Non-Participating	1	30



**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
644	491583.87	4871268.58	Non-Participating	1	30
15	507596.16	4875246.28	Non-Participating	1	30
379	493858.51	4865675.06	Non-Participating	1	30
431	492354.77	4868912.11	Participating	1	30
586	490903.77	4872050.05	Non-Participating	1	30
611	489807.12	4873557.35	Non-Participating	1	30
140	508608.89	4873590.53	Non-Participating	1	30
141	508631.91	4873590.93	Non-Participating	1	30
142	508613.65	4873652.84	Participating	1	30
256	503837.48	4864808.63	Non-Participating	1	30
261	502744.45	4864637.95	Non-Participating	1	30
262	500293.87	4864408.55	Non-Participating	1	30
558	489070.22	4875417.85	Non-Participating	1	30
601	489305.30	4874280.67	Participating	1	30
642	492088.16	4871151.03	Participating	1	30
392	492892.87	4868809.26	Non-Participating	1	30
560	488998.60	4876062.19	Participating	1	30
639	491742.59	4870251.31	Non-Participating	1	30
645	491466.08	4871036.24	Non-Participating	1	30
281	496387.78	4863669.96	Non-Participating	1	30
432	492373.27	4868475.96	Non-Participating	1	30
484	490977.06	4879298.11	Non-Participating	1	30
638	491691.36	4870338.51	Non-Participating	1	30
686	492242.97	4868718.98	Non-Participating	1	30
446	490229.89	4872596.92	Non-Participating	1	30
144	509004.04	4872856.29	Non-Participating	1	29
274	495591.47	4863853.66	Non-Participating	1	29
335	507954.57	4875255.16	Non-Participating	1	29
91	508121.97	4874981.77	Non-Participating	1	29
143	508917.66	4873593.31	Non-Participating	1	29
347	507746.57	4873752.32	Non-Participating	1	29
348	509482.74	4869911.96	Non-Participating	1	29
430	491814.62	4869462.51	Participating	1	29
585	489802.42	4873070.99	Non-Participating	1	29
637	491440.93	4870296.94	Participating	1	29
652	491759.63	4869590.01	Non-Participating	1	29
687	492201.39	4868471.14	Participating	1	29
260	502861.92	4864320.45	Non-Participating	1	29
275	495598.45	4863807.52	Non-Participating	1	29
346	507707.14	4873655.54	Non-Participating	1	29
273	495460.45	4863808.79	Non-Participating	1	29
334	508137.19	4875249.86	Non-Participating	1	29
181	509642.37	4871517.50	Non-Participating	1	29
182	509638.57	4871313.88	Non-Participating	1	29
184	509715.57	4870766.88	Non-Participating	1	29
145	509375.92	4872966.88	Participating	1	29
483	490495.82	4879286.80	Non-Participating	1	29

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
179	509716.92	4871621.42	Non-Participating	1	29
180	509716.39	4871712.56	Non-Participating	1	29
255	504453.20	4864368.89	Non-Participating	1	29
384	493181.97	4865807.99	Non-Participating	1	29
150	509630.84	4872355.63	Non-Participating	1	29
235	508125.47	4866480.14	Non-Participating	1	29
286	497390.91	4863188.77	Non-Participating	1	29
292	499653.41	4863563.84	Non-Participating	1	29
297	501228.41	4863777.42	Non-Participating	1	29
149	509722.39	4872284.72	Non-Participating	1	29
482	489635.56	4878759.90	Non-Participating	1	29
612	488849.73	4874109.24	Non-Participating	1	29
92	508591.19	4875255.26	Non-Participating	1	28
436	492683.89	4866290.27	Non-Participating	1	28
641	490729.74	4870543.54	Non-Participating	1	28
646	490182.63	4871392.80	Non-Participating	1	28
186	509710.09	4868616.84	Non-Participating	1	28
223	509431.73	4867831.46	Non-Participating	1	28
287	499200.13	4863160.86	Non-Participating	1	28
288	499366.82	4863159.80	Non-Participating	1	28
350	509715.75	4868523.34	Non-Participating	1	28
447	489847.36	4872269.25	Non-Participating	1	28
640	490556.45	4870428.90	Non-Participating	1	28
655	491214.49	4868921.13	Non-Participating	1	28
151	509722.69	4873399.56	Non-Participating	1	28
291	499600.44	4863131.46	Non-Participating	1	28
378	493303.66	4865363.05	Non-Participating	1	28
647	490146.04	4871128.30	Non-Participating	1	28
146	509975.20	4872682.45	Non-Participating	1	28
183	510238.58	4871099.40	Non-Participating	1	28
289	499062.33	4863011.63	Non-Participating	1	28
290	499521.73	4863071.93	Non-Participating	1	28
448	488635.42	4877561.29	Non-Participating	1	28
656	491144.65	4868793.54	Non-Participating	1	28
249	505979.98	4864375.54	Non-Participating	1	28
277	495449.26	4863156.32	Non-Participating	1	28
349	510177.21	4869522.86	Non-Participating	1	28
555	488220.58	4875677.44	Non-Participating	1	28
93	509166.13	4875086.85	Non-Participating	1	28
298	502760.35	4863408.22	Non-Participating	1	28
351	509715.75	4867936.59	Non-Participating	1	28
437	492560.24	4865883.35	Non-Participating	1	28
518	488326.68	4876849.62	Non-Participating	1	28
236	508115.22	4865668.00	Participating	1	28
250	506660.75	4864623.72	Non-Participating	1	28
481	489545.45	4879212.95	Non-Participating	1	28
556	488332.16	4876043.35	Participating	1	28

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
648	489684.58	4871207.32	Non-Participating	1	28
654	490718.55	4869035.68	Non-Participating	1	28
95	509351.34	4875158.02	Non-Participating	1	28
98	509731.74	4874372.94	Non-Participating	1	28
282	495401.41	4862947.65	Non-Participating	1	28
433	492178.63	4867809.55	Non-Participating	1	28
480	489444.23	4879207.74	Non-Participating	1	28
519	488211.66	4877034.73	Non-Participating	1	28
595	488313.23	4874925.37	Participating	1	28
596	488330.19	4874908.78	Participating	1	28
94	509022.59	4875282.64	Non-Participating	1	27
234	509084.69	4866510.99	Non-Participating	1	27
299	502811.16	4863065.78	Non-Participating	1	27
699	494269.33	4863513.13	Non-Participating	1	27
285	497883.34	4862416.63	Non-Participating	1	27
449	488219.84	4877375.84	Non-Participating	1	27
613	488302.06	4873557.83	Non-Participating	1	27
193	510669.32	4871235.95	Non-Participating	1	27
284	498032.83	4862353.66	Non-Participating	1	27
651	490439.21	4869028.96	Non-Participating	1	27
355	504354.46	4863221.55	Non-Participating	1	27
450	488227.59	4877664.18	Non-Participating	1	27
593	488227.77	4874362.55	Participating	1	27
594	488176.73	4874445.52	Non-Participating	1	27
650	490330.39	4868981.77	Non-Participating	1	27
653	491515.95	4869809.52	Non-Participating	1	27
302	504359.50	4863154.55	Non-Participating	1	27
477	488578.50	4878448.47	Non-Participating	1	27
691	492326.88	4865129.44	Non-Participating	1	27
147	510643.93	4872858.40	Non-Participating	1	27
185	510779.47	4869615.18	Non-Participating	1	27
278	495021.10	4862798.98	Non-Participating	1	27
301	504324.44	4863058.11	Non-Participating	1	27
332	509540.98	4875523.36	Non-Participating	1	27
148	510742.82	4872673.86	Non-Participating	1	27
247	507911.18	4864780.64	Non-Participating	1	27
296	501290.46	4862403.31	Non-Participating	1	27
688	491286.85	4866494.23	Non-Participating	1	27
690	491637.21	4866020.30	Non-Participating	1	27
97	509776.66	4875411.96	Non-Participating	1	27
441	509739.94	4875483.39	Non-Participating	1	27
614	487911.15	4873636.20	Non-Participating	1	27
701	493669.38	4863482.76	Non-Participating	1	27
330	509957.99	4875215.57	Non-Participating	1	27
476	488294.10	4878419.31	Non-Participating	1	27
700	493677.47	4863383.00	Non-Participating	1	27
233	509654.54	4866311.78	Non-Participating	1	27

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
283	497806.48	4861897.78	Non-Participating	1	27
303	505569.77	4863166.39	Non-Participating	1	27
329	510106.92	4875126.21	Non-Participating	1	27
435	491772.81	4867258.11	Non-Participating	1	27
660	490399.71	4868828.19	Non-Participating	1	27
16	511230.91	4871253.21	Non-Participating	1	26
192	511231.78	4870673.51	Non-Participating	1	26
194	511198.71	4871506.32	Non-Participating	1	26
237	508300.10	4864702.93	Non-Participating	1	26
294	500766.98	4862078.00	Non-Participating	1	26
295	501364.94	4862089.11	Non-Participating	1	26
475	488227.48	4878434.34	Non-Participating	1	26
583	487877.11	4873120.91	Non-Participating	1	26
698	493649.83	4863248.87	Non-Participating	1	26
293	500052.87	4861924.15	Non-Participating	1	26
553	487414.85	4875979.00	Non-Participating	1	26
190	511340.26	4870437.24	Non-Participating	1	26
191	511328.61	4870357.34	Non-Participating	1	26
238	508661.25	4864863.00	Non-Participating	1	26
304	505982.13	4863095.12	Non-Participating	1	26
316	499547.11	4861789.56	Non-Participating	1	26
478	488238.28	4878729.90	Non-Participating	1	26
552	487379.99	4875967.61	Non-Participating	1	26
584	488112.71	4872671.02	Non-Participating	1	26
246	507972.08	4864241.82	Non-Participating	1	26
616	487514.01	4873755.84	Non-Participating	1	26
658	490772.60	4868329.90	Non-Participating	1	26
313	496566.43	4861678.65	Non-Participating	1	26
315	498202.69	4861536.49	Non-Participating	1	26
689	491009.28	4865891.24	Non-Participating	1	26
694	492846.71	4863545.15	Non-Participating	1	26
280	495589.39	4861913.81	Non-Participating	1	26
317	499706.65	4861546.15	Non-Participating	1	26
615	487684.01	4873459.47	Non-Participating	1	26
629	488319.13	4871047.52	Non-Participating	1	26
187	511208.69	4868187.15	Non-Participating	1	26
189	511354.81	4868870.63	Non-Participating	1	26
479	488802.63	4879306.04	Non-Participating	1	26
692	491378.79	4865103.88	Non-Participating	1	26
693	491360.33	4865074.29	Non-Participating	1	26
188	511358.45	4868626.10	Non-Participating	1	26
239	509043.52	4864717.00	Non-Participating	1	26
635	489918.83	4870357.95	Non-Participating	1	26
659	490521.01	4868392.32	Non-Participating	1	26
245	508023.68	4863776.16	Non-Participating	1	26
300	502845.02	4861700.00	Non-Participating	1	26
314	496394.58	4861521.88	Non-Participating	1	26

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
331	509838.84	4875240.39	Non-Participating	1	26
636	490477.39	4870317.69	Non-Participating	1	26
649	489742.38	4869647.95	Non-Participating	1	26
244	507091.02	4863071.04	Non-Participating	1	26
279	495447.60	4861627.16	Non-Participating	1	26
307	505988.95	4862547.09	Non-Participating	1	26
438	493165.10	4862890.93	Non-Participating	1	26
617	487184.42	4873945.73	Non-Participating	1	26
632	488931.40	4870482.89	Non-Participating	1	26
697	492988.35	4862968.51	Non-Participating	1	26
383	494229.69	4862485.36	Non-Participating	1	25
592	487443.29	4874431.59	Non-Participating	1	25
633	489465.02	4870612.47	Non-Participating	1	25
457	487110.32	4877460.18	Non-Participating	1	25
631	488100.93	4870340.68	Non-Participating	1	25
682	490410.02	4866045.09	Non-Participating	1	25
695	491647.96	4864076.25	Non-Participating	1	25
195	512094.54	4871434.48	Non-Participating	1	25
224	511197.03	4867137.19	Non-Participating	1	25
318	503314.07	4861437.35	Non-Participating	1	25
321	504448.61	4861690.45	Non-Participating	1	25
443	512055.62	4871144.22	Non-Participating	1	25
550	486758.93	4875870.36	Non-Participating	1	25
628	487697.00	4871268.04	Non-Participating	1	25
382	494693.22	4861787.99	Non-Participating	1	25
551	486732.47	4875847.61	Non-Participating	1	25
554	486752.22	4876287.93	Non-Participating	1	25
18	510963.01	4866310.55	Non-Participating	1	25
228	510956.59	4866312.68	Non-Participating	1	25
305	505957.47	4862103.78	Non-Participating	1	25
306	506058.01	4862083.94	Non-Participating	1	25
451	487845.93	4879211.82	Non-Participating	1	25
630	487859.22	4870334.28	Non-Participating	1	25
680	490017.33	4865967.73	Non-Participating	1	25
196	512320.76	4871236.81	Non-Participating	1	25
676	489861.71	4865984.83	Non-Participating	1	25
197	511855.79	4867910.86	Non-Participating	1	25
240	508220.95	4863160.03	Non-Participating	1	25
320	504352.19	4861303.49	Non-Participating	1	25
439	493590.90	4862204.60	Non-Participating	1	25
520	486597.05	4876484.54	Non-Participating	1	25
681	490278.87	4865979.10	Non-Participating	1	25
17	511252.81	4866394.34	Non-Participating	1	25
227	511254.51	4866393.12	Non-Participating	1	25
319	504482.21	4861250.15	Non-Participating	1	25
328	511919.63	4867891.62	Non-Participating	1	25
454	487445.96	4879108.89	Non-Participating	1	25

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
455	487500.71	4879138.87	Non-Participating	1	25
458	486739.40	4877456.16	Non-Participating	1	25
459	486738.89	4877554.33	Non-Participating	1	25
619	486670.36	4873699.15	Non-Participating	1	25
620	486755.87	4873650.47	Non-Participating	1	25
243	509723.76	4864264.38	Non-Participating	1	25
582	486655.64	4873090.69	Non-Participating	1	25
657	490586.54	4867989.99	Non-Participating	1	25
673	489312.09	4866497.79	Non-Participating	1	25
677	489395.33	4866310.51	Non-Participating	1	25
241	508608.56	4863085.28	Non-Participating	1	25
308	505982.34	4861816.52	Non-Participating	1	25
581	486676.17	4872464.77	Non-Participating	1	25
591	486316.80	4874665.05	Non-Participating	1	25
618	486591.04	4874277.89	Non-Participating	1	25
627	487448.24	4871236.67	Non-Participating	1	25
662	489421.01	4868140.33	Non-Participating	1	25
674	489313.39	4866375.23	Non-Participating	1	25
309	508028.80	4862608.01	Non-Participating	1	24
460	486756.68	4878037.63	Non-Participating	1	24
461	486660.03	4877806.42	Non-Participating	1	24
671	489177.54	4866889.51	Non-Participating	1	24
675	489310.25	4866131.82	Non-Participating	1	24
634	489473.93	4870174.17	Non-Participating	1	24
665	488410.14	4867926.75	Non-Participating	1	24
19	511236.15	4865354.84	Non-Participating	1	24
231	511238.56	4865356.24	Non-Participating	1	24
323	512456.10	4867927.90	Non-Participating	1	24
623	486638.09	4871400.01	Non-Participating	1	24
672	489191.30	4866647.84	Non-Participating	1	24
685	489842.93	4865195.32	Non-Participating	1	24
354	506107.06	4861179.97	Non-Participating	1	24
547	485950.14	4875850.27	Non-Participating	1	24
548	485922.83	4875490.30	Non-Participating	1	24
580	486198.35	4872740.10	Non-Participating	1	24
20	511469.59	4865525.69	Non-Participating	1	24
232	511480.24	4865525.57	Non-Participating	1	24
333	508513.01	4875649.50	Non-Participating	1	24
464	486256.72	4877643.56	Non-Participating	1	24
624	486672.02	4870622.68	Non-Participating	1	24
663	487623.14	4868576.03	Non-Participating	1	24
669	489407.69	4866850.23	Non-Participating	1	24
452	486858.06	4879271.46	Non-Participating	1	24
678	490197.73	4866693.01	Non-Participating	1	24
679	490217.54	4866649.68	Non-Participating	1	24
696	490594.15	4864686.77	Non-Participating	1	24
322	505946.34	4860787.53	Non-Participating	1	24



**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
625	486655.48	4870232.51	Non-Participating	1	24
666	490006.54	4867558.26	Non-Participating	1	24
453	486750.57	4879405.48	Non-Participating	1	24
465	485959.87	4877465.90	Non-Participating	1	24
549	485570.32	4875343.66	Non-Participating	1	24
571	485562.84	4875163.93	Non-Participating	1	24
622	486094.94	4871309.02	Non-Participating	1	24
664	487782.58	4867705.95	Non-Participating	1	24
225	512836.13	4867255.07	Non-Participating	1	23
242	510181.05	4863250.58	Non-Participating	1	23
311	509978.52	4862987.49	Non-Participating	1	23
310	510037.65	4862973.60	Non-Participating	1	23
456	486363.48	4879172.96	Non-Participating	1	23
667	489786.08	4867239.58	Non-Participating	1	23
21	511803.28	4864790.87	Non-Participating	1	23
229	511803.46	4864790.40	Non-Participating	1	23
670	489550.29	4866777.40	Non-Participating	1	23
25	511249.27	4863981.03	Non-Participating	1	23
26	511259.59	4863882.99	Non-Participating	1	23
230	511248.62	4863982.43	Non-Participating	1	23
469	485584.47	4877637.05	Non-Participating	1	23
470	485555.94	4877595.45	Non-Participating	1	23
471	485553.87	4877635.12	Non-Participating	1	23
579	485379.31	4872761.19	Non-Participating	1	23
27	511344.96	4863873.64	Non-Participating	1	23
325	511241.06	4863845.52	Non-Participating	1	23
468	485477.21	4877647.07	Non-Participating	1	23
575	485248.40	4873345.47	Non-Participating	1	23
576	485233.04	4873372.20	Non-Participating	1	23
326	511377.68	4863817.25	Non-Participating	1	23
546	485040.33	4875536.46	Non-Participating	1	23
570	485049.92	4874303.42	Non-Participating	1	23
574	485076.63	4873384.34	Non-Participating	1	23
683	490085.49	4864761.25	Non-Participating	1	23
521	485139.90	4876925.87	Non-Participating	1	23
522	485112.68	4876718.66	Non-Participating	1	23
523	485111.73	4876886.12	Non-Participating	1	23
684	489923.58	4864746.23	Non-Participating	1	23
23	512873.66	4865696.43	Non-Participating	1	23
226	512876.54	4865698.06	Non-Participating	1	23
462	485834.32	4879132.42	Non-Participating	1	23
463	485809.66	4879170.03	Non-Participating	1	23
572	485226.22	4873854.62	Non-Participating	1	23
577	484992.60	4872278.33	Non-Participating	1	23
626	487378.63	4870881.50	Non-Participating	1	23
22	512882.51	4865215.73	Non-Participating	1	23
28	511215.66	4862975.26	Non-Participating	1	23

**Table F-1: Project Only Results Sorted By Sound Level**

Receptor ID	Coordinates UTM NAD83 Zone 15N		Participation Status	Noise Area Classification	Project Only Broadband L <sub>50</sub> Sound Level (dBA)
	X (m)	Y (m)			
312	511214.04	4862974.57	Non-Participating	1	23
324	512869.46	4865200.07	Non-Participating	1	23
578	484936.10	4872282.95	Non-Participating	1	23
24	512672.12	4864525.97	Non-Participating	1	22
545	484639.57	4876183.37	Non-Participating	1	22
573	484962.06	4873636.11	Non-Participating	1	22
472	485326.16	4879324.31	Non-Participating	1	22
527	484482.97	4876529.89	Non-Participating	1	22
543	484347.49	4875779.83	Non-Participating	1	22
466	484581.56	4877648.78	Non-Participating	1	22
524	484576.48	4877381.31	Non-Participating	1	22
525	484604.14	4877406.38	Non-Participating	1	22
473	485052.32	4879054.82	Non-Participating	1	22
528	484133.35	4876454.25	Non-Participating	1	22
544	484122.70	4876211.77	Non-Participating	1	22
526	484415.46	4876945.29	Non-Participating	1	22
96	509416.42	4875235.41	Non-Participating	1	22
532	483894.45	4877038.60	Non-Participating	1	21
474	485117.12	4878621.98	Non-Participating	1	21
533	483805.65	4877165.29	Non-Participating	1	21
542	483610.07	4875926.75	Non-Participating	1	21
467	483815.76	4877785.78	Non-Participating	1	21
538	483371.66	4876260.99	Non-Participating	1	21
539	483342.50	4876216.88	Non-Participating	1	21
540	483353.94	4876115.55	Non-Participating	1	21
541	483356.50	4875964.09	Non-Participating	1	21
529	483354.68	4876911.14	Non-Participating	1	21
530	483340.51	4876941.40	Non-Participating	1	21
531	483284.50	4877111.89	Non-Participating	1	21
702	483374.01	4877839.13	Non-Participating	1	21
703	483734.01	4879213.02	Non-Participating	1	21
661	490132.35	4868300.15	Non-Participating	1	20
621	486727.45	4871753.50	Non-Participating	1	20
327	511380.49	4867122.86	Non-Participating	1	19
668	489471.01	4866930.92	Non-Participating	1	19
569	485068.52	4874814.15	Non-Participating	1	17

# **APPENDIX E**

Appendix E includes shadow flicker studies for both the 2.5 MW layout and the alternative layout that includes eight 2.3 MW turbines

SHADOW FLICKER MODELING REPORT  
GE 2.5 LAYOUT

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Dodge County Wind Project  
Dodge and Steele Counties, Minnesota

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December 17, 2018  
Revised September 4, 2019

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## 1.0 EXECUTIVE SUMMARY

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The Dodge County Wind Project (the Project) is a proposed wind power generation facility with a total capacity of approximately 170 megawatt (MW) and will consist of 68 wind turbines within an approximately 81 square mile region (Project Area) in Dodge and Steele Counties, Minnesota. The Project is being developed by Dodge County Wind, LLC (DCW), a wholly-owned indirect subsidiary of NextEra Energy Resources (NEER). Epsilon Associates, Inc. (Epsilon) has been retained by DCW through Atwell, LLC (Atwell) to conduct shadow flicker modeling for this Project. This report supersedes the previously prepared Shadow Flicker Modeling Report dated December 17, 2018 that was filed with the Minnesota Public Utilities Commission.

Shadow flicker modeling was conservatively conducted for 72 GE wind turbines, which includes 4 alternate wind turbine locations. The purpose of this analysis is to predict the worst-case and expected annual durations of wind turbine shadow flicker at nearby residences and other sensitive receptors (e.g. church).

The maximum expected annual duration of shadow flicker at a modeling receptor resulting from the operation of the 68 proposed and 4 alternate wind turbines is 39 hours, 50 minutes. This is at a participating receptor. The maximum expected annual duration of shadow flicker at a non-participating modeling receptor is 33 hours, 56 minutes. The modeling results are conservative in that modeling receptors were treated as “greenhouses” and the surrounding area was assumed to be without vegetation or structures (“bare earth”).



## 2.0 INTRODUCTION

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The proposed Project to be located in Dodge and Steele Counties, Minnesota is proposed to consist of 68 wind turbines. The proposed wind turbines are GE 2.5 MW units with a rotor diameter of 116 meters and a hub height of 90 meters. All wind turbines will be Low Noise Trailing Edge (LNTE) models. Of the 72 wind turbines included in the analysis (68 proposed + 4 alternates), 58 are located in Dodge County and 14 are located in Steele County. Previously the analysis included a combination of GE 2.5-116 Low Noise Trailing Edge (LNTE) wind turbines (60 proposed + 4 alternates) and GE 2.3 116 LNTE wind turbines (8 proposed). Figure 2-1 shows the locations of the 68 proposed and 4 alternate wind turbines over aerial imagery in Dodge and Steele Counties.

With respect to wind turbines, shadow flicker can be defined as an intermittent change in the intensity of light in a given area resulting from the operation of a wind turbine due to its interaction with the sun. While indoors, an observer experiences repeated changes in the brightness of the room as shadows cast from the wind turbine blades briefly pass by windows as the blades rotate. In order for this to occur, the wind turbine must be operating, the sun must be shining, and the window must be within the shadow region of the wind turbine, otherwise there is no shadow flicker. A stationary wind turbine only generates a stationary shadow similar to any other structure.

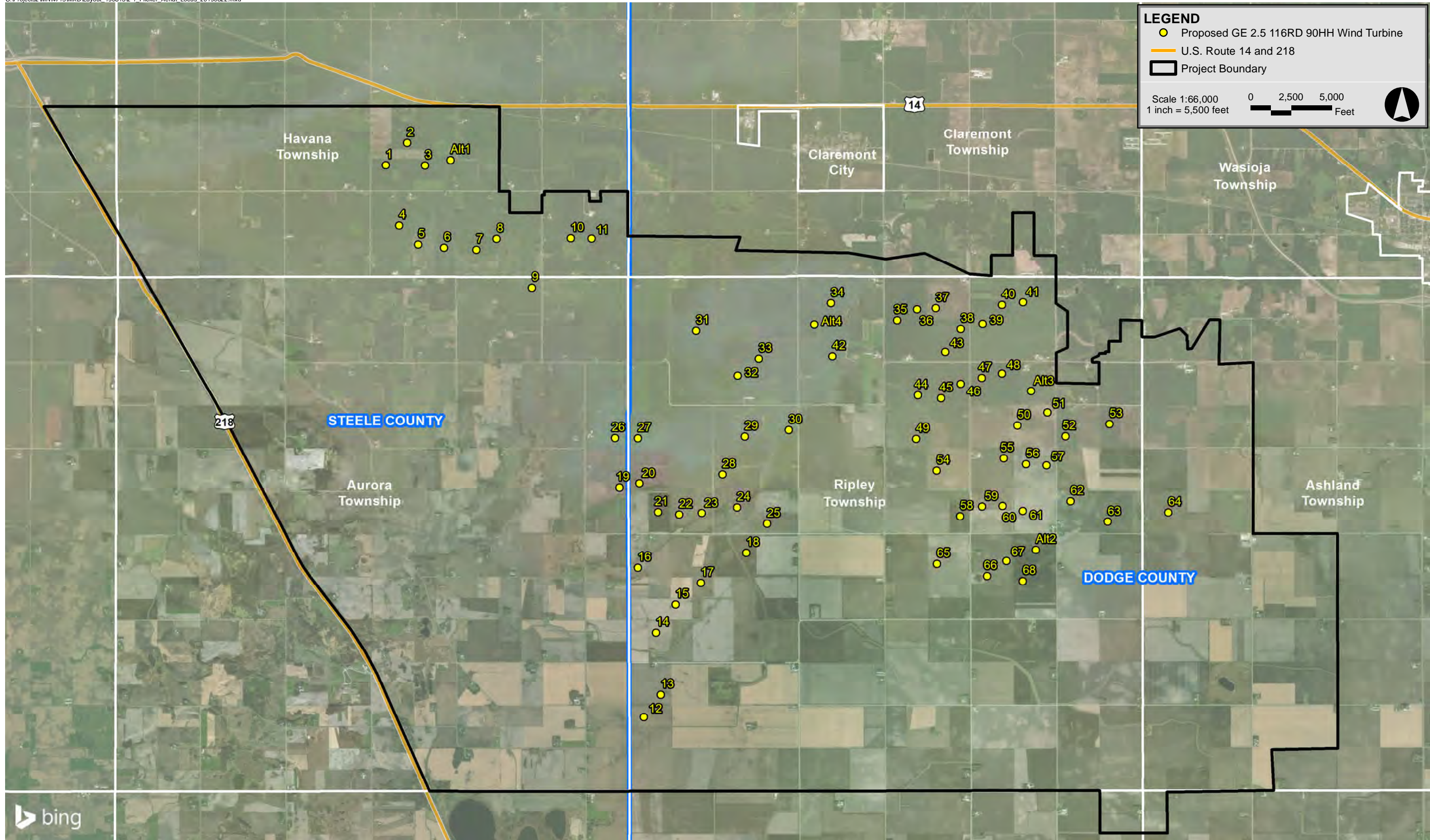
Based on the current design and operation of typical modern wind turbines, shadow flicker is not a cause of epileptic seizures. According to the Epilepsy Foundation, "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)."<sup>1</sup> The wind turbines for this Project have a maximum rotational speed of 15.7 rpm which corresponds to a shadow flicker frequency of 0.8 Hz. This frequency is well below the frequency identified by the Epilepsy Foundation; therefore, the triggering of epileptic seizures is not a concern with this Project.

This report presents the findings of a shadow flicker modeling study for the Project. The wind turbines were modeled with the WindPRO software package using information provided by DCW and Atwell. The expected annual duration of shadow flicker was calculated at modeling receptors and shadow flicker isolines for the area surrounding the Project were generated. The results of the modeling are found within this report.

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<sup>1</sup> Epilepsy Foundation, <http://www.epilepsy.com/learn/triggers-seizures/photosensitivity-and-seizures>. Accessed in June 2018.





Dodge County Wind Dodge & Steele Counties, MN



## 3.0 SHADOW FLICKER MODELING

---

### 3.1 Modeling Methodology

Shadow flicker was modeled using a software package, WindPRO version 3.2. WindPRO is a software suite developed by EMD International A/S and is used for assessing potential environmental impacts from wind turbines. Using the Shadow module within WindPRO, worst-case shadow flicker in the area surrounding the wind turbines was calculated based on data inputs including: location of the wind turbines, location of discrete receptor points, wind turbine dimensions, flicker calculation limits, and terrain data. Based on these data, the model was able to incorporate the appropriate sun angle and maximum daily sunlight for this latitude into the calculations. The resulting worst-case calculations assume that the sun is always shining during daylight hours and that the wind turbine is always operating. The WindPRO Shadow module can be further refined by incorporating sunshine probabilities and wind turbine operational estimates by wind direction over the course of a year. The values produced by this further refinement are known as the “expected” shadow flicker. Both worst-case and expected annual shadow flicker durations are presented in this section.

The proposed wind turbine layout for the Project dated August 15, 2019 was provided by DCW. Of the 72 conservatively modeled wind turbines, 4 are alternative wind turbine locations. Locations of the turbines are shown in Figure 3-1, and the coordinates are provided in Appendix A. The layout consists of GE 2.5-116 wind turbines with a rotor diameter of 116 meters and a hub height of 90 meters. All wind turbines will have the optional LNTE blades. This option does not impact the shadow flicker calculations. Each wind turbine has the following characteristics based on the technical data provided by Atwell, DCW, and/or NEER:

		<u>GE 2.5-116</u>
◆ Rated Power	=	2,500 kW
◆ Hub Height	=	90 meters
◆ Rotor Diameter	=	116 meters
◆ Cut-in Wind Speed	=	3 m/s
◆ Cut-out Wind Speed <sup>2</sup>	=	31 m/s
◆ Maximum RPM	=	15.7 rpm

To-date, there are no federal, state, or local regulations regarding the maximum radial distance from a wind turbine to which shadow flicker should be analyzed applicable to this Project. In the United States, shadow flicker is commonly evaluated out to a distance of ten times the rotor diameter. According to the Massachusetts Model Bylaw for wind energy

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<sup>2</sup> Based on a 600-second time interval

facilities, shadow flicker impacts are minimal at and beyond a distance of ten rotor diameters.<sup>3</sup> Defining the shadow flicker calculation area has also been addressed in Europe where the ten times rotor diameter approach has been accepted in multiple European countries.<sup>4</sup> Some jurisdictions conservatively require a larger calculation area. The New Hampshire Site Evaluation Committee through rulemaking docket 2014-04 adopted rules on December 15, 2015 outlining application requirements and criteria for energy facilities, including wind energy facilities. As part of these revised regulations, Site 301.08(a)(2) requires an evaluation distance of at least 1 mile from a wind turbine.<sup>5</sup> Section 16-50j-94, part (g), of the Regulations of Connecticut State Agencies identifies the components required in a shadow flicker evaluation report which includes the calculation of shadow flicker from each proposed wind turbine to any off-site occupied structure within a 1.25 mile radius.<sup>6</sup> For this Project, ten times the maximum rotor diameter of the proposed wind turbines corresponds to a distance of 0.72 miles (1,160 m). Conservatively, this analysis includes shadow flicker calculations out to 1.25 miles (2,012 m) from each wind turbine in the model for the proposed layout.

