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Environmental Noise Study

For

Southwest Anthony Henday Drive in Edmonton, AB

Prepared for:

ISL Engineering and Land Services Ltd.

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Executive Summary

aci Acoustical Consultants Inc., of Edmonton AB, was retained by ISL Engineering a Land Services Ltd. (ISL) to conduct an environmental noise assessment for the Southwest section of Anthony Henday Drive (SWAHD) in Edmonton, Alberta. The purpose of the work was to conduct 24-hour environmental noise monitorings at various locations adjacent to the roadway and generate a computer noise model with current and future traffic conditions and compare the results to the Alberta Transportation noise guidelines. The information contained within this report details the results of the 24-hour noise monitorings conducted at 15 locations along SWAHD and provides a comparison to the results obtained from noise monitorings conducted in 2007[1], 2013[2], & 2016[3] at the same locations. The data was also to be used as a calibration tool for a computer noise model of the study area. The site work was conducted for aci from May to August, 2017 by S. Bilawchuk, M.Sc., P.Eng.

Noise Monitoring

The noise monitoring results indicated an increase in the L_{eq}24 noise levels from 2007 to 2013 ranging from +1.6 to +6.8 dBA at all locations. The relative increases were logical given the various factors that changed from 2007 to 2013, including:

- Increase in traffic volumes ranging from 2x to 3x;
- Increased posted speed limit from 90 km/hr (with 70 km/hr zones) to 100 km/hr throughout;
- Modifications to the road surface (i.e. milling of concrete and re-paving of some asphalt sections);
- Additional lanes between Lessard Road and Whitemud Drive; and
- Changes to existing interchanges, additions of new interchanges.

In addition, the results from the 2013 noise monitoring indicated that the noise level contributions associated with the concrete surface are essentially identical to those associated with the asphalt surface.

The noise monitoring results indicate a change in the L_{eq}24 noise levels from 2013 to 2017 ranging from -0.9 to +4.1 dBA. For locations with small changes (i.e. less than 2.0 dBA), the differences are largely

[1] Data available in the report entitled *"Environmental Noise Survey and Computer Modeling for Southwest Anthony Henday Drive in Edmonton, Alberta"*, prepared for UMA Engineering Ltd., by aci Acoustical Consultants Inc., October 2007

[2] Data available in the report entitled *"Environmental Noise Study for Southwest Anthony Henday Drive in Edmonton, Alberta"*, prepared for AECOM, by aci Acoustical Consultants Inc., December, 2013.

[3] Data available in the report entitled *"Environmental Noise Study for Southwest Anthony Henday Drive at Wedgewood Heights Residential Neighborhood in Edmonton, Alberta"*, prepared for ISL, by aci Acoustical Consultants Inc., December, 2016.

due to small variations in environmental conditions (i.e. wind speed and wind direction) as well differences in foliage conditions between the specific 2013 and 2017 noise monitoring periods. For locations with larger changes (i.e. greater than 2.0 dBA), the differences are likely due to the environmental and foliage conditions along with changes in traffic volumes on nearby roads

The 1/3 octave band frequency data show the typical trend of low frequency noise (near 63 – 80 Hz) resulting from engines and exhaust, as well as mid-high frequency noise (near 1,000 Hz) resulting from tire noise.

Noise Modeling

The noise modeling results for Current Conditions matched well with the noise measurement results. The Current modeled noise levels were below the limit of 65 dBA L_{eq}24 at all of the residential outdoor receptor locations.

The noise modeling results for the Future Conditions (with projected traffic volumes for the Year 2027) indicated noise levels which were still below the limit of 65 dBA L_{eq}24 at all but two locations. The locations are adjacent to a condominium/apartment complex which currently only has a chainlink fence adjacent to the TUC.

A sensitivity analysis of the future traffic volumes, traffic speeds, and % heavy trucks on SWAHD indicated that significant individual increases to each parameter or significant increases to all three combined, would result in a few additional locations with noise levels at or above 65 dBA L_{eq}24. These include the following:

- Receptors to the southeast and southwest of the interchange at SWAHD and Whitemud Drive. These receptors currently have no solid fences to act as noise barriers;
- Receptors to the west of SWAHD and in between Whitemud Drive and Callingwood Road. These receptors currently have no solid fences to act as noise barriers;
- Receptors southwest of the interchange at SWAHD and Calgary Trail at which Calgary Trail and the associated interchange ramps are the dominant noise sources.

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1.0 Introduction

aci Acoustical Consultants Inc., of Edmonton AB, was retained by ISL Engineering a Land Services Ltd. (ISL) to conduct an environmental noise assessment for the Southwest section of Anthony Henday Drive (SWAHD) in Edmonton, Alberta. The purpose of the work was to conduct 24-hour environmental noise monitorings at various locations adjacent to the roadway and generate a computer noise model with current and future traffic conditions and compare the results to the Alberta Transportation noise guidelines. The information contained within this report details the results of the 24-hour noise monitorings conducted at 15 locations along SWAHD and provides a comparison to the results obtained from noise monitorings conducted in 2007[1], 2013[2], & 2016[3] at the same locations. The data was also to be used as a calibration tool for a computer noise model of the study area. The site work was conducted for aci from May to August, 2017 by S. Bilawchuk, M.Sc., P.Eng.

2.0 Location Description

2.1. Roadways

The study area for SWAHD spans from south of Stony Plain Road in the northwest end of the City to Calgary Trail / Gateway Boulevard in the southeast end of the City, as indicated in Figures 1a - 1e. Throughout the entire span (approximately 20 km), SWAHD is a twinned road with at least 2-lanes in each direction. From Stony Plain Road to Lessard Road, the road surface is comprised of conventional asphalt pavement (ACP). Starting at Lessard Road, the material used is Portland Cement Concrete Pavement (PCCP). This concrete has a screeded surface with the grooves oriented parallel to the direction of traffic flow. With the exception of the bridges (with asphalt surfaces) along the way, the road surface is PCCP until the interchange at Calgary Trail / Gateway Boulevard. The posted speed limit throughout is 100 km/hr. Currently, there are grade separated interchanges at the following locations:

- Stony Plain Road
- 87 Avenue
- Whitemud Drive
- Callingwood Road / 62 Avenue
- Lessard Road

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[2] Data available in the report entitled *"Environmental Noise Study for Southwest Anthony Henday Drive in Edmonton, Alberta"*, prepared for AECOM, by aci Acoustical Consultants Inc., December, 2013.

[3] Data available in the report entitled *"Environmental Noise Study for Southwest Anthony Henday Drive at Wedgewood Heights Residential Neighborhood in Edmonton, Alberta"*, prepared for ISL, by aci Acoustical Consultants Inc., December, 2016.

- Cameron Heights Drive
- Terwillegar Drive (1st Stage completed)
- 156 Street / Rabbit Hill Road
- 111 Street
- Calgary Trail / Gateway Boulevard

Currently, there is limited (right-turn only) access between SWAHD and 127 Street and between SWAHD and 119 Street.

For the future case noise modeling scenario the following interchanges have been upgraded to their final design or added as new locations:

- Terwillegar Drive (completion of 2nd Stage interchange by adding second bridge structure and realignment of roadways)
- 127 Street (new grade separated interchange)

2.2. Adjacent Development

Starting from the northwest portion of the study area, the adjacent development between Stony Plain Road and Lessard Road consists largely of single family detached residential development on both sides of SWAHD which back directly onto the Transportation and Utility Corridor (TUC) and SWAHD. There is multi-family development with 4-storey buildings, large individual commercial structures such as churches and commercial shopping developments interspersed on the east and west sides of SWAHD. A majority of the residential areas that back onto SWAHD have direct line-of-sight to SWAHD (over top of the fences) due to a relatively flat topography in between the houses and SWAHD. Relative to the 2013 study, there is additional single family residential development to the southwest of the interchange between Stony Plain Road and SWAHD as well as some new 4-storey multi-family developments adjacent to SWAHD to the north of Lessard Road and a small semi-detached residential development to the northeast of the interchange between Lessard Road and SWAHD.

South of Lessard Road and west of SWAHD is recent residential development as well as open field with small acreage style residential lots further to the southwest. Northeast of SWAHD is single family detached residential development which backs directly onto the TUC and the roadway, extending to the east side of Cameron Heights Drive. Further east is the North Saskatchewan River Valley. Some portions of the residential development south of Lessard Road (east of SWAHD) have direct line-of-sight to SWAHD (over top of the fences), while other portions do not because of the topography and trees in between. For residents in Cameron Heights, west of Cameron Heights Drive, there is a masonry noise wall which has been constructed at the rear property line for those who back onto SWAHD. Thus, these residents do not have direct line-of-sight from their backyards to SWAHD. East of Cameron Heights drive, there is a 1.83 m (6 ft) solid screen wood fence as well as some significant earth berms resulting from the interchange ramps. Thus, most of the residential receptors do not have direct line-of-sight to SWAHD.

Single family detached residential development backing onto the TUC and SWAHD, on both sides of SWAHD, continue on the east/south side of the River Valley. Due to the topography and vegetation, residential areas on the west side of SWAHD and those further north on the east side of SWAHD do not have direct line-of-sight to SWAHD. Furth south (closer to Terwillegar Drive), the residents on the east and west sides of SWAHD have direct line-of-sight to the interchange between Terwillegar Drive and SWAHD.

East of Terwillegar Drive and north of SWAHD is residential development comprised of single family detached houses and multi-family condominium 4-storey structures which back onto the TUC and SWAHD. The majority of these developments have direct line-of-sight to SWAHD (over top of the fences). To the south/west of SWAHD and south of Terwillegar Drive is commercial development with large "box" stores. There is a small portion of single family detached residential development to the east of the commercial development and further residential development further to the south. There is also a single acreage-style residential location west of 156 Street and south of SWAHD. All of these areas have direct line-of-sight to SWAHD (over top of fences). Relative to the 2013 study, there is additional multi-family and single family detached residential development north and south of SWAHD in between Terwillegar Drive and Rabbit Hill Road as well as additional commercial development to the south of SWAHD.

East of Rabbit Hill Road and north of SWAHD is residential development comprised of single family detached houses. Immediately east of Rabbit Hill Road, the development backs directly onto the TUC and SWAHD with direct line-of-sight (over top of fences). Further east, the residential development is limited to the north of the Whitemud Creek Ravine which is further north of the TUC boundary. Most of these locations do not have direct line-of-sight to SWAHD due to the topography and vegetation. South of SWAHD and east of Rabbit Hill Road is industrial development operated by the City of Edmonton including a transit maintenance facility, a winter snow storage facility, and an ECO waste and recycling station. Further east is the University of Alberta south farm area. Relative to the 2013 study, there is additional 4-storey multi-family residential development to the north of SWAHD and to the east of Rabbit Hill Road as well as new single-family detached residential development to the south of SWAHD, south of Ellerslie Road and east of 141 Street SW.

Between 127 Street and Calgary Trail / Gateway Boulevard the adjacent development consists largely of single family detached residential development on both sides of SWAHD which back directly onto the TUC and SWAHD. There are also some developments of multi-family structures with 4-storey buildings. Most of the residential areas have direct line-of-sight to SWAHD (over top of fences) while some portions do not have line-of-sight due to topographical features and vegetation in between.

2.3. Topography

Topographically, the land surrounding the SWAHD between Stony Plain Road and Lessard Road is generally flat with only small hills between the roadway and the residential structures. The ground is covered with field grasses and small patches of trees and bushes. South of Lessard Road, is the Wedgewood Ravine which is a small ravine filled with tall trees and bushes. This provides a moderate level of sound absorption for the houses nearby. Further to the southeast, within the River Valley, the road reduces in elevation where it crosses the river with two separate bridges then increases in elevation on the southeast side. Within this area, the ground is covered with trees, bushes, and field grasses.

Beyond the River Valley to the southeast, the land is generally flat and covered with field grasses and small patches of trees and bushes. This continues until the Whitemud Creek Ravine, which is again a small ravine filled with trees and bushes. Further east, the land is again generally flat and covered with field grasses until the Blackmud Creek Ravine where there is a small band of trees and bushes. Beyond this continuing east, the land is flat and covered with field grasses until the interchange at Calgary Trail / Gateway Boulevard.

Relative to the study in 2013, the only significant topographical change is in the area near noise monitor location M08 (refer to Figure 1c). A recent ATCO Pipelines project resulted in the construction of a large earth berm to the south of the residential areas north/east of SWAHD and west of Terwillegar Drive. This updated earth berm has been incorporated into the noise modeling results.

3.0 Measurement & Modeling Methods

3.1. Environmental Noise Monitoring

As part of the study a total of fifteen (15) 24-hour environmental noise monitorings were conducted throughout the study area. The noise monitoring locations, as indicated in Figures 1a - 1e, were selected based on their proximity to SWAHD and adjacent interchanges as well as adjacent residential receptors. Twelve locations were identical to those used in 2007, one location was identical to the second Wedgewood Heights location from 2016, and two locations were added to the 2017 study to include newer residential areas. Note also that two previous locations (M09, M10) were not repeated for the 2017 study because of their proximity to the roadway and because the 2013 results indicated essentially no difference in the noise levels between the concrete and asphalt surfaces. Instead, the two new nearby locations were added adjacent to residential receptors. A detailed description of each location is provided below. The measurements were conducted collecting broadband A-weighted as well as 1/3-octave band sound levels. This enabled a detailed analysis of the noise climate. The noise monitorings were conducted on weekdays under "typical" traffic conditions. In particular, measurements avoided any holidays, major construction activity that would re-route traffic nearby, and other occurrences which would affect the normal traffic on the road. In addition, the monitorings were conducted in summer-like conditions (i.e. no snow cover) with dry road surfaces, no precipitation, and low wind-speeds. The monitorings were accompanied by a 24-hour digital audio recording for more detailed post process analysis. Finally, a portable weather monitor was used within the area to obtain local weather conditions. Refer to Appendix I for a detailed description of the measurement equipment used, Appendix II for a description of the acoustical terminology, and Appendix III for a list of common noise sources. All noise measurement instrumentation was calibrated at the start of each measurement and then checked afterwards to ensure that there had been negligible calibration drift over the duration of the measurement period.

Noise Monitor M01

Noise Monitor M01 was located approximately 400 m north of 87 Avenue and 440 m east of SWAHD (northbound lanes) as shown in Figure 1a and Figure 2. This put the noise monitor approximately 15 m west of the rear property line for the residence at 9004–190 Street. At this location, there was direct line-of-sight to SWAHD, 87 Avenue, and the interchange between the two. The 2007 noise monitor was started at 08:00 on Monday May 14, 2007 and ran for 24-hours until 08:00 on Tuesday May 15, 2007. The 2013 noise monitor was started at 03:00 on Tuesday September 10, 2013 and ran for 24-hours until 03:00 on Wednesday, September 11, 2013. The 2017 noise monitor ran for 24-hours from 12:30 on Monday August 14, 2017 to 12:30 on Tuesday August 15, 2017.

Noise Monitor M02

Noise Monitor M02 was located approximately 165 m north of Whitemud Drive and 400 m west of SWAHD (southbound lanes) as shown in Figure 1a and Figure 3. This put the noise monitor approximately 3 m southeast of the rear property line for the residence at 348 Pearson Crescent (Lewis Estates). At this location, there was direct line-of-sight to SWAHD, Whitemud Drive, and the interchange between the two. The 2007 noise monitor was started at 08:30 on Monday May 14, 2007 and ran for 24-hours until 08:30 on Tuesday May 15, 2007. The 2013 noise monitor was started at 04:00 on Wednesday October 23, 2013 and ran for 24-hours until 04:00 on Thursday October 24, 2013. The 2017 noise monitor ran for 24-hours from 10:00 on Wednesday June 07, 2017 to 10:00 on Thursday June 08, 2017.

Noise Monitor M03

Noise Monitor M03 was located approximately 300 m south of Whitemud Drive and 400 m east of SWAHD (northbound lanes) as shown in Figure 1b and Figure 4. This put the noise monitor on top of a small hill approximately 50 m west of the residence at 7419–190A Street (across the street). At this location, there was direct line-of-sight to SWAHD, and the interchange between SWAHD and Whitemud Drive as well as partial line-of-sight to Whitemud Drive. The 2007 noise monitor was started at 09:00 on Monday May 14, 2007 and ran for 24-hours until 09:00 on Tuesday May 15, 2007. The 2013 noise monitor was started at 03:00 on Tuesday September 10, 2013 and ran for 24-hours until 03:00 on Wednesday, September 11, 2013. The 2017 noise monitor ran for 24-hours from 23:00 on Monday June 12, 2017 to 23:00 on Tuesday June 13, 2017.

Noise Monitor M04

Noise Monitor M04 was located approximately 550 m north of 62 Avenue and 240 m east of SWAHD (northbound lanes) as shown in Figure 1b and Figure 5. This put the noise monitor adjacent to the TUC fence and approximately 7 m west of the rear fence of the residence at 1255 Ormsby Lane. At this location, there was direct line-of-sight to SWAHD. The 2007 noise monitor was started at 09:30 on Monday May 14, 2007 and ran for 24-hours until 09:30 on Tuesday May 15, 2007. The 2013 noise monitor was started at 03:00 on Tuesday September 10, 2013 and ran for 24-hours until 03:00 on Wednesday, September 11, 2013. The 2017 noise monitor ran for 24-hours from 13:00 on Monday August 14, 2017 to 13:00 on Tuesday August 15, 2017.

Noise Monitor M05

Noise Monitor M05 was located approximately 400 m north of Lessard Road and 225 m east of SWAHD (northbound lanes) as shown in Figure 1b and Figure 6. This put the noise monitor approximately 10 m west of the rear fence of the residence at 19055–49 Avenue. At this location, there was direct line-of-sight to SWAHD and partial line-of-sight to Lessard Road. The 2007 noise monitor was started at 10:00 on Monday May 14, 2007 and ran for 24-hours until 10:00 on Tuesday May 15, 2007. The 2013 noise monitor was started at 18:00 on Wednesday August 14, 2013 and ran for 24-hours until 18:00 on Thursday August 15, 2013. The 2017 noise monitor ran for 24-hours from 20:30 on Monday July 24, 2017 to 20:30 on Tuesday July 25, 2017.

Noise Monitor M06

Noise Monitor M06 was located approximately 810 m south of Lessard Road and 100 m northeast of (perpendicular to) SWAHD (northbound lanes) as shown in Figure 1c and Figure 7. This put the noise monitor approximately 40 m west of the rear fence of the residence at 1644 Welbourn Cove (Wedgewood Heights). At this location, there was partial line-of-sight to SWAHD through a row of trees. The 2007 noise monitor was started at 11:00 on Tuesday May 15, 2007 and ran for 24-hours until 11:00 on Wednesday May 16, 2007. The 2013 noise monitor was started at 06:00 on Tuesday August 13, 2013 and ran for 24-hours until 06:00 on Wednesday August 14, 2013. The 2016 noise monitor was started at 12:30 on Thursday September 29, 2016 and ran for approximately 2-weeks until 09:20 on Thursday, October 13, 2016. The assessment data used was from 12:00 on October 11, 2016 until 12:00 on October 12, 2016. This is the time period with the highest sustained noise levels associated with vehicle traffic on SWAHD without being contaminated by high winds. The 2017 noise monitor was started at 17:00 on Wednesday May 03, 2017 and ran for approximately 2-weeks until 10:00 on Tuesday May 16, 2017. The assessment data used was from 16:00 on May 03, 2017 until 16:00 on May 04, 2017. This is the time period with the highest sustained noise levels associated with vehicle traffic on SWAHD without being contaminated by high winds.

Noise Monitor M6b

Noise Monitor M6b was placed in the backyard at the residence at 1664 Welbourn Cove. The noise monitor was located approximately mid-yard (north-south) at 2 m from the rear property line and with the microphone at a height of 1.2 m as per the Alberta Transportation noise criteria. This placed the noise monitor approximately 890 m south of Lessard Road and 150 m from SWAHD (northbound lanes) as shown in Figure 1c and Figure 8. At this location, there was no line-of-sight to SWAHD due to the trees and topography. The 2016 noise monitor was started at 13:30 on Thursday September 29, 2016 and ran for approximately 2-weeks until 10:45 on Thursday, October 13, 2016. The assessment data used was from 12:00 on October 11, 2016 until 12:00 on October 12, 2016. This is the time period with the highest sustained noise levels associated with vehicle traffic on SWAHD without being contaminated by high winds. The 2017 noise monitor was started at 17:00 on Wednesday May 03, 2017 and ran for approximately 2-weeks until 10:00 on Tuesday May 16, 2017. The assessment data used was from 16:00 on May 03, 2017 until 16:00 on May 04, 2017. This is the time period with the highest sustained noise levels associated with vehicle traffic on SWAHD without being contaminated by high winds.

Noise Monitor M07

Noise Monitor M07 was located approximately 370 m west of Cameron Heights Drive and 50 m north of (perpendicular to) SWAHD (northbound lanes) as shown in Figure 1c and Figure 9. This put the noise monitor approximately 12 m south of the rear fence of the residence at 151 Caldwell Way (Cameron Heights). At this location, there was direct line-of-sight to SWAHD. The 2007 noise monitor was started at 12:00 on Tuesday May 15, 2007 and ran for 24-hours until 12:00 on Wednesday May 16, 2007. The 2013 noise monitor was started at 06:00 on Tuesday August 13, 2013 and ran for 24-hours until 06:00 on Wednesday August 14, 2013. The 2017 noise monitor ran for 24-hours from 06:00 on Tuesday June 06, 2017 to 06:00 on Wednesday June 07, 2017.

Noise Monitor M08

Noise Monitor M08 was located approximately 800 m north of Terwillegar Drive and 240 m northeast of (perpendicular to) SWAHD (northbound lanes) as shown as shown in Figure 1c and Figure 10. This put the noise monitor approximately 5 m west of the rear fence-line of the residence at 1622 Haswell Court (Haddow). At this location, there was no line-of-sight to SWAHD due to the small hill/berm to the west of the noise monitor. The 2007 noise monitor was started at 12:30 on Tuesday May 15, 2007 and ran for 24-hours until 12:30 on Wednesday May 16, 2007. The 2013 noise monitor was started at 00:00 on Wednesday October 30, 2013 and ran for 24-hours until 00:00 on Thursday October 31, 2013. The 2017 noise monitor ran for 24-hours from 13:00 on Wednesday August 16, 2017 to 13:00 on Thursday August 17, 2017.

Noise Monitor M11

Noise Monitor M11 was located approximately 200 m north of SWAHD (westbound lanes) and 900 m west of 111 Street, as shown in Figure 1d and Figure 11. This put the noise monitor approximately 8 m south of the rear fence-line of the residence at 803 – 115A Street (Twin Brooks). At this location, there was direct line-of-sight to SWAHD with just a small hill/berm to the south of the noise monitor (negligible effect on the sound propagation between SWAHD and the monitor). The 2007 noise monitor was started at 11:00 on Wednesday May 30, 2007 and ran for 24-hours until 11:00 on Thursday May 31, 2007. The 2013 noise monitor was started at 06:00 on Tuesday August 13, 2013 and ran for 24-hours until 06:00 on Wednesday August 14, 2013. The 2017 noise monitor ran for 24-hours from 06:00 on Tuesday June 06, 2017 to 06:00 on Wednesday June 07, 2017.

Noise Monitor M12

Noise Monitor M12 was located approximately 240 m south of SWAHD (eastbound lanes) and 160 m west of 111 Street, as shown in Figure 1d and Figure 12. This put the noise monitor approximately 50 m north of the multi-family building on MacEwan Road. At this location, there was direct line-of-sight to SWAHD (west of the on-ramp), to 111 Street, and to the ramp from SWAHD eastbound to 111 Street. The 2007 noise monitor was started at 13:30 on Thursday May 31, 2007 and ran for 24-hours until 13:30 on Friday June 1, 2007. The 2013 noise monitor was started at 10:00 on Wednesday August 28, 2013 and ran for 24-hours until 10:00 on Thursday August 29, 2013. The 2017 noise monitor ran for 24-hours from 02:00 on Tuesday June 13, 2017 to 02:00 on Wednesday June 14, 2017.

Noise Monitor M13

Noise Monitor M13 was located approximately 550 m south of AHD (eastbound lanes) and 90 m west of Calgary Trail, as shown in Figure 1e and Figure 13. This put the noise monitor directly adjacent to the rear fence-line of the residence at 363 Blackburn Drive East. The noise monitor was elevated approximately 0.2 m above the fence height to eliminate reflections. At this location, there was direct line-of-sight to Calgary Trail but none to SWAHD due to the topography associated with the interchange. The 2007 noise monitor was started at 11:30 on Wednesday May 30, 2007 and ran for 24-hours until 11:30 on Thursday May 31, 2007. The 2013 noise monitor was started at 10:00 on Wednesday August 28, 2013 and ran for 24-hours until 10:00 on Thursday August 29, 2013. The 2017 noise monitor ran for 24-hours from 07:00 on Tuesday August 8, 2017 to 07:00 on Wednesday August 9, 2017.

Noise Monitor M14

Noise Monitor M14 was located approximately 320 m north of SWAHD (eastbound lanes) and 340 m west of Calgary Trail, as shown in Figure 1e and Figure 14. This put the noise monitor approximately 8.0 m south of the rear fence-line of the residence at 10459 – 105 Street. At this location, there was direct line-of-sight to Calgary Trail, to the interchange, and to sections of SWAHD east of the interchange. The 2007 noise monitor was started at 12:00 on Wednesday May 30, 2007 and ran for 24-hours until 12:00 on Thursday May 31, 2007. The 2013 noise monitor was started at 06:00 on Tuesday August 13, 2013 and ran for 24-hours until 06:00 on Wednesday August 14, 2013. The 2017 noise monitor ran for 24-hours from 06:00 on Tuesday June 06, 2017 to 06:00 on Wednesday June 07, 2017.

Noise Monitor M15

Noise Monitor M15 was located approximately 260 m northeast of SWAHD (westbound lanes) and 625 m south of Terwillegar Road, as shown in Figure 1d and Figure 15. This put the noise monitor at the barb-wire TUC fence approximately 10 m west of the fence at the west corner of the west building at Axxess Apartments at 930 – 156 Street, NW. At this location, there was direct line-of-sight to SWAHD and to the interchange ramps with Terwillegar Drive. The noise monitor ran for 24-hours from 14:30 on Wednesday August 16, 2017 to 14:30 on Thursday August 17, 2017.

Noise Monitor M16

Noise Monitor M16 was located approximately 275 m north of SWAHD (westbound lanes) and 530 m east of Rabbit Hill Road, as shown in Figure 1d and Figure 16. This put the noise monitor approximately 2 m south of the fence at the southwest corner of the Mactaggart Place Apartments/Condos at 5868 Mullen Place, NW. At this location, there was direct line-of-sight to SWAHD in the southwest direction and to Rabbit Hill Road. There was not direct line-of-sight to SWAHD to the southeast due to the topography. The noise monitor ran for 24-hours from 10:00 on Tuesday June 06, 2017 to 10:00 on Wednesday June 07, 2017.

3.2. Computer Noise Modeling

The computer noise modeling was conducted using the CADNA/A (Build 159.4707) software package. CADNA/A allows for the modeling of various noise sources such as road, rail, and various stationary sources. In addition, topographical features such as land contours, vegetation, and bodies of water can be included. Finally, meteorological conditions such as temperature, relative humidity, wind-speed and wind-direction can be included in the calculations.

The default calculation method for traffic noise in CADNA/A follows the German Standard RLS-90. It is aci's experience that this calculation method is accurate under the conditions present for this study, with a tendency to slightly over-predict potential noise levels (i.e. resulting in conservative values). The calculation method used for noise propagation follows the ISO standard 9613-2. All receiver locations were assumed as being downwind from the source(s). In particular, as stated in Section 5 of the ISO document:

> *"Downwind propagation conditions for the method specified in this part of IS0 9613 are as specified in 5.4.3.3 of IS0 1996-2:1987, namely*
> - *wind direction within an angle of ± 45^0 of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region, with the wind blowing from source to receiver, and*
> - *wind speed between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground.*
>
> *The equations for calculating the average downwind sound pressure level LAT(DW) in this part of IS0 9613, including the equations for attenuation given in clause 7, are the average for meteorological conditions within these limits. The term average here means the average over a short time interval, as defined in 3.1.*
> *These equations also hold, equivalently, for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights".*

Throughout the study area, the ground was given an absorption coefficient of 0.5. Field grasses were added where appropriate to match existing conditions in addition to providing a calibration of the modeled results compared to the measured results at the various noise monitoring locations. Therefore, all sound level propagation calculations are considered conservatively representative of summertime conditions for all surrounding residents.

Note that not every commercial building and house in the area was modeled. Only the first row of buildings (in relation to the major roadways) were included, since these are the ones which will have the highest sound levels and will result in the greatest impact and level of shielding for structures further in.

As part of the study, various scenarios were modeled including:

1) Current conditions: This included existing road configurations and traffic volumes present during the noise monitoring (2017). The noise monitoring data was used as a calibration method for the model.
2) Future conditions: This included road configurations and interchanges with projected traffic volumes for the year 2027.
3) Future conditions (as in Item #2) with a sensitivity analysis: This involved modification of various traffic parameters (listed below) to determine their effect on noise levels.
    a. Traffic counts
    b. Traffic speeds
    c. Traffic composition (i.e. % heavy vehicles)
    d. All of (a), (b), and (c) combined

The computer noise modeling results were calculated in two ways. First, sound levels were calculated at specific receiver locations. This included the noise monitor locations as well as numerous representative residential locations. Next, the sound levels were calculated using a 5 m x 5 m grid over the entire study area for the Current and Future conditions. This provided color noise contours for easier visualization of the results.

Refer to Appendix IV for a list of the computer noise modeling parameters. In addition, it is important to note that, relative to the 2013 noise model, some of the noise receptors in the 2017 noise have changed location and some new receptors have been added. This reflects new and updated residential developments. A full list of the receptors which have changed location and have been added is also provided in Appendix IV.

4.0 Permissible Sound Levels

Environmental noise levels from road traffic are commonly described in terms of equivalent sound levels or L_{eq}. This is the level of a steady sound having the same acoustic energy, over a given time period, as the fluctuating sound. In addition, this energy averaged level is A–weighted to account for the reduced sensitivity of average human hearing to low frequency sounds. These L_{eq} in dBA, which are the most common environmental noise measure, are often given for day-time (07:00 to 22:00) L_{eq}Day and night-time (22:00 to 07:00) L_{eq}Night while other criteria use the entire 24-hour period as L_{eq}24.

The criterion used to evaluate the road noise in the study area is based on the document entitled *"Noise Attenuation Guidelines for Provincial Highways Under Provincial Jurisdiction Within Cities and Urban Areas"* by Alberta Transportation. The document specifies:

> "*For construction or improvements of highways through cities and other urban areas, Alberta Transportation will adopt a noise level of 65 dBA L_{eq}24 measured 1.2 m above ground level and 2 meters inside the property line (outside the highway right-of-way). The measurements should be adjusted to the 10-year planning horizon, as a threshold to consider noise mitigation measures*"

As such, the criterion used to assess the noise levels in the computer noise model will be **65 dBA L_{eq}24** for all current dwellings at a height of 1.2 m above grade. For typical residential lots that back or "side" onto the provincial roadway, the assessment will be taken at 2 m inside the residential property line in the back-yard amenity space. For typical residential lots that "front" onto the provincial highway, noise levels will be assessed at 2 m inside the residential property line in the front yard.

5.0 Noise Monitoring Results

5.1. Noise Monitor Results

The results obtained from the environmental noise monitorings are shown in Table 1 and in Figures 17 – 47 (broadband A-weighted L_{eq} sound levels and 1/3 octave band L_{eq} sound levels provided). It should be noted that the data have been adjusted by the removal of non-typical noise events such as loud aircraft flyovers (the noise modeling does not account for aircraft), human activity, dogs making noise nearby, etc. Refer to Appendix V for a detailed list the adjusted data.

At all locations, the resultant 1/3 octave band L_{eq} sound levels were very similar. All locations show the typical trend of low frequency noise (near 63 – 80 Hz) resulting from engines and exhaust, as well as mid-high frequency noise (near 1,000 Hz) resulting from tire noise. These results confirm that the noise levels being measured by the noise monitors were largely attributed to SWAHD in addition to the other major roadways. Some locations also show elevated peaks near 5 - 8 kHz which are related to bird chirping or crickets nearby. Subjectively, there were some locations at which the adjacent City of Edmonton roads were the dominant noise sources due to the relative distances from the noise monitor to the City roads and to SWAHD.

Table 1 shows the data obtained during the 2017, 2013, and 2007 noise monitoring periods as well as the relative difference between the 2007 to 2013 and the 2013 to 2017 noise monitoring periods for all noise monitoring locations. The results for all three noise monitoring periods are also provided in the 1/3-octave band L_{eq} sound levels in Figures 17 – 47

Table 1. 2017 and Historical Noise Monitoring Results[1]

Monitor	2007 $L_{eq}24$ (dBA)	2013 $L_{eq}24$ (dBA)	2013 - 2007 $L_{eq}24$ Difference (dBA)		2017 $L_{eq}24$ (dBA)	2017 - 2013 $L_{eq}24$ Difference (dBA)
M01	53.5	59.8	6.3		59.1	-0.7
M02	54.9	60.6	5.7		60.6	0.0
M03	53.0	59.4	6.4		58.5	-0.9
M04	56.6	62.0	5.5		62.8	0.8
M05	55.5	59.4	3.9		62.3	2.9
M06	57.2	60.5	3.3		62.8	2.3
M6b	-	-	-		57.2	-
M07	65.7	70.6	4.9		71.0	0.4
M08	52.1	55.6	3.5		54.8	-0.8
M11	56.4	58.0	1.6		59.5	1.4
M12	50.7	57.5	6.8		60.4	2.9
M13	60.7	63.7	3.0		65.6	1.9
M14	55.3	57.1	1.8		61.1	4.1
M15	-	-	-		59.3	-
M16	-	-	-		58.6	-

The noise monitoring results indicate an increase in the $L_{eq}24$ noise levels from 2007 to 2013 ranging from +1.6 to +6.8 dBA. The relative increases are logical given the various factors that changed from 2007 to 2013, including:

- Increase in traffic volumes ranging from 2x to 3x;
- Increased posted speed limit from 90 km/hr (with 70 km/hr zones) to 100 km/hr throughout;
- Modifications to the road surface (i.e. milling of concrete and re-paving of some asphalt sections);
- Additional lanes between Lessard Road and Whitemud Drive; and
- Changes to existing interchanges, additions of new interchanges.

The noise monitoring results indicate a change in the $L_{eq}24$ noise levels from 2013 to 2017 ranging from -0.9 to +4.1 dBA. For locations with small changes (i.e. less than 2.0 dBA), the differences are largely due to small variations in environmental conditions (i.e. wind speed and wind direction) as well differences in foliage conditions between the specific 2013 and 2017 noise monitoring periods. For locations with

[1] With the exception of Noise Monitor M06B, the noise levels measured at any of the noise monitor locations cannot be directly compared to the Alberta Transportation criteria because the noise monitors were located within the TUC and not within a residential backyard. This is particularly true for noise monitor M07 which was located very near the roadway and the adjacent residents have a large noise wall resulting in much lower noise levels in the backyards relative to adjacent to the roadway.

larger changes (i.e. greater than 2.0 dBA), the differences are likely due to the environmental and foliage conditions along with changes in traffic volumes on nearby roads

In addition to the data presented in Table 1 with the noise monitoring results for all locations spanning from 2007 to 2017, Table 2 presents the results of the noise monitoring conducted within the Wedgewood Heights residential area in September 2016 and in May 2017.

Table 2. 2017 and 2016 Wedgewood Heights Noise Monitoring Results

Monitor	September 2016 L_{eq}24 (dBA)	May 2017 L_{eq}24 (dBA)	2016 - 2017 L_{eq}24 Difference (dBA)
M06	63.6	62.8	-0.8
M6b	58.4	57.2	-1.3

The results indicate lower noise levels in 2017, compared to 2016 ranging from -0.8 to -1.3 dBA. These differences in sound levels are largely the result of the foliage conditions from Fall 2016 (no leaves on the trees) to Spring 2017 (leaves starting to bud) along with small differences in environmental conditions.

5.2. Weather Conditions

The weather conditions for noise monitors M01 & M04 (August 14 – 15, 2017) had a windspeed ranging from 5 – 20 km/hr from the northwest and west for the entire time.

The weather conditions for noise monitor M02 (June 07 – 08, 2017) had a windspeed ranging from 10 – 20 km/hr from the south and southeast for the entire time.

The weather conditions for noise monitor M03 (June 12 – 13, 2017) had a windspeed ranging from 0 – 20 km/hr from the northwest, north, and northeast for the entire time.

The weather conditions for noise monitor M05 (July 24 – 25, 2017) had a windspeed ranging from 5 – 15 km/hr from the west and southwest for the entire time.

The weather conditions for noise monitors M06 & M06b (May 03 – 04, 2017) had a windspeed ranging from 0 – 10 km/hr from the south and southwest for the entire time. During the September 2016 noise monitoring period had light wind from the west/southwest/south throughout.

The weather conditions for noise monitors M07, M11, M14, & M16 (June 06 – 07, 2017) had a windspeed ranging from 5 – 20 km/hr from the south and southeast for the entire time.

The weather conditions for noise monitor M08 & M15 (August 16 – 17, 2017) had a windspeed ranging from 5 – 20 km/hr from the west for the entire time.

The weather conditions for noise monitor M12 (June 13 – 14, 2017) had a windspeed ranging from 0 – 20 km/hr from the northwest, north, and northeast for the entire time.

The weather conditions for noise monitor M13 (August 08 – 09, 2017) had a windspeed ranging from 0 – 10 km/hr from the south and southeast for the entire time.

The wind conditions were favourable from the adjacent sections of SWAHD towards the noise monitors.

Weather data for the duration of the environmental noise monitorings is presented in Appendix VI.

6.0 Noise Modelling Results

6.1. Current Conditions

The results of the noise modeling under current conditions at the noise monitoring locations are presented in Table 3. The monitored and modeled L_{eq}24 sound levels are presented as well as the relative difference at each location. The differences ranged between 0.0 to 0.9 dBA which is very accurate. In addition, the noise modeling results at all locations were either the same or slightly greater than the monitoring results, which is conservative.

Table 3. Noise Modeling Results Under Current Conditions at Monitor Locations

Monitor	Monitored L_{eq}24 (dBA)	Modeled L_{eq}24 (dBA)	Difference L_{eq}24 (dBA)
M1	59.1	59.2	0.1
M2	60.6	61.2	0.6
M3	58.5	59.4	0.9
M4	62.8	62.8	0.0
M5	62.3	62.4	0.1
M6	62.8	63.0	0.2
M6b	57.2	58.1	0.9
M7	71.0	71.0	0.0
M8	54.8	55.0	0.2
M11	59.5	59.6	0.1
M12	60.4	60.4	0.0
M13	65.6	65.7	0.1
M14	61.1	61.2	0.1
M15	59.3	59.6	0.3
M16	58.6	58.9	0.3

The results of the Current Conditions noise modeling at the various residential property locations are presented in Tables 4a - 4h. The study area was divided into 8 separate sections, with roadway interchanges generally as the dividers for each section. In addition to the information presented in Tables 4a - 4h, the L_{eq}24 color noise contours for the entire study area are shown in Figures 48a – 48i. The color contours provide a very good representation of where the "hot" spots are (in terms of elevated noise levels) and the relative contribution from each of the nearby roadways for the various receptor locations. In the event of a discrepancy between the results indicated in the color contours and the Tables, the Tables will be considered as correct because the calculation locations in the Tables are at exact coordinates while the color contours are calculated on a 5m x 5m grid and the results elsewhere are interpolated.

The current noise levels at residential property locations are under the limit of 65 dBA L_{eq}24 at all locations.

Table 4a. Noise Modeling Results With Current Conditions for Region 1

Receptor	L_{eq}24 (dBA)		Receptor	L_{eq}24 (dBA)
R_001	58.3		R_027	62.2
R_002	58.8		R_028	61.8
R_003	57.9		R_029	61.8
R_004	57.3		R_030	56.5
R_005	60.0		R_031	55.9
R_006	57.1		R_032	55.3
R_007	56.3		R_033	57.7
R_008	59.1		R_034	56.9
R_009	59.2		R_035	55.9
R_010	59.0		R_036	55.4
R_011	58.9		R_037	55.4
R_012	58.8		R_038	55.2
R_013	58.9		R_039	58.6
R_014	58.9		R_040	58.4
R_015	57.7		R_041	59.8
R_016	57.0		R_042	58.3
R_017	57.5		R_043	57.5
R_018	60.5		R_044	59.6
R_019	59.4		R_045	58.4
R_020	59.3		R_046	58.2
R_021	59.3		R_047	58.2
R_022	59.4		R_048	58.4
R_023	59.6		R_049	58.2
R_024	59.9		R_050	58.2
R_025	60.4		R_051	58.5
R_026	61.2		R_052	58.6

Table 4b. Noise Modeling Results With Current Conditions for Region 2

Receptor	$L_{eq}24$ (dBA)		Receptor	$L_{eq}24$ (dBA)
R_053	57.2		R_087	58.8
R_054	56.6		R_088	58.8
R_055	58.8		R_089	59.4
R_056	58.9		R_090	62.5
R_057	59.1		R_091	63.4
R_058	57.8		R_092	63.8
R_059	58.4		R_093	59.9
R_060	59.5		R_094	57.9
R_061	60.3		R_095	58.5
R_062	61.2		R_096	58.2
R_063	61.7		R_097	58.3
R_064	62.0		R_098	64.1
R_065	62.2		R_099	64.4
R_066	61.0		R_100	58.9
R_067	59.2		R_101	59.0
R_068	59.2		R_102	59.1
R_069	58.5		R_103	58.8
R_070	59.0		R_104	58.4
R_071	59.9		R_105	59.3
R_072	59.2		R_106	61.3
R_073	59.9		R_107	61.8
R_074	59.9		R_108	62.1
R_075	59.4		R_109	57.5
R_076	59.1		R_110	58.4
R_077	59.5		R_111	57.7
R_078	58.8		R_112	57.2
R_079	59.7		R_113	54.9
R_080	58.4		R_114	57.8
R_081	55.3		R_115	54.5
R_082	60.0		R_116	57.3
R_083	58.2		R_117	57.2
R_084	58.6		R_118	57.9
R_085	58.1		R_119	58.7
R_086	58.9			

Table 4c. Noise Modeling Results With Current Conditions for Region 3

Receptor	$L_{eq}24$ (dBA)
R_120	58.7
R_121	56.1
R_122	56.3
R_123	56.8
R_124	57.2
R_125	57.7
R_126	57.9
R_127	58.4
R_128	58.9
R_129	59.7
R_130	58.6
R_131	59.0
R_132	59.1
R_133	59.2
R_134	59.3
R_135	59.3
R_136	59.3
R_137	60.8
R_138	61.0
R_139	59.0
R_140	57.9
R_141	57.1
R_142	56.6
R_143	56.8
R_144	58.8
R_145	59.4
R_146	60.8
R_147	60.7
R_148	60.5
R_149	58.6
R_150	57.1
R_151	59.4
R_152	61.5
R_153	61.0
R_154	61.9
R_155	62.2
R_156	61.2
R_157	57.5
R_158	57.1
R_159	56.7
R_160	58.4
R_161	55.3
R_162	55.6
R_163	58.7
R_164	58.7
R_165	55.6

Table 4d. Noise Modeling Results With Current Conditions for Region 4

Receptor	L_{eq}24 (dBA)		Receptor	L_{eq}24 (dBA)
R_166	57.7		R_194	56.7
R_167	58.6		R_195	57.2
R_168	57.9		R_196	57.6
R_169	55.7		R_197	56.4
R_170	55.4		R_198	57.0
R_171	55.4		R_199	50.8
R_172	56.0		R_200	53.0
R_173	56.3		R_201	58.6
R_174	56.9		R_202	55.8
R_175	57.6		R_203	53.5
R_176	57.5		R_204	54.7
R_177	60.1		R_205	53.2
R_178	60.4		R_206	53.7
R_179	59.2		R_207	54.2
R_180	58.1		R_208	53.3
R_181	58.6		R_209	51.4
R_182	55.7		R_210	49.4
R_183	54.2		Region4-A	56.4
R_184	56.7		Region4-B	56.4
R_185	58.5		Region4-C	56.3
R_186	55.9		Region4-D	56.2
R_187	55.6		Region4-E	56.1
R_188	56.3		Region4-F	55.7
R_189	55.8		Region4-G	55.4
R_190	56.6		Region4-H	53.4
R_191	56.6		Region4-I	53.1
R_192	57.1		Region4-J	53.1
R_193	57.0		Region4-K	53.9

Table 4e. Noise Modeling Results With Current Conditions for Region 5

Receptor	$L_{eq}24$ (dBA)		Receptor	$L_{eq}24$ (dBA)
R_211	51.5		R_243	55.3
R_212	50.6		R_244	56.3
R_213	49.6		R_245	55.9
R_214	50.4		R_246	56.3
R_215	50.6		R_247	56.0
R_216	53.0		R_248	55.3
R_217	53.0		R_249	58.3
R_218	54.2		R_250	51.3
R_219	55.8		R_251	53.4
R_220	55.6		R_252	54.8
R_221	55.7		R_253	53.7
R_222	54.8		R_254	53.4
R_223	54.0		R_255	53.0
R_224	53.5		R_256	53.1
R_225	52.4		R_257	53.5
R_226	54.3		R_258	53.7
R_227	53.6		R_259	53.9
R_228	53.6		R_260	54.2
R_229	53.7		R_261	54.6
R_230	53.8		R_262	55.0
R_231	54.1		R_263	55.3
R_232	54.1		R_264	55.3
R_233	54.5		R_265	55.0
R_234	54.2		R_266	55.0
R_235	54.5		R_267	55.6
R_236	54.9		R_268	56.7
R_237	52.5		R_269	59.0
R_238	53.5		R_270	60.7
R_239	53.4		R_271	60.6
R_240	53.0		R_272	58.5
R_241	52.9		R_273	58.9
R_242	53.2			

Table 4f. Noise Modeling Results With Current Conditions for Region 6

Receptor	$L_{eq}24$ (dBA)		Receptor	$L_{eq}24$ (dBA)
R_274	59.8		R_307	56.9
R_275	59.8		R_308	61.2
R_276	58.7		R_309	58.7
R_277	57.8		R_310	58.0
R_278	57.0		R_311	56.5
R_279	55.1		R_312	55.6
R_280	54.6		R_313	55.4
R_281	53.5		R_314	55.5
R_282	53.6		R_315	56.3
R_283	54.5		R_316	55.9
R_284	55.8		R_317	55.5
R_285	57.0		R_318	52.2
R_286	58.6		R_319	47.5
R_287	57.7		R_320	54.5
R_288	58.9		R_321	54.0
R_289	59.0		R_322	52.4
R_290	59.2		R_323	52.3
R_291	59.1		R_324	51.6
R_292	58.4		R_325	52.3
R_293	58.4		R_326	51.3
R_294	58.1		R_327	51.4
R_295	58.4		R_328	51.8
R_296	56.6		R_329	53.4
R_297	56.2		R_330	52.7
R_298	55.8		R_331	51.9
R_299	55.5		Region6-A	58.0
R_300	55.5		Region6-B	58.1
R_301	55.9		Region6-C	57.6
R_302	60.8		Region6-D	57.5
R_303	58.2		Region6-E	57.2
R_304	59.3		Region6-F	56.1
R_305	59.1		Region6-G	57.3
R_306	58.1		Region6-H	57.6

Table 4g. Noise Modeling Results With Current Conditions for Region 7

Receptor	$L_{eq}24$ (dBA)		Receptor	$L_{eq}24$ (dBA)
R_332	52.5		R_363	58.4
R_333	53.5		R_364	58.9
R_334	53.3		R_365	53.1
R_335	57.4		R_366	53.8
R_336	57.3		R_367	55.9
R_337	55.6		R_368	55.6
R_338	54.5		R_369	57.2
R_339	56.7		R_370	57.2
R_340	55.8		R_371	58.5
R_341	55.6		R_372	56.1
R_342	55.9		R_373	57.1
R_343	56.0		R_374	57.6
R_344	55.7		R_375	58.1
R_345	55.2		R_376	58.4
R_346	55.9		R_377	59.1
R_347	55.4		R_378	57.2
R_348	55.3		R_379	58.1
R_349	56.0		R_380	55.4
R_350	55.8		R_381	56.9
R_351	56.2		R_382	57.7
R_352	55.6		R_383	57.3
R_353	55.1		R_384	56.2
R_354	56.4		R_385	57.2
R_355	57.0		R_386	55.4
R_356	57.4		R_387	55.1
R_357	56.4		R_388	55.6
R_358	56.2		R_389	56.3
R_359	55.6		R_390	58.8
R_360	56.1		R_391	60.4
R_361	56.8		R_392	60.6
R_362	57.5			

Table 4h. Noise Modeling Results With Current Conditions for Region 8

Receptor	$L_{eq}24$ (dBA)		Receptor	$L_{eq}24$ (dBA)
R_393	56.8		R_427	59.1
R_394	56.1		R_428	56.2
R_395	54.7		R_429	57.6
R_396	54.7		R_430	57.3
R_397	55.6		R_431	57.7
R_398	56.0		R_432	57.5
R_399	53.5		R_433	57.5
R_400	53.4		R_434	58.1
R_401	49.9		R_435	57.9
R_402	49.2		R_436	58.1
R_403	49.5		R_437	57.4
R_404	50.9		R_438	56.5
R_405	54.1		R_439	56.9
R_406	54.2		R_440	56.6
R_407	54.5		R_441	56.9
R_408	56.0		R_442	57.6
R_409	56.7		R_443	57.9
R_410	56.5		R_444	58.2
R_411	56.9		R_445	58.6
R_412	58.0		R_446	60.5
R_413	58.4		R_447	61.8
R_414	59.1		R_448	62.5
R_415	59.3		R_449	63.0
R_416	59.9		R_450	63.6
R_417	59.8		R_451	64.1
R_418	58.5		R_452	64.3
R_419	57.9		R_453	60.3
R_420	55.6		R_454	61.1
R_421	54.4		R_455	61.9
R_422	53.1		R_456	63.4
R_423	56.0		R_457	63.0
R_424	57.1		R_458	62.2
R_425	56.2		R_459	61.5
R_426	58.3			

6.2. Future Conditions

The results of the noise modeling under future conditions (Year 2027) at the residential receptor locations are presented in Tables 5a - 5h and shown in Figures 49a – 49i. The L_{eq}24, L_{eq}Day and L_{eq}Night sound levels are presented in the Tables along with the relative increase in the L_{eq}24 compared to current conditions. As with the Current Conditions, in the event of a discrepancy between the results indicated in the color contours and the Tables, the Tables will be considered as correct. Below each Table is a summary discussion of the results for that particular Region.

Table 5a. Noise Modeling Results With Future Conditions for Region 1

Receptor	L_{eq}24 (dBA)	L_{eq}24 Increase Relative to Current Conditions (dBA)		Receptor	L_{eq}24 (dBA)	L_{eq}24 Increase Relative to Current Conditions (dBA)
R_001	59.2	0.9		R_027	63.5	1.3
R_002	59.6	0.8		R_028	63.2	1.4
R_003	58.7	0.8		R_029	63.4	1.6
R_004	58.1	0.8		R_030	57.2	0.7
R_005	60.7	0.7		R_031	56.6	0.7
R_006	57.8	0.7		R_032	56.0	0.7
R_007	57.0	0.7		R_033	58.4	0.7
R_008	59.8	0.7		R_034	57.5	0.6
R_009	59.8	0.6		R_035	56.5	0.6
R_010	59.6	0.6		R_036	56.0	0.6
R_011	59.6	0.7		R_037	55.9	0.5
R_012	59.5	0.7		R_038	55.7	0.5
R_013	59.5	0.6		R_039	58.0	-0.6
R_014	59.5	0.6		R_040	58.8	0.4
R_015	58.3	0.6		R_041	60.2	0.4
R_016	57.5	0.5		R_042	58.9	0.6
R_017	57.8	0.3		R_043	58.1	0.6
R_018	59.8	-0.7		R_044	60.3	0.7
R_019	59.8	0.4		R_045	59.2	0.8
R_020	59.9	0.6		R_046	59.1	0.9
R_021	59.9	0.6		R_047	59.2	1.0
R_022	60.1	0.7		R_048	59.5	1.1
R_023	60.4	0.8		R_049	59.5	1.3
R_024	60.7	0.8		R_050	59.7	1.5
R_025	61.3	0.9		R_051	60.2	1.7
R_026	62.2	1.0		R_052	60.5	1.9

The Future Conditions noise modeling for Region 1 indicated noise levels below 65 dBA L_{eq}24 at all locations. The decreases/increases relative to the Current Conditions for Region 1 ranged from -0.7 to +1.9 dBA which were due to the projected decreases/increases in traffic volumes on SWAHD and adjacent City Roads.

Table 5b. Noise Modeling Results With Future Conditions for Region 2

Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)		Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)
R_053	58.6	1.4		R_087	60.1	1.3
R_054	57.9	1.3		R_088	59.9	1.1
R_055	59.8	1.0		R_089	60.4	1.0
R_056	59.9	1.0		R_090	63.5	1.0
R_057	60.0	0.9		R_091	64.4	1.0
R_058	58.7	0.9		R_092	64.7	0.9
R_059	59.3	0.9		R_093	60.6	0.7
R_060	60.3	0.8		R_094	58.5	0.6
R_061	61.1	0.8		R_095	59.2	0.7
R_062	62.1	0.9		R_096	58.9	0.7
R_063	62.5	0.8		R_097	59.0	0.7
R_064	62.8	0.8		R_098	65.0	0.9
R_065	63.0	0.8		R_099	65.2	0.8
R_066	61.8	0.8		R_100	59.7	0.8
R_067	60.0	0.8		R_101	59.7	0.7
R_068	59.9	0.7		R_102	59.9	0.8
R_069	59.3	0.8		R_103	59.6	0.8
R_070	59.8	0.8		R_104	59.1	0.7
R_071	60.7	0.8		R_105	59.9	0.6
R_072	59.9	0.7		R_106	62.1	0.8
R_073	60.7	0.8		R_107	62.6	0.8
R_074	60.7	0.8		R_108	62.9	0.8
R_075	60.1	0.7		R_109	58.2	0.7
R_076	59.9	0.8		R_110	59.2	0.8
R_077	60.2	0.7		R_111	58.4	0.7
R_078	59.5	0.7		R_112	57.7	0.5
R_079	60.4	0.7		R_113	55.5	0.6
R_080	59.0	0.6		R_114	58.4	0.6
R_081	55.8	0.5		R_115	55.1	0.6
R_082	60.0	0.0		R_116	58.0	0.7
R_083	60.2	2.0		R_117	57.8	0.6
R_084	60.4	1.8		R_118	58.6	0.7
R_085	59.7	1.6		R_119	59.3	0.6
R_086	60.3	1.4				

The Future Conditions noise modeling for Region 2 indicated noise levels below 65 dBA $L_{eq}24$ at all locations but two locations. The increases relative to the Current Conditions for Region 2 ranged from +0.0 to +2.0 dBA which were due to the projected increases in traffic volumes on SWAHD and adjacent City Roads. The two locations with noise levels at or above 65 dBA Leq24 are at an adjacent condominium/apartment complex which currently only has a chainlink fence adjacent to the TUC.

Table 5c. Noise Modeling Results With Future Conditions for Region 3

Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)
R_120	58.9	0.2
R_121	56.5	0.4
R_122	56.9	0.6
R_123	57.3	0.5
R_124	57.7	0.5
R_125	58.2	0.5
R_126	58.4	0.5
R_127	58.9	0.5
R_128	59.4	0.5
R_129	60.2	0.5
R_130	59.0	0.4
R_131	59.5	0.5
R_132	59.5	0.4
R_133	59.7	0.5
R_134	59.8	0.5
R_135	59.8	0.5
R_136	59.7	0.4
R_137	61.3	0.5
R_138	61.1	0.1
R_139	59.6	0.6
R_140	58.4	0.5
R_141	57.6	0.5
R_142	57.1	0.5
R_143	57.3	0.5
R_144	59.3	0.5
R_145	59.9	0.5
R_146	61.2	0.4
R_147	61.1	0.4
R_148	60.8	0.3
R_149	59.1	0.5
R_150	57.6	0.5
R_151	59.8	0.4
R_152	62.0	0.5
R_153	61.5	0.5
R_154	62.4	0.5
R_155	62.8	0.6
R_156	61.7	0.5
R_157	57.9	0.4
R_158	57.4	0.3
R_159	57.2	0.5
R_160	58.9	0.5
R_161	55.7	0.4
R_162	56.1	0.5
R_163	59.3	0.6
R_164	59.3	0.6
R_165	56.0	0.4

The Future Conditions noise modeling for Region 3 indicated noise levels below 65 dBA $L_{eq}24$ at all locations. The increases relative to the Current Conditions for Region 3 ranged from +0.1 to +0.6 dBA which were due to the projected increases in traffic volumes on SWAHD and adjacent City Roads.