A dataset containing participation status information for property parcels in the proximity of the Project was provided by Atwell on December 10, 2018. This information was supplemented by Atwell/DCW regarding a recent change to participation status for the parcel with receptor #358 whose owner recently signed a participation agreement. Parcels identified as “LSE” within the dataset and the receptor #358 parcel are participating and are indicated as such on Figure 3-1. Consistent with the LWECS requirement, properties in Dodge County not participating in the Project will have turbines set back at least 3 rotor diameters (RD) from their property in non-prevailing wind directions and at least 5 RD from their property in prevailing wind directions from each wind turbine (5 by 3 setback). Therefore, any parcel located in Dodge County that is closer than these setbacks must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Dodge County closer than these setbacks has been assigned a “participation pending” status. Properties located in Steele County not participating in the Project will have turbines set back at least 5 rotor diameters from their property in any direction from a wind turbine (5 by 5 setback). Therefore, any parcel located in Steele County closer than this setback must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Steele County

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<sup>3</sup> Massachusetts Department of Energy Resources, “Model As-of-Right Zoning Ordinance or Bylaw: Allowing Use of Wind Energy Facilities” 2009.

<sup>4</sup> Parsons Brinckerhoff, “Update of UK Shadow Flicker Evidence Base” Prepared for Department of Energy and Climate Change, 2011.

<sup>5</sup> State of New Hampshire Site Evaluation Committee Site 300 Rules (2015), available at [http://www.gencourt.state.nh.us/rules/state\\_agencies/site100-300.html](http://www.gencourt.state.nh.us/rules/state_agencies/site100-300.html) Accessed in January 2018.

<sup>6</sup> State of Connecticut CSC Wind Regulations (2014), available at <https://www.cga.ct.gov/aspx/CGARegulations/CGARegulations.aspx?Yr=2014&Reg=2012-054&Amd=E> Accessed in January 2018.

closer than the 5 by 5 setback has been assigned a “participation pending” status. A setback data layer was provided by Atwell and is shown on Figure 3-1. Participation status used throughout this analysis is shown in Figure 3-1.

A modeling receptor dataset dated June 15, 2017 was provided by Atwell. Receptors within 2 miles of the Project Area categorized as residential, mobile home, town, church, or municipal (694) were input into the WindPRO model. Each modeling point was assumed to have a window facing all directions (“greenhouse” mode) which yields conservative results. Participation status for each modeling receptor was assigned based on the data presented in Figure 3-1. All modeling receptors are identified in Figure 3-2 and are distinguished as either participating, participation pending, or non-participating. The model was set to limit calculations to 2,012 meters from a wind turbine, the equivalent of 1.25 miles. Consequently, shadow flicker at any of the 694 modeling receptors greater than the corresponding limitation distance from a wind turbine was zero. In addition to modeling discrete points, shadow flicker was calculated at grid points in the area surrounding the modeled wind turbines to generate flicker isolines. A 20-meter spacing was used for this grid.

The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey. Conservatively, obstacles, i.e. buildings and vegetation, were excluded from the analysis. This is effectively a “bare earth” scenario which is conservative. When accounted for in the shadow flicker calculations, such obstacles may significantly mitigate or eliminate the flicker effect depending on their size, type, and location. In addition, shadow flicker durations were calculated only when the angle of the sun was at least 3° above the horizon.

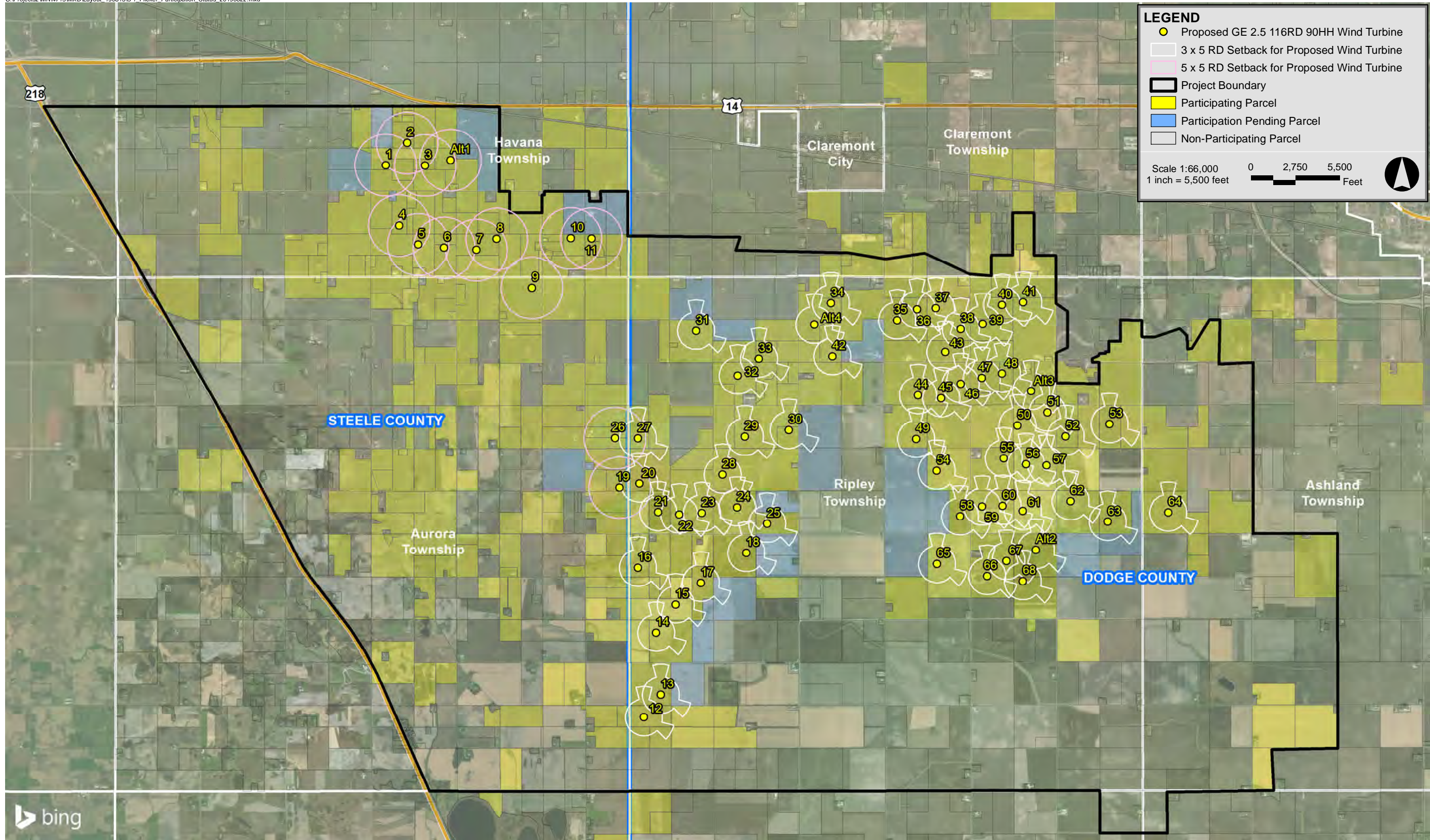
Monthly sunshine probabilities were input for each month from January to December. These numbers were obtained from a publicly available historical dataset for Minneapolis-St. Paul, Minnesota from the National Oceanic and Atmospheric Administration’s (NOAA) National Centers for Environmental Information (NCEI).<sup>7</sup> Table 3-1 shows the percentage of sunshine hours by month used in the shadow flicker modeling. These values are the percentages that the sun is expected to be shining during daylight hours.

Annual operational hours per wind direction sector were provided by NEER. These hours per wind direction sector are used by WindPRO in the estimation of the “wind direction” and “operation time” reduction factors. Based on this dataset, the wind turbines would operate 97% of the year. Table 3-2 shows the distribution of operational hours for the 16 wind directions.

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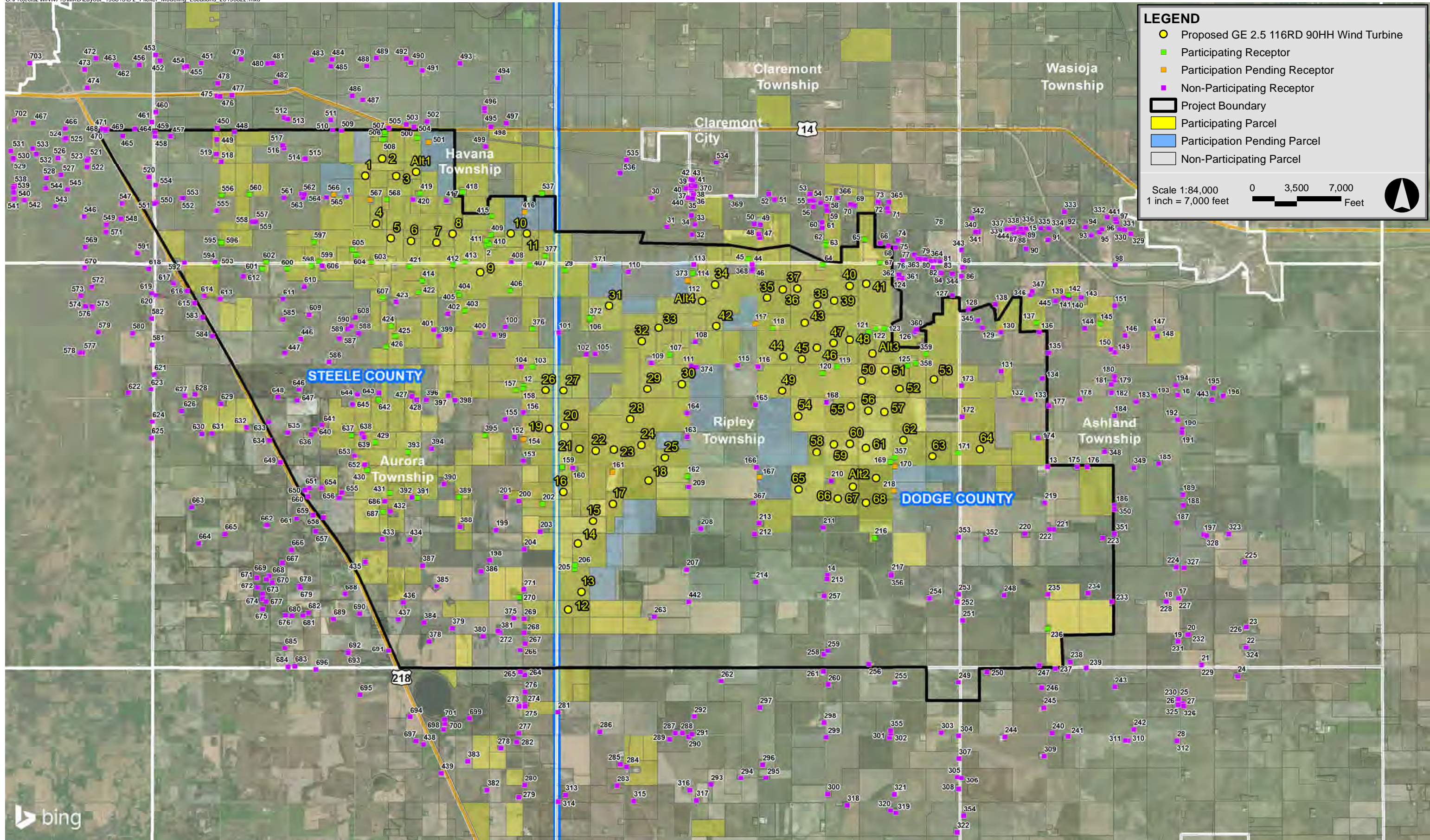
<sup>7</sup> NCEI (formerly NCDC), <http://www1.ncdc.noaa.gov/pub/data/ccd-data/pctpos15.dat>. Accessed in April 2018.





Dodge County Wind Dodge & Steele Counties, MN





Dodge County Wind Dodge & Steele Counties, MN



Figure 3-2

Shadow Flicker Modeling Locations, 190815 Layout



**Table 3-1 Monthly Percent of Possible Sunshine**

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<b>Month</b>	<b>Possible Sunshine</b>
January	53%
February	59%
March	57%
April	56%
May	62%
June	67%
July	74%
August	69%
September	62%
October	51%
November	37%
December	38%

**Table 3-2 Operational Hours per Wind Direction Sector**

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<b>Wind Sector</b>	<b>Operational Hours</b>
N	322
NNE	238
NE	229
ENE	199
E	286
ESE	335
SE	391
SSE	675
S	1,176
SSW	859
SW	501
WSW	358
W	483
WNW	826
NW	1,068
NNW	535
Annual	8,481

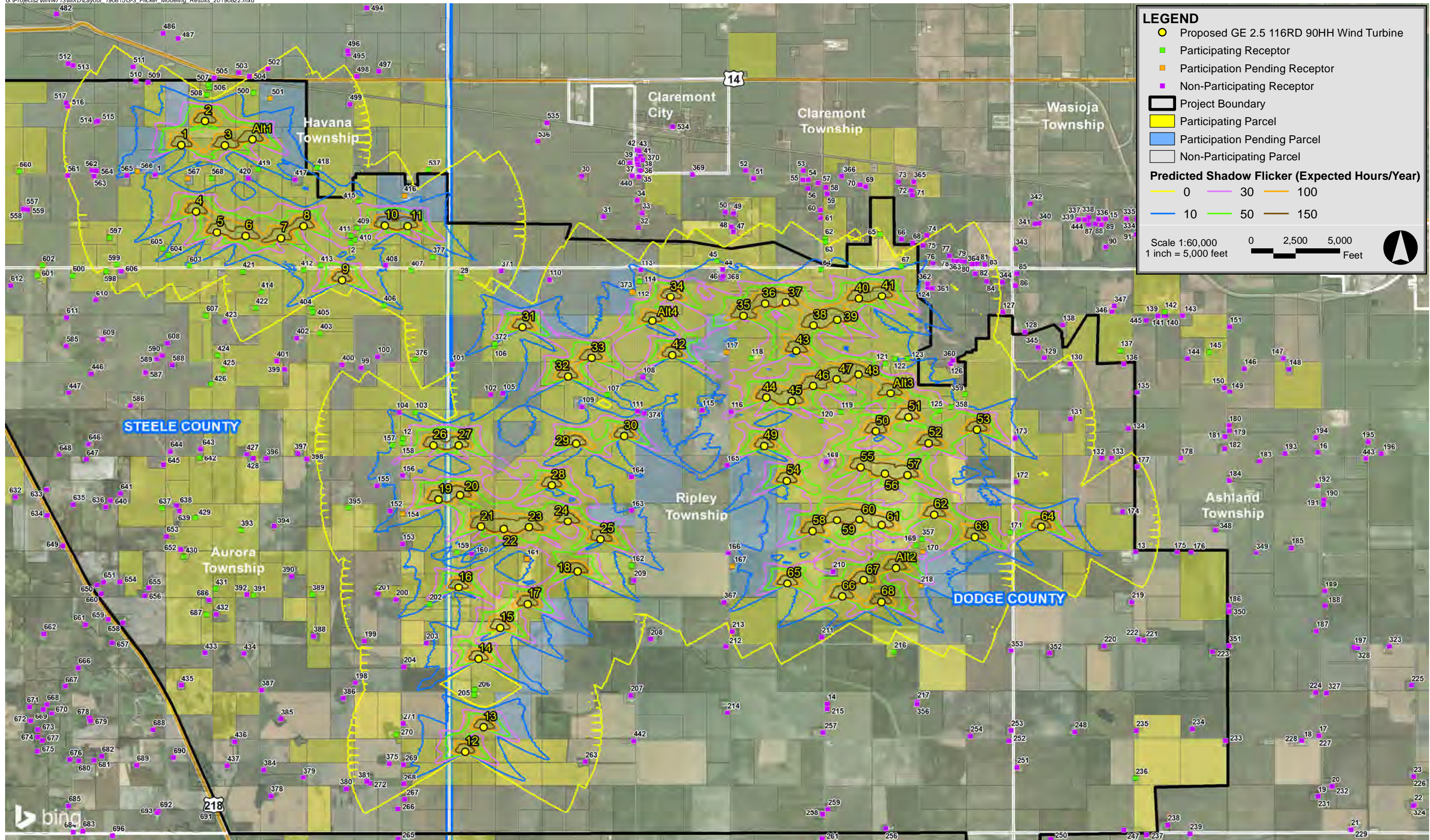
## 3.2 Results

Following the modeling methodology outlined in Section 3.1, WindPRO was used to calculate shadow flicker at the 694 discrete modeling points in Dodge and Steele Counties and generate shadow flicker isolines based on the grid calculations. Table B-1 in Appendix B presents the modeling results for the 694 modeling receptor locations. Both worst-case and expected values are presented.

The modeled worst-case annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 125 hours, 39 minutes per year. The maximum worst-case flicker was at a participating receptor (#169). The maximum modeled worst-case annual flicker at a non-participating receptor (#116) is 94 hours, 16 minutes.

The predicted expected annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 39 hours, 50 minutes per year. The maximum expected flicker was at a participating receptor (#125). The maximum expected annual duration of shadow flicker at a non-participating modeling receptor is 33 hours, 56 minutes (#116). The majority of the receptors (546) were predicted to experience no annual shadow flicker. 97 locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 39 locations would be expected to have 10 to 30 hours of shadow flicker per year. 12 receptors are expected to have over 30 hours of flicker per year, one of which is a non-participating receptor. Figure 3-3 displays the modeled flicker isolines (expected hrs/yr) over aerial imagery in relation to modeled wind turbines and modeling receptors.





Dodge County Wind Dodge & Steele Counties, MN



Appendix A

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DCW Wind Turbine Coordinates

**Table A-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
1	491773.49	4876513.69
2	492177.40	4876929.74
3	492515.95	4876507.29
4	492027.69	4875376.03
5	492382.70	4875021.02
6	492872.33	4874956.90
7	493480.60	4874916.73
8	493862.85	4875124.65
9	494524.33	4874201.90
10	495256.04	4875133.97
11	495645.46	4875128.40
12	496632.97	4866120.24
13	496950.55	4866540.12
14	496863.02	4867708.41
15	497232.19	4868242.38
16	496520.92	4868936.19
17	497702.64	4868650.42
18	498559.17	4869213.08
19	496175.92	4870443.22
20	496546.68	4870518.48
21	496901.03	4869976.79
22	497294.89	4869935.28
23	497723.95	4869962.98
24	498388.48	4870067.35
25	498952.27	4869760.73
26	496087.93	4871373.26
27	496519.91	4871371.21
28	498114.74	4870686.08
29	498532.91	4871403.19
30	499356.88	4871529.00
31	497612.89	4873395.25
32	498398.28	4872549.54
33	498796.96	4872868.03
34	500149.90	4873911.23
35	501398.06	4873589.09
36	501770.29	4873795.69
37	502124.90	4873815.21
38	502595.92	4873426.22
39	503005.34	4873519.47
40	503372.12	4873881.51
41	503770.23	4873926.96
42	500177.97	4872914.07
43	502301.86	4872993.95
44	501790.90	4872182.22
45	502227.91	4872122.24
46	502591.63	4872391.24
47	502991.91	4872505.27
48	503371.39	4872585.69
49	501755.51	4871361.61
50	503662.93	4871608.22



**Table A-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
51	504224.94	4871855.24
52	504569.48	4871409.27
53	505395.56	4871637.86
54	502140.74	4870760.46
55	503404.54	4870993.37
56	503820.93	4870883.24
57	504206.39	4870859.18
58	502581.34	4869899.76
59	502997.22	4870084.96
60	503382.55	4870096.20
61	503764.41	4869999.27
62	504662.35	4870183.97
63	505359.94	4869797.24
64	506497.95	4869971.23
65	502147.93	4869004.19
66	503091.92	4868779.21
67	503453.82	4869064.27
68	503763.25	4868682.38
Alt1	492991.91	4876607.27
Alt2	504008.92	4869270.22
Alt3	503919.66	4872259.61
Alt4	499837.87	4873507.53

Appendix B

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Shadow Flicker Modeling Results: Modeling Receptors

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
1	491323.97	4876003.31	Non-Participating	38:02	118	0:31	12:20
2	494675.74	4874843.64	Participating	85:20	151	0:50	32:51
12	495571.71	4871482.46	Participating	48:31	65	1:05	16:58
13	508114.34	4869543.75	Non-Participating	2:39	21	0:11	1:02
14	502838.46	4866942.77	Non-Participating	0:00	0	0:00	0:00
15	507596.16	4875246.28	Non-Participating	0:00	0	0:00	0:00
16	511230.91	4871253.21	Non-Participating	0:00	0	0:00	0:00
17	511252.81	4866394.34	Non-Participating	0:00	0	0:00	0:00
18	510963.01	4866310.55	Non-Participating	0:00	0	0:00	0:00
19	511236.15	4865354.84	Non-Participating	0:00	0	0:00	0:00
20	511469.59	4865525.69	Non-Participating	0:00	0	0:00	0:00
21	511803.28	4864790.87	Non-Participating	0:00	0	0:00	0:00
22	512882.51	4865215.73	Non-Participating	0:00	0	0:00	0:00
23	512873.66	4865696.43	Non-Participating	0:00	0	0:00	0:00
24	512672.12	4864525.97	Non-Participating	0:00	0	0:00	0:00
25	511249.27	4863981.03	Non-Participating	0:00	0	0:00	0:00
26	511259.59	4863882.99	Non-Participating	0:00	0	0:00	0:00
27	511344.96	4863873.64	Non-Participating	0:00	0	0:00	0:00
28	511215.66	4862975.26	Non-Participating	0:00	0	0:00	0:00
29	496552.23	4874244.46	Participating	12:32	46	0:20	3:36
30	498628.08	4875979.63	Non-Participating	0:00	0	0:00	0:00
31	499002.42	4875287.65	Non-Participating	0:00	0	0:00	0:00
32	499599.12	4875101.12	Non-Participating	0:00	0	0:00	0:00
33	499667.39	4875349.30	Non-Participating	0:00	0	0:00	0:00
34	499579.55	4875568.90	Non-Participating	0:00	0	0:00	0:00
35	499611.30	4875969.22	Non-Participating	0:00	0	0:00	0:00
36	499630.61	4876074.26	Non-Participating	0:00	0	0:00	0:00
37	499592.84	4876172.35	Non-Participating	0:00	0	0:00	0:00
38	499584.90	4876221.63	Non-Participating	0:00	0	0:00	0:00
39	499575.64	4876277.53	Non-Participating	0:00	0	0:00	0:00
40	499452.74	4876213.03	Non-Participating	0:00	0	0:00	0:00
41	499633.37	4876323.52	Non-Participating	0:00	0	0:00	0:00
42	499577.34	4876430.68	Non-Participating	0:00	0	0:00	0:00
43	499610.04	4876414.33	Non-Participating	0:00	0	0:00	0:00
44	501043.37	4874380.00	Non-Participating	65:11	112	0:50	18:37
45	500947.46	4874527.17	Participating	47:53	86	0:44	12:31
46	501031.13	4874231.83	Non-Participating	50:38	94	0:48	15:42
47	501227.06	4875030.65	Non-Participating	0:00	0	0:00	0:00
48	501197.62	4875115.32	Non-Participating	0:00	0	0:00	0:00
49	501230.36	4875345.51	Non-Participating	0:00	0	0:00	0:00
50	501090.13	4875362.70	Non-Participating	0:00	0	0:00	0:00
51	501571.15	4875944.50	Non-Participating	0:00	0	0:00	0:00
52	501438.59	4876074.41	Non-Participating	0:00	0	0:00	0:00
53	502423.50	4876077.06	Non-Participating	0:00	0	0:00	0:00
54	502510.29	4875920.42	Non-Participating	0:00	0	0:00	0:00
55	502413.98	4875915.66	Non-Participating	0:00	0	0:00	0:00
56	502502.88	4875773.32	Non-Participating	0:00	0	0:00	0:00
57	502679.62	4875863.27	Non-Participating	0:00	0	0:00	0:00
58	502810.85	4875788.66	Non-Participating	0:00	0	0:00	0:00
59	502831.49	4875681.24	Non-Participating	0:00	0	0:00	0:00
60	502714.55	4875399.19	Non-Participating	0:00	0	0:00	0:00
61	502721.16	4875266.90	Non-Participating	0:00	0	0:00	0:00
62	502793.92	4874915.01	Participating	0:00	0	0:00	0:00
63	502795.77	4874857.59	Participating	0:00	0	0:00	0:00
64	502728.04	4874380.81	Participating	84:25	123	1:02	23:13
65	503738.09	4874989.75	Participating	3:49	47	0:09	0:54
66	504105.86	4874905.08	Non-Participating	0:00	0	0:00	0:00
67	504104.11	4874434.02	Participating	35:08	81	0:39	8:19
68	504298.15	4874837.83	Non-Participating	0:00	0	0:00	0:00
69	503489.38	4875803.62	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
70	503392.81	4875830.08	Non-Participating	0:00	0	0:00	0:00
71	504290.41	4875654.93	Non-Participating	0:00	0	0:00	0:00
72	504273.87	4875735.63	Non-Participating	0:00	0	0:00	0:00
73	504056.70	4875882.71	Non-Participating	0:00	0	0:00	0:00
74	504535.62	4874968.38	Non-Participating	0:00	0	0:00	0:00
75	504475.43	4874793.75	Non-Participating	10:34	40	0:19	2:22
76	504646.75	4874484.85	Non-Participating	23:25	70	0:32	5:56
77	504921.92	4874625.08	Non-Participating	11:01	54	0:20	2:46
78	505001.62	4874532.14	Non-Participating	9:07	40	0:21	2:33
79	505124.98	4874525.20	Non-Participating	6:34	33	0:19	1:55
80	505184.52	4874515.28	Non-Participating	5:35	32	0:17	1:40
81	505399.82	4874479.23	Non-Participating	2:09	18	0:11	0:39
82	505367.74	4874307.25	Non-Participating	2:43	18	0:13	0:48
83	505532.77	4874466.33	Non-Participating	1:38	16	0:09	0:29
84	505566.18	4874182.83	Non-Participating	1:38	15	0:10	0:30
85	506083.22	4874314.89	Non-Participating	0:00	0	0:00	0:00
86	506058.09	4874109.83	Non-Participating	0:00	0	0:00	0:00
87	507311.95	4875159.44	Non-Participating	0:00	0	0:00	0:00
88	507422.02	4875164.20	Non-Participating	0:00	0	0:00	0:00
89	507528.65	4875149.91	Non-Participating	0:00	0	0:00	0:00
90	507599.42	4874772.15	Non-Participating	0:00	0	0:00	0:00
91	508121.97	4874981.77	Non-Participating	0:00	0	0:00	0:00
92	508591.19	4875255.26	Non-Participating	0:00	0	0:00	0:00
93	509166.13	4875086.85	Non-Participating	0:00	0	0:00	0:00
94	509022.59	4875282.64	Non-Participating	0:00	0	0:00	0:00
95	509351.34	4875158.02	Non-Participating	0:00	0	0:00	0:00
96	509416.42	4875235.41	Non-Participating	0:00	0	0:00	0:00
97	509776.66	4875411.96	Non-Participating	0:00	0	0:00	0:00
98	509731.74	4874372.94	Non-Participating	0:00	0	0:00	0:00
99	494854.60	4872697.99	Non-Participating	0:00	0	0:00	0:00
100	495132.34	4872890.10	Non-Participating	0:00	0	0:00	0:00
101	496413.53	4872753.51	Non-Participating	13:45	72	0:17	5:07
102	497067.91	4872235.01	Non-Participating	17:10	103	0:17	5:00
103	495778.39	4871934.81	Participating	30:43	76	0:31	9:08
104	495507.06	4871937.58	Non-Participating	32:30	90	0:33	9:41
105	497277.52	4872254.03	Non-Participating	30:58	130	0:28	9:18
106	497138.35	4873069.61	Participating	7:12	44	0:18	2:32
107	499065.71	4872231.14	Participating	45:20	78	0:46	20:19
108	499677.17	4872538.85	Non-Participating	26:07	88	0:30	10:53
109	498632.85	4872029.26	Non-Participating	33:12	133	0:33	10:29
110	498077.69	4874206.61	Non-Participating	1:38	16	0:09	0:35
111	499582.38	4871957.52	Non-Participating	24:34	107	0:22	9:23
112	499505.52	4873983.70	Participation Pending	34:43	99	0:41	11:54
113	499640.46	4874375.81	Non-Participating	46:49	90	0:42	14:02
114	499618.58	4874177.48	Participating	40:58	66	0:50	14:12
115	500691.28	4871972.52	Non-Participating	26:05	116	0:25	8:32
116	501183.27	4871944.87	Non-Participating	94:16	206	0:44	33:56
117	501103.10	4872967.75	Participation Pending	48:38	207	0:40	17:03
118	501528.69	4872860.66	Participating	62:42	239	0:35	22:32
119	503071.21	4871942.22	Participating	88:30	201	0:54	31:30
120	502725.93	4871787.44	Participating	67:24	234	0:42	24:22
121	503827.13	4872773.68	Participating	79:26	203	1:09	26:00
122	503996.46	4872856.76	Participating	40:22	106	0:51	12:48
123	504201.25	4872856.23	Participating	31:57	133	0:36	11:36
124	504551.09	4874079.47	Non-Participating	21:05	63	0:37	6:31
125	504758.52	4871963.59	Participating	114:30	259	0:49	39:50
126	504942.08	4872768.12	Non-Participating	12:50	60	0:24	3:40
127	505837.17	4873650.51	Non-Participating	0:00	0	0:00	0:00
128	506220.82	4873313.16	Non-Participating	0:00	0	0:00	0:00
129	506549.56	4872868.13	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
130	506996.44	4872762.57	Non-Participating	2:45	33	0:09	0:39
131	506998.03	4871828.06	Non-Participating	2:17	18	0:12	0:45
132	507534.25	4871148.65	Non-Participating	0:00	0	0:00	0:00
133	507702.53	4871154.60	Non-Participating	0:00	0	0:00	0:00
134	507988.15	4871657.51	Non-Participating	0:00	0	0:00	0:00
135	508141.14	4872275.11	Non-Participating	0:00	0	0:00	0:00
136	507912.94	4872763.80	Non-Participating	0:00	0	0:00	0:00
137	507852.51	4872992.61	Participating	0:00	0	0:00	0:00
138	506865.15	4873428.54	Non-Participating	0:00	0	0:00	0:00
139	508493.79	4873588.15	Non-Participating	0:00	0	0:00	0:00
140	508608.89	4873590.53	Non-Participating	0:00	0	0:00	0:00
141	508631.91	4873590.93	Non-Participating	0:00	0	0:00	0:00
142	508613.65	4873652.84	Participating	0:00	0	0:00	0:00
143	508917.66	4873593.31	Non-Participating	0:00	0	0:00	0:00
144	509004.04	4872856.29	Non-Participating	0:00	0	0:00	0:00
145	509375.92	4872966.88	Participating	0:00	0	0:00	0:00
146	509975.20	4872682.45	Non-Participating	0:00	0	0:00	0:00
147	510643.93	4872858.40	Non-Participating	0:00	0	0:00	0:00
148	510742.82	4872673.86	Non-Participating	0:00	0	0:00	0:00
149	509722.39	4872284.72	Non-Participating	0:00	0	0:00	0:00
150	509630.84	4872355.63	Non-Participating	0:00	0	0:00	0:00
151	509722.69	4873399.56	Non-Participating	0:00	0	0:00	0:00
152	495349.84	4870249.67	Non-Participating	21:25	69	0:33	7:25
153	495559.21	4869681.85	Non-Participating	24:09	99	0:23	7:32
154	495562.38	4870204.93	Participation Pending	68:47	140	0:44	25:34
155	495124.76	4870677.40	Non-Participating	20:40	110	0:24	7:22
156	495559.28	4870851.63	Non-Participating	63:12	173	0:43	21:22
157	495387.82	4871379.34	Participating	35:25	105	0:39	11:52
158	495550.87	4871409.04	Participating	44:08	79	0:54	15:31
159	496488.82	4869537.11	Participating	50:41	178	0:33	18:21
160	496747.46	4869514.95	Non-Participating	31:53	137	0:26	11:43
161	497688.18	4869422.48	Participation Pending	26:23	99	0:30	8:43
162	499490.33	4869311.02	Participating	14:54	69	0:28	5:05
163	499484.18	4870256.98	Non-Participating	51:20	126	0:40	13:25
164	499480.74	4870826.96	Non-Participating	20:55	133	0:20	6:18
165	501120.03	4871028.07	Non-Participating	50:26	152	0:40	18:16
166	501137.73	4869524.71	Non-Participating	15:20	68	0:24	5:08
167	501212.34	4869298.23	Participation Pending	18:20	75	0:29	6:34
168	502822.20	4871087.25	Non-Participating	79:49	225	0:45	27:04
169	504355.79	4869657.97	Participating	125:39	234	1:03	38:34
170	504464.66	4869547.53	Participation Pending	104:07	215	1:08	33:30
171	505966.47	4869876.74	Participating	87:17	136	1:06	30:12
172	506068.12	4870744.95	Non-Participating	7:42	63	0:13	2:51
173	506052.46	4871492.14	Non-Participating	37:11	99	0:41	14:22
174	507891.98	4870234.05	Non-Participating	3:58	23	0:16	1:10
175	508823.64	4869539.44	Non-Participating	0:00	0	0:00	0:00
176	509063.51	4869535.71	Non-Participating	0:00	0	0:00	0:00
177	508143.94	4871002.25	Non-Participating	2:26	24	0:10	0:35
178	508887.77	4871155.48	Non-Participating	0:00	0	0:00	0:00
179	509716.92	4871621.42	Non-Participating	0:00	0	0:00	0:00
180	509716.39	4871712.56	Non-Participating	0:00	0	0:00	0:00
181	509642.37	4871517.50	Non-Participating	0:00	0	0:00	0:00
182	509638.57	4871313.88	Non-Participating	0:00	0	0:00	0:00
183	510238.58	4871099.40	Non-Participating	0:00	0	0:00	0:00
184	509715.57	4870766.88	Non-Participating	0:00	0	0:00	0:00
185	510779.47	4869615.18	Non-Participating	0:00	0	0:00	0:00
186	509710.09	4868616.84	Non-Participating	0:00	0	0:00	0:00
187	511208.69	4868187.15	Non-Participating	0:00	0	0:00	0:00
188	511358.45	4868626.10	Non-Participating	0:00	0	0:00	0:00
189	511354.81	4868870.63	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
190	511340.26	4870437.24	Non-Participating	0:00	0	0:00	0:00
191	511328.61	4870357.34	Non-Participating	0:00	0	0:00	0:00
192	511231.78	4870673.51	Non-Participating	0:00	0	0:00	0:00
193	510669.32	4871235.95	Non-Participating	0:00	0	0:00	0:00
194	511198.71	4871506.32	Non-Participating	0:00	0	0:00	0:00
195	512094.54	4871434.48	Non-Participating	0:00	0	0:00	0:00
196	512320.76	4871236.81	Non-Participating	0:00	0	0:00	0:00
197	511855.79	4867910.86	Non-Participating	0:00	0	0:00	0:00
198	494754.88	4867302.15	Non-Participating	0:00	0	0:00	0:00
199	494905.17	4868021.02	Non-Participating	4:35	54	0:07	1:40
200	495449.94	4868724.88	Non-Participating	16:04	103	0:24	5:20
201	495138.07	4868819.47	Non-Participating	3:45	22	0:15	1:16
202	496022.17	4868650.40	Participating	32:23	95	0:37	11:57
203	495966.21	4867985.63	Non-Participating	20:21	88	0:29	7:05
204	495581.29	4867570.63	Non-Participating	14:56	96	0:19	4:54
205	496788.12	4867093.39	Participating	0:00	0	0:00	0:00
206	496798.37	4867179.05	Participating	0:00	0	0:00	0:00
207	499466.54	4867083.00	Non-Participating	0:00	0	0:00	0:00
208	499809.28	4868052.25	Non-Participating	0:00	0	0:00	0:00
209	499522.27	4869059.69	Non-Participating	13:40	55	0:27	5:01
210	502932.76	4869206.67	Non-Participating	88:42	195	1:21	29:35
211	502739.87	4868086.02	Non-Participating	8:14	44	0:15	3:03
212	501100.51	4867929.92	Non-Participating	0:00	0	0:00	0:00
213	501205.69	4868183.52	Non-Participating	1:30	16	0:08	0:32
214	501126.31	4866789.30	Non-Participating	0:00	0	0:00	0:00
215	502829.57	4866859.28	Non-Participating	0:00	0	0:00	0:00
216	503980.77	4867832.68	Participating	0:00	0	0:00	0:00
217	504375.89	4866974.59	Non-Participating	0:00	0	0:00	0:00
218	504434.89	4868964.79	Participation Pending	40:01	114	0:38	12:45
219	508048.06	4868683.08	Non-Participating	0:00	0	0:00	0:00
220	507577.42	4867933.06	Non-Participating	0:00	0	0:00	0:00
221	508256.18	4868031.55	Non-Participating	0:00	0	0:00	0:00
222	508160.93	4868043.79	Non-Participating	0:00	0	0:00	0:00
223	509431.73	4867831.46	Non-Participating	0:00	0	0:00	0:00
224	511197.03	4867137.19	Non-Participating	0:00	0	0:00	0:00
225	512836.13	4867255.07	Non-Participating	0:00	0	0:00	0:00
226	512876.54	4865698.06	Non-Participating	0:00	0	0:00	0:00
227	511254.51	4866393.12	Non-Participating	0:00	0	0:00	0:00
228	510956.59	4866312.68	Non-Participating	0:00	0	0:00	0:00
229	511803.46	4864790.40	Non-Participating	0:00	0	0:00	0:00
230	511248.62	4863982.43	Non-Participating	0:00	0	0:00	0:00
231	511238.56	4865356.24	Non-Participating	0:00	0	0:00	0:00
232	511480.24	4865525.57	Non-Participating	0:00	0	0:00	0:00
233	509654.54	4866311.78	Non-Participating	0:00	0	0:00	0:00
234	509084.69	4866510.99	Non-Participating	0:00	0	0:00	0:00
235	508125.47	4866480.14	Non-Participating	0:00	0	0:00	0:00
236	508115.22	4865668.00	Participating	0:00	0	0:00	0:00
237	508300.10	4864702.93	Non-Participating	0:00	0	0:00	0:00
238	508661.25	4864863.00	Non-Participating	0:00	0	0:00	0:00
239	509043.52	4864717.00	Non-Participating	0:00	0	0:00	0:00
240	508220.95	4863160.03	Non-Participating	0:00	0	0:00	0:00
241	508608.56	4863085.28	Non-Participating	0:00	0	0:00	0:00
242	510181.05	4863250.58	Non-Participating	0:00	0	0:00	0:00
243	509723.76	4864264.38	Non-Participating	0:00	0	0:00	0:00
244	507091.02	4863071.04	Non-Participating	0:00	0	0:00	0:00
245	508023.68	4863776.16	Non-Participating	0:00	0	0:00	0:00
246	507972.08	4864241.82	Non-Participating	0:00	0	0:00	0:00
247	507911.18	4864780.64	Non-Participating	0:00	0	0:00	0:00
248	507075.09	4866460.06	Non-Participating	0:00	0	0:00	0:00
249	505979.98	4864375.54	Non-Participating	0:00	0	0:00	0:00



Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
250	506660.75	4864623.72	Non-Participating	0:00	0	0:00	0:00
251	506083.96	4865856.15	Non-Participating	0:00	0	0:00	0:00
252	505944.82	4866307.39	Non-Participating	0:00	0	0:00	0:00
253	505982.60	4866485.83	Non-Participating	0:00	0	0:00	0:00
254	505286.95	4866388.36	Non-Participating	0:00	0	0:00	0:00
255	504453.20	4864368.89	Non-Participating	0:00	0	0:00	0:00
256	503837.48	4864808.63	Non-Participating	0:00	0	0:00	0:00
257	502759.65	4866448.52	Non-Participating	0:00	0	0:00	0:00
258	502756.62	4865044.88	Non-Participating	0:00	0	0:00	0:00
259	502847.64	4865132.72	Non-Participating	0:00	0	0:00	0:00
260	502861.92	4864320.45	Non-Participating	0:00	0	0:00	0:00
261	502744.45	4864637.95	Non-Participating	0:00	0	0:00	0:00
262	500293.87	4864408.55	Non-Participating	0:00	0	0:00	0:00
263	498693.14	4865949.36	Non-Participating	2:01	20	0:09	0:50
264	495594.27	4864552.69	Non-Participating	0:00	0	0:00	0:00
265	495484.80	4864629.42	Non-Participating	0:00	0	0:00	0:00
266	495481.67	4865143.24	Non-Participating	0:00	0	0:00	0:00
267	495597.95	4865308.34	Non-Participating	0:00	0	0:00	0:00
268	495580.09	4865567.90	Non-Participating	17:29	64	0:22	6:32
269	495577.97	4865900.74	Non-Participating	16:16	75	0:24	5:46
270	495457.06	4866413.77	Participating	9:06	49	0:20	3:04
271	495573.74	4866601.10	Non-Participating	11:56	55	0:22	4:08
272	494999.07	4865576.36	Non-Participating	2:14	21	0:10	0:48
273	495460.45	4863808.79	Non-Participating	0:00	0	0:00	0:00
274	495591.47	4863853.66	Non-Participating	0:00	0	0:00	0:00
275	495598.45	4863807.52	Non-Participating	0:00	0	0:00	0:00
276	495602.69	4864144.71	Non-Participating	0:00	0	0:00	0:00
277	495449.26	4863156.32	Non-Participating	0:00	0	0:00	0:00
278	495021.10	4862798.98	Non-Participating	0:00	0	0:00	0:00
279	495447.60	4861627.16	Non-Participating	0:00	0	0:00	0:00
280	495589.39	4861913.81	Non-Participating	0:00	0	0:00	0:00
281	496387.78	4863669.96	Non-Participating	0:00	0	0:00	0:00
282	495401.41	4862947.65	Non-Participating	0:00	0	0:00	0:00
283	497806.48	4861897.78	Non-Participating	0:00	0	0:00	0:00
284	498032.83	4862353.66	Non-Participating	0:00	0	0:00	0:00
285	497883.34	4862416.63	Non-Participating	0:00	0	0:00	0:00
286	497390.91	4863188.77	Non-Participating	0:00	0	0:00	0:00
287	499200.13	4863160.86	Non-Participating	0:00	0	0:00	0:00
288	499366.82	4863159.80	Non-Participating	0:00	0	0:00	0:00
289	499062.33	4863011.63	Non-Participating	0:00	0	0:00	0:00
290	499521.73	4863071.93	Non-Participating	0:00	0	0:00	0:00
291	499600.44	4863131.46	Non-Participating	0:00	0	0:00	0:00
292	499653.41	4863563.84	Non-Participating	0:00	0	0:00	0:00
293	500052.87	4861924.15	Non-Participating	0:00	0	0:00	0:00
294	500766.98	4862078.00	Non-Participating	0:00	0	0:00	0:00
295	501364.94	4862089.11	Non-Participating	0:00	0	0:00	0:00
296	501290.46	4862403.31	Non-Participating	0:00	0	0:00	0:00
297	501228.41	4863777.42	Non-Participating	0:00	0	0:00	0:00
298	502760.35	4863408.22	Non-Participating	0:00	0	0:00	0:00
299	502811.16	4863065.78	Non-Participating	0:00	0	0:00	0:00
300	502845.02	4861700.00	Non-Participating	0:00	0	0:00	0:00
301	504324.44	4863058.11	Non-Participating	0:00	0	0:00	0:00
302	504359.50	4863154.55	Non-Participating	0:00	0	0:00	0:00
303	505569.77	4863166.39	Non-Participating	0:00	0	0:00	0:00
304	505982.13	4863095.12	Non-Participating	0:00	0	0:00	0:00
305	505957.47	4862103.78	Non-Participating	0:00	0	0:00	0:00
306	506058.01	4862083.94	Non-Participating	0:00	0	0:00	0:00
307	505988.95	4862547.09	Non-Participating	0:00	0	0:00	0:00
308	505982.34	4861816.52	Non-Participating	0:00	0	0:00	0:00
309	508028.80	4862608.01	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
310	510037.65	4862973.60	Non-Participating	0:00	0	0:00	0:00
311	509978.52	4862987.49	Non-Participating	0:00	0	0:00	0:00
312	511214.04	4862974.57	Non-Participating	0:00	0	0:00	0:00
313	496566.43	4861678.65	Non-Participating	0:00	0	0:00	0:00
314	496394.58	4861521.88	Non-Participating	0:00	0	0:00	0:00
315	498202.69	4861536.49	Non-Participating	0:00	0	0:00	0:00
316	499547.11	4861789.56	Non-Participating	0:00	0	0:00	0:00
317	499706.65	4861546.15	Non-Participating	0:00	0	0:00	0:00
318	503314.07	4861437.35	Non-Participating	0:00	0	0:00	0:00
319	504482.21	4861250.15	Non-Participating	0:00	0	0:00	0:00
320	504352.19	4861303.49	Non-Participating	0:00	0	0:00	0:00
321	504448.61	4861690.45	Non-Participating	0:00	0	0:00	0:00
322	505946.34	4860787.53	Non-Participating	0:00	0	0:00	0:00
323	512456.10	4867927.90	Non-Participating	0:00	0	0:00	0:00
324	512869.46	4865200.07	Non-Participating	0:00	0	0:00	0:00
325	511241.06	4863845.52	Non-Participating	0:00	0	0:00	0:00
326	511377.68	4863817.25	Non-Participating	0:00	0	0:00	0:00
327	511380.49	4867122.86	Non-Participating	0:00	0	0:00	0:00
328	511919.63	4867891.62	Non-Participating	0:00	0	0:00	0:00
329	510106.92	4875126.21	Non-Participating	0:00	0	0:00	0:00
330	509957.99	4875215.57	Non-Participating	0:00	0	0:00	0:00
331	509838.84	4875240.39	Non-Participating	0:00	0	0:00	0:00
332	509540.98	4875523.36	Non-Participating	0:00	0	0:00	0:00
333	508513.01	4875649.50	Non-Participating	0:00	0	0:00	0:00
334	508137.19	4875249.86	Non-Participating	0:00	0	0:00	0:00
335	507954.57	4875255.16	Non-Participating	0:00	0	0:00	0:00
336	507476.85	4875245.18	Non-Participating	0:00	0	0:00	0:00
337	507291.26	4875238.55	Non-Participating	0:00	0	0:00	0:00
338	507308.94	4875273.90	Non-Participating	0:00	0	0:00	0:00
339	507133.29	4875236.34	Non-Participating	0:00	0	0:00	0:00
340	506456.95	4875177.45	Non-Participating	0:00	0	0:00	0:00
341	506392.06	4875165.44	Non-Participating	0:00	0	0:00	0:00
342	506303.13	4875506.73	Non-Participating	0:00	0	0:00	0:00
343	506056.14	4874737.23	Non-Participating	0:00	0	0:00	0:00
344	505835.16	4874164.35	Non-Participating	0:00	0	0:00	0:00
345	506443.65	4873048.96	Non-Participating	0:00	0	0:00	0:00
346	507707.14	4873655.54	Non-Participating	0:00	0	0:00	0:00
347	507746.57	4873752.32	Non-Participating	0:00	0	0:00	0:00
348	509482.74	4869911.96	Non-Participating	0:00	0	0:00	0:00
349	510177.21	4869522.86	Non-Participating	0:00	0	0:00	0:00
350	509715.75	4868523.34	Non-Participating	0:00	0	0:00	0:00
351	509715.75	4867936.59	Non-Participating	0:00	0	0:00	0:00
352	506639.54	4867805.93	Non-Participating	0:00	0	0:00	0:00
353	505981.69	4867853.87	Non-Participating	0:00	0	0:00	0:00
354	506107.06	4861179.97	Non-Participating	0:00	0	0:00	0:00
355	504354.46	4863221.55	Non-Participating	0:00	0	0:00	0:00
356	504370.17	4866942.89	Non-Participating	0:00	0	0:00	0:00
357	504454.04	4869760.35	Participating	100:46	226	0:43	33:19
358	504953.18	4872026.30	Participating	106:46	212	0:57	33:45
359	505194.11	4872241.77	Participating	16:34	77	0:25	5:19
360	504982.82	4872823.99	Non-Participating	11:59	55	0:23	3:16
361	504632.53	4874064.72	Non-Participating	16:44	56	0:33	5:19
362	504550.66	4874140.13	Non-Participating	21:48	62	0:39	6:31
363	505058.05	4874529.02	Non-Participating	7:54	37	0:20	2:16
364	505317.29	4874471.44	Non-Participating	2:44	20	0:13	0:49
365	504311.78	4875881.90	Non-Participating	0:00	0	0:00	0:00
366	503080.23	4875981.03	Non-Participating	0:00	0	0:00	0:00
367	501067.74	4868680.68	Non-Participating	10:25	38	0:24	3:42
368	501045.42	4874262.69	Non-Participating	54:27	104	0:52	16:42
369	500526.98	4876004.95	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
370	499677.17	4876262.10	Non-Participating	0:00	0	0:00	0:00
371	497251.94	4874354.41	Non-Participating	4:23	34	0:11	1:58
372	497140.70	4873107.83	Participating	20:58	82	0:29	7:36
373	499493.80	4874005.78	Participation Pending	28:22	75	0:40	9:56
374	499695.62	4871921.37	Non-Participating	70:23	152	1:01	18:38
375	495332.11	4865917.77	Non-Participating	7:18	49	0:17	2:33
376	495778.75	4872841.02	Participating	1:15	16	0:07	0:26
377	496079.55	4874600.17	Participating	6:20	46	0:13	1:49
378	493303.66	4865363.05	Non-Participating	0:00	0	0:00	0:00
379	493858.51	4865675.06	Non-Participating	0:00	0	0:00	0:00
380	494597.57	4865481.24	Non-Participating	0:00	0	0:00	0:00
381	494950.93	4865608.48	Non-Participating	1:57	19	0:09	0:41
382	494693.22	4861787.99	Non-Participating	0:00	0	0:00	0:00
383	494229.69	4862485.36	Non-Participating	0:00	0	0:00	0:00
384	493181.97	4865807.99	Non-Participating	0:00	0	0:00	0:00
385	493478.15	4866684.14	Non-Participating	0:00	0	0:00	0:00
386	494547.73	4867036.45	Non-Participating	0:00	0	0:00	0:00
387	493147.39	4867174.99	Non-Participating	0:00	0	0:00	0:00
388	494039.10	4868100.58	Non-Participating	0:00	0	0:00	0:00
389	494018.51	4868810.50	Participating	0:00	0	0:00	0:00
390	493659.28	4869128.74	Non-Participating	0:00	0	0:00	0:00
391	493009.42	4868795.04	Participating	0:00	0	0:00	0:00
392	492892.87	4868809.26	Non-Participating	0:00	0	0:00	0:00
393	492790.68	4869907.25	Participating	0:00	0	0:00	0:00
394	493362.95	4869980.97	Non-Participating	0:00	0	0:00	0:00
395	494639.05	4870297.72	Participating	2:57	20	0:13	0:59
396	493230.51	4871142.26	Non-Participating	0:00	0	0:00	0:00
397	493766.48	4871236.38	Non-Participating	0:00	0	0:00	0:00
398	493921.25	4871132.90	Non-Participating	0:00	0	0:00	0:00
399	493540.46	4872673.61	Non-Participating	0:00	0	0:00	0:00
400	494524.93	4872747.21	Non-Participating	0:00	0	0:00	0:00
401	493407.56	4872816.88	Non-Participating	0:00	0	0:00	0:00
402	493747.84	4873206.91	Non-Participating	0:00	0	0:00	0:00
403	494151.04	4873285.23	Participating	0:00	0	0:00	0:00
404	494002.17	4873709.27	Participating	0:00	0	0:00	0:00
405	494024.46	4873648.96	Participating	0:00	0	0:00	0:00
406	495243.19	4873764.68	Participating	7:43	36	0:17	3:31
407	495706.37	4874363.08	Participating	8:12	46	0:21	2:49
408	495270.39	4874448.85	Non-Participating	26:25	103	0:35	8:56
409	494786.51	4875095.87	Participating	83:05	125	1:13	29:19
410	494742.68	4874890.93	Participating	93:02	155	0:58	34:55
411	494673.38	4874964.89	Participating	88:05	147	1:05	32:11
412	493870.54	4874371.18	Participating	46:55	133	0:40	17:43
413	494159.74	4874451.58	Participating	100:13	201	1:02	34:04
414	493136.16	4874000.60	Participating	4:15	24	0:16	1:27
415	494807.37	4875552.26	Participating	84:02	124	0:53	25:41
416	495595.18	4875646.56	Participation Pending	1:29	15	0:09	0:27
417	493717.24	4875917.78	Non-Participating	23:46	150	0:18	8:57
418	494099.39	4876121.20	Participating	21:15	122	0:21	8:17
419	493086.55	4876093.83	Participating	16:10	84	0:21	4:43
420	492917.55	4875943.58	Non-Participating	42:47	163	0:27	14:21
421	492824.93	4874336.74	Participating	1:54	16	0:10	0:40
422	493045.90	4873720.17	Participating	4:04	26	0:14	1:27
423	492516.61	4873491.63	Non-Participating	0:00	0	0:00	0:00
424	492393.91	4872911.32	Participating	0:00	0	0:00	0:00
425	492485.00	4872667.59	Participating	0:00	0	0:00	0:00
426	492280.30	4872422.45	Participating	0:00	0	0:00	0:00
427	492886.93	4871221.63	Non-Participating	0:00	0	0:00	0:00
428	493003.05	4871142.66	Non-Participating	0:00	0	0:00	0:00
429	492012.71	4870131.27	Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
430	491814.62	4869462.51	Participating	0:00	0	0:00	0:00
431	492354.77	4868912.11	Participating	0:00	0	0:00	0:00
432	492373.27	4868475.96	Non-Participating	0:00	0	0:00	0:00
433	492178.63	4867809.55	Non-Participating	0:00	0	0:00	0:00
434	492842.51	4867801.89	Non-Participating	0:00	0	0:00	0:00
435	491772.81	4867258.11	Non-Participating	0:00	0	0:00	0:00
436	492683.89	4866290.27	Non-Participating	0:00	0	0:00	0:00
437	492560.24	4865883.35	Non-Participating	0:00	0	0:00	0:00
438	493165.10	4862890.93	Non-Participating	0:00	0	0:00	0:00
439	493590.90	4862204.60	Non-Participating	0:00	0	0:00	0:00
440	499494.35	4875986.15	Non-Participating	0:00	0	0:00	0:00
441	509739.94	4875483.39	Non-Participating	0:00	0	0:00	0:00
442	499516.46	4866307.27	Non-Participating	0:00	0	0:00	0:00
443	512055.62	4871144.22	Non-Participating	0:00	0	0:00	0:00
444	507243.76	4875236.34	Non-Participating	0:00	0	0:00	0:00
445	508298.59	4873512.15	Non-Participating	0:00	0	0:00	0:00
446	490229.89	4872596.92	Non-Participating	0:00	0	0:00	0:00
447	489847.36	4872269.25	Non-Participating	0:00	0	0:00	0:00
448	488635.42	4877561.29	Non-Participating	0:00	0	0:00	0:00
449	488219.84	4877375.84	Non-Participating	0:00	0	0:00	0:00
450	488227.59	4877664.18	Non-Participating	0:00	0	0:00	0:00
451	487845.93	4879211.82	Non-Participating	0:00	0	0:00	0:00
452	486858.06	4879271.46	Non-Participating	0:00	0	0:00	0:00
453	486750.57	4879405.48	Non-Participating	0:00	0	0:00	0:00
454	487445.96	4879108.89	Non-Participating	0:00	0	0:00	0:00
455	487500.71	4879138.87	Non-Participating	0:00	0	0:00	0:00
456	486363.48	4879172.96	Non-Participating	0:00	0	0:00	0:00
457	487110.32	4877460.18	Non-Participating	0:00	0	0:00	0:00
458	486739.40	4877456.16	Non-Participating	0:00	0	0:00	0:00
459	486738.89	4877554.33	Non-Participating	0:00	0	0:00	0:00
460	486756.68	4878037.63	Non-Participating	0:00	0	0:00	0:00
461	486660.03	4877806.42	Non-Participating	0:00	0	0:00	0:00
462	485834.32	4879132.42	Non-Participating	0:00	0	0:00	0:00
463	485809.66	4879170.03	Non-Participating	0:00	0	0:00	0:00
464	486256.72	4877643.56	Non-Participating	0:00	0	0:00	0:00
465	485959.87	4877465.90	Non-Participating	0:00	0	0:00	0:00
466	484581.56	4877648.78	Non-Participating	0:00	0	0:00	0:00
467	483815.76	4877785.78	Non-Participating	0:00	0	0:00	0:00
468	485477.21	4877647.07	Non-Participating	0:00	0	0:00	0:00
469	485584.47	4877637.05	Non-Participating	0:00	0	0:00	0:00
470	485555.94	4877595.45	Non-Participating	0:00	0	0:00	0:00
471	485553.87	4877635.12	Non-Participating	0:00	0	0:00	0:00
472	485326.16	4879324.31	Non-Participating	0:00	0	0:00	0:00
473	485052.32	4879054.82	Non-Participating	0:00	0	0:00	0:00
474	485117.12	4878621.98	Non-Participating	0:00	0	0:00	0:00
475	488227.48	4878434.34	Non-Participating	0:00	0	0:00	0:00
476	488294.10	4878419.31	Non-Participating	0:00	0	0:00	0:00
477	488578.50	4878448.47	Non-Participating	0:00	0	0:00	0:00
478	488238.28	4878729.90	Non-Participating	0:00	0	0:00	0:00
479	488802.63	4879306.04	Non-Participating	0:00	0	0:00	0:00
480	489444.23	4879207.74	Non-Participating	0:00	0	0:00	0:00
481	489545.45	4879212.95	Non-Participating	0:00	0	0:00	0:00
482	489635.56	4878759.90	Non-Participating	0:00	0	0:00	0:00
483	490495.82	4879286.80	Non-Participating	0:00	0	0:00	0:00
484	490977.06	4879298.11	Non-Participating	0:00	0	0:00	0:00
485	490949.78	4879137.82	Non-Participating	0:00	0	0:00	0:00
486	491460.25	4878431.59	Non-Participating	0:00	0	0:00	0:00
487	491713.80	4878334.91	Non-Participating	0:00	0	0:00	0:00
488	491806.50	4879142.21	Non-Participating	0:00	0	0:00	0:00
489	492039.41	4879331.55	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
490	492860.00	4879226.20	Non-Participating	0:00	0	0:00	0:00
491	493142.48	4879036.43	Non-Participating	0:00	0	0:00	0:00
492	492758.53	4879319.56	Non-Participating	0:00	0	0:00	0:00
493	494040.55	4879209.90	Non-Participating	0:00	0	0:00	0:00
494	494946.88	4878858.40	Non-Participating	0:00	0	0:00	0:00
495	494631.87	4878070.88	Non-Participating	0:00	0	0:00	0:00
496	494622.23	4878130.23	Non-Participating	0:00	0	0:00	0:00
497	495153.30	4877779.20	Non-Participating	0:00	0	0:00	0:00
498	494779.88	4877690.16	Non-Participating	0:00	0	0:00	0:00
499	494656.56	4877212.33	Non-Participating	1:37	16	0:09	0:29
500	493010.05	4877412.07	Participating	24:10	104	0:29	5:57
501	493292.00	4877317.09	Participation Pending	9:10	51	0:21	2:40
502	493253.70	4877817.21	Non-Participating	9:16	37	0:19	2:03
503	492754.95	4877751.84	Non-Participating	0:00	0	0:00	0:00
504	492937.93	4877693.98	Non-Participating	0:00	0	0:00	0:00
505	492333.63	4877666.52	Non-Participating	0:00	0	0:00	0:00
506	492251.72	4877503.81	Participating	0:00	0	0:00	0:00
507	492234.18	4877555.41	Participating	0:00	0	0:00	0:00
508	492209.17	4877379.83	Participating	0:00	0	0:00	0:00
509	491204.57	4877592.32	Non-Participating	16:53	78	0:24	4:59
510	490993.10	4877604.29	Non-Participating	10:31	84	0:18	3:13
511	490950.33	4877852.19	Non-Participating	10:00	52	0:16	2:56
512	489835.40	4877912.18	Non-Participating	0:00	0	0:00	0:00
513	489914.98	4877880.09	Non-Participating	0:00	0	0:00	0:00
514	490320.50	4876915.99	Non-Participating	5:06	37	0:15	1:45
515	490345.19	4876928.97	Non-Participating	5:30	38	0:15	1:54
516	489824.65	4877177.26	Non-Participating	0:00	0	0:00	0:00
517	489798.47	4877241.24	Non-Participating	0:00	0	0:00	0:00
518	488326.68	4876849.62	Non-Participating	0:00	0	0:00	0:00
519	488211.66	4877034.73	Non-Participating	0:00	0	0:00	0:00
520	486597.05	4876484.54	Non-Participating	0:00	0	0:00	0:00
521	485139.90	4876925.87	Non-Participating	0:00	0	0:00	0:00
522	485112.68	4876718.66	Non-Participating	0:00	0	0:00	0:00
523	485111.73	4876886.12	Non-Participating	0:00	0	0:00	0:00
524	484576.48	4877381.31	Non-Participating	0:00	0	0:00	0:00
525	484604.14	4877406.38	Non-Participating	0:00	0	0:00	0:00
526	484415.46	4876945.29	Non-Participating	0:00	0	0:00	0:00
527	484482.97	4876529.89	Non-Participating	0:00	0	0:00	0:00
528	484133.35	4876454.25	Non-Participating	0:00	0	0:00	0:00
529	483354.68	4876911.14	Non-Participating	0:00	0	0:00	0:00
530	483340.51	4876941.40	Non-Participating	0:00	0	0:00	0:00
531	483284.50	4877111.89	Non-Participating	0:00	0	0:00	0:00
532	483894.45	4877038.60	Non-Participating	0:00	0	0:00	0:00
533	483805.65	4877165.29	Non-Participating	0:00	0	0:00	0:00
534	500183.35	4876832.93	Non-Participating	0:00	0	0:00	0:00
535	498032.98	4876897.85	Non-Participating	0:00	0	0:00	0:00
536	497876.00	4876576.62	Non-Participating	0:00	0	0:00	0:00
537	496003.73	4876090.86	Participating	0:00	0	0:00	0:00
538	483371.66	4876260.99	Non-Participating	0:00	0	0:00	0:00
539	483342.50	4876216.88	Non-Participating	0:00	0	0:00	0:00
540	483353.94	4876115.55	Non-Participating	0:00	0	0:00	0:00
541	483356.50	4875964.09	Non-Participating	0:00	0	0:00	0:00
542	483610.07	4875926.75	Non-Participating	0:00	0	0:00	0:00
543	484347.49	4875779.83	Non-Participating	0:00	0	0:00	0:00
544	484122.70	4876211.77	Non-Participating	0:00	0	0:00	0:00
545	484639.57	4876183.37	Non-Participating	0:00	0	0:00	0:00
546	485040.33	4875536.46	Non-Participating	0:00	0	0:00	0:00
547	485950.14	4875850.27	Non-Participating	0:00	0	0:00	0:00
548	485922.83	4875490.30	Non-Participating	0:00	0	0:00	0:00
549	485570.32	4875343.66	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
550	486758.93	4875870.36	Non-Participating	0:00	0	0:00	0:00
551	486732.47	4875847.61	Non-Participating	0:00	0	0:00	0:00
552	487379.99	4875967.61	Non-Participating	0:00	0	0:00	0:00
553	487414.85	4875979.00	Non-Participating	0:00	0	0:00	0:00
554	486752.22	4876287.93	Non-Participating	0:00	0	0:00	0:00
555	488220.58	4875677.44	Non-Participating	0:00	0	0:00	0:00
556	488332.16	4876043.35	Participating	0:00	0	0:00	0:00
557	489116.44	4875427.96	Non-Participating	0:00	0	0:00	0:00
558	489070.22	4875417.85	Non-Participating	0:00	0	0:00	0:00
559	489141.82	4875405.73	Non-Participating	0:00	0	0:00	0:00
560	488998.60	4876062.19	Participating	0:00	0	0:00	0:00
561	489826.70	4875987.32	Non-Participating	0:00	0	0:00	0:00
562	490243.39	4876075.04	Non-Participating	5:02	39	0:13	1:46
563	490277.50	4875981.51	Non-Participating	5:51	43	0:14	2:06
564	490318.56	4876072.58	Non-Participating	6:09	43	0:14	2:11
565	490841.49	4875989.47	Non-Participating	25:14	131	0:21	8:55
566	491021.44	4876062.81	Participation Pending	31:09	142	0:23	10:20
567	491885.42	4875936.91	Participation Pending	6:07	58	0:10	2:06
568	492288.14	4875939.17	Participating	4:28	38	0:11	1:18
569	485068.52	4874814.15	Non-Participating	0:00	0	0:00	0:00
570	485049.92	4874303.42	Non-Participating	0:00	0	0:00	0:00
571	485562.84	4875163.93	Non-Participating	0:00	0	0:00	0:00
572	485226.22	4873854.62	Non-Participating	0:00	0	0:00	0:00
573	484962.06	4873636.11	Non-Participating	0:00	0	0:00	0:00
574	485076.63	4873384.34	Non-Participating	0:00	0	0:00	0:00
575	485248.40	4873345.47	Non-Participating	0:00	0	0:00	0:00
576	485233.04	4873372.20	Non-Participating	0:00	0	0:00	0:00
577	484992.60	4872278.33	Non-Participating	0:00	0	0:00	0:00
578	484936.10	4872282.95	Non-Participating	0:00	0	0:00	0:00
579	485379.31	4872761.19	Non-Participating	0:00	0	0:00	0:00
580	486198.35	4872740.10	Non-Participating	0:00	0	0:00	0:00
581	486676.17	4872464.77	Non-Participating	0:00	0	0:00	0:00
582	486655.64	4873090.69	Non-Participating	0:00	0	0:00	0:00
583	487877.11	4873120.91	Non-Participating	0:00	0	0:00	0:00
584	488112.71	4872671.02	Non-Participating	0:00	0	0:00	0:00
585	489802.42	4873070.99	Non-Participating	0:00	0	0:00	0:00
586	490903.77	4872050.05	Non-Participating	0:00	0	0:00	0:00
587	491158.49	4872615.01	Non-Participating	0:00	0	0:00	0:00
588	491617.71	4872744.89	Non-Participating	0:00	0	0:00	0:00
589	491351.60	4872844.56	Non-Participating	0:00	0	0:00	0:00
590	491439.59	4872911.18	Non-Participating	0:00	0	0:00	0:00
591	486316.80	4874665.05	Non-Participating	0:00	0	0:00	0:00
592	487443.29	4874431.59	Non-Participating	0:00	0	0:00	0:00
593	488227.77	4874362.55	Participating	0:00	0	0:00	0:00
594	488176.73	4874445.52	Non-Participating	0:00	0	0:00	0:00
595	488313.23	4874925.37	Participating	0:00	0	0:00	0:00
596	488330.19	4874908.78	Participating	0:00	0	0:00	0:00
597	490542.51	4874927.42	Participating	5:25	41	0:14	1:54
598	490484.06	4874350.37	Participating	0:00	0	0:00	0:00
599	490667.31	4874464.80	Participating	2:15	20	0:10	0:48
600	489910.19	4874274.68	Participating	0:00	0	0:00	0:00
601	489305.30	4874280.67	Participating	0:00	0	0:00	0:00
602	489395.90	4874448.33	Participating	0:00	0	0:00	0:00
603	491911.47	4874443.00	Participating	22:18	83	0:25	8:16
604	491551.67	4874626.99	Participating	40:56	120	0:32	15:10
605	491452.04	4874745.89	Participating	20:02	72	0:29	7:06
606	490742.07	4874350.00	Non-Participating	2:57	25	0:11	1:05
607	492196.54	4873592.10	Participating	0:00	0	0:00	0:00
608	491538.28	4873118.40	Non-Participating	0:00	0	0:00	0:00
609	490427.30	4873185.69	Non-Participating	0:00	0	0:00	0:00



Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
610	490308.00	4873855.52	Non-Participating	0:00	0	0:00	0:00
611	489807.12	4873557.35	Non-Participating	0:00	0	0:00	0:00
612	488849.73	4874109.24	Non-Participating	0:00	0	0:00	0:00
613	488302.06	4873557.83	Non-Participating	0:00	0	0:00	0:00
614	487911.15	4873636.20	Non-Participating	0:00	0	0:00	0:00
615	487684.01	4873459.47	Non-Participating	0:00	0	0:00	0:00
616	487514.01	4873755.84	Non-Participating	0:00	0	0:00	0:00
617	487184.42	4873945.73	Non-Participating	0:00	0	0:00	0:00
618	486591.04	4874277.89	Non-Participating	0:00	0	0:00	0:00
619	486670.36	4873699.15	Non-Participating	0:00	0	0:00	0:00
620	486755.87	4873650.47	Non-Participating	0:00	0	0:00	0:00
621	486727.45	4871753.50	Non-Participating	0:00	0	0:00	0:00
622	486094.94	4871309.02	Non-Participating	0:00	0	0:00	0:00
623	486638.09	4871400.01	Non-Participating	0:00	0	0:00	0:00
624	486672.02	4870622.68	Non-Participating	0:00	0	0:00	0:00
625	486655.48	4870232.51	Non-Participating	0:00	0	0:00	0:00
626	487378.63	4870881.50	Non-Participating	0:00	0	0:00	0:00
627	487448.24	4871236.67	Non-Participating	0:00	0	0:00	0:00
628	487697.00	4871268.04	Non-Participating	0:00	0	0:00	0:00
629	488319.13	4871047.52	Non-Participating	0:00	0	0:00	0:00
630	487859.22	4870334.28	Non-Participating	0:00	0	0:00	0:00
631	488100.93	4870340.68	Non-Participating	0:00	0	0:00	0:00
632	488931.40	4870482.89	Non-Participating	0:00	0	0:00	0:00
633	489465.02	4870612.47	Non-Participating	0:00	0	0:00	0:00
634	489473.93	4870174.17	Non-Participating	0:00	0	0:00	0:00
635	489918.83	4870357.95	Non-Participating	0:00	0	0:00	0:00
636	490477.39	4870317.69	Non-Participating	0:00	0	0:00	0:00
637	491440.93	4870296.94	Participating	0:00	0	0:00	0:00
638	491691.36	4870338.51	Non-Participating	0:00	0	0:00	0:00
639	491742.59	4870251.31	Non-Participating	0:00	0	0:00	0:00
640	490556.45	4870428.90	Non-Participating	0:00	0	0:00	0:00
641	490729.74	4870543.54	Non-Participating	0:00	0	0:00	0:00
642	492088.16	4871151.03	Participating	0:00	0	0:00	0:00
643	492101.16	4871308.61	Non-Participating	0:00	0	0:00	0:00
644	491583.87	4871268.58	Non-Participating	0:00	0	0:00	0:00
645	491466.08	4871036.24	Non-Participating	0:00	0	0:00	0:00
646	490182.63	4871392.80	Non-Participating	0:00	0	0:00	0:00
647	490146.04	4871128.30	Non-Participating	0:00	0	0:00	0:00
648	489684.58	4871207.32	Non-Participating	0:00	0	0:00	0:00
649	489742.38	4869647.95	Non-Participating	0:00	0	0:00	0:00
650	490330.39	4868981.77	Non-Participating	0:00	0	0:00	0:00
651	490439.21	4869028.96	Non-Participating	0:00	0	0:00	0:00
652	491759.63	4869590.01	Non-Participating	0:00	0	0:00	0:00
653	491515.95	4869809.52	Non-Participating	0:00	0	0:00	0:00
654	490718.55	4869035.68	Non-Participating	0:00	0	0:00	0:00
655	491214.49	4868921.13	Non-Participating	0:00	0	0:00	0:00
656	491144.65	4868793.54	Non-Participating	0:00	0	0:00	0:00
657	490586.54	4867989.99	Non-Participating	0:00	0	0:00	0:00
658	490772.60	4868329.90	Non-Participating	0:00	0	0:00	0:00
659	490521.01	4868392.32	Non-Participating	0:00	0	0:00	0:00
660	490399.71	4868828.19	Non-Participating	0:00	0	0:00	0:00
661	490132.35	4868300.15	Non-Participating	0:00	0	0:00	0:00
662	489421.01	4868140.33	Non-Participating	0:00	0	0:00	0:00
663	487623.14	4868576.03	Non-Participating	0:00	0	0:00	0:00
664	487782.58	4867705.95	Non-Participating	0:00	0	0:00	0:00
665	488410.14	4867926.75	Non-Participating	0:00	0	0:00	0:00
666	490006.54	4867558.26	Non-Participating	0:00	0	0:00	0:00
667	489786.08	4867239.58	Non-Participating	0:00	0	0:00	0:00
668	489471.01	4866930.92	Non-Participating	0:00	0	0:00	0:00
669	489407.69	4866850.23	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
670	489550.29	4866777.40	Non-Participating	0:00	0	0:00	0:00
671	489177.54	4866889.51	Non-Participating	0:00	0	0:00	0:00
672	489191.30	4866647.84	Non-Participating	0:00	0	0:00	0:00
673	489312.09	4866497.79	Non-Participating	0:00	0	0:00	0:00
674	489313.39	4866375.23	Non-Participating	0:00	0	0:00	0:00
675	489310.25	4866131.82	Non-Participating	0:00	0	0:00	0:00
676	489861.71	4865984.83	Non-Participating	0:00	0	0:00	0:00
677	489395.33	4866310.51	Non-Participating	0:00	0	0:00	0:00
678	490197.73	4866693.01	Non-Participating	0:00	0	0:00	0:00
679	490217.54	4866649.68	Non-Participating	0:00	0	0:00	0:00
680	490017.33	4865967.73	Non-Participating	0:00	0	0:00	0:00
681	490278.87	4865979.10	Non-Participating	0:00	0	0:00	0:00
682	490410.02	4866045.09	Non-Participating	0:00	0	0:00	0:00
683	490085.49	4864761.25	Non-Participating	0:00	0	0:00	0:00
684	489923.58	4864746.23	Non-Participating	0:00	0	0:00	0:00
685	489842.93	4865195.32	Non-Participating	0:00	0	0:00	0:00
686	492242.97	4868718.98	Non-Participating	0:00	0	0:00	0:00
687	492201.39	4868471.14	Participating	0:00	0	0:00	0:00
688	491286.85	4866494.23	Non-Participating	0:00	0	0:00	0:00
689	491009.28	4865891.24	Non-Participating	0:00	0	0:00	0:00
690	491637.21	4866020.30	Non-Participating	0:00	0	0:00	0:00
691	492326.88	4865129.44	Non-Participating	0:00	0	0:00	0:00
692	491378.79	4865103.88	Non-Participating	0:00	0	0:00	0:00
693	491360.33	4865074.29	Non-Participating	0:00	0	0:00	0:00
694	492846.71	4863545.15	Non-Participating	0:00	0	0:00	0:00
695	491647.96	4864076.25	Non-Participating	0:00	0	0:00	0:00
696	490594.15	4864686.77	Non-Participating	0:00	0	0:00	0:00
697	492988.35	4862968.51	Non-Participating	0:00	0	0:00	0:00
698	493649.83	4863248.87	Non-Participating	0:00	0	0:00	0:00
699	494269.33	4863513.13	Non-Participating	0:00	0	0:00	0:00
700	493677.47	4863383.00	Non-Participating	0:00	0	0:00	0:00
701	493669.38	4863482.76	Non-Participating	0:00	0	0:00	0:00
702	483374.01	4877839.13	Non-Participating	0:00	0	0:00	0:00
703	483734.01	4879213.02	Non-Participating	0:00	0	0:00	0:00

SHADOW FLICKER MODELING REPORT  
COMBINED GE 2.3 AND GE 2.5 LAYOUT

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Dodge County Wind Project  
Dodge and Steele Counties, Minnesota

*Prepared for:*

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*Prepared by:*



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December 17, 2018  
Revised September 4, 2019

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## 1.0 EXECUTIVE SUMMARY

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The Dodge County Wind Project (the Project) is a proposed wind power generation facility with a total capacity of approximately 170 megawatt (MW) and will consist of 68 wind turbines within an approximately 81 square mile region (Project Area) in Dodge and Steele Counties, Minnesota. The Project is being developed by Dodge County Wind, LLC (DCW), a wholly-owned indirect subsidiary of NextEra Energy Resources (NEER). Epsilon Associates, Inc. (Epsilon) has been retained by DCW through Atwell, LLC (Atwell) to conduct shadow flicker modeling for this Project.

Shadow flicker modeling was conservatively conducted for 72 GE wind turbines, which includes 4 alternate wind turbine locations. The purpose of this analysis is to predict the worst-case and expected annual durations of wind turbine shadow flicker at nearby residences and other sensitive receptors (e.g. church).

The maximum expected annual duration of shadow flicker at a modeling receptor resulting from the operation of the 68 proposed and 4 alternate wind turbines is 39 hours, 29 minutes. This is at a participating receptor. The maximum expected annual duration of shadow flicker at a non-participating modeling receptor is 33 hours, 56 minutes. The modeling results are conservative in that modeling receptors were treated as “greenhouses” and the surrounding area was assumed to be without vegetation or structures (“bare earth”).

## 2.0 INTRODUCTION

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The proposed Project to be located in Dodge and Steele Counties, Minnesota is proposed to consist of 68 wind turbines. The proposed wind turbines are a combination of GE 2.5 MW and GE 2.3 MW units with rotor diameters of 116 meters for each, and hub heights of 90 and 80 meters, respectively. All GE 2.5-116 units and all GE 2.3-116 units will be Low Noise Trailing Edge (LNTE) models. Of the 72 wind turbines included in the analysis (68 proposed + 4 alternates), 58 are located in Dodge County and 14 are located in Steele County. Figure 2-1 shows the locations of the 68 proposed and 4 alternate wind turbines over aerial imagery in Dodge and Steele Counties.

With respect to wind turbines, shadow flicker can be defined as an intermittent change in the intensity of light in a given area resulting from the operation of a wind turbine due to its interaction with the sun. While indoors, an observer experiences repeated changes in the brightness of the room as shadows cast from the wind turbine blades briefly pass by windows as the blades rotate. In order for this to occur, the wind turbine must be operating, the sun must be shining, and the window must be within the shadow region of the wind turbine, otherwise there is no shadow flicker. A stationary wind turbine only generates a stationary shadow similar to any other structure.

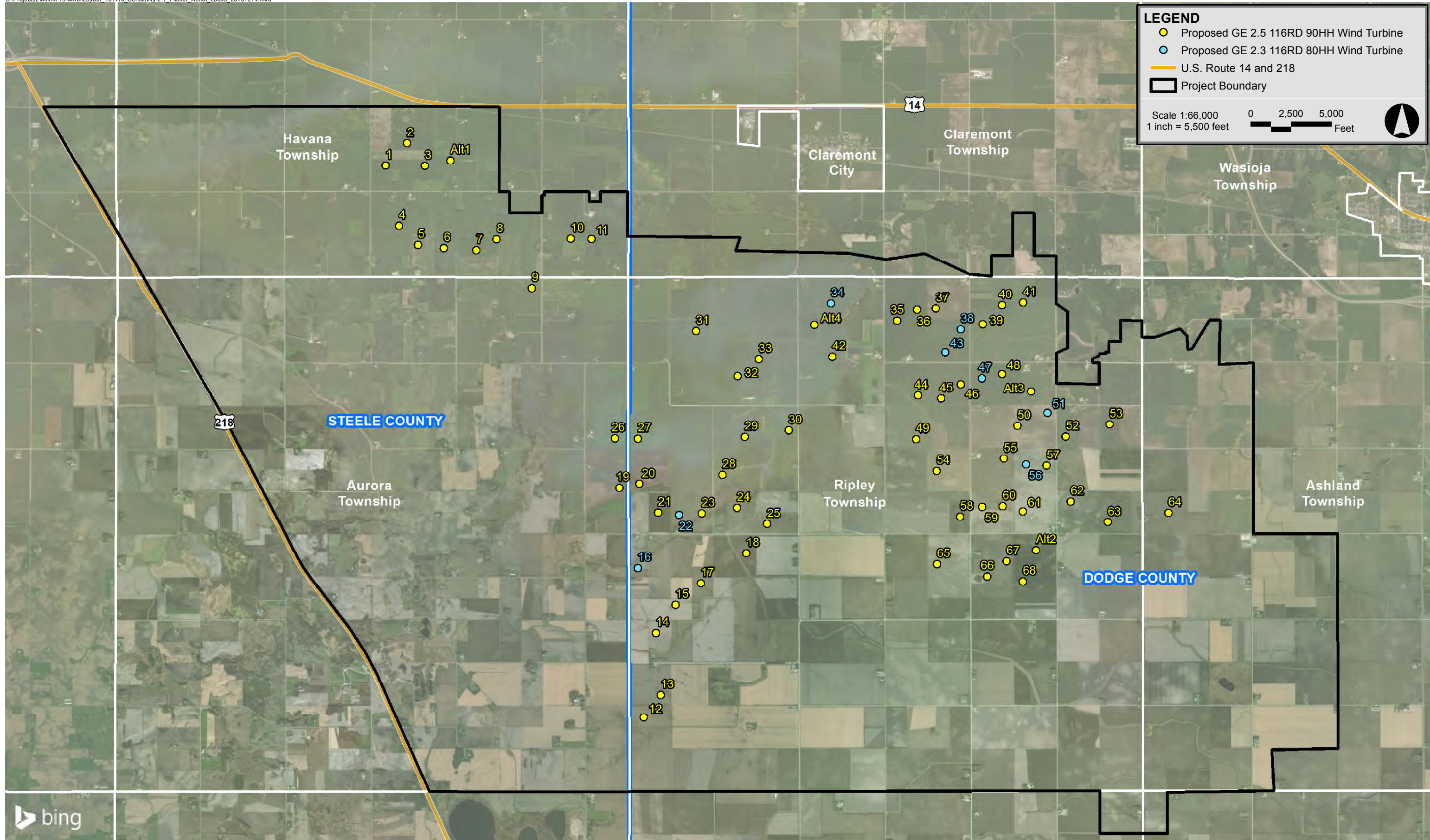
Based on the current design and operation of typical modern wind turbines, shadow flicker is not a cause of epileptic seizures. According to the Epilepsy Foundation, "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)."<sup>1</sup> The wind turbines for this Project have a maximum rotational speed of 15.7 rpm which corresponds to a shadow flicker frequency of 0.8 Hz. This frequency is well below the frequency identified by the Epilepsy Foundation; therefore, the triggering of epileptic seizures is not a concern with this Project.

This report presents the findings of a shadow flicker modeling study for the Project. The wind turbines were modeled with the WindPRO software package using information provided by DCW and Atwell. The expected annual duration of shadow flicker was calculated at modeling receptors and shadow flicker isolines for the area surrounding the Project were generated. The results of the modeling are found within this report.

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<sup>1</sup> Epilepsy Foundation, <http://www.epilepsy.com/learn/triggers-seizures/photosensitivity-and-seizures>. Accessed in June 2018.





Dodge County Wind Dodge & Steele Counties, MN



## 3.0 SHADOW FLICKER MODELING

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### 3.1 Modeling Methodology

Shadow flicker was modeled using a software package, WindPRO version 3.2. WindPRO is a software suite developed by EMD International A/S and is used for assessing potential environmental impacts from wind turbines. Using the Shadow module within WindPRO, worst-case shadow flicker in the area surrounding the wind turbines was calculated based on data inputs including: location of the wind turbines, location of discrete receptor points, wind turbine dimensions, flicker calculation limits, and terrain data. Based on these data, the model was able to incorporate the appropriate sun angle and maximum daily sunlight for this latitude into the calculations. The resulting worst-case calculations assume that the sun is always shining during daylight hours and that the wind turbine is always operating. The WindPRO Shadow module can be further refined by incorporating sunshine probabilities and wind turbine operational estimates by wind direction over the course of a year. The values produced by this further refinement are known as the “expected” shadow flicker. Both worst-case and expected annual shadow flicker durations are presented in this section.

The proposed wind turbine layout for the Project dated November 16, 2018 was provided by Atwell. Of the 72 conservatively modeled wind turbines, 4 are alternative wind turbine locations. Locations of the turbines are shown in Figure 3-1, and the coordinates are provided in Appendix A. The layout consists of 64 GE 2.5-116 wind turbines (4 alts) and eight (8) GE 2.3-116 wind turbines with rotor diameters of 116 meters for each, and hub heights of 90 meters and 80 meters, respectively. All wind turbines will have the optional LNTE blades. This option does not impact the shadow flicker calculations. Each wind turbine has the following characteristics based on the technical data provided by Atwell, DCW, and/or NEER:

		<u>GE 2.5-116</u>	<u>GE 2.3-116</u>
◆ Rated Power	=	2,500 kW	2,300 kW
◆ Hub Height	=	90 meters	80 meters
◆ Rotor Diameter	=	116 meters	116 meters
◆ Cut-in Wind Speed	=	3 m/s	3 m/s
◆ Cut-out Wind Speed <sup>2</sup>	=	31 m/s	32 m/s
◆ Maximum RPM	=	15.7 rpm	15.7 rpm

To-date, there are no federal, state, or local regulations regarding the maximum radial distance from a wind turbine to which shadow flicker should be analyzed applicable to this Project. In the United States, shadow flicker is commonly evaluated out to a distance of ten

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<sup>2</sup> Based on a 600-second time interval

times the rotor diameter. According to the Massachusetts Model Bylaw for wind energy facilities, shadow flicker impacts are minimal at and beyond a distance of ten rotor diameters.<sup>3</sup> Defining the shadow flicker calculation area has also been addressed in Europe where the ten times rotor diameter approach has been accepted in multiple European countries.<sup>4</sup> Some jurisdictions conservatively require a larger calculation area. The New Hampshire Site Evaluation Committee through rulemaking docket 2014-04 adopted rules on December 15, 2015 outlining application requirements and criteria for energy facilities, including wind energy facilities. As part of these revised regulations, Site 301.08(a)(2) requires an evaluation distance of at least 1 mile from a wind turbine.<sup>5</sup> Section 16-50j-94, part (g), of the Regulations of Connecticut State Agencies identifies the components required in a shadow flicker evaluation report which includes the calculation of shadow flicker from each proposed wind turbine to any off-site occupied structure within a 1.25 mile radius.<sup>6</sup> For this Project, ten times the maximum rotor diameter of the proposed wind turbines corresponds to a distance of 0.72 miles (1,160 m). Conservatively, this analysis includes shadow flicker calculations out to 1.25 miles (2,012 m) from each wind turbine in the model for the proposed layout.

A dataset containing participation status information for property parcels in the proximity of the Project was provided by Atwell on December 10, 2018. This information was supplemented by Atwell/DCW regarding a recent change to participation status for the parcel with receptor #358 whose owner recently signed a participation agreement. Parcels identified as “LSE” within the dataset and the receptor #358 parcel are participating and are indicated as such on Figure 3-1. Consistent with the LWECs requirement, properties in Dodge County not participating in the Project will have turbines set back at least 3 rotor diameters (RD) from their property in non-prevailing wind directions and at least 5 RD from their property in prevailing wind directions from each wind turbine (5 by 3 setback). Therefore, any parcel located in Dodge County that is closer than these setbacks must be a participating parcel for the Project. Accordingly, any non-“LSE” parcel in Dodge County closer than these setbacks has been assigned a “participation pending” status. Properties located in Steele County not participating in the Project will have turbines set back at least 5 rotor diameters from their property in any direction from a wind turbine (5 by 5 setback). Therefore, any parcel located in Steele County closer than this setback must be a

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<sup>3</sup> Massachusetts Department of Energy Resources, “Model As-of-Right Zoning Ordinance or Bylaw: Allowing Use of Wind Energy Facilities” 2009.

<sup>4</sup> Parsons Brinckerhoff, “Update of UK Shadow Flicker Evidence Base” Prepared for Department of Energy and Climate Change, 2011.

<sup>5</sup> State of New Hampshire Site Evaluation Committee Site 300 Rules (2015), available at [http://www.gencourt.state.nh.us/rules/state\\_agencies/site100-300.html](http://www.gencourt.state.nh.us/rules/state_agencies/site100-300.html) Accessed in January 2018.

<sup>6</sup> State of Connecticut CSC Wind Regulations (2014), available at <https://www.cga.ct.gov/aspx/CGARegulations/CGARegulations.aspx?Yr=2014&Reg=2012-054&Amd=E> Accessed in January 2018.

participating parcel for the Project. Accordingly, any non-“LSE” parcel in Steele County closer than the 5 by 5 setback has been assigned a “participation pending” status. A setback data layer was provided by Atwell and is shown on Figure 3-1. Participation status used throughout this analysis is shown in Figure 3-1.

A modeling receptor dataset dated June 15, 2017 was provided by Atwell. Receptors within 2 miles of the Project Area categorized as residential, mobile home, town, church, or municipal (694) were input into the WindPRO model. Each modeling point was assumed to have a window facing all directions (“greenhouse” mode) which yields conservative results. Participation status for each modeling receptor was assigned based on the data presented in Figure 3-1. All modeling receptors are identified in Figure 3-2 and are distinguished as either participating, participation pending, or non-participating. The model was set to limit calculations to 2,012 meters from a wind turbine, the equivalent of 1.25 miles. Consequently, shadow flicker at any of the 694 modeling receptors greater than the corresponding limitation distance from a wind turbine was zero. In addition to modeling discrete points, shadow flicker was calculated at grid points in the area surrounding the modeled wind turbines to generate flicker isolines. A 20-meter spacing was used for this grid.

The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey. Conservatively, obstacles, i.e. buildings and vegetation, were excluded from the analysis. This is effectively a “bare earth” scenario which is conservative. When accounted for in the shadow flicker calculations, such obstacles may significantly mitigate or eliminate the flicker effect depending on their size, type, and location. In addition, shadow flicker durations were calculated only when the angle of the sun was at least 3° above the horizon.

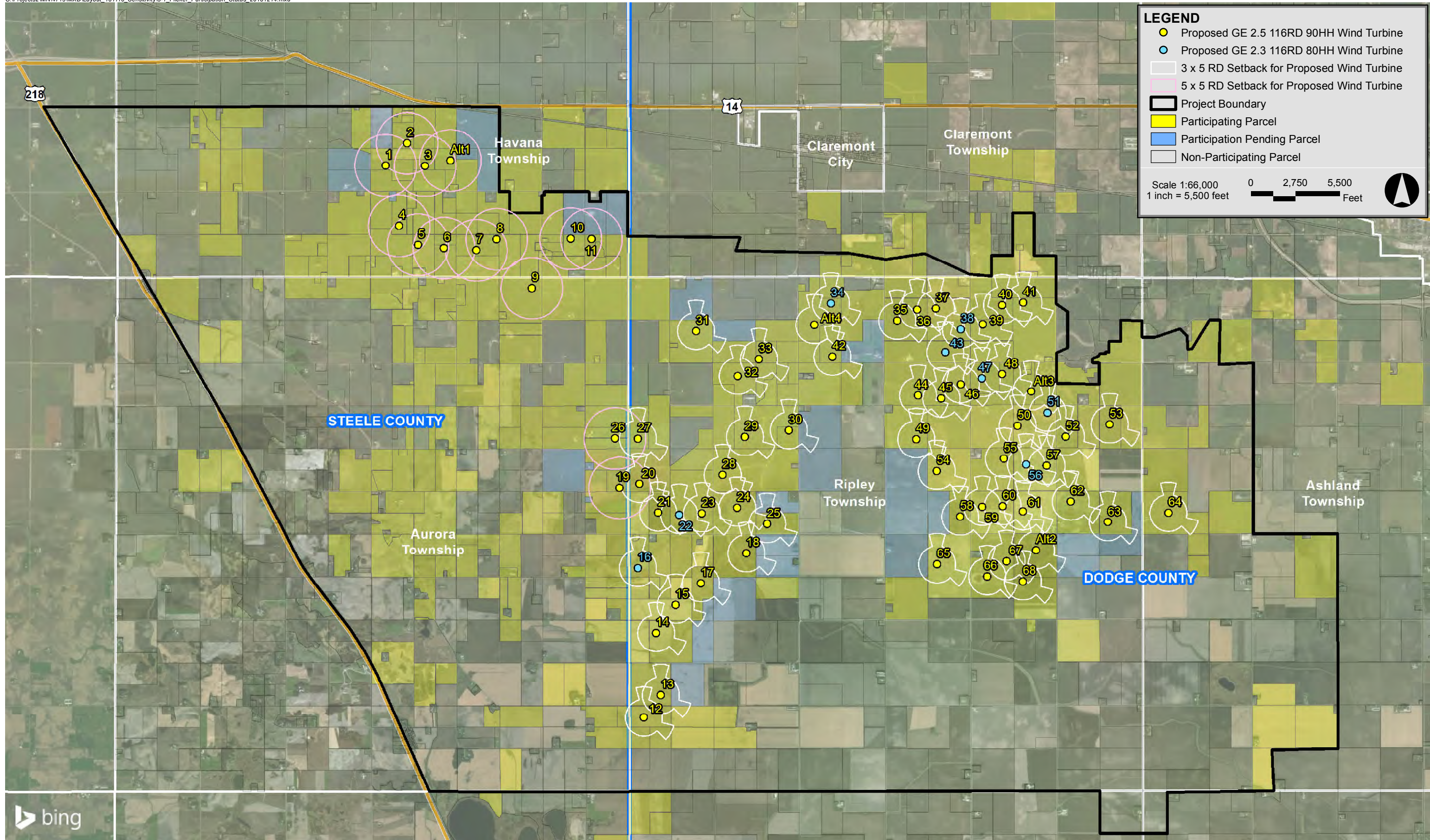
Monthly sunshine probabilities were input for each month from January to December. These numbers were obtained from a publicly available historical dataset for Minneapolis-St. Paul, Minnesota from the National Oceanic and Atmospheric Administration’s (NOAA) National Centers for Environmental Information (NCEI).<sup>7</sup> Table 3-1 shows the percentage of sunshine hours by month used in the shadow flicker modeling. These values are the percentages that the sun is expected to be shining during daylight hours.