Table 5d. Noise Modeling Results With Future Conditions for Region 4

Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)		Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)
R_166	56.9	-0.8		R_194	57.5	0.8
R_167	57.9	-0.7		R_195	58.0	0.8
R_168	57.2	-0.7		R_196	58.4	0.8
R_169	56.0	0.3		R_197	57.2	0.8
R_170	55.9	0.5		R_198	57.8	0.8
R_171	55.9	0.5		R_199	52.0	1.2
R_172	56.6	0.6		R_200	55.1	2.1
R_173	56.9	0.6		R_201	61.7	3.1
R_174	57.5	0.6		R_202	57.5	1.7
R_175	58.2	0.6		R_203	55.0	1.5
R_176	58.1	0.6		R_204	56.2	1.5
R_177	60.7	0.6		R_205	54.6	1.4
R_178	61.1	0.7		R_206	54.9	1.2
R_179	59.8	0.6		R_207	55.2	1.0
R_180	58.7	0.6		R_208	54.3	1.0
R_181	59.2	0.6		R_209	52.3	0.9
R_182	56.4	0.7		R_210	50.2	0.8
R_183	54.8	0.6		Region4-A	57.0	0.6
R_184	57.4	0.7		Region4-B	57.0	0.6
R_185	59.1	0.6		Region4-C	56.9	0.6
R_186	56.6	0.7		Region4-D	56.8	0.6
R_187	56.3	0.7		Region4-E	56.7	0.6
R_188	57.0	0.7		Region4-F	56.3	0.6
R_189	56.5	0.7		Region4-G	56.0	0.6
R_190	57.3	0.7		Region4-H	54.0	0.6
R_191	57.3	0.7		Region4-I	53.7	0.6
R_192	57.9	0.8		Region4-J	53.7	0.6
R_193	57.8	0.8		Region4-K	54.6	0.7

The Future Conditions noise modeling for Region 4 indicated noise levels below 65 dBA $L_{eq}24$ at all locations. The decreases/increases relative to the Current Conditions for Region 4 ranged from -0.8 to +3.1 dBA which were due to the projected decreases/increases in traffic volumes on SWAHD and adjacent City Roads.

Table 5e. Noise Modeling Results With Future Conditions for Region 5

Receptor	L_{eq}24 (dBA)	L_{eq}24 Increase Relative to Current Conditions (dBA)		Receptor	L_{eq}24 (dBA)	L_{eq}24 Increase Relative to Current Conditions (dBA)
R_211	52.2	0.7		R_243	56.0	0.7
R_212	51.3	0.7		R_244	57.0	0.7
R_213	50.3	0.7		R_245	56.7	0.8
R_214	51.0	0.6		R_246	57.2	0.9
R_215	51.2	0.6		R_247	57.0	1.0
R_216	53.7	0.7		R_248	56.3	1.0
R_217	53.7	0.7		R_249	59.4	1.1
R_218	54.9	0.7		R_250	51.8	0.5
R_219	56.5	0.7		R_251	54.0	0.6
R_220	56.3	0.7		R_252	55.4	0.6
R_221	56.4	0.7		R_253	54.2	0.5
R_222	55.5	0.7		R_254	54.0	0.6
R_223	54.7	0.7		R_255	53.6	0.6
R_224	54.2	0.7		R_256	53.7	0.6
R_225	53.0	0.6		R_257	54.1	0.6
R_226	55.0	0.7		R_258	54.2	0.5
R_227	54.2	0.6		R_259	54.4	0.5
R_228	54.3	0.7		R_260	54.7	0.5
R_229	54.4	0.7		R_261	55.1	0.5
R_230	54.5	0.7		R_262	55.6	0.6
R_231	54.7	0.6		R_263	55.8	0.5
R_232	54.7	0.6		R_264	55.8	0.5
R_233	55.1	0.6		R_265	55.4	0.4
R_234	54.8	0.6		R_266	55.2	0.2
R_235	55.2	0.7		R_267	55.8	0.2
R_236	55.5	0.6		R_268	56.6	-0.1
R_237	52.9	0.4		R_269	58.6	-0.4
R_238	54.1	0.6		R_270	59.9	-0.8
R_239	54.1	0.7		R_271	59.7	-0.9
R_240	53.6	0.6		R_272	57.8	-0.7
R_241	53.6	0.7		R_273	58.2	-0.7
R_242	53.9	0.7				

The Future Conditions noise modeling for Region 5 indicated noise levels below 65 dBA L_{eq}24 at all locations. The decreases/increases relative to the Current Conditions for Region 5 ranged from -0.9 to +1.1 dBA which were due to the projected decreases/increases in traffic volumes on SWAHD and adjacent City Roads.

Table 5f. Noise Modeling Results With Future Conditions for Region 6

Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)		Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)
R_274	61.3	1.5		R_307	57.4	0.5
R_275	61.6	1.8		R_308	62.4	1.2
R_276	60.5	1.8		R_309	59.7	1.0
R_277	59.5	1.7		R_310	58.8	0.8
R_278	58.7	1.7		R_311	57.3	0.8
R_279	56.5	1.4		R_312	56.3	0.7
R_280	56.0	1.4		R_313	56.0	0.6
R_281	55.0	1.5		R_314	56.1	0.6
R_282	54.9	1.3		R_315	56.8	0.5
R_283	56.0	1.5		R_316	56.5	0.6
R_284	57.0	1.2		R_317	56.1	0.6
R_285	57.8	0.8		R_318	52.6	0.4
R_286	59.2	0.6		R_319	48.0	0.5
R_287	58.2	0.5		R_320	55.1	0.6
R_288	59.3	0.4		R_321	54.6	0.6
R_289	59.4	0.4		R_322	53.0	0.6
R_290	59.5	0.3		R_323	52.9	0.6
R_291	59.5	0.4		R_324	52.2	0.6
R_292	58.8	0.4		R_325	52.8	0.5
R_293	58.9	0.5		R_326	51.9	0.6
R_294	58.6	0.5		R_327	52.0	0.6
R_295	58.8	0.4		R_328	52.3	0.5
R_296	57.2	0.6		R_329	53.9	0.5
R_297	56.7	0.5		R_330	53.2	0.5
R_298	56.4	0.6		R_331	52.3	0.4
R_299	56.2	0.7		Region6-A	58.9	0.9
R_300	56.3	0.8		Region6-B	59.0	0.9
R_301	56.8	0.9		Region6-C	58.5	0.9
R_302	61.9	1.1		Region6-D	58.3	0.8
R_303	58.5	0.3		Region6-E	58.0	0.8
R_304	59.6	0.3		Region6-F	57.0	0.9
R_305	59.4	0.3		Region6-G	58.2	0.9
R_306	58.4	0.3		Region6-H	58.5	0.9

The Future Conditions noise modeling for Region 6 indicated noise levels below 65 dBA $L_{eq}24$ at all locations. The increases relative to the Current Conditions for Region 6 ranged from +0.4 to +1.8 dBA which were due to the projected increases in traffic volumes on SWAHD and adjacent City Roads.

Table 5g. Noise Modeling Results With Future Conditions for Region 7

Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)		Receptor	$L_{eq}24$ (dBA)	$L_{eq}24$ Increase Relative to Current Conditions (dBA)
R_332	52.3	-0.2		R_363	59.2	0.8
R_333	52.9	-0.6		R_364	59.6	0.7
R_334	53.6	0.3		R_365	53.1	0.0
R_335	56.7	-0.7		R_366	53.7	-0.1
R_336	55.8	-1.5		R_367	55.9	0.0
R_337	55.5	-0.1		R_368	55.7	0.1
R_338	52.7	-1.8		R_369	57.1	-0.1
R_339	55.3	-1.4		R_370	57.3	0.1
R_340	54.9	-0.9		R_371	59.1	0.6
R_341	54.9	-0.7		R_372	56.7	0.6
R_342	55.3	-0.6		R_373	57.6	0.5
R_343	55.6	-0.4		R_374	58.1	0.5
R_344	55.5	-0.2		R_375	58.6	0.5
R_345	55.5	0.3		R_376	59.0	0.6
R_346	56.2	0.3		R_377	59.7	0.6
R_347	55.7	0.3		R_378	57.7	0.5
R_348	55.6	0.3		R_379	58.6	0.5
R_349	56.5	0.5		R_380	56.0	0.6
R_350	56.3	0.5		R_381	57.5	0.6
R_351	56.7	0.5		R_382	58.3	0.6
R_352	56.1	0.5		R_383	57.9	0.6
R_353	55.7	0.6		R_384	56.9	0.7
R_354	57.0	0.6		R_385	57.8	0.6
R_355	57.6	0.6		R_386	56.1	0.7
R_356	58.0	0.6		R_387	55.8	0.7
R_357	57.1	0.7		R_388	56.3	0.7
R_358	56.8	0.6		R_389	57.0	0.7
R_359	56.3	0.7		R_390	59.7	0.9
R_360	56.8	0.7		R_391	61.4	1.0
R_361	57.6	0.8		R_392	61.5	0.9
R_362	58.3	0.8				

The Future Conditions noise modeling for Region 7 indicated noise levels below 65 dBA $L_{eq}24$ at all locations. The changes relative to the Current Conditions for Region 7 ranged from -1.8 to +1.0 dBA. The increases are largely due to the projected increases in traffic volumes on SWAHD and adjacent City Roads. The decreases are due to the shielding from SWAHD provided by the earth structure for the bridge for the proposed interchange at 127 Street.

Table 5h. Noise Modeling Results With Future Conditions for Region 8

Receptor	L_{eq}24 (dBA)	L_{eq}24 Increase Relative to Current Conditions (dBA)		Receptor	L_{eq}24 (dBA)	L_{eq}24 Increase Relative to Current Conditions (dBA)
R_393	57.4	0.6		R_427	59.6	0.5
R_394	56.7	0.6		R_428	56.6	0.4
R_395	55.4	0.7		R_429	58.1	0.5
R_396	55.3	0.6		R_430	57.8	0.5
R_397	56.2	0.6		R_431	58.2	0.5
R_398	56.6	0.6		R_432	58.0	0.5
R_399	54.0	0.5		R_433	58.0	0.5
R_400	54.0	0.6		R_434	58.6	0.5
R_401	50.8	0.9		R_435	58.4	0.5
R_402	50.4	1.2		R_436	58.6	0.5
R_403	50.8	1.3		R_437	57.9	0.5
R_404	52.2	1.3		R_438	57.0	0.5
R_405	55.1	1.0		R_439	57.5	0.6
R_406	55.3	1.1		R_440	57.1	0.5
R_407	55.6	1.1		R_441	57.4	0.5
R_408	57.0	1.0		R_442	58.2	0.6
R_409	57.8	1.1		R_443	58.4	0.5
R_410	57.6	1.1		R_444	58.8	0.6
R_411	58.0	1.1		R_445	59.2	0.6
R_412	59.1	1.1		R_446	61.1	0.6
R_413	59.5	1.1		R_447	62.3	0.5
R_414	60.3	1.2		R_448	63.1	0.6
R_415	60.6	1.3		R_449	63.6	0.6
R_416	61.3	1.4		R_450	64.2	0.6
R_417	61.2	1.4		R_451	64.7	0.6
R_418	59.3	0.8		R_452	64.9	0.6
R_419	58.7	0.8		R_453	61.0	0.7
R_420	56.3	0.7		R_454	61.7	0.6
R_421	55.0	0.6		R_455	62.5	0.6
R_422	53.7	0.6		R_456	64.1	0.7
R_423	56.4	0.4		R_457	63.7	0.7
R_424	57.5	0.4		R_458	62.9	0.7
R_425	56.7	0.5		R_459	62.3	0.8
R_426	58.8	0.5				

The Future Conditions noise modeling for Region 8 indicated noise levels below 65 dBA L_{eq}24 at all locations. The increases relative to the Current Conditions for Region 8 ranged from +0.4 to +1.4 dBA which were due to the projected increases in traffic volumes on SWAHD and adjacent City Roads.

6.3. Future Conditions Sensitivity Analysis

As part of the study, a sensitivity analysis was performed for the main future (2027) traffic parameters associated with SWAHD. These included the overall traffic volumes, the traffic speeds, and the % heavy trucks. Each was evaluated with an increase and a decrease relative to the future conditions modeled. In addition, the cumulative impact of an increase and a decrease in all three variables was assessed.

6.3.1. Traffic Volume Analysis

As with any noise source, the relative change in noise level with changing quantity is a simple logarithmic function as indicated below:

$$\Delta SPL = 10\log_{10}\left(relative\ change\right)$$

This means that if the traffic volumes, for example, are doubled, there will be a 3.0 dBA increase. **If there is a relative increase in traffic volumes of 25% (possible error in long term planning horizon), there will be a relative maximum 1.0 dBA increase for locations in which the noise climate is entirely dominated by SWAHD (i.e. relative to other City Roadways). Conversely, there is a maximum relative decrease of -1.3 dBA for a relative reduction in traffic volumes of 25%.** At locations in which the noise climate has a greater influence by City Roadways, changes in traffic volumes on SWAHD will have less of an impact. Tables 6a – 6h show the $L_{eq}24$ results for the ± 25% vehicles per day conditions as well as the relative change in noise levels at all modeled receptor locations. The relative increase in noise levels from a relative increase of 25% in traffic volumes on SWAHD would result in a small number of additional receptor locations having noise levels at or above 65 dBA $L_{eq}24$ (highlighted in yellow in Tables 6a – 6h) . These include receptors to the southwest of the interchange at SWAHD and Whitemud Drive (currently no solid fences) and receptors southwest of the interchange at SWAHD and Calgary Trail (Calgary Trail and associated ramps dominate).

As an aside, typical traffic volumes on typical urban roads only vary a few percent from day-to-day. This means that changes in noise levels from day-to-day are almost entirely dictated by environmental and meteorological conditions, and not by varying traffic volumes.

Table 6a. Effects of Changing AHD Traffic Volumes for Region 1

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_001	59.5	0.3	58.8	-0.4
R_002	60.0	0.4	59.2	-0.4
R_003	59.2	0.5	58.1	-0.6
R_004	58.7	0.6	57.5	-0.6
R_005	61.4	0.7	59.9	-0.8
R_006	58.5	0.7	56.9	-0.9
R_007	57.8	0.8	56.0	-1.0
R_008	60.6	0.8	58.7	-1.1
R_009	60.7	0.9	58.8	-1.0
R_010	60.5	0.9	58.6	-1.0
R_011	60.4	0.8	58.5	-1.1
R_012	60.3	0.8	58.4	-1.1
R_013	60.3	0.8	58.5	-1.0
R_014	60.3	0.8	58.5	-1.0
R_015	59.1	0.8	57.3	-1.0
R_016	58.2	0.7	56.6	-0.9
R_017	58.5	0.7	56.9	-0.9
R_018	60.2	0.4	59.3	-0.5
R_019	60.5	0.7	59.0	-0.8
R_020	60.5	0.6	59.1	-0.8
R_021	60.6	0.7	59.2	-0.7
R_022	60.8	0.7	59.4	-0.7
R_023	61.0	0.6	59.6	-0.8
R_024	61.3	0.6	60.1	-0.6
R_025	61.8	0.5	60.7	-0.6
R_026	62.7	0.5	61.8	-0.4

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_027	63.8	0.3	63.2	-0.3
R_028	63.4	0.2	63.0	-0.2
R_029	63.5	0.1	63.2	-0.2
R_030	57.7	0.5	56.6	-0.6
R_031	57.2	0.6	55.7	-0.9
R_032	56.7	0.7	55.0	-1.0
R_033	59.2	0.8	57.3	-1.1
R_034	58.4	0.9	56.5	-1.0
R_035	57.3	0.8	55.5	-1.0
R_036	56.8	0.8	55.0	-1.0
R_037	56.7	0.8	55.0	-0.9
R_038	56.4	0.7	54.7	-1.0
R_039	58.3	0.3	57.7	-0.3
R_040	59.6	0.8	57.8	-1.0
R_041	61.0	0.8	59.2	-1.0
R_042	59.7	0.8	57.9	-1.0
R_043	58.8	0.7	57.2	-0.9
R_044	61.0	0.7	59.4	-0.9
R_045	59.8	0.6	58.4	-0.8
R_046	59.7	0.6	58.4	-0.7
R_047	59.7	0.5	58.5	-0.7
R_048	60.0	0.5	58.9	-0.6
R_049	60.0	0.5	59.0	-0.5
R_050	60.0	0.3	59.3	-0.4
R_051	60.5	0.3	59.9	-0.3
R_052	60.7	0.2	60.3	-0.2

Table 6b. Effects of Changing AHD Traffic Volumes for Region 2

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)		Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_053	58.9	0.3		58.4	-0.2		R_087	60.6	0.5		59.5	-0.6
R_054	58.3	0.4		57.5	-0.4		R_088	60.5	0.6		59.2	-0.7
R_055	60.4	0.6		59.2	-0.6		R_089	61.1	0.7		59.6	-0.8
R_056	60.5	0.6		59.1	-0.8		R_090	64.2	0.7		62.6	-0.9
R_057	60.7	0.7		59.2	-0.8		R_091	65.1	0.7		63.4	-1.0
R_058	59.4	0.7		57.7	-1.0		R_092	65.5	0.8		63.7	-1.0
R_059	60.1	0.8		58.3	-1.0		R_093	61.4	0.8		59.7	-0.9
R_060	61.1	0.8		59.3	-1.0		R_094	59.2	0.7		57.7	-0.8
R_061	61.9	0.8		60.1	-1.0		R_095	59.9	0.7		58.3	-0.9
R_062	62.9	0.8		61.0	-1.1		R_096	59.6	0.7		58.0	-0.9
R_063	63.3	0.8		61.4	-1.1		R_097	59.7	0.7		58.2	-0.8
R_064	63.7	0.9		61.7	-1.1		R_098	65.9	0.9		63.8	-1.2
R_065	63.9	0.9		61.9	-1.1		R_099	66.1	0.9		64.0	-1.2
R_066	62.7	0.9		60.7	-1.1		R_100	60.5	0.8		58.7	-1.0
R_067	60.9	0.9		59.0	-1.0		R_101	60.6	0.9		58.7	-1.0
R_068	60.7	0.8		58.9	-1.0		R_102	60.7	0.8		58.8	-1.1
R_069	60.1	0.8		58.2	-1.1		R_103	60.4	0.8		58.5	-1.1
R_070	60.7	0.9		58.6	-1.2		R_104	60.0	0.9		58.1	-1.0
R_071	61.6	0.9		59.5	-1.2		R_105	60.7	0.8		59.1	-0.8
R_072	60.8	0.9		58.8	-1.1		R_106	63.1	1.0		61.0	-1.1
R_073	61.6	0.9		59.6	-1.1		R_107	63.5	0.9		61.4	-1.2
R_074	61.6	0.9		59.6	-1.1		R_108	63.8	0.9		61.7	-1.2
R_075	61.0	0.9		59.0	-1.1		R_109	59.0	0.8		57.2	-1.0
R_076	60.7	0.8		58.7	-1.2		R_110	60.0	0.8		58.1	-1.1
R_077	61.1	0.9		59.1	-1.1		R_111	59.2	0.8		57.4	-1.0
R_078	60.4	0.9		58.4	-1.1		R_112	58.3	0.6		57.0	-0.7
R_079	61.3	0.9		59.3	-1.1		R_113	56.2	0.7		54.8	-0.7
R_080	59.8	0.8		58.0	-1.0		R_114	59.1	0.7		57.6	-0.8
R_081	56.5	0.7		54.9	-0.9		R_115	55.8	0.7		54.3	-0.8
R_082	60.3	0.3		59.6	-0.4		R_116	58.9	0.9		57.0	-1.0
R_083	60.4	0.2		60.0	-0.2		R_117	58.5	0.7		56.9	-0.9
R_084	60.6	0.2		60.1	-0.3		R_118	59.3	0.7		57.7	-0.9
R_085	60.0	0.3		59.3	-0.4		R_119	60.0	0.7		58.4	-0.9
R_086	60.7	0.4		59.8	-0.5							

Note: SWAHD is the dominant noise source at Receptors R_091, R_092, R_098, R_099. However, these locations do not currently have any solid wood fences to act as noise barriers.

Table 6c. Effects of Changing AHD Traffic Volumes for Region 3

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_120	59.3	0.4		58.4	-0.5
R_121	57.3	0.8		55.6	-0.9
R_122	57.6	0.7		56.0	-0.9
R_123	58.1	0.8		56.3	-1.0
R_124	58.6	0.9		56.7	-1.0
R_125	59.0	0.8		57.1	-1.1
R_126	59.3	0.9		57.3	-1.1
R_127	59.8	0.9		57.8	-1.1
R_128	60.3	0.9		58.2	-1.2
R_129	61.1	0.9		59.1	-1.1
R_130	59.9	0.9		57.9	-1.1
R_131	60.4	0.9		58.4	-1.1
R_132	60.4	0.9		58.4	-1.1
R_133	60.6	0.9		58.5	-1.2
R_134	60.7	0.9		58.6	-1.2
R_135	60.7	0.9		58.6	-1.2
R_136	60.6	0.9		58.6	-1.1
R_137	62.2	0.9		60.1	-1.2
R_138	61.9	0.8		60.2	-0.9
R_139	59.9	0.3		59.2	-0.4
R_140	58.9	0.5		57.8	-0.6
R_141	58.3	0.7		56.9	-0.7
R_142	57.8	0.7		56.2	-0.9
R_143	58.0	0.7		56.4	-0.9
R_144	60.1	0.8		58.4	-0.9
R_145	60.6	0.7		59.0	-0.9
R_146	62.0	0.8		60.4	-0.8
R_147	61.9	0.8		60.2	-0.9
R_148	61.4	0.6		60.1	-0.7
R_149	59.9	0.8		58.1	-1.0
R_150	58.4	0.8		56.5	-1.1
R_151	60.5	0.7		58.9	-0.9
R_152	62.9	0.9		60.8	-1.2
R_153	62.5	1.0		60.3	-1.2
R_154	63.3	0.9		61.2	-1.2
R_155	63.7	0.9		61.6	-1.2
R_156	62.6	0.9		60.5	-1.2
R_157	58.8	0.9		56.9	-1.0
R_158	57.9	0.5		56.8	-0.6
R_159	58.0	0.8		56.2	-1.0
R_160	59.8	0.9		57.9	-1.0
R_161	56.6	0.9		54.8	-0.9
R_162	56.9	0.8		55.1	-1.0
R_163	60.0	0.7		58.4	-0.9
R_164	59.8	0.5		58.6	-0.7
R_165	56.2	0.2		55.8	-0.2

Table 6d. Effects of Changing AHD Traffic Volumes for Region 4

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)		Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_166	57.4	0.5		56.3	-0.6		R_194	58.4	0.9		56.4	-1.1
R_167	58.4	0.5		57.3	-0.6		R_195	58.9	0.9		56.9	-1.1
R_168	57.7	0.5		56.5	-0.7		R_196	59.3	0.9		57.3	-1.1
R_169	56.8	0.8		55.0	-1.0		R_197	58.1	0.9		56.1	-1.1
R_170	56.7	0.8		54.8	-1.1		R_198	58.7	0.9		56.7	-1.1
R_171	56.8	0.9		54.8	-1.1		R_199	52.7	0.7		51.2	-0.8
R_172	57.5	0.9		55.5	-1.1		R_200	55.4	0.3		54.8	-0.3
R_173	57.8	0.9		55.7	-1.2		R_201	61.7	0.0		61.6	-0.1
R_174	58.4	0.9		56.3	-1.2		R_202	57.9	0.4		57.1	-0.4
R_175	59.1	0.9		57.0	-1.2		R_203	55.4	0.4		54.4	-0.6
R_176	59.0	0.9		56.9	-1.2		R_204	56.8	0.6		55.6	-0.6
R_177	61.6	0.9		59.5	-1.2		R_205	55.2	0.6		53.8	-0.8
R_178	62.0	0.9		59.8	-1.3		R_206	55.6	0.7		53.9	-1.0
R_179	60.7	0.9		58.5	-1.3		R_207	56.0	0.8		54.3	-0.9
R_180	59.7	1.0		57.5	-1.2		R_208	55.1	0.8		53.3	-1.0
R_181	60.1	0.9		58.0	-1.2		R_209	53.1	0.8		51.3	-1.0
R_182	57.3	0.9		55.2	-1.2		R_210	51.0	0.8		49.1	-1.1
R_183	55.8	1.0		53.6	-1.2		Region4-A	57.9	0.9		55.9	-1.1
R_184	58.3	0.9		56.2	-1.2		Region4-B	57.9	0.9		55.9	-1.1
R_185	60.1	1.0		57.9	-1.2		Region4-C	57.8	0.9		55.8	-1.1
R_186	57.5	0.9		55.5	-1.1		Region4-D	57.7	0.9		55.7	-1.1
R_187	57.2	0.9		55.2	-1.1		Region4-E	57.6	0.9		55.5	-1.2
R_188	58.0	1.0		55.9	-1.1		Region4-F	57.2	0.9		55.2	-1.1
R_189	57.4	0.9		55.3	-1.2		Region4-G	56.9	0.9		54.8	-1.2
R_190	58.2	0.9		56.2	-1.1		Region4-H	54.9	0.9		52.8	-1.2
R_191	58.2	0.9		56.2	-1.1		Region4-I	54.6	0.9		52.5	-1.2
R_192	58.8	0.9		56.8	-1.1		Region4-J	54.6	0.9		52.5	-1.2
R_193	58.7	0.9		56.7	-1.1		Region4-K	55.5	0.9		53.4	-1.2

Table 6e. Effects of Changing AHD Traffic Volumes for Region 5

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)	Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_211	53.1	0.9	51.0	-1.2	R_243	56.4	0.4	55.6	-0.4
R_212	52.2	0.9	50.2	-1.1	R_244	57.3	0.3	56.8	-0.2
R_213	51.1	0.8	49.2	-1.1	R_245	56.9	0.2	56.5	-0.2
R_214	51.8	0.8	50.1	-0.9	R_246	57.4	0.2	57.1	-0.1
R_215	52.0	0.8	50.3	-0.9	R_247	57.1	0.1	56.9	-0.1
R_216	54.6	0.9	52.5	-1.2	R_248	56.4	0.1	56.2	-0.1
R_217	54.6	0.9	52.5	-1.2	R_249	59.5	0.1	59.3	-0.1
R_218	55.8	0.9	53.7	-1.2	R_250	52.5	0.7	50.9	-0.9
R_219	57.4	0.9	55.3	-1.2	R_251	54.9	0.9	52.9	-1.1
R_220	57.2	0.9	55.1	-1.2	R_252	56.3	0.9	54.4	-1.0
R_221	57.3	0.9	55.2	-1.2	R_253	55.0	0.8	53.3	-0.9
R_222	56.4	0.9	54.3	-1.2	R_254	54.7	0.7	53.0	-1.0
R_223	55.6	0.9	53.5	-1.2	R_255	54.4	0.8	52.7	-0.9
R_224	55.1	0.9	53.1	-1.1	R_256	54.5	0.8	52.8	-0.9
R_225	54.0	1.0	51.9	-1.1	R_257	54.8	0.7	53.1	-1.0
R_226	55.9	0.9	53.9	-1.1	R_258	55.0	0.8	53.3	-0.9
R_227	55.1	0.9	53.1	-1.1	R_259	55.2	0.8	53.5	-0.9
R_228	55.1	0.8	53.2	-1.1	R_260	55.5	0.8	53.8	-0.9
R_229	55.2	0.8	53.3	-1.1	R_261	55.9	0.8	54.3	-0.8
R_230	55.3	0.8	53.4	-1.1	R_262	56.3	0.7	54.7	-0.9
R_231	55.5	0.8	53.7	-1.0	R_263	56.5	0.7	55.0	-0.8
R_232	55.6	0.9	53.7	-1.0	R_264	56.5	0.7	54.9	-0.9
R_233	56.0	0.9	54.1	-1.0	R_265	56.0	0.6	54.6	-0.8
R_234	55.6	0.8	53.8	-1.0	R_266	55.8	0.6	54.6	-0.6
R_235	56.0	0.8	54.2	-1.0	R_267	56.3	0.5	55.2	-0.6
R_236	56.3	0.8	54.6	-0.9	R_268	57.1	0.5	56.1	-0.5
R_237	53.6	0.7	52.1	-0.8	R_269	58.9	0.3	58.2	-0.4
R_238	54.7	0.6	53.3	-0.8	R_270	60.2	0.3	59.7	-0.2
R_239	54.7	0.6	53.4	-0.7	R_271	59.9	0.2	59.5	-0.2
R_240	54.2	0.6	53.0	-0.6	R_272	58.1	0.3	57.5	-0.3
R_241	54.1	0.5	53.0	-0.6	R_273	58.5	0.3	57.9	-0.3
R_242	54.3	0.4	53.4	-0.5					

Table 6f. Effects of Changing AHD Traffic Volumes for Region 6

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)	Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_274	61.4	0.1	61.3	0.0	R_307	58.2	0.8	56.5	-0.9
R_275	61.7	0.1	61.6	0.0	R_308	62.6	0.2	62.2	-0.2
R_276	60.5	0.0	60.4	-0.1	R_309	60.1	0.4	59.2	-0.5
R_277	59.6	0.1	59.4	-0.1	R_310	59.4	0.6	58.2	-0.6
R_278	58.9	0.2	58.6	-0.1	R_311	58.0	0.7	56.4	-0.9
R_279	56.7	0.2	56.3	-0.2	R_312	57.1	0.8	55.3	-1.0
R_280	56.3	0.3	55.7	-0.3	R_313	56.9	0.9	55.0	-1.0
R_281	55.4	0.4	54.6	-0.4	R_314	57.0	0.9	55.0	-1.1
R_282	55.3	0.4	54.5	-0.4	R_315	57.8	1.0	55.7	-1.1
R_283	56.5	0.5	55.5	-0.5	R_316	57.3	0.8	55.5	-1.0
R_284	57.6	0.6	56.3	-0.7	R_317	56.7	0.6	55.4	-0.7
R_285	58.5	0.7	57.1	-0.7	R_318	52.9	0.3	52.3	-0.3
R_286	60.0	0.8	58.3	-0.9	R_319	48.8	0.8	47.2	-0.8
R_287	59.0	0.8	57.2	-1.0	R_320	56.0	0.9	54.0	-1.1
R_288	60.1	0.8	58.3	-1.0	R_321	55.3	0.7	53.8	-0.8
R_289	60.2	0.8	58.4	-1.0	R_322	53.7	0.7	52.1	-0.9
R_290	60.4	0.9	58.5	-1.0	R_323	53.6	0.7	51.9	-1.0
R_291	60.3	0.8	58.4	-1.1	R_324	52.9	0.7	51.3	-0.9
R_292	59.6	0.8	57.7	-1.1	R_325	53.4	0.6	52.1	-0.7
R_293	59.7	0.8	57.8	-1.1	R_326	52.5	0.6	51.2	-0.7
R_294	59.4	0.8	57.5	-1.1	R_327	52.7	0.7	51.1	-0.9
R_295	59.7	0.9	57.8	-1.0	R_328	53.1	0.8	51.4	-0.9
R_296	58.0	0.8	56.2	-1.0	R_329	54.8	0.9	52.9	-1.0
R_297	57.5	0.8	55.8	-0.9	R_330	54.0	0.8	52.2	-1.0
R_298	57.1	0.7	55.6	-0.8	R_331	53.0	0.7	51.5	-0.8
R_299	56.9	0.7	55.4	-0.8	Region6-A	59.2	0.3	58.5	-0.4
R_300	56.9	0.6	55.6	-0.7	Region6-B	59.2	0.2	58.7	-0.3
R_301	57.3	0.5	56.2	-0.6	Region6-C	58.7	0.2	58.2	-0.3
R_302	62.0	0.1	61.7	-0.2	Region6-D	58.6	0.3	58.1	-0.2
R_303	59.1	0.6	57.8	-0.7	Region6-E	58.3	0.3	57.8	-0.2
R_304	60.2	0.6	58.8	-0.8	Region6-F	57.2	0.2	56.8	-0.2
R_305	60.1	0.7	58.6	-0.8	Region6-G	58.4	0.2	58.0	-0.2
R_306	59.2	0.8	57.4	-1.0	Region6-H	58.7	0.2	58.3	-0.2

Table 6g. Effects of Changing AHD Traffic Volumes for Region 7

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)	Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)	L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_332	53.2	0.9	51.3	-1.0	R_363	59.6	0.4	58.8	-0.4
R_333	53.8	0.9	51.8	-1.1	R_364	59.9	0.3	59.2	-0.4
R_334	54.5	0.9	52.5	-1.1	R_365	53.7	0.6	52.3	-0.8
R_335	57.5	0.8	55.6	-1.1	R_366	54.5	0.8	52.6	-1.1
R_336	56.6	0.8	54.7	-1.1	R_367	56.8	0.9	54.9	-1.0
R_337	56.3	0.8	54.4	-1.1	R_368	56.5	0.8	54.6	-1.1
R_338	53.4	0.7	51.8	-0.9	R_369	58.0	0.9	56.0	-1.1
R_339	56.1	0.8	54.2	-1.1	R_370	58.2	0.9	56.2	-1.1
R_340	55.8	0.9	53.9	-1.0	R_371	60.0	0.9	58.0	-1.1
R_341	55.8	0.9	53.8	-1.1	R_372	57.6	0.9	55.6	-1.1
R_342	56.2	0.9	54.2	-1.1	R_373	58.5	0.9	56.5	-1.1
R_343	56.5	0.9	54.5	-1.1	R_374	59.0	0.9	57.1	-1.0
R_344	56.4	0.9	54.4	-1.1	R_375	59.5	0.9	57.6	-1.0
R_345	56.4	0.9	54.4	-1.1	R_376	59.9	0.9	57.9	-1.1
R_346	57.0	0.8	55.1	-1.1	R_377	60.6	0.9	58.6	-1.1
R_347	56.5	0.8	54.6	-1.1	R_378	58.6	0.9	56.7	-1.0
R_348	56.5	0.9	54.6	-1.0	R_379	59.5	0.9	57.6	-1.0
R_349	57.3	0.8	55.4	-1.1	R_380	56.8	0.8	54.9	-1.1
R_350	57.1	0.8	55.3	-1.0	R_381	58.3	0.8	56.5	-1.0
R_351	57.5	0.8	55.7	-1.0	R_382	59.1	0.8	57.3	-1.0
R_352	56.9	0.8	55.1	-1.0	R_383	58.7	0.8	56.9	-1.0
R_353	56.4	0.7	54.7	-1.0	R_384	57.6	0.7	55.9	-1.0
R_354	57.8	0.8	56.1	-0.9	R_385	58.6	0.8	57.0	-0.8
R_355	58.4	0.8	56.7	-0.9	R_386	56.8	0.7	55.2	-0.9
R_356	58.7	0.7	57.1	-0.9	R_387	56.5	0.7	54.9	-0.9
R_357	57.7	0.6	56.2	-0.9	R_388	56.9	0.6	55.6	-0.7
R_358	57.5	0.7	56.0	-0.8	R_389	57.5	0.5	56.5	-0.5
R_359	56.8	0.5	55.6	-0.7	R_390	59.9	0.2	59.4	-0.3
R_360	57.3	0.5	56.2	-0.6	R_391	61.5	0.1	61.2	-0.2
R_361	58.0	0.4	57.1	-0.5	R_392	61.6	0.1	61.3	-0.2
R_362	58.7	0.4	57.9	-0.4					

Table 6h. Effects of Changing AHD Traffic Volumes for Region 8

Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)		Receptor	L_{eq}24 with +25% Vehicles Per Day (dBA)	Increase Relative to Future Vehicles Per Day (dBA)		L_{eq}24 with -25% Vehicles Per Day (dBA)	Decrease Relative to Future Vehicles Per Day (dBA)
R_393	58.0	0.6		56.9	-0.5		R_427	60.4	0.8		58.6	-1.0
R_394	57.3	0.6		56.1	-0.6		R_428	57.3	0.7		55.8	-0.8
R_395	56.0	0.6		54.6	-0.8		R_429	58.9	0.8		57.2	-0.9
R_396	56.0	0.7		54.5	-0.8		R_430	58.6	0.8		56.8	-1.0
R_397	56.9	0.7		55.4	-0.8		R_431	59.0	0.8		57.2	-1.0
R_398	57.3	0.7		55.7	-0.9		R_432	58.8	0.8		57.1	-0.9
R_399	54.8	0.8		53.1	-0.9		R_433	58.7	0.7		57.1	-0.9
R_400	54.7	0.7		53.2	-0.8		R_434	59.3	0.7		57.7	-0.9
R_401	51.3	0.5		50.3	-0.5		R_435	59.1	0.7		57.5	-0.9
R_402	50.7	0.3		50.0	-0.4		R_436	59.3	0.7		57.8	-0.8
R_403	51.0	0.2		50.5	-0.3		R_437	58.6	0.7		57.1	-0.8
R_404	52.4	0.2		51.9	-0.3		R_438	57.6	0.6		56.3	-0.7
R_405	55.6	0.5		54.6	-0.5		R_439	58.1	0.6		56.8	-0.7
R_406	55.7	0.4		54.8	-0.5		R_440	57.7	0.6		56.5	-0.6
R_407	56.0	0.4		55.2	-0.4		R_441	58.0	0.6		56.8	-0.6
R_408	57.5	0.5		56.5	-0.5		R_442	58.7	0.5		57.5	-0.7
R_409	58.3	0.5		57.2	-0.6		R_443	59.0	0.6		57.8	-0.6
R_410	58.1	0.5		57.1	-0.5		R_444	59.3	0.5		58.3	-0.5
R_411	58.5	0.5		57.6	-0.4		R_445	59.6	0.4		58.8	-0.4
R_412	59.6	0.5		58.6	-0.5		R_446	61.4	0.3		60.7	-0.4
R_413	59.9	0.4		59.0	-0.5		R_447	62.8	0.5		61.9	-0.4
R_414	60.7	0.4		59.9	-0.4		R_448	63.6	0.5		62.5	-0.6
R_415	60.9	0.3		60.2	-0.4		R_449	64.2	0.6		63.1	-0.5
R_416	61.6	0.3		61.0	-0.3		R_450	64.8	0.6		63.6	-0.6
R_417	61.5	0.3		60.9	-0.3		R_451	65.3	0.6		64.0	-0.7
R_418	59.6	0.3		59.1	-0.2		R_452	65.6	0.7		64.2	-0.7
R_419	59.0	0.3		58.2	-0.5		R_453	61.7	0.7		60.2	-0.8
R_420	56.9	0.6		55.6	-0.7		R_454	62.4	0.7		60.9	-0.8
R_421	55.7	0.7		54.2	-0.8		R_455	63.3	0.8		61.7	-0.8
R_422	54.4	0.7		52.9	-0.8		R_456	64.8	0.7		63.2	-0.9
R_423	56.9	0.5		55.8	-0.6		R_457	64.4	0.7		62.8	-0.9
R_424	58.3	0.8		56.6	-0.9		R_458	63.6	0.7		62.1	-0.8
R_425	57.5	0.8		55.8	-0.9		R_459	63.0	0.7		61.4	-0.9
R_426	59.6	0.8		57.8	-1.0							

Note: The dominant noise sources for Receptors R_451 & R_452 are Calgary Trail, Gateway Blvd, SWAHD, and the associated ramps.

6.3.2. Traffic Speed Analysis

In order to determine the effect of different traffic speeds, two scenarios were modeled. The future conditions case included a speed of 100 km/hr on SWAHD throughout the entire study area. This speed was increased to 110 km/hr and then decreased to 90 km/hr to determine the relative change compared to 100 km/hr. It is unlikely that the posted traffic speeds will fall outside of this range. Tables 7a – 7h show the L_{eq}24 results for both the 110 km/hr and 90 km/hr conditions as well as the change in noise levels (relative to 100 km/hr) at all modeled receptor locations. **When increasing the speed to 110 km/hr, the noise levels increased by 0.0 – 0.6 dBA. When reducing the speed to 90 km/hr, the noise levels decreased by 0.0 – 0.6 dBA.** As with the traffic volumes assessment, the largest changes were at locations where the noise climate was completely dominated by the noise from SWAHD. The locations with the lowest changes were those where the noise climate was dominated by City Roads. The relative increase in noise levels from a speed increase to 110 km/hr on SWAHD would result in a small number of additional receptor locations having noise levels at or above 65 dBA L_{eq}24 (highlighted in yellow in Tables 7a – 7h). These include receptors to the southwest of the interchange at SWAHD and Whitemud Drive (currently no solid fences) and receptors southwest of the interchange at SWAHD and Calgary Trail (Calgary Trail and associated ramps dominate). Given that a minimum 2.0 – 3.0 dBA change is required before most people start to notice a change, changing the traffic speeds will not significantly impact the perceived noise climate.

Table 7a. Effects of Changing AHD Traffic Speed for Region 1

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_001	59.3	0.1		59.0	-0.2		R_027	63.6	0.1		63.4	-0.1
R_002	59.9	0.3		59.5	-0.1		R_028	63.4	0.2		63.1	-0.1
R_003	59.0	0.3		58.4	-0.3		R_029	63.5	0.1		63.3	-0.1
R_004	58.4	0.3		57.9	-0.2		R_030	57.5	0.3		56.9	-0.3
R_005	61.1	0.4		60.4	-0.3		R_031	56.9	0.3		56.2	-0.4
R_006	58.2	0.4		57.4	-0.4		R_032	56.4	0.4		55.6	-0.4
R_007	57.5	0.5		56.6	-0.4		R_033	58.8	0.4		57.9	-0.5
R_008	60.3	0.5		59.4	-0.4		R_034	58.0	0.5		57.1	-0.4
R_009	60.3	0.5		59.4	-0.4		R_035	56.9	0.4		56.1	-0.4
R_010	60.1	0.5		59.2	-0.4		R_036	56.4	0.4		55.6	-0.4
R_011	60.0	0.4		59.1	-0.5		R_037	56.4	0.5		55.5	-0.4
R_012	60.0	0.5		59.0	-0.5		R_038	56.1	0.4		55.3	-0.4
R_013	60.0	0.5		59.1	-0.4		R_039	58.2	0.2		57.9	-0.1
R_014	59.9	0.4		59.1	-0.4		R_040	59.3	0.5		58.4	-0.4
R_015	58.7	0.4		57.9	-0.4		R_041	60.7	0.5		59.8	-0.4
R_016	57.9	0.4		57.1	-0.4		R_042	59.3	0.4		58.5	-0.4
R_017	58.2	0.4		57.4	-0.4		R_043	58.5	0.4		57.7	-0.4
R_018	60.0	0.2		59.6	-0.2		R_044	60.7	0.4		59.9	-0.4
R_019	60.2	0.4		59.5	-0.3		R_045	59.5	0.3		58.8	-0.4
R_020	60.2	0.3		59.5	-0.4		R_046	59.5	0.4		58.8	-0.3
R_021	60.3	0.4		59.6	-0.3		R_047	59.5	0.3		58.9	-0.3
R_022	60.5	0.4		59.8	-0.3		R_048	59.8	0.3		59.2	-0.3
R_023	60.7	0.3		60.1	-0.3		R_049	59.8	0.3		59.3	-0.2
R_024	61.0	0.3		60.4	-0.3		R_050	59.9	0.2		59.5	-0.2
R_025	61.6	0.3		61.1	-0.2		R_051	60.4	0.2		60.1	-0.1
R_026	62.5	0.3		62.0	-0.2		R_052	60.6	0.1		60.4	-0.1

Table 7b. Effects of Changing AHD Traffic Speed for Region 2

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_053	58.8	0.2		58.5	-0.1		R_087	60.4	0.3		59.8	-0.3
R_054	58.1	0.2		57.8	-0.1		R_088	60.2	0.3		59.6	-0.3
R_055	60.1	0.3		59.5	-0.3		R_089	60.8	0.4		60.1	-0.3
R_056	60.3	0.4		59.5	-0.4		R_090	63.9	0.4		63.1	-0.4
R_057	60.4	0.4		59.7	-0.3		R_091	64.8	0.4		63.9	-0.5
R_058	59.1	0.4		58.3	-0.4		R_092	65.2	0.5		64.3	-0.4
R_059	59.8	0.5		58.9	-0.4		R_093	61.1	0.5		60.2	-0.4
R_060	60.8	0.5		59.9	-0.4		R_094	58.9	0.4		58.2	-0.3
R_061	61.6	0.5		60.7	-0.4		R_095	59.6	0.4		58.8	-0.4
R_062	62.6	0.5		61.6	-0.5		R_096	59.3	0.4		58.5	-0.4
R_063	63.0	0.5		62.0	-0.5		R_097	59.4	0.4		58.6	-0.4
R_064	63.3	0.5		62.3	-0.5		R_098	65.5	0.5		64.5	-0.5
R_065	63.5	0.5		62.5	-0.5		R_099	65.7	0.5		64.7	-0.5
R_066	62.3	0.5		61.3	-0.5		R_100	60.2	0.5		59.2	-0.5
R_067	60.5	0.5		59.6	-0.4		R_101	60.2	0.5		59.3	-0.4
R_068	60.4	0.5		59.5	-0.4		R_102	60.4	0.5		59.4	-0.5
R_069	59.8	0.5		58.8	-0.5		R_103	60.1	0.5		59.1	-0.5
R_070	60.3	0.5		59.3	-0.5		R_104	59.6	0.5		58.7	-0.4
R_071	61.2	0.5		60.2	-0.5		R_105	60.4	0.5		59.6	-0.3
R_072	60.5	0.6		59.5	-0.4		R_106	62.7	0.6		61.6	-0.5
R_073	61.2	0.5		60.2	-0.5		R_107	63.2	0.6		62.1	-0.5
R_074	61.2	0.5		60.2	-0.5		R_108	63.4	0.5		62.4	-0.5
R_075	60.6	0.5		59.6	-0.5		R_109	58.7	0.5		57.8	-0.4
R_076	60.4	0.5		59.4	-0.5		R_110	59.7	0.5		58.7	-0.5
R_077	60.7	0.5		59.7	-0.5		R_111	58.9	0.5		58.0	-0.4
R_078	60.0	0.5		59.0	-0.5		R_112	58.1	0.4		57.4	-0.3
R_079	60.9	0.5		59.9	-0.5		R_113	55.9	0.4		55.2	-0.3
R_080	59.5	0.5		58.6	-0.4		R_114	58.8	0.4		58.0	-0.4
R_081	56.2	0.4		55.4	-0.4		R_115	55.5	0.4		54.8	-0.3
R_082	60.1	0.1		59.8	-0.2		R_116	58.6	0.6		57.6	-0.4
R_083	60.3	0.1		60.1	-0.1		R_117	58.2	0.4		57.4	-0.4
R_084	60.5	0.1		60.3	-0.1		R_118	59.0	0.4		58.2	-0.4
R_085	59.9	0.2		59.5	-0.2		R_119	59.7	0.4		58.9	-0.4
R_086	60.5	0.2		60.0	-0.3							

Note: SWAHD is the dominant noise source at Receptors R_092, R_098, R_099. However, these locations do not currently have any solid wood fences to act as noise barriers.

Table 7c. Effects of Changing AHD Traffic Speed for Region 3

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_120	59.1	0.2		58.7	-0.2
R_121	57.0	0.5		56.2	-0.3
R_122	57.3	0.4		56.5	-0.4
R_123	57.8	0.5		56.9	-0.4
R_124	58.2	0.5		57.3	-0.4
R_125	58.7	0.5		57.7	-0.5
R_126	58.9	0.5		57.9	-0.5
R_127	59.5	0.6		58.5	-0.4
R_128	59.9	0.5		58.9	-0.5
R_129	60.8	0.6		59.8	-0.4
R_130	59.5	0.5		58.6	-0.4
R_131	60.0	0.5		59.0	-0.5
R_132	60.1	0.6		59.1	-0.4
R_133	60.2	0.5		59.2	-0.5
R_134	60.3	0.5		59.3	-0.5
R_135	60.3	0.5		59.3	-0.5
R_136	60.3	0.6		59.3	-0.4
R_137	61.8	0.5		60.8	-0.5
R_138	61.6	0.5		60.7	-0.4
R_139	59.7	0.1		59.4	-0.2
R_140	58.7	0.3		58.1	-0.3
R_141	58.0	0.4		57.3	-0.3
R_142	57.5	0.4		56.8	-0.3
R_143	57.7	0.4		56.9	-0.4
R_144	59.7	0.4		58.9	-0.4
R_145	60.3	0.4		59.5	-0.4
R_146	61.7	0.5		60.9	-0.3
R_147	61.6	0.5		60.8	-0.3
R_148	61.1	0.3		60.5	-0.3
R_149	59.5	0.4		58.7	-0.4
R_150	58.1	0.5		57.1	-0.5
R_151	60.2	0.4		59.4	-0.4
R_152	62.5	0.5		61.5	-0.5
R_153	62.0	0.5		61.0	-0.5
R_154	62.9	0.5		61.9	-0.5
R_155	63.3	0.5		62.3	-0.5
R_156	62.2	0.5		61.2	-0.5
R_157	58.4	0.5		57.5	-0.4
R_158	57.6	0.2		57.1	-0.3
R_159	57.7	0.5		56.8	-0.4
R_160	59.4	0.5		58.5	-0.4
R_161	56.2	0.5		55.3	-0.4
R_162	56.6	0.5		55.7	-0.4
R_163	59.7	0.4		58.9	-0.4
R_164	59.6	0.3		59.0	-0.3
R_165	56.1	0.1		55.9	-0.1

Table 7d. Effects of Changing AHD Traffic Speed for Region 4

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_166	57.2	0.3		56.7	-0.2		R_194	58.0	0.5		57.1	-0.4
R_167	58.2	0.3		57.6	-0.3		R_195	58.5	0.5		57.5	-0.5
R_168	57.5	0.3		56.9	-0.3		R_196	58.9	0.5		58.0	-0.4
R_169	56.5	0.5		55.6	-0.4		R_197	57.7	0.5		56.8	-0.4
R_170	56.4	0.5		55.4	-0.5		R_198	58.3	0.5		57.3	-0.5
R_171	56.4	0.5		55.4	-0.5		R_199	52.4	0.4		51.7	-0.3
R_172	57.1	0.5		56.1	-0.5		R_200	55.3	0.2		55.0	-0.1
R_173	57.4	0.5		56.4	-0.5		R_201	61.7	0.0		61.6	-0.1
R_174	58.0	0.5		57.0	-0.5		R_202	57.7	0.2		57.3	-0.2
R_175	58.7	0.5		57.7	-0.5		R_203	55.2	0.2		54.7	-0.3
R_176	58.6	0.5		57.6	-0.5		R_204	56.6	0.4		56.0	-0.2
R_177	61.2	0.5		60.2	-0.5		R_205	54.9	0.3		54.2	-0.4
R_178	61.6	0.5		60.6	-0.5		R_206	55.3	0.4		54.4	-0.5
R_179	60.3	0.5		59.3	-0.5		R_207	55.7	0.5		54.8	-0.4
R_180	59.3	0.6		58.2	-0.5		R_208	54.7	0.4		53.8	-0.5
R_181	59.7	0.5		58.7	-0.5		R_209	52.8	0.5		51.9	-0.4
R_182	56.9	0.5		55.9	-0.5		R_210	50.7	0.5		49.7	-0.5
R_183	55.4	0.6		54.3	-0.5		Region4-A	57.5	0.5		56.6	-0.4
R_184	57.9	0.5		56.9	-0.5		Region4-B	57.5	0.5		56.5	-0.5
R_185	59.7	0.6		58.6	-0.5		Region4-C	57.4	0.5		56.5	-0.4
R_186	57.1	0.5		56.1	-0.5		Region4-D	57.4	0.6		56.4	-0.4
R_187	56.8	0.5		55.8	-0.5		Region4-E	57.2	0.5		56.2	-0.5
R_188	57.6	0.6		56.6	-0.4		Region4-F	56.9	0.6		55.9	-0.4
R_189	57.0	0.5		56.0	-0.5		Region4-G	56.5	0.5		55.5	-0.5
R_190	57.9	0.6		56.9	-0.4		Region4-H	54.5	0.5		53.5	-0.5
R_191	57.8	0.5		56.9	-0.4		Region4-I	54.2	0.5		53.2	-0.5
R_192	58.4	0.5		57.4	-0.5		Region4-J	54.2	0.5		53.2	-0.5
R_193	58.3	0.5		57.3	-0.5		Region4-K	55.1	0.5		54.1	-0.5

Table 7e. Effects of Changing AHD Traffic Speed for Region 5

Recepto r	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Recepto r	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_211	52.7	0.5		51.7	-0.5		R_243	56.2	0.2		55.8	-0.2
R_212	51.8	0.5		50.8	-0.5		R_244	57.2	0.2		56.9	-0.1
R_213	50.8	0.5		49.8	-0.5		R_245	56.8	0.1		56.6	-0.1
R_214	51.5	0.5		50.6	-0.4		R_246	57.3	0.1		57.2	0.0
R_215	51.7	0.5		50.8	-0.4		R_247	57.1	0.1		57.0	0.0
R_216	54.2	0.5		53.2	-0.5		R_248	56.4	0.1		56.2	-0.1
R_217	54.2	0.5		53.2	-0.5		R_249	59.5	0.1		59.4	0.0
R_218	55.5	0.6		54.4	-0.5		R_250	52.2	0.4		51.4	-0.4
R_219	57.0	0.5		55.9	-0.6		R_251	54.5	0.5		53.6	-0.4
R_220	56.8	0.5		55.8	-0.5		R_252	55.9	0.5		55.0	-0.4
R_221	56.9	0.5		55.9	-0.5		R_253	54.6	0.4		53.8	-0.4
R_222	56.0	0.5		55.0	-0.5		R_254	54.4	0.4		53.5	-0.5
R_223	55.2	0.5		54.2	-0.5		R_255	54.0	0.4		53.2	-0.4
R_224	54.7	0.5		53.7	-0.5		R_256	54.2	0.5		53.3	-0.4
R_225	53.6	0.6		52.5	-0.5		R_257	54.5	0.4		53.7	-0.4
R_226	55.5	0.5		54.5	-0.5		R_258	54.7	0.5		53.8	-0.4
R_227	54.7	0.5		53.8	-0.4		R_259	54.9	0.5		54.0	-0.4
R_228	54.8	0.5		53.8	-0.5		R_260	55.2	0.5		54.4	-0.3
R_229	54.9	0.5		53.9	-0.5		R_261	55.6	0.5		54.8	-0.3
R_230	55.0	0.5		54.0	-0.5		R_262	56.0	0.4		55.2	-0.4
R_231	55.2	0.5		54.3	-0.4		R_263	56.2	0.4		55.4	-0.4
R_232	55.2	0.5		54.3	-0.4		R_264	56.2	0.4		55.4	-0.4
R_233	55.6	0.5		54.7	-0.4		R_265	55.8	0.4		55.0	-0.4
R_234	55.3	0.5		54.4	-0.4		R_266	55.6	0.4		54.9	-0.3
R_235	55.6	0.4		54.7	-0.5		R_267	56.0	0.2		55.5	-0.3
R_236	56.0	0.5		55.1	-0.4		R_268	56.9	0.3		56.4	-0.2
R_237	53.3	0.4		52.6	-0.3		R_269	58.8	0.2		58.4	-0.2
R_238	54.4	0.3		53.7	-0.4		R_270	60.1	0.2		59.8	-0.1
R_239	54.4	0.3		53.8	-0.3		R_271	59.8	0.1		59.6	-0.1
R_240	53.9	0.3		53.3	-0.3		R_272	58.0	0.2		57.7	-0.1
R_241	53.9	0.3		53.3	-0.3		R_273	58.3	0.1		58.1	-0.1
R_242	54.1	0.2		53.7	-0.2							

Table 7f. Effects of Changing AHD Traffic Speed for Region 6

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_274	61.3	0.0		61.3	0.0		R_307	57.8	0.4		57.0	-0.4
R_275	61.7	0.1		61.6	0.0		R_308	62.5	0.1		62.3	-0.1
R_276	60.5	0.0		60.4	-0.1		R_309	59.9	0.2		59.5	-0.2
R_277	59.6	0.1		59.5	0.0		R_310	59.2	0.4		58.5	-0.3
R_278	58.8	0.1		58.6	-0.1		R_311	57.7	0.4		56.9	-0.4
R_279	56.6	0.1		56.4	-0.1		R_312	56.8	0.5		55.8	-0.5
R_280	56.2	0.2		55.9	-0.1		R_313	56.5	0.5		55.6	-0.4
R_281	55.2	0.2		54.8	-0.2		R_314	56.7	0.6		55.6	-0.5
R_282	55.2	0.3		54.7	-0.2		R_315	57.4	0.6		56.3	-0.5
R_283	56.3	0.3		55.8	-0.2		R_316	56.9	0.4		56.0	-0.5
R_284	57.3	0.3		56.7	-0.3		R_317	56.5	0.4		55.8	-0.3
R_285	58.2	0.4		57.5	-0.3		R_318	52.8	0.2		52.5	-0.1
R_286	59.6	0.4		58.8	-0.4		R_319	48.5	0.5		47.7	-0.3
R_287	58.6	0.4		57.8	-0.4		R_320	55.7	0.6		54.6	-0.5
R_288	59.8	0.5		58.9	-0.4		R_321	55.1	0.5		54.3	-0.3
R_289	59.9	0.5		59.0	-0.4		R_322	53.4	0.4		52.6	-0.4
R_290	60.0	0.5		59.1	-0.4		R_323	53.3	0.4		52.4	-0.5
R_291	60.0	0.5		59.0	-0.5		R_324	52.6	0.4		51.8	-0.4
R_292	59.3	0.5		58.3	-0.5		R_325	53.2	0.4		52.5	-0.3
R_293	59.4	0.5		58.4	-0.5		R_326	52.3	0.4		51.6	-0.3
R_294	59.1	0.5		58.1	-0.5		R_327	52.4	0.4		51.6	-0.4
R_295	59.3	0.5		58.4	-0.4		R_328	52.8	0.5		51.9	-0.4
R_296	57.6	0.4		56.8	-0.4		R_329	54.5	0.6		53.5	-0.4
R_297	57.2	0.5		56.3	-0.4		R_330	53.7	0.5		52.7	-0.5
R_298	56.8	0.4		56.1	-0.3		R_331	52.8	0.5		52.0	-0.3
R_299	56.6	0.4		55.9	-0.3		Region6-A	59.0	0.1		58.7	-0.2
R_300	56.6	0.3		56.0	-0.3		Region6-B	59.1	0.1		58.8	-0.2
R_301	57.1	0.3		56.5	-0.3		Region6-C	58.6	0.1		58.3	-0.2
R_302	62.0	0.1		61.8	-0.1		Region6-D	58.5	0.2		58.2	-0.1
R_303	58.8	0.3		58.2	-0.3		Region6-E	58.2	0.2		57.9	-0.1
R_304	60.0	0.4		59.2	-0.4		Region6-F	57.1	0.1		56.9	-0.1
R_305	59.8	0.4		59.1	-0.3		Region6-G	58.3	0.1		58.1	-0.1
R_306	58.9	0.5		58.0	-0.4		Region6-H	58.6	0.1		58.4	-0.1

Table 7g. Effects of Changing AHD Traffic Speed for Region 7

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_332	52.9	0.6		51.8	-0.5		R_363	59.4	0.2		59.0	-0.2
R_333	53.4	0.5		52.4	-0.5		R_364	59.8	0.2		59.4	-0.2
R_334	54.1	0.5		53.1	-0.5		R_365	53.5	0.4		52.7	-0.4
R_335	57.2	0.5		56.2	-0.5		R_366	54.2	0.5		53.2	-0.5
R_336	56.3	0.5		55.3	-0.5		R_367	56.5	0.6		55.4	-0.5
R_337	56.0	0.5		55.0	-0.5		R_368	56.2	0.5		55.2	-0.5
R_338	53.1	0.4		52.2	-0.5		R_369	57.7	0.6		56.6	-0.5
R_339	55.8	0.5		54.8	-0.5		R_370	57.9	0.6		56.8	-0.5
R_340	55.5	0.6		54.4	-0.5		R_371	59.7	0.6		58.6	-0.5
R_341	55.5	0.6		54.4	-0.5		R_372	57.2	0.5		56.2	-0.5
R_342	55.9	0.6		54.8	-0.5		R_373	58.2	0.6		57.1	-0.5
R_343	56.2	0.6		55.1	-0.5		R_374	58.7	0.6		57.6	-0.5
R_344	56.1	0.6		55.0	-0.5		R_375	59.2	0.6		58.1	-0.5
R_345	56.0	0.5		55.0	-0.5		R_376	59.6	0.6		58.5	-0.5
R_346	56.7	0.5		55.6	-0.6		R_377	60.3	0.6		59.2	-0.5
R_347	56.2	0.5		55.2	-0.5		R_378	58.3	0.6		57.2	-0.5
R_348	56.2	0.6		55.1	-0.5		R_379	59.2	0.6		58.1	-0.5
R_349	57.0	0.5		56.0	-0.5		R_380	56.5	0.5		55.5	-0.5
R_350	56.8	0.5		55.8	-0.5		R_381	58.0	0.5		57.0	-0.5
R_351	57.2	0.5		56.2	-0.5		R_382	58.8	0.5		57.8	-0.5
R_352	56.6	0.5		55.6	-0.5		R_383	58.4	0.5		57.4	-0.5
R_353	56.2	0.5		55.2	-0.5		R_384	57.4	0.5		56.4	-0.5
R_354	57.5	0.5		56.6	-0.4		R_385	58.3	0.5		57.4	-0.4
R_355	58.1	0.5		57.2	-0.4		R_386	56.5	0.4		55.7	-0.4
R_356	58.5	0.5		57.6	-0.4		R_387	56.2	0.4		55.4	-0.4
R_357	57.5	0.4		56.7	-0.4		R_388	56.7	0.4		56.0	-0.3
R_358	57.2	0.4		56.4	-0.4		R_389	57.4	0.4		56.8	-0.2
R_359	56.6	0.3		55.9	-0.4		R_390	59.8	0.1		59.5	-0.2
R_360	57.2	0.4		56.5	-0.3		R_391	61.4	0.0		61.3	-0.1
R_361	57.8	0.2		57.3	-0.3		R_392	61.6	0.1		61.4	-0.1
R_362	58.5	0.2		58.1	-0.2							

Table 7h. Effects of Changing AHD Traffic Speed for Region 8

Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)		Receptor	L_{eq}24 with 110 km/hr on AHD (dBA)	Increase Compared to 100 km/hr (dBA)		L_{eq}24 with 90 km/hr on AHD (dBA)	Decrease Compared to 100 km/hr (dBA)
R_393	57.8	0.4		57.2	-0.2		R_427	60.1	0.5		59.1	-0.5
R_394	57.1	0.4		56.4	-0.3		R_428	57.1	0.5		56.2	-0.4
R_395	55.8	0.4		55.0	-0.4		R_429	58.6	0.5		57.7	-0.4
R_396	55.8	0.5		54.9	-0.4		R_430	58.3	0.5		57.3	-0.5
R_397	56.7	0.5		55.8	-0.4		R_431	58.7	0.5		57.7	-0.5
R_398	57.1	0.5		56.1	-0.5		R_432	58.5	0.5		57.6	-0.4
R_399	54.5	0.5		53.6	-0.4		R_433	58.5	0.5		57.5	-0.5
R_400	54.5	0.5		53.6	-0.4		R_434	59.1	0.5		58.2	-0.4
R_401	51.1	0.3		50.6	-0.2		R_435	58.9	0.5		58.0	-0.4
R_402	50.6	0.2		50.2	-0.2		R_436	59.1	0.5		58.2	-0.4
R_403	50.9	0.1		50.6	-0.2		R_437	58.3	0.4		57.5	-0.4
R_404	52.3	0.1		52.0	-0.2		R_438	57.4	0.4		56.7	-0.3
R_405	55.4	0.3		54.8	-0.3		R_439	57.9	0.4		57.1	-0.4
R_406	55.5	0.2		55.0	-0.3		R_440	57.5	0.4		56.8	-0.3
R_407	55.9	0.3		55.4	-0.2		R_441	57.8	0.4		57.1	-0.3
R_408	57.3	0.3		56.8	-0.2		R_442	58.5	0.3		57.8	-0.4
R_409	58.1	0.3		57.5	-0.3		R_443	58.8	0.4		58.1	-0.3
R_410	57.9	0.3		57.4	-0.2		R_444	59.1	0.3		58.5	-0.3
R_411	58.3	0.3		57.8	-0.2		R_445	59.5	0.3		59.0	-0.2
R_412	59.4	0.3		58.8	-0.3		R_446	61.3	0.2		60.9	-0.2
R_413	59.8	0.3		59.2	-0.3		R_447	62.6	0.3		62.1	-0.2
R_414	60.6	0.3		60.1	-0.2		R_448	63.4	0.3		62.8	-0.3
R_415	60.8	0.2		60.4	-0.2		R_449	64.0	0.4		63.4	-0.2
R_416	61.5	0.2		61.1	-0.2		R_450	64.6	0.4		63.9	-0.3
R_417	61.4	0.2		61.1	-0.1		R_451	65.1	0.4		64.3	-0.4
R_418	59.5	0.2		59.2	-0.1		R_452	65.3	0.4		64.6	-0.3
R_419	58.9	0.2		58.5	-0.2		R_453	61.4	0.4		60.6	-0.4
R_420	56.7	0.4		55.9	-0.4		R_454	62.2	0.5		61.3	-0.4
R_421	55.4	0.4		54.6	-0.4		R_455	63.0	0.5		62.1	-0.4
R_422	54.2	0.5		53.3	-0.4		R_456	64.5	0.4		63.7	-0.4
R_423	56.7	0.3		56.1	-0.3		R_457	64.1	0.4		63.3	-0.4
R_424	58.1	0.6		57.1	-0.4		R_458	63.4	0.5		62.5	-0.4
R_425	57.2	0.5		56.3	-0.4		R_459	62.7	0.4		61.9	-0.4
R_426	59.4	0.6		58.3	-0.5							

Note: The dominant noise sources for Receptors R_451 & R_452 are Calgary Trail, Gateway Blvd, SWAHD, and the associated ramps.

6.3.3. % Heavy Trucks Analysis

In order to determine the effect of varying % heavy trucks, two scenarios were modeled. The future conditions were increased by 5% and then decreased by 5% to determine a relative range of values. It is unlikely that the % heavy trucks will fall outside of this range. The results are shown in Tables 8a – 8h. It can be seen that **the relative sound level increase with a relative increase of 5% heavy trucks is approximately 0.0 – 0.9 dBA. The relative sound level decrease with a relative decrease of 5% heavy trucks is approximately 0.0 – 1.1 dBA.** As with the traffic volumes and traffic speeds assessments, the largest changes were at locations where the noise climate was completely dominated by the noise from SWAHD. The locations with the lowest changes were those where the noise climate was dominated by City Roads. The relative increase in noise levels with a relative increase of 5% heavy trucks on SWAHD would result in a small number of additional locations having noise levels at or above 65 dBA L_{eq}24 (highlighted in yellow in Tables 8a – 8h). These include receptors to the southwest of the interchange at SWAHD and Whitemud Drive (currently no solid fences) and receptors southwest of the interchange at SWAHD and Calgary Trail (Calgary Trail and associated ramps dominate). Again, given that a minimum 2.0 – 3.0 dBA change is required before most people start to notice a change, it will take a significant change to the % heavy trucks before most people will notice the difference.

In general, the effect of changing the % heavy trucks is inversely logarithmic. For example, the difference between 0% and 1% is significant (approximately 0.7 dBA) while the difference between 10% and 11% is much less (approximately 0.2 dBA). Since the % heavy trucks is at least 8% along the entire SWAHD, small % changes in heavy trucks will not have a significant impact.

Table 8a. Effects of Changing AHD % Heavy Trucks for Region 1

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Condition s (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Condition s (dBA)		Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Condition s (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Condition s (dBA)
R_001	59.4	0.2		58.9	-0.3		R_027	63.7	0.2		63.3	-0.2
R_002	60.0	0.4		59.3	-0.3		R_028	63.4	0.2		63.1	-0.1
R_003	59.2	0.5		58.2	-0.5		R_029	63.5	0.1		63.3	-0.1
R_004	58.6	0.5		57.6	-0.5		R_030	57.6	0.4		56.7	-0.5
R_005	61.3	0.6		60.0	-0.7		R_031	57.1	0.5		55.9	-0.7
R_006	58.4	0.6		57.0	-0.8		R_032	56.6	0.6		55.2	-0.8
R_007	57.7	0.7		56.2	-0.8		R_033	59.1	0.7		57.5	-0.9
R_008	60.5	0.7		58.9	-0.9		R_034	58.2	0.7		56.7	-0.8
R_009	60.5	0.7		59.0	-0.8		R_035	57.2	0.7		55.7	-0.8
R_010	60.4	0.8		58.7	-0.9		R_036	56.7	0.7		55.2	-0.8
R_011	60.3	0.7		58.7	-0.9		R_037	56.6	0.7		55.2	-0.7
R_012	60.2	0.7		58.6	-0.9		R_038	56.3	0.6		54.9	-0.8
R_013	60.2	0.7		58.6	-0.9		R_039	58.3	0.3		57.7	-0.3
R_014	60.2	0.7		58.6	-0.9		R_040	59.5	0.7		57.9	-0.9
R_015	59.0	0.7		57.4	-0.9		R_041	60.9	0.7		59.4	-0.8
R_016	58.1	0.6		56.7	-0.8		R_042	59.6	0.7		58.1	-0.8
R_017	58.4	0.6		57.1	-0.7		R_043	58.7	0.6		57.3	-0.8
R_018	60.2	0.4		59.4	-0.4		R_044	60.9	0.6		59.5	-0.8
R_019	60.4	0.6		59.1	-0.7		R_045	59.7	0.5		58.5	-0.7
R_020	60.4	0.5		59.2	-0.7		R_046	59.6	0.5		58.5	-0.6
R_021	60.5	0.6		59.3	-0.6		R_047	59.7	0.5		58.6	-0.6
R_022	60.7	0.6		59.5	-0.6		R_048	60.0	0.5		59.0	-0.5
R_023	60.9	0.5		59.8	-0.6		R_049	59.9	0.4		59.1	-0.4
R_024	61.2	0.5		60.2	-0.5		R_050	60.0	0.3		59.3	-0.4
R_025	61.7	0.4		60.8	-0.5		R_051	60.4	0.2		60.0	-0.2
R_026	62.6	0.4		61.8	-0.4		R_052	60.6	0.1		60.3	-0.2

Table 8b. Effects of Changing AHD % Heavy Trucks for Region 2

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_053	58.9	0.3		58.4	-0.2		R_087	60.5	0.4		59.6	-0.5
R_054	58.3	0.4		57.6	-0.3		R_088	60.4	0.5		59.3	-0.6
R_055	60.3	0.5		59.3	-0.5		R_089	61.0	0.6		59.8	-0.6
R_056	60.5	0.6		59.2	-0.7		R_090	64.1	0.6		62.8	-0.7
R_057	60.6	0.6		59.3	-0.7		R_091	65.1	0.7		63.5	-0.9
R_058	59.4	0.7		57.9	-0.8		R_092	65.5	0.8		63.8	-0.9
R_059	60.0	0.7		58.5	-0.8		R_093	61.3	0.7		59.8	-0.8
R_060	61.1	0.8		59.5	-0.8		R_094	59.1	0.6		57.8	-0.7
R_061	61.8	0.7		60.2	-0.9		R_095	59.8	0.6		58.4	-0.8
R_062	62.8	0.7		61.2	-0.9		R_096	59.5	0.6		58.1	-0.8
R_063	63.2	0.7		61.5	-1.0		R_097	59.6	0.6		58.3	-0.7
R_064	63.6	0.8		61.8	-1.0		R_098	65.8	0.8		64.0	-1.0
R_065	63.8	0.8		62.0	-1.0		R_099	66.0	0.8		64.2	-1.0
R_066	62.6	0.8		60.8	-1.0		R_100	60.4	0.7		58.8	-0.9
R_067	60.8	0.8		59.1	-0.9		R_101	60.5	0.8		58.8	-0.9
R_068	60.6	0.7		59.1	-0.8		R_102	60.6	0.7		58.9	-1.0
R_069	60.0	0.7		58.3	-1.0		R_103	60.3	0.7		58.7	-0.9
R_070	60.6	0.8		58.8	-1.0		R_104	59.9	0.8		58.2	-0.9
R_071	61.5	0.8		59.7	-1.0		R_105	60.6	0.7		59.2	-0.7
R_072	60.7	0.8		59.0	-0.9		R_106	63.0	0.9		61.1	-1.0
R_073	61.5	0.8		59.7	-1.0		R_107	63.4	0.8		61.6	-1.0
R_074	61.5	0.8		59.7	-1.0		R_108	63.7	0.8		61.9	-1.0
R_075	60.9	0.8		59.2	-0.9		R_109	58.9	0.7		57.3	-0.9
R_076	60.6	0.7		58.9	-1.0		R_110	59.9	0.7		58.3	-0.9
R_077	61.0	0.8		59.2	-1.0		R_111	59.1	0.7		57.5	-0.9
R_078	60.3	0.8		58.5	-1.0		R_112	58.3	0.6		57.1	-0.6
R_079	61.2	0.8		59.5	-0.9		R_113	56.1	0.6		54.9	-0.6
R_080	59.8	0.8		58.2	-0.8		R_114	59.0	0.6		57.7	-0.7
R_081	56.4	0.6		55.0	-0.8		R_115	55.7	0.6		54.4	-0.7
R_082	60.2	0.2		59.7	-0.3		R_116	58.8	0.8		57.1	-0.9
R_083	60.3	0.1		60.0	-0.2		R_117	58.4	0.6		57.0	-0.8
R_084	60.6	0.2		60.1	-0.3		R_118	59.2	0.6		57.8	-0.8
R_085	60.0	0.3		59.3	-0.4		R_119	60.0	0.7		58.5	-0.8
R_086	60.7	0.4		59.8	-0.5							

Note: SWAHD is the dominant noise source at Receptors R_091, R_092, R_098, R_099. However, these locations do not currently have any solid wood fences to act as noise barriers.

Table 8c. Effects of Changing AHD % Heavy Trucks for Region 3

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_120	59.3	0.4		58.4	-0.5
R_121	57.2	0.7		55.8	-0.7
R_122	57.5	0.6		56.1	-0.8
R_123	58.0	0.7		56.5	-0.8
R_124	58.5	0.8		56.9	-0.8
R_125	58.9	0.7		57.3	-0.9
R_126	59.2	0.8		57.5	-0.9
R_127	59.7	0.8		58.0	-0.9
R_128	60.1	0.7		58.4	-1.0
R_129	61.0	0.8		59.3	-0.9
R_130	59.8	0.8		58.1	-0.9
R_131	60.3	0.8		58.6	-0.9
R_132	60.3	0.8		58.6	-0.9
R_133	60.4	0.7		58.7	-1.0
R_134	60.6	0.8		58.8	-1.0
R_135	60.6	0.8		58.8	-1.0
R_136	60.5	0.8		58.8	-0.9
R_137	62.0	0.7		60.3	-1.0
R_138	61.8	0.7		60.3	-0.8
R_139	59.8	0.2		59.3	-0.3
R_140	58.9	0.5		57.9	-0.5
R_141	58.2	0.6		57.0	-0.6
R_142	57.7	0.6		56.4	-0.7
R_143	57.9	0.6		56.5	-0.8
R_144	60.0	0.7		58.5	-0.8
R_145	60.5	0.6		59.1	-0.8
R_146	61.9	0.7		60.5	-0.7
R_147	61.8	0.7		60.4	-0.7
R_148	61.3	0.5		60.2	-0.6
R_149	59.8	0.7		58.3	-0.8
R_150	58.3	0.7		56.7	-0.9
R_151	60.4	0.6		59.0	-0.8
R_152	62.8	0.8		61.0	-1.0
R_153	62.3	0.8		60.5	-1.0
R_154	63.2	0.8		61.4	-1.0
R_155	63.6	0.8		61.8	-1.0
R_156	62.5	0.8		60.7	-1.0
R_157	58.7	0.8		57.1	-0.8
R_158	57.8	0.4		56.9	-0.5
R_159	57.9	0.7		56.4	-0.8
R_160	59.7	0.8		58.1	-0.8
R_161	56.4	0.7		54.9	-0.8
R_162	56.8	0.7		55.3	-0.8
R_163	59.9	0.6		58.5	-0.8
R_164	59.7	0.4		58.7	-0.6
R_165	56.2	0.2		55.8	-0.2

Table 8d. Effects of Changing AHD % Heavy Trucks for Region 4

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_166	57.4	0.5		56.4	-0.5		R_194	58.3	0.8		56.6	-0.9
R_167	58.3	0.4		57.4	-0.5		R_195	58.8	0.8		57.1	-0.9
R_168	57.6	0.4		56.6	-0.6		R_196	59.2	0.8		57.5	-0.9
R_169	56.7	0.7		55.1	-0.9		R_197	58.0	0.8		56.3	-0.9
R_170	56.6	0.7		54.9	-1.0		R_198	58.6	0.8		56.9	-0.9
R_171	56.7	0.8		55.0	-0.9		R_199	52.6	0.6		51.3	-0.7
R_172	57.3	0.7		55.6	-1.0		R_200	55.4	0.3		54.8	-0.3
R_173	57.7	0.8		55.9	-1.0		R_201	61.7	0.0		61.6	-0.1
R_174	58.3	0.8		56.5	-1.0		R_202	57.9	0.4		57.1	-0.4
R_175	58.9	0.7		57.2	-1.0		R_203	55.4	0.4		54.5	-0.5
R_176	58.9	0.8		57.1	-1.0		R_204	56.7	0.5		55.7	-0.5
R_177	61.5	0.8		59.6	-1.1		R_205	55.1	0.5		53.9	-0.7
R_178	61.9	0.8		60.0	-1.1		R_206	55.6	0.7		54.0	-0.9
R_179	60.6	0.8		58.7	-1.1		R_207	55.9	0.7		54.4	-0.8
R_180	59.5	0.8		57.7	-1.0		R_208	55.0	0.7		53.4	-0.9
R_181	60.0	0.8		58.2	-1.0		R_209	53.0	0.7		51.4	-0.9
R_182	57.2	0.8		55.4	-1.0		R_210	50.9	0.7		49.3	-0.9
R_183	55.6	0.8		53.8	-1.0		Region4-A	57.8	0.8		56.1	-0.9
R_184	58.2	0.8		56.4	-1.0		Region4-B	57.7	0.7		56.0	-1.0
R_185	59.9	0.8		58.1	-1.0		Region4-C	57.7	0.8		56.0	-0.9
R_186	57.4	0.8		55.6	-1.0		Region4-D	57.6	0.8		55.9	-0.9
R_187	57.1	0.8		55.3	-1.0		Region4-E	57.4	0.7		55.7	-1.0
R_188	57.8	0.8		56.1	-0.9		Region4-F	57.1	0.8		55.4	-0.9
R_189	57.3	0.8		55.5	-1.0		Region4-G	56.8	0.8		55.0	-1.0
R_190	58.1	0.8		56.4	-0.9		Region4-H	54.8	0.8		53.0	-1.0
R_191	58.1	0.8		56.4	-0.9		Region4-I	54.5	0.8		52.7	-1.0
R_192	58.6	0.7		57.0	-0.9		Region4-J	54.5	0.8		52.7	-1.0
R_193	58.6	0.8		56.9	-0.9		Region4-K	55.4	0.8		53.5	-1.1

Table 8e. Effects of Changing AHD % Heavy Trucks for Region 5

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_211	53.0	0.8		51.2	-1.0		R_243	56.3	0.3		55.7	-0.3
R_212	52.1	0.8		50.3	-1.0		R_244	57.2	0.2		56.8	-0.2
R_213	51.0	0.7		49.4	-0.9		R_245	56.9	0.2		56.5	-0.2
R_214	51.7	0.7		50.2	-0.8		R_246	57.4	0.2		57.1	-0.1
R_215	51.9	0.7		50.4	-0.8		R_247	57.1	0.1		56.9	-0.1
R_216	54.5	0.8		52.7	-1.0		R_248	56.4	0.1		56.2	-0.1
R_217	54.5	0.8		52.6	-1.1		R_249	59.5	0.1		59.4	0.0
R_218	55.7	0.8		53.8	-1.1		R_250	52.5	0.7		51.1	-0.7
R_219	57.3	0.8		55.4	-1.1		R_251	54.8	0.8		53.1	-0.9
R_220	57.1	0.8		55.3	-1.0		R_252	56.2	0.8		54.5	-0.9
R_221	57.2	0.8		55.4	-1.0		R_253	54.9	0.7		53.5	-0.7
R_222	56.3	0.8		54.5	-1.0		R_254	54.6	0.6		53.1	-0.9
R_223	55.5	0.8		53.7	-1.0		R_255	54.3	0.7		52.8	-0.8
R_224	55.0	0.8		53.2	-1.0		R_256	54.4	0.7		52.9	-0.8
R_225	53.9	0.9		52.0	-1.0		R_257	54.7	0.6		53.3	-0.8
R_226	55.8	0.8		54.0	-1.0		R_258	54.9	0.7		53.4	-0.8
R_227	55.0	0.8		53.3	-0.9		R_259	55.1	0.7		53.6	-0.8
R_228	55.0	0.7		53.3	-1.0		R_260	55.4	0.7		54.0	-0.7
R_229	55.1	0.7		53.4	-1.0		R_261	55.8	0.7		54.4	-0.7
R_230	55.2	0.7		53.6	-0.9		R_262	56.2	0.6		54.8	-0.8
R_231	55.4	0.7		53.9	-0.8		R_263	56.4	0.6		55.1	-0.7
R_232	55.5	0.8		53.8	-0.9		R_264	56.4	0.6		55.0	-0.8
R_233	55.9	0.8		54.3	-0.8		R_265	56.0	0.6		54.7	-0.7
R_234	55.5	0.7		54.0	-0.8		R_266	55.8	0.6		54.7	-0.5
R_235	55.9	0.7		54.3	-0.9		R_267	56.2	0.4		55.3	-0.5
R_236	56.2	0.7		54.7	-0.8		R_268	57.0	0.4		56.2	-0.4
R_237	53.5	0.6		52.2	-0.7		R_269	58.9	0.3		58.3	-0.3
R_238	54.6	0.5		53.4	-0.7		R_270	60.2	0.3		59.7	-0.2
R_239	54.6	0.5		53.4	-0.7		R_271	59.9	0.2		59.5	-0.2
R_240	54.1	0.5		53.1	-0.5		R_272	58.1	0.3		57.6	-0.2
R_241	54.0	0.4		53.1	-0.5		R_273	58.4	0.2		58.0	-0.2
R_242	54.2	0.3		53.5	-0.4							

Table 8f. Effects of Changing AHD % Heavy Trucks for Region 6

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)	L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)	Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)	L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_274	61.4	0.1	61.3	0.0	R_307	58.1	0.7	56.6	-0.8
R_275	61.7	0.1	61.6	0.0	R_308	62.5	0.1	62.2	-0.2
R_276	60.5	0.0	60.4	-0.1	R_309	60.1	0.4	59.2	-0.5
R_277	59.6	0.1	59.4	-0.1	R_310	59.3	0.5	58.2	-0.6
R_278	58.8	0.1	58.6	-0.1	R_311	57.9	0.6	56.5	-0.8
R_279	56.7	0.2	56.3	-0.2	R_312	57.0	0.7	55.4	-0.9
R_280	56.3	0.3	55.7	-0.3	R_313	56.8	0.8	55.1	-0.9
R_281	55.3	0.3	54.6	-0.4	R_314	56.9	0.8	55.1	-1.0
R_282	55.3	0.4	54.5	-0.4	R_315	57.7	0.9	55.8	-1.0
R_283	56.5	0.5	55.6	-0.4	R_316	57.2	0.7	55.6	-0.9
R_284	57.5	0.5	56.4	-0.6	R_317	56.7	0.6	55.4	-0.7
R_285	58.4	0.6	57.2	-0.6	R_318	52.9	0.3	52.3	-0.3
R_286	59.9	0.7	58.4	-0.8	R_319	48.7	0.7	47.3	-0.7
R_287	58.9	0.7	57.4	-0.8	R_320	55.9	0.8	54.1	-1.0
R_288	60.0	0.7	58.5	-0.8	R_321	55.3	0.7	53.9	-0.7
R_289	60.1	0.7	58.5	-0.9	R_322	53.7	0.7	52.2	-0.8
R_290	60.3	0.8	58.7	-0.8	R_323	53.6	0.7	52.0	-0.9
R_291	60.2	0.7	58.6	-0.9	R_324	52.9	0.7	51.4	-0.8
R_292	59.5	0.7	57.9	-0.9	R_325	53.4	0.6	52.1	-0.7
R_293	59.6	0.7	57.9	-1.0	R_326	52.5	0.6	51.3	-0.6
R_294	59.3	0.7	57.7	-0.9	R_327	52.6	0.6	51.2	-0.8
R_295	59.6	0.8	58.0	-0.8	R_328	53.1	0.8	51.5	-0.8
R_296	57.9	0.7	56.4	-0.8	R_329	54.7	0.8	53.0	-0.9
R_297	57.4	0.7	55.9	-0.8	R_330	53.9	0.7	52.3	-0.9
R_298	57.1	0.7	55.7	-0.7	R_331	53.0	0.7	51.6	-0.7
R_299	56.8	0.6	55.5	-0.7	Region6-A	59.1	0.2	58.6	-0.3
R_300	56.8	0.5	55.7	-0.6	Region6-B	59.2	0.2	58.7	-0.3
R_301	57.2	0.4	56.3	-0.5	Region6-C	58.7	0.2	58.2	-0.3
R_302	62.0	0.1	61.7	-0.2	Region6-D	58.5	0.2	58.1	-0.2
R_303	59.0	0.5	57.9	-0.6	Region6-E	58.3	0.3	57.8	-0.2
R_304	60.2	0.6	58.9	-0.7	Region6-F	57.2	0.2	56.8	-0.2
R_305	60.0	0.6	58.7	-0.7	Region6-G	58.4	0.2	58.0	-0.2
R_306	59.1	0.7	57.5	-0.9	Region6-H	58.7	0.2	58.3	-0.2

Table 8g. Effects of Changing AHD % Heavy Trucks for Region 7

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_332	53.1	0.8		51.4	-0.9		R_363	59.6	0.4		58.8	-0.4
R_333	53.7	0.8		51.9	-1.0		R_364	59.9	0.3		59.2	-0.4
R_334	54.4	0.8		52.6	-1.0		R_365	53.7	0.6		52.3	-0.8
R_335	57.5	0.8		55.7	-1.0		R_366	54.4	0.7		52.7	-1.0
R_336	56.6	0.8		54.8	-1.0		R_367	56.8	0.9		54.9	-1.0
R_337	56.2	0.7		54.5	-1.0		R_368	56.5	0.8		54.7	-1.0
R_338	53.3	0.6		51.8	-0.9		R_369	58.0	0.9		56.1	-1.0
R_339	56.1	0.8		54.3	-1.0		R_370	58.1	0.8		56.2	-1.1
R_340	55.7	0.8		53.9	-1.0		R_371	60.0	0.9		58.1	-1.0
R_341	55.8	0.9		53.9	-1.0		R_372	57.5	0.8		55.7	-1.0
R_342	56.2	0.9		54.3	-1.0		R_373	58.5	0.9		56.6	-1.0
R_343	56.5	0.9		54.6	-1.0		R_374	58.9	0.8		57.1	-1.0
R_344	56.4	0.9		54.5	-1.0		R_375	59.5	0.9		57.6	-1.0
R_345	56.3	0.8		54.5	-1.0		R_376	59.8	0.8		57.9	-1.1
R_346	57.0	0.8		55.1	-1.1		R_377	60.5	0.8		58.6	-1.1
R_347	56.5	0.8		54.7	-1.0		R_378	58.6	0.9		56.7	-1.0
R_348	56.4	0.8		54.6	-1.0		R_379	59.4	0.8		57.6	-1.0
R_349	57.3	0.8		55.5	-1.0		R_380	56.8	0.8		55.0	-1.0
R_350	57.1	0.8		55.3	-1.0		R_381	58.3	0.8		56.6	-0.9
R_351	57.5	0.8		55.8	-0.9		R_382	59.0	0.7		57.3	-1.0
R_352	56.9	0.8		55.2	-0.9		R_383	58.6	0.7		57.0	-0.9
R_353	56.4	0.7		54.8	-0.9		R_384	57.6	0.7		56.0	-0.9
R_354	57.8	0.8		56.1	-0.9		R_385	58.5	0.7		57.0	-0.8
R_355	58.3	0.7		56.7	-0.9		R_386	56.7	0.6		55.3	-0.8
R_356	58.7	0.7		57.2	-0.8		R_387	56.4	0.6		55.0	-0.8
R_357	57.7	0.6		56.3	-0.8		R_388	56.9	0.6		55.7	-0.6
R_358	57.4	0.6		56.1	-0.7		R_389	57.5	0.5		56.5	-0.5
R_359	56.8	0.5		55.6	-0.7		R_390	59.9	0.2		59.4	-0.3
R_360	57.3	0.5		56.3	-0.5		R_391	61.5	0.1		61.2	-0.2
R_361	58.0	0.4		57.1	-0.5		R_392	61.6	0.1		61.3	-0.2
R_362	58.7	0.4		57.9	-0.4							

Table 8h. Effects of Changing AHD % Heavy Trucks for Region 8

Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_393	57.9	0.5		56.9	-0.5		R_427	60.4	0.8		58.6	-1.0
R_394	57.3	0.6		56.1	-0.6		R_428	57.3	0.7		55.8	-0.8
R_395	56.0	0.6		54.7	-0.7		R_429	58.9	0.8		57.3	-0.8
R_396	56.0	0.7		54.5	-0.8		R_430	58.5	0.7		56.9	-0.9
R_397	56.9	0.7		55.4	-0.8		R_431	58.9	0.7		57.3	-0.9
R_398	57.3	0.7		55.7	-0.9		R_432	58.8	0.8		57.1	-0.9
R_399	54.8	0.8		53.2	-0.8		R_433	58.7	0.7		57.1	-0.9
R_400	54.7	0.7		53.2	-0.8		R_434	59.3	0.7		57.8	-0.8
R_401	51.3	0.5		50.3	-0.5		R_435	59.1	0.7		57.6	-0.8
R_402	50.7	0.3		50.0	-0.4		R_436	59.3	0.7		57.8	-0.8
R_403	51.0	0.2		50.5	-0.3		R_437	58.5	0.6		57.2	-0.7
R_404	52.4	0.2		51.9	-0.3		R_438	57.6	0.6		56.4	-0.6
R_405	55.6	0.5		54.6	-0.5		R_439	58.1	0.6		56.8	-0.7
R_406	55.7	0.4		54.8	-0.5		R_440	57.7	0.6		56.5	-0.6
R_407	56.0	0.4		55.2	-0.4		R_441	58.0	0.6		56.8	-0.6
R_408	57.5	0.5		56.6	-0.4		R_442	58.7	0.5		57.5	-0.7
R_409	58.2	0.4		57.2	-0.6		R_443	58.9	0.5		57.9	-0.5
R_410	58.0	0.4		57.1	-0.5		R_444	59.3	0.5		58.3	-0.5
R_411	58.5	0.5		57.6	-0.4		R_445	59.6	0.4		58.8	-0.4
R_412	59.6	0.5		58.6	-0.5		R_446	61.4	0.3		60.7	-0.4
R_413	59.9	0.4		59.0	-0.5		R_447	62.7	0.4		61.9	-0.4
R_414	60.7	0.4		59.9	-0.4		R_448	63.6	0.5		62.6	-0.5
R_415	60.9	0.3		60.2	-0.4		R_449	64.1	0.5		63.1	-0.5
R_416	61.5	0.2		61.0	-0.3		R_450	64.7	0.5		63.6	-0.6
R_417	61.5	0.3		60.9	-0.3		R_451	65.2	0.5		64.0	-0.7
R_418	59.6	0.3		59.1	-0.2		R_452	65.5	0.6		64.2	-0.7
R_419	59.0	0.3		58.3	-0.4		R_453	61.6	0.6		60.2	-0.8
R_420	56.8	0.5		55.6	-0.7		R_454	62.4	0.7		61.0	-0.7
R_421	55.7	0.7		54.2	-0.8		R_455	63.2	0.7		61.8	-0.7
R_422	54.4	0.7		53.0	-0.7		R_456	64.7	0.6		63.3	-0.8
R_423	56.8	0.4		55.8	-0.6		R_457	64.3	0.6		62.9	-0.8
R_424	58.3	0.8		56.6	-0.9		R_458	63.6	0.7		62.2	-0.7
R_425	57.5	0.8		55.8	-0.9		R_459	62.9	0.6		61.5	-0.8
R_426	59.6	0.8		57.9	-0.9							

Note: The dominant noise sources for Receptors R_451 & R_452 are Calgary Trail, Gateway Blvd, SWAHD, and the associated ramps.

6.3.4. Cumulative Sensitivity Analysis

With the information provided by the sensitivity analysis for each of the three main traffic parameters, it is possible to determine a cumulative effect if all three are taken into account simultaneously. The results are presented in Tables 9a – 9h. It can be seen that **the relative sound level increase with 25% more traffic on SWAHD, a speed of 110 km/hr, and a relative increase of 5% heavy trucks is approximately 0.1 – 2.3 dBA. The relative sound level decrease with 25% less traffic, a speed of 90 km/hr, and a relative decrease of 5% heavy trucks is approximately 0.1 – 3.0 dBA.** At locations in which the noise climate is most directly impacted by City roadways, the increases are as low as 0.1 dBA. The relative increase in noise levels associated with a relative increase of 25% traffic volumes, 5% heavy trucks and a speed of 110 km/hr on SWAHD would result in a small number of additional locations having noise levels at or above 65 dBA L_{eq}24 (highlighted in yellow in Tables 9a –9h). These include receptors at the following locations:

- East of SWAHD between Whitemud Drive and Callingwood Road (currently no solid fence)
- Southwest of the interchange at SWAHD and Whitemud Drive (currently no solid fences)
- West of SWAHD between Whitemud Drive and Callingwood Road (currently no solid fences)
- Southwest of the interchange at SWAHD and Calgary Trail (Calgary Trail and associated ramps dominate).

Table 9a. Effects of Cumulative Effects on Noise Levels For Region 1

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_001	59.9	0.7		58.5	-0.7		R_027	64.2	0.7		62.9	-0.6
R_002	60.6	1.0		58.7	-0.9		R_028	63.8	0.6		62.8	-0.4
R_003	60.0	1.3		57.4	-1.3		R_029	63.8	0.4		63.1	-0.3
R_004	59.5	1.4		56.8	-1.3		R_030	58.5	1.3		55.9	-1.3
R_005	62.4	1.7		58.8	-1.9		R_031	58.2	1.6		54.7	-1.9
R_006	59.5	1.7		55.8	-2.0		R_032	57.8	1.8		53.8	-2.2
R_007	58.9	1.9		54.8	-2.2		R_033	60.3	1.9		56.0	-2.4
R_008	61.8	2.0		57.4	-2.4		R_034	59.5	2.0		55.2	-2.3
R_009	61.8	2.0		57.5	-2.3		R_035	58.4	1.9		54.2	-2.3
R_010	61.7	2.1		57.2	-2.4		R_036	57.9	1.9		53.8	-2.2
R_011	61.6	2.0		57.1	-2.5		R_037	57.8	1.9		53.8	-2.1
R_012	61.5	2.0		57.0	-2.5		R_038	57.5	1.8		53.5	-2.2
R_013	61.5	2.0		57.1	-2.4		R_039	58.8	0.8		57.3	-0.7
R_014	61.4	1.9		57.2	-2.3		R_040	60.7	1.9		56.5	-2.3
R_015	60.2	1.9		56.0	-2.3		R_041	62.2	2.0		58.0	-2.2
R_016	59.3	1.8		55.5	-2.0		R_042	60.7	1.8		56.7	-2.2
R_017	59.5	1.7		55.9	-1.9		R_043	59.9	1.8		56.1	-2.0
R_018	60.9	1.1		58.7	-1.1		R_044	62.0	1.7		58.2	-2.1
R_019	61.5	1.7		58.0	-1.8		R_045	60.8	1.6		57.4	-1.8
R_020	61.5	1.6		58.1	-1.8		R_046	60.6	1.5		57.5	-1.6
R_021	61.5	1.6		58.2	-1.7		R_047	60.6	1.4		57.7	-1.5
R_022	61.7	1.6		58.5	-1.6		R_048	60.8	1.3		58.2	-1.3
R_023	61.9	1.5		58.8	-1.6		R_049	60.6	1.1		58.5	-1.0
R_024	62.1	1.4		59.3	-1.4		R_050	60.6	0.9		58.8	-0.9
R_025	62.6	1.3		60.1	-1.2		R_051	60.9	0.7		59.6	-0.6
R_026	63.3	1.1		61.3	-0.9		R_052	61.0	0.5		60.1	-0.4

Table 9b. Effects of Cumulative Effects on Noise Levels For Region 2

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_053	59.3	0.7		58.1	-0.5		R_087	61.4	1.3		58.8	-1.3
R_054	58.9	1.0		57.1	-0.8		R_088	61.3	1.4		58.3	-1.6
R_055	61.2	1.4		58.4	-1.4		R_089	62.1	1.7		58.7	-1.7
R_056	61.5	1.6		58.1	-1.8		R_090	65.2	1.7		61.5	-2.0
R_057	61.6	1.6		58.2	-1.8		R_091	66.3	1.9		62.1	-2.3
R_058	60.5	1.8		56.5	-2.2		R_092	66.7	2.0		62.2	-2.5
R_059	61.2	1.9		57.0	-2.3		R_093	62.5	1.9		58.4	-2.2
R_060	62.3	2.0		58.0	-2.3		R_094	60.2	1.7		56.7	-1.8
R_061	63.1	2.0		58.7	-2.4		R_095	61.0	1.8		57.1	-2.1
R_062	64.1	2.0		59.6	-2.5		R_096	60.7	1.8		56.9	-2.0
R_063	64.5	2.0		59.9	-2.6		R_097	60.7	1.7		57.1	-1.9
R_064	64.9	2.1		60.2	-2.6		R_098	67.1	2.1		62.2	-2.8
R_065	65.1	2.1		60.3	-2.7		R_099	67.4	2.2		62.3	-2.9
R_066	63.9	2.1		59.1	-2.7		R_100	61.7	2.0		57.3	-2.4
R_067	62.0	2.0		57.6	-2.4		R_101	61.7	2.0		57.3	-2.4
R_068	61.9	2.0		57.6	-2.3		R_102	61.9	2.0		57.4	-2.5
R_069	61.3	2.0		56.7	-2.6		R_103	61.6	2.0		57.1	-2.5
R_070	61.9	2.1		57.0	-2.8		R_104	61.2	2.1		56.6	-2.5
R_071	62.8	2.1		57.9	-2.8		R_105	61.7	1.8		57.9	-2.0
R_072	62.0	2.1		57.3	-2.6		R_106	64.3	2.2		59.3	-2.8
R_073	62.8	2.1		58.1	-2.6		R_107	64.8	2.2		59.8	-2.8
R_074	62.9	2.2		58.0	-2.7		R_108	65.1	2.2		60.0	-2.9
R_075	62.2	2.1		57.5	-2.6		R_109	60.2	2.0		55.8	-2.4
R_076	62.0	2.1		57.2	-2.7		R_110	61.2	2.0		56.7	-2.5
R_077	62.4	2.2		57.5	-2.7		R_111	60.3	1.9		56.0	-2.4
R_078	61.6	2.1		56.8	-2.7		R_112	59.2	1.5		56.2	-1.5
R_079	62.5	2.1		57.9	-2.5		R_113	57.1	1.6		53.8	-1.7
R_080	61.0	2.0		56.7	-2.3		R_114	60.1	1.7		56.6	-1.8
R_081	57.5	1.7		53.8	-2.0		R_115	56.7	1.6		53.4	-1.7
R_082	60.7	0.7		59.3	-0.7		R_116	60.1	2.1		55.5	-2.5
R_083	60.7	0.5		59.8	-0.4		R_117	59.5	1.7		55.8	-2.0
R_084	61.1	0.7		59.8	-0.6		R_118	60.4	1.8		56.6	-2.0
R_085	60.6	0.9		58.8	-0.9		R_119	61.1	1.8		57.3	-2.0
R_086	61.4	1.1		59.2	-1.1							

Note: SWAHD is the dominant noise source at Receptors R_065, R_090, R_091, R_092, R_098, R_099, R_108. However, these locations do not currently have any solid wood fences to act as noise barriers.

Table 9c. Effects of Cumulative Effects on Noise Levels For Region 3

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_120	60.0	1.1		57.8	-1.1
R_121	58.3	1.8		54.5	-2.0
R_122	58.7	1.8		54.8	-2.1
R_123	59.3	2.0		55.0	-2.3
R_124	59.7	2.0		55.3	-2.4
R_125	60.2	2.0		55.7	-2.5
R_126	60.5	2.1		55.8	-2.6
R_127	61.1	2.2		56.3	-2.6
R_128	61.5	2.1		56.7	-2.7
R_129	62.4	2.2		57.5	-2.7
R_130	61.1	2.1		56.4	-2.6
R_131	61.6	2.1		56.9	-2.6
R_132	61.6	2.1		56.9	-2.6
R_133	61.8	2.1		57.0	-2.7
R_134	61.9	2.1		57.1	-2.7
R_135	61.9	2.1		57.1	-2.7
R_136	61.8	2.1		57.1	-2.6
R_137	63.4	2.1		58.6	-2.7
R_138	63.1	2.0		58.9	-2.2
R_139	60.4	0.8		58.8	-0.8
R_140	59.7	1.3		57.1	-1.3
R_141	59.3	1.7		55.9	-1.7
R_142	58.9	1.8		55.2	-1.9
R_143	59.0	1.7		55.2	-2.1
R_144	61.1	1.8		57.2	-2.1
R_145	61.7	1.8		57.8	-2.1
R_146	63.0	1.8		59.3	-1.9
R_147	62.9	1.8		59.1	-2.0
R_148	62.2	1.4		59.4	-1.4
R_149	61.0	1.9		56.9	-2.2
R_150	59.6	2.0		55.1	-2.5
R_151	61.5	1.7		57.7	-2.1
R_152	64.2	2.2		59.2	-2.8
R_153	63.7	2.2		58.7	-2.8
R_154	64.5	2.1		59.5	-2.9
R_155	64.9	2.1		60.0	-2.8
R_156	63.8	2.1		58.9	-2.8
R_157	59.9	2.0		55.6	-2.3
R_158	58.6	1.2		56.1	-1.3
R_159	59.1	1.9		54.8	-2.4
R_160	61.0	2.1		56.4	-2.5
R_161	57.6	1.9		53.5	-2.2
R_162	58.0	1.9		53.9	-2.2
R_163	61.0	1.7		57.2	-2.1
R_164	60.6	1.3		57.8	-1.5
R_165	56.6	0.6		55.6	-0.4

Table 9d. Effects of Cumulative Effects on Noise Levels For Region 4

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_166	58.2	1.3		55.7	-1.2		R_194	59.6	2.1		55.0	-2.5
R_167	59.2	1.3		56.6	-1.3		R_195	60.1	2.1		55.4	-2.6
R_168	58.5	1.3		55.8	-1.4		R_196	60.5	2.1		55.9	-2.5
R_169	58.0	2.0		53.6	-2.4		R_197	59.3	2.1		54.7	-2.5
R_170	57.9	2.0		53.3	-2.6		R_198	59.9	2.1		55.2	-2.6
R_171	58.0	2.1		53.3	-2.6		R_199	53.6	1.6		50.2	-1.8
R_172	58.7	2.1		53.9	-2.7		R_200	55.9	0.8		54.4	-0.7
R_173	59.0	2.1		54.2	-2.7		R_201	61.8	0.1		61.5	-0.2
R_174	59.6	2.1		54.7	-2.8		R_202	58.5	1.0		56.5	-1.0
R_175	60.3	2.1		55.4	-2.8		R_203	56.2	1.2		53.8	-1.2
R_176	60.2	2.1		55.3	-2.8		R_204	57.6	1.4		54.8	-1.4
R_177	62.8	2.1		57.8	-2.9		R_205	56.2	1.6		52.8	-1.8
R_178	63.2	2.1		58.2	-2.9		R_206	56.8	1.9		52.7	-2.2
R_179	62.0	2.2		56.9	-2.9		R_207	57.2	2.0		53.0	-2.2
R_180	60.9	2.2		55.8	-2.9		R_208	56.2	1.9		52.0	-2.3
R_181	61.4	2.2		56.2	-3.0		R_209	54.3	2.0		49.9	-2.4
R_182	58.6	2.2		53.5	-2.9		R_210	52.2	2.0		47.7	-2.5
R_183	57.0	2.2		52.0	-2.8		Region4-A	59.0	2.0		54.5	-2.5
R_184	59.5	2.1		54.6	-2.8		Region4-B	59.0	2.0		54.4	-2.6
R_185	61.3	2.2		56.3	-2.8		Region4-C	59.0	2.1		54.3	-2.6
R_186	58.7	2.1		53.9	-2.7		Region4-D	58.9	2.1		54.1	-2.7
R_187	58.4	2.1		53.6	-2.7		Region4-E	58.8	2.1		53.9	-2.8
R_188	59.2	2.2		54.3	-2.7		Region4-F	58.5	2.2		53.6	-2.7
R_189	58.6	2.1		53.7	-2.8		Region4-G	58.1	2.1		53.2	-2.8
R_190	59.5	2.2		54.6	-2.7		Region4-H	56.2	2.2		51.2	-2.8
R_191	59.4	2.1		54.7	-2.6		Region4-I	55.9	2.2		50.9	-2.8
R_192	60.0	2.1		55.3	-2.6		Region4-J	55.8	2.1		50.8	-2.9
R_193	59.9	2.1		55.2	-2.6		Region4-K	56.7	2.1		51.7	-2.9

Table 9e. Effects of Cumulative Effects on Noise Levels For Region 5

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_211	54.3	2.1		49.4	-2.8		R_243	57.0	1.0		55.2	-0.8
R_212	53.4	2.1		48.6	-2.7		R_244	57.7	0.7		56.5	-0.5
R_213	52.3	2.0		47.8	-2.5		R_245	57.3	0.6		56.2	-0.5
R_214	53.0	2.0		48.8	-2.2		R_246	57.6	0.4		56.9	-0.3
R_215	53.1	1.9		49.0	-2.2		R_247	57.3	0.3		56.8	-0.2
R_216	55.9	2.2		50.9	-2.8		R_248	56.6	0.3		56.0	-0.3
R_217	55.9	2.2		50.7	-3.0		R_249	59.7	0.3		59.3	-0.1
R_218	57.1	2.2		51.9	-3.0		R_250	53.6	1.8		49.8	-2.0
R_219	58.7	2.2		53.6	-2.9		R_251	56.0	2.0		51.5	-2.5
R_220	58.5	2.2		53.4	-2.9		R_252	57.5	2.1		52.9	-2.5
R_221	58.6	2.2		53.5	-2.9		R_253	56.0	1.8		52.2	-2.0
R_222	57.6	2.1		52.7	-2.8		R_254	55.8	1.8		51.7	-2.3
R_223	56.8	2.1		51.9	-2.8		R_255	55.5	1.9		51.4	-2.2
R_224	56.3	2.1		51.5	-2.7		R_256	55.6	1.9		51.6	-2.1
R_225	55.2	2.2		50.2	-2.8		R_257	55.9	1.8		51.9	-2.2
R_226	57.1	2.1		52.3	-2.7		R_258	56.1	1.9		52.1	-2.1
R_227	56.3	2.1		51.6	-2.6		R_259	56.3	1.9		52.3	-2.1
R_228	56.3	2.0		51.7	-2.6		R_260	56.5	1.8		52.7	-2.0
R_229	56.4	2.0		51.9	-2.5		R_261	56.9	1.8		53.2	-1.9
R_230	56.5	2.0		52.0	-2.5		R_262	57.4	1.8		53.5	-2.1
R_231	56.7	2.0		52.4	-2.3		R_263	57.5	1.7		53.9	-1.9
R_232	56.7	2.0		52.3	-2.4		R_264	57.5	1.7		53.8	-2.0
R_233	57.1	2.0		52.8	-2.3		R_265	57.0	1.6		53.6	-1.8
R_234	56.7	1.9		52.5	-2.3		R_266	56.7	1.5		53.8	-1.4
R_235	57.1	1.9		52.9	-2.3		R_267	57.0	1.2		54.5	-1.3
R_236	57.4	1.9		53.3	-2.2		R_268	57.7	1.1		55.6	-1.0
R_237	54.5	1.6		51.1	-1.8		R_269	59.5	0.9		57.8	-0.8
R_238	55.6	1.5		52.5	-1.6		R_270	60.6	0.7		59.4	-0.5
R_239	55.6	1.5		52.5	-1.6		R_271	60.2	0.5		59.3	-0.4
R_240	55.0	1.4		52.3	-1.3		R_272	58.6	0.8		57.2	-0.6
R_241	54.8	1.2		52.4	-1.2		R_273	58.9	0.7		57.6	-0.6
R_242	55.0	1.1		52.8	-1.1							

Table 9f. Effects of Cumulative Effects on Noise Levels For Region 6

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_274	61.5	0.2		61.2	-0.1		R_307	59.2	1.8		55.3	-2.1
R_275	61.8	0.2		61.5	-0.1		R_308	62.9	0.5		62.0	-0.4
R_276	60.7	0.2		60.3	-0.2		R_309	60.8	1.1		58.6	-1.1
R_277	59.8	0.3		59.3	-0.2		R_310	60.3	1.5		57.3	-1.5
R_278	59.1	0.4		58.4	-0.3		R_311	59.1	1.8		55.2	-2.1
R_279	57.0	0.5		56.1	-0.4		R_312	58.3	2.0		53.8	-2.5
R_280	56.8	0.8		55.4	-0.6		R_313	58.1	2.1		53.5	-2.5
R_281	56.0	1.0		54.1	-0.9		R_314	58.2	2.1		53.5	-2.6
R_282	56.0	1.1		54.0	-0.9		R_315	59.1	2.3		53.9	-2.9
R_283	57.2	1.2		54.9	-1.1		R_316	58.4	1.9		54.2	-2.3
R_284	58.4	1.4		55.5	-1.5		R_317	57.7	1.6		54.4	-1.7
R_285	59.5	1.7		56.1	-1.7		R_318	53.4	0.8		51.9	-0.7
R_286	61.0	1.8		57.1	-2.1		R_319	49.8	1.8		46.1	-1.9
R_287	60.1	1.9		55.9	-2.3		R_320	57.3	2.2		52.3	-2.8
R_288	61.2	1.9		57.0	-2.3		R_321	56.4	1.8		52.7	-1.9
R_289	61.4	2.0		57.0	-2.4		R_322	54.8	1.8		50.9	-2.1
R_290	61.5	2.0		57.2	-2.3		R_323	54.7	1.8		50.7	-2.2
R_291	61.5	2.0		57.0	-2.5		R_324	54.0	1.8		50.0	-2.2
R_292	60.8	2.0		56.3	-2.5		R_325	54.4	1.6		51.1	-1.7
R_293	60.9	2.0		56.3	-2.6		R_326	53.4	1.5		50.4	-1.5
R_294	60.6	2.0		56.0	-2.6		R_327	53.7	1.7		50.0	-2.0
R_295	60.8	2.0		56.5	-2.3		R_328	54.3	2.0		50.0	-2.3
R_296	59.0	1.8		55.0	-2.2		R_329	56.0	2.1		51.4	-2.5
R_297	58.6	1.9		54.5	-2.2		R_330	55.2	2.0		50.8	-2.4
R_298	58.1	1.7		54.6	-1.8		R_331	54.1	1.8		50.4	-1.9
R_299	57.8	1.6		54.5	-1.7		Region6-A	59.6	0.7		58.2	-0.7
R_300	57.8	1.5		54.8	-1.5		Region6-B	59.7	0.7		58.4	-0.6
R_301	58.0	1.2		55.5	-1.3		Region6-C	59.1	0.6		57.9	-0.6
R_302	62.3	0.4		61.6	-0.3		Region6-D	59.0	0.7		57.8	-0.5
R_303	59.9	1.4		57.0	-1.5		Region6-E	58.7	0.7		57.5	-0.5
R_304	61.2	1.6		57.8	-1.8		Region6-F	57.5	0.5		56.6	-0.4
R_305	61.0	1.6		57.7	-1.7		Region6-G	58.7	0.5		57.8	-0.4
R_306	60.4	2.0		56.0	-2.4		Region6-H	59.1	0.6		58.0	-0.5

Table 9g. Effects of Cumulative Effects on Noise Levels For Region 7

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)	L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)	Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)	L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_332	54.4	2.1	49.7	-2.6	R_363	60.2	1.0	58.3	-0.9
R_333	55.0	2.1	50.3	-2.6	R_364	60.5	0.9	58.8	-0.8
R_334	55.7	2.1	50.9	-2.7	R_365	54.8	1.7	51.1	-2.0
R_335	58.8	2.1	53.9	-2.8	R_366	55.7	2.0	51.1	-2.6
R_336	57.9	2.1	53.2	-2.6	R_367	58.1	2.2	53.2	-2.7
R_337	57.5	2.0	53.0	-2.5	R_368	57.8	2.1	53.0	-2.7
R_338	54.5	1.8	50.5	-2.2	R_369	59.3	2.2	54.3	-2.8
R_339	57.4	2.1	52.7	-2.6	R_370	59.5	2.2	54.5	-2.8
R_340	57.1	2.2	52.3	-2.6	R_371	61.3	2.2	56.3	-2.8
R_341	57.1	2.2	52.1	-2.8	R_372	58.8	2.1	54.0	-2.7
R_342	57.5	2.2	52.5	-2.8	R_373	59.8	2.2	54.8	-2.8
R_343	57.8	2.2	52.8	-2.8	R_374	60.2	2.1	55.5	-2.6
R_344	57.7	2.2	52.8	-2.7	R_375	60.8	2.2	55.9	-2.7
R_345	57.6	2.1	52.8	-2.7	R_376	61.2	2.2	56.1	-2.9
R_346	58.3	2.1	53.4	-2.8	R_377	61.9	2.2	56.8	-2.9
R_347	57.8	2.1	53.0	-2.7	R_378	59.9	2.2	55.0	-2.7
R_348	57.7	2.1	53.0	-2.6	R_379	60.7	2.1	56.0	-2.6
R_349	58.6	2.1	53.8	-2.7	R_380	58.1	2.1	53.4	-2.6
R_350	58.4	2.1	53.7	-2.6	R_381	59.5	2.0	55.1	-2.4
R_351	58.8	2.1	54.2	-2.5	R_382	60.3	2.0	55.8	-2.5
R_352	58.1	2.0	53.7	-2.4	R_383	59.9	2.0	55.5	-2.4
R_353	57.6	1.9	53.4	-2.3	R_384	58.8	1.9	54.6	-2.3
R_354	59.0	2.0	54.7	-2.3	R_385	59.7	1.9	55.7	-2.1
R_355	59.5	1.9	55.4	-2.2	R_386	57.8	1.7	54.1	-2.0
R_356	59.9	1.9	55.9	-2.1	R_387	57.5	1.7	53.8	-2.0
R_357	58.8	1.7	55.1	-2.0	R_388	57.8	1.5	54.7	-1.6
R_358	58.5	1.7	55.0	-1.8	R_389	58.4	1.4	55.8	-1.2
R_359	57.8	1.5	54.7	-1.6	R_390	60.3	0.6	59.1	-0.6
R_360	58.2	1.4	55.5	-1.3	R_391	61.7	0.3	61.1	-0.3
R_361	58.7	1.1	56.5	-1.1	R_392	61.9	0.4	61.1	-0.4
R_362	59.4	1.1	57.3	-1.0					

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Table 9h. Effects of Cumulative Effects on Noise Levels For Region 8

Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)		Receptor	L_{eq}24 with 25% Additional Vehicles, Speed of 110 km/hr, 5% Greater Heavy Trucks on AHD (dBA)	Increase Compared to Future Conditions (dBA)		L_{eq}24 with 25% Fewer Vehicles, Speed of 90 km/hr, 5% Fewer Heavy Trucks on AHD (dBA)	Decrease Compared to Future Conditions (dBA)
R_393	58.8	1.4		56.1	-1.3		R_427	61.6	2.0		57.1	-2.5
R_394	58.3	1.6		55.2	-1.5		R_428	58.4	1.8		54.7	-1.9
R_395	57.1	1.7		53.6	-1.8		R_429	60.0	1.9		55.9	-2.2
R_396	57.1	1.8		53.4	-1.9		R_430	59.8	2.0		55.4	-2.4
R_397	58.0	1.8		54.2	-2.0		R_431	60.2	2.0		55.8	-2.4
R_398	58.5	1.9		54.3	-2.3		R_432	60.0	2.0		55.7	-2.3
R_399	56.0	2.0		51.8	-2.2		R_433	59.9	1.9		55.8	-2.2
R_400	55.9	1.9		51.9	-2.1		R_434	60.5	1.9		56.4	-2.2
R_401	52.1	1.3		49.7	-1.1		R_435	60.2	1.8		56.3	-2.1
R_402	51.3	0.9		49.6	-0.8		R_436	60.4	1.8		56.5	-2.1
R_403	51.5	0.7		50.2	-0.6		R_437	59.6	1.7		56.0	-1.9
R_404	52.8	0.6		51.6	-0.6		R_438	58.5	1.5		55.4	-1.6
R_405	56.4	1.3		53.9	-1.2		R_439	59.1	1.6		55.8	-1.7
R_406	56.4	1.1		54.2	-1.1		R_440	58.7	1.6		55.5	-1.6
R_407	56.7	1.1		54.6	-1.0		R_441	58.9	1.5		55.9	-1.5
R_408	58.3	1.3		55.9	-1.1		R_442	59.6	1.4		56.6	-1.6
R_409	59.1	1.3		56.5	-1.3		R_443	59.8	1.4		57.0	-1.4
R_410	58.8	1.2		56.5	-1.1		R_444	60.1	1.3		57.5	-1.3
R_411	59.2	1.2		56.9	-1.1		R_445	60.3	1.1		58.2	-1.0
R_412	60.4	1.3		57.9	-1.2		R_446	62.0	0.9		60.3	-0.8
R_413	60.7	1.2		58.3	-1.2		R_447	63.4	1.1		61.4	-0.9
R_414	61.4	1.1		59.3	-1.0		R_448	64.4	1.3		61.8	-1.3
R_415	61.5	0.9		59.7	-0.9		R_449	65.0	1.4		62.3	-1.3
R_416	62.1	0.8		60.6	-0.7		R_450	65.7	1.5		62.7	-1.5
R_417	62.0	0.8		60.6	-0.6		R_451	66.2	1.5		63.0	-1.7
R_418	60.1	0.8		58.7	-0.6		R_452	66.5	1.6		63.2	-1.7
R_419	59.7	1.0		57.7	-1.0		R_453	62.7	1.7		59.1	-1.9
R_420	57.8	1.5		54.7	-1.6		R_454	63.5	1.8		59.8	-1.9
R_421	56.8	1.8		53.0	-2.0		R_455	64.3	1.8		60.5	-2.0
R_422	55.4	1.7		51.8	-1.9		R_456	65.8	1.7		62.1	-2.0
R_423	57.7	1.3		55.1	-1.3		R_457	65.4	1.7		61.7	-2.0
R_424	59.5	2.0		55.2	-2.3		R_458	64.7	1.8		61.0	-1.9
R_425	58.7	2.0		54.4	-2.3		R_459	64.0	1.7		60.4	-1.9
R_426	60.9	2.1		56.3	-2.5							

Note: The dominant noise sources for Receptors R_449, R_450, R_451, R_452, R_456, R_457 are Calgary Trail, Gateway Blvd, SWAHD, and the associated ramps.