Annual operational hours per wind direction sector were provided by NEER. These hours per wind direction sector are used by WindPRO in the estimation of the “wind direction” and “operation time” reduction factors. Based on this dataset, the wind turbines would operate 97% of the year. Table 3-2 shows the distribution of operational hours for the 16 wind directions.

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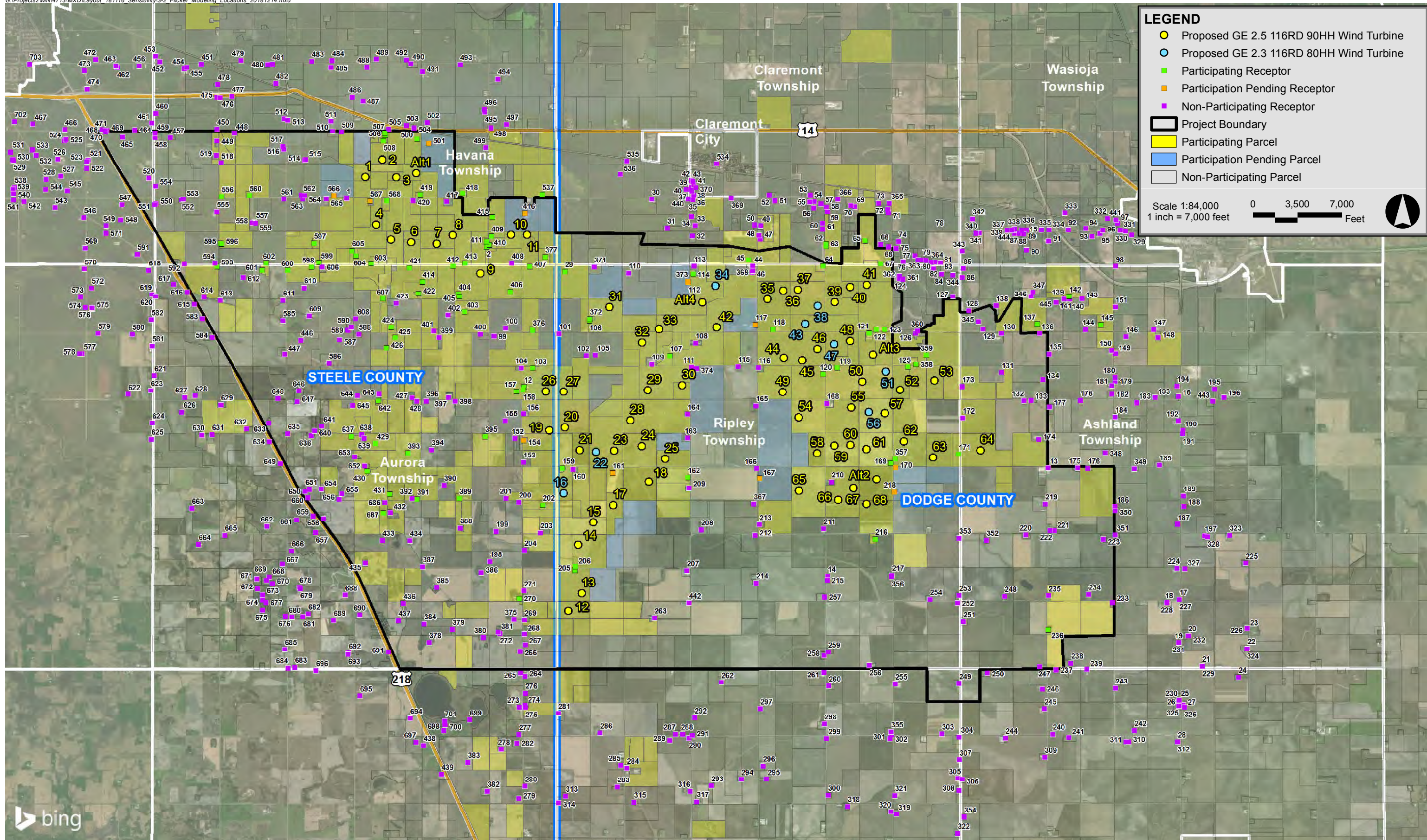
<sup>7</sup> NCEI (formerly NCDC), <http://www1.ncdc.noaa.gov/pub/data/ccd-data/pctpos15.dat>. Accessed in April 2018.





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**Table 3-1 Monthly Percent of Possible Sunshine**

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<b>Month</b>	<b>Possible Sunshine</b>
January	53%
February	59%
March	57%
April	56%
May	62%
June	67%
July	74%
August	69%
September	62%
October	51%
November	37%
December	38%

**Table 3-2 Operational Hours per Wind Direction Sector**

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<b>Wind Sector</b>	<b>Operational Hours</b>
N	322
NNE	238
NE	229
ENE	199
E	286
ESE	335
SE	391
SSE	675
S	1,176
SSW	859
SW	501
WSW	358
W	483
WNW	826
NW	1,068
NNW	535
Annual	8,481

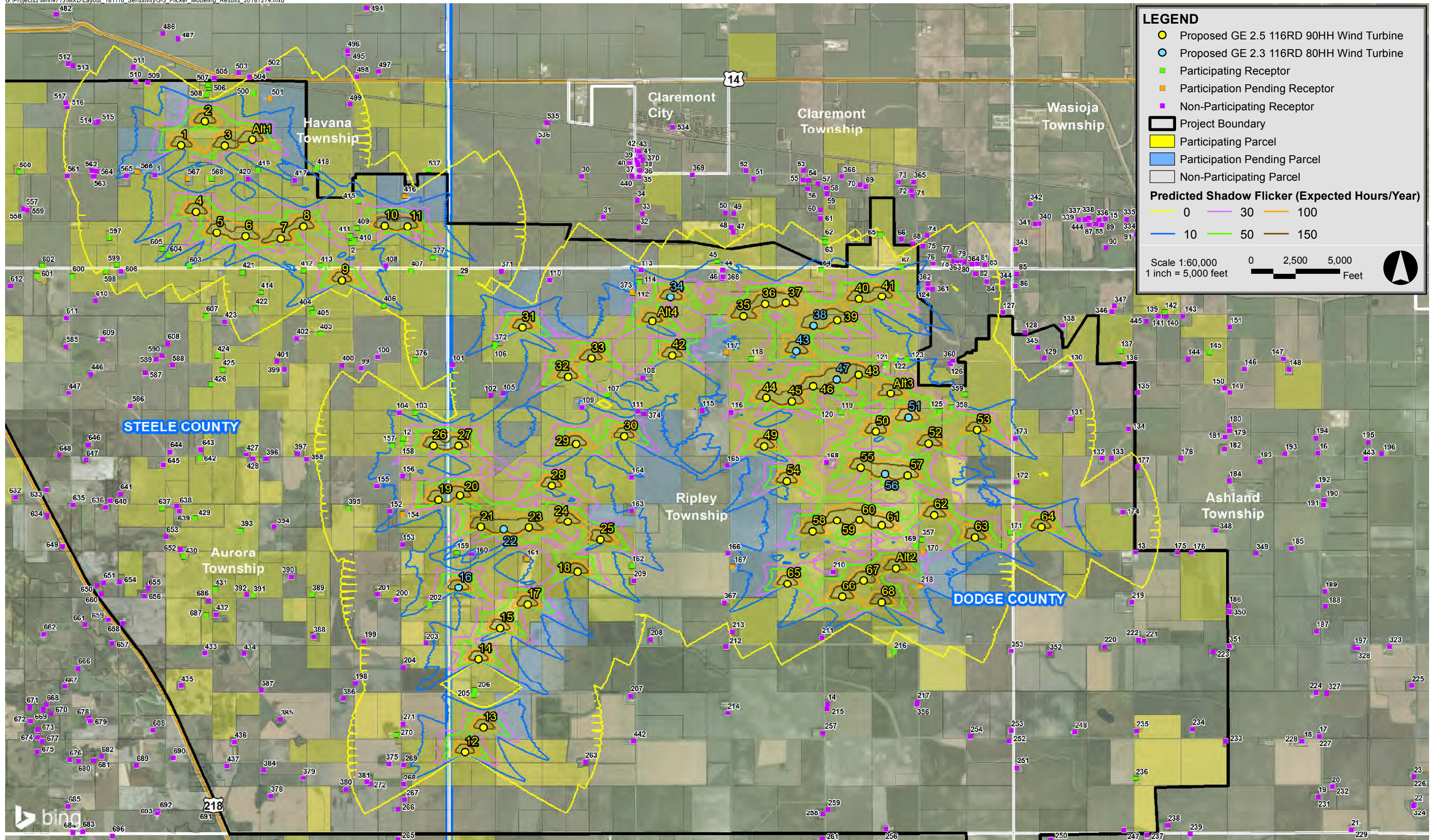
## 3.2 Results

Following the modeling methodology outlined in Section 3.1, WindPRO was used to calculate shadow flicker at the 694 discrete modeling points in Dodge and Steele Counties and generate shadow flicker isolines based on the grid calculations. Table B-1 in Appendix B presents the modeling results for the 694 modeling receptor locations. Both worst-case and expected values are presented.

The modeled worst-case annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 125 hours, 39 minutes per year. The maximum worst-case flicker was at a participating receptor (#169). The maximum modeled worst-case annual flicker at a non-participating receptor (#116) is 94 hours, 16 minutes.

The predicted expected annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 39 hours, 29 minutes per year. The maximum expected flicker was at a participating receptor (#125). The maximum expected annual duration of shadow flicker at a non-participating modeling receptor is 33 hours, 56 minutes (#116). The majority of the receptors (546) were predicted to experience no annual shadow flicker. 97 locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 39 locations would be expected to have 10 to 30 hours of shadow flicker per year. 12 receptors are expected to have over 30 hours of flicker per year, one of which is a non-participating receptor. Figure 3-3 displays the modeled flicker isolines (expected hrs/yr) over aerial imagery in relation to modeled wind turbines and modeling receptors.





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Appendix A

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DCW Wind Turbine Coordinates

**Table A-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
1	491773.49	4876513.69
2	492177.40	4876929.74
3	492515.95	4876507.29
4	492027.69	4875376.03
5	492382.70	4875021.02
6	492872.33	4874956.90
7	493480.60	4874916.73
8	493862.85	4875124.65
9	494524.33	4874201.90
10	495256.04	4875133.97
11	495645.46	4875128.40
12	496632.97	4866120.24
13	496950.55	4866540.12
14	496863.02	4867708.41
15	497232.19	4868242.38
16	496520.92	4868936.19
17	497702.64	4868650.42
18	498559.17	4869213.08
19	496175.92	4870443.22
20	496546.68	4870518.48
21	496901.03	4869976.79
22	497294.89	4869935.28
23	497723.95	4869962.98
24	498388.48	4870067.35
25	498952.27	4869760.73
26	496087.93	4871373.26
27	496519.91	4871371.21
28	498114.74	4870686.08
29	498532.91	4871403.19
30	499356.88	4871529.00
31	497612.89	4873395.25
32	498398.28	4872549.54
33	498796.96	4872868.03
34	500149.90	4873911.23
35	501398.06	4873589.09
36	501770.29	4873795.69
37	502124.90	4873815.21
38	502595.92	4873426.22
39	503005.34	4873519.47
40	503372.12	4873881.51
41	503770.23	4873926.96
42	500177.97	4872914.07
43	502301.86	4872993.95
44	501790.90	4872182.22
45	502227.91	4872122.24
46	502591.63	4872391.24
47	502991.91	4872505.27
48	503371.39	4872585.69
49	501755.51	4871361.61
50	503662.93	4871608.22



**Table A-1: DCW Wind Turbine Coordinates**

Wind Turbine ID	Coordinates NAD83 UTM Zone 15N (meters)	
	X (Easting)	Y (Northing)
51	504224.94	4871855.24
52	504569.48	4871409.27
53	505395.56	4871637.86
54	502140.74	4870760.46
55	503404.54	4870993.37
56	503820.93	4870883.24
57	504206.39	4870859.18
58	502581.34	4869899.76
59	502997.22	4870084.96
60	503382.55	4870096.20
61	503764.41	4869999.27
62	504662.35	4870183.97
63	505359.94	4869797.24
64	506497.95	4869971.23
65	502147.93	4869004.19
66	503091.92	4868779.21
67	503453.82	4869064.27
68	503763.25	4868682.38
Alt1	492991.91	4876607.27
Alt2	504008.92	4869270.22
Alt3	503919.66	4872259.61
Alt4	499837.87	4873507.53

## Appendix B

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### Shadow Flicker Modeling Results: Modeling Receptors

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
1	491323.97	4876003.31	Non-Participating	38:02	118	0:31	12:20
2	494675.74	4874843.64	Participating	85:20	151	0:50	32:51
12	495571.71	4871482.46	Participating	48:31	65	1:05	16:58
13	508114.34	4869543.75	Non-Participating	2:39	21	0:11	1:02
14	502838.46	4866942.77	Non-Participating	0:00	0	0:00	0:00
15	507596.16	4875246.28	Non-Participating	0:00	0	0:00	0:00
16	511230.91	4871253.21	Non-Participating	0:00	0	0:00	0:00
17	511252.81	4866394.34	Non-Participating	0:00	0	0:00	0:00
18	510963.01	4866310.55	Non-Participating	0:00	0	0:00	0:00
19	511236.15	4865354.84	Non-Participating	0:00	0	0:00	0:00
20	511469.59	4865525.69	Non-Participating	0:00	0	0:00	0:00
21	511803.28	4864790.87	Non-Participating	0:00	0	0:00	0:00
22	512882.51	4865215.73	Non-Participating	0:00	0	0:00	0:00
23	512873.66	4865696.43	Non-Participating	0:00	0	0:00	0:00
24	512672.12	4864525.97	Non-Participating	0:00	0	0:00	0:00
25	511249.27	4863981.03	Non-Participating	0:00	0	0:00	0:00
26	511259.59	4863882.99	Non-Participating	0:00	0	0:00	0:00
27	511344.96	4863873.64	Non-Participating	0:00	0	0:00	0:00
28	511215.66	4862975.26	Non-Participating	0:00	0	0:00	0:00
29	496552.23	4874244.46	Participating	12:32	46	0:20	3:36
30	498628.08	4875979.63	Non-Participating	0:00	0	0:00	0:00
31	499002.42	4875287.65	Non-Participating	0:00	0	0:00	0:00
32	499599.12	4875101.12	Non-Participating	0:00	0	0:00	0:00
33	499667.39	4875349.30	Non-Participating	0:00	0	0:00	0:00
34	499579.55	4875568.90	Non-Participating	0:00	0	0:00	0:00
35	499611.30	4875969.22	Non-Participating	0:00	0	0:00	0:00
36	499630.61	4876074.26	Non-Participating	0:00	0	0:00	0:00
37	499592.84	4876172.35	Non-Participating	0:00	0	0:00	0:00
38	499584.90	4876221.63	Non-Participating	0:00	0	0:00	0:00
39	499575.64	4876277.53	Non-Participating	0:00	0	0:00	0:00
40	499452.74	4876213.03	Non-Participating	0:00	0	0:00	0:00
41	499633.37	4876323.52	Non-Participating	0:00	0	0:00	0:00
42	499577.34	4876430.68	Non-Participating	0:00	0	0:00	0:00
43	499610.04	4876414.33	Non-Participating	0:00	0	0:00	0:00
44	501043.37	4874380.00	Non-Participating	63:22	110	0:48	18:04
45	500947.46	4874527.17	Participating	44:45	86	0:43	11:44
46	501031.13	4874231.83	Non-Participating	49:09	92	0:47	15:15
47	501227.06	4875030.65	Non-Participating	0:00	0	0:00	0:00
48	501197.62	4875115.32	Non-Participating	0:00	0	0:00	0:00
49	501230.36	4875345.51	Non-Participating	0:00	0	0:00	0:00
50	501090.13	4875362.70	Non-Participating	0:00	0	0:00	0:00
51	501571.15	4875944.50	Non-Participating	0:00	0	0:00	0:00
52	501438.59	4876074.41	Non-Participating	0:00	0	0:00	0:00
53	502423.50	4876077.06	Non-Participating	0:00	0	0:00	0:00
54	502510.29	4875920.42	Non-Participating	0:00	0	0:00	0:00
55	502413.98	4875915.66	Non-Participating	0:00	0	0:00	0:00
56	502502.88	4875773.32	Non-Participating	0:00	0	0:00	0:00
57	502679.62	4875863.27	Non-Participating	0:00	0	0:00	0:00
58	502810.85	4875788.66	Non-Participating	0:00	0	0:00	0:00
59	502831.49	4875681.24	Non-Participating	0:00	0	0:00	0:00
60	502714.55	4875399.19	Non-Participating	0:00	0	0:00	0:00
61	502721.16	4875266.90	Non-Participating	0:00	0	0:00	0:00
62	502793.92	4874915.01	Participating	0:00	0	0:00	0:00
63	502795.77	4874857.59	Participating	0:00	0	0:00	0:00
64	502728.04	4874380.81	Participating	84:25	123	1:02	23:13
65	503738.09	4874989.75	Participating	3:49	47	0:09	0:54
66	504105.86	4874905.08	Non-Participating	0:00	0	0:00	0:00
67	504104.11	4874434.02	Participating	34:50	81	0:39	8:14
68	504298.15	4874837.83	Non-Participating	0:00	0	0:00	0:00
69	503489.38	4875803.62	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
70	503392.81	4875830.08	Non-Participating	0:00	0	0:00	0:00
71	504290.41	4875654.93	Non-Participating	0:00	0	0:00	0:00
72	504273.87	4875735.63	Non-Participating	0:00	0	0:00	0:00
73	504056.70	4875882.71	Non-Participating	0:00	0	0:00	0:00
74	504535.62	4874968.38	Non-Participating	0:00	0	0:00	0:00
75	504475.43	4874793.75	Non-Participating	10:34	40	0:19	2:22
76	504646.75	4874484.85	Non-Participating	23:25	70	0:32	5:56
77	504921.92	4874625.08	Non-Participating	11:01	54	0:20	2:46
78	505001.62	4874532.14	Non-Participating	9:07	40	0:21	2:33
79	505124.98	4874525.20	Non-Participating	6:34	33	0:19	1:55
80	505184.52	4874515.28	Non-Participating	5:35	32	0:17	1:40
81	505399.82	4874479.23	Non-Participating	2:09	18	0:11	0:39
82	505367.74	4874307.25	Non-Participating	2:43	18	0:13	0:48
83	505532.77	4874466.33	Non-Participating	1:38	16	0:09	0:29
84	505566.18	4874182.83	Non-Participating	1:38	15	0:10	0:30
85	506083.22	4874314.89	Non-Participating	0:00	0	0:00	0:00
86	506058.09	4874109.83	Non-Participating	0:00	0	0:00	0:00
87	507311.95	4875159.44	Non-Participating	0:00	0	0:00	0:00
88	507422.02	4875164.20	Non-Participating	0:00	0	0:00	0:00
89	507528.65	4875149.91	Non-Participating	0:00	0	0:00	0:00
90	507599.42	4874772.15	Non-Participating	0:00	0	0:00	0:00
91	508121.97	4874981.77	Non-Participating	0:00	0	0:00	0:00
92	508591.19	4875255.26	Non-Participating	0:00	0	0:00	0:00
93	509166.13	4875086.85	Non-Participating	0:00	0	0:00	0:00
94	509022.59	4875282.64	Non-Participating	0:00	0	0:00	0:00
95	509351.34	4875158.02	Non-Participating	0:00	0	0:00	0:00
96	509416.42	4875235.41	Non-Participating	0:00	0	0:00	0:00
97	509776.66	4875411.96	Non-Participating	0:00	0	0:00	0:00
98	509731.74	4874372.94	Non-Participating	0:00	0	0:00	0:00
99	494854.60	4872697.99	Non-Participating	0:00	0	0:00	0:00
100	495132.34	4872890.10	Non-Participating	0:00	0	0:00	0:00
101	496413.53	4872753.51	Non-Participating	13:45	72	0:17	5:07
102	497067.91	4872235.01	Non-Participating	17:10	103	0:17	5:00
103	495778.39	4871934.81	Participating	30:43	76	0:31	9:08
104	495507.06	4871937.58	Non-Participating	32:30	90	0:33	9:41
105	497277.52	4872254.03	Non-Participating	30:58	130	0:28	9:18
106	497138.35	4873069.61	Participating	7:12	44	0:18	2:32
107	499065.71	4872231.14	Participating	45:20	78	0:46	20:19
108	499677.17	4872538.85	Non-Participating	26:07	88	0:30	10:53
109	498632.85	4872029.26	Non-Participating	33:12	133	0:33	10:29
110	498077.69	4874206.61	Non-Participating	1:38	16	0:09	0:35
111	499582.38	4871957.52	Non-Participating	24:34	107	0:22	9:23
112	499505.52	4873983.70	Participation Pending	33:02	98	0:41	11:16
113	499640.46	4874375.81	Non-Participating	42:45	85	0:43	12:46
114	499618.58	4874177.48	Participating	39:58	69	0:48	13:44
115	500691.28	4871972.52	Non-Participating	26:05	116	0:25	8:32
116	501183.27	4871944.87	Non-Participating	94:16	206	0:44	33:56
117	501103.10	4872967.75	Participation Pending	46:48	203	0:39	16:24
118	501528.69	4872860.66	Participating	58:49	236	0:35	21:09
119	503071.21	4871942.22	Participating	87:34	199	0:54	31:11
120	502725.93	4871787.44	Participating	64:50	227	0:42	23:33
121	503827.13	4872773.68	Participating	77:13	201	1:09	25:05
122	503996.46	4872856.76	Participating	38:17	101	0:51	12:00
123	504201.25	4872856.23	Participating	30:54	128	0:37	11:11
124	504551.09	4874079.47	Non-Participating	21:05	63	0:37	6:31
125	504758.52	4871963.59	Participating	113:42	255	0:49	39:29
126	504942.08	4872768.12	Non-Participating	12:45	60	0:24	3:39
127	505837.17	4873650.51	Non-Participating	0:00	0	0:00	0:00
128	506220.82	4873313.16	Non-Participating	0:00	0	0:00	0:00
129	506549.56	4872868.13	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
130	506996.44	4872762.57	Non-Participating	2:45	33	0:09	0:39
131	506998.03	4871828.06	Non-Participating	2:17	18	0:12	0:45
132	507534.25	4871148.65	Non-Participating	0:00	0	0:00	0:00
133	507702.53	4871154.60	Non-Participating	0:00	0	0:00	0:00
134	507988.15	4871657.51	Non-Participating	0:00	0	0:00	0:00
135	508141.14	4872275.11	Non-Participating	0:00	0	0:00	0:00
136	507912.94	4872763.80	Non-Participating	0:00	0	0:00	0:00
137	507852.51	4872992.61	Participating	0:00	0	0:00	0:00
138	506865.15	4873428.54	Non-Participating	0:00	0	0:00	0:00
139	508493.79	4873588.15	Non-Participating	0:00	0	0:00	0:00
140	508608.89	4873590.53	Non-Participating	0:00	0	0:00	0:00
141	508631.91	4873590.93	Non-Participating	0:00	0	0:00	0:00
142	508613.65	4873652.84	Participating	0:00	0	0:00	0:00
143	508917.66	4873593.31	Non-Participating	0:00	0	0:00	0:00
144	509004.04	4872856.29	Non-Participating	0:00	0	0:00	0:00
145	509375.92	4872966.88	Participating	0:00	0	0:00	0:00
146	509975.20	4872682.45	Non-Participating	0:00	0	0:00	0:00
147	510643.93	4872858.40	Non-Participating	0:00	0	0:00	0:00
148	510742.82	4872673.86	Non-Participating	0:00	0	0:00	0:00
149	509722.39	4872284.72	Non-Participating	0:00	0	0:00	0:00
150	509630.84	4872355.63	Non-Participating	0:00	0	0:00	0:00
151	509722.69	4873399.56	Non-Participating	0:00	0	0:00	0:00
152	495349.84	4870249.67	Non-Participating	21:25	69	0:33	7:25
153	495559.21	4869681.85	Non-Participating	21:37	95	0:21	6:45
154	495562.38	4870204.93	Participation Pending	68:46	140	0:44	25:33
155	495124.76	4870677.40	Non-Participating	20:40	110	0:24	7:22
156	495559.28	4870851.63	Non-Participating	62:43	173	0:42	21:13
157	495387.82	4871379.34	Participating	35:25	105	0:39	11:52
158	495550.87	4871409.04	Participating	44:08	79	0:54	15:31
159	496488.82	4869537.11	Participating	49:39	178	0:32	17:58
160	496747.46	4869514.95	Non-Participating	31:53	137	0:26	11:43
161	497688.18	4869422.48	Participation Pending	25:25	97	0:30	8:26
162	499490.33	4869311.02	Participating	14:54	69	0:28	5:05
163	499484.18	4870256.98	Non-Participating	51:20	126	0:40	13:25
164	499480.74	4870826.96	Non-Participating	20:55	133	0:20	6:18
165	501120.03	4871028.07	Non-Participating	50:26	152	0:40	18:16
166	501137.73	4869524.71	Non-Participating	15:20	68	0:24	5:08
167	501212.34	4869298.23	Participation Pending	18:20	75	0:29	6:34
168	502822.20	4871087.25	Non-Participating	78:42	226	0:45	26:39
169	504355.79	4869657.97	Participating	125:39	234	1:03	38:34
170	504464.66	4869547.53	Participation Pending	104:07	215	1:08	33:30
171	505966.47	4869876.74	Participating	87:17	136	1:06	30:12
172	506068.12	4870744.95	Non-Participating	7:42	63	0:13	2:51
173	506052.46	4871492.14	Non-Participating	37:10	98	0:41	14:22
174	507891.98	4870234.05	Non-Participating	3:58	23	0:16	1:10
175	508823.64	4869539.44	Non-Participating	0:00	0	0:00	0:00
176	509063.51	4869535.71	Non-Participating	0:00	0	0:00	0:00
177	508143.94	4871002.25	Non-Participating	2:26	24	0:10	0:35
178	508887.77	4871155.48	Non-Participating	0:00	0	0:00	0:00
179	509716.92	4871621.42	Non-Participating	0:00	0	0:00	0:00
180	509716.39	4871712.56	Non-Participating	0:00	0	0:00	0:00
181	509642.37	4871517.50	Non-Participating	0:00	0	0:00	0:00
182	509638.57	4871313.88	Non-Participating	0:00	0	0:00	0:00
183	510238.58	4871099.40	Non-Participating	0:00	0	0:00	0:00
184	509715.57	4870766.88	Non-Participating	0:00	0	0:00	0:00
185	510779.47	4869615.18	Non-Participating	0:00	0	0:00	0:00
186	509710.09	4868616.84	Non-Participating	0:00	0	0:00	0:00
187	511208.69	4868187.15	Non-Participating	0:00	0	0:00	0:00
188	511358.45	4868626.10	Non-Participating	0:00	0	0:00	0:00
189	511354.81	4868870.63	Non-Participating	0:00	0	0:00	0:00



Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
190	511340.26	4870437.24	Non-Participating	0:00	0	0:00	0:00
191	511328.61	4870357.34	Non-Participating	0:00	0	0:00	0:00
192	511231.78	4870673.51	Non-Participating	0:00	0	0:00	0:00
193	510669.32	4871235.95	Non-Participating	0:00	0	0:00	0:00
194	511198.71	4871506.32	Non-Participating	0:00	0	0:00	0:00
195	512094.54	4871434.48	Non-Participating	0:00	0	0:00	0:00
196	512320.76	4871236.81	Non-Participating	0:00	0	0:00	0:00
197	511855.79	4867910.86	Non-Participating	0:00	0	0:00	0:00
198	494754.88	4867302.15	Non-Participating	0:00	0	0:00	0:00
199	494905.17	4868021.02	Non-Participating	3:49	52	0:06	1:23
200	495449.94	4868724.88	Non-Participating	14:46	100	0:22	4:53
201	495138.07	4868819.47	Non-Participating	3:04	21	0:13	1:02
202	496022.17	4868650.40	Participating	34:38	103	0:37	12:47
203	495966.21	4867985.63	Non-Participating	20:21	88	0:29	7:05
204	495581.29	4867570.63	Non-Participating	14:56	96	0:19	4:54
205	496788.12	4867093.39	Participating	0:00	0	0:00	0:00
206	496798.37	4867179.05	Participating	0:00	0	0:00	0:00
207	499466.54	4867083.00	Non-Participating	0:00	0	0:00	0:00
208	499809.28	4868052.25	Non-Participating	0:00	0	0:00	0:00
209	499522.27	4869059.69	Non-Participating	13:40	55	0:27	5:01
210	502932.76	4869206.67	Non-Participating	88:42	195	1:21	29:35
211	502739.87	4868086.02	Non-Participating	8:14	44	0:15	3:03
212	501100.51	4867929.92	Non-Participating	0:00	0	0:00	0:00
213	501205.69	4868183.52	Non-Participating	1:30	16	0:08	0:32
214	501126.31	4866789.30	Non-Participating	0:00	0	0:00	0:00
215	502829.57	4866859.28	Non-Participating	0:00	0	0:00	0:00
216	503980.77	4867832.68	Participating	0:00	0	0:00	0:00
217	504375.89	4866974.59	Non-Participating	0:00	0	0:00	0:00
218	504434.89	4868964.79	Participation Pending	40:01	114	0:38	12:45
219	508048.06	4868683.08	Non-Participating	0:00	0	0:00	0:00
220	507577.42	4867933.06	Non-Participating	0:00	0	0:00	0:00
221	508256.18	4868031.55	Non-Participating	0:00	0	0:00	0:00
222	508160.93	4868043.79	Non-Participating	0:00	0	0:00	0:00
223	509431.73	4867831.46	Non-Participating	0:00	0	0:00	0:00
224	511197.03	4867137.19	Non-Participating	0:00	0	0:00	0:00
225	512836.13	4867255.07	Non-Participating	0:00	0	0:00	0:00
226	512876.54	4865698.06	Non-Participating	0:00	0	0:00	0:00
227	511254.51	4866393.12	Non-Participating	0:00	0	0:00	0:00
228	510956.59	4866312.68	Non-Participating	0:00	0	0:00	0:00
229	511803.46	4864790.40	Non-Participating	0:00	0	0:00	0:00
230	511248.62	4863982.43	Non-Participating	0:00	0	0:00	0:00
231	511238.56	4865356.24	Non-Participating	0:00	0	0:00	0:00
232	511480.24	4865525.57	Non-Participating	0:00	0	0:00	0:00
233	509654.54	4866311.78	Non-Participating	0:00	0	0:00	0:00
234	509084.69	4866510.99	Non-Participating	0:00	0	0:00	0:00
235	508125.47	4866480.14	Non-Participating	0:00	0	0:00	0:00
236	508115.22	4865668.00	Participating	0:00	0	0:00	0:00
237	508300.10	4864702.93	Non-Participating	0:00	0	0:00	0:00
238	508661.25	4864863.00	Non-Participating	0:00	0	0:00	0:00
239	509043.52	4864717.00	Non-Participating	0:00	0	0:00	0:00
240	508220.95	4863160.03	Non-Participating	0:00	0	0:00	0:00
241	508608.56	4863085.28	Non-Participating	0:00	0	0:00	0:00
242	510181.05	4863250.58	Non-Participating	0:00	0	0:00	0:00
243	509723.76	4864264.38	Non-Participating	0:00	0	0:00	0:00
244	507091.02	4863071.04	Non-Participating	0:00	0	0:00	0:00
245	508023.68	4863776.16	Non-Participating	0:00	0	0:00	0:00
246	507972.08	4864241.82	Non-Participating	0:00	0	0:00	0:00
247	507911.18	4864780.64	Non-Participating	0:00	0	0:00	0:00
248	507075.09	4866460.06	Non-Participating	0:00	0	0:00	0:00
249	505979.98	4864375.54	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
250	506660.75	4864623.72	Non-Participating	0:00	0	0:00	0:00
251	506083.96	4865856.15	Non-Participating	0:00	0	0:00	0:00
252	505944.82	4866307.39	Non-Participating	0:00	0	0:00	0:00
253	505982.60	4866485.83	Non-Participating	0:00	0	0:00	0:00
254	505286.95	4866388.36	Non-Participating	0:00	0	0:00	0:00
255	504453.20	4864368.89	Non-Participating	0:00	0	0:00	0:00
256	503837.48	4864808.63	Non-Participating	0:00	0	0:00	0:00
257	502759.65	4866448.52	Non-Participating	0:00	0	0:00	0:00
258	502756.62	4865044.88	Non-Participating	0:00	0	0:00	0:00
259	502847.64	4865132.72	Non-Participating	0:00	0	0:00	0:00
260	502861.92	4864320.45	Non-Participating	0:00	0	0:00	0:00
261	502744.45	4864637.95	Non-Participating	0:00	0	0:00	0:00
262	500293.87	4864408.55	Non-Participating	0:00	0	0:00	0:00
263	498693.14	4865949.36	Non-Participating	2:01	20	0:09	0:50
264	495594.27	4864552.69	Non-Participating	0:00	0	0:00	0:00
265	495484.80	4864629.42	Non-Participating	0:00	0	0:00	0:00
266	495481.67	4865143.24	Non-Participating	0:00	0	0:00	0:00
267	495597.95	4865308.34	Non-Participating	0:00	0	0:00	0:00
268	495580.09	4865567.90	Non-Participating	17:29	64	0:22	6:32
269	495577.97	4865900.74	Non-Participating	16:16	75	0:24	5:46
270	495457.06	4866413.77	Participating	9:06	49	0:20	3:04
271	495573.74	4866601.10	Non-Participating	11:56	55	0:22	4:08
272	494999.07	4865576.36	Non-Participating	2:14	21	0:10	0:48
273	495460.45	4863808.79	Non-Participating	0:00	0	0:00	0:00
274	495591.47	4863853.66	Non-Participating	0:00	0	0:00	0:00
275	495598.45	4863807.52	Non-Participating	0:00	0	0:00	0:00
276	495602.69	4864144.71	Non-Participating	0:00	0	0:00	0:00
277	495449.26	4863156.32	Non-Participating	0:00	0	0:00	0:00
278	495021.10	4862798.98	Non-Participating	0:00	0	0:00	0:00
279	495447.60	4861627.16	Non-Participating	0:00	0	0:00	0:00
280	495589.39	4861913.81	Non-Participating	0:00	0	0:00	0:00
281	496387.78	4863669.96	Non-Participating	0:00	0	0:00	0:00
282	495401.41	4862947.65	Non-Participating	0:00	0	0:00	0:00
283	497806.48	4861897.78	Non-Participating	0:00	0	0:00	0:00
284	498032.83	4862353.66	Non-Participating	0:00	0	0:00	0:00
285	497883.34	4862416.63	Non-Participating	0:00	0	0:00	0:00
286	497390.91	4863188.77	Non-Participating	0:00	0	0:00	0:00
287	499200.13	4863160.86	Non-Participating	0:00	0	0:00	0:00
288	499366.82	4863159.80	Non-Participating	0:00	0	0:00	0:00
289	499062.33	4863011.63	Non-Participating	0:00	0	0:00	0:00
290	499521.73	4863071.93	Non-Participating	0:00	0	0:00	0:00
291	499600.44	4863131.46	Non-Participating	0:00	0	0:00	0:00
292	499653.41	4863563.84	Non-Participating	0:00	0	0:00	0:00
293	500052.87	4861924.15	Non-Participating	0:00	0	0:00	0:00
294	500766.98	4862078.00	Non-Participating	0:00	0	0:00	0:00
295	501364.94	4862089.11	Non-Participating	0:00	0	0:00	0:00
296	501290.46	4862403.31	Non-Participating	0:00	0	0:00	0:00
297	501228.41	4863777.42	Non-Participating	0:00	0	0:00	0:00
298	502760.35	4863408.22	Non-Participating	0:00	0	0:00	0:00
299	502811.16	4863065.78	Non-Participating	0:00	0	0:00	0:00
300	502845.02	4861700.00	Non-Participating	0:00	0	0:00	0:00
301	504324.44	4863058.11	Non-Participating	0:00	0	0:00	0:00
302	504359.50	4863154.55	Non-Participating	0:00	0	0:00	0:00
303	505569.77	4863166.39	Non-Participating	0:00	0	0:00	0:00
304	505982.13	4863095.12	Non-Participating	0:00	0	0:00	0:00
305	505957.47	4862103.78	Non-Participating	0:00	0	0:00	0:00
306	506058.01	4862083.94	Non-Participating	0:00	0	0:00	0:00
307	505988.95	4862547.09	Non-Participating	0:00	0	0:00	0:00
308	505982.34	4861816.52	Non-Participating	0:00	0	0:00	0:00
309	508028.80	4862608.01	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
310	510037.65	4862973.60	Non-Participating	0:00	0	0:00	0:00
311	509978.52	4862987.49	Non-Participating	0:00	0	0:00	0:00
312	511214.04	4862974.57	Non-Participating	0:00	0	0:00	0:00
313	496566.43	4861678.65	Non-Participating	0:00	0	0:00	0:00
314	496394.58	4861521.88	Non-Participating	0:00	0	0:00	0:00
315	498202.69	4861536.49	Non-Participating	0:00	0	0:00	0:00
316	499547.11	4861789.56	Non-Participating	0:00	0	0:00	0:00
317	499706.65	4861546.15	Non-Participating	0:00	0	0:00	0:00
318	503314.07	4861437.35	Non-Participating	0:00	0	0:00	0:00
319	504482.21	4861250.15	Non-Participating	0:00	0	0:00	0:00
320	504352.19	4861303.49	Non-Participating	0:00	0	0:00	0:00
321	504448.61	4861690.45	Non-Participating	0:00	0	0:00	0:00
322	505946.34	4860787.53	Non-Participating	0:00	0	0:00	0:00
323	512456.10	4867927.90	Non-Participating	0:00	0	0:00	0:00
324	512869.46	4865200.07	Non-Participating	0:00	0	0:00	0:00
325	511241.06	4863845.52	Non-Participating	0:00	0	0:00	0:00
326	511377.68	4863817.25	Non-Participating	0:00	0	0:00	0:00
327	511380.49	4867122.86	Non-Participating	0:00	0	0:00	0:00
328	511919.63	4867891.62	Non-Participating	0:00	0	0:00	0:00
329	510106.92	4875126.21	Non-Participating	0:00	0	0:00	0:00
330	509957.99	4875215.57	Non-Participating	0:00	0	0:00	0:00
331	509838.84	4875240.39	Non-Participating	0:00	0	0:00	0:00
332	509540.98	4875523.36	Non-Participating	0:00	0	0:00	0:00
333	508513.01	4875649.50	Non-Participating	0:00	0	0:00	0:00
334	508137.19	4875249.86	Non-Participating	0:00	0	0:00	0:00
335	507954.57	4875255.16	Non-Participating	0:00	0	0:00	0:00
336	507476.85	4875245.18	Non-Participating	0:00	0	0:00	0:00
337	507291.26	4875238.55	Non-Participating	0:00	0	0:00	0:00
338	507308.94	4875273.90	Non-Participating	0:00	0	0:00	0:00
339	507133.29	4875236.34	Non-Participating	0:00	0	0:00	0:00
340	506456.95	4875177.45	Non-Participating	0:00	0	0:00	0:00
341	506392.06	4875165.44	Non-Participating	0:00	0	0:00	0:00
342	506303.13	4875506.73	Non-Participating	0:00	0	0:00	0:00
343	506056.14	4874737.23	Non-Participating	0:00	0	0:00	0:00
344	505835.16	4874164.35	Non-Participating	0:00	0	0:00	0:00
345	506443.65	4873048.96	Non-Participating	0:00	0	0:00	0:00
346	507707.14	4873655.54	Non-Participating	0:00	0	0:00	0:00
347	507746.57	4873752.32	Non-Participating	0:00	0	0:00	0:00
348	509482.74	4869911.96	Non-Participating	0:00	0	0:00	0:00
349	510177.21	4869522.86	Non-Participating	0:00	0	0:00	0:00
350	509715.75	4868523.34	Non-Participating	0:00	0	0:00	0:00
351	509715.75	4867936.59	Non-Participating	0:00	0	0:00	0:00
352	506639.54	4867805.93	Non-Participating	0:00	0	0:00	0:00
353	505981.69	4867853.87	Non-Participating	0:00	0	0:00	0:00
354	506107.06	4861179.97	Non-Participating	0:00	0	0:00	0:00
355	504354.46	4863221.55	Non-Participating	0:00	0	0:00	0:00
356	504370.17	4866942.89	Non-Participating	0:00	0	0:00	0:00
357	504454.04	4869760.35	Participating	100:46	226	0:43	33:19
358	504953.18	4872026.30	Participating	104:55	209	0:57	33:09
359	505194.11	4872241.77	Participating	15:20	75	0:23	4:57
360	504982.82	4872823.99	Non-Participating	11:59	55	0:23	3:16
361	504632.53	4874064.72	Non-Participating	16:44	56	0:33	5:19
362	504550.66	4874140.13	Non-Participating	21:48	62	0:39	6:31
363	505058.05	4874529.02	Non-Participating	7:54	37	0:20	2:16
364	505317.29	4874471.44	Non-Participating	2:44	20	0:13	0:49
365	504311.78	4875881.90	Non-Participating	0:00	0	0:00	0:00
366	503080.23	4875981.03	Non-Participating	0:00	0	0:00	0:00
367	501067.74	4868680.68	Non-Participating	10:25	38	0:24	3:42
368	501045.42	4874262.69	Non-Participating	52:43	102	0:52	16:09
369	500526.98	4876004.95	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
370	499677.17	4876262.10	Non-Participating	0:00	0	0:00	0:00
371	497251.94	4874354.41	Non-Participating	4:23	34	0:11	1:58
372	497140.70	4873107.83	Participating	20:58	82	0:29	7:36
373	499493.80	4874005.78	Participation Pending	26:26	72	0:40	9:14
374	499695.62	4871921.37	Non-Participating	70:23	152	1:01	18:38
375	495332.11	4865917.77	Non-Participating	7:18	49	0:17	2:33
376	495778.75	4872841.02	Participating	1:15	16	0:07	0:26
377	496079.55	4874600.17	Participating	6:20	46	0:13	1:49
378	493303.66	4865363.05	Non-Participating	0:00	0	0:00	0:00
379	493858.51	4865675.06	Non-Participating	0:00	0	0:00	0:00
380	494597.57	4865481.24	Non-Participating	0:00	0	0:00	0:00
381	494950.93	4865608.48	Non-Participating	1:57	19	0:09	0:41
382	494693.22	4861787.99	Non-Participating	0:00	0	0:00	0:00
383	494229.69	4862485.36	Non-Participating	0:00	0	0:00	0:00
384	493181.97	4865807.99	Non-Participating	0:00	0	0:00	0:00
385	493478.15	4866684.14	Non-Participating	0:00	0	0:00	0:00
386	494547.73	4867036.45	Non-Participating	0:00	0	0:00	0:00
387	493147.39	4867174.99	Non-Participating	0:00	0	0:00	0:00
388	494039.10	4868100.58	Non-Participating	0:00	0	0:00	0:00
389	494018.51	4868810.50	Participating	0:00	0	0:00	0:00
390	493659.28	4869128.74	Non-Participating	0:00	0	0:00	0:00
391	493009.42	4868795.04	Participating	0:00	0	0:00	0:00
392	492892.87	4868809.26	Non-Participating	0:00	0	0:00	0:00
393	492790.68	4869907.25	Participating	0:00	0	0:00	0:00
394	493362.95	4869980.97	Non-Participating	0:00	0	0:00	0:00
395	494639.05	4870297.72	Participating	2:57	20	0:13	0:59
396	493230.51	4871142.26	Non-Participating	0:00	0	0:00	0:00
397	493766.48	4871236.38	Non-Participating	0:00	0	0:00	0:00
398	493921.25	4871132.90	Non-Participating	0:00	0	0:00	0:00
399	493540.46	4872673.61	Non-Participating	0:00	0	0:00	0:00
400	494524.93	4872747.21	Non-Participating	0:00	0	0:00	0:00
401	493407.56	4872816.88	Non-Participating	0:00	0	0:00	0:00
402	493747.84	4873206.91	Non-Participating	0:00	0	0:00	0:00
403	494151.04	4873285.23	Participating	0:00	0	0:00	0:00
404	494002.17	4873709.27	Participating	0:00	0	0:00	0:00
405	494024.46	4873648.96	Participating	0:00	0	0:00	0:00
406	495243.19	4873764.68	Participating	7:43	36	0:17	3:31
407	495706.37	4874363.08	Participating	8:12	46	0:21	2:49
408	495270.39	4874448.85	Non-Participating	26:25	103	0:35	8:56
409	494786.51	4875095.87	Participating	83:05	125	1:13	29:19
410	494742.68	4874890.93	Participating	93:02	155	0:58	34:55
411	494673.38	4874964.89	Participating	88:05	147	1:05	32:11
412	493870.54	4874371.18	Participating	46:55	133	0:40	17:43
413	494159.74	4874451.58	Participating	100:13	201	1:02	34:04
414	493136.16	4874000.60	Participating	4:15	24	0:16	1:27
415	494807.37	4875552.26	Participating	84:02	124	0:53	25:41
416	495595.18	4875646.56	Participation Pending	1:29	15	0:09	0:27
417	493717.24	4875917.78	Non-Participating	23:46	150	0:18	8:57
418	494099.39	4876121.20	Participating	21:15	122	0:21	8:17
419	493086.55	4876093.83	Participating	16:10	84	0:21	4:43
420	492917.55	4875943.58	Non-Participating	42:47	163	0:27	14:21
421	492824.93	4874336.74	Participating	1:54	16	0:10	0:40
422	493045.90	4873720.17	Participating	4:04	26	0:14	1:27
423	492516.61	4873491.63	Non-Participating	0:00	0	0:00	0:00
424	492393.91	4872911.32	Participating	0:00	0	0:00	0:00
425	492485.00	4872667.59	Participating	0:00	0	0:00	0:00
426	492280.30	4872422.45	Participating	0:00	0	0:00	0:00
427	492886.93	4871221.63	Non-Participating	0:00	0	0:00	0:00
428	493003.05	4871142.66	Non-Participating	0:00	0	0:00	0:00
429	492012.71	4870131.27	Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
430	491814.62	4869462.51	Participating	0:00	0	0:00	0:00
431	492354.77	4868912.11	Participating	0:00	0	0:00	0:00
432	492373.27	4868475.96	Non-Participating	0:00	0	0:00	0:00
433	492178.63	4867809.55	Non-Participating	0:00	0	0:00	0:00
434	492842.51	4867801.89	Non-Participating	0:00	0	0:00	0:00
435	491772.81	4867258.11	Non-Participating	0:00	0	0:00	0:00
436	492683.89	4866290.27	Non-Participating	0:00	0	0:00	0:00
437	492560.24	4865883.35	Non-Participating	0:00	0	0:00	0:00
438	493165.10	4862890.93	Non-Participating	0:00	0	0:00	0:00
439	493590.90	4862204.60	Non-Participating	0:00	0	0:00	0:00
440	499494.35	4875986.15	Non-Participating	0:00	0	0:00	0:00
441	509739.94	4875483.39	Non-Participating	0:00	0	0:00	0:00
442	499516.46	4866307.27	Non-Participating	0:00	0	0:00	0:00
443	512055.62	4871144.22	Non-Participating	0:00	0	0:00	0:00
444	507243.76	4875236.34	Non-Participating	0:00	0	0:00	0:00
445	508298.59	4873512.15	Non-Participating	0:00	0	0:00	0:00
446	490229.89	4872596.92	Non-Participating	0:00	0	0:00	0:00
447	489847.36	4872269.25	Non-Participating	0:00	0	0:00	0:00
448	488635.42	4877561.29	Non-Participating	0:00	0	0:00	0:00
449	488219.84	4877375.84	Non-Participating	0:00	0	0:00	0:00
450	488227.59	4877664.18	Non-Participating	0:00	0	0:00	0:00
451	487845.93	4879211.82	Non-Participating	0:00	0	0:00	0:00
452	486858.06	4879271.46	Non-Participating	0:00	0	0:00	0:00
453	486750.57	4879405.48	Non-Participating	0:00	0	0:00	0:00
454	487445.96	4879108.89	Non-Participating	0:00	0	0:00	0:00
455	487500.71	4879138.87	Non-Participating	0:00	0	0:00	0:00
456	486363.48	4879172.96	Non-Participating	0:00	0	0:00	0:00
457	487110.32	4877460.18	Non-Participating	0:00	0	0:00	0:00
458	486739.40	4877456.16	Non-Participating	0:00	0	0:00	0:00
459	486738.89	4877554.33	Non-Participating	0:00	0	0:00	0:00
460	486756.68	4878037.63	Non-Participating	0:00	0	0:00	0:00
461	486660.03	4877806.42	Non-Participating	0:00	0	0:00	0:00
462	485834.32	4879132.42	Non-Participating	0:00	0	0:00	0:00
463	485809.66	4879170.03	Non-Participating	0:00	0	0:00	0:00
464	486256.72	4877643.56	Non-Participating	0:00	0	0:00	0:00
465	485959.87	4877465.90	Non-Participating	0:00	0	0:00	0:00
466	484581.56	4877648.78	Non-Participating	0:00	0	0:00	0:00
467	483815.76	4877785.78	Non-Participating	0:00	0	0:00	0:00
468	485477.21	4877647.07	Non-Participating	0:00	0	0:00	0:00
469	485584.47	4877637.05	Non-Participating	0:00	0	0:00	0:00
470	485555.94	4877595.45	Non-Participating	0:00	0	0:00	0:00
471	485553.87	4877635.12	Non-Participating	0:00	0	0:00	0:00
472	485326.16	4879324.31	Non-Participating	0:00	0	0:00	0:00
473	485052.32	4879054.82	Non-Participating	0:00	0	0:00	0:00
474	485117.12	4878621.98	Non-Participating	0:00	0	0:00	0:00
475	488227.48	4878434.34	Non-Participating	0:00	0	0:00	0:00
476	488294.10	4878419.31	Non-Participating	0:00	0	0:00	0:00
477	488578.50	4878448.47	Non-Participating	0:00	0	0:00	0:00
478	488238.28	4878729.90	Non-Participating	0:00	0	0:00	0:00
479	488802.63	4879306.04	Non-Participating	0:00	0	0:00	0:00
480	489444.23	4879207.74	Non-Participating	0:00	0	0:00	0:00
481	489545.45	4879212.95	Non-Participating	0:00	0	0:00	0:00
482	489635.56	4878759.90	Non-Participating	0:00	0	0:00	0:00
483	490495.82	4879286.80	Non-Participating	0:00	0	0:00	0:00
484	490977.06	4879298.11	Non-Participating	0:00	0	0:00	0:00
485	490949.78	4879137.82	Non-Participating	0:00	0	0:00	0:00
486	491460.25	4878431.59	Non-Participating	0:00	0	0:00	0:00
487	491713.80	4878334.91	Non-Participating	0:00	0	0:00	0:00
488	491806.50	4879142.21	Non-Participating	0:00	0	0:00	0:00
489	492039.41	4879331.55	Non-Participating	0:00	0	0:00	0:00



Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
490	492860.00	4879226.20	Non-Participating	0:00	0	0:00	0:00
491	493142.48	4879036.43	Non-Participating	0:00	0	0:00	0:00
492	492758.53	4879319.56	Non-Participating	0:00	0	0:00	0:00
493	494040.55	4879209.90	Non-Participating	0:00	0	0:00	0:00
494	494946.88	4878858.40	Non-Participating	0:00	0	0:00	0:00
495	494631.87	4878070.88	Non-Participating	0:00	0	0:00	0:00
496	494622.23	4878130.23	Non-Participating	0:00	0	0:00	0:00
497	495153.30	4877779.20	Non-Participating	0:00	0	0:00	0:00
498	494779.88	4877690.16	Non-Participating	0:00	0	0:00	0:00
499	494656.56	4877212.33	Non-Participating	1:37	16	0:09	0:29
500	493010.05	4877412.07	Participating	24:10	104	0:29	5:57
501	493292.00	4877317.09	Participation Pending	9:10	51	0:21	2:40
502	493253.70	4877817.21	Non-Participating	9:16	37	0:19	2:03
503	492754.95	4877751.84	Non-Participating	0:00	0	0:00	0:00
504	492937.93	4877693.98	Non-Participating	0:00	0	0:00	0:00
505	492333.63	4877666.52	Non-Participating	0:00	0	0:00	0:00
506	492251.72	4877503.81	Participating	0:00	0	0:00	0:00
507	492234.18	4877555.41	Participating	0:00	0	0:00	0:00
508	492209.17	4877379.83	Participating	0:00	0	0:00	0:00
509	491204.57	4877592.32	Non-Participating	16:53	78	0:24	4:59
510	490993.10	4877604.29	Non-Participating	10:31	84	0:18	3:13
511	490950.33	4877852.19	Non-Participating	10:00	52	0:16	2:56
512	489835.40	4877912.18	Non-Participating	0:00	0	0:00	0:00
513	489914.98	4877880.09	Non-Participating	0:00	0	0:00	0:00
514	490320.50	4876915.99	Non-Participating	5:06	37	0:15	1:45
515	490345.19	4876928.97	Non-Participating	5:30	38	0:15	1:54
516	489824.65	4877177.26	Non-Participating	0:00	0	0:00	0:00
517	489798.47	4877241.24	Non-Participating	0:00	0	0:00	0:00
518	488326.68	4876849.62	Non-Participating	0:00	0	0:00	0:00
519	488211.66	4877034.73	Non-Participating	0:00	0	0:00	0:00
520	486597.05	4876484.54	Non-Participating	0:00	0	0:00	0:00
521	485139.90	4876925.87	Non-Participating	0:00	0	0:00	0:00
522	485112.68	4876718.66	Non-Participating	0:00	0	0:00	0:00
523	485111.73	4876886.12	Non-Participating	0:00	0	0:00	0:00
524	484576.48	4877381.31	Non-Participating	0:00	0	0:00	0:00
525	484604.14	4877406.38	Non-Participating	0:00	0	0:00	0:00
526	484415.46	4876945.29	Non-Participating	0:00	0	0:00	0:00
527	484482.97	4876529.89	Non-Participating	0:00	0	0:00	0:00
528	484133.35	4876454.25	Non-Participating	0:00	0	0:00	0:00
529	483354.68	4876911.14	Non-Participating	0:00	0	0:00	0:00
530	483340.51	4876941.40	Non-Participating	0:00	0	0:00	0:00
531	483284.50	4877111.89	Non-Participating	0:00	0	0:00	0:00
532	483894.45	4877038.60	Non-Participating	0:00	0	0:00	0:00
533	483805.65	4877165.29	Non-Participating	0:00	0	0:00	0:00
534	500183.35	4876832.93	Non-Participating	0:00	0	0:00	0:00
535	498032.98	4876897.85	Non-Participating	0:00	0	0:00	0:00
536	497876.00	4876576.62	Non-Participating	0:00	0	0:00	0:00
537	496003.73	4876090.86	Participating	0:00	0	0:00	0:00
538	483371.66	4876260.99	Non-Participating	0:00	0	0:00	0:00
539	483342.50	4876216.88	Non-Participating	0:00	0	0:00	0:00
540	483353.94	4876115.55	Non-Participating	0:00	0	0:00	0:00
541	483356.50	4875964.09	Non-Participating	0:00	0	0:00	0:00
542	483610.07	4875926.75	Non-Participating	0:00	0	0:00	0:00
543	484347.49	4875779.83	Non-Participating	0:00	0	0:00	0:00
544	484122.70	4876211.77	Non-Participating	0:00	0	0:00	0:00
545	484639.57	4876183.37	Non-Participating	0:00	0	0:00	0:00
546	485040.33	4875536.46	Non-Participating	0:00	0	0:00	0:00
547	485950.14	4875850.27	Non-Participating	0:00	0	0:00	0:00
548	485922.83	4875490.30	Non-Participating	0:00	0	0:00	0:00
549	485570.32	4875343.66	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
550	486758.93	4875870.36	Non-Participating	0:00	0	0:00	0:00
551	486732.47	4875847.61	Non-Participating	0:00	0	0:00	0:00
552	487379.99	4875967.61	Non-Participating	0:00	0	0:00	0:00
553	487414.85	4875979.00	Non-Participating	0:00	0	0:00	0:00
554	486752.22	4876287.93	Non-Participating	0:00	0	0:00	0:00
555	488220.58	4875677.44	Non-Participating	0:00	0	0:00	0:00
556	488332.16	4876043.35	Participating	0:00	0	0:00	0:00
557	489116.44	4875427.96	Non-Participating	0:00	0	0:00	0:00
558	489070.22	4875417.85	Non-Participating	0:00	0	0:00	0:00
559	489141.82	4875405.73	Non-Participating	0:00	0	0:00	0:00
560	488998.60	4876062.19	Participating	0:00	0	0:00	0:00
561	489826.70	4875987.32	Non-Participating	0:00	0	0:00	0:00
562	490243.39	4876075.04	Non-Participating	5:02	39	0:13	1:46
563	490277.50	4875981.51	Non-Participating	5:51	43	0:14	2:06
564	490318.56	4876072.58	Non-Participating	6:09	43	0:14	2:11
565	490841.49	4875989.47	Non-Participating	25:14	131	0:21	8:55
566	491021.44	4876062.81	Participation Pending	31:09	142	0:23	10:20
567	491885.42	4875936.91	Participation Pending	6:07	58	0:10	2:06
568	492288.14	4875939.17	Participating	4:28	38	0:11	1:18
569	485068.52	4874814.15	Non-Participating	0:00	0	0:00	0:00
570	485049.92	4874303.42	Non-Participating	0:00	0	0:00	0:00
571	485562.84	4875163.93	Non-Participating	0:00	0	0:00	0:00
572	485226.22	4873854.62	Non-Participating	0:00	0	0:00	0:00
573	484962.06	4873636.11	Non-Participating	0:00	0	0:00	0:00
574	485076.63	4873384.34	Non-Participating	0:00	0	0:00	0:00
575	485248.40	4873345.47	Non-Participating	0:00	0	0:00	0:00
576	485233.04	4873372.20	Non-Participating	0:00	0	0:00	0:00
577	484992.60	4872278.33	Non-Participating	0:00	0	0:00	0:00
578	484936.10	4872282.95	Non-Participating	0:00	0	0:00	0:00
579	485379.31	4872761.19	Non-Participating	0:00	0	0:00	0:00
580	486198.35	4872740.10	Non-Participating	0:00	0	0:00	0:00
581	486676.17	4872464.77	Non-Participating	0:00	0	0:00	0:00
582	486655.64	4873090.69	Non-Participating	0:00	0	0:00	0:00
583	487877.11	4873120.91	Non-Participating	0:00	0	0:00	0:00
584	488112.71	4872671.02	Non-Participating	0:00	0	0:00	0:00
585	489802.42	4873070.99	Non-Participating	0:00	0	0:00	0:00
586	490903.77	4872050.05	Non-Participating	0:00	0	0:00	0:00
587	491158.49	4872615.01	Non-Participating	0:00	0	0:00	0:00
588	491617.71	4872744.89	Non-Participating	0:00	0	0:00	0:00
589	491351.60	4872844.56	Non-Participating	0:00	0	0:00	0:00
590	491439.59	4872911.18	Non-Participating	0:00	0	0:00	0:00
591	486316.80	4874665.05	Non-Participating	0:00	0	0:00	0:00
592	487443.29	4874431.59	Non-Participating	0:00	0	0:00	0:00
593	488227.77	4874362.55	Participating	0:00	0	0:00	0:00
594	488176.73	4874445.52	Non-Participating	0:00	0	0:00	0:00
595	488313.23	4874925.37	Participating	0:00	0	0:00	0:00
596	488330.19	4874908.78	Participating	0:00	0	0:00	0:00
597	490542.51	4874927.42	Participating	5:25	41	0:14	1:54
598	490484.06	4874350.37	Participating	0:00	0	0:00	0:00
599	490667.31	4874464.80	Participating	2:15	20	0:10	0:48
600	489910.19	4874274.68	Participating	0:00	0	0:00	0:00
601	489305.30	4874280.67	Participating	0:00	0	0:00	0:00
602	489395.90	4874448.33	Participating	0:00	0	0:00	0:00
603	491911.47	4874443.00	Participating	22:18	83	0:25	8:16
604	491551.67	4874626.99	Participating	40:56	120	0:32	15:10
605	491452.04	4874745.89	Participating	20:02	72	0:29	7:06
606	490742.07	4874350.00	Non-Participating	2:57	25	0:11	1:05
607	492196.54	4873592.10	Participating	0:00	0	0:00	0:00
608	491538.28	4873118.40	Non-Participating	0:00	0	0:00	0:00
609	490427.30	4873185.69	Non-Participating	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
610	490308.00	4873855.52	Non-Participating	0:00	0	0:00	0:00
611	489807.12	4873557.35	Non-Participating	0:00	0	0:00	0:00
612	488849.73	4874109.24	Non-Participating	0:00	0	0:00	0:00
613	488302.06	4873557.83	Non-Participating	0:00	0	0:00	0:00
614	487911.15	4873636.20	Non-Participating	0:00	0	0:00	0:00
615	487684.01	4873459.47	Non-Participating	0:00	0	0:00	0:00
616	487514.01	4873755.84	Non-Participating	0:00	0	0:00	0:00
617	487184.42	4873945.73	Non-Participating	0:00	0	0:00	0:00
618	486591.04	4874277.89	Non-Participating	0:00	0	0:00	0:00
619	486670.36	4873699.15	Non-Participating	0:00	0	0:00	0:00
620	486755.87	4873650.47	Non-Participating	0:00	0	0:00	0:00
621	486727.45	4871753.50	Non-Participating	0:00	0	0:00	0:00
622	486094.94	4871309.02	Non-Participating	0:00	0	0:00	0:00
623	486638.09	4871400.01	Non-Participating	0:00	0	0:00	0:00
624	486672.02	4870622.68	Non-Participating	0:00	0	0:00	0:00
625	486655.48	4870232.51	Non-Participating	0:00	0	0:00	0:00
626	487378.63	4870881.50	Non-Participating	0:00	0	0:00	0:00
627	487448.24	4871236.67	Non-Participating	0:00	0	0:00	0:00
628	487697.00	4871268.04	Non-Participating	0:00	0	0:00	0:00
629	488319.13	4871047.52	Non-Participating	0:00	0	0:00	0:00
630	487859.22	4870334.28	Non-Participating	0:00	0	0:00	0:00
631	488100.93	4870340.68	Non-Participating	0:00	0	0:00	0:00
632	488931.40	4870482.89	Non-Participating	0:00	0	0:00	0:00
633	489465.02	4870612.47	Non-Participating	0:00	0	0:00	0:00
634	489473.93	4870174.17	Non-Participating	0:00	0	0:00	0:00
635	489918.83	4870357.95	Non-Participating	0:00	0	0:00	0:00
636	490477.39	4870317.69	Non-Participating	0:00	0	0:00	0:00
637	491440.93	4870296.94	Participating	0:00	0	0:00	0:00
638	491691.36	4870338.51	Non-Participating	0:00	0	0:00	0:00
639	491742.59	4870251.31	Non-Participating	0:00	0	0:00	0:00
640	490556.45	4870428.90	Non-Participating	0:00	0	0:00	0:00
641	490729.74	4870543.54	Non-Participating	0:00	0	0:00	0:00
642	492088.16	4871151.03	Participating	0:00	0	0:00	0:00
643	492101.16	4871308.61	Non-Participating	0:00	0	0:00	0:00
644	491583.87	4871268.58	Non-Participating	0:00	0	0:00	0:00
645	491466.08	4871036.24	Non-Participating	0:00	0	0:00	0:00
646	490182.63	4871392.80	Non-Participating	0:00	0	0:00	0:00
647	490146.04	4871128.30	Non-Participating	0:00	0	0:00	0:00
648	489684.58	4871207.32	Non-Participating	0:00	0	0:00	0:00
649	489742.38	4869647.95	Non-Participating	0:00	0	0:00	0:00
650	490330.39	4868981.77	Non-Participating	0:00	0	0:00	0:00
651	490439.21	4869028.96	Non-Participating	0:00	0	0:00	0:00
652	491759.63	4869590.01	Non-Participating	0:00	0	0:00	0:00
653	491515.95	4869809.52	Non-Participating	0:00	0	0:00	0:00
654	490718.55	4869035.68	Non-Participating	0:00	0	0:00	0:00
655	491214.49	4868921.13	Non-Participating	0:00	0	0:00	0:00
656	491144.65	4868793.54	Non-Participating	0:00	0	0:00	0:00
657	490586.54	4867989.99	Non-Participating	0:00	0	0:00	0:00
658	490772.60	4868329.90	Non-Participating	0:00	0	0:00	0:00
659	490521.01	4868392.32	Non-Participating	0:00	0	0:00	0:00
660	490399.71	4868828.19	Non-Participating	0:00	0	0:00	0:00
661	490132.35	4868300.15	Non-Participating	0:00	0	0:00	0:00
662	489421.01	4868140.33	Non-Participating	0:00	0	0:00	0:00
663	487623.14	4868576.03	Non-Participating	0:00	0	0:00	0:00
664	487782.58	4867705.95	Non-Participating	0:00	0	0:00	0:00
665	488410.14	4867926.75	Non-Participating	0:00	0	0:00	0:00
666	490006.54	4867558.26	Non-Participating	0:00	0	0:00	0:00
667	489786.08	4867239.58	Non-Participating	0:00	0	0:00	0:00
668	489471.01	4866930.92	Non-Participating	0:00	0	0:00	0:00
669	489407.69	4866850.23	Non-Participating	0:00	0	0:00	0:00