7.0 Conclusion

Noise Monitoring

The noise monitoring results indicated an increase in the L_{eq}24 noise levels from 2007 to 2013 ranging from +1.6 to +6.8 dBA at all locations. The relative increases were logical given the various factors that changed from 2007 to 2013, including:

- Increase in traffic volumes ranging from 2x to 3x;
- Increased posted speed limit from 90 km/hr (with 70 km/hr zones) to 100 km/hr throughout;
- Modifications to the road surface (i.e. milling of concrete and re-paving of some asphalt sections);
- Additional lanes between Lessard Road and Whitemud Drive; and
- Changes to existing interchanges, additions of new interchanges.

In addition, the results from the 2013 noise monitoring indicated that the noise level contributions associated with the concrete surface are essentially identical to those associated with the asphalt surface.

The noise monitoring results indicate a change in the L_{eq}24 noise levels from 2013 to 2017 ranging from -0.9 to +4.1 dBA. For locations with small changes (i.e. less than 2.0 dBA), the differences are largely due to small variations in environmental conditions (i.e. wind speed and wind direction) as well differences in foliage conditions between the specific 2013 and 2017 noise monitoring periods. For locations with larger changes (i.e. greater than 2.0 dBA), the differences are likely due to the environmental and foliage conditions along with changes in traffic volumes on nearby roads

The 1/3 octave band frequency data show the typical trend of low frequency noise (near 63 – 80 Hz) resulting from engines and exhaust, as well as mid-high frequency noise (near 1,000 Hz) resulting from tire noise.

Noise Modeling

The noise modeling results for Current Conditions matched well with the noise measurement results. The Current modeled noise levels were below the limit of 65 dBA L_{eq}24 at all of the residential outdoor receptor locations.

The noise modeling results for the Future Conditions (with projected traffic volumes for the Year 2027) indicated noise levels which were still below the limit of 65 dBA L_{eq}24 at all but two locations. The locations are adjacent to a condominium/apartment complex which currently only has a chainlink fence adjacent to the TUC.

A sensitivity analysis of the future traffic volumes, traffic speeds, and % heavy trucks on SWAHD indicated that significant individual increases to each parameter or significant increases to all three combined, would result in a few additional locations with noise levels at or above 65 dBA $L_{eq}24$. These include the following:

- Receptors to the southeast and southwest of the interchange at SWAHD and Whitemud Drive. These receptors currently have no solid fences to act as noise barriers;
- Receptors to the west of SWAHD and in between Whitemud Drive and Callingwood Road. These receptors currently have no solid fences to act as noise barriers;
- Receptors southwest of the interchange at SWAHD and Calgary Trail at which Calgary Trail and the associated interchange ramps are the dominant noise sources.

8.0 References

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- *Environmental Noise Study for Southwest Anthony Henday Drive at Wedgewood Heights Residential Neighborhood in Edmonton, Alberta*, prepared for ISL, by aci Acoustical Consultants Inc., December, 2016.
- City of Edmonton Urban Traffic Noise Policy (C506), 2004
- International Organization for Standardization (ISO), *Standard 1996-1, Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures, 2003*, Geneva Switzerland.
- International Organization for Standardization (ISO), *Standard 9613-1, Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of absorption of sound by the atmosphere, 1993*, Geneva Switzerland.
- International Organization for Standardization (ISO), *Standard 9613-2, Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation, 1996*, Geneva Switzerland.

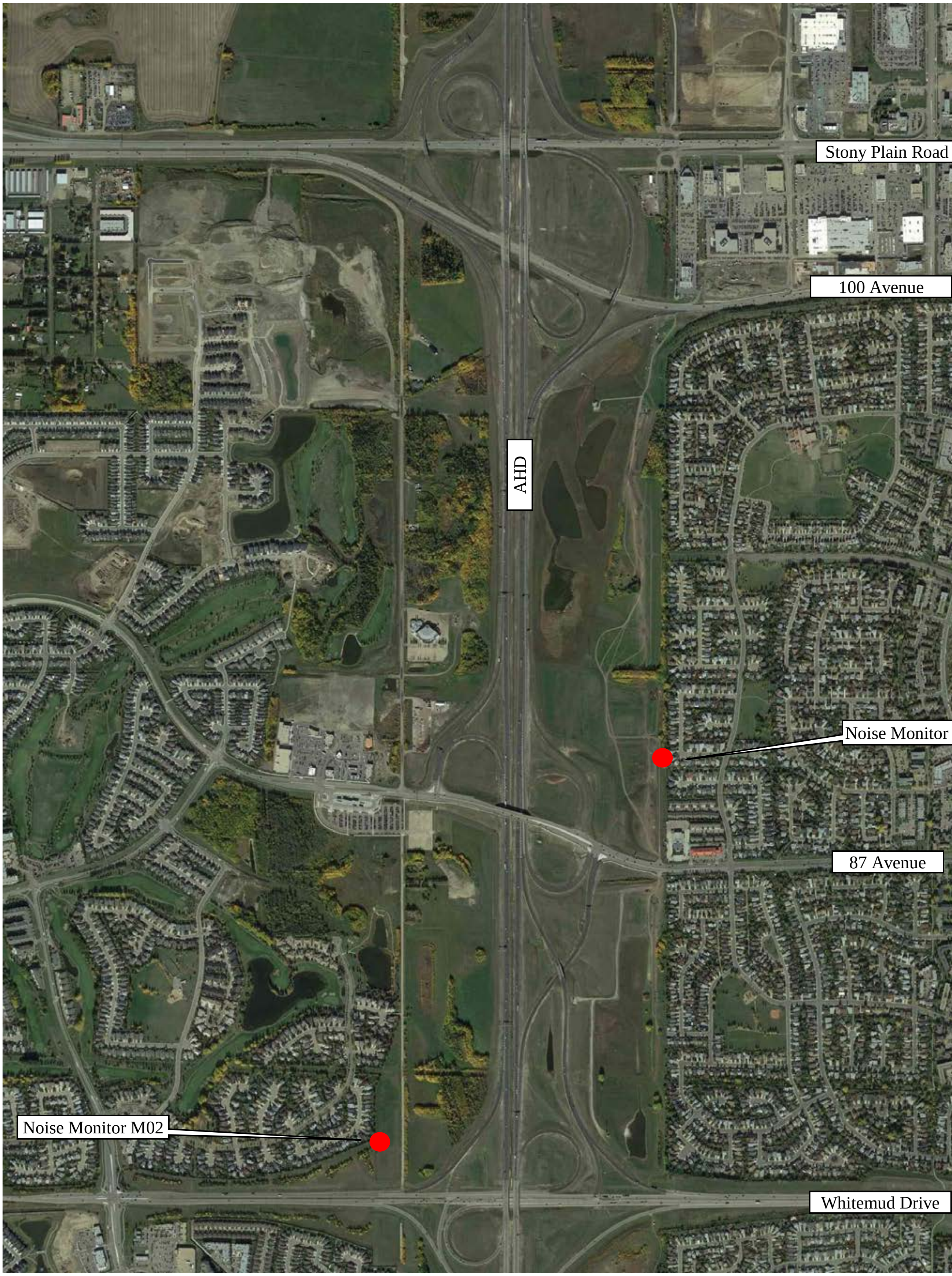

Figure 1a. Study Area From Stony Plain Road to Whitemud Drive

Figure 1b. Study Area From Whitemud Drive to Lessard Road

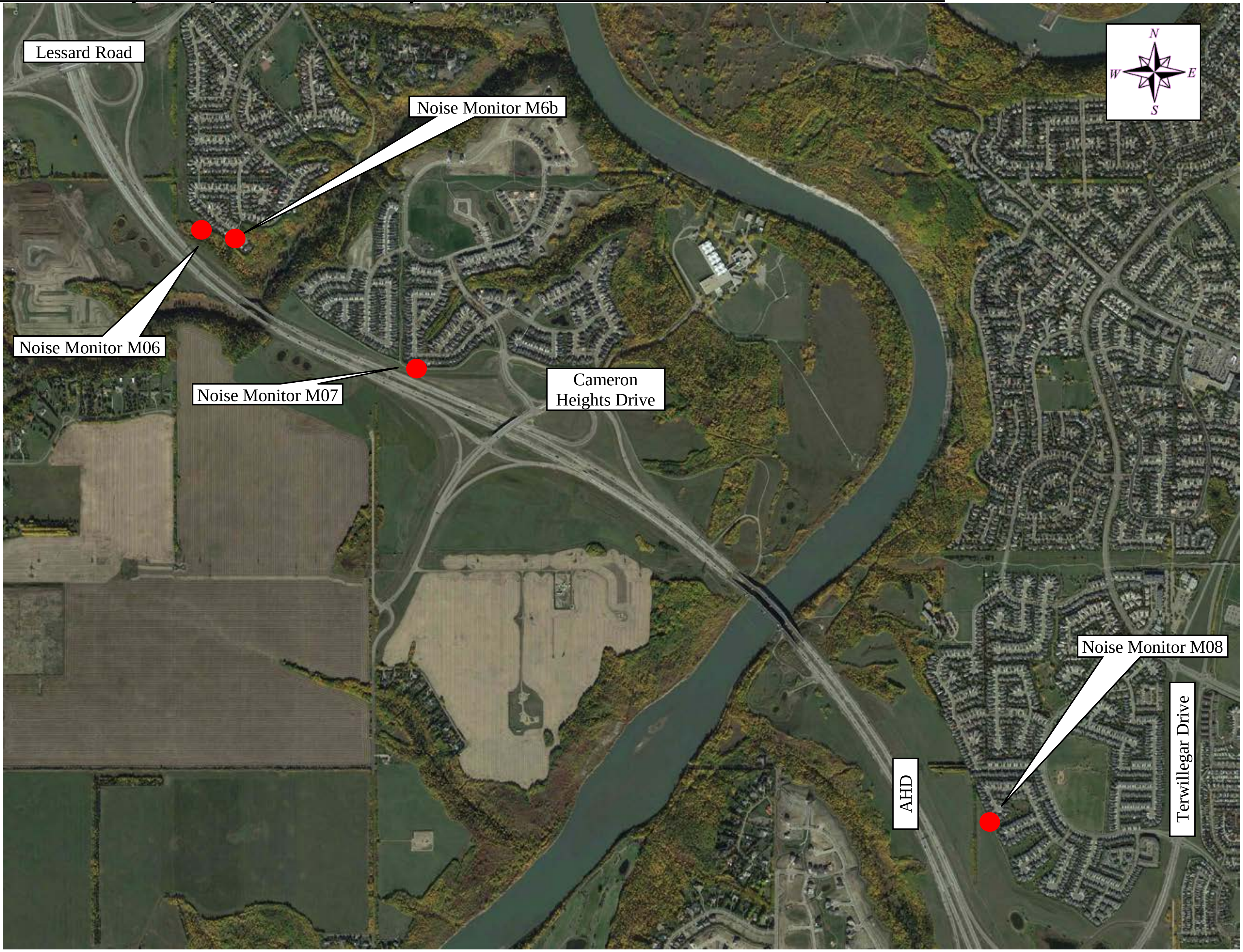

Figure 1c. Study Area From Lessard Road to Terwillegar Drive

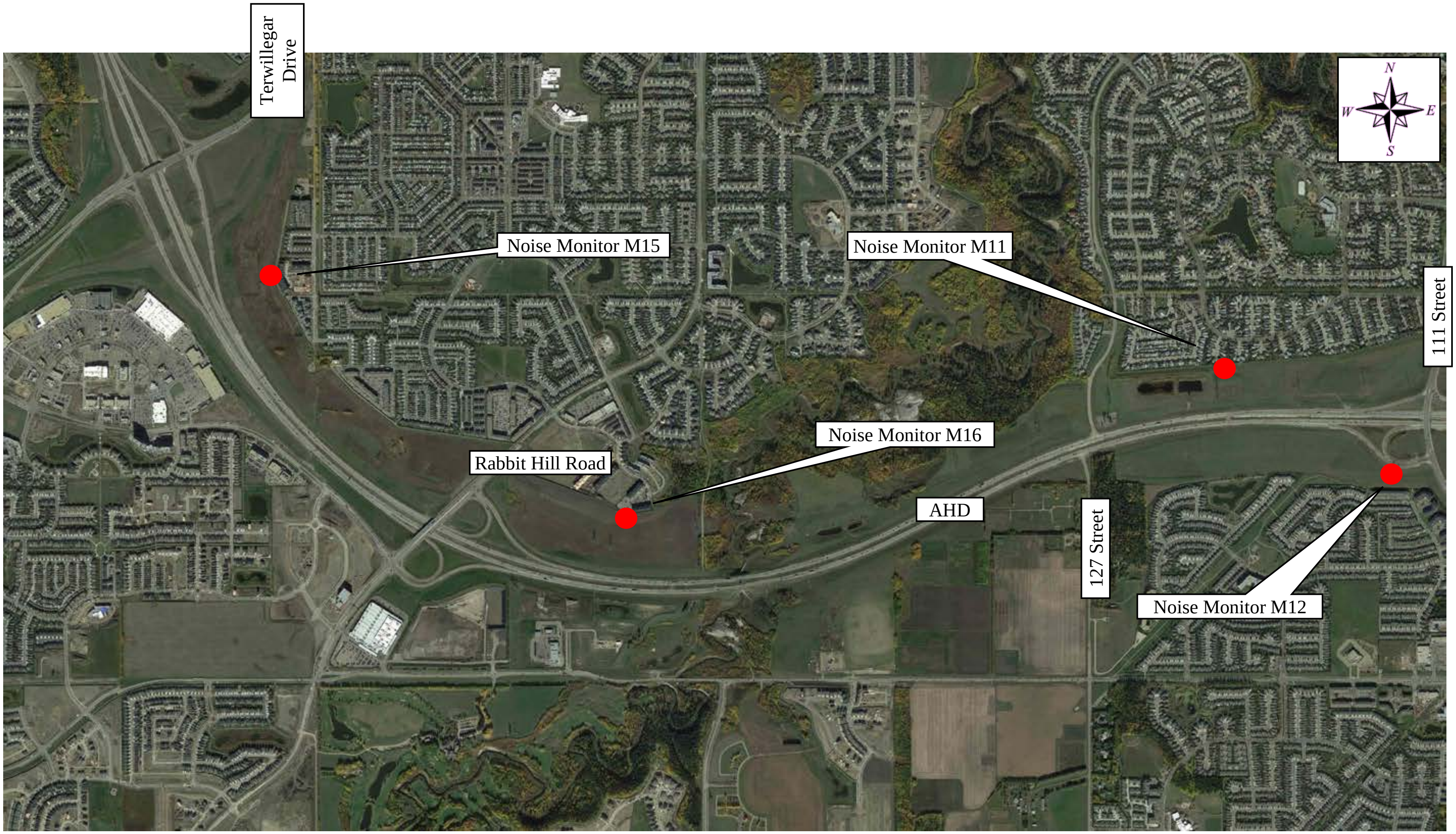

Figure 1d. Study Area From Terwillegar Drive to 111 Street

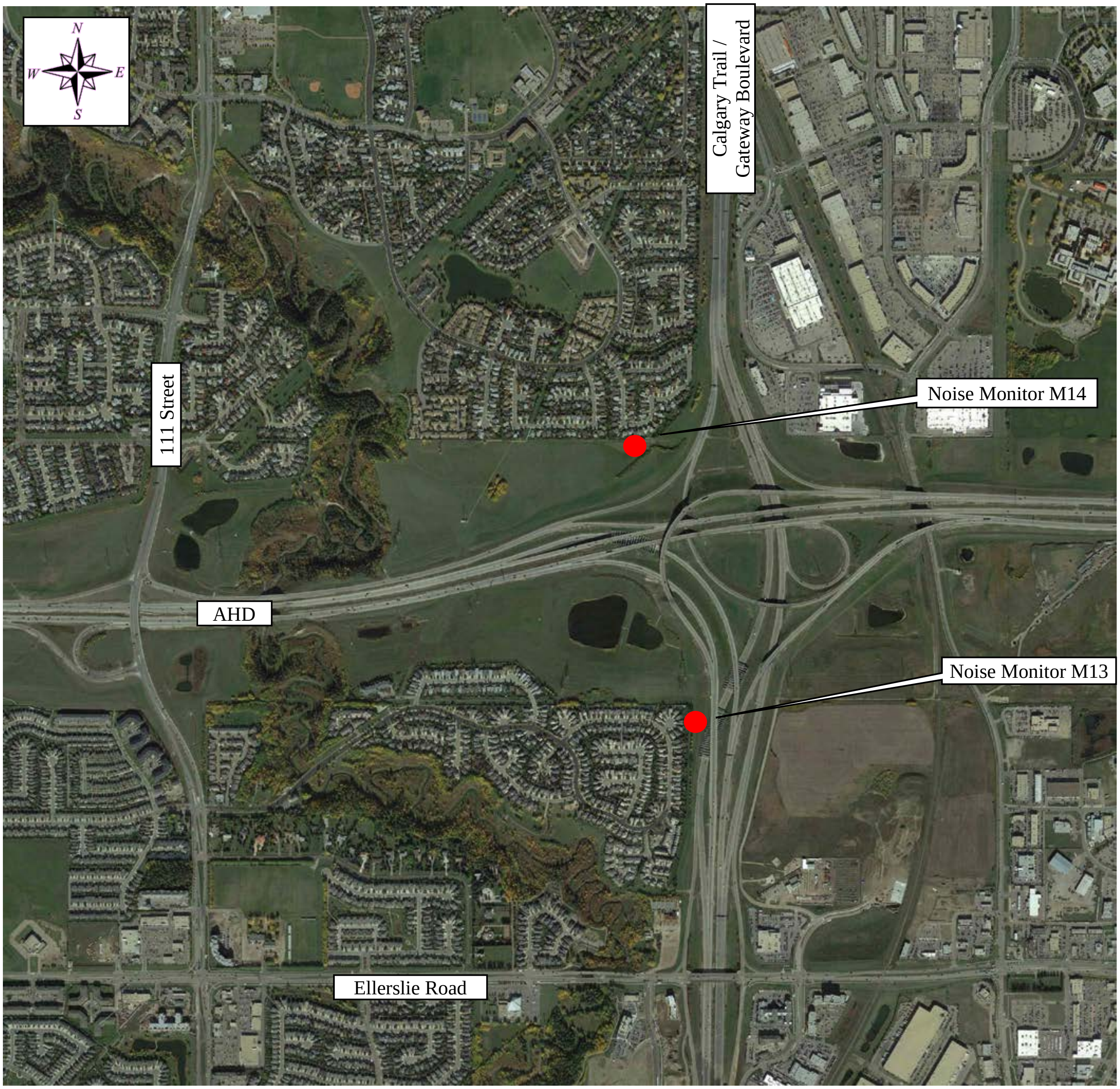

Figure 1e. Study Area From 111 Street to Gateway Boulevard

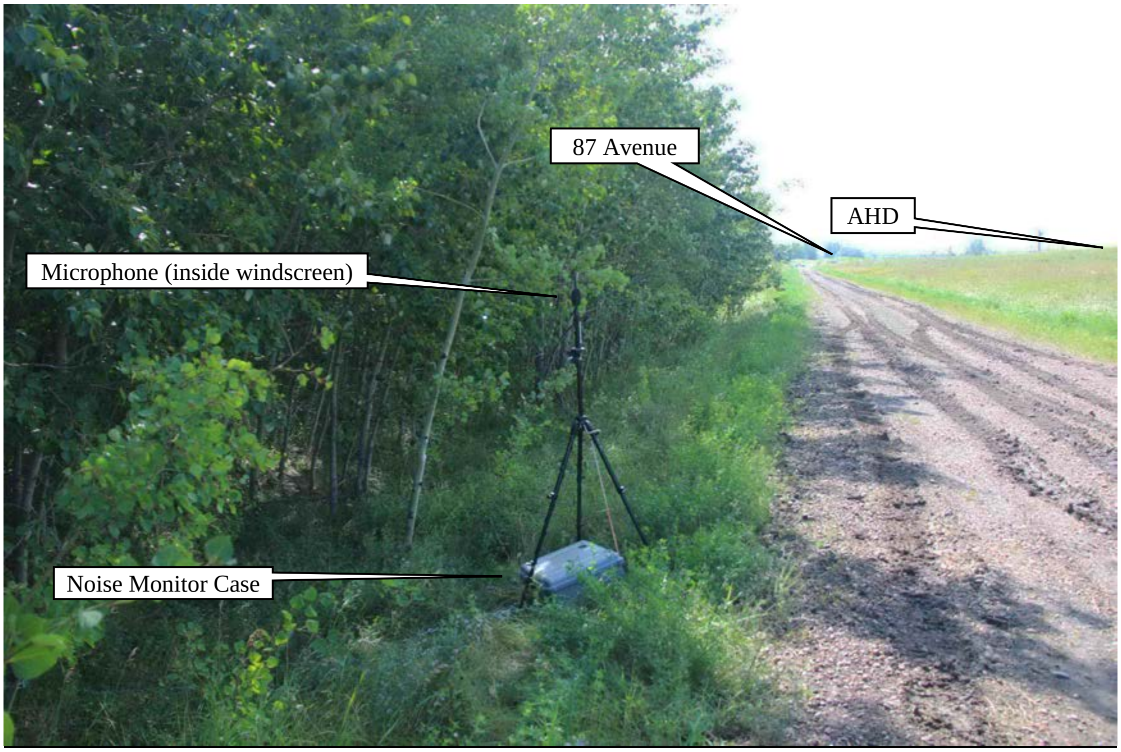

Figure 2. Noise Monitor M01

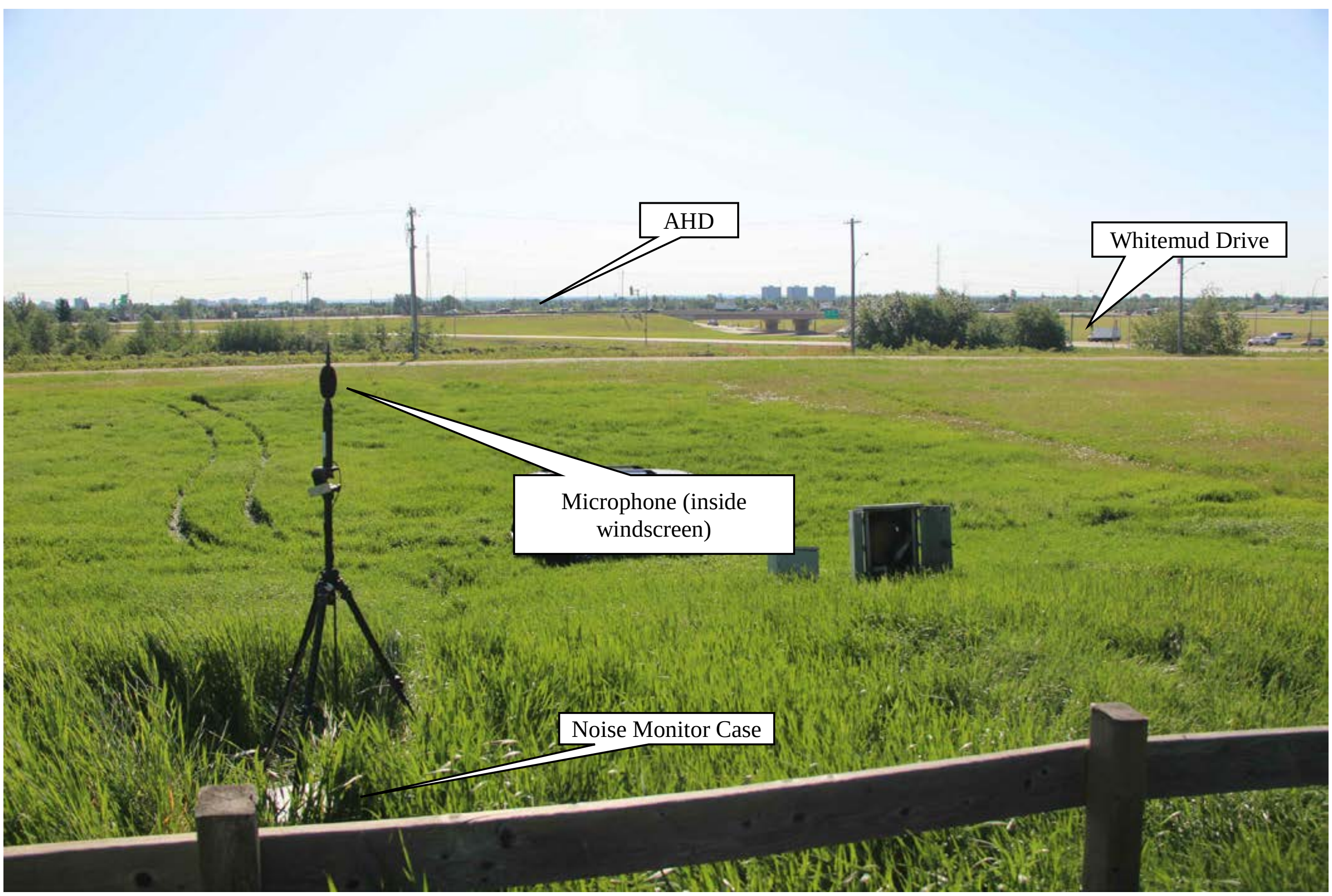

Figure 3. Noise Monitor M02

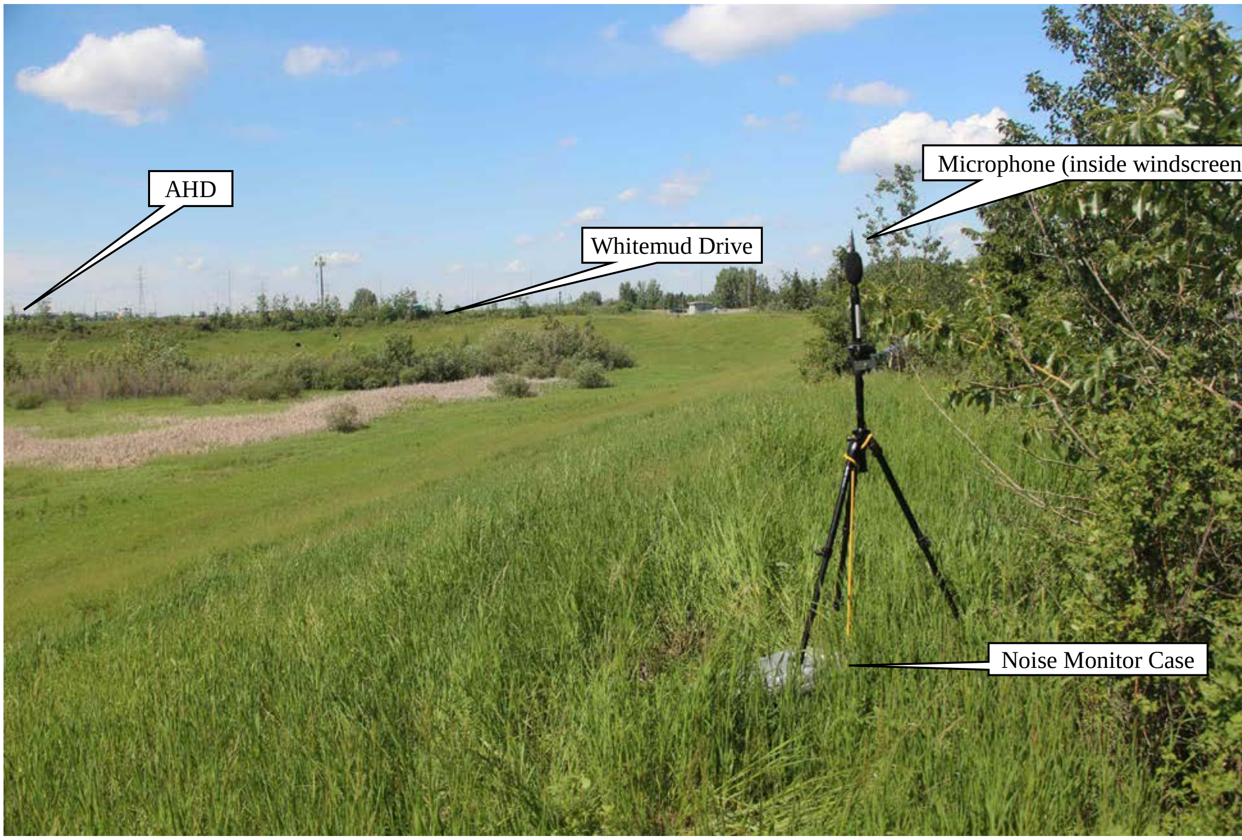

Figure 4. Noise Monitor M03

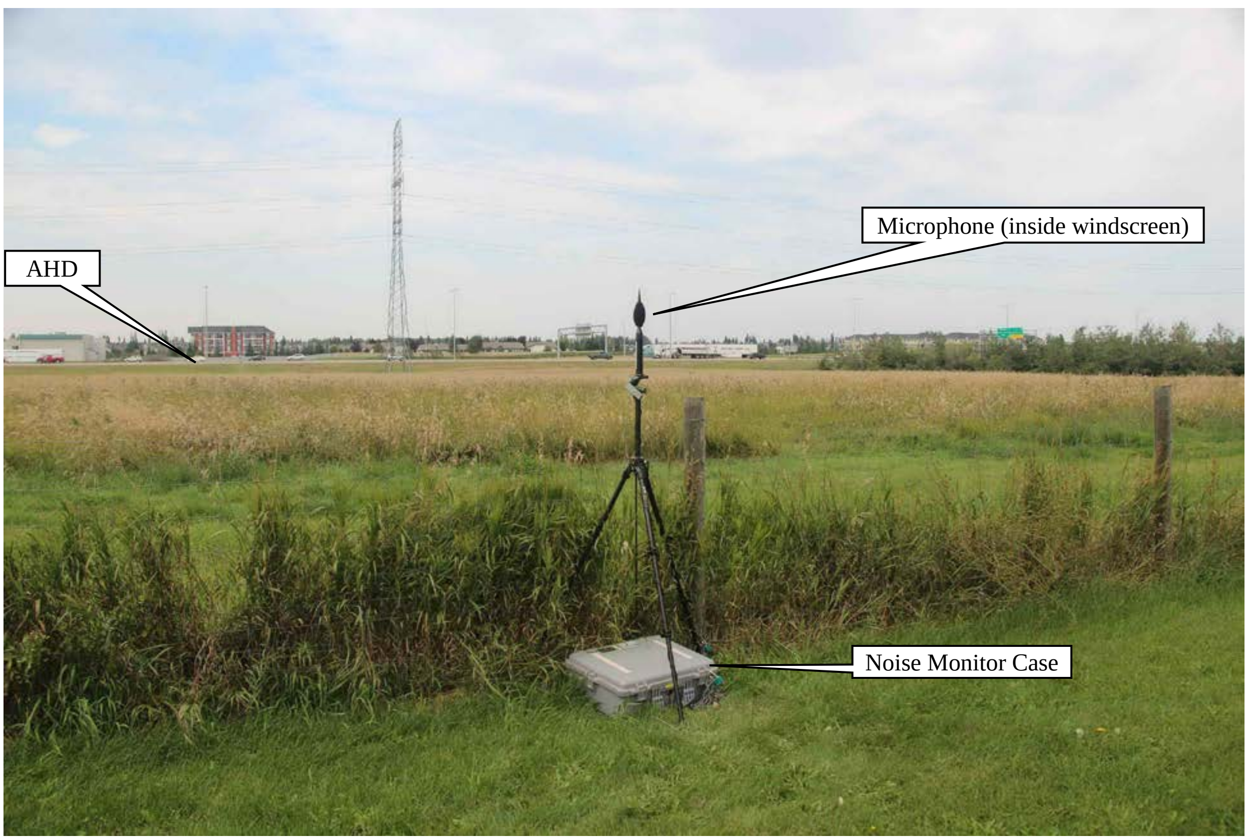

Figure 5. Noise Monitor M04

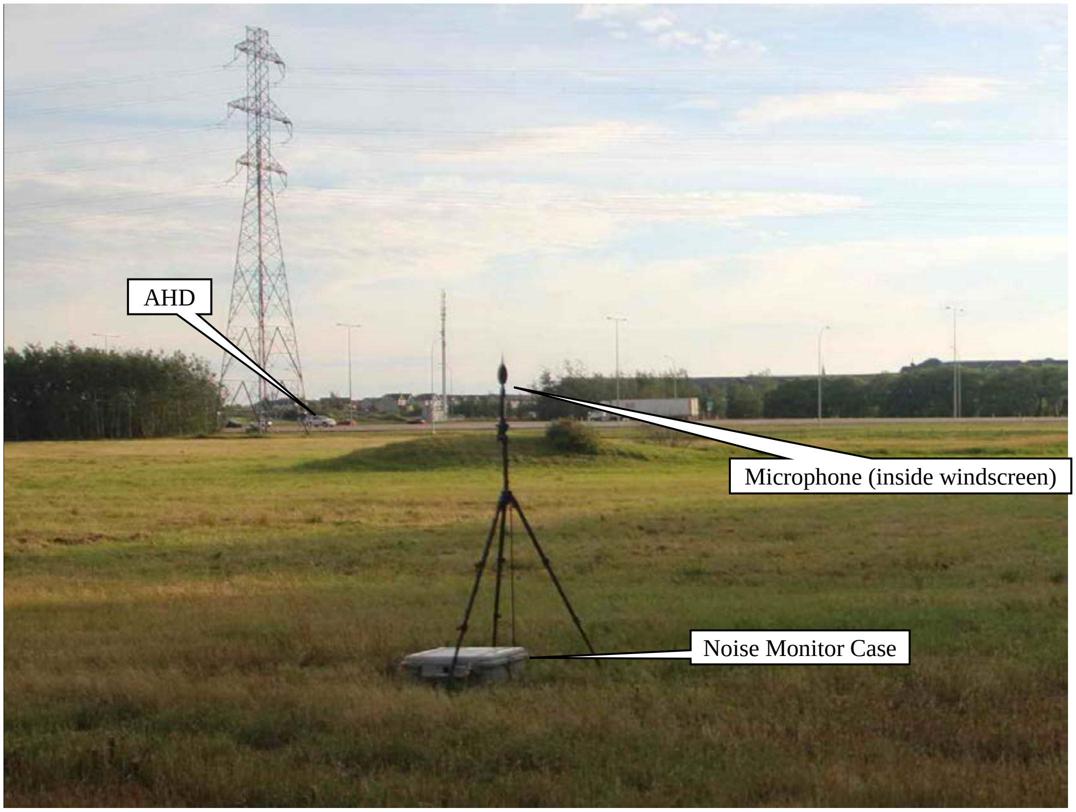

Figure 6. Noise Monitor M05

Figure 7. Noise Monitor M06

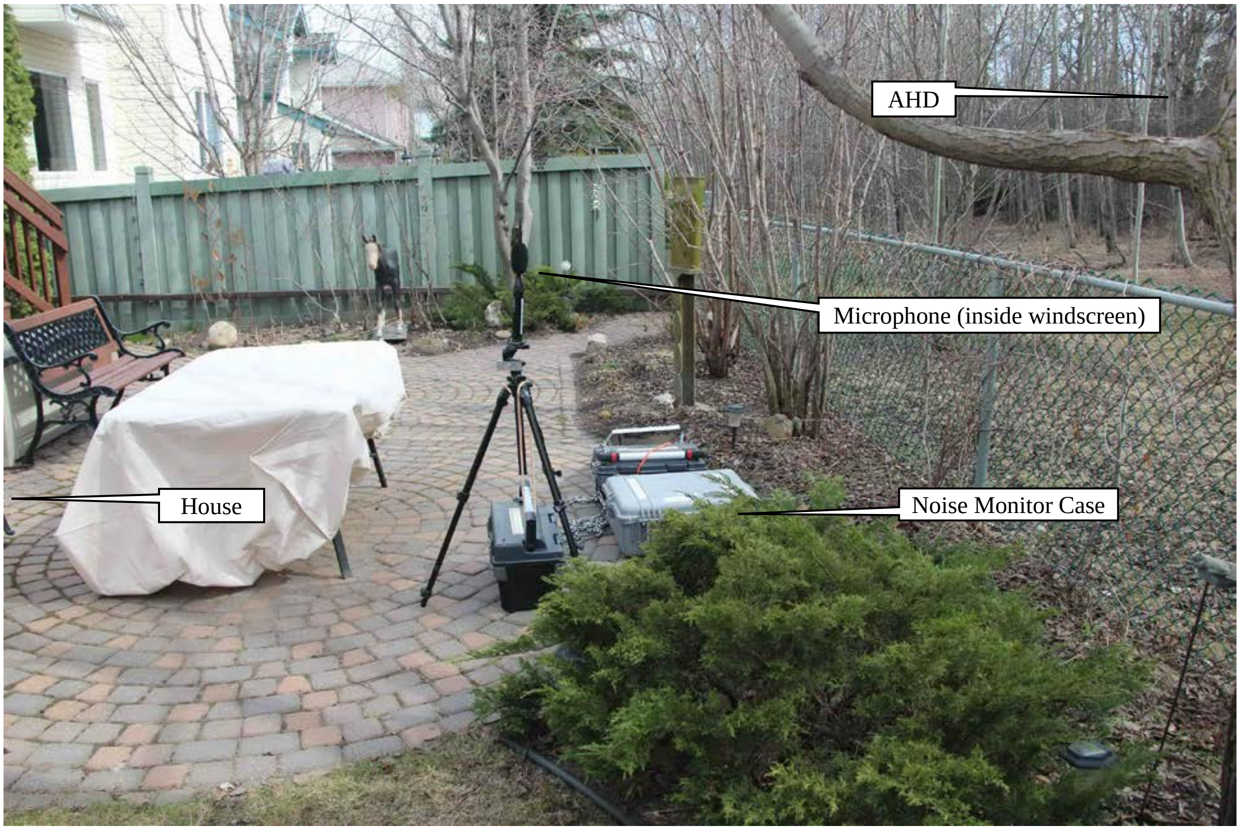

Figure 8. Noise Monitor M06b

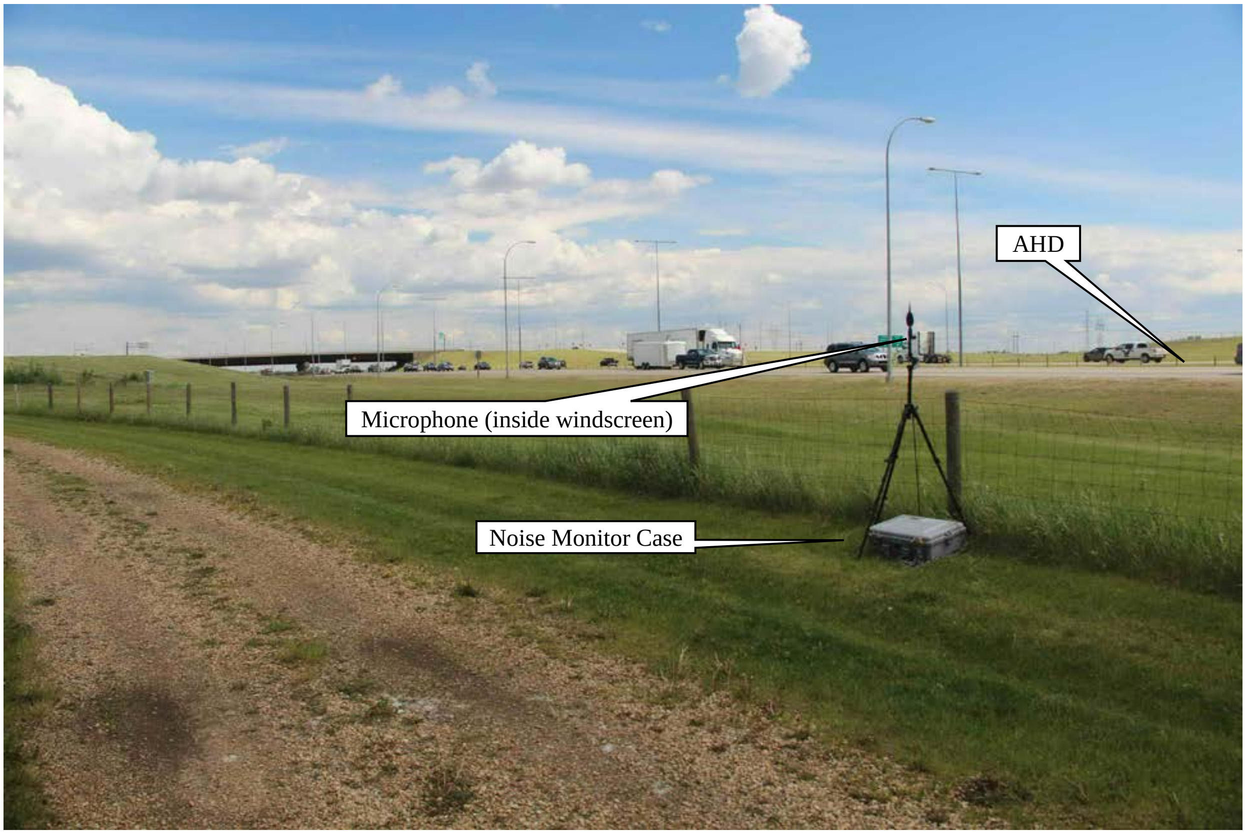

Figure 9. Noise Monitor M07

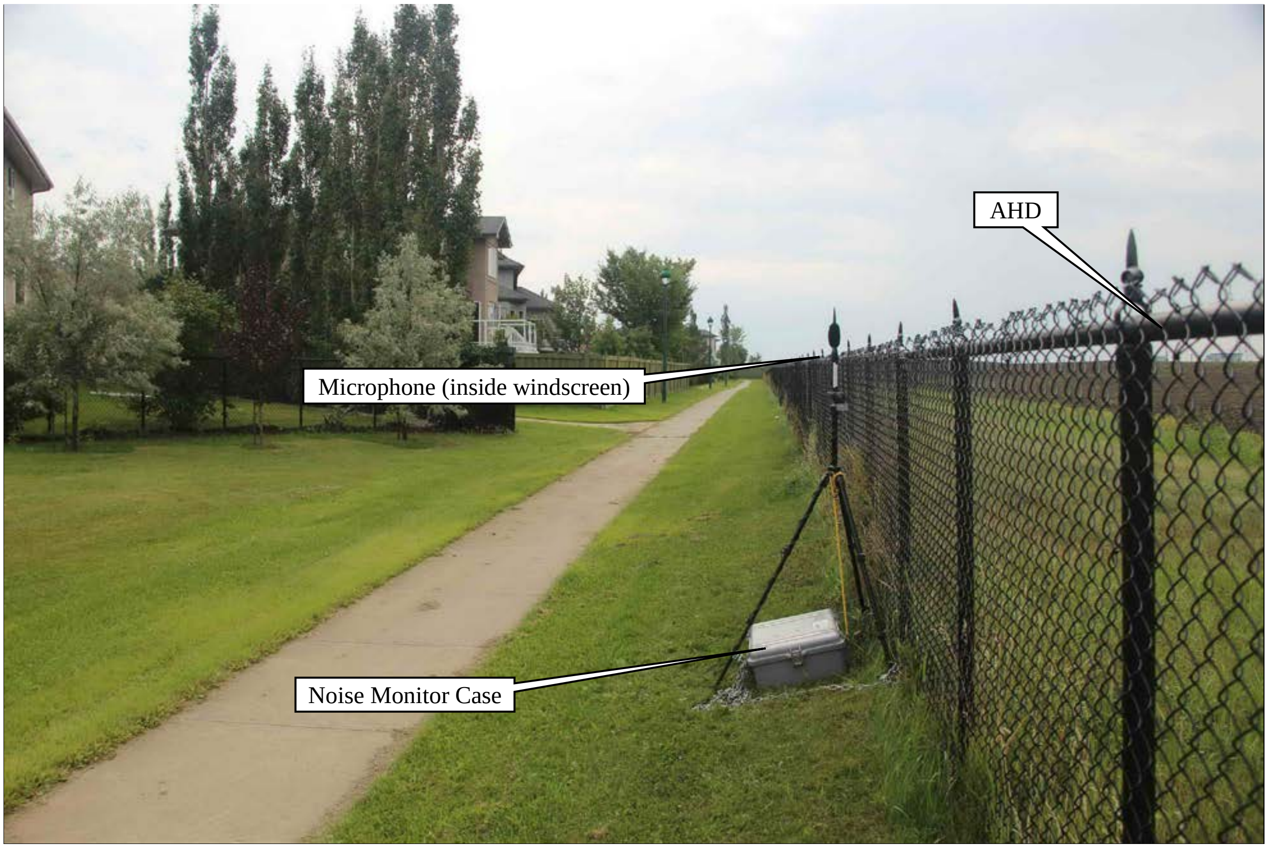

Figure 10. Noise Monitor M08

Figure 11. Noise Monitor M11

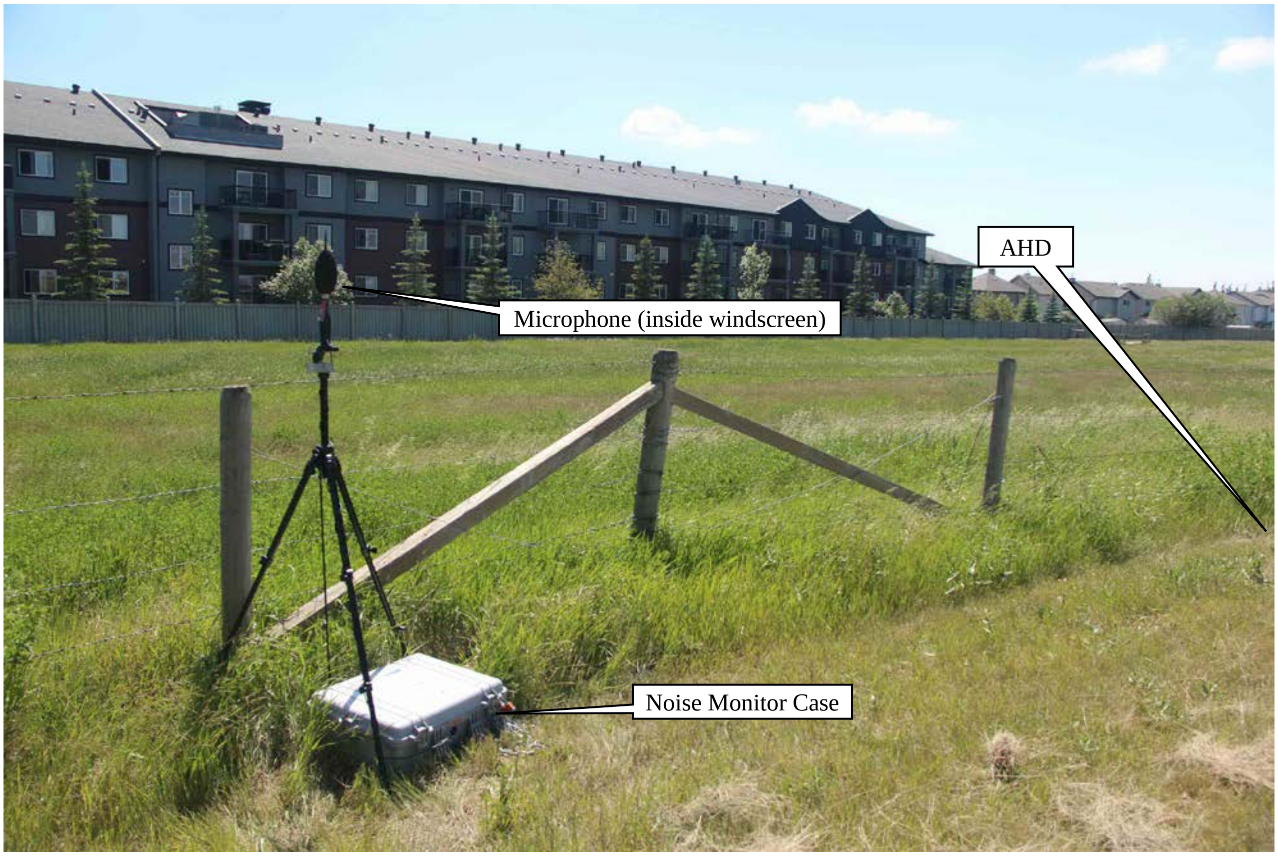

Figure 12. Noise Monitor M12

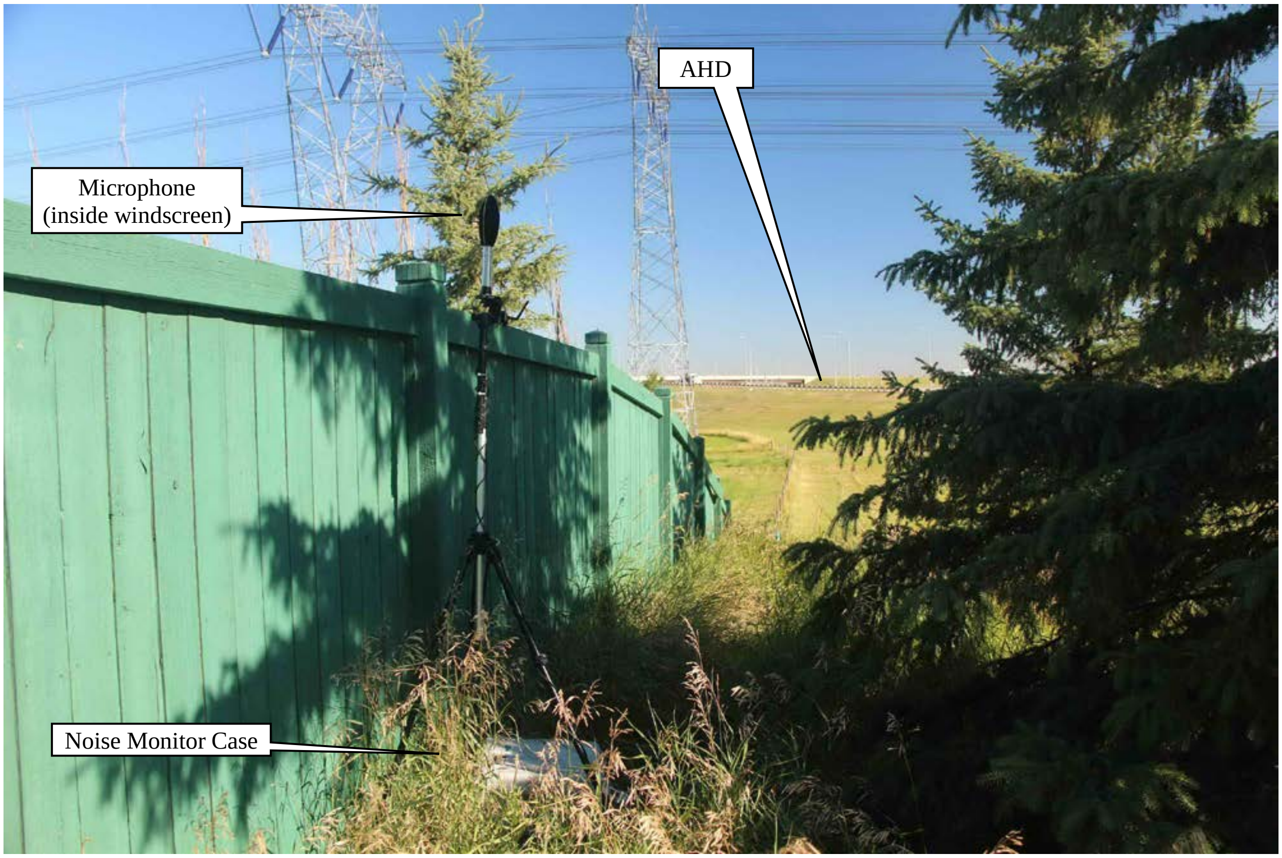

Figure 13. Noise Monitor M13

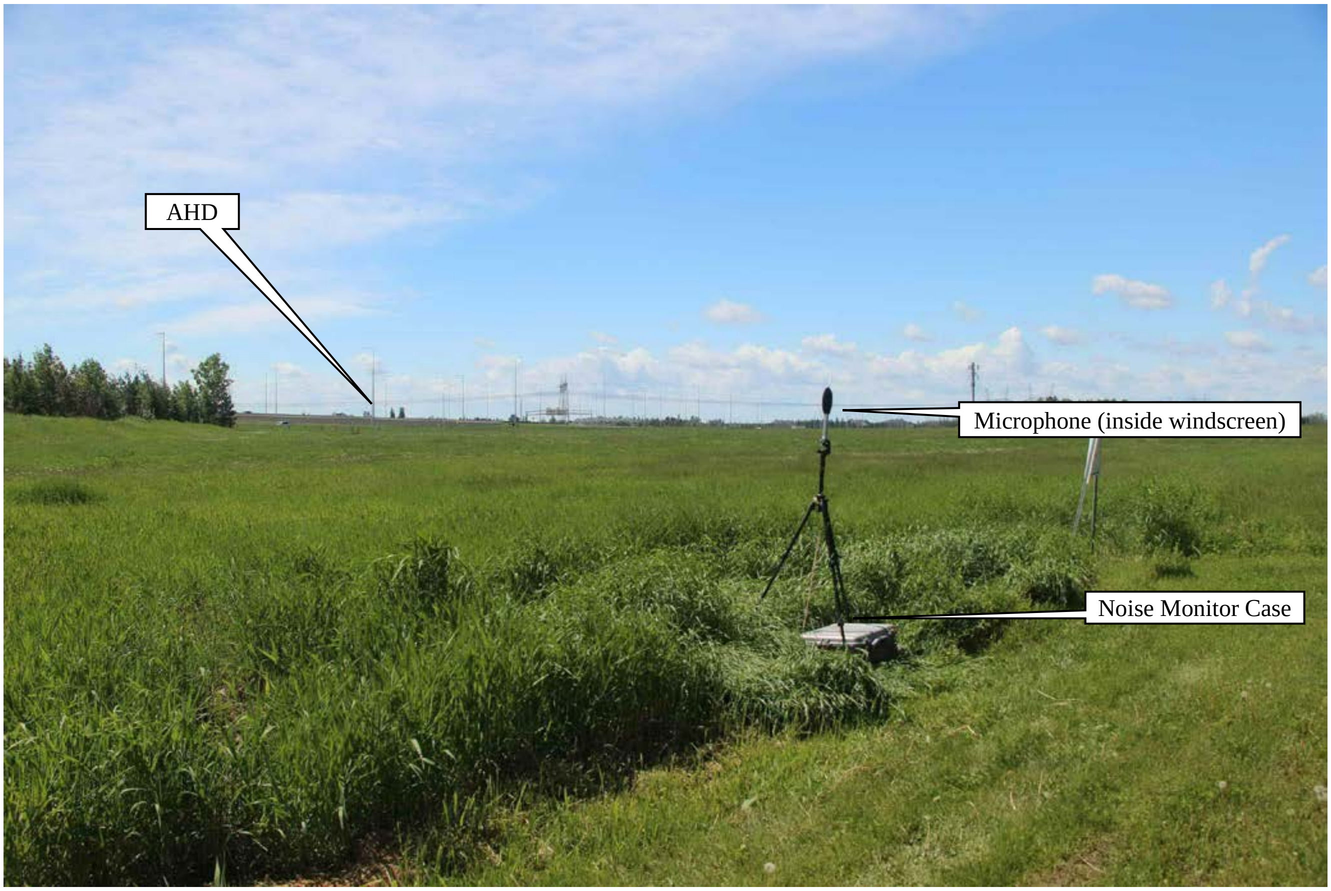

Figure 14. Noise Monitor M14

Figure 15. Noise Monitor M15

Figure 16. Noise Monitor M16

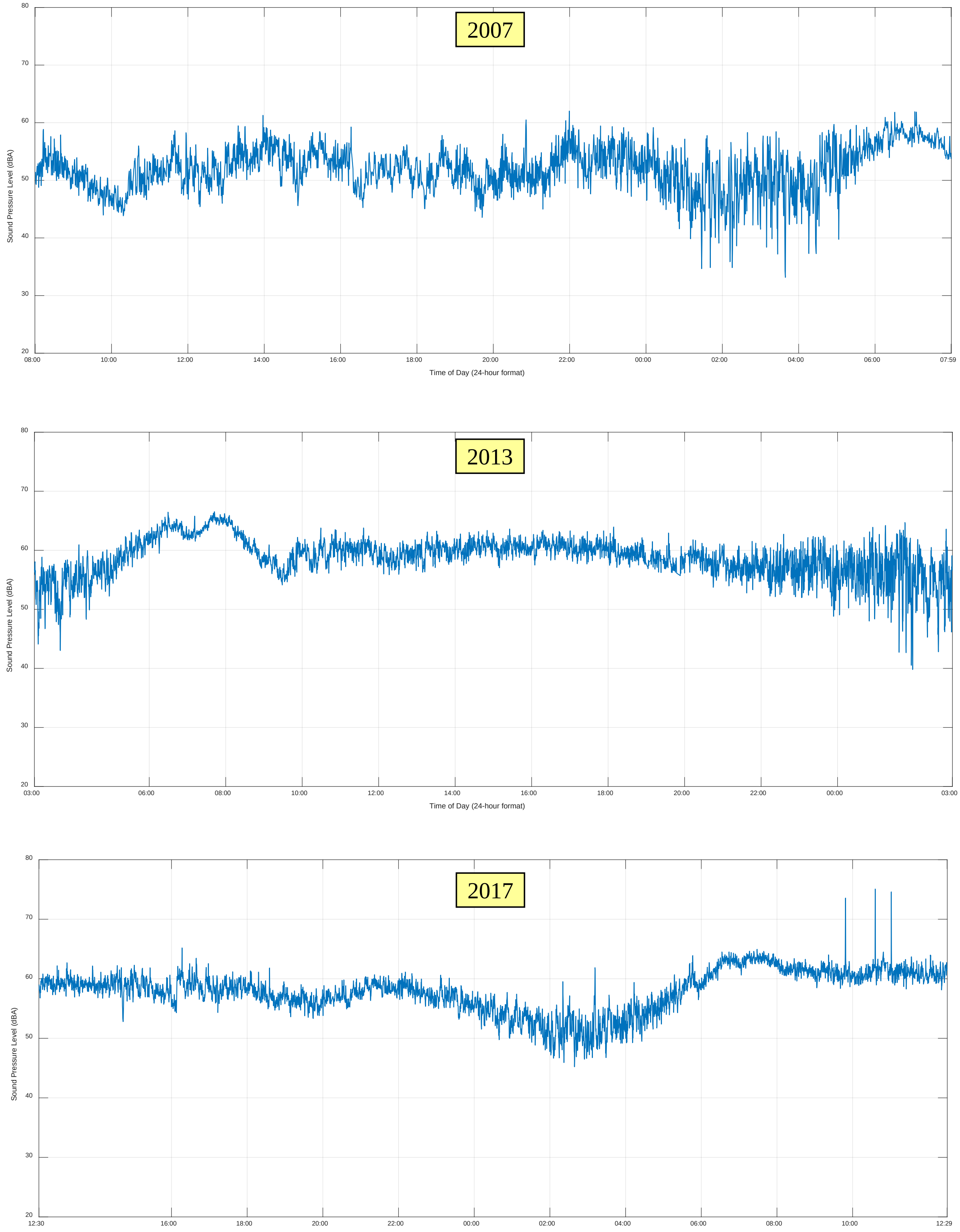

Figure 17. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M01

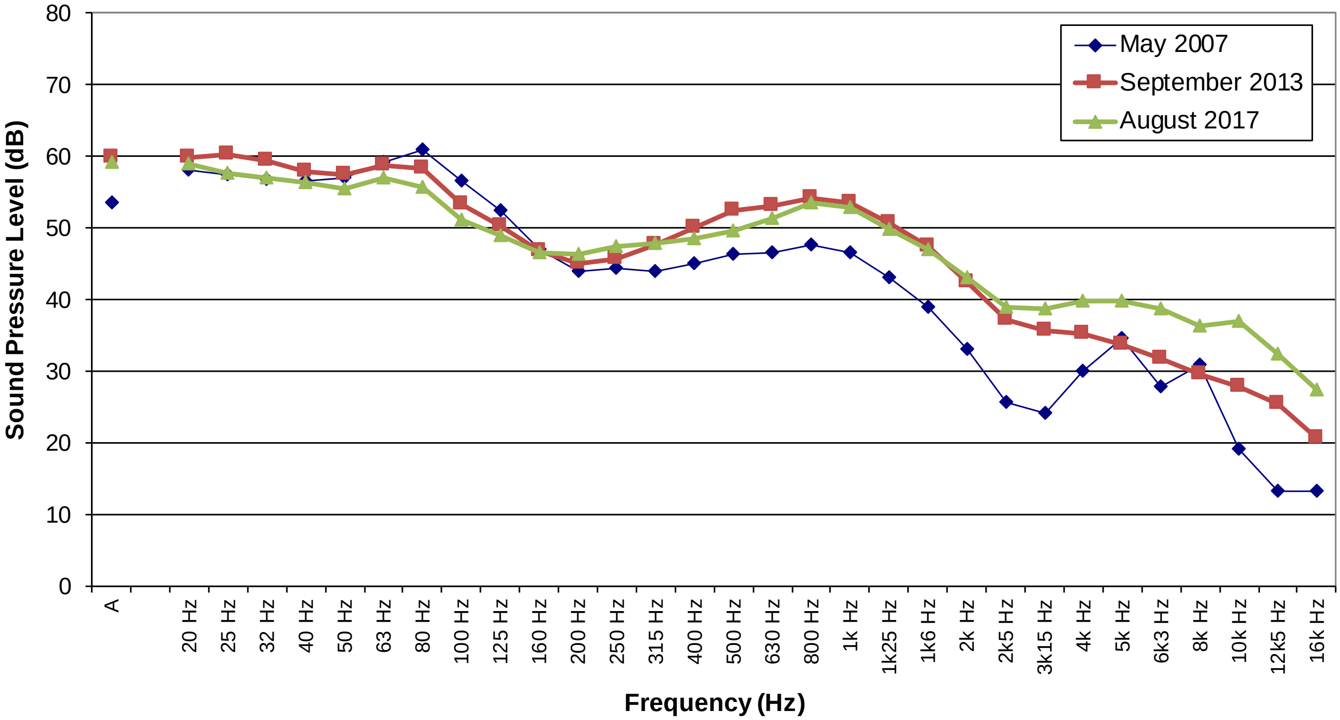

Figure 18. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M01

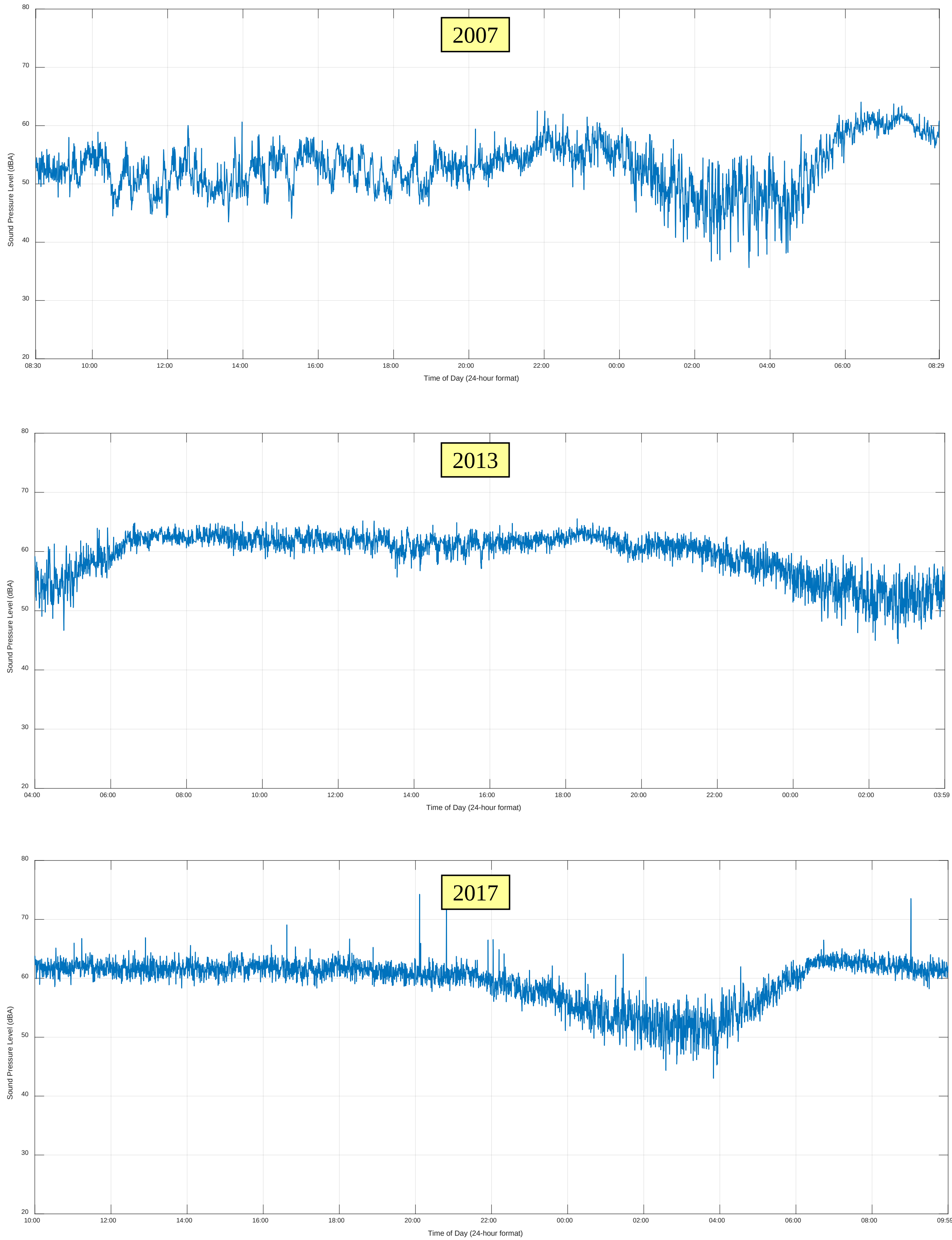

Figure 19. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M02

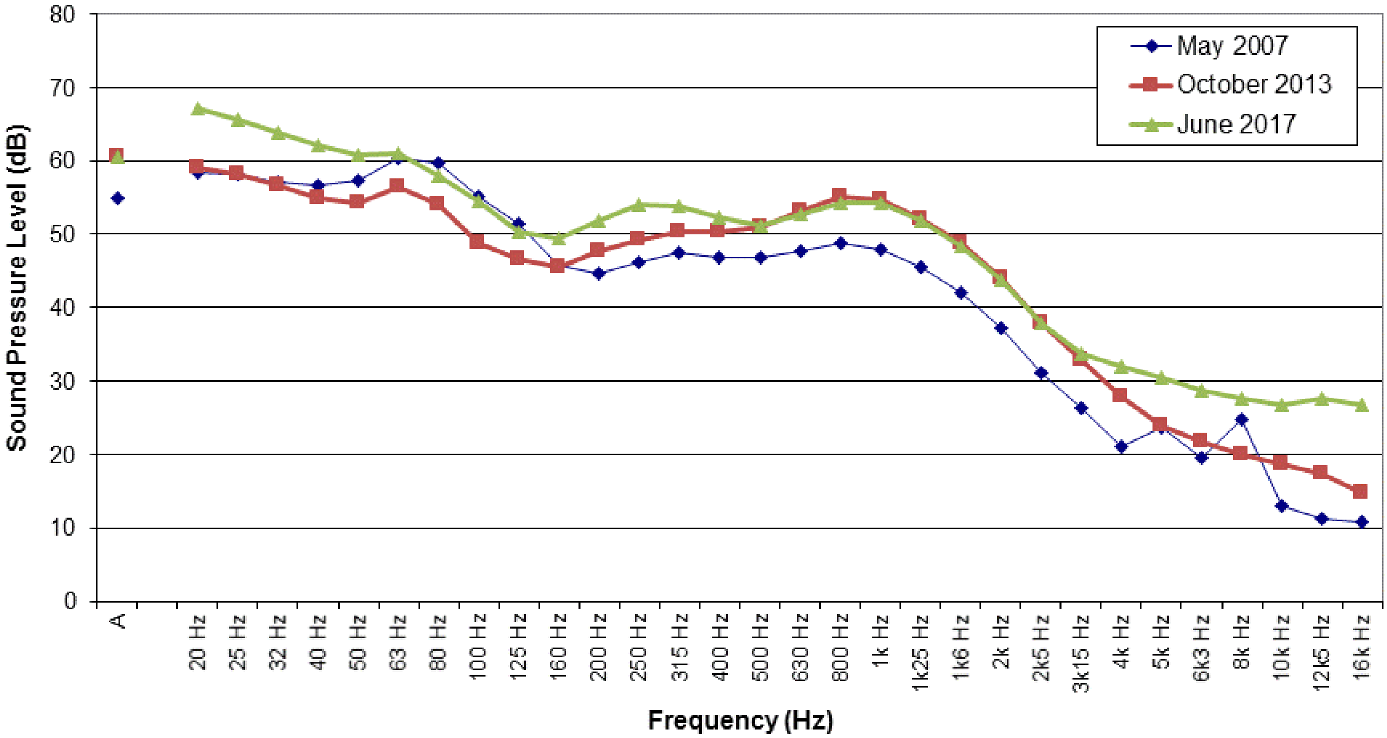

Figure 20. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M02

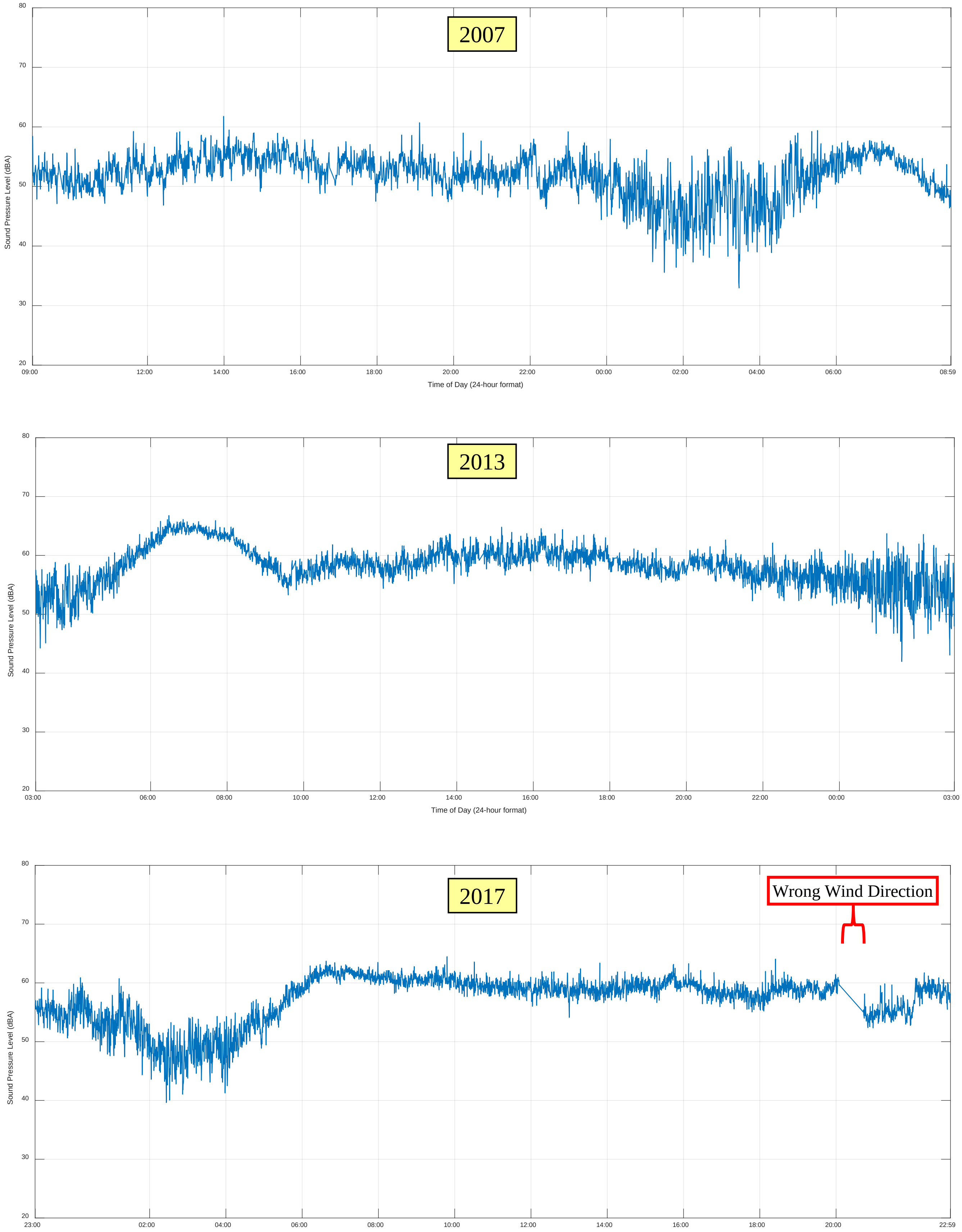

Figure 21. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M03

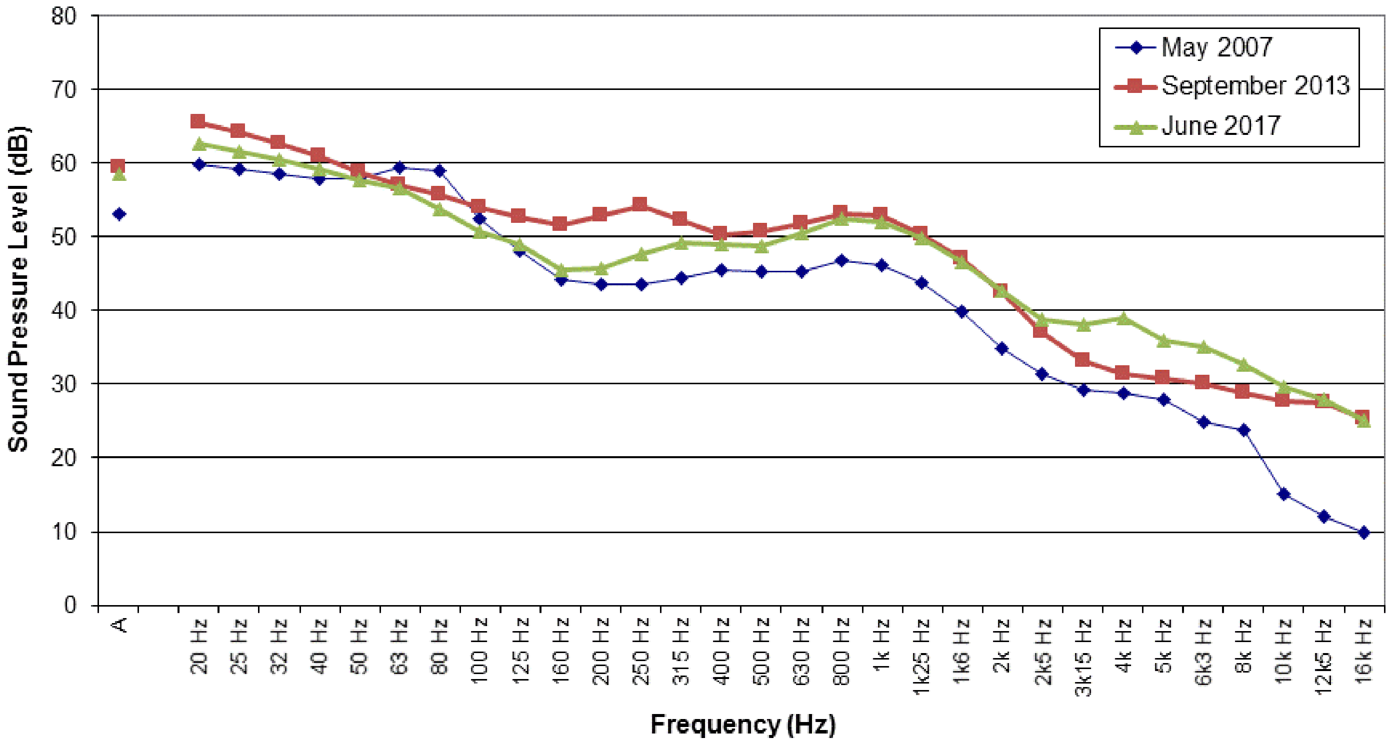

Figure 22. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M03

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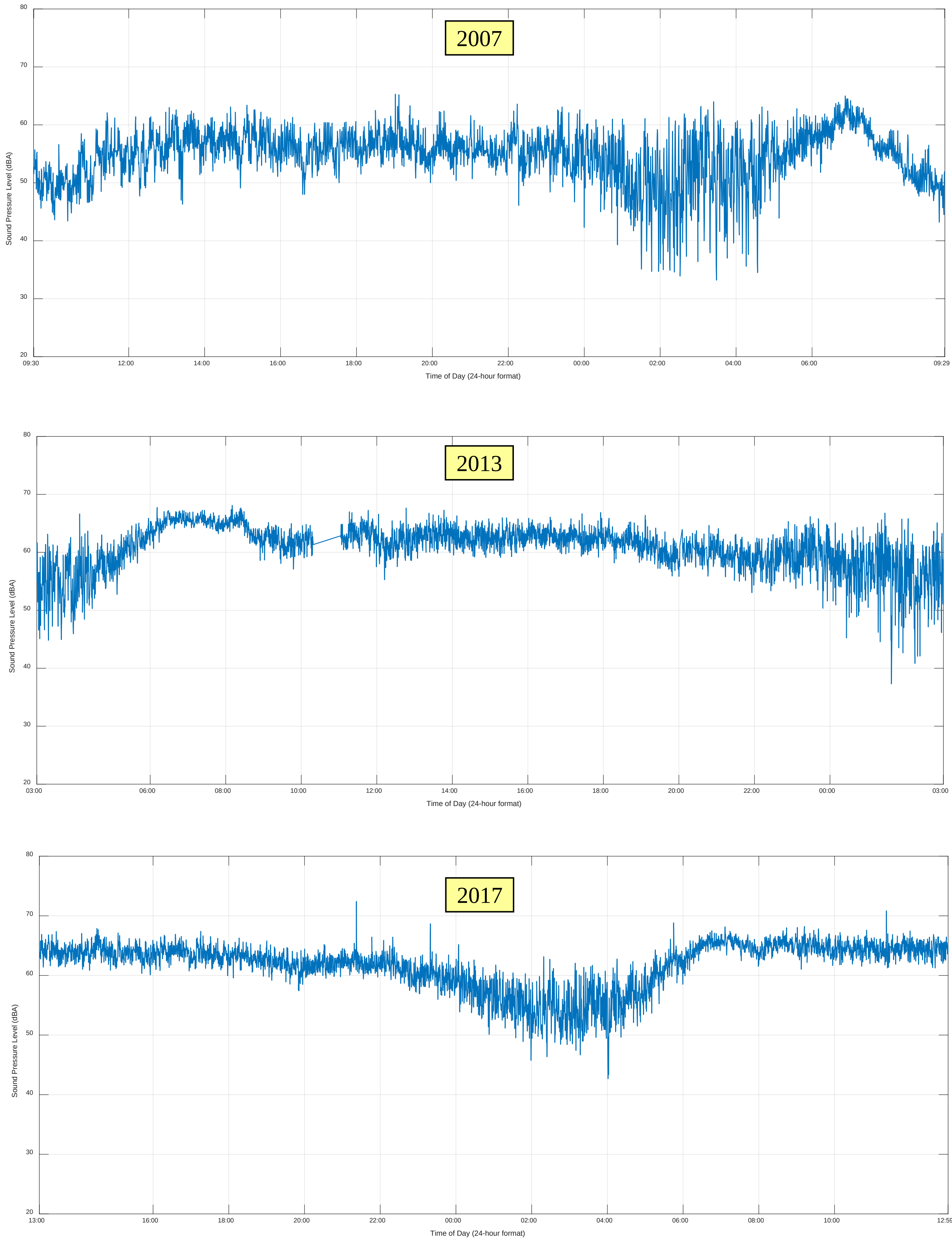


Figure 23. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M04

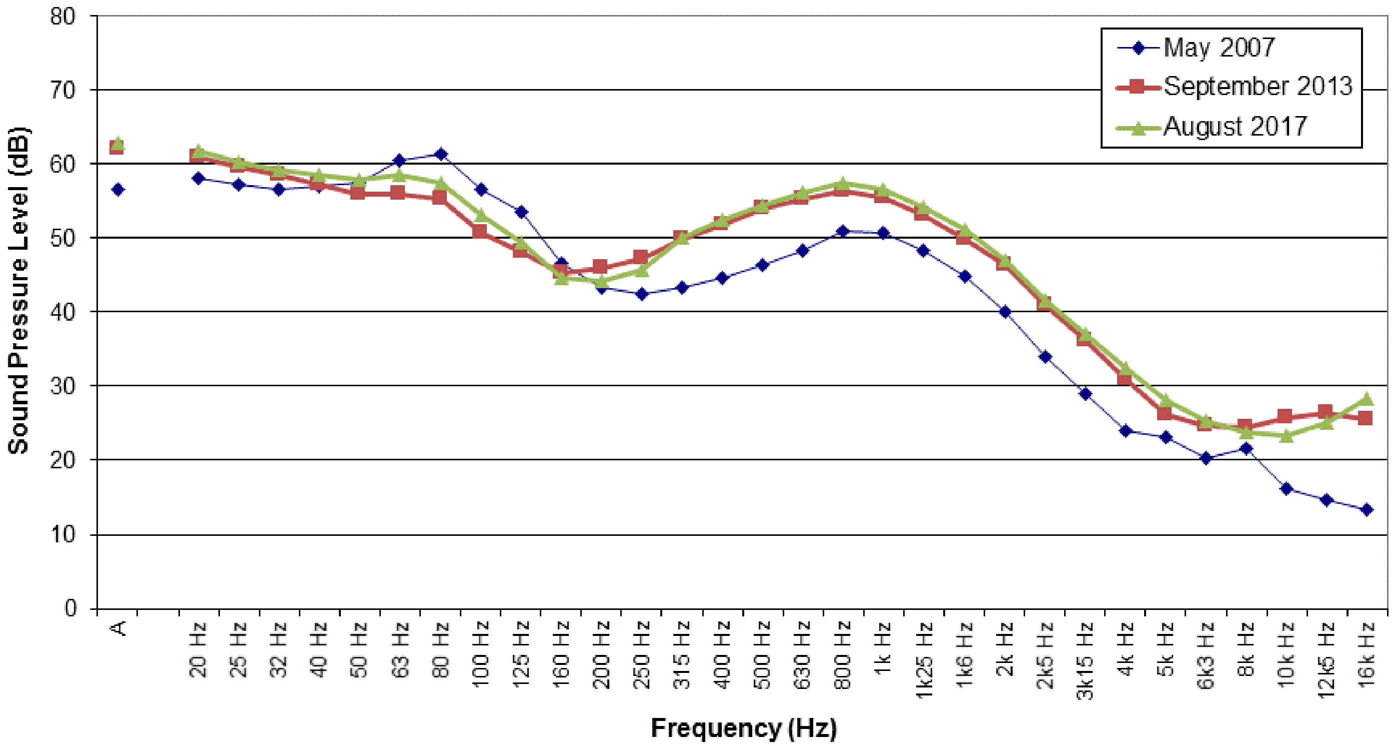


Figure 24. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M04

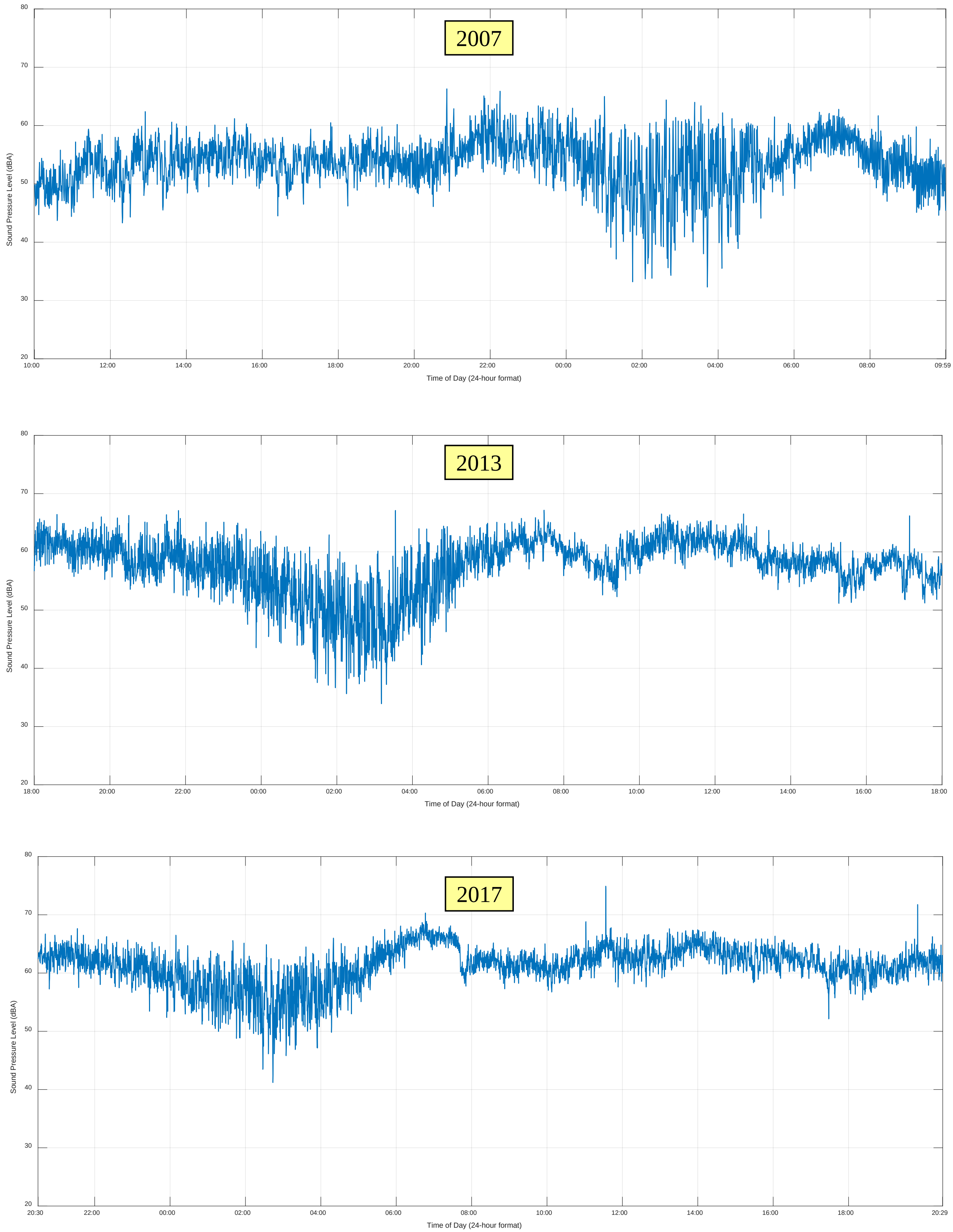


Figure 25. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M05

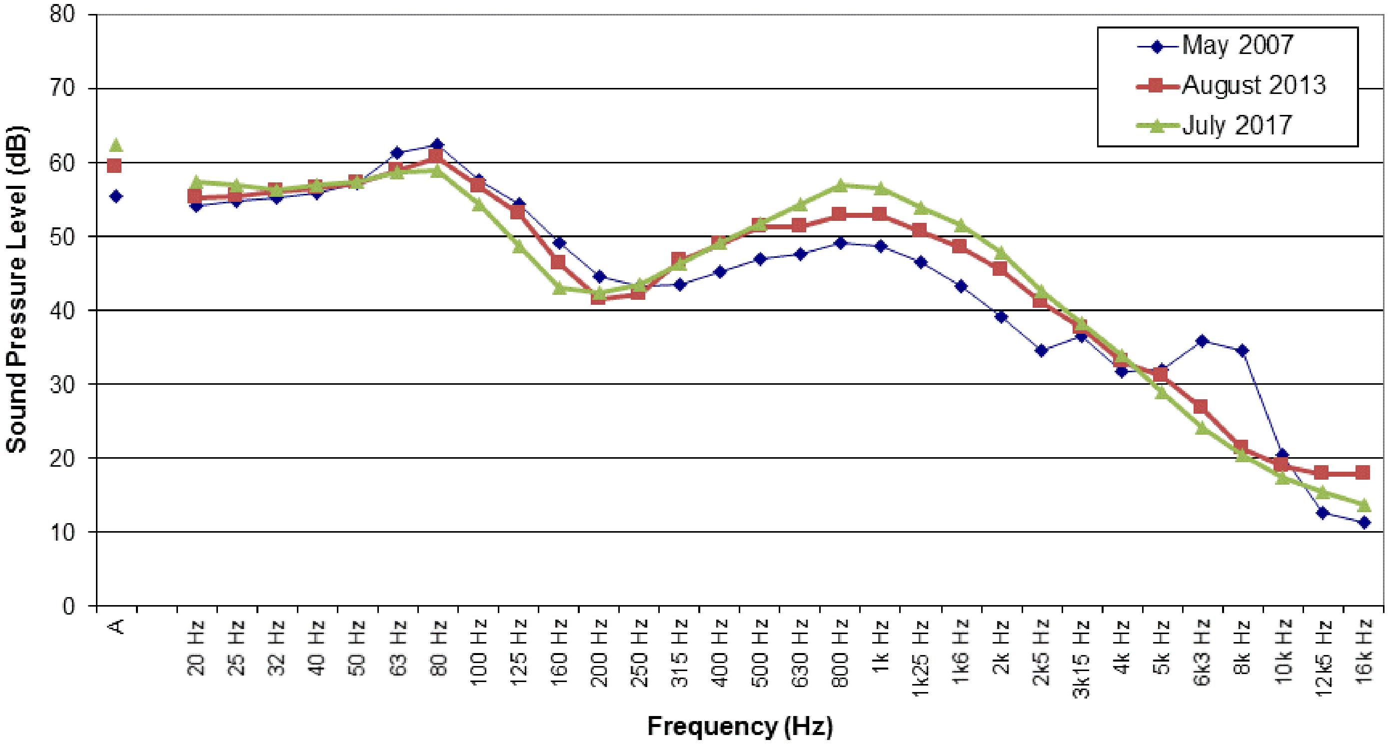
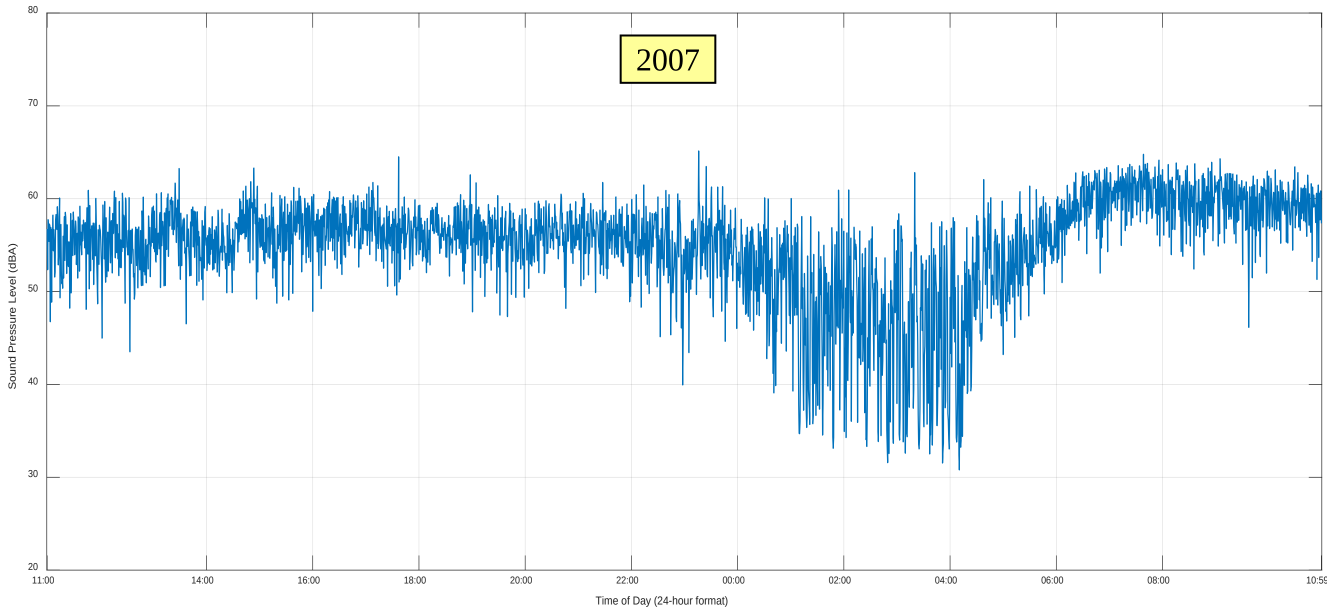


Figure 26. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M05



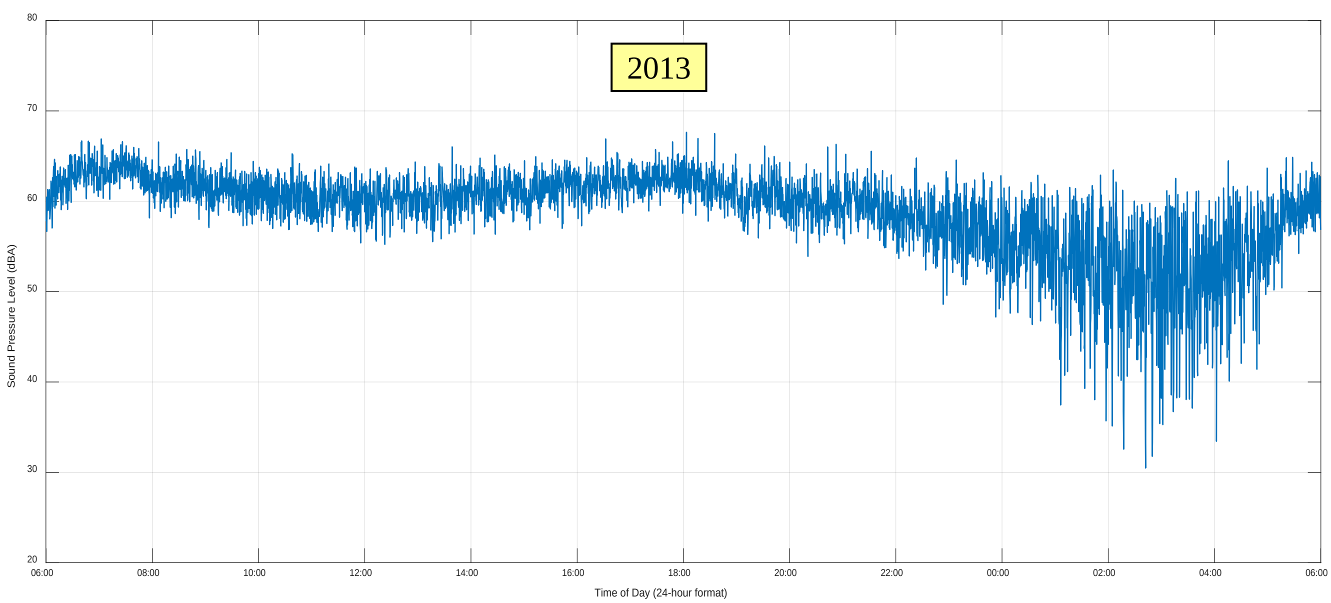


Figure 27. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M06 (2007 & 2013)

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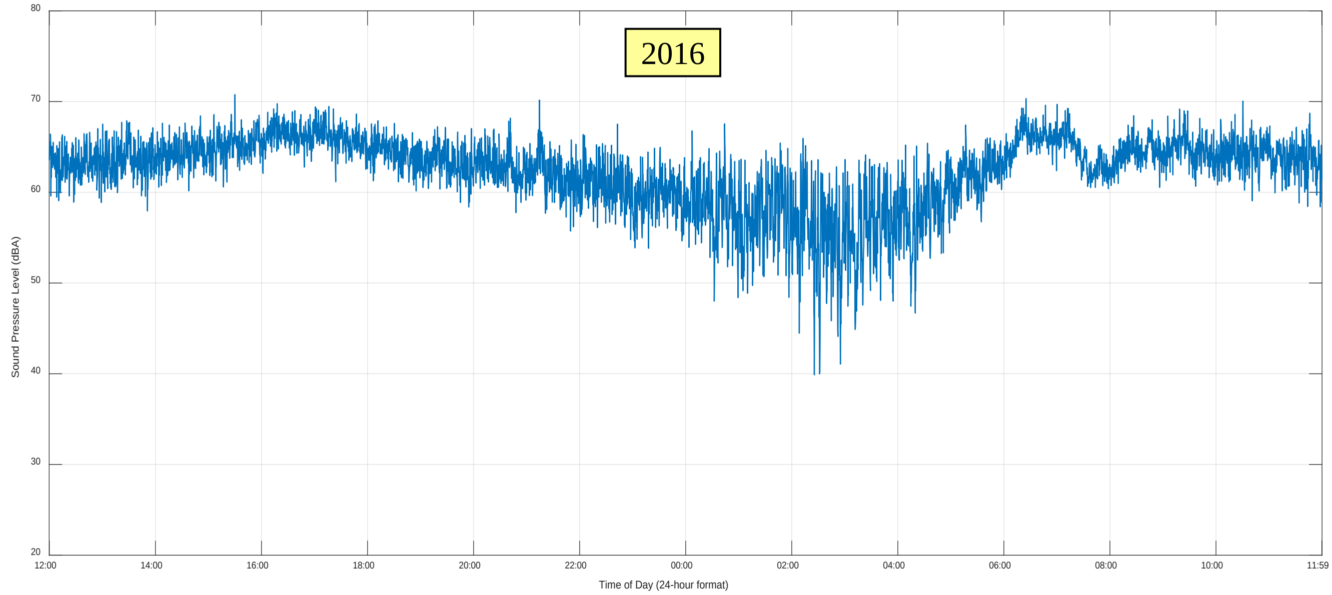


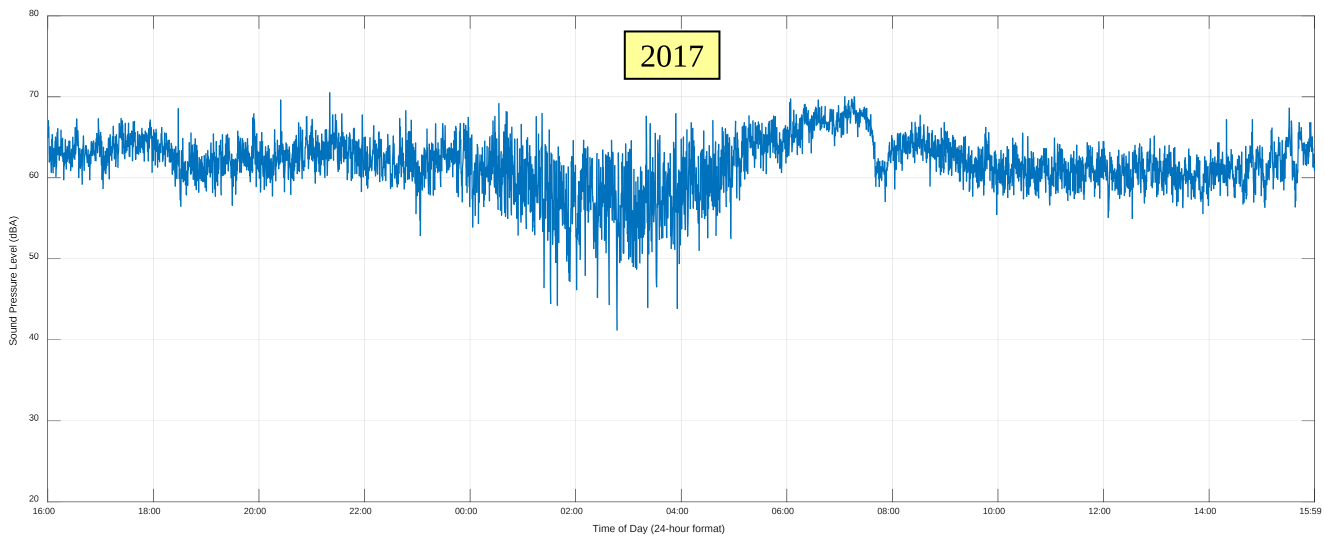


Figure 28. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M06 (2016 & 2017)

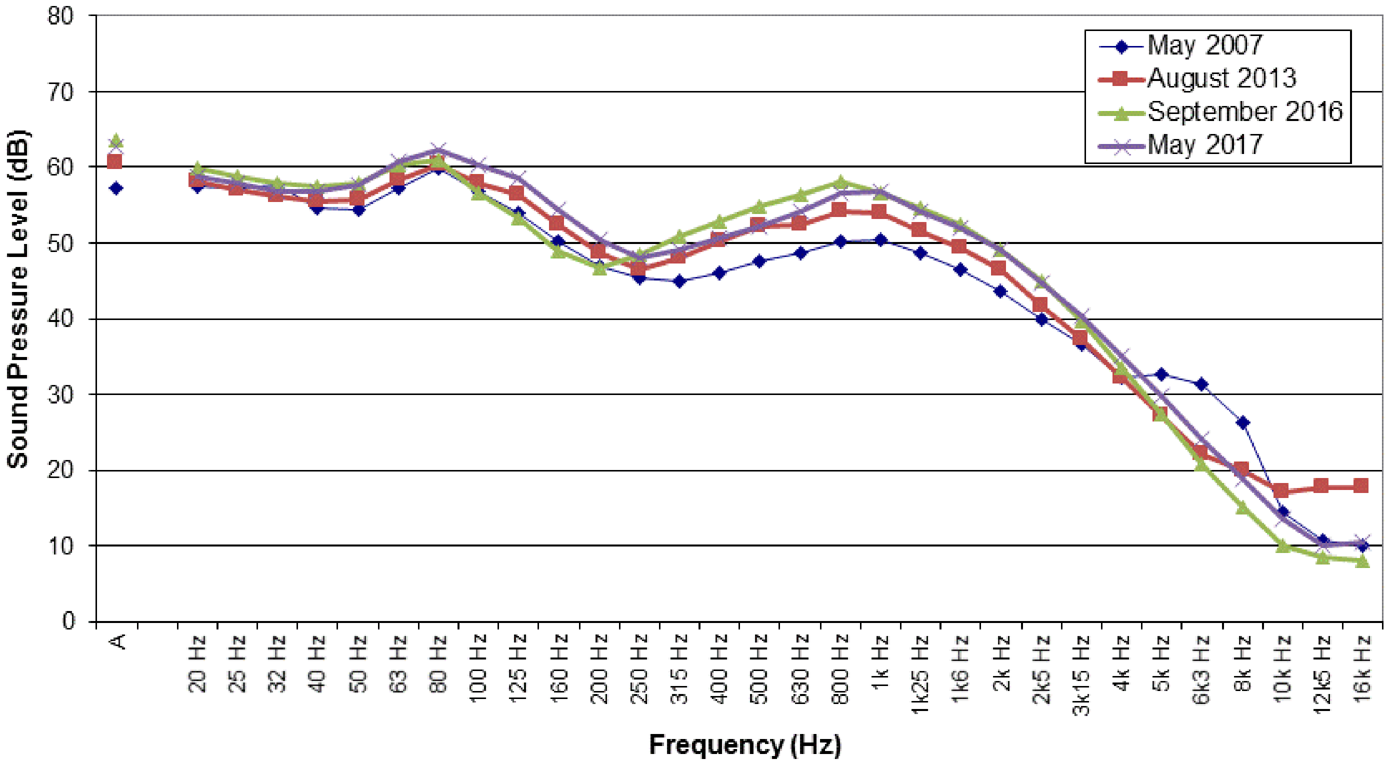
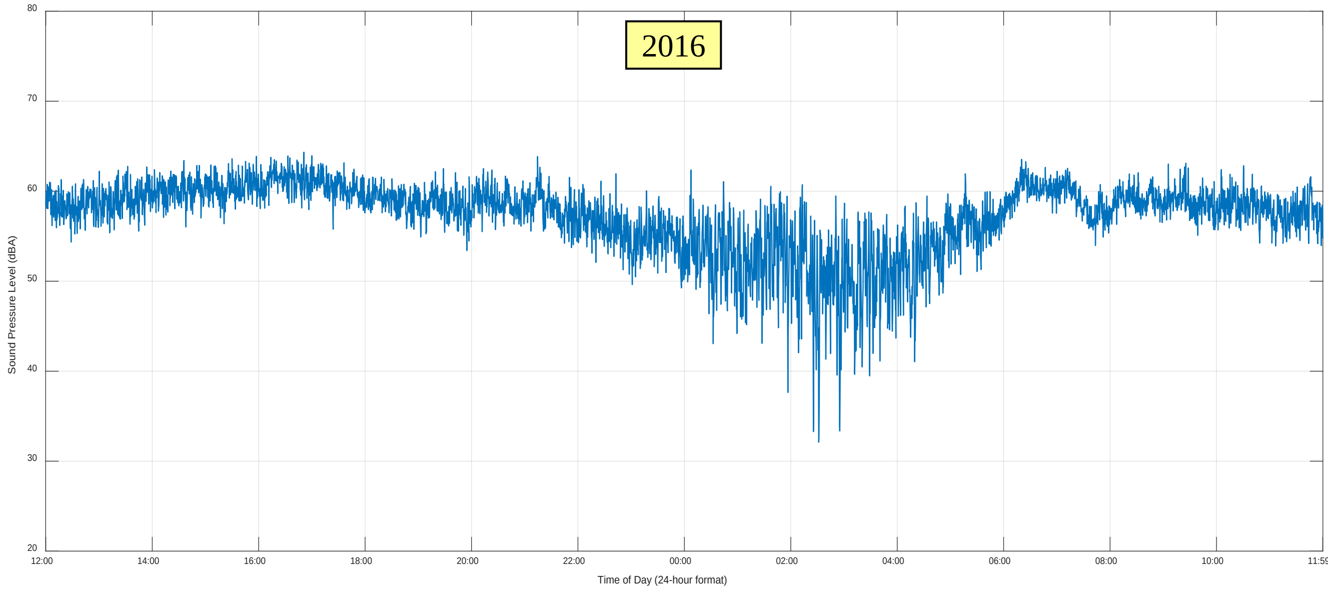