**Table B-1: Shadow Flicker Modeling Results**

Receptor ID	Coordinates NAD83 UTM Zone 15N (meters)		Participation Status	Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker Hours - Daily	Expected Shadow Flicker Hours - Annual
	X (Easting)	Y (Northing)		(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
670	489550.29	4866777.40	Non-Participating	0:00	0	0:00	0:00
671	489177.54	4866889.51	Non-Participating	0:00	0	0:00	0:00
672	489191.30	4866647.84	Non-Participating	0:00	0	0:00	0:00
673	489312.09	4866497.79	Non-Participating	0:00	0	0:00	0:00
674	489313.39	4866375.23	Non-Participating	0:00	0	0:00	0:00
675	489310.25	4866131.82	Non-Participating	0:00	0	0:00	0:00
676	489861.71	4865984.83	Non-Participating	0:00	0	0:00	0:00
677	489395.33	4866310.51	Non-Participating	0:00	0	0:00	0:00
678	490197.73	4866693.01	Non-Participating	0:00	0	0:00	0:00
679	490217.54	4866649.68	Non-Participating	0:00	0	0:00	0:00
680	490017.33	4865967.73	Non-Participating	0:00	0	0:00	0:00
681	490278.87	4865979.10	Non-Participating	0:00	0	0:00	0:00
682	490410.02	4866045.09	Non-Participating	0:00	0	0:00	0:00
683	490085.49	4864761.25	Non-Participating	0:00	0	0:00	0:00
684	489923.58	4864746.23	Non-Participating	0:00	0	0:00	0:00
685	489842.93	4865195.32	Non-Participating	0:00	0	0:00	0:00
686	492242.97	4868718.98	Non-Participating	0:00	0	0:00	0:00
687	492201.39	4868471.14	Participating	0:00	0	0:00	0:00
688	491286.85	4866494.23	Non-Participating	0:00	0	0:00	0:00
689	491009.28	4865891.24	Non-Participating	0:00	0	0:00	0:00
690	491637.21	4866020.30	Non-Participating	0:00	0	0:00	0:00
691	492326.88	4865129.44	Non-Participating	0:00	0	0:00	0:00
692	491378.79	4865103.88	Non-Participating	0:00	0	0:00	0:00
693	491360.33	4865074.29	Non-Participating	0:00	0	0:00	0:00
694	492846.71	4863545.15	Non-Participating	0:00	0	0:00	0:00
695	491647.96	4864076.25	Non-Participating	0:00	0	0:00	0:00
696	490594.15	4864686.77	Non-Participating	0:00	0	0:00	0:00
697	492988.35	4862968.51	Non-Participating	0:00	0	0:00	0:00
698	493649.83	4863248.87	Non-Participating	0:00	0	0:00	0:00
699	494269.33	4863513.13	Non-Participating	0:00	0	0:00	0:00
700	493677.47	4863383.00	Non-Participating	0:00	0	0:00	0:00
701	493669.38	4863482.76	Non-Participating	0:00	0	0:00	0:00
702	483374.01	4877839.13	Non-Participating	0:00	0	0:00	0:00
703	483734.01	4879213.02	Non-Participating	0:00	0	0:00	0:00

# **APPENDIX F**



# **Dodge County Wind, MN Electromagnetic Interference Analysis**

The following document was prepared by NextEra Analytics, an indirect wholly-owned subsidiary of NextEra Energy Resources, LLC (NEER) for the use of Dodge County Wind, LLC, as an indirect wholly-owned subsidiary of NEER. NextEra Analytics has prepared this report based on available government information by the Federal Communications Commission (FCC) and internal analysis methods. We cannot guarantee the accuracy of the data collected by the FCC. Microwave tower and link information may be inaccurate or incomplete due to FCC applicant error.

## **Executive Summary**

NextEra Analytics, an affiliate of Dodge County Wind LLC (Dodge County) assessed the potential for interference of licensed communication links in close proximity to the proposed Dodge County Wind Project area for the purposes of determining exclusion zones to aid the design of a proposed wind energy generation project. This report summarizes the microwave links and towers along with local cellular towers, media towers (AM and FM), television, and aviation towers, identified within and near the assessment area.

A review of the Federal Communications Commission (FCC) national database and the Universal Licensing System was conducted to identify these possible constraints. Wind turbine offset distances were taken in consideration for the design of the wind turbine array.

Electromagnetic analysis results show that interference is not expected to impact nearby microwave, AM, FM, cellular, TV, and aviation towers based on the array design.

The analysis is current as of June 28, 2018. NextEra Analytics recommends a refresh of this analysis if the proposed wind energy generation project has not been constructed after two years.

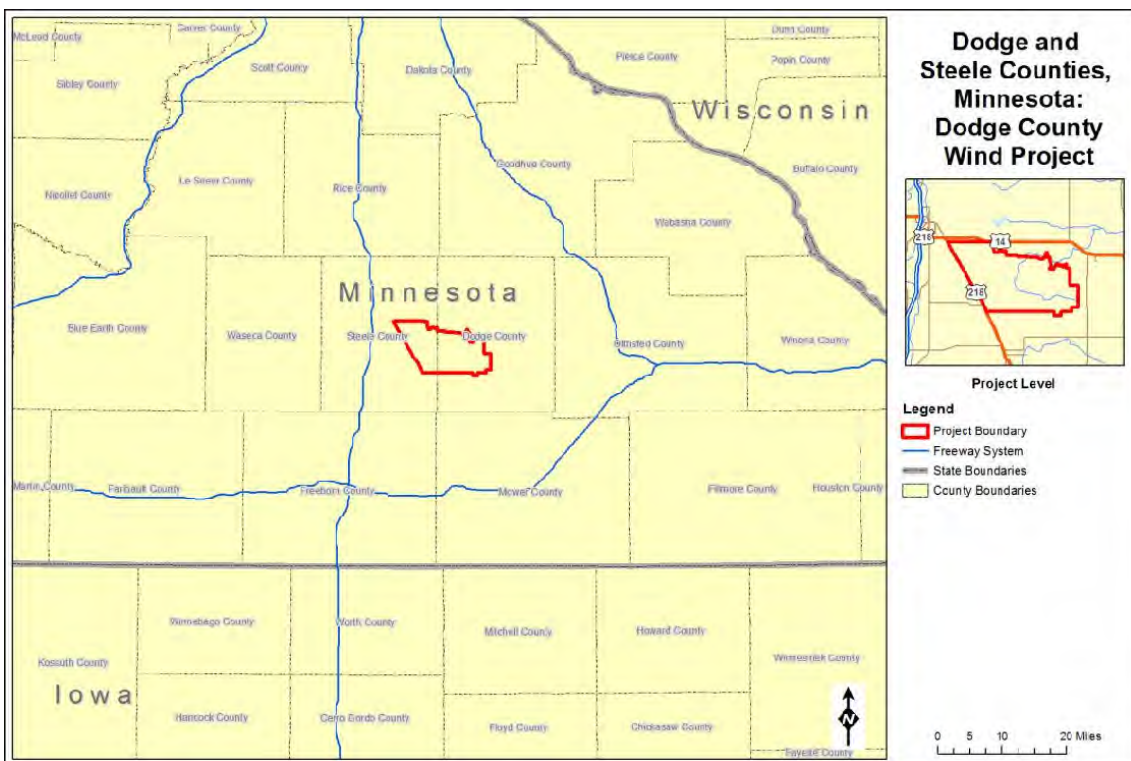
This report only provides analysis for licensed radio towers and links found within the FCC database. Many local municipalities (police, fire, etc.) do not license microwave links, NextEra Analytics recommends that Dodge County LLC coordinate with the appropriate local municipality officials. Also not included within the database are microwave towers and links utilized by the Federal government (Dept. of Defense, Dept. of Commerce, etc.), again for public safety concerns. A letter stating "No Harmful Interference Anticipated (NHIA)" has been received from the National Telecommunications and Information Agency (NTIA).

## **Dodge County Wind, MN – Electromagnetic Interference**

NextEra Analytics, an affiliate of Dodge County Wind LLC (Dodge County) assessed the potential for interference of licensed communication links in close proximity to the proposed Dodge County Wind Project area for the purposes of determining exclusion zones to aid the design of a proposed wind energy generation project. This report summarizes the microwave links and towers along with local cellular towers, media towers (AM and FM), television, and aviation towers, identified within and near the assessment area.

A review of the FCC national database and the Universal Licensing System was conducted to identify these possible constraints. Wind turbine offset distances were taken into consideration for the design of the wind turbine array.

The site is located in Dodge and Steele County, Minnesota, roughly 28 kilometers west of the city of Rochester, Minnesota. Figure 1 below, depicts the project location of Dodge County Wind.



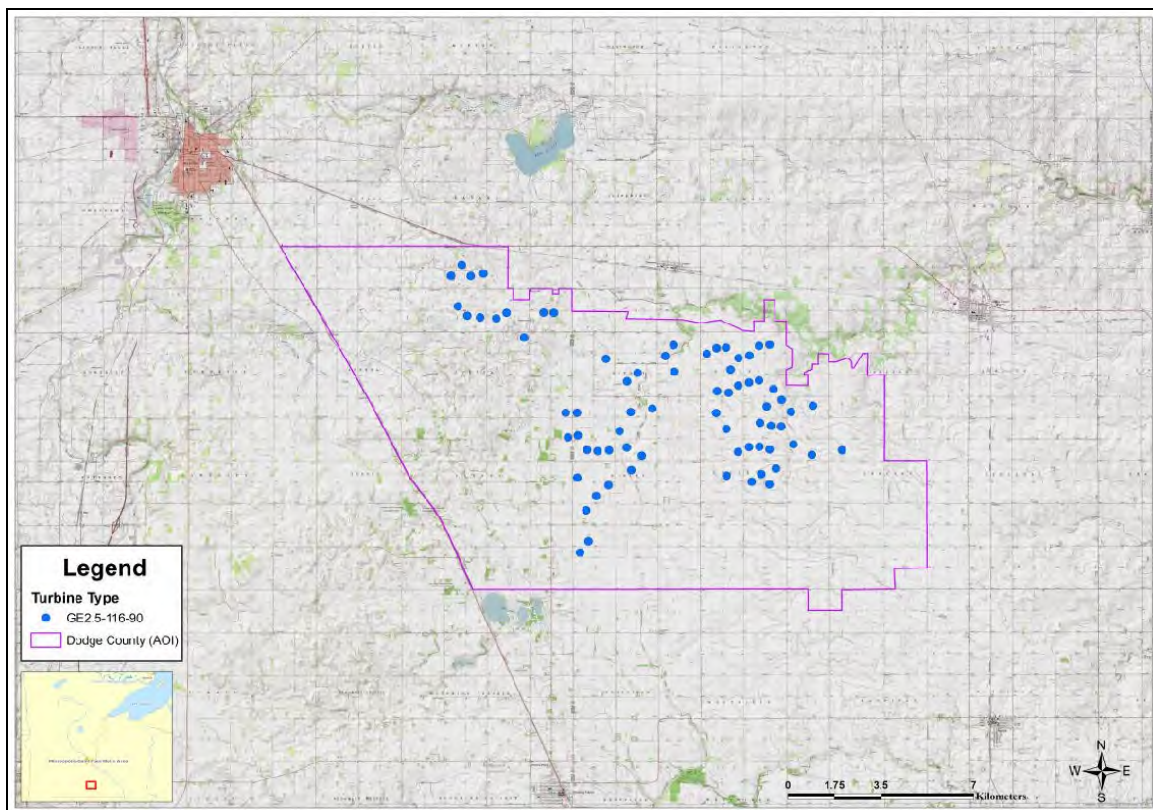
**Figure 1: Dodge County Wind Project Location**

## **Turbine Technology**

Dodge County Wind is a proposed wind energy generation site that consists of 72 turbine locations. The layout is composed of 72 (68 primary and 4 alternate) GE2.5-116 turbines (2.5MW rated capacity, 116m rotor diameter (RD)) for a total capacity of 170MW. Turbine layout details are included in Table 1 and Figure 2.

<b>Turbine Technology</b>	GE2.5-116
<b>Turbine Count</b>	68(4)
<b>Hub Height (m)</b>	90
<b>Rotor Diameter (m)</b>	116
<b>Turbine Rated Power (MW)</b>	2.5
<b>Total Capacity (MW)</b>	170

**Table 1: Dodge County Layout Summary**



**Figure 2: Dodge County Wind Turbine Technology Allocation**

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## **Data Sources**

Within the United States, the location of industrial and commercial telecommunication systems, including microwave links, are collected and maintained by the Wireless Telecommunications Bureau (WTB), a division of the FCC. This data is made publicly available through the ULS database, which contains licensing information on both current and permit pending facilities for microwave, cellular, media, and several radio services utilized by private industry (non-Federal telecommunication systems). License information supplied within the ULS database is updated daily, and is dependent upon information provided by each individual applicant.

NextEra Analytics used several data sources (ESRI satellite imagery, Google Earth, etc.) of high resolution imagery to aid in assessing the accuracy of the geographic locations of each microwave tower with links intersecting the project boundary or area of interest (AOI).

## **Methodology**

The ULS database, described earlier, was used to identify the microwave towers, microwave links, cellular, AM, FM, and aviation towers within a 25-kilometer radius that may impact the Dodge County Wind Farm. Television towers were identified within a 100-kilometer radius. The database provides detailed information for each radio tower and link, which was used to calculate turbine exclusion zones to ensure interference compliance.

Exclusion zones for wind turbines near microwave links are calculated using a theory proposed by Bacon (2002), which identifies the radius of the 2<sup>nd</sup> Fresnel zone, a theoretical sphere representative of a propagating radio wave, as an appropriate offset distance. Calculations of the 2<sup>nd</sup> Fresnel zone can be determined by:

$$\text{2nd Fresnel zone Radius} = \sqrt{\frac{2\lambda d_1 d_2}{d_1 + d_2}} \quad (1)$$

Where:

$d_1, d_2$  = distances from each end of the radio path.

$\lambda$  = wavelength of the corresponding radio frequency.

To account for precision errors within the ULS database, and to further reduce the potential for interference from a wind turbine, a Worst Case Fresnel Zone (WCFZ) was calculated for each microwave link. The WCFZ provides the maximum offset distance required, and is determined by the 2<sup>nd</sup> Fresnel zone



radius obtained at the midpoint of the link, where  $d_1 = d_2$ . Adjusting Eq. 1 to calculate the WCFZ in meters yields the following:

$$WCFZ = 17.32 \sqrt{\frac{nD}{4(F)}} \quad (2)$$

Where:

D = distance between the transmitter and receiver towers.

F = frequency in GHz.

n = Fresnel zone, which for the 2<sup>nd</sup> Fresnel Zone  $n = 2$ .

The calculated radius distance from Eq. 2 provides a three-dimensional turbine exclusion zone around each microwave link that can be used to guide wind turbine array design.

In addition to the WCFZ calculated for each microwave link, NextEra Analytics applies an offset of one-half RD plus 10 meter to account for turbine blade overhang. A turbine overhang offset using a 116 m turbine technology is included within this analysis to represent the GE2.5-116 wind turbine generator.

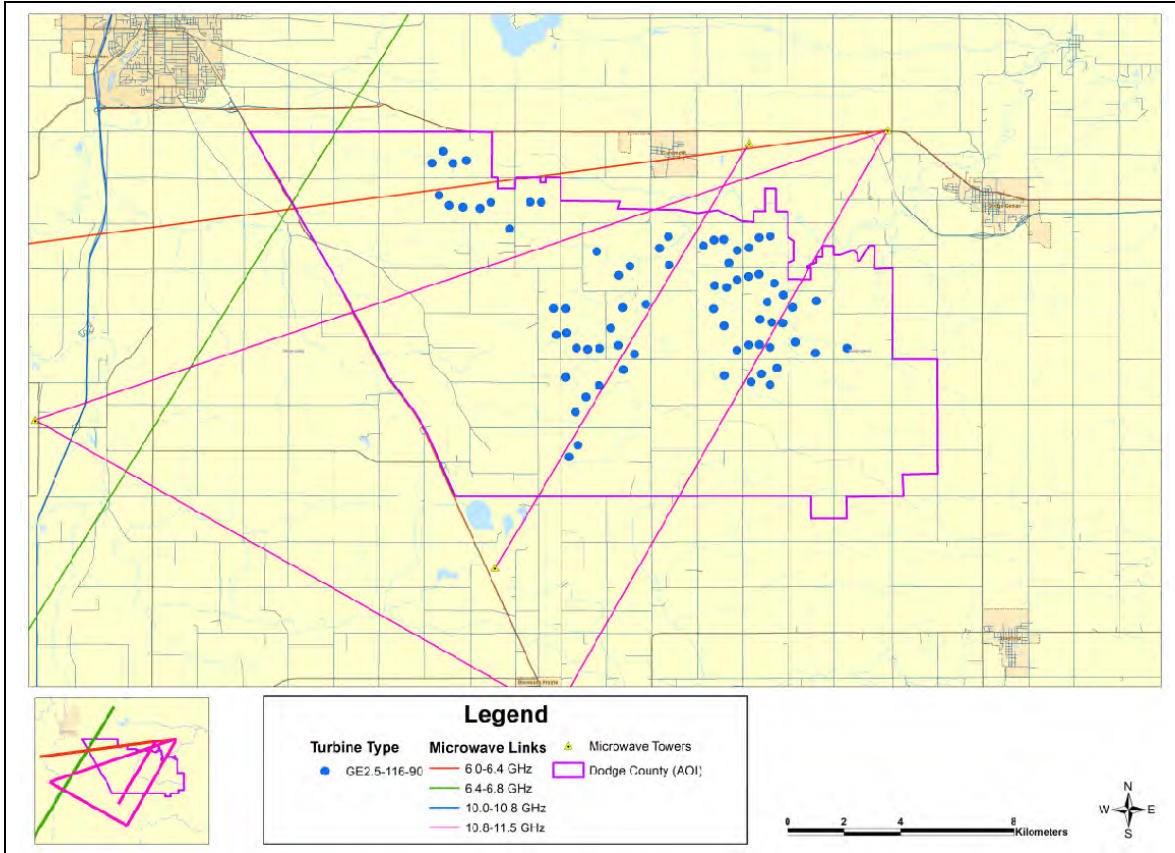
The WTB cannot provide quality assurance for every license within the ULS database, so accuracy of the data relies on applicant certifications, and, in extreme cases, license audits. It has been NextEra Analytics' experience that most inaccuracies occur with regard to the location of the radio towers, where approximation or lack of precision of the geographic coordinates can result in a difference in the position of the tower by as much as 500 meters.

To fully account for these location errors, NextEra Analytics recommends on-site verification to identify the exact location of the transmitter and receiver towers. However, for this analysis, NextEra Analytics used high-resolution satellite imagery to identify possible tower location errors. Most microwave, media, and cellular towers extend well over 80m above ground level, and can be clearly viewed within high resolution satellite imagery. Each tower that may impact the project boundary was investigated for potential location error. Adjustments to the location of the microwave, media, and cellular towers are only made if clear evidence from the satellite imagery shows an inaccuracy.

### **Microwave Links and Microwave Towers**

No microwave towers were identified within the Project area. However, twelve microwave links have been identified near the project area and ten have been found to intersect the AOI. The WCFZ for all of these links has been calculated, and the appropriate turbine offset has been used to minimize any harmful impact from the proposed turbine layout.

Figure 3 below illustrates the position of each microwave link with respect to the project boundary and turbine locations.



**Figure 3: Dodge County Wind With Microwave Links**

Table 2 provides more detailed information on each microwave link in proximity to the area with the calculated WCFZ.

ID	STATUS	TRANSMITTER CALLSIGN	MICROWAVE NAME	BAND FREQ (GHz)	WCFZ (m)	BEAM LENGTH (Km)
1	Active	WHI758	UNION PACIFIC RAILROAD COMPANY	6.6	30.25	40.17
2	Active	WHI759	UNION PACIFIC RAILROAD COMPANY	6.7	29.89	40.17
3	Active	WQJE209	Minnesota, State of	6.1	28.39	32.75
4	Active	WQJY578	Minnesota, State of	6.3	27.82	32.75
5	Active	WQQD451	Radio Link Internet	10.8	17.18	21.16
6	Active	WQQD451	Radio Link Internet	10.8	18.14	23.77
7	Active	WQQD451	Radio Link Internet	11.0	16.99	21.16
8	Active	WQQD451	Radio Link Internet	10.9	18.07	23.77
9	Active	WQQD513	Radio Link Internet	11.2	20.63	31.92
10	Active	WQQD513	Radio Link Internet	11.3	17.74	23.77
11	Active	WQWJ905	T-MOBILE LICENSE LLC	11	15.44	17.5
12	Active	WQWJ906	T-MOBILE LICENSE LLC	11.5	15.11	17.5

**Table 2: Detailed Information on Microwave Links That Intersect the Project Boundary**

There are a number of links that are within relatively close proximity to turbines. The Worst Case Fresnel Zone was calculated for each microwave link and a conservative offset of 68 meters was used to reduce the probability of harmful interference. Figures 4-6 provide aerial imagery of the turbine layout relative to the Fresnel zones and their offsets that intersect the project boundary.

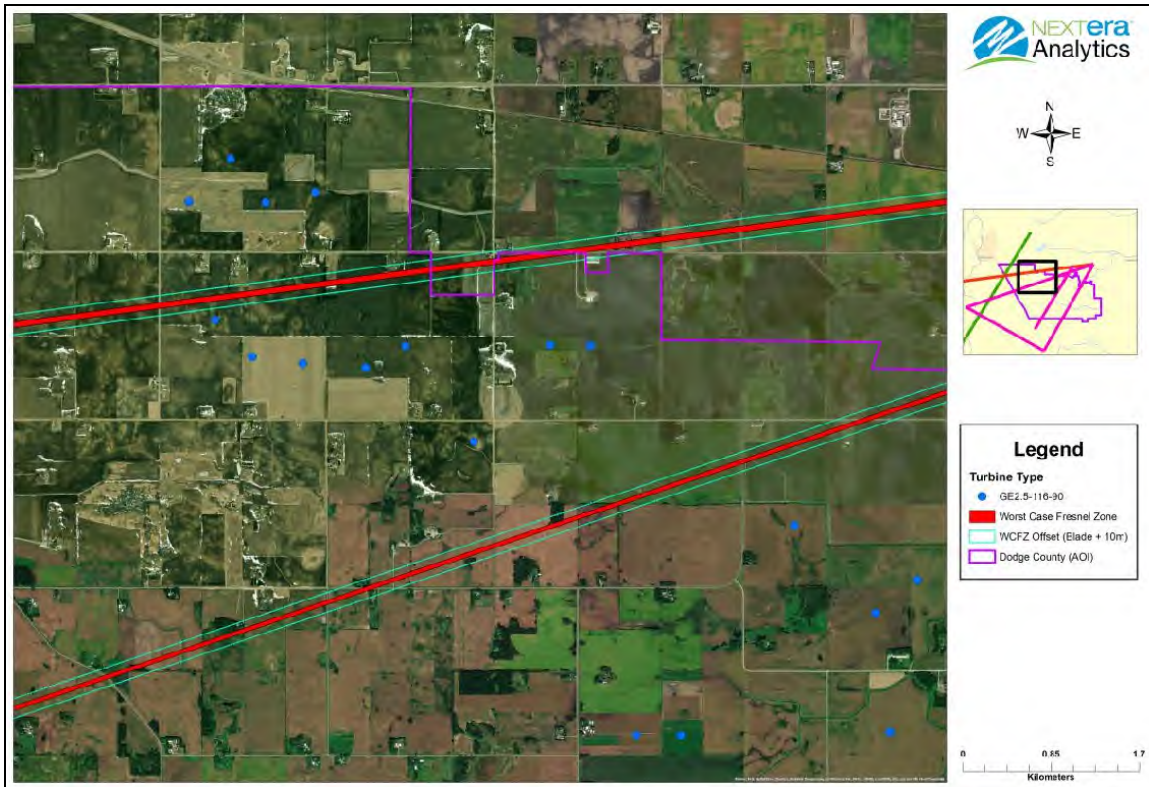


Figure 4: Dodge County Wind Fresnel Zone Northwest



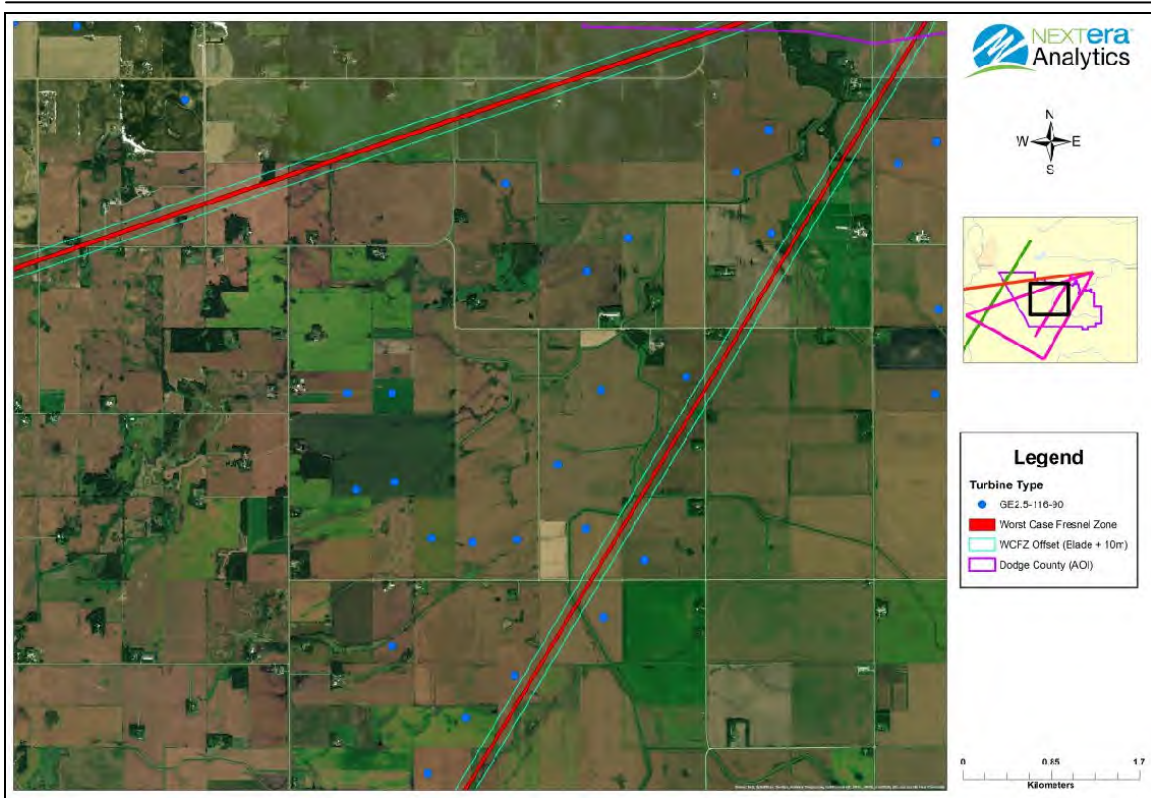


Figure 5: Dodge County Wind Fresnel Zone West

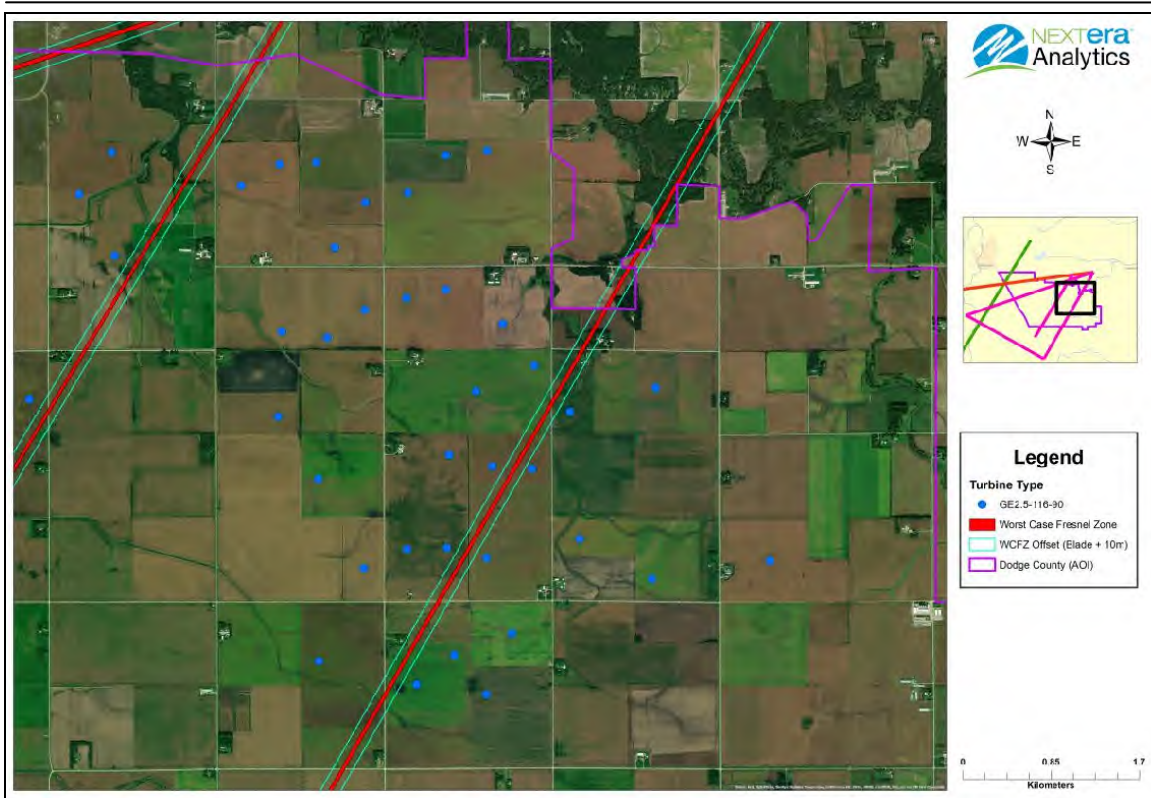


Figure 6: Dodge County Wind Fresnel Zone East

## Cellular Towers

No cellular towers were identified within the project boundary. Thirteen cellular towers were discovered within 25 km of the project boundary and are identified in Table 3 and figure 7.