Figure 29. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M06



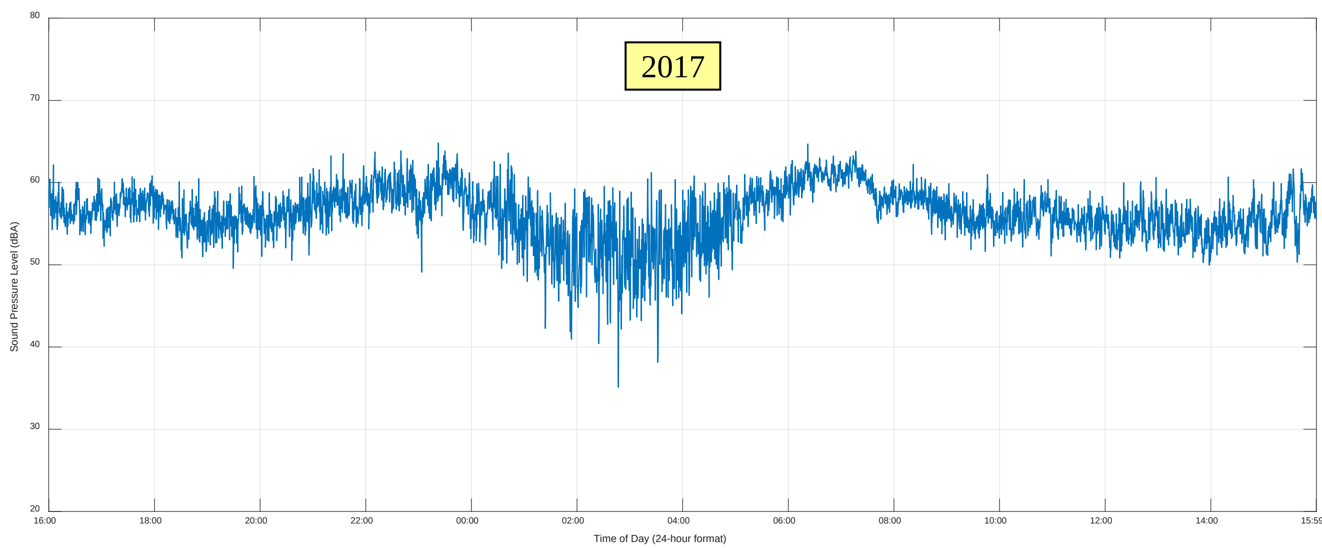


Figure 30. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M6b

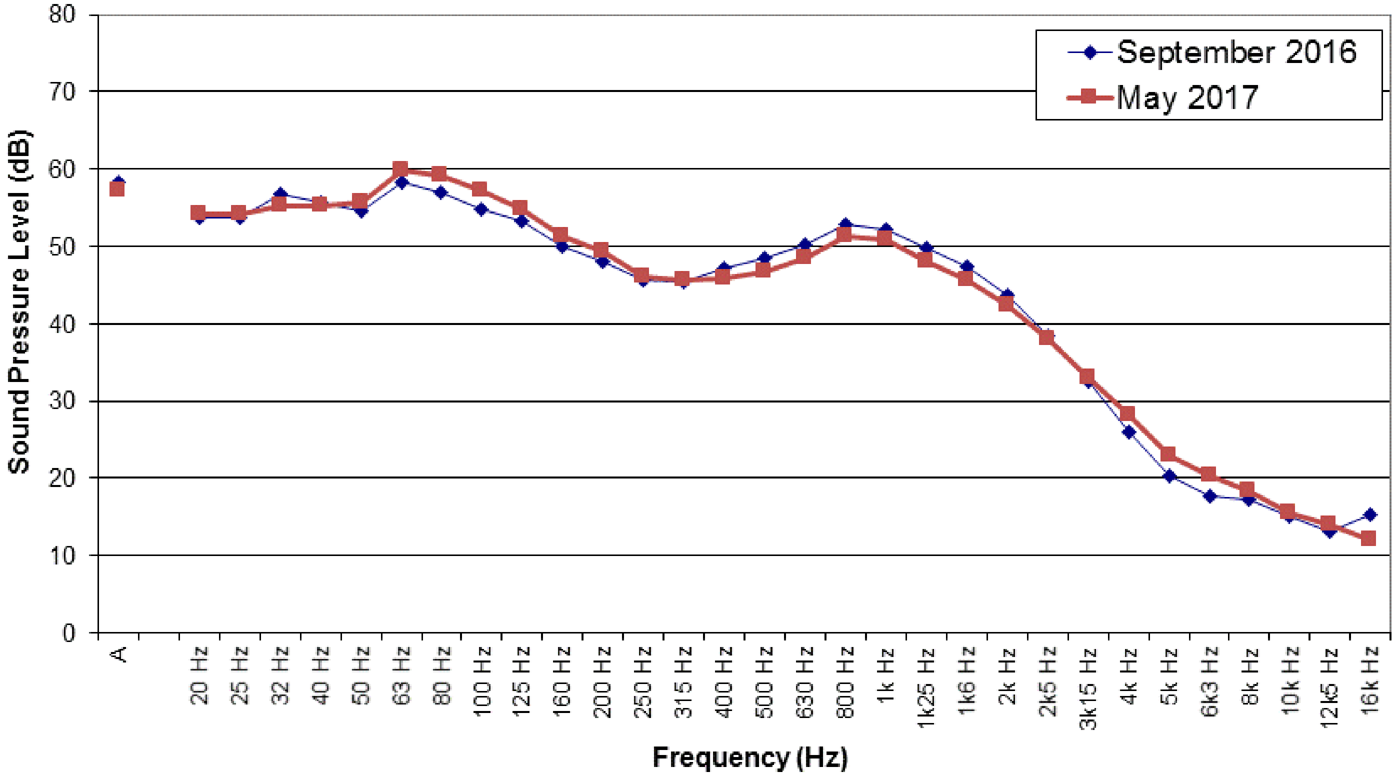


Figure 31. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M6b

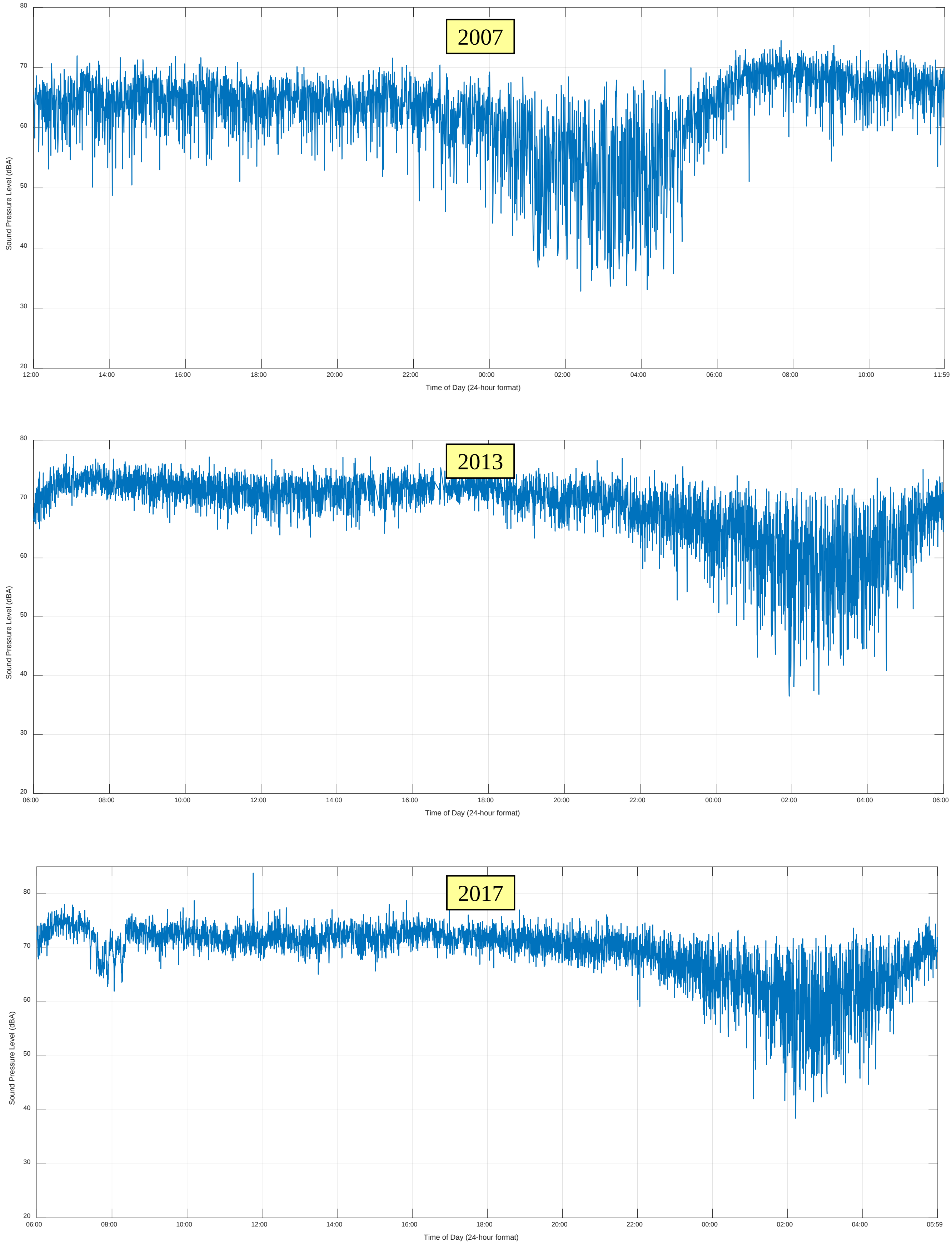


Figure 32. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M07

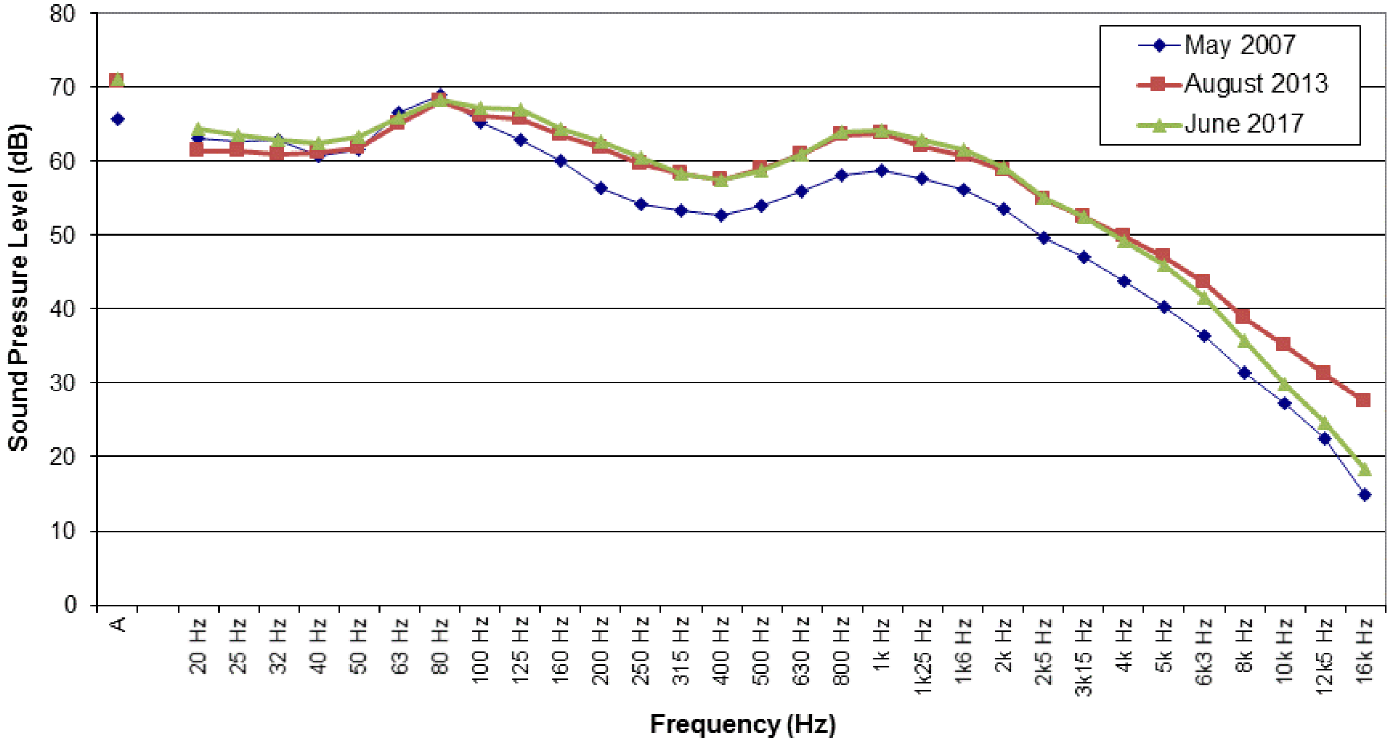


Figure 33. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M07

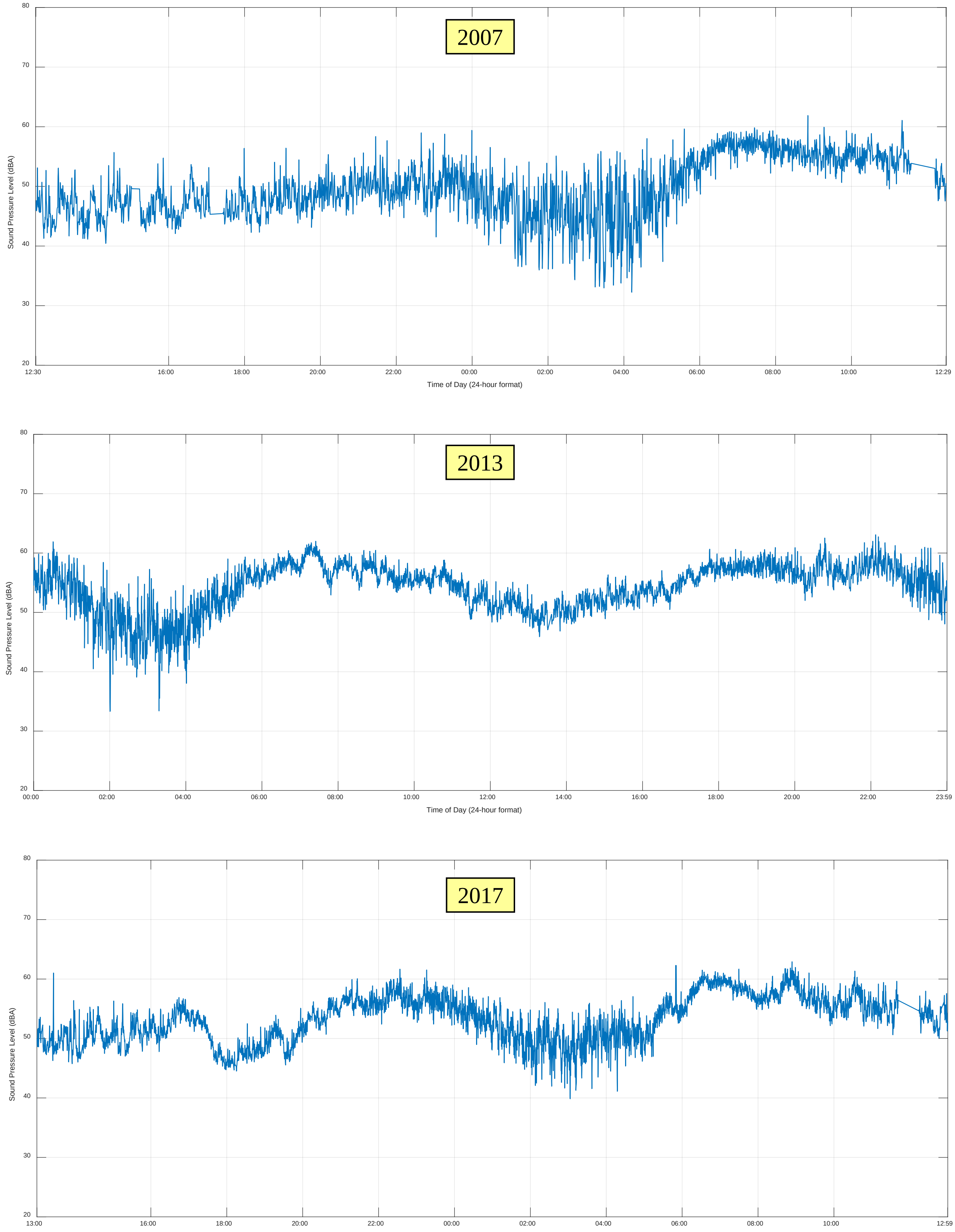


Figure 34. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M08

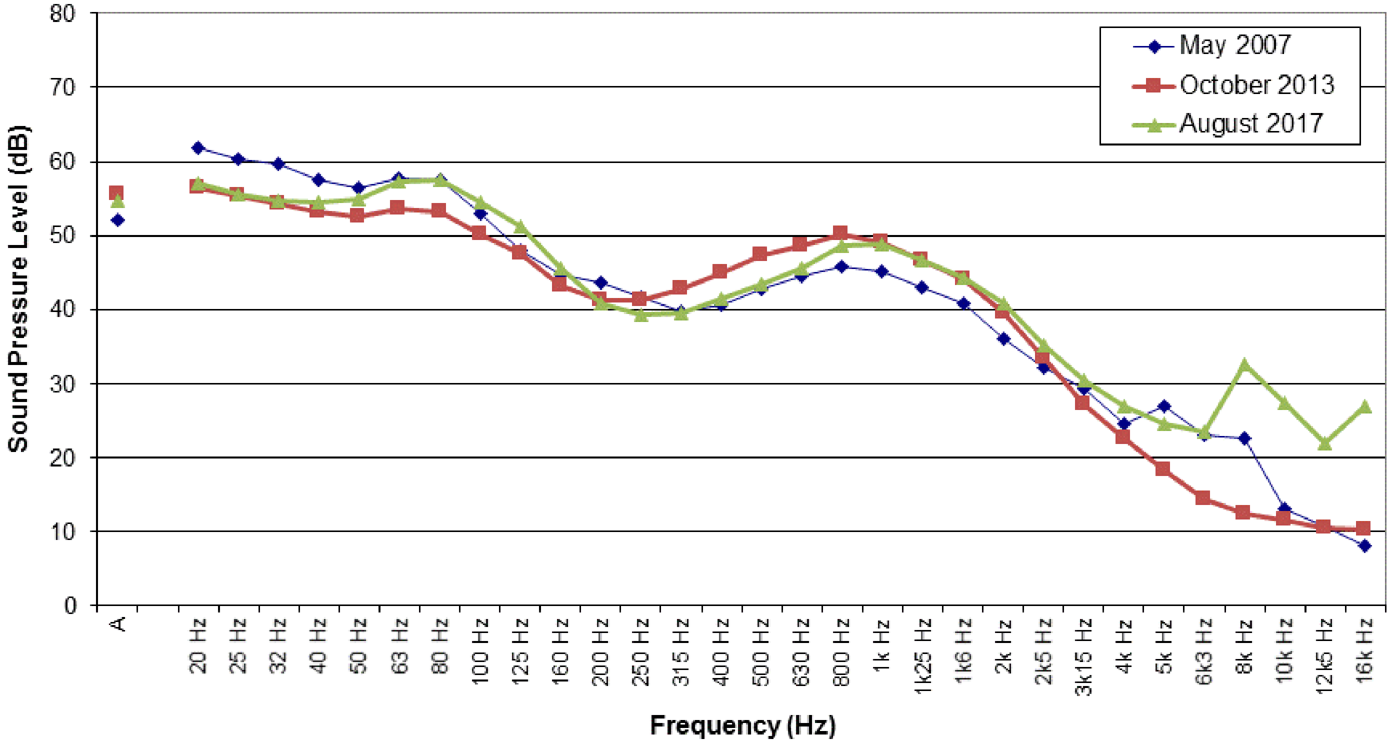


Figure 35. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M08

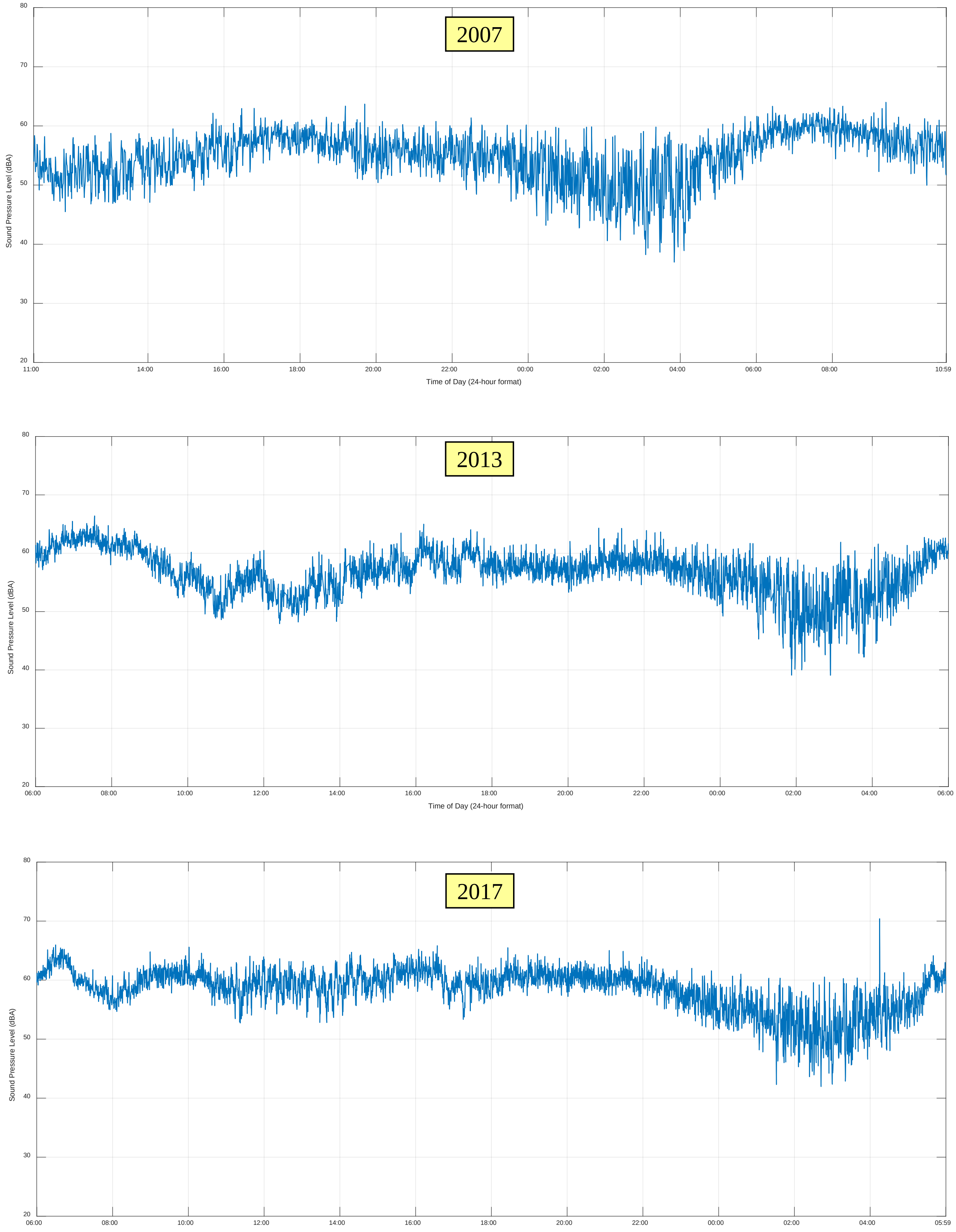


Figure 36. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M11

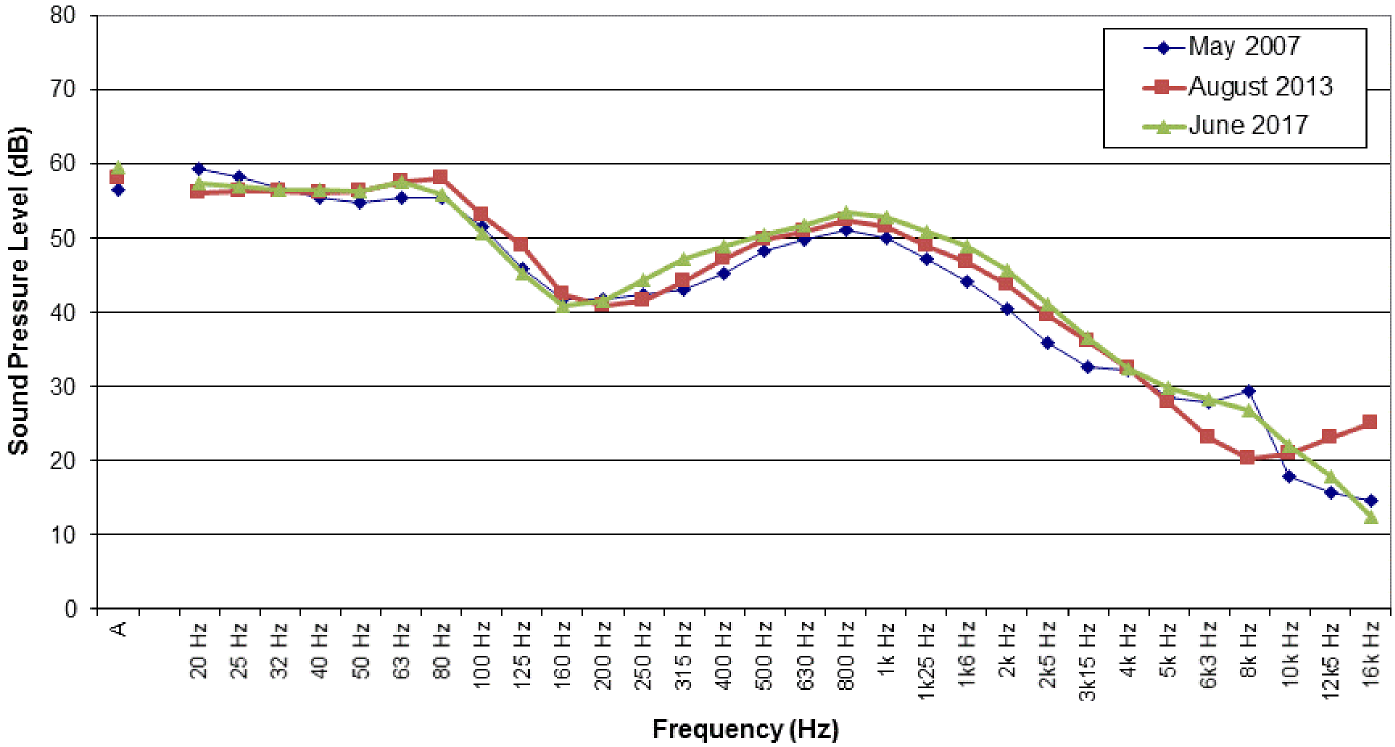


Figure 37. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M11

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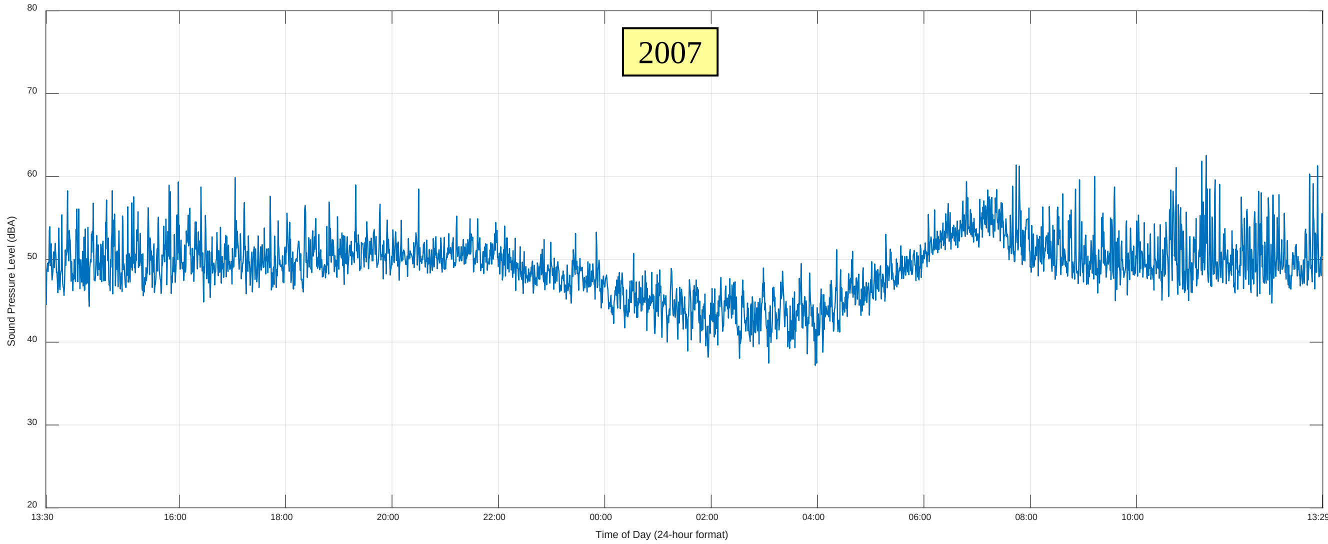

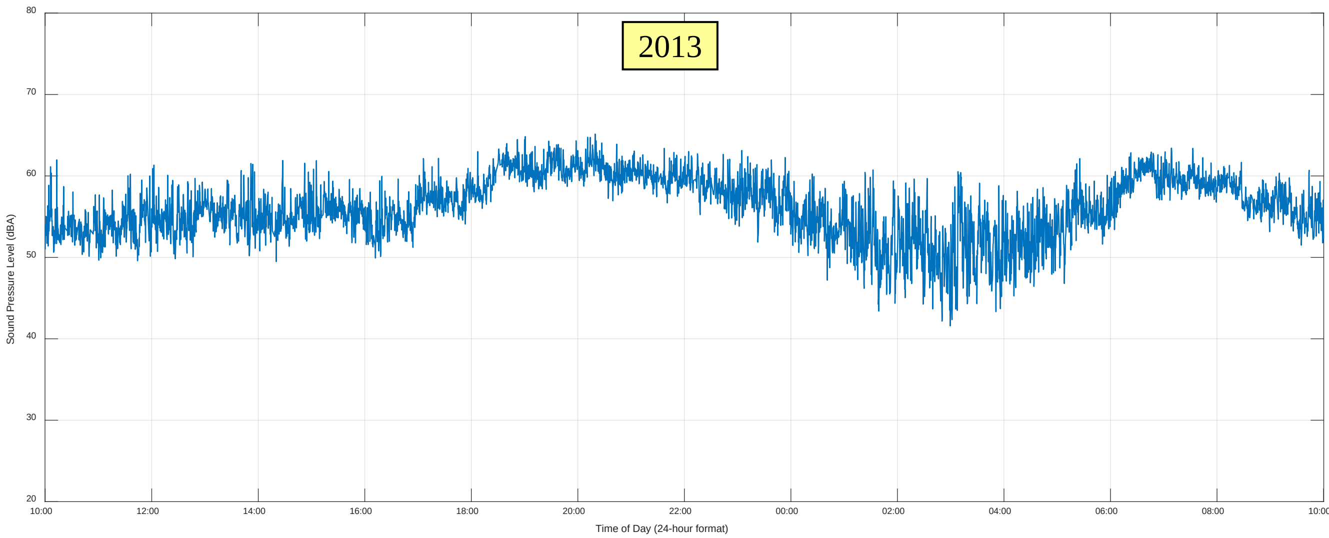

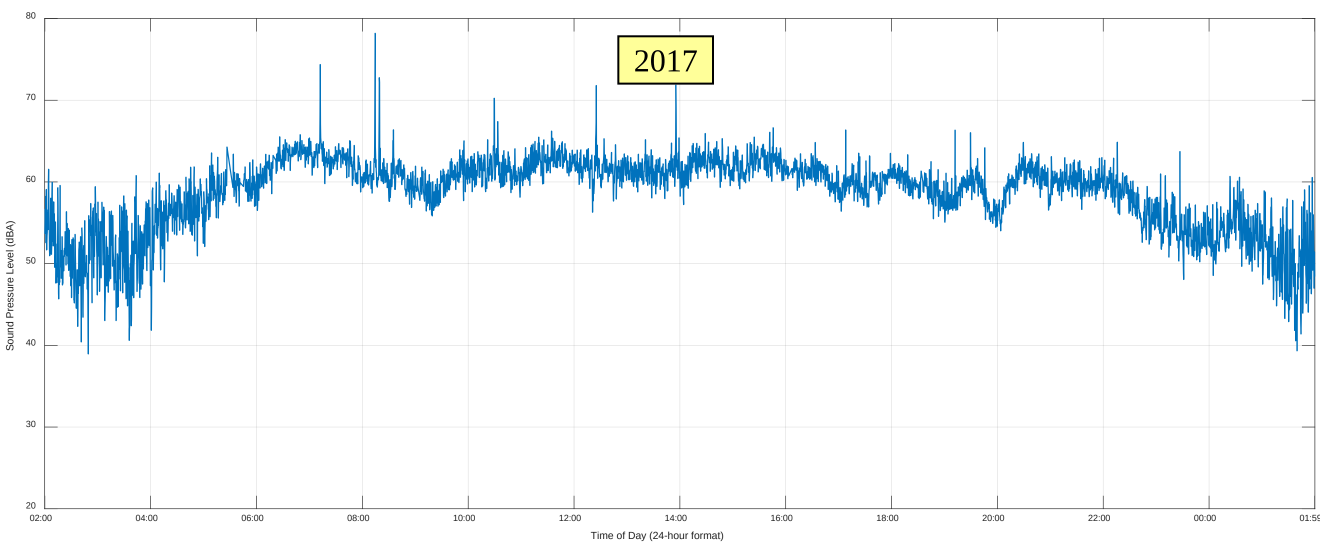

Figure 38. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M12

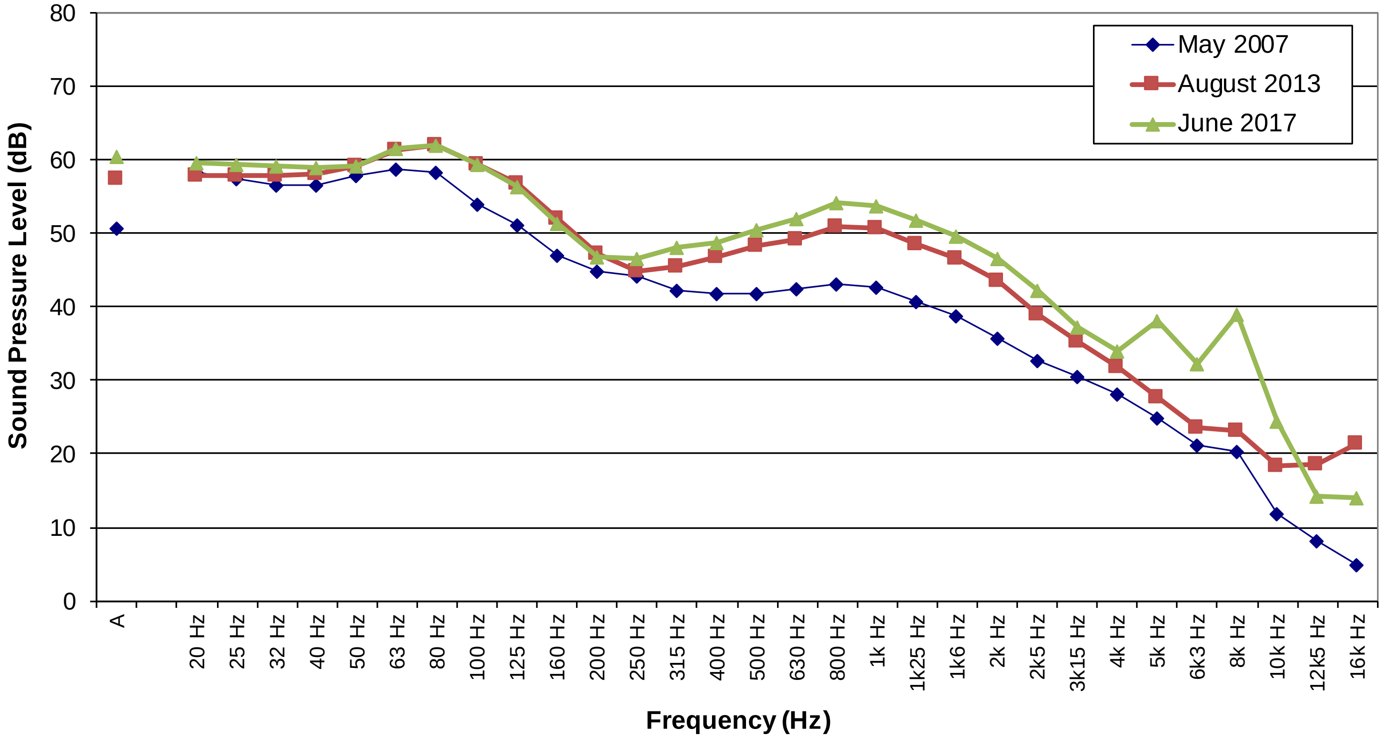

Figure 39. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M12

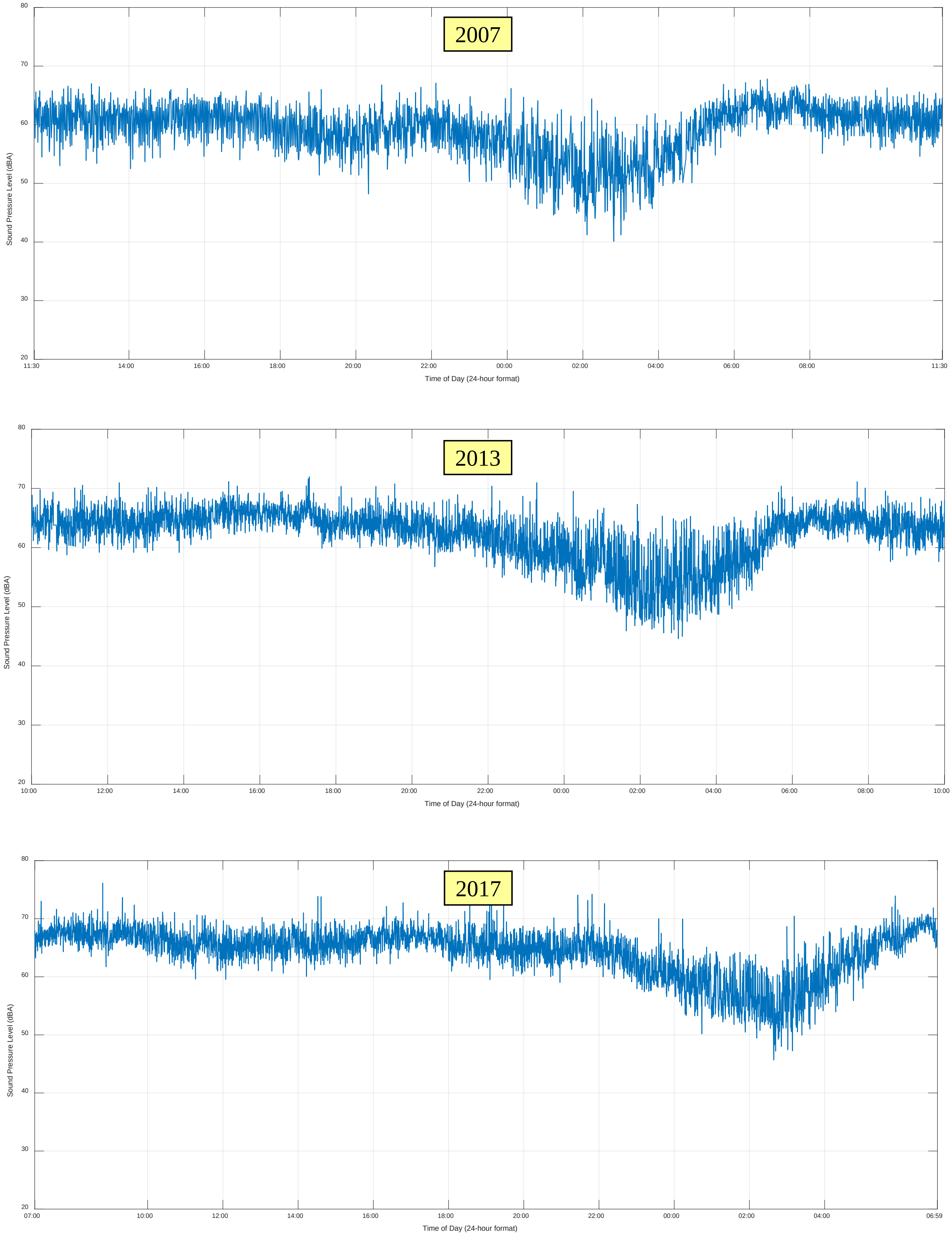

Figure 40. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M13

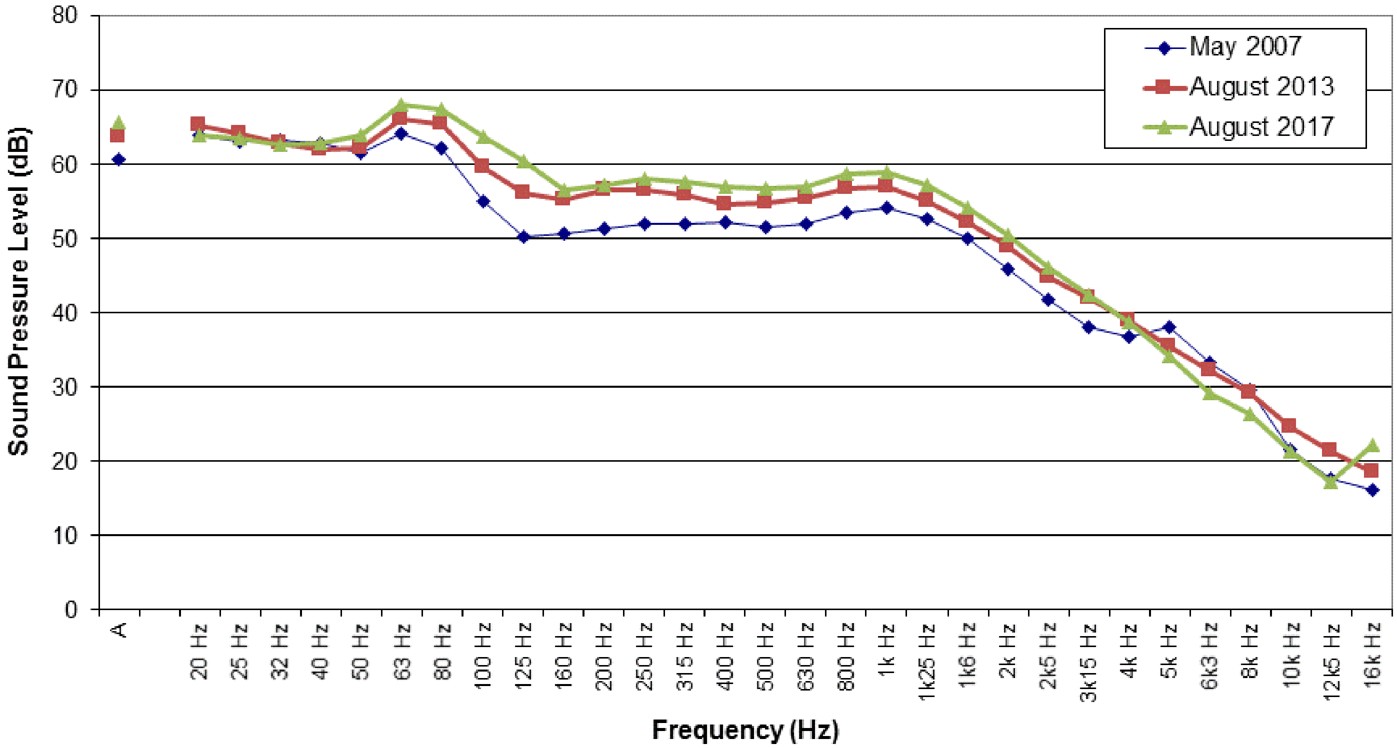

Figure 41. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M13

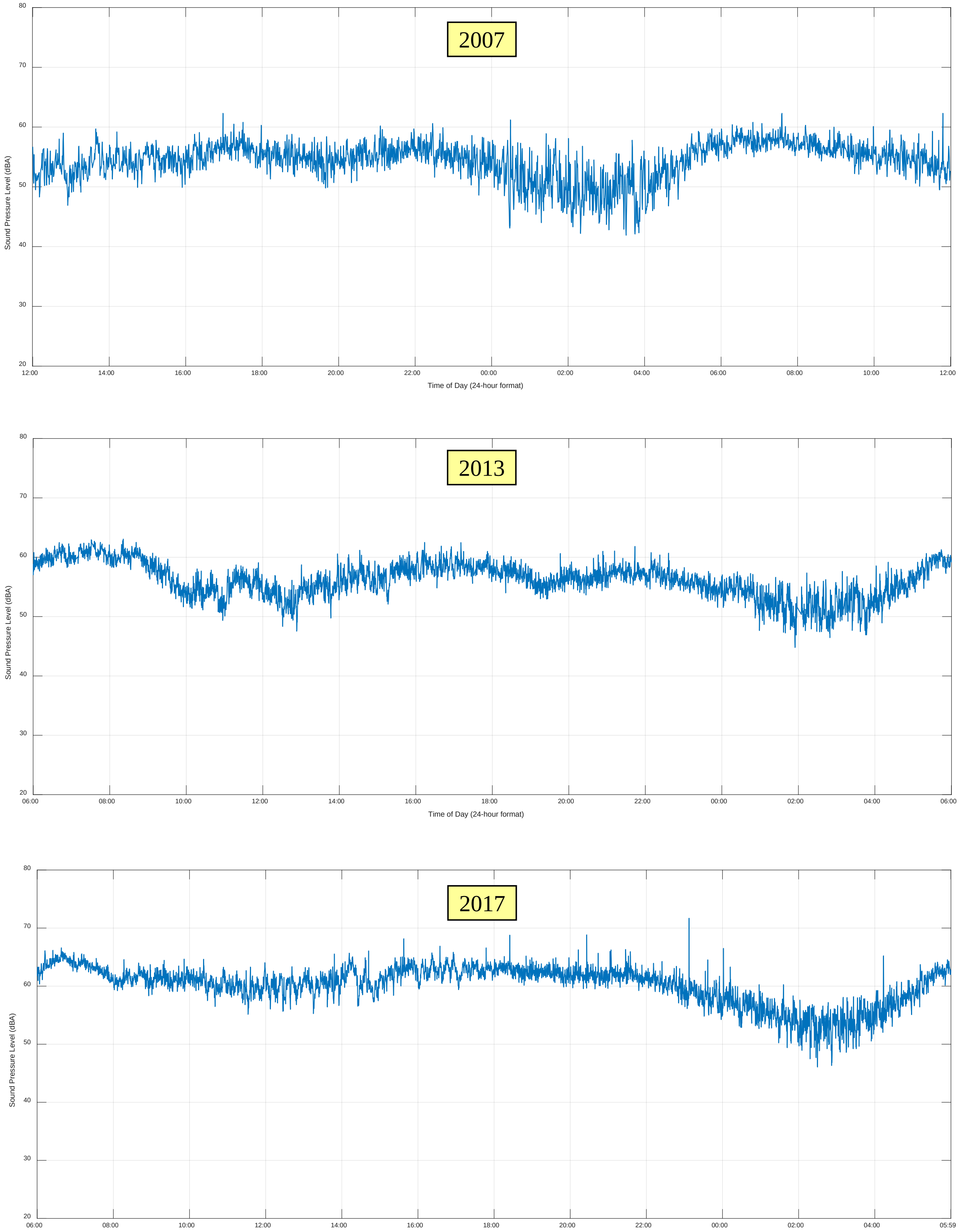

Figure 42. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M14

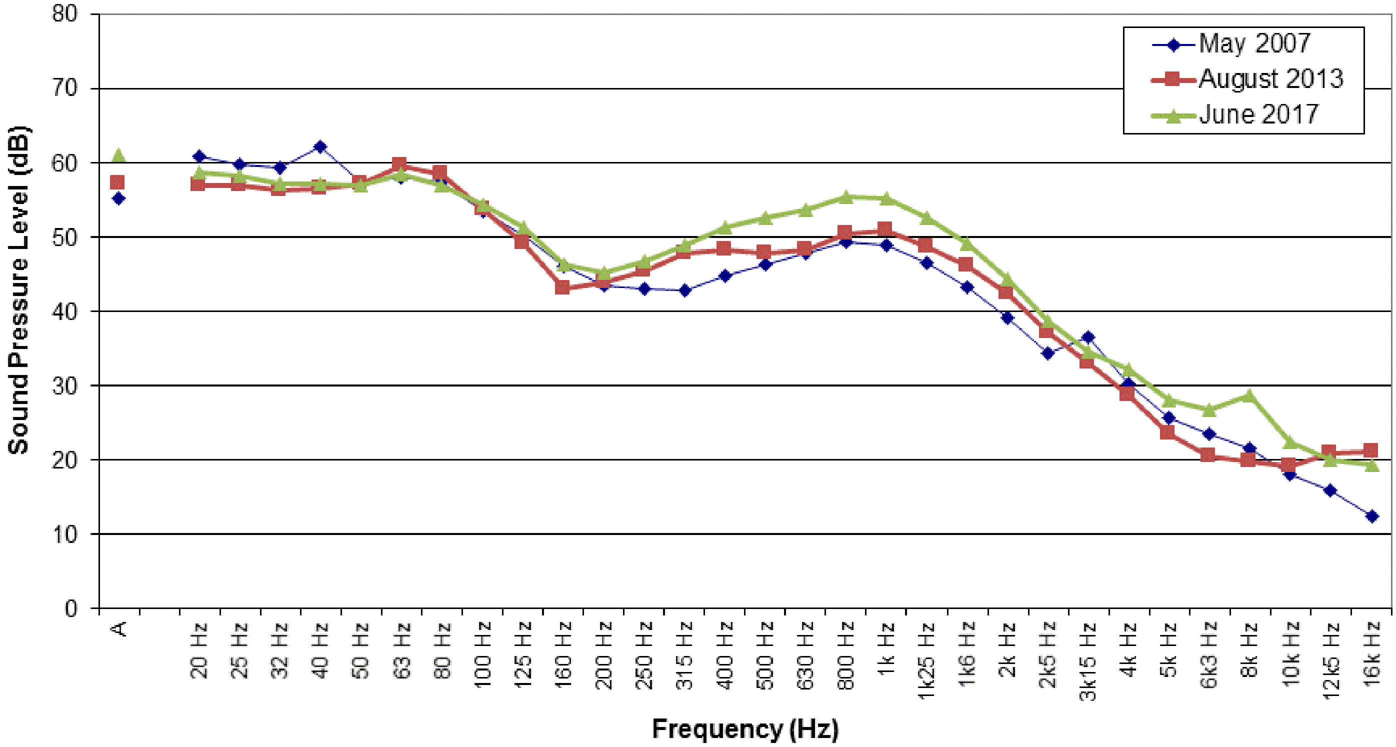

Figure 43. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M14

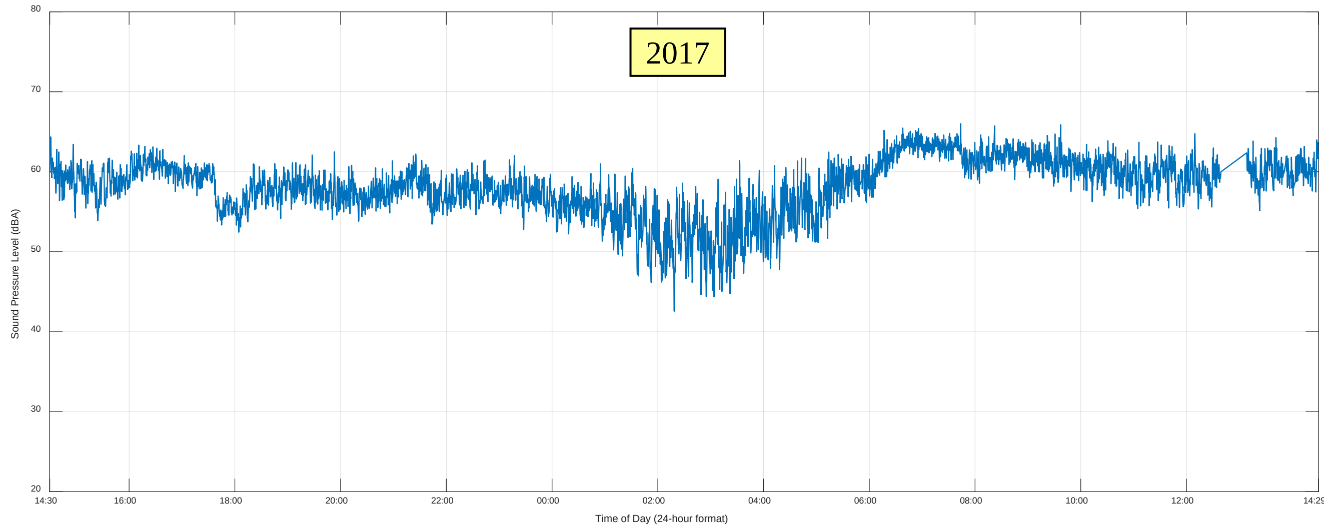

Figure 44. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M15

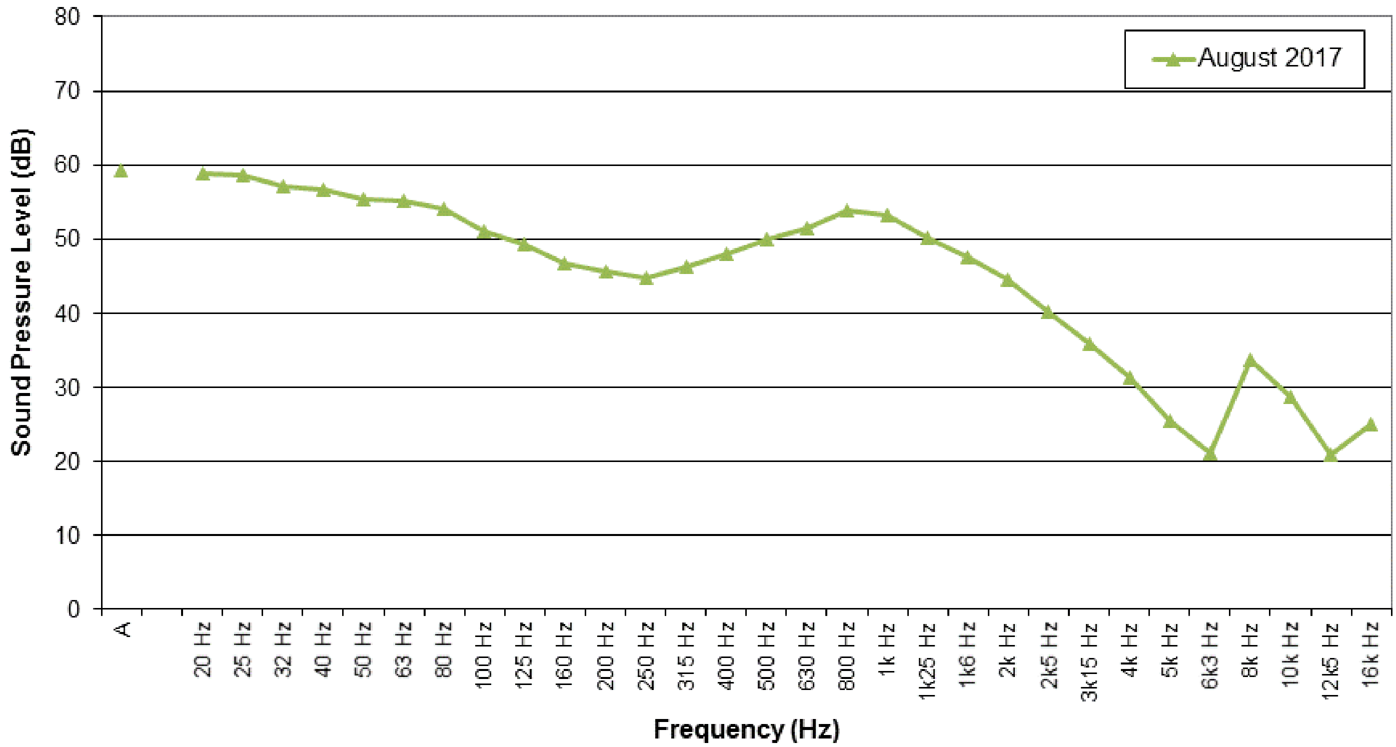

Figure 45. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M15

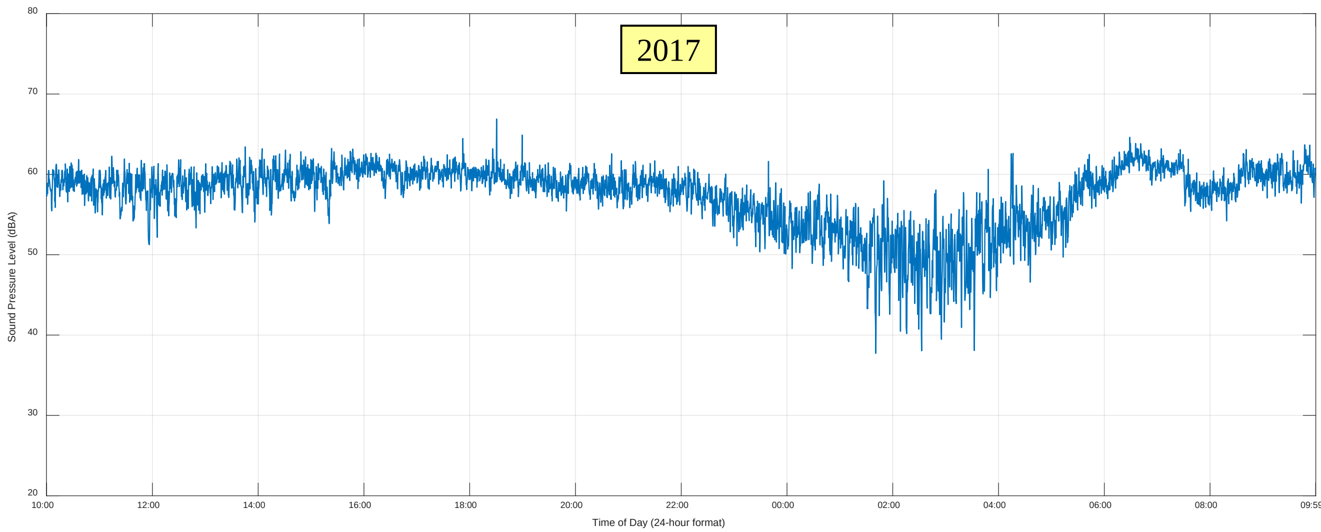

Figure 46. 24-Hour Broadband A-Weighted L_{eq} Sound Levels at Noise Monitor M16

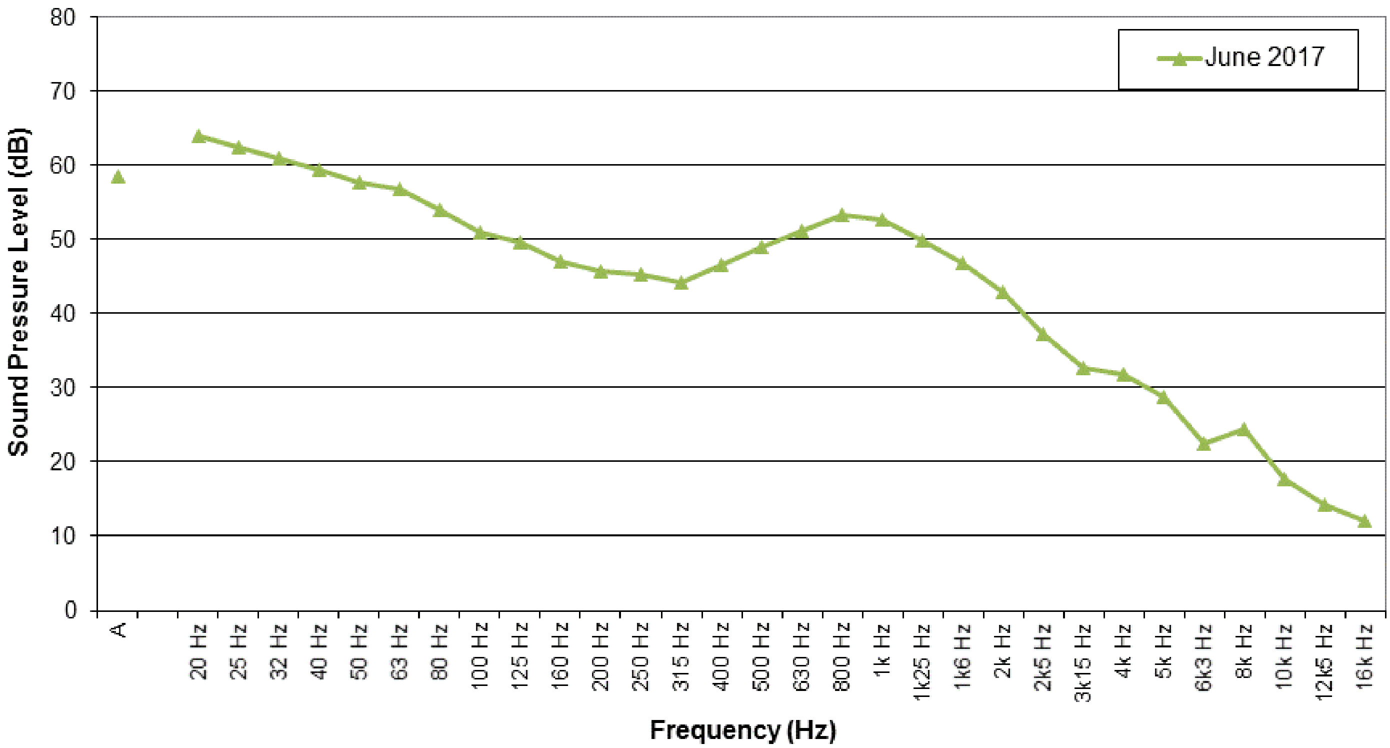

Figure 47. 24-Hour 1/3 Octave Band L_{eq} Sound Levels at Noise Monitor M16

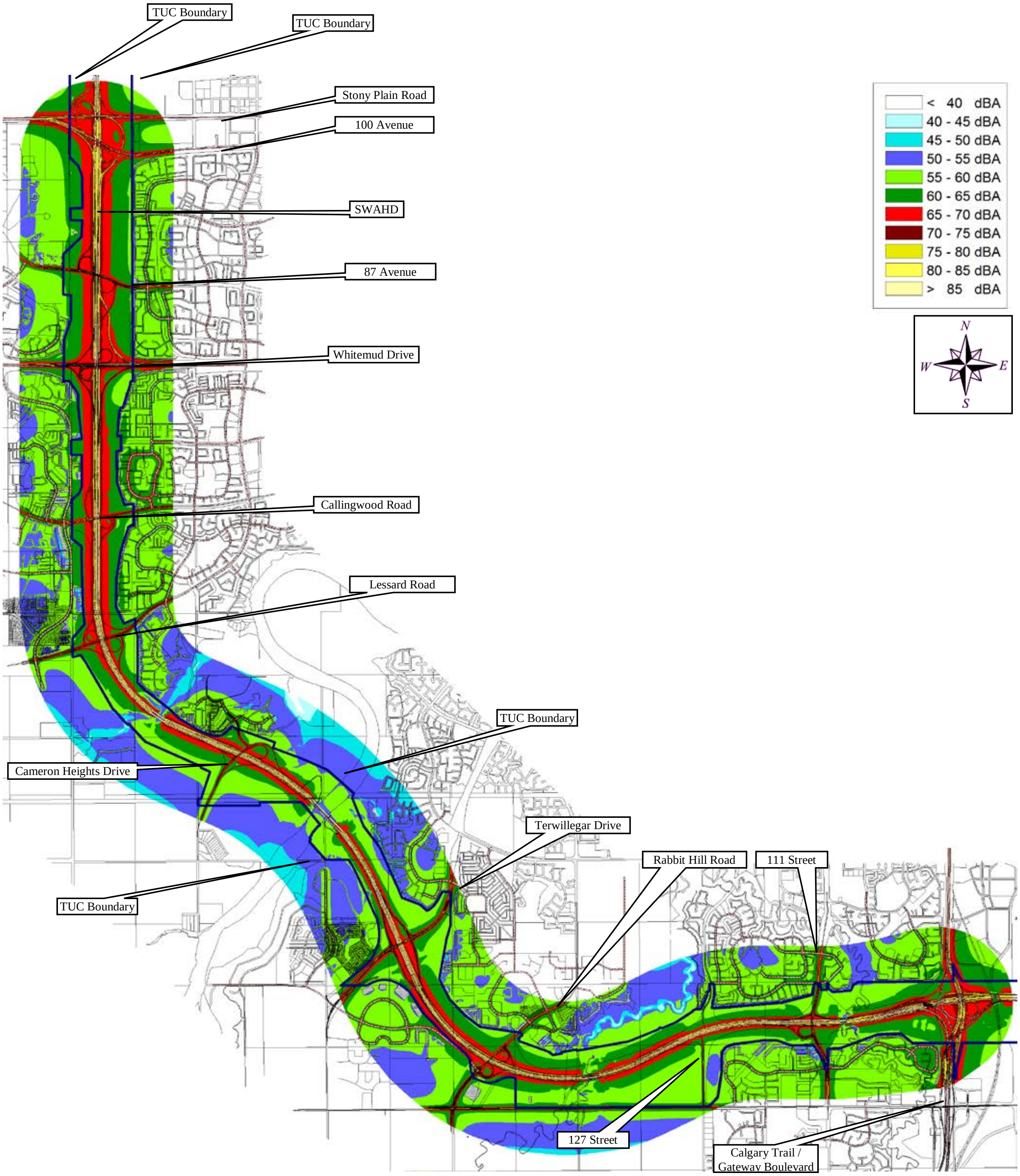

Figure 48a. Current Conditions L_{eq}24 Sound Levels for Entire Study Area

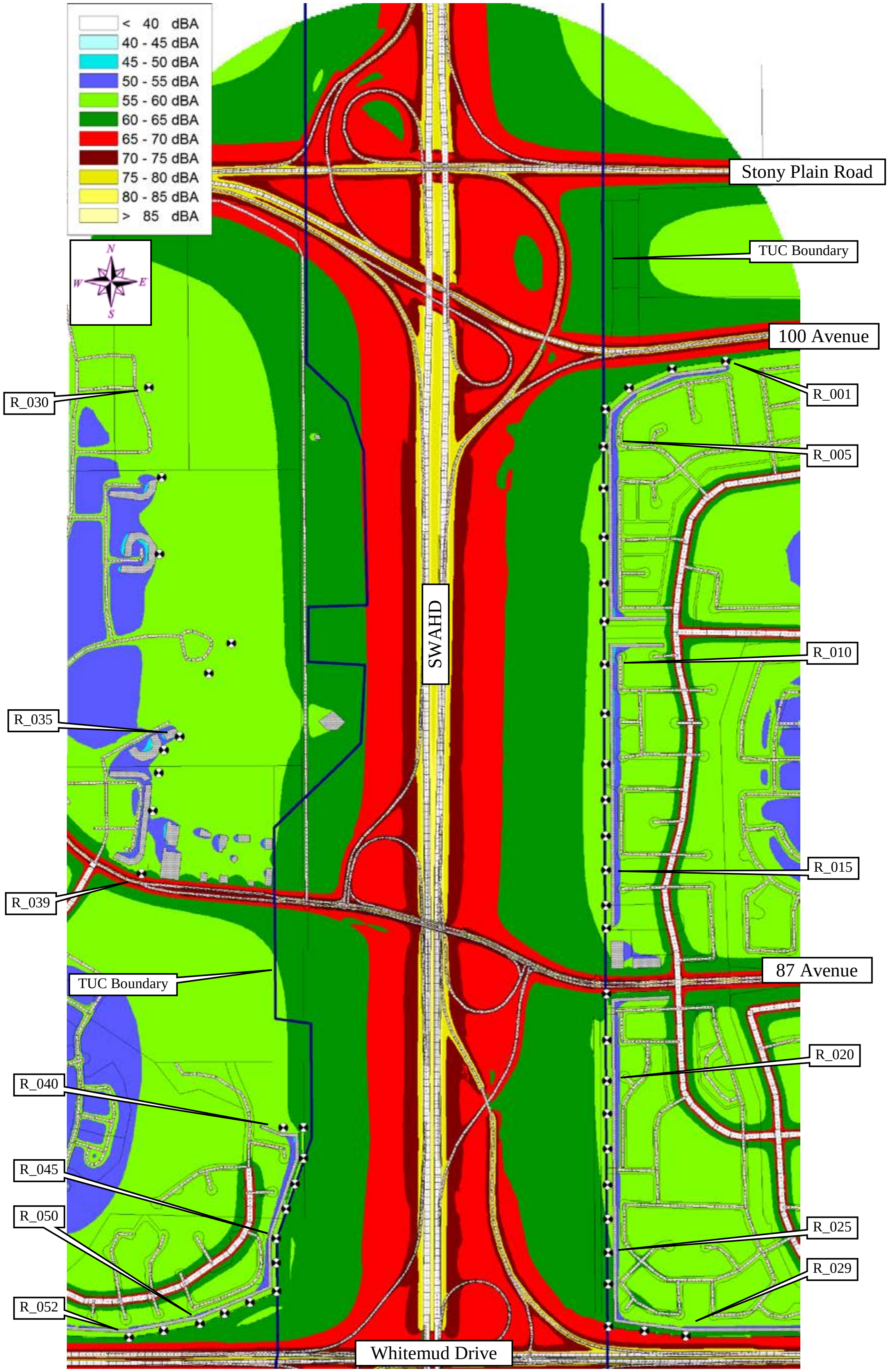

Figure 48b. Current Conditions L_{eq}24 Sound Levels for Region 1

Figure 48c. Current Conditions L_{eq}24 Sound Levels for Region 2

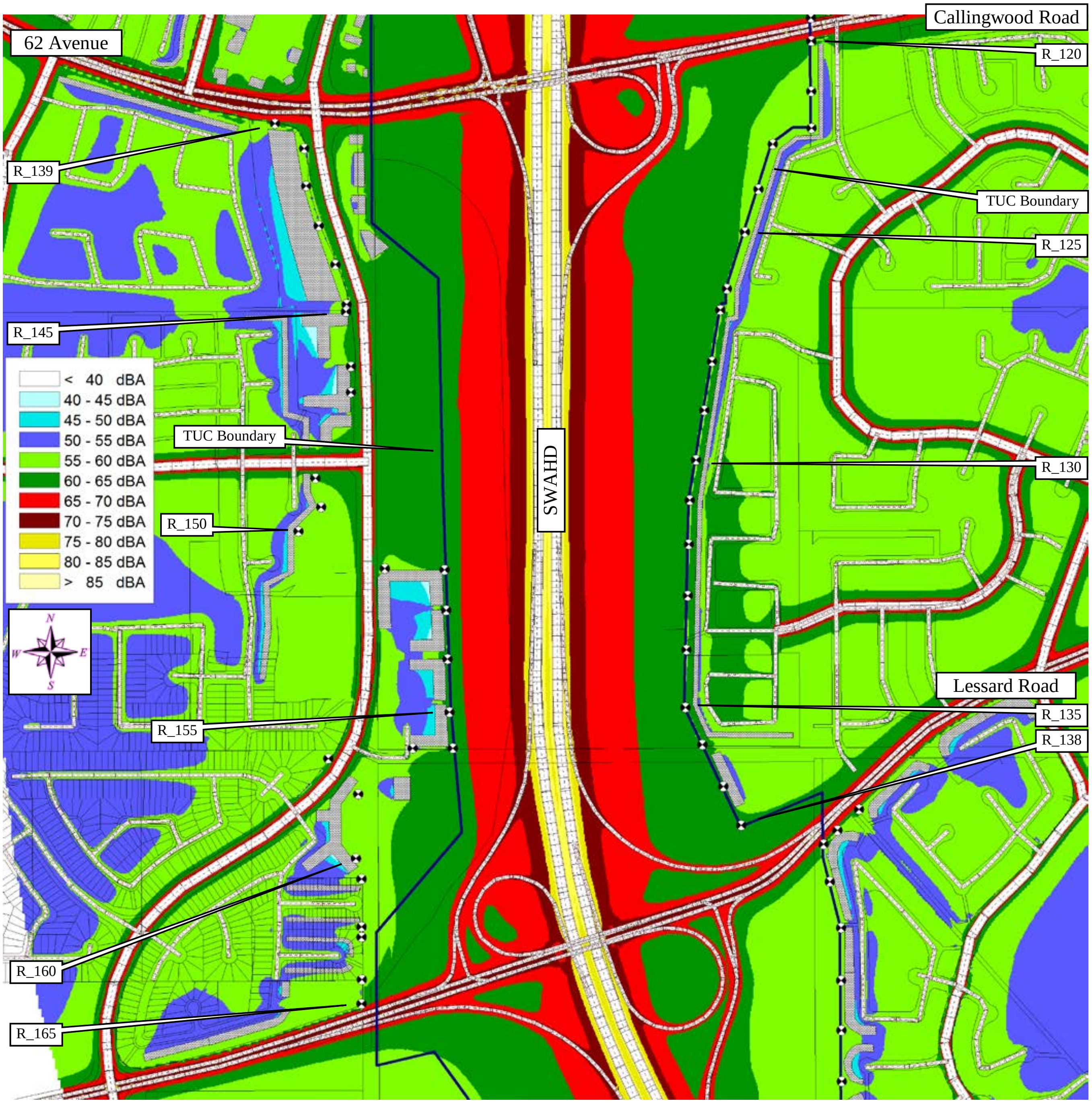

Figure 48d. Current Conditions L_{eq}24 Sound Levels for Region 3

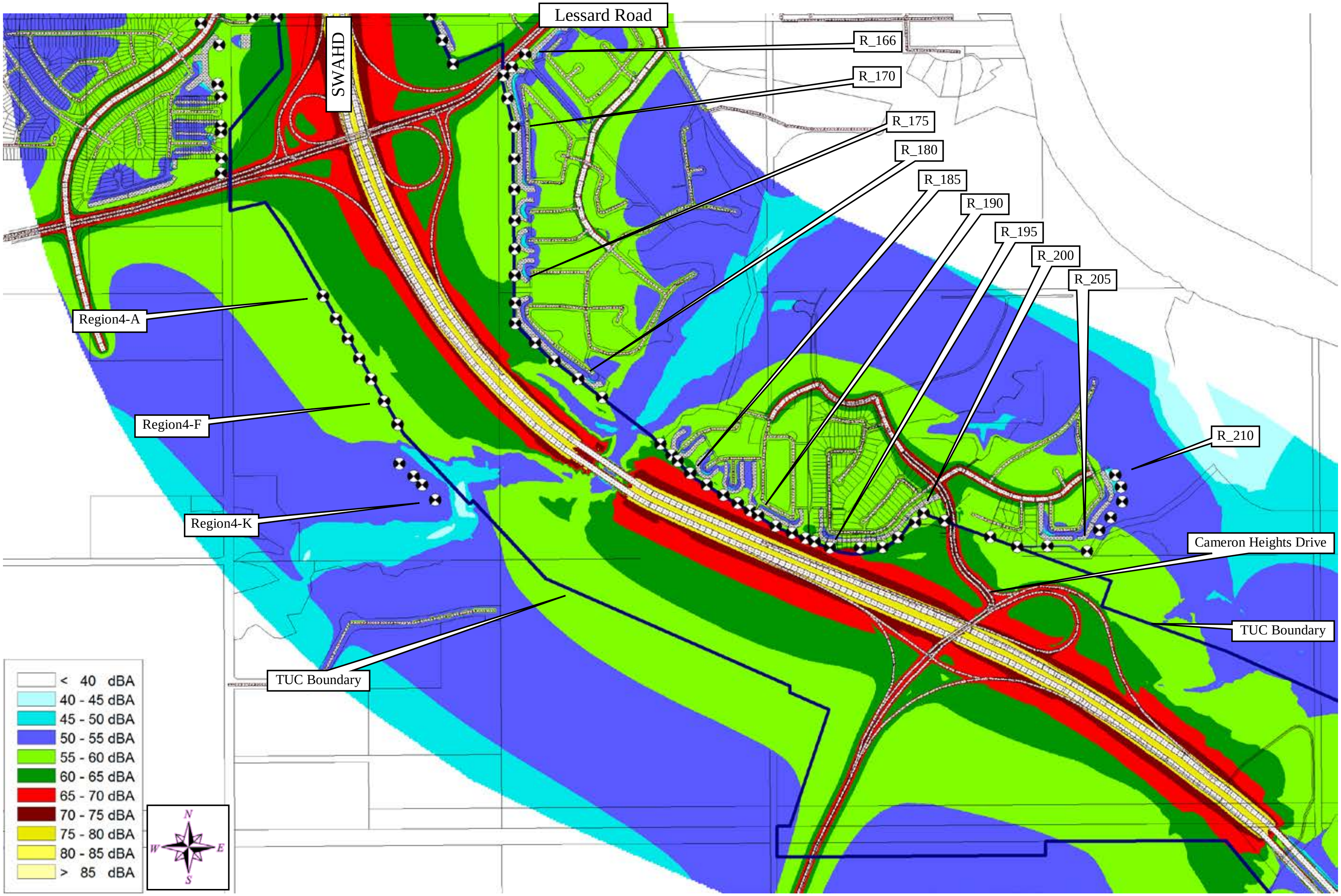

Figure 48e. Current Conditions L_{eq}24 Sound Levels for Region 4

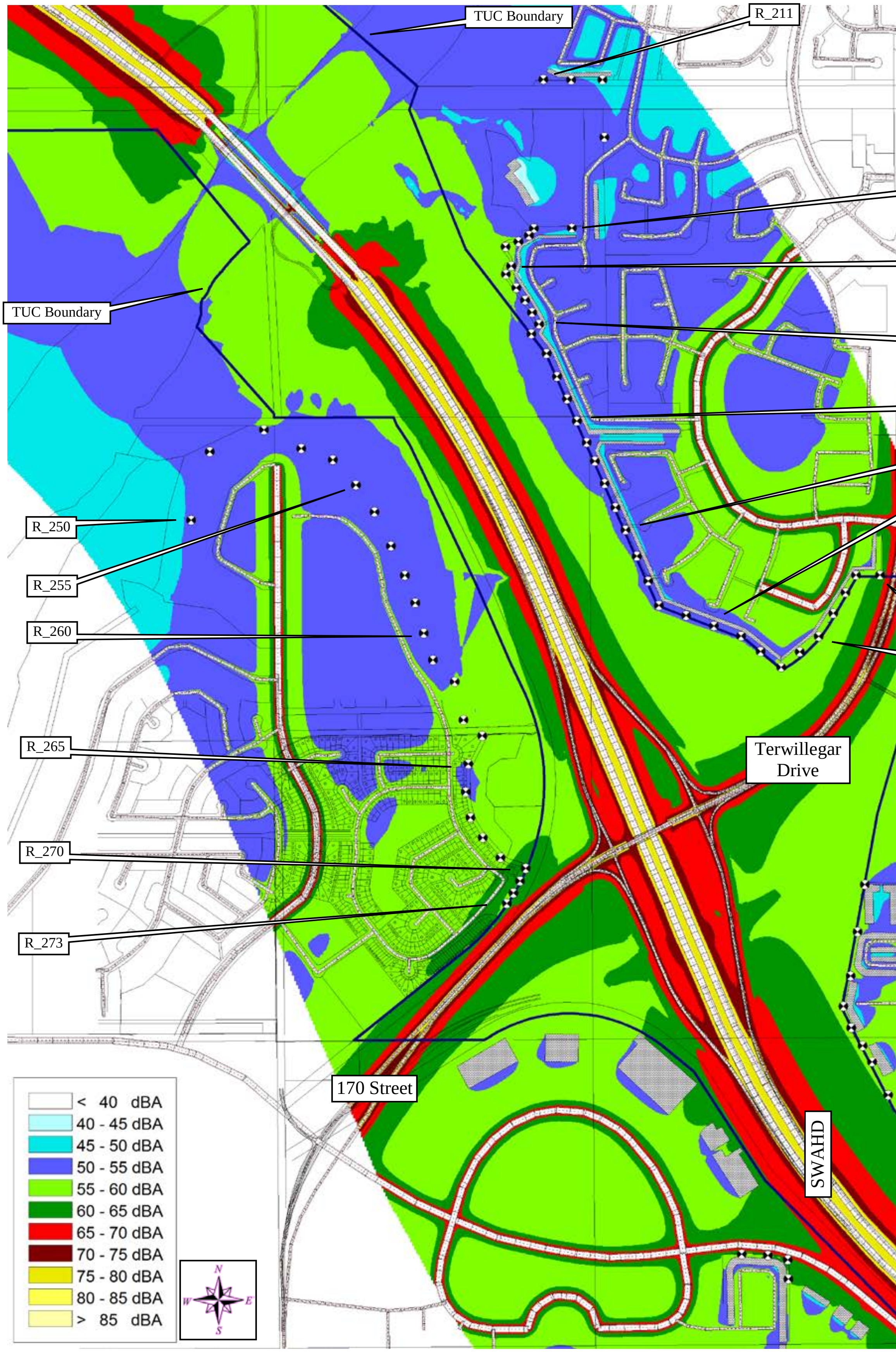

Figure 48f. Current Conditions L_{eq}24 Sound Levels for Region 5

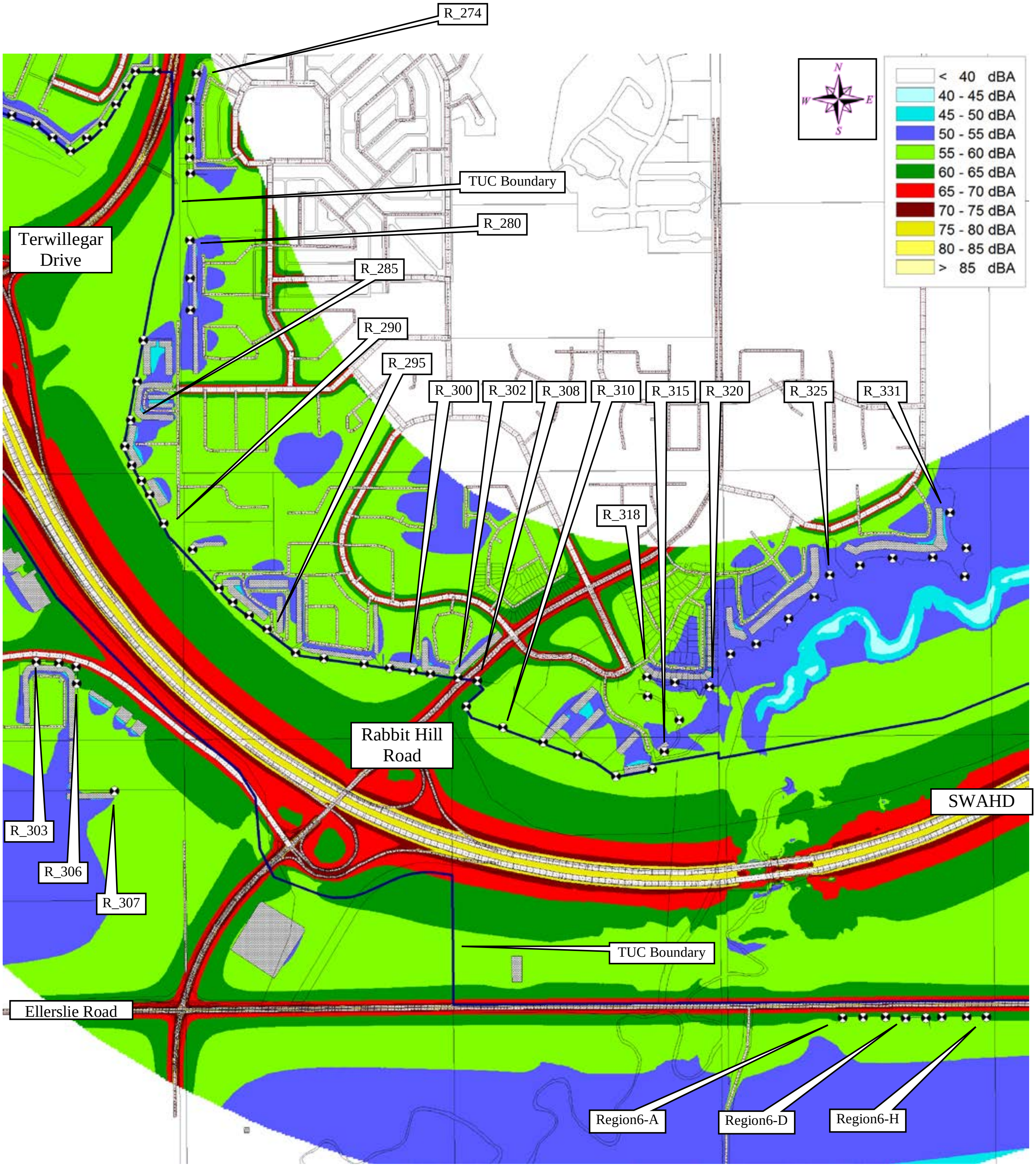

Figure 48g. Current Conditions L_{eq}24 Sound Levels for Region 6

Figure 48h. Current Conditions L_{eq}24 Sound Levels for Region 7

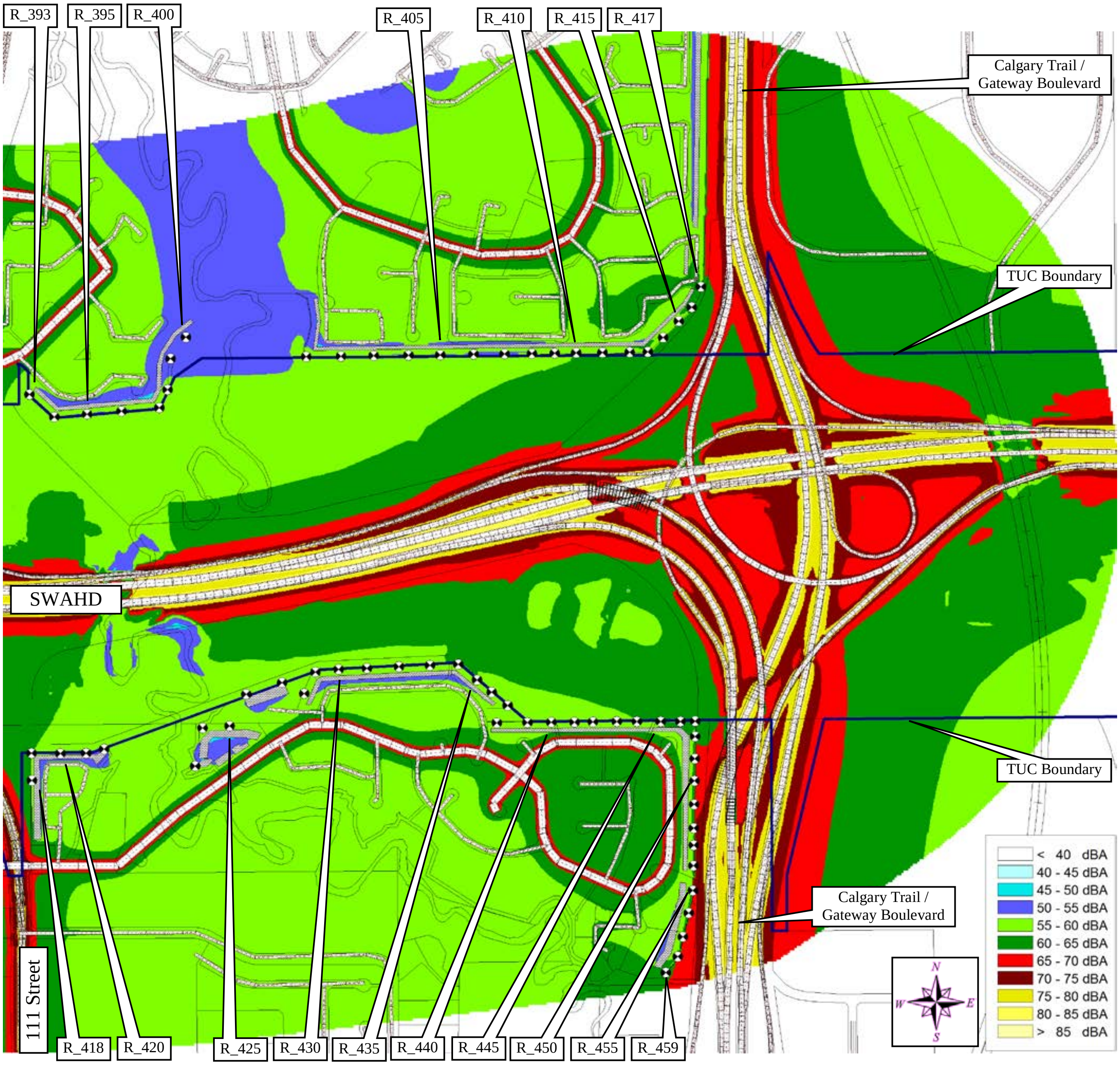

Figure 48i. Current Conditions L_{eq}24 Sound Levels for Region 8

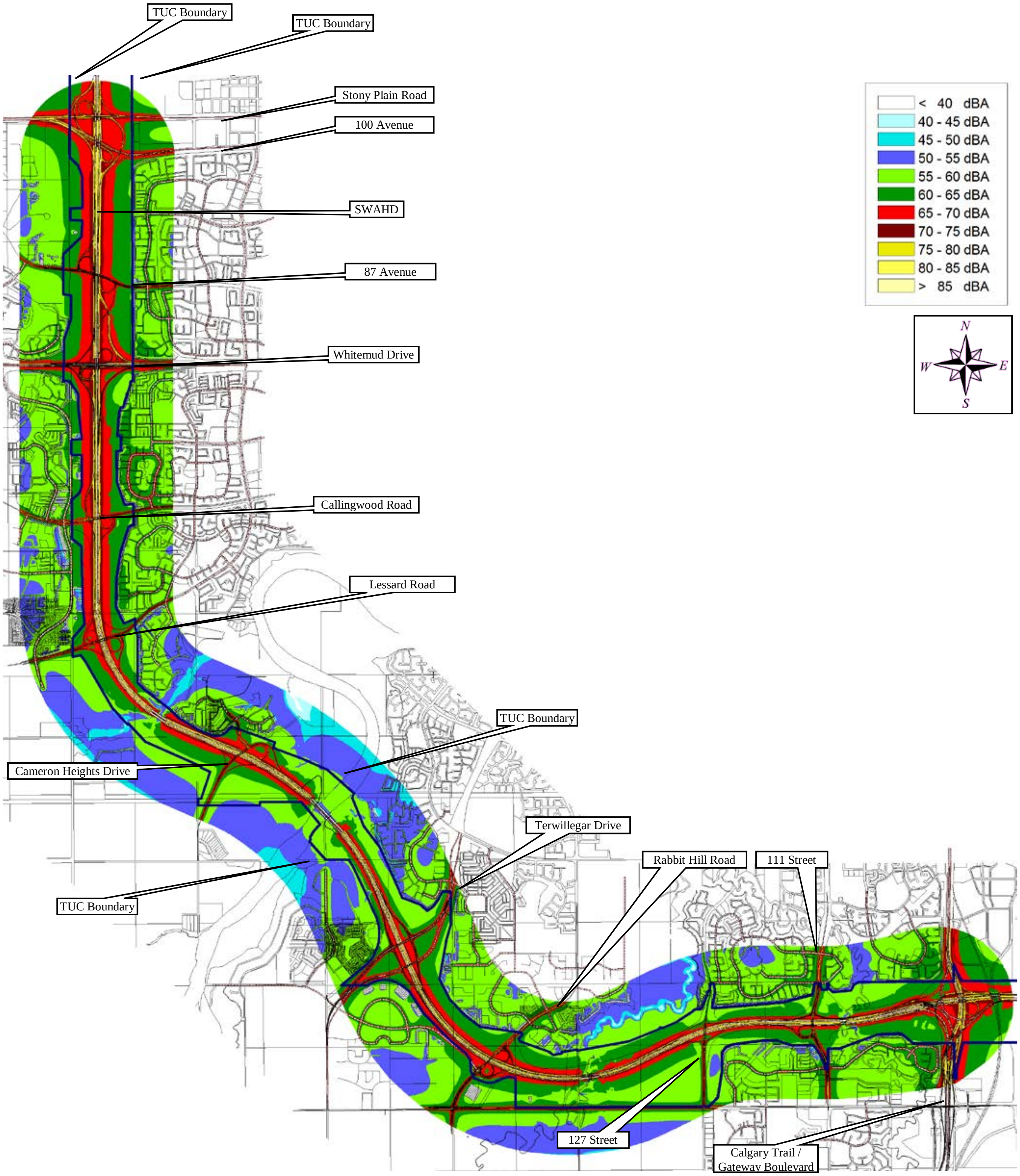

Figure 49a. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Entire Study Area

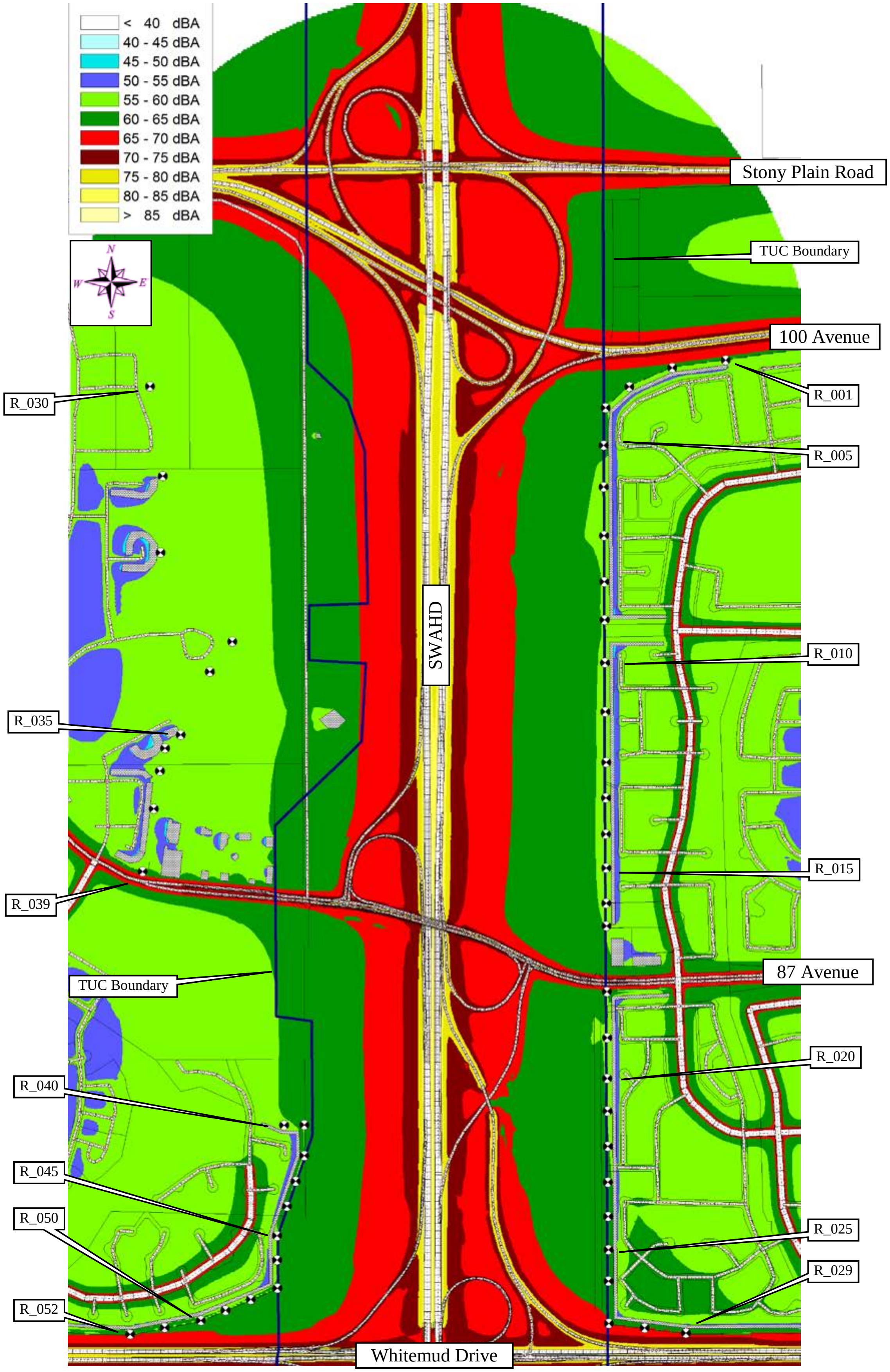

Figure 49b. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 1

Figure 49c. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 2

Figure 49d. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 3

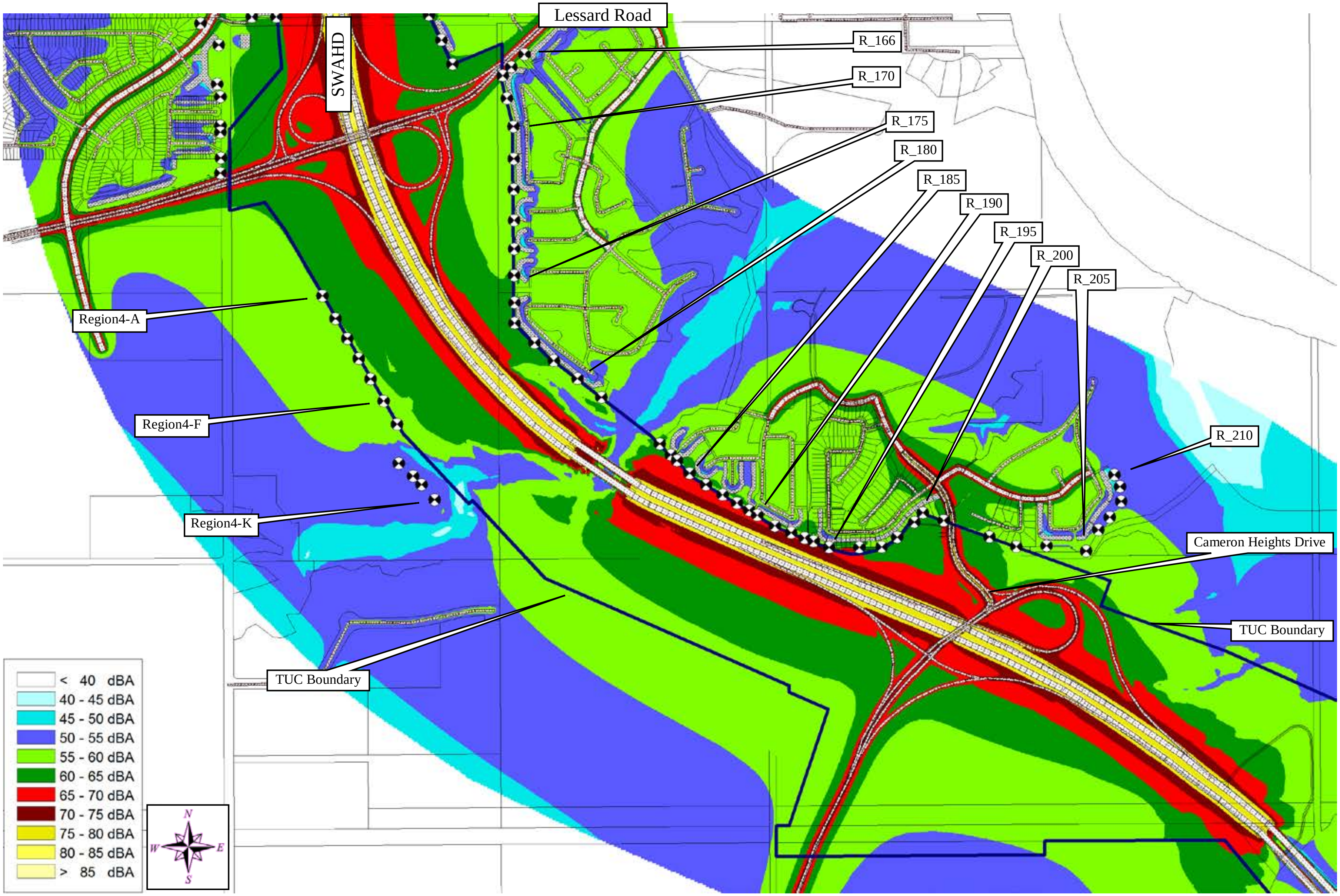

Figure 49e. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 4

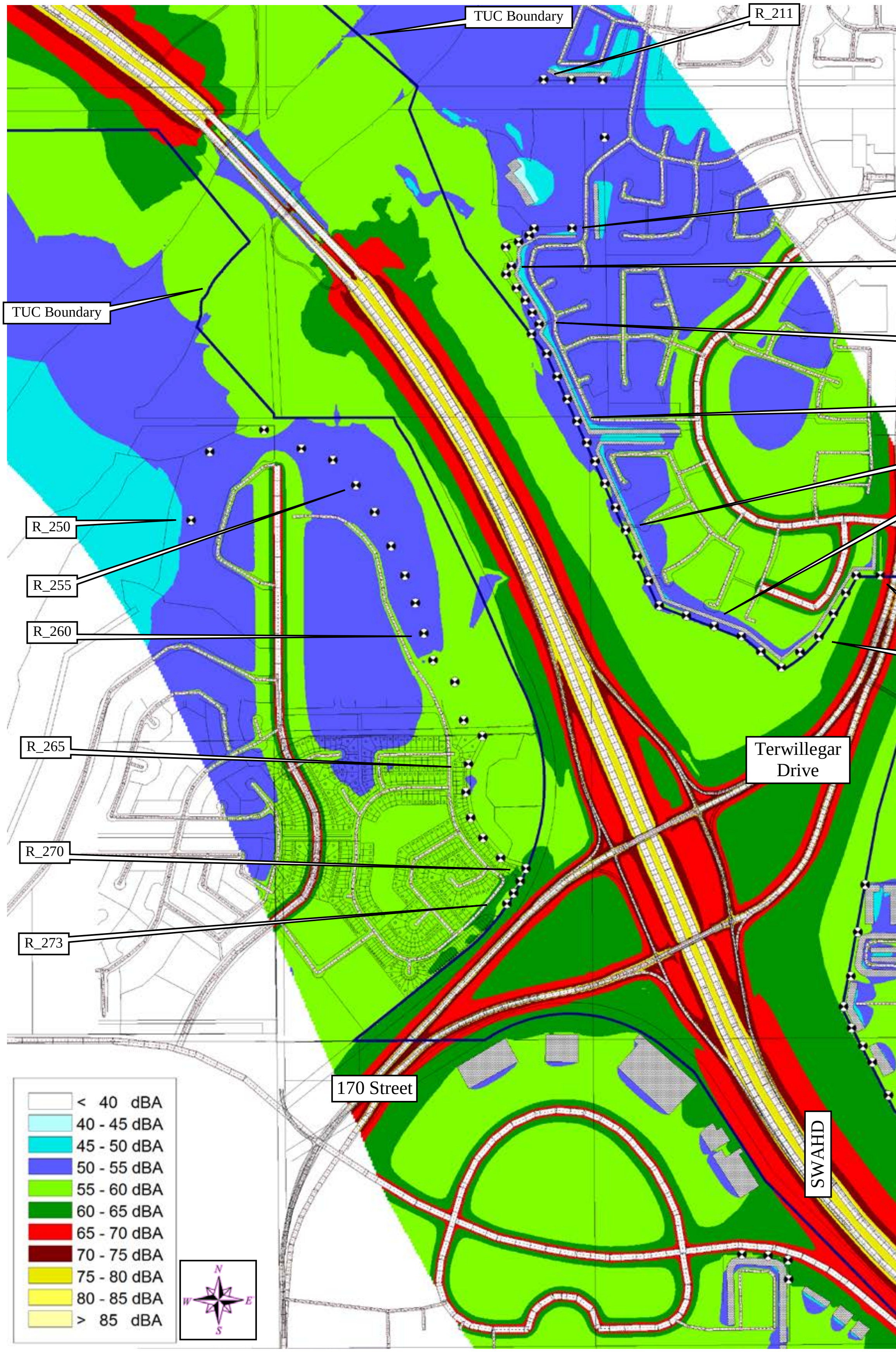

Figure 49f. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 5

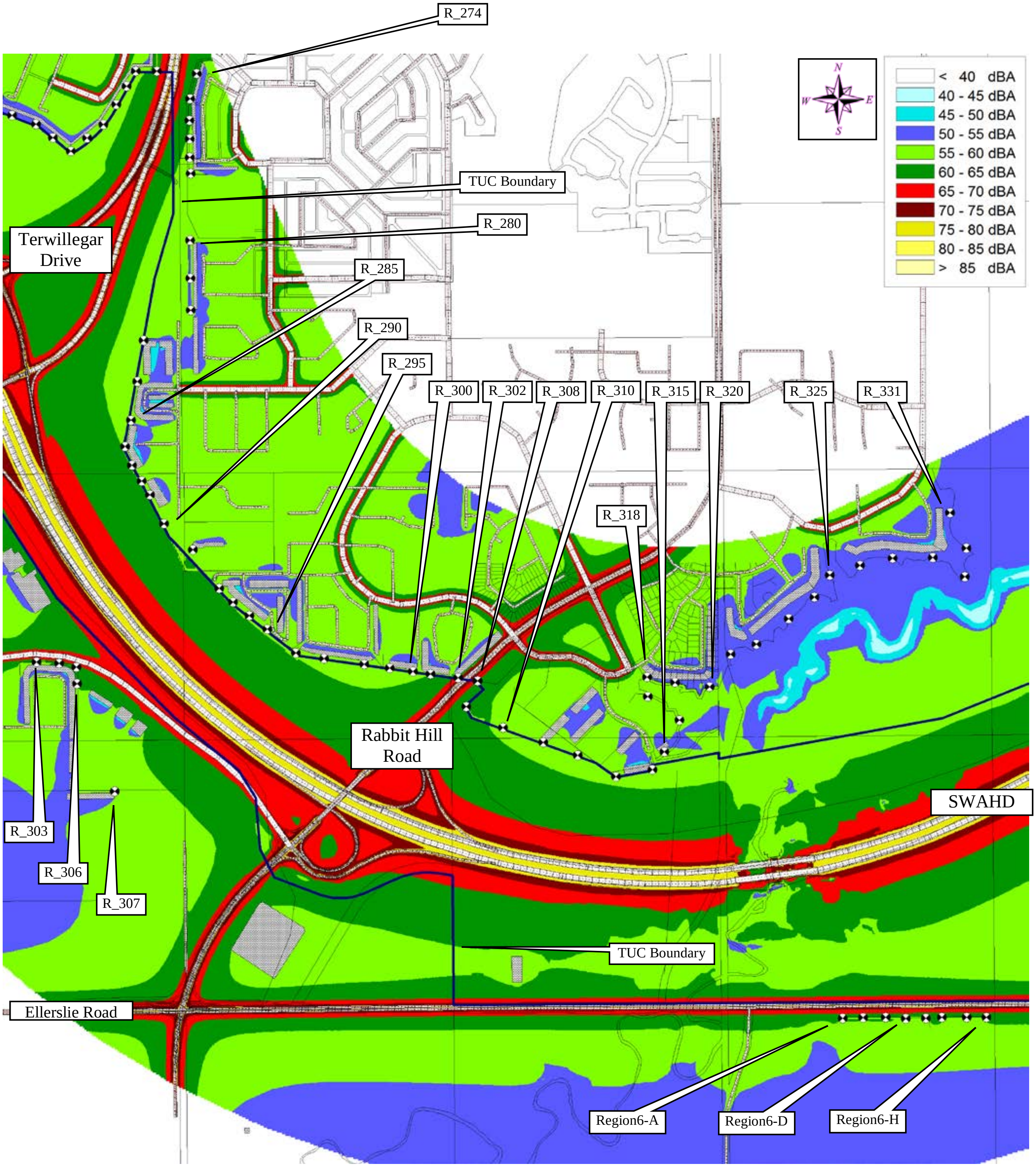

Figure 49g. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 6

Figure 49h. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 7

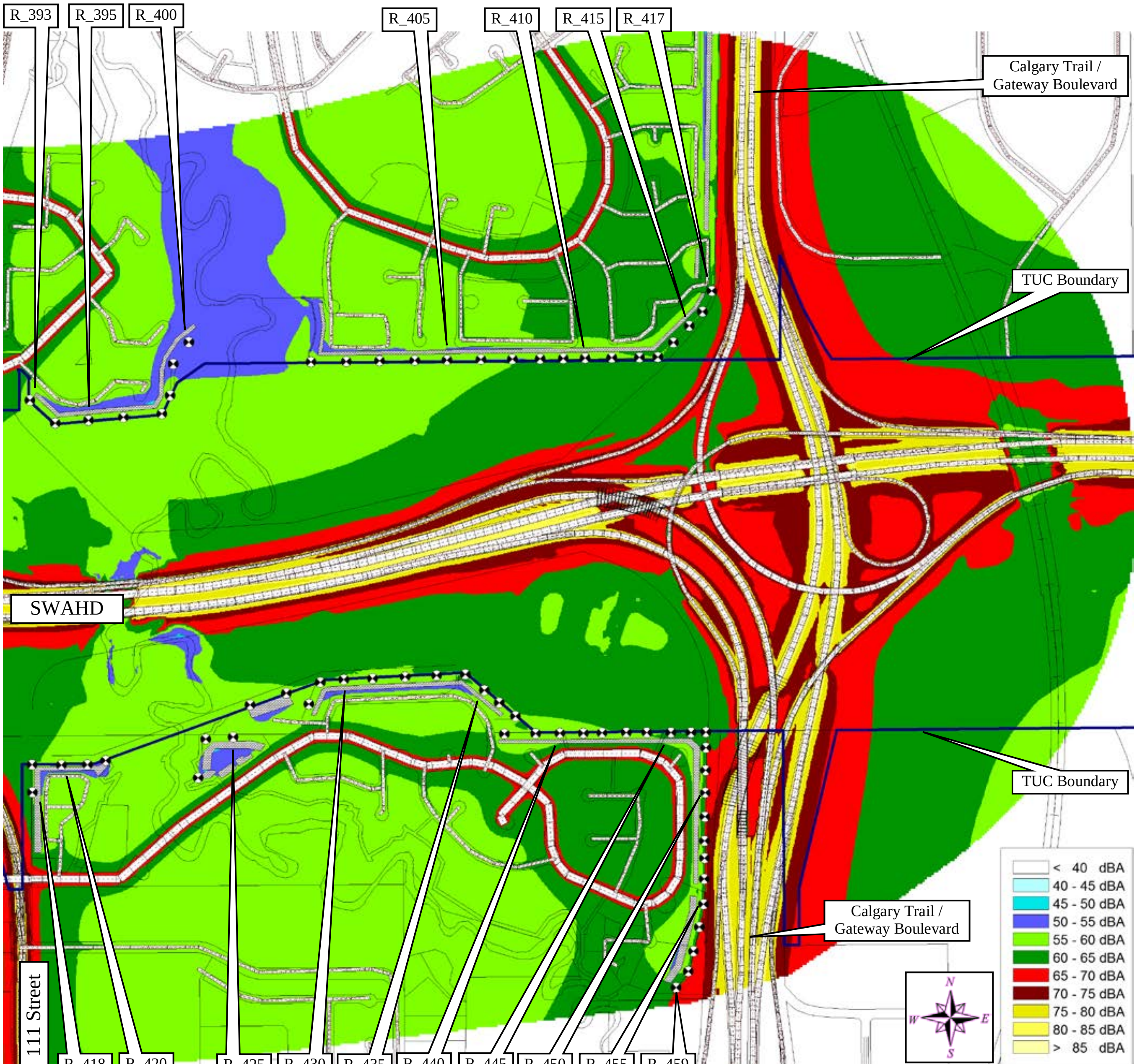

Figure 49i. Future Conditions (Year 2027) L_{eq}24 Sound Levels for Region 8

Appendix I. MEASUREMENT EQUIPMENT USED

Noise Monitors

The environmental noise monitoring equipment used consisted of Brüel and Kjær Type 2250/2270 Precision Integrating Sound Level Meters enclosed in environmental cases, with tripods, and weather protective microphone hoods. The systems acquired data in 15-second L_{eq} samples using 1/3 octave band frequency analysis and overall A-weighted and C-weighted sound levels. The sound level meters conform to Type 1, ANSI S1.4, ANSI S1.43, IEC 61672-1, IEC 60651, IEC 60804 and DIN 45657. The 1/3 octave filters conform to S1.11 – Type 0-C, and IEC 61260 – Class 0. The calibrator conforms to IEC 942 and ANSI S1.40. The sound level meters, pre-amplifiers and microphones were certified on November 10, 2016 / November 11, 2016 / November 14, 2016 / January 19, 2017 / April 29, 2017 / and May 09, 2017 and the calibrator (type B&K 4231) was certified on January 18, 2017 by a NIST NVLAP Accredited Calibration Laboratory for all requirements of ISO 17025: 1999 and relevant requirements of ISO 9002:1994, ISO 9001:2000 and ANSI/NCSL Z540: 1994 Part 1. Simultaneous digital audio was recorded directly on the sound level meter using a 8 kHz sample rate for more detailed post-processing analysis. Refer to the next section in the Appendix for a detailed description of the various acoustical descriptive terms used.

Weather Monitor

The weather monitoring equipment used for the study consisted of an Orion Weather Station with a WXT520 Self-Aspirating Radiation Shield Sensor Unit, a Weather MicroServer Data-logger, and a Lightning Arrestor. The Data-logger and batteries were located in a grounded, weather protective case. The Sensor Unit was mounted on a sturdy survey tripod (with supporting guy-wires) at approximately 5.0 m above ground. The system was set up to record data in 1-minute samples obtaining the wind-speed, peak wind-speed, and wind-direction in a rolling 2-minute average as well as the temperature, relative humidity, rain rate and total rain accumulation.