Harmful interference associated with cellular towers is not likely as cellular transitions or packet switching occurs when a cellular link becomes unavailable.

Electromagnetic Interference

ID	STATUS	CALLSIGN	LICENSEE	LATITUDE	LONGITUDE	DISTANCE TO AOI(km)
1	Active	KNKN403	Alltel Communications, LLC	43.87508	-93.04960	6.73
2	Active	KNKN416	Alltel Communications, LLC	43.88539	-92.81930	8.00
3	Active	KNKN572	AT&T Mobility Spectrum LLC	43.91286	-93.07440	2.53
4	Active	KNKA667	AT&T Mobility Spectrum LLC	44.00672	-92.71860	13.25
5	Active	WPSJ612	Alltel Communications, LLC	44.00694	-92.71940	13.19
6	Active	KNKA667	AT&T Mobility Spectrum LLC	44.02406	-92.59830	23.08
7	Active	WPSJ612	Alltel Communications, LLC	44.05111	-92.87640	4.64
8	Active	KNKN572	AT&T Mobility Spectrum LLC	44.06072	-93.16470	1.01
9	Active	KNLH690	Verizon Wireless (VAW) LLC	44.08283	-93.22030	4.58
10	Active	KNKN403	Alltel Communications, LLC	44.09361	-93.25390	7.35
11	Active	KNKN416	Alltel Communications, LLC	44.09556	-92.79830	12.43
12	Active	KNKN403	Alltel Communications, LLC	44.11167	-93.18280	6.68
13	Active	KNKN416	Alltel Communications, LLC	44.25556	-92.98170	23.88

Table 3: Cellular Towers within 25 km of the Project Boundary

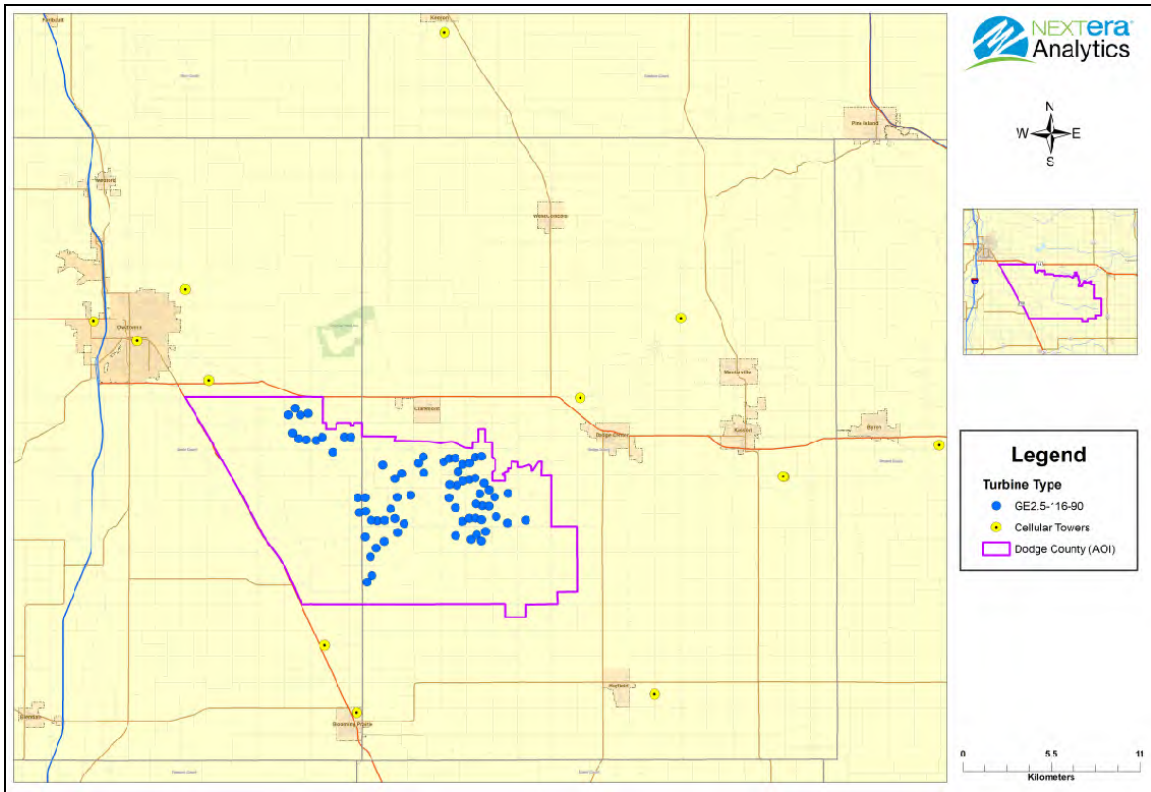


Figure 7: Cellular Towers within 25 km of the Project Boundary

**Media Towers**

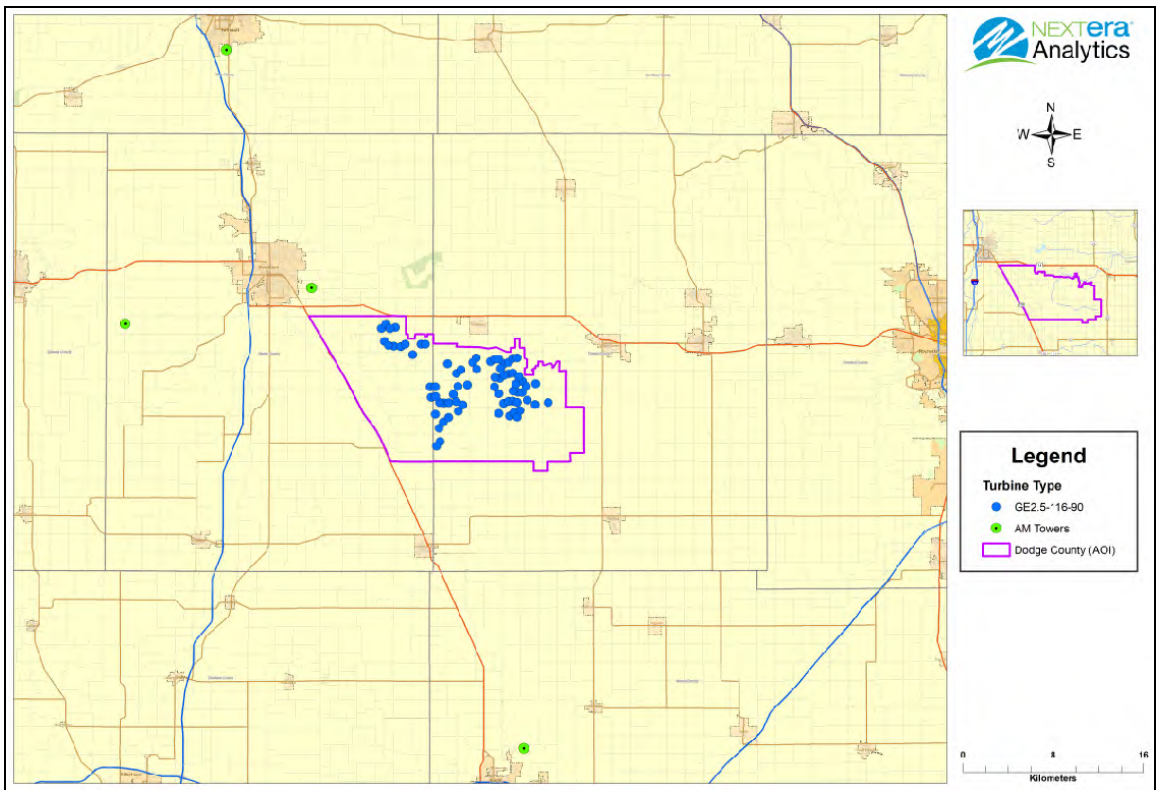
No active AM radio towers were identified within the project boundary. 11 AM towers were discovered within 25 km of the project boundary and are included in Table 4 and figure 8.



While no harmful interference to the AM towers is expected, reception of AM radio stations near each individual turbine may be impacted, especially for areas on the edge of AM radio coverage. The exclusion distance from AM towers is 1 wavelength from non-directional antennas and 10 wavelengths or 3 kilometers from directional antennas (Marlowe, 2015). Given most AM radio receptors will be nearby dwellings, which should have a sufficient offset from each turbine, any interruption to reception from the installation of wind turbines is expected to be minimal. The closest AM towers, KRFO, are located 2.5 km from the project boundary, and have a broadcasting frequency of 1390 kHz which corresponds to a wavelength of 216 m. Thus, the proposed layout is greater than 10 wavelengths away from the closest station.

ID	CALLSIGN	LICENSEE	FREQUENCY (kHz)	LATITUDE	LONGITUDE	DISTANCE TO AOI(km)
1	KDHL	TOWNSQUARE MEDIA FARIBAULT LICENSE, LLC	920	44.26306	-93.27472	24.62
2	KDHL	TOWNSQUARE MEDIA FARIBAULT LICENSE, LLC	920	44.26306	-93.27472	24.62
3	KQAQ	HOMETOWN BROADCASTING OF AUSTIN, INC.	970	43.70750	-92.94583	24.58
4	KQAQ	HOMETOWN BROADCASTING OF AUSTIN, INC.	970	43.70750	-92.94583	24.58
5	KOWZ	MAIN STREET BROADCASTING, INC.	1170	44.04472	-93.38556	16.25
6	KOWZ	MAIN STREET BROADCASTING, INC.	1170	44.04472	-93.38556	16.25
7	KOWZ	MAIN STREET BROADCASTING, INC.	1170	44.04472	-93.38556	16.25
8	KRFO	CUMULUS LICENSING LLC	1390	44.07389	-93.18000	2.48
9	KRFO	CUMULUS LICENSING LLC	1390	44.07389	-93.18000	2.48
10	KRFO	TOWNSQUARE MEDIA FARIBAULT LICENSE, LLC	1390	44.07389	-93.18000	2.48
11	KRFO	TOWNSQUARE MEDIA FARIBAULT LICENSE, LLC	1390	44.07389	-93.18000	2.48

**Table 4: AM Transmitter Towers within 25 km of the Project Boundary**



**Figure 8: AM Transmitter Towers within 25 km of the Project Boundary**

No active FM radio towers were identified within the project boundary. Fifteen FM towers were discovered within 25 km of the project boundary and are included in Table 5 and figure 9.

While no harmful interference to the FM towers is expected, reception of FM radio stations near each individual turbine may be impacted, especially for areas on the edge of FM radio coverage. The recommended exclusion distance for FM towers is approximately 4 kilometers. FM stations that are closer than 4 kilometers to wind turbines have the potential to experience interference (Marlowe, 2015). Given most FM radio receptors will be nearby dwellings, which should have a sufficient offset from each turbine, any interruption to reception from the installation of wind turbines is expected to be minimal. Three FM towers are located less than 4 km from the AOI, K234DB, KCJL-LP and KRFO-FM, and are the most vulnerable to experience interference. However, the nearest wind turbines are located 4.8 km and 7.1 km away from the towers.

ID	CALLSIGN	LICENSEE	FREQUENCY (MHz)	LATITUDE	LONGITUDE	DISTANCE TO AOI(km)
1	KRUE	MAIN STREET BROADCASTING, INC.	92.1	44.04556	-93.3839	16.11
2	K228DR	OWATONNA AREA CHRISTIAN RADIO, INC.	93.5	44.08983	-93.2246	5.40
3	K232FY	HOMETOWN BROADCASTING OF AUSTIN, INC.	94.3	43.78806	-92.9081	15.64
4	K234DB	TOWNSQUARE MEDIA FARIBAUT LICENSE, LLC	94.7	44.07389	-93.1800	2.48
5	KCJL-LP	ONE DAY CHURCH PROJECT, INC.	95.1	43.99250	-92.8600	2.13
6	KWWK	TOWNSQUARE MEDIA ROCHESTER LICENSE, LLC	96.5	44.03306	-92.6028	22.97
7	NEW	TOWNSQUARE MEDIA FARIBAUT LICENSE, LLC	98.1	44.26361	-93.2736	24.65
8	K253CH	MINN-IOWA CHRISTIAN BROADCASTING, INC.	98.5	43.88708	-92.8489	6.52
9	KOWZ-FM	BLOOMING PRAIRIE FARM RADIO INC.	100.9	44.04556	-93.3839	16.11
10	KRCH	CC LICENSES, LLC, AS DEBTOR IN POSSESSION	101.7	44.11639	-92.6894	20.64
11	K280EC	MINNESOTA PUBLIC RADIO	103.9	44.08861	-93.1403	4.10
12	KRFO-FM	TOWNSQUARE MEDIA FARIBAUT LICENSE, LLC	104.9	44.07389	-93.1800	2.48
13	K289AE	MINNESOTA PUBLIC RADIO	105.7	44.08861	-93.1403	4.10
14	K292GU	MAIN STREET BROADCASTING, INC.	106.3	44.04556	-93.3839	16.11
15	KBGY	MILESTONE RADIO II LLC	107.5	44.21167	-93.3383	21.70

**Table 5: FM Transmitter Towers within 25 km of the Project Boundary**

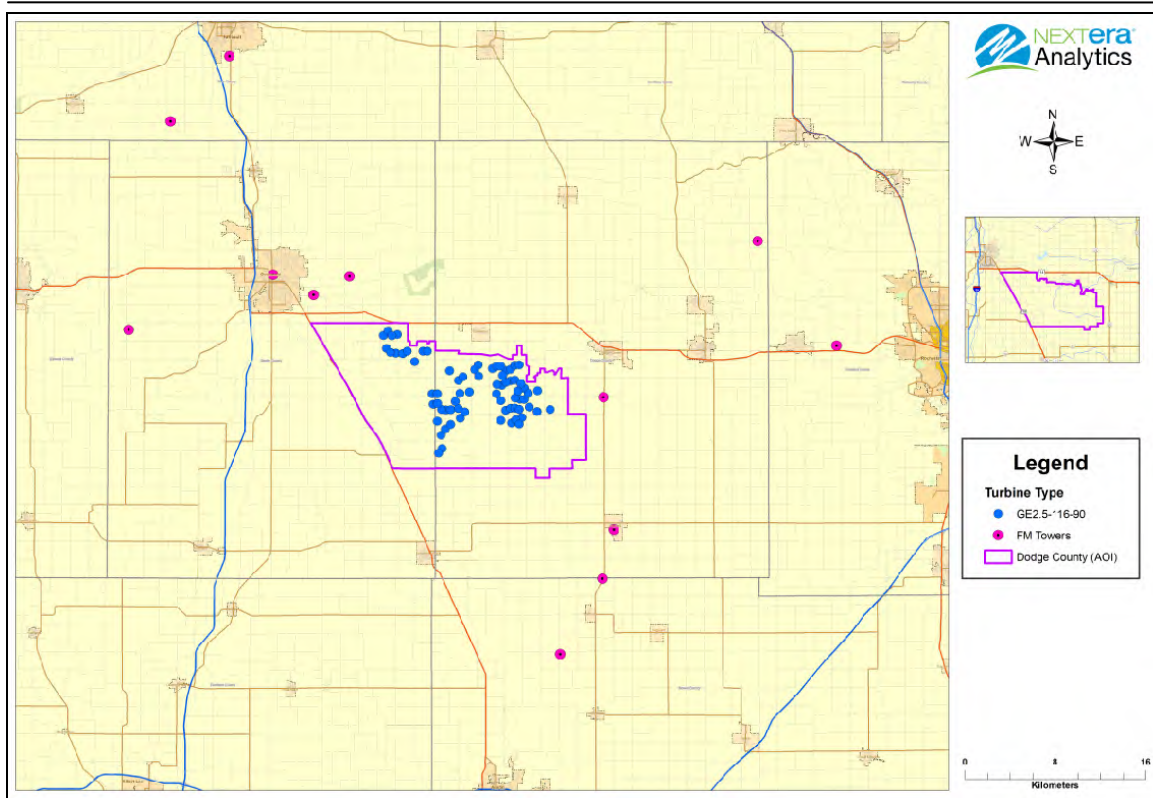


Figure 9: FM Transmitter Towers within 25 km of the Project Boundary

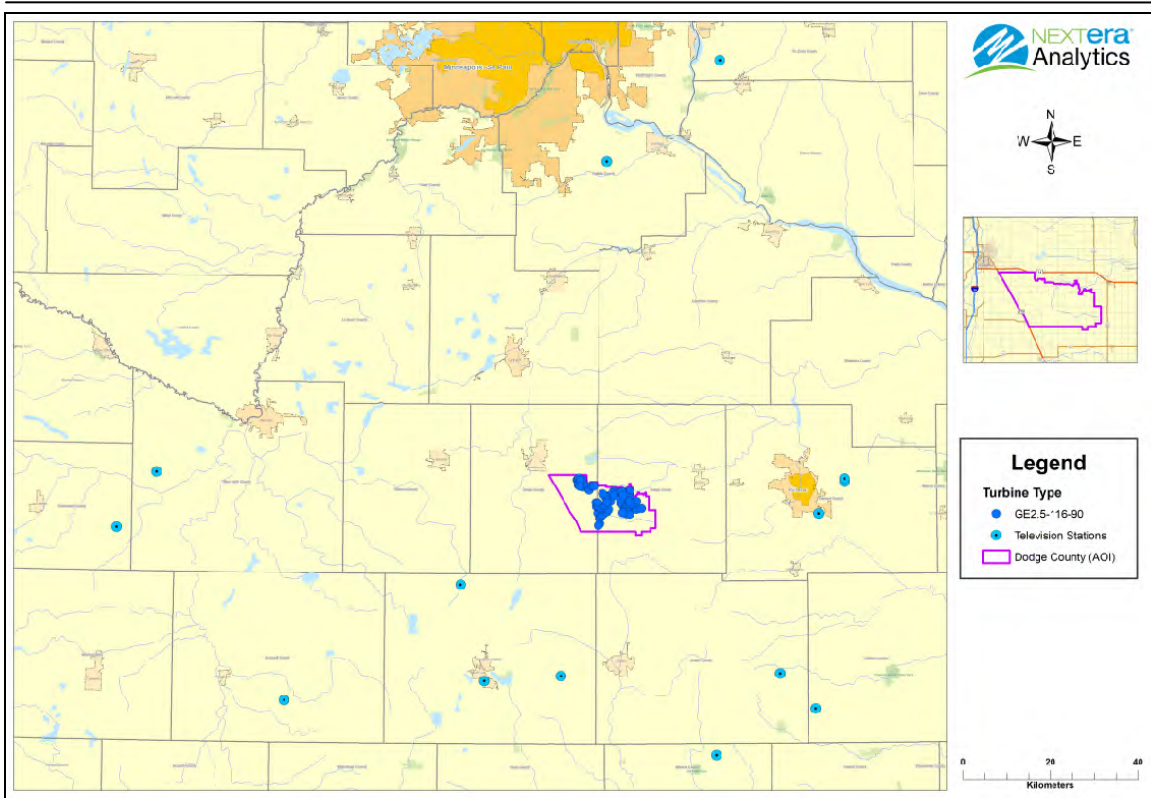
## Television Stations

No digital or analog television stations were identified within the project boundary. Table 6 and figure 10 identifies licensed television stations within 100 km of the project boundary as determined by the FCC. There are 14 stations less than 50 km from the project boundary which are likely to be broadcasting to the region.

Electromagnetic Interference

ID	CALLSIGN	LICENSEE	SERVICE	CHANNEL	ERP (kW)	Latitude	Longitude	DISTANCE TO AOI(km)
1	K48KJ-D	THREE ANGELS BROADCASTING NETWORK, INC.	LD	48	1.5	43.82532	-93.43253	29.90
2	DK43DH	TELEVIEW SYSTEMS OF MINNESOTA	TX	43	1.47	43.63832	-93.14712	33.32
3	DK53DI	TELEVIEW SYSTEMS OF MINNESOTA	TX	53	1.47	43.63832	-93.14712	33.32
4	DK55FJ	TELEVIEW SYSTEMS OF MINNESOTA	TX	55	1.47	43.63832	-93.14712	33.32
5	DK57EU	TELEVIEW SYSTEMS OF MINNESOTA	TX	57	1.47	43.63832	-93.14712	33.32
6	DK61EU	TELEVIEW SYSTEMS OF MINNESOTA	TX	61	1.47	43.63832	-93.14712	33.32
7	K52HH	MS COMMUNICATIONS, LLC	TX	52	0.004	43.97112	-92.41520	37.24
8	K40JT	TRINITY BROADCASTING NETWORK	TX	40	10.7	43.62782	-93.36383	40.59
9	K25NK-D	THREE ANGELS BROADCASTING NETWORK, INC.	LD	25	15	44.03556	-92.3406	43.66
10	K56HW	TRINITY BROADCASTING NETWORK	TX	56	75	44.04222	-92.340794	43.75
11	K58GC	THREE ANGELS BROADCASTING NETWORK, INC.	TX	58	29	44.04222	-92.34079	43.75
12	KSMQ-TV	KSMQ PUBLIC SERVICE MEDIA, INC.	DT	20	319.2	43.64282	-92.52660	43.78
13	KAAL	KAAL-TV, LLC	DT	36	620	43.64278	-92.5267	43.78
14	KXLT-TV	SAGAMOREHILL OF MINNESOTA LICENSES, LLC	DT	46	220	43.64278	-92.5267	43.78
15	KIMT	NVT MASON CITY LICENSEE, LLC	DT	42	800	43.47562	-92.70831	53.12
16	KYIN	IOWA PUBLIC BROADCASTING BOARD	DT	18	533	43.47562	-92.708305	53.12
17	KTTC	KTTC LICENSE, LLC	DT	10	43.1	43.57083	-92.4272	55.08
18	KWJM-LD	DTV AMERICA CORPORATION	LD	15	6	44.69528	-93.0183	71.67
19	KILW-LD	DTV AMERICA CORPORATION	LD	28	6	44.69528	-93.0183	71.67
20	KMQV-LD	DTV AMERICA CORPORATION	LD	49	6	44.69528	-93.0181	71.67
21	DK34JZ-D	SOUTH CENTRAL ELECTRIC ASSOCIATION	LD	34	0.17	43.58582	-93.929648	77.83
22	K14KD-D	SOUTH CENTRAL ELECTRIC ASSOCIATION	LD	14	3	43.58582	-93.92965	77.83
23	K23FY-D	COOPERATIVE TELEVISION ASSOCIATION OF SOUTHERN MINNESOTA	LD	23	3	43.58582	-93.92965	77.83
24	K27FI-D	SOUTH CENTRAL ELECTRIC ASSOCIATION	LD	27	3	43.58582	-93.929648	77.83
25	K29IF-D	BLUE EARTH-NICOLLET-FARIBAULT COOP ELECTRIC ASSN	LD	29	3.1	43.58582	-93.929648	77.83
26	K31EF-D	SOUTH CENTRAL ELECTRIC ASSOCIATION	LD	31	3	43.58582	-93.929648	77.83
27	K35IU-D	SOUTH CENTRAL ELECTRIC ASSOCIATION	LD	35	3	43.58582	-93.929648	77.83
28	K40JS-D	BLUE EARTH-NICOLLET FARIBAULT COOPERATIVE ELECTRIC ASSN.	LD	40	3	43.58582	-93.929648	77.83
29	K49JG-D	BLUE EARTH-NICOLLET FARIBAULT COOPERATIVE ELECTRIC ASSN.	LD	49	3	43.58582	-93.929648	77.83
30	K51KB-D	SOUTH CENTRAL ELECTRIC ASSOCIATION	LD	51	3	43.58582	-93.92965	77.83
31	K21KF-D	COOPERATIVE TELEVISION ASSOCIATION OF SOUTHERN MINNESOTA	LD	21	3	43.58583	-93.9297	77.84
32	K47MI-D	COOPERATIVE TELEVISION ASSOCIATION OF SOUTHERN MINNESOTA	LD	47	3	43.58583	-93.9297	77.84
33	K43JE-D	THREE ANGELS BROADCASTING NETWORK, INC.	LD	43	10.82	44.05152	-94.29996	89.50
34	W47CO-D	STATE OF WISCONSIN - EDUCATIONAL COMMUNICATIONS BOARD	LD	47	1.6	44.90282	-92.69131	98.76
35	KEYC-TV	UNITED COMMUNICATIONS CORPORATION	DT	12	52.7	43.93694	-94.4108	99.30

Table 6: Television Stations within 100 km of the Project Boundary



**Figure 10: Television Stations within 100 km of the Project Boundary**

While the impact of wind turbines on digital television reception is not well known due to limited cases and testing, any interference is expected to be limited to areas near the edge of station reception, areas near a turbine that is within the line-of-sight between the transmit tower and receptor, and areas of complex topography (OfCom, 2009). Most of the stations within 100km are low power stations or translator stations and have limited range and are not anticipated to experience reception degradation. There are seven full power stations KXLT-TV, KSMQ-TV, KAAL, KIMT, KYIN, KEYC-TV, and KTTC which have a possibility of experiencing reception degradation if the proposed wind farm is located in the line-of-sight.

It is important to note that this assessment is based on broad assumptions, as it is difficult to accurately pinpoint the impact a large wind farm may have on each individual household due to a large number of external variables (topography, weather, antennae, etc.) which affect the propagation of the television radio signal.



## Aviation Towers

No active Aviation towers were identified within the project boundary. Ten aviation towers were discovered within 25 km of the project boundary and are included in Table 7 and figure 11.

While no harmful interference is expected for the aviation towers; Dodge County Wind is subject to a Federal Aviation Agency (FAA) to determine any exclusion zones. Proposed turbine locations will maintain the standard appropriate offset distances in addition to any setbacks set by the agency to minimize harmful impact.

ID	STATUS	CALLSIGN	LICENSEE	SERVICE	LATITUDE	LONGITUDE	DISTANCE TO AOI(km)
1	Active	WGE2	MINNESOTA, STATE OF	AF Aeronautical and Fixed	44.02025	-92.82960	5.72
2	Active	WRLB2051	MINNESOTA, STATE OF	AR Aviation Radionavigation	44.07389	-93.15560	2.47
3	Active	WRLA2017	MINNESOTA, STATE OF	AR Aviation Radionavigation	44.07389	-93.12190	2.46
4	Active	WRLG2026	MINNESOTA, STATE OF	AR Aviation Radionavigation	44.11969	-93.25580	9.55
5	Active	WPZQ973	Owatonna, City of	AF Aeronautical and Fixed	44.12136	-93.25020	9.44
6	Active	WJZ8	MINNESOTA, STATE OF	AF Aeronautical and Fixed	44.12139	-93.25030	9.44
7	Active	WRL2041	MINNESOTA, STATE OF	AR Aviation Radionavigation	44.12914	-93.27270	11.22
8	Active	WQSR490	Minnesota, State of MNDOT Aeronautics	AR Aviation Radionavigation	44.12975	-93.27190	11.23
9	Active	WRLO2040	MINNESOTA, STATE OF	AR Aviation Radionavigation	44.20442	-93.37050	22.66
10	Active	WRNV2064	MINNESOTA, STATE OF	AR Aviation Radionavigation	44.20444	-93.37060	22.67

**Table 7: Aviation Towers within 25 km of the Project Boundary**

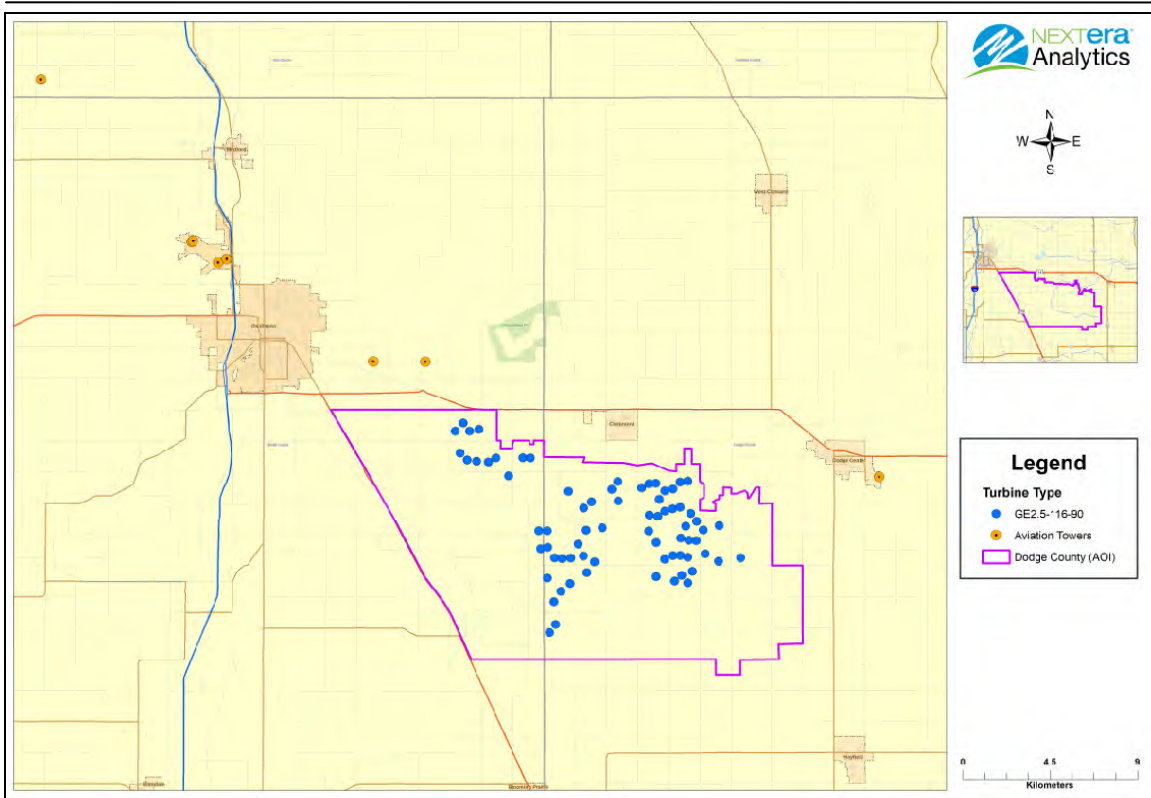


Figure 11: Aviation Towers within 25 km of the Project Boundary

## **Conclusion and Recommendations**

NextEra Analytics analyzed the potential for wind turbine interference on licensed microwave links located within the proposed Dodge County Wind Project energy generation site. This report summarizes the microwave towers, microwave links, cellular towers, media towers, television towers, and aviation towers within and near the project boundary.

Ten microwave links were found to intersect the project boundary, and an appropriate offset to the WCFZ has been utilized to mitigate harmful interference from the proposed turbine layout. No interference from the proposed turbine layout is expected near microwave, AM, FM, cellular, aviation, and TV towers. This analysis is current as of June 28, 2018. NextEra Analytics recommends a refresh of this analysis if the proposed wind energy generation project has not been constructed after two years.

It is important to note that this report only provides analysis for licensed radio towers and links found within the FCC-ULS database. Many local municipalities (police, fire, etc.) do not license microwave links, NextEra Analytics recommends Dodge County Wind LLC coordinate with the appropriate local municipality officials. Also not included within the database are microwave towers and links

utilized by the Federal government (Dept. of Defense, Dept. of Commerce, etc.), again for public safety concerns. A Federal communications study by the National Telecommunications and Information Agency (NTIA) has been conducted stating no harmful interference is expected in the project area.

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