For the May, 2017 noise monitorings at M06 & M6b, the weather monitor was placed at the M06 location. For the remainder of the 2017 noise monitorings, the weather monitor was placed at an open, "high-ground" location within the TUC and logged the weather data for approximately 3-months, spanning all noise monitoring periods.

Record of Calibration Results

Description	Date	Time	Pre / Post	Calibration Level	Calibrator Model	Serial Number
M1	August 14 2017	12:15	Pre	93.9 dBA	B&K 4231	2594693
M1	August 17 2017	13:30	Post	93.9 dBA	B&K 4231	2594693
M2	June 07 2017	9:30	Pre	93.9 dBA	B&K 4231	2594693
M2	June 08 2017	13:45	Post	93.9 dBA	B&K 4231	2594693
M3	June 12 2017	16:00	Pre	93.9 dBA	B&K 4231	2594693
M3	June 14 2017	10:30	Post	93.9 dBA	B&K 4231	2594693
M4	August 14 2017	12:45	Pre	93.9 dBA	B&K 4231	2594693
M4	August 17 2017	14:00	Post	93.8 dBA	B&K 4231	2594693
M5	July 24 2017	20:15	Pre	93.9 dBA	B&K 4231	2594693
M5	July 26 2017	11:45	Post	93.8 dBA	B&K 4231	2594693
M6	May 03 2017	14:30	Pre	93.9 dBA	B&K 4231	2594693
M6	May 16 2017	10:30	Post	93.8 dBA	B&K 4231	2594693
M6B	May 03 2017	16:00	Pre	93.9 dBA	B&K 4231	2594693
M6B	May 16 2017	15:00	Post	93.8 dBA	B&K 4231	2594693
M7	June 05 2017	15:15	Pre	93.9 dBA	B&K 4231	2594693
M7	June 07 2017	9:00	Post	93.9 dBA	B&K 4231	2594693
M8	August 14 2017	13:15	Pre	93.9 dBA	B&K 4231	2594693
M8	August 17 2017	14:30	Post	93.8 dBA	B&K 4231	2594693
M11	June 05 2017	13:15	Pre	93.9 dBA	B&K 4231	2594693
M11	June 07 2017	11:30	Post	93.9 dBA	B&K 4231	2594693
M12	June 12 2017	15:00	Pre	93.9 dBA	B&K 4231	2594693
M12	June 14 2017	9:30	Post	93.8 dBA	B&K 4231	2594693
M13	August 07 2017	14:00	Pre	93.9 dBA	B&K 4231	2594693
M13	August 11 2017	9:45	Post	93.9 dBA	B&K 4231	2594693
M14	June 05 2017	12:40	Pre	93.9 dBA	B&K 4231	2594693
M14	June 07 2017	11:00	Post	93.8 dBA	B&K 4231	2594693
M15	August 14 2017	14:15	Pre	93.9 dBA	B&K 4231	2594693
M15	August 17 2017	15:00	Post	93.8 dBA	B&K 4231	2594693
M16	June 05 2017	14:00	Pre	93.9 dBA	B&K 4231	2594693
M16	June 07 2017	12:00	Post	93.8 dBA	B&K 4231	2594693

B&K 2250 Unit #1 SLM Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38467

Instrument:	**Sound Level Meter**	*Date Calibrated:* **5/9/2017**	*Cal Due:*	
Model:	**2250**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X	X
Serial number:	**2488495**	*Out of tolerance:*		
Tested with:	**Microphone 4189 s/n 2471133** **Preamplifier ZC0032 s/n 3271**	*See comments:*		
		Contains non-accredited tests: __Yes X No		
Type (class):	**1**	*Calibration service:* __ Basic X Standard		
Customer:	**ACI Acoustical Consultants Inc.**	*Address:* **5031 - 210 Street**		
Tel/Fax:	**780-414-6373 / 780-414-6376**	**Edmonton, Alberta** **CANADA T6M 0A8**		

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.0	100.11	41.8

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	[signature]
Date	5/9/17	Date	5/9/2017

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B&K 2250 Unit #1 Microphone Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38468

Instrument:	**Microphone**	*Date Calibrated:* **5/8/2017**	*Cal Due:*	
Model:	**4189**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel & Kjær**	*In tolerance:*	X	X
Serial number:	**2471133**	*Out of tolerance:*		
Composed of:		*See comments:*		

Contains non-accredited tests: __ **Yes** _X_ **No**

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373/780-414-6376**

Address: **5031 - 210 Street
Edmonton, Alberta
CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	[signature]
Date	5/8/17	Date	5/9/2017

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B&K 2270 Unit #3 SLM Calibration Certificate

Scantek, Inc.
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ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
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NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37708

Instrument: **Sound Level Meter**
Model: **2270**
Manufacturer: **Brüel and Kjær**
Serial number: **3002730**
Tested with: **Microphone 4189 s/n 2850741**
Preamplifier ZC0032 s/n 18750
Type (class): **1**
Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373 / -6376**

Date Calibrated: **1/19/2017** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard
Address: **5031 - 210 Street**
Edmonton, Alberta, CANADA
T6M 0A8

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.3	100.34	42.3

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	[signature]
Date	1/19/17	Date	1/20/2017

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B&K 2270 Unit #3 Microphone Calibration Certificate

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ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
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NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37709

Instrument: **Microphone**
Model: **4189**
Manufacturer: **Brüel & Kjær**
Serial number: **2850741**
Composed of:

Date Calibrated: **1/18/2017** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373/-6376**
Address: **5031 - 210 Street, Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	22909	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	Steven E Marshall
Date	1/18/17	Date	1/20/2017

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NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37319

Instrument: **Sound Level Meter**
Model: **2270**
Manufacturer: **Brüel and Kjær**
Serial number: **2644639**
Tested with: **Microphone 4189 s/n 2643219**
Preamplifier ZC0032 s/n 8255
Type (class): **1**
Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373 / -6376**

Date Calibrated: **11/14/2016** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes **X** No
Calibration service: __ Basic **X** Standard
Address: **5031 - 210 Street**
Edmonton, Alberta, CANADA
T6M 0A8

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.5	100.29	38.8

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	11/14/16	Date	11/14/2016

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B&K 2270 Unit #4 Microphone Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37320

Instrument: **Microphone**
Model: **4189**
Manufacturer: **Brüel & Kjær**
Serial number: **2643219**
Composed of:

Date Calibrated: **11/10/2016** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __**Yes** **X No**

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373/-6376**
Address: **5031 - 210 Street, Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	Authorized signatory:	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	11/10/16	Date	11/14/2016

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
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B&K 2250 Unit #5 SLM Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37315

Instrument:	**Sound Level Meter**	*Date Calibrated:* **11/11/2016** *Cal Due:*	
Model:	**2250**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X / X
Serial number:	**2722894**	*Out of tolerance:*	
Tested with:	**Microphone 4189 s/n 2719777**	*See comments:*	
	Preamplifier ZC0032 s/n 13895	*Contains non-accredited tests:*	__Yes X No
Type (class):	**1**	*Calibration service:*	__ Basic X Standard
Customer:	**ACI Acoustical Consultants Inc.**	*Address:*	**5031 - 210 Street**
Tel/Fax:	**780-414-6373 / -6376**		**Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.6	99.58	30.5

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Valentin Buzduga
Signature		Signature	
Date	11/11/16	Date	11/14/2016

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B&K 2250 Unit #5 Microphone Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37316

Instrument: **Microphone**
Model: **4189**
Manufacturer: **Brüel & Kjær**
Serial number: **2719777**
Composed of:

Date Calibrated: **11/10/2016** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373/-6376**
Address: **5031 - 210 Street Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	Authorized signatory:	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	11/10/16	Date	11/14/2016

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
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B&K 2250 Unit #6 SLM Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37313

Instrument:	**Sound Level Meter**	*Date Calibrated:* **11/10/2016** *Cal Due:*		
Model:	**2250**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	**X**	**X**
Serial number:	**2661161**	*Out of tolerance:*		
Tested with:	**Microphone 4189 s/n 2650730**	*See comments:*		
	Preamplifier ZC0032 s/n 9935	*Contains non-accredited tests:* __Yes X No		
Type (class):	**1**	*Calibration service:* __ Basic X Standard		
Customer:	**ACI Acoustical Consultants Inc.**	*Address:* **5031 - 210 Street**		
Tel/Fax:	**780-414-6373 / -6376**	**Edmonton, Alberta, CANADA T6M 0A8**		

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.1	100.26	38.2

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	11/10/16	Date	11/14/2016

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
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B&K 2250 Unit #6 Microphone Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37314

Instrument: **Microphone**
Model: **4189**
Manufacturer: **Brüel & Kjær**
Serial number: **2650730**
Composed of:

Date Calibrated: **11/10/2016** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373/-6376**
Address: **5031 - 210 Street Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	Authorized signatory:	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	11/10/16	Date	11/14/2016

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
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B&K 2250 Unit #9 SLM Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.36134

Instrument:	**Sound Level Meter**	*Date Calibrated:* **4/29/2016** *Cal Due:*		
Model:	**2250**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	**X**	**X**
Serial number:	**3006198**	*Out of tolerance:*		
Tested with:	**Microphone 4189 s/n 2906926** **Preamplifier ZC0032 s/n 19467**	*See comments:*		
		Contains non-accredited tests: __**Yes** **X** **No**		
Type (class):	**1**	*Calibration service:* __ **Basic** **X** **Standard**		
Customer:	**Acoustical Consultants Inc.**	*Address:* **5031 210 Street, Edmonton, Alberta, Canada T6M 0A8**		
Tel/Fax:	**780-414-6373 /**			

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 20, 2015	Scantek, Inc./ NVLAP	Jul 20, 2016
DS-360-SRS	Function Generator	88077	Sep 9, 2014	ACR Env./ A2LA	Sep 9, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 24, 2015	ACR Env./ A2LA	Sep 24, 2016
HM30-Thommen	Meteo Station	1040170/39633	Oct 23, 2015	ACR Env./ A2LA	Oct 23, 2016
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.6	100.23	37.2

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	4/29/16	Date	5/04/2016

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B&K 2250 Unit #9 Microphone Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.36135

Instrument:	**Microphone**	*Date Calibrated:* **4/28/2016** *Cal Due:*		
Model:	**4189**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel & Kjær**	*In tolerance:*	**X**	**X**
Serial number:	**2906926**	*Out of tolerance:*		
Composed of:		*See comments:*		
		Contains non-accredited tests: __Yes _X_ No		
Customer:	**Acoustical Consultants Inc.**	*Address:* **5031 210 Street**		
Tel/Fax:	**780-414-6373/**	**Edmonton, Alberta, Canada T6M 0A8**		

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 20, 2015	Scantek, Inc./ NVLAP	Jul 20, 2016
DS-360-SRS	Function Generator	88077	Sep 9, 2014	ACR Env./ A2LA	Sep 9, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 24, 2015	ACR Env./ A2LA	Sep 24, 2016
HM30-Thommen	Meteo Station	1040170/39633	Oct 23, 2015	ACR Env./ A2LA	Oct 23, 2016
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	22909	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	92268	Oct 14, 2015	Scantek, Inc./ NVLAP	Oct 14, 2016
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	Authorized signatory:	Valentin Buzduga
Signature	[signature]	Signature	[signature]
Date	4/28/16	Date	5/04/2016

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B&K 2250 Unit #10 SLM Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38469

Instrument:	**Sound Level Meter**	*Date Calibrated:* **5/9/2017**	*Cal Due:*
Model:	**2250**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X / X
Serial number:	**3007542**	*Out of tolerance:*	
Tested with:	**Microphone 4189 s/n 2978664**	*See comments:*	
	Preamplifier ZC0032 s/n 22379	*Contains non-accredited tests:* __Yes _X_ No	
Type (class):	**1**	*Calibration service:* __ Basic _X_ Standard	
Customer:	**ACI Acoustical Consultants Inc.**	*Address:*	**5031 - 210 Street, Edmonton, Alberta, CANADA T6M 0A8**
Tel/Fax:	**780-414-6373 / 780-414-6376**		

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.5	100.05	43.4

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	Steven E Marshall
Date		Date	5/9/2017

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B&K 2250 Unit #10 Microphone Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.38470

Instrument: **Microphone**
Model: **4189**
Manufacturer: **Brüel & Kjær**
Serial number: **2978664**
Composed of:

Date Calibrated: **5/8/2017** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373/780-414-6376**
Address: **5031 - 210 Street, Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	Authorized signatory:	Steven E. Marshall
Signature	[signature]	Signature	[signature]
Date	5/8/17	Date	5/9/2017

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B&K 4231 Calibrator Calibration Certificate

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37706

Instrument: **Acoustical Calibrator**
Model: **4231**
Manufacturer: **Brüel and Kjær**
Serial number: **2594693**
Class (IEC 60942): **1**
Barometer type:
Barometer s/n:

Date Calibrated: **1/18/2017** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No

Customer: **ACI Acoustical Consultants Inc.**
Tel/Fax: **780-414-6373 / -6376**
Address: **5031 - 210 Street, Edmonton, Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
140-Norsonic	Real Time Analyzer	1403978	Mar 17, 2016	Scantek, Inc. / NVLAP	Mar 17, 2017
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4192-Brüel&Kjær	Microphone	2854675	Nov 11, 2016	Scantek, Inc. / NVLAP	Nov 11, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature	[signature]	Signature	[signature]
Date	1/18/17	Date	1/20/2017

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Appendix II. THE ASSESSMENT OF ENVIRONMENTAL NOISE (GENERAL)

Sound Pressure Level

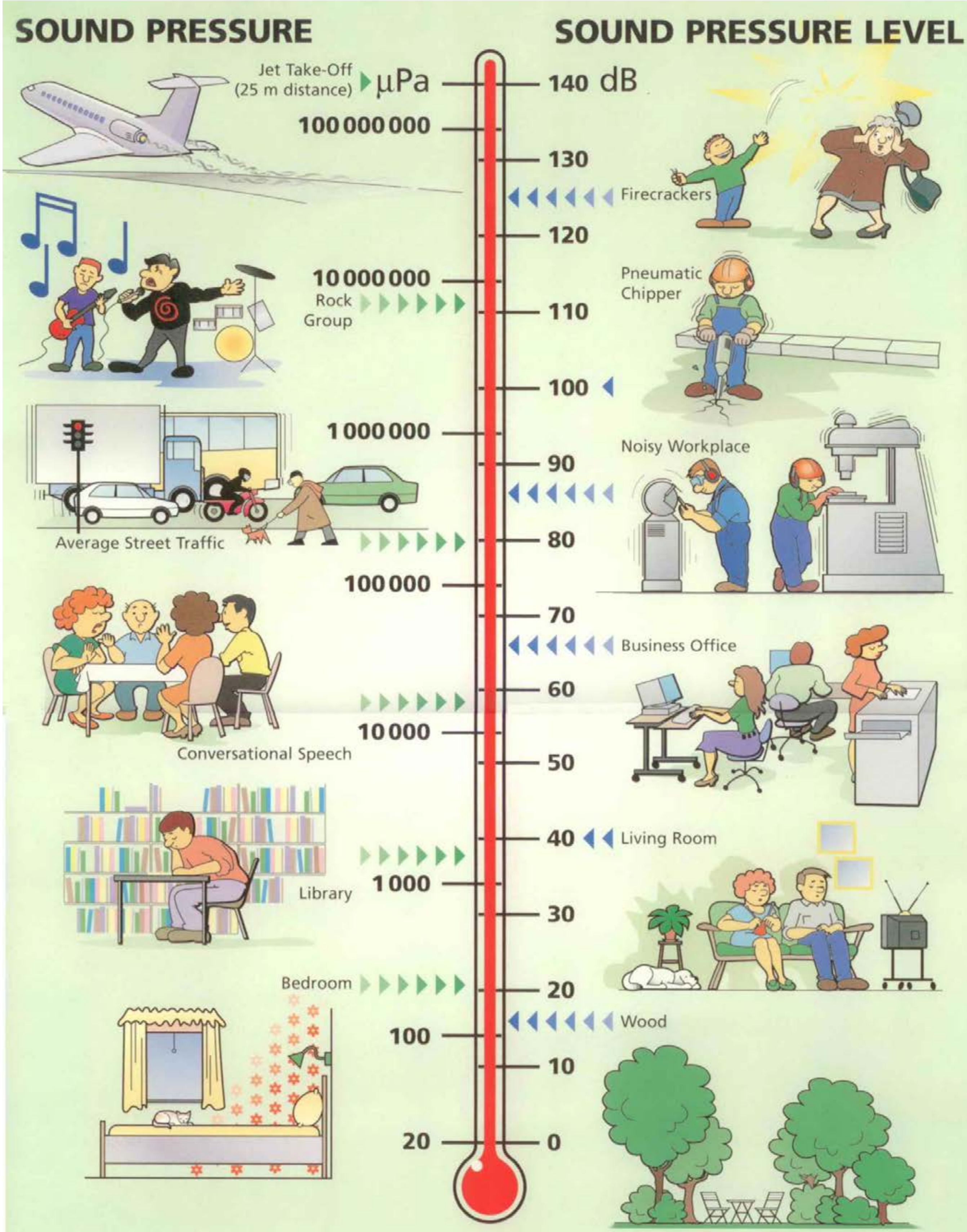
Sound pressure is initially measured in Pascal's (Pa). Humans can hear several orders of magnitude in sound pressure levels, so a more convenient scale is used. This scale is known as the decibel (dB) scale, named after Alexander Graham Bell (telephone guy). It is a base 10 logarithmic scale. When we measure pressure we typically measure the RMS sound pressure.

$$SPL = 10\log_{10}\left[\frac{P_{RMS}^{2}}{P_{ref}^{2}}\right] = 20\log_{10}\left[\frac{P_{RMS}}{P_{ref}}\right]$$

Where: SPL = Sound Pressure Level in dB
P_{RMS} = Root Mean Square measured pressure (Pa)
P_{ref} = Reference sound pressure level ($P_{ref} = 2\text{x}10^{-5}$ Pa = 20 μPa)

This reference sound pressure level is an internationally agreed upon value. It represents the threshold of human hearing for "typical" people based on numerous testing. It is possible to have a threshold which is lower than 20 μPa which will result in negative dB levels. As such, zero dB does not mean there is no sound!

In general, a difference of 1 – 2 dB is the threshold for humans to notice that there has been a change in sound level. A difference of 3 dB (factor of 2 in acoustical energy) is perceptible and a change of 5 dB is strongly perceptible. A change of 10 dB is typically considered a factor of 2. This is quite remarkable when considering that 10 dB is 10-times the acoustical energy!


SOUND PRESSURE
SOUND PRESSURE LEVEL
Jet Take-Off
(25 m distance)
µPa
140 dB
100 000 000
130
Firecrackers
120
10 000 000
Rock
Group
Pneumatic
Chipper
110
100
1 000 000
Noisy Workplace
90
Average Street Traffic
80
100 000
70
Business Office
60
10 000
Conversational Speech
50
40
Living Room
Library
1 000
30
Bedroom
20
Wood
100
10
20
0

Frequency

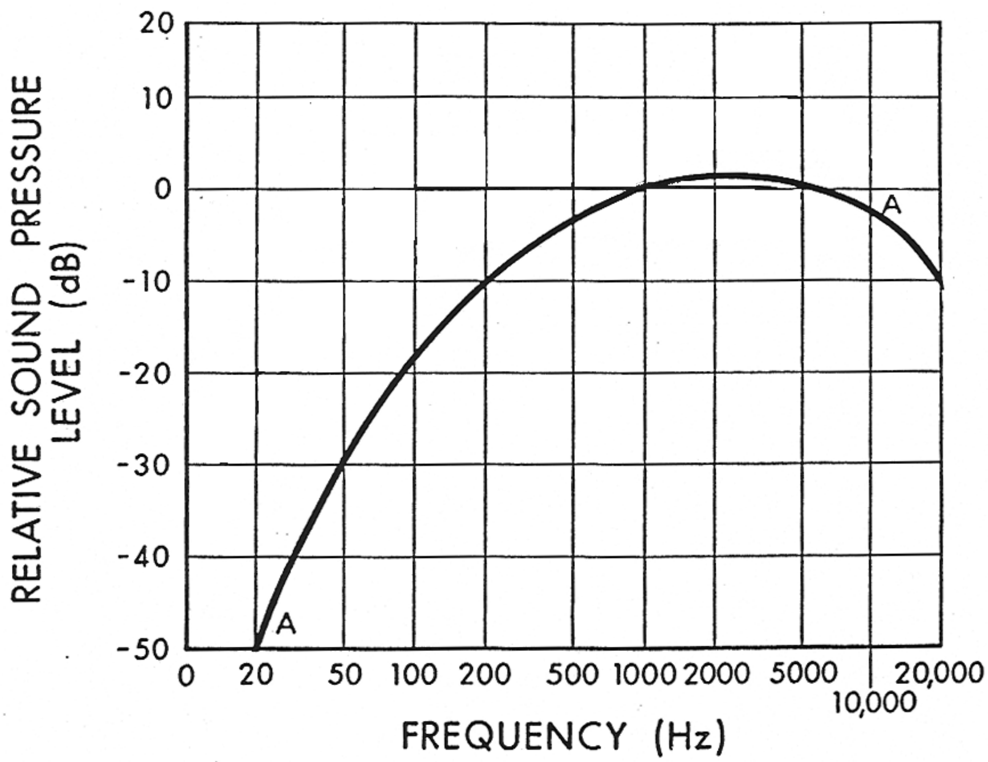
The range of frequencies audible to the human ear ranges from approximately 20 Hz to 20 kHz. Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency sounds. Due to the large frequency range of human hearing, the entire spectrum is often divided into 31 bands, each known as a 1/3 octave band.

The internationally agreed upon center frequencies and upper and lower band limits for the 1/1 (whole octave) and 1/3 octave bands are as follows:

Lower Band Limit	Whole Octave Center Frequency	Upper Band Limit
11	**16**	22
22	**31.5**	44
44	**63**	88
88	**125**	177
177	**250**	355
355	**500**	710
710	**1000**	1420
1420	**2000**	2840
2840	**4000**	5680
5680	**8000**	11360
11360	**16000**	22720

Lower Band Limit	1/3 Octave Center Frequency	Upper Band Limit
14.1	**16**	17.8
17.8	**20**	22.4
22.4	**25**	28.2
28.2	**31.5**	35.5
35.5	**40**	44.7
44.7	**50**	56.2
56.2	**63**	70.8
70.8	**80**	89.1
89.1	**100**	112
112	**125**	141
141	**160**	178
178	**200**	224
224	**250**	282
282	**315**	355
355	**400**	447
447	**500**	562
562	**630**	708
708	**800**	891
891	**1000**	1122
1122	**1250**	1413
1413	**1600**	1778
1778	**2000**	2239
2239	**2500**	2818
2818	**3150**	3548
3548	**4000**	4467
4467	**5000**	5623
5623	**6300**	7079
7079	**8000**	8913
8913	**10000**	11220
11220	**12500**	14130
14130	**16000**	17780
17780	**20000**	22390

Human hearing is most sensitive at approximately 3500 Hz which corresponds to the ¼ wavelength of the ear canal (approximately 2.5 cm). Because of this range of sensitivity to various frequencies, we typically apply various weighting networks to the broadband measured sound to more appropriately account for the way humans hear. By default, the most common weighting network used is the so-called “A-weighting”. It can be seen in the figure that the low frequency sounds are reduced significantly with the A-weighting.



Combination of Sounds

When combining multiple sound sources the general equation is:

$$\Sigma SPL_n = 10\log_{10}\left[\sum_{i=1}^{n} 10^{\frac{SPL_i}{10}}\right]$$

Examples:

- Two sources of 50 dB each add together to result in 53 dB.
- Three sources of 50 dB each add together to result in 55 dB.
- Ten sources of 50 dB each add together to result in 60 dB.
- One source of 50 dB added to another source of 40 dB results in 50.4 dB

It can be seen that, if multiple similar sources exist, removing or reducing only one source will have little effect.

Sound Level Measurements

Over the years a number of methods for measuring and describing environmental noise have been developed. The most widely used and accepted is the concept of the Energy Equivalent Sound Level (L_{eq}) which was developed in the US (1970's) to characterize noise levels near US Air-force bases. This is the level of a steady state sound which, for a given period of time, would contain the same energy as the time varying sound. The concept is that the same amount of annoyance occurs from a sound having a high level for a short period of time as from a sound at a lower level for a longer period of time.
The L_{eq} is defined as:

$$L_{eq} = 10\log_{10}\left[\frac{1}{T}\int_0^T 10^{\frac{dB}{10}}\,dT\right] = 10\log_{10}\left[\frac{1}{T}\int_0^T \frac{P^2}{P_{ref}^2}\,dT\right]$$

We must specify the time period over which to measure the sound. i.e. 1-second, 10-seconds, 15-seconds, 1-minute, 1-day, etc. **An L_{eq} is meaningless if there is no time period associated**.

In general there a few very common L_{eq} sample durations which are used in describing environmental noise measurements. These include:

- L_{eq}24 - Measured over a 24-hour period
- L_{eq}Night - Measured over the night-time (typically 22:00 – 07:00)
- L_{eq}Day - Measured over the day-time (typically 07:00 – 22:00)
- L_{DN} - Same as L_{eq}24 with a 10 dB penalty added to the night-time

Statistical Descriptor

Another method of conveying long term noise levels utilizes statistical descriptors. These are calculated from a cumulative distribution of the sound levels over the entire measurement duration and then determining the sound level at xx % of the time.

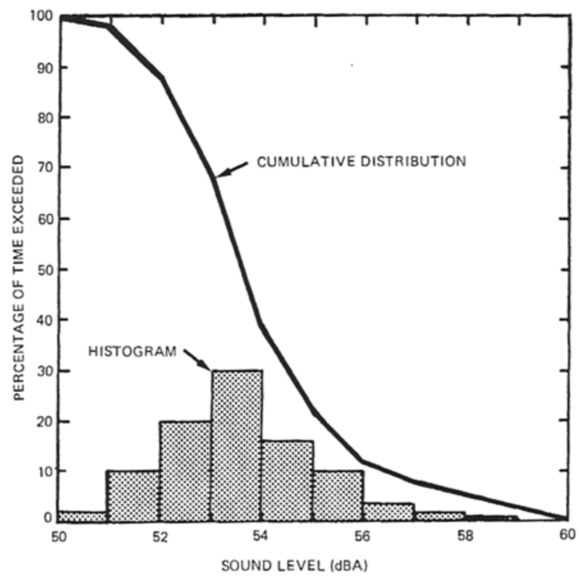


Figure 16.6 Statistically processed community noise showing histogram and cumulative distribution of A weighted sound levels.

Industrial Noise Control, Lewis Bell, Marcel Dekker, Inc. 1994

The most common statistical descriptors are:

L_{min} - minimum sound level measured
L_{01} - sound level that was exceeded only 1% of the time
L_{10} - sound level that was exceeded only 10% of the time.
- Good measure of intermittent or intrusive noise
- Good measure of Traffic Noise

L_{50} - sound level that was exceeded 50% of the time (arithmetic average)
- Good to compare to L_{eq} to determine steadiness of noise

L_{90} - sound level that was exceeded 90% of the time
- Good indicator of typical “ambient” noise levels

L_{99} - sound level that was exceeded 99% of the time
L_{max} - maximum sound level measured

These descriptors can be used to provide a more detailed analysis of the varying noise climate:

- If there is a large difference between the L_{eq} and the L_{50} (L_{eq} can never be any lower than the L_{50}) then it can be surmised that one or more short duration, high level sound(s) occurred during the time period.
- If the gap between the L_{10} and L_{90} is relatively small (less than 15 – 20 dBA) then it can be surmised that the noise climate was relatively steady.

Sound Propagation

In order to understand sound propagation, the nature of the source must first be discussed. In general, there are three types of sources. These are known as 'point', 'line', and 'area'. This discussion will concentrate on point and line sources since area sources are much more complex and can usually be approximated by point sources at large distances.

Point Source

As sound radiates from a point source, it dissipates through geometric spreading. The basic relationship between the sound levels at two distances from a point source is:

$$\therefore SPL_1 - SPL_2 = 20\log_{10}\left(\frac{r_2}{r_1}\right)$$

Where: SPL_1 = sound pressure level at location 1, SPL_2 = sound pressure level at location 2
r_1 = distance from source to location 1, r_2 = distance from source to location 2

Thus, the reduction in sound pressure level for a point source radiating in a free field is **6 dB per doubling of distance**. This relationship is independent of reflectivity factors provided they are always present. Note that this only considers geometric spreading and does not take into account atmospheric effects. Point sources still have some physical dimension associated with them, and typically do not radiate sound equally in all directions in all frequencies. The directionality of a source is also highly dependent on frequency. As frequency increases, directionality increases.

Examples (note no atmospheric absorption):

- A point source measuring 50 dB at 100m will be 44 dB at 200m.
- A point source measuring 50 dB at 100m will be 40.5 dB at 300m.
- A point source measuring 50 dB at 100m will be 38 dB at 400m.
- A point source measuring 50 dB at 100m will be 30 dB at 1000m.

Line Source

A line source is similar to a point source in that it dissipates through geometric spreading. The difference is that a line source is equivalent to a long line of many point sources. The basic relationship between the sound levels at two distances from a line source is:

$$SPL_1 - SPL_2 = 10\log_{10}\left(\frac{r_2}{r_1}\right)$$

The difference from the point source is that the '20' term in front of the 'log' is now only 10. Thus, the reduction in sound pressure level for a line source radiating in a free field is **3 dB per doubling of distance**.

Examples (note no atmospheric absorption):

- A line source measuring 50 dB at 100m will be 47 dB at 200m.
- A line source measuring 50 dB at 100m will be 45 dB at 300m.
- A line source measuring 50 dB at 100m will be 34 dB at 400m.
- A line source measuring 50 dB at 100m will be 40 dB at 1000m.

Atmospheric Absorption

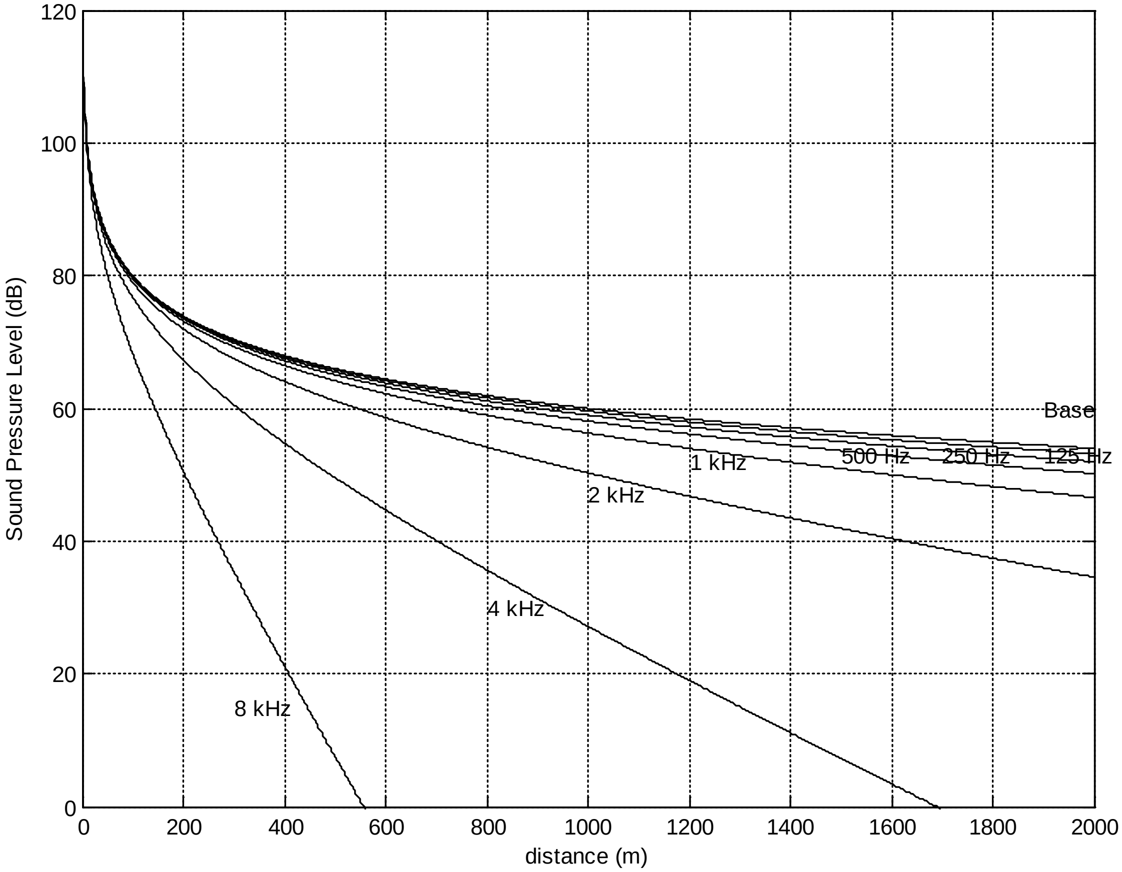
As sound transmits through a medium, there is an attenuation (or dissipation of acoustic energy) which can be attributed to three mechanisms:

1) **Viscous Effects** - Dissipation of acoustic energy due to fluid friction which results in thermodynamically irreversible propagation of sound.
2) **Heat Conduction Effects** - Heat transfer between high and low temperature regions in the wave which result in non-adiabatic propagation of the sound.
3) **Inter Molecular Energy Interchanges** - Molecular energy relaxation effects which result in a time lag between changes in translational kinetic energy and the energy associated with rotation and vibration of the molecules.

The following table illustrates the attenuation coefficient of sound at standard pressure (101.325 kPa) in units of dB/100m.

Temperature °C	Relative Humidity (%)	Frequency (Hz) 125	250	500	1000	2000	4000
30	20	0.06	0.18	0.37	0.64	1.40	4.40
	50	0.03	0.10	0.33	0.75	1.30	2.50
	90	0.02	0.06	0.24	0.70	1.50	2.60
20	20	0.07	0.15	0.27	0.62	1.90	6.70
	50	0.04	0.12	0.28	0.50	1.00	2.80
	90	0.02	0.08	0.26	0.56	0.99	2.10
10	20	0.06	0.11	0.29	0.94	3.20	9.00
	50	0.04	0.11	0.20	0.41	1.20	4.20
	90	0.03	0.10	0.21	0.38	0.81	2.50
0	20	0.05	0.15	0.50	1.60	3.70	5.70
	50	0.04	0.08	0.19	0.60	2.10	6.70
	90	0.03	0.08	0.15	0.36	1.10	4.10

- As frequency increases, absorption increases
- As Relative Humidity increases, absorption decreases
- There is no direct relationship between absorption and temperature
- **The net result of atmospheric absorption is to modify the sound propagation of a point source from 6 dB/doubling-of-distance to approximately 7 – 8 dB/doubling-of-distance (based on anecdotal experience)**



Atmospheric Absorption at 10ºC and 70% RH

Meteorological Effects

There are many meteorological factors which can affect how sound propagates over large distances. These various phenomena must be considered when trying to determine the relative impact of a noise source either after installation or during the design stage.

Wind

- Can greatly alter the noise climate away from a source depending on direction
- Sound levels downwind from a source can be increased due to refraction of sound back down towards the surface. This is due to the generally higher velocities as altitude increases.
- Sound levels upwind from a source can be decreased due to a "bending" of the sound away from the earth's surface.
- Sound level differences of ±10dB are possible depending on severity of wind and distance from source.
- Sound levels crosswind are generally not disturbed by an appreciable amount
- Wind tends to generate its own noise, however, and can provide a high degree of masking relative to a noise source of particular interest.

Temperature

- Temperature effects can be similar to wind effects
- Typically, the temperature is warmer at ground level than it is at higher elevations.
- If there is a very large difference between the ground temperature (very warm) and the air aloft (only a few hundred meters) then the transmitted sound refracts upward due to the changing speed of sound.
- If the air aloft is warmer than the ground temperature (known as an *inversion*) the resulting higher speed of sound aloft tends to refract the transmitted sound back down towards the ground. This essentially works on Snell's law of reflection and refraction.
- Temperature inversions typically happen early in the morning and are most common over large bodies of water or across river valleys.
- Sound level differences of ±10dB are possible depending on gradient of temperature and distance from source.

Rain

- Rain does not affect sound propagation by an appreciable amount unless it is very heavy
- The larger concern is the noise generated by the rain itself. A heavy rain striking the ground can cause a significant amount of highly broadband noise. The amount of noise generated is difficult to predict.
- Rain can also affect the output of various noise sources such as vehicle traffic.

Summary

- In general, these wind and temperature effects are difficult to predict
- Empirical models (based on measured data) have been generated to attempt to account for these effects.
- Environmental noise measurements must be conducted with these effects in mind. Sometimes it is desired to have completely calm conditions, other times a "worst case" of downwind noise levels are desired.

Topographical Effects

Similar to the various atmospheric effects outlined in the previous section, the effect of various geographical and vegetative factors must also be considered when examining the propagation of noise over large distances.

Topography

- One of the most important factors in sound propagation.
- Can provide a natural barrier between source and receiver (i.e. if berm or hill in between).
- Can provide a natural amplifier between source and receiver (i.e. large valley in between or hard reflective surface in between).
- Must look at location of topographical features relative to source and receiver to determine importance (i.e. small berm 1km away from source and 1km away from receiver will make negligible impact).

Grass

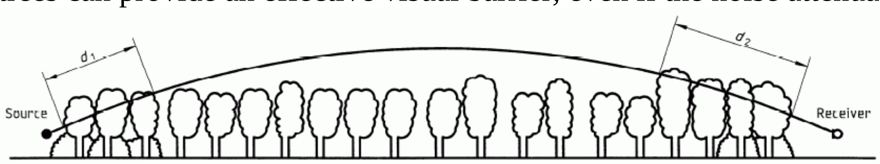
- Can be an effective absorber due to large area covered
- Only effective at low height above ground. Does not affect sound transmitted direct from source to receiver if there is line of sight.
- Typically less absorption than atmospheric absorption when there is line of sight.
- Approximate rule of thumb based on empirical data is:

$$A_g = 18\log_{10}(f) - 31 \qquad (dB/100m)$$

Where: A_g is the absorption amount

Trees

- Provide absorption due to foliage
- Deciduous trees are essentially ineffective in the winter
- Absorption depends heavily on density and height of trees
- No data found on absorption of various kinds of trees
- Large spans of trees are required to obtain even minor amounts of sound reduction
- In many cases, trees can provide an effective visual barrier, even if the noise attenuation is negligible.



NOTE — $d_f = d_1 + d_2$

For calculating d_1 and d_2, the curved path radius may be assumed to be 5 km.

Figure A.1 — Attenuation due to propagation through foliage increases linearly with propagation distance d_f through the foliage

Table A.1 — Attenuation of an octave band of noise due to propagation a distance d_f through dense foliage

Propagation distance d_f	Nominal midband frequency Hz							
m	63	125	250	500	1 000	2 000	4 000	8 000
	Attenuation, dB:							
$10 \leq d_f \leq 20$	0	0	1	1	1	1	2	3
	Attenuation, dB/m:							
$20 \leq d_f \leq 200$	0,02	0,03	0,04	0,05	0,06	0,08	0,09	0,12

Tree/Foliage attenuation from ISO 9613-2:1996

Bodies of Water

- Large bodies of water can provide the opposite effect to grass and trees.
- Reflections caused by small incidence angles (grazing) can result in larger sound levels at great distances (increased reflectivity, Q).
- Typically air temperatures are warmer high aloft since air temperatures near water surface tend to be more constant. Result is a high probability of temperature inversion.
- Sound levels can “carry” much further.

Snow

- Covers the ground for approximately 1/2 of the year in northern climates.
- Can act as an absorber or reflector (and varying degrees in between).
- Freshly fallen snow can be quite absorptive.
- Snow which has been sitting for a while and hard packed due to wind can be quite reflective.
- Falling snow can be more absorptive than rain, but does not tend to produce its own noise.
- Snow can cover grass which might have provided some means of absorption.
- Typically sound propagates with less impedance in winter due to hard snow on ground and no foliage on trees/shrubs.

Appendix III. SOUND LEVELS OF FAMILIAR NOISE SOURCES

Used with Permission Obtained from the Alberta Energy Regulator (AER) Directive 038 (2007)

Source[1]	**Sound Level (dBA)**
Bedroom of a country home	30
Soft whisper at 1.5 m	30
Quiet office or living room	40
Moderate rainfall	50
Inside average urban home	50
Quiet street	50
Normal conversation at 1 m	60
Noisy office	60
Noisy restaurant	70
Highway traffic at 15 m	75
Loud singing at 1 m	75
Tractor at 15 m	78-95
Busy traffic intersection	80
Electric typewriter	80
Bus or heavy truck at 15 m	88-94
Jackhammer	88-98
Loud shout	90
Freight train at 15 m	95
Modified motorcycle	95
Jet taking off at 600 m	100
Amplified rock music	110
Jet taking off at 60 m	120
Air-raid siren	130

[1] Cottrell, Tom, 1980, *Noise in Alberta*, Table 1, p.8, ECA80 - 16/1B4 (Edmonton: Environment Council of Alberta).

SOUND LEVELS GENERATED BY COMMON APPLIANCES

Used with Permission Obtained from the Alberta Energy Regulator (AER) Directive 038 (2007)

Source[1]	Sound level at 3 feet (dBA)
Freezer	38-45
Refrigerator	34-53
Electric heater	47
Hair clipper	50
Electric toothbrush	48-57
Humidifier	41-54
Clothes dryer	51-65
Air conditioner	50-67
Electric shaver	47-68
Water faucet	62
Hair dryer	58-64
Clothes washer	48-73
Dishwasher	59-71
Electric can opener	60-70
Food mixer	59-75
Electric knife	65-75
Electric knife sharpener	72
Sewing machine	70-74
Vacuum cleaner	65-80
Food blender	65-85
Coffee mill	75-79
Food waste disposer	69-90
Edger and trimmer	81
Home shop tools	64-95
Hedge clippers	85
Electric lawn mower	80-90

[1] Reif, Z. F., and Vermeulen, P. J., 1979, "Noise from domestic appliances, construction, and industry," Table 1, p.166, in Jones, H. W., ed., *Noise in the Human Environment*, vol. 2, ECA79-SP/1 (Edmonton: Environment Council of Alberta).

Appendix IV NOISE MODELLING PARAMETERS

Current Conditions (Year 2017)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
AHD North of Stony Plain Road NB	2575	11.2	681	11.2	100	44749
AHD North of Stony Plain Road SB	2575	11.2	681	11.2	100	44749
AHD South of Stony Plain Road NB	3183	11.3	842	11.3	100	55331
AHD South of Stony Plain Road SB	3183	11.3	842	11.3	100	55331
AHD South of 87 Avenue NB	3067	11.3	811	11.3	100	53304
AHD South of 87 Avenue SB	3067	11.3	811	11.3	100	53304
AHD South of Whitemud Drive NB	2598	10.4	687	10.4	100	45163
AHD South of Whitemud Drive SB	2598	10.4	687	10.4	100	45163
AHD South of 62 Avenue NB	2286	11.4	605	11.4	100	39734
AHD South of 62 Avenue SB	2286	11.4	605	11.4	100	39734
AHD South of Lessard Road NB	2306	11.1	610	11.1	100	40081
AHD South of Lessard Road SB	2306	11.1	610	11.1	100	40081
AHD East of Cameron Heights Drive NB	2373	10.6	628	10.6	100	41239
AHD East of Cameron Heights Drive SB	2373	10.6	628	10.6	100	41239
AHD South of Terwillegar Drive NB	2191	10.9	580	10.9	100	38078
AHD South of Terwillegar Drive SB	2191	10.9	580	10.9	100	38078
AHD East of Rabbit Hill Road WB	2521	9.9	667	9.9	100	43825
AHD East of Rabbit Hill Road EB	2521	9.9	667	9.9	100	43825
AHD East of 127 Street WB	2539	8.8	672	8.8	100	44130
AHD East of 127 Street EB	2539	8.8	672	8.8	100	44130
AHD East of 111 Street WB	2566	8.1	679	8.1	100	44606
AHD East of 111 Street EB	2566	8.1	679	8.1	100	44606
AHD East of Gateway Boulevard WB	2377	11.3	629	11.3	100	41317
AHD East of Gateway Boulevard EB	2377	11.3	629	11.3	100	41317
Gateway Boulevard South of AHD NB	3503	9.6	927	9.6	100	60880
Calgary Trail South of AHD SB	3503	9.6	927	9.6	100	60880
Gateway Boulevard South of Ellerslie Road NB	3347	10.7	885	10.7	110	58175
Calgary Trail South of Ellerslie Road SB	3347	10.7	885	10.7	110	58175
Stony Plain Road East of AHD EB	1650	4.9	437	4.9	70	28686
Stony Plain Road East of AHD WB	1650	6.1	437	6.1	70	28686
Stony Plain Road West of AHD EB	1467	10.7	388	10.7	80	25494
Stony Plain Road West of AHD WB	1468	13.1	388	13.1	80	25515
AHD NB to Stony Plain Road EB Ramp	580	3.6	153	3.6	80	10080
AHD NB to Stony Plain Road WB Ramp	515	19.5	136	19.5	80	8946
Stony Plain Road WB to AHD NB Ramp	293	3.9	78	3.9	70	5092
Stony Plain Road WB to AHD SB Ramp	579	7.5	153	7.5	60	10069
AHD SB to Stony Plain Road WB Ramp	175	26.5	46	26.5	80	3045
AHD SB to Stony Plain Road EB Ramp	293	5.3	78	5.3	80	5092
Stony Plain Road EB to AHD SB Ramp	514	16.4	136	16.4	80	8935
Stony Plain Road EB to AHD NB Ramp	175	16.1	46	16.1	80	3045
87 Avenue East of AHD EB	732	4.0	194	4.0	60	12715
87 Avenue East of AHD WB	732	3.5	194	3.5	60	12715
87 Avenue West of AHD EB	552	6.1	146	6.1	60	9586
87 Avenue West of AHD WB	552	5.8	146	5.8	60	9586
AHD NB to 87 Avenue EB Ramp	205	1.4	54	1.4	70	3559
AHD NB to 87 Avenue WB Ramp	94	6.2	25	6.2	70	1627
87 Avenue WB to AHD NB Ramp	243	3.2	64	3.2	60	4231
87 Avenue WB to AHD SB Ramp	205	2.4	54	2.4	60	3559
AHD SB to 87 Avenue WB Ramp	175	7.4	46	7.4	70	3034
AHD SB to 87 Avenue EB Ramp	243	3.3	64	3.3	70	4231
87 Avenue EB to AHD SB Ramp	94	4.5	25	4.5	60	1627
87 Avenue EB to AHD NB Ramp	175	6.4	46	6.4	60	3034
Whitemud Drive East of AHD EB	1562	8.8	413	8.8	80	27153
Whitemud Drive East of AHD WB	1562	9.3	413	9.3	80	27153
Whitemud Drive West of AHD EB	860	3.9	227	3.9	80	14941

Current Conditions (Year 2017) (Cont.)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
Whitemud Drive West of AHD WB	860	10.6	227	10.6	80	14941
AHD NB to Whitemud Drive EB Ramp	295	2.8	78	2.8	90	5124
AHD NB to Whitemud Drive WB Ramp	109	5.6	29	5.6	70	1890
Whitemud Drive WB to AHD NB Ramp	763	15.9	202	15.9	80	13261
Whitemud Drive WB to AHD SB Ramp	295	2.5	78	2.5	80	5124
AHD SB to Whitemud Drive WB Ramp	184	3.7	49	3.7	80	3202
AHD SB to Whitemud Drive EB Ramp	763	14.8	202	14.8	70	13261
Whitemud Drive EB to AHD SB Ramp	171	3.5	45	3.5	80	2971
Whitemud Drive EB to AHD NB Ramp	184	5.9	49	5.9	80	3202
Callingwood Road East of AHD EB	468	3.3	124	3.3	60	8137
Callingwood Road East of AHD WB	468	3.3	124	3.3	60	8127
62 Avenue West of AHD EB	732	3.9	194	3.9	60	12726
62 Avenue West of AHD WB	732	4.0	194	4.0	60	12726
AHD NB to Callingwood Road EB Ramp	97	3.7	26	3.7	70	1680
AHD NB to 62 Avenue WB Ramp	122	5.9	32	5.9	70	2121
Callingwood Road WB to AHD NB Ramp	150	4.1	40	4.1	60	2614
Callingwood Road WB to AHD SB Ramp	96	3.7	25	3.7	60	1669
AHD SB to 62 Avenue WB Ramp	389	4.2	103	4.2	70	6762
AHD SB to Callingwood Road EB Ramp	150	3.9	40	3.9	70	2614
62 Avenue EB to AHD SB Ramp	122	4.5	32	4.5	60	2121
62 Avenue EB to AHD NB Ramp	389	4.4	103	4.4	60	6762
Lessard Road East of AHD EB	452	3.8	120	3.8	60	7854
Lessard Road East of AHD WB	451	4.2	119	4.2	60	7843
Lessard Road West of AHD EB	429	5.4	113	5.4	60	7455
Lessard Road West of AHD WB	429	5.4	113	5.4	60	7455
AHD NB to Lessard Road EB Ramp	151	3.8	40	3.8	70	2625
AHD NB to Lessard Road WB Ramp	126	7.7	33	7.7	70	2194
Lessard Road WB to AHD NB Ramp	106	4.0	28	4.0	70	1837
Lessard Road WB to AHD SB Ramp	151	5.3	40	5.3	60	2625
AHD SB to Lessard Road WB Ramp	133	7.6	35	7.6	70	2310
AHD SB to Lessard Road EB Ramp	106	5.1	28	5.1	70	1837
Lessard Road EB to AHD SB Ramp	126	9.1	33	9.1	70	2194
Lessard Road EB to AHD NB Ramp	133	8.1	35	8.1	60	2310
Cameron Heights Drive South of AHD NB	144	3.2	38	3.2	70	2499
Cameron Heights Drive South of AHD SB	144	3.2	38	3.2	70	2499
Cameron Heights Drive North of AHD NB	124	9.3	33	9.3	60	2152
Cameron Heights Drive North of AHD SB	120	9.3	32	9.3	60	2079
AHD WB to Cameron Heights Drive NB Ramp	57	6.2	15	6.2	60	997
AHD WB to Cameron Heights Drive SB Ramp	108	2.7	28	2.7	60	1869
Cameron Heights Drive SB to AHD WB Ramp	63	9.1	17	9.1	60	1102
Cameron Heights Drive SB to AHD EB Ramp	57	8.6	15	8.6	60	997
AHD EB to Cameron Heights Drive SB Ramp	33	2.9	9	2.9	60	577
AHD EB to Cameron Heights Drive NB Ramp	63	12.2	17	12.2	60	1102
Cameron Heights Drive NB to AHD EB Ramp	108	3.3	28	3.3	60	1869
Cameron Heights Drive NB to AHD WB Ramp	33	2.2	9	2.2	60	577
170 Street South of AHD NB	1062	7.1	281	7.1	70	18459
170 Street South of AHD SB	1062	7.1	281	7.1	70	18459
Terwillegar Drive North of AHD NB	917	4.2	243	4.2	70	15944
Terwillegar Drive North of AHD SB	917	4.2	243	4.2	70	15944
AHD NB to Terwillegar Drive NB Ramp	201	4.6	53	4.6	70	3496
AHD NB to 170 Street SB Ramp	199	11.4	53	11.4	70	3465
Terwillegar Drive SB to AHD NB Ramp	202	4.8	54	4.8	70	3517
Terwillegar Drive SB to AHD SB Ramp	201	4.2	53	4.2	70	3496
AHD SB to 170 Street SB Ramp	367	9.1	97	9.1	70	6373
AHD SB to Terwillegar Drive NB Ramp	202	4.3	54	4.3	70	3517

Current Conditions (Year 2017) (Cont.)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
170 Street NB to AHD SB Ramp	200	13.2	53	13.2	70	3475
170 Street NB to AHD NB Ramp	367	11.4	97	11.4	70	6373
156 Street South of AHD NB	625	9.4	165	9.4	60	10862
156 Street South of AHD SB	625	9.4	165	9.4	60	10862
Rabbit Hill Road North of AHD NB	636	5.7	168	5.7	60	11046
Rabbit Hill Road North of AHD SB	636	5.7	168	5.7	60	11046
AHD WB to Rabbit Hill Road NB Ramp	262	5.6	69	5.6	60	4557
AHD WB to 156 Street SB Ramp	219	7.5	58	7.5	60	3801
Rabbit Hill Road SB to AHD WB Ramp	109	12.1	29	12.1	60	1890
Rabbit Hill Road SB to AHD EB Ramp	262	5.9	69	5.9	60	4557
AHD EB to 156 Street SB Ramp	142	21.6	38	21.6	60	2467
AHD EB to Rabbit Hill Road NB Ramp	109	8.9	29	8.9	60	1890
156 Street NB to AHD EB Ramp	218	16.6	58	16.6	60	3790
156 Street NB to AHD WB Ramp	142	10.9	38	10.9	60	2467
127 Street South of AHD	327	3.0	86	3.0	60	5680
127 Street North of AHD	125	1.7	33	1.7	60	2173
111 Street South of AHD NB	948	4.4	251	4.4	60	16480
111 Street South of AHD SB	948	4.4	251	4.4	60	16480
111 Street North of AHD NB	781	4.2	207	4.2	60	13576
111 Street North of AHD SB	781	4.2	207	4.2	60	13576
AHD WB to 111 Street NB Ramp	151	2.0	40	2.0	70	2625
AHD WB to 111 Street SB Ramp	242	4.1	64	4.1	70	4210
111 Street SB to AHD WB Ramp	151	5.4	40	5.4	70	2625
111 Street SB to AHD EB Ramp	151	3.2	40	3.2	60	2625
AHD EB to 111 Street SB Ramp	236	6.1	62	6.1	70	4095
AHD EB to 111 Street NB Ramp	151	5.5	40	5.5	70	2625
111 Street NB to AHD EB Ramp	242	4.7	64	4.7	60	4210
111 Street NB to AHD WB Ramp	236	6.4	62	6.4	70	4095
Gateway Boulevard North of AHD NB	2366	3.3	626	3.3	100	41123
Calgary Trail North of AHD SB	2366	3.3	626	3.3	100	41123
AHD WB to Gateway Boulevard NB Ramp	217	1.8	58	1.8	80	3780
AHD WB to Calgary Trail SB Ramp	644	16.2	170	16.2	80	11193
Calgary Trail SB to AHD WB Ramp	541	4.0	143	4.0	80	9397
Calgary Trail SB to AHD EB Ramp	217	2.1	58	2.1	80	3780
AHD EB to Calgary Trail SB Ramp	740	13.8	196	13.8	80	12862
AHD EB to Gateway Boulevard NB Ramp	541	2.8	143	2.8	70	9408
Gateway Boulevard NB to AHD EB Ramp	644	16.8	170	16.8	80	11193
Gateway Boulevard NB to AHD WB Ramp	740	13.5	196	13.5	80	12862
Ellerslie Road East of Gateway Boulevard EB	1041	2.6	275	2.6	60	18091
Ellerslie Road East of Gateway Boulevard WB	1041	2.6	275	2.6	60	18091
Ellerslie Road West of Gateway Boulevard EB	929	2.4	246	2.4	60	16138
Ellerslie Road West of Gateway Boulevard WB	929	2.4	246	2.4	60	16138
Gateway Boulevard NB to Ellerslie Road EB Ramp	218	5.4	58	5.4	70	3790
Gateway Boulevard NB to Ellerslie Road WB Ramp	117	3.7	31	3.7	70	2026
Ellerslie Road WB to Gateway Boulevard NB Ramp	302	1.8	80	1.8	70	5250
Ellerslie Road WB to Calgary Trail SB Ramp	218	6.1	58	6.1	70	3790
Calgary Trail SB to Ellerslie Road WB Ramp	278	1.4	74	1.4	70	4830
Calgary Trail SB to Ellerslie Road EB Ramp	302	1.3	80	1.3	70	5250
Ellerslie Road EB to Calgary Trail SB Ramp	116	5.6	31	5.6	70	2016
Ellerslie Road EB to Gateway Boulevard NB Ramp	278	1.0	74	1.0	70	4830
91 Street	1640	4.4	434	4.4	70	28497
AHD WB to 91 Street NB Ramp	152	4.8	40	4.8	60	2635
AHD WB to 91 Street SB Ramp	202	7.4	54	7.4	60	3517
91 Street SB to AHD WB Ramp	263	6.6	70	6.6	60	4578
91 Street SB to AHD EB Ramp	152	4.1	40	4.1	60	2635

Current Conditions (Year 2017) (Cont.)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
AHD EB to 91 Street SB Ramp	248	5.6	66	5.6	60	4305
AHD EB to 91 Street NB Ramp	263	6.9	70	6.9	60	4578
91 Street NB to AHD EB Ramp	202	4.9	54	4.9	60	3517
91 Street NB to AHD WB Ramp	248	5.6	66	5.6	60	4305
66 Street	665	9.1	176	9.1	60	11550
50 Street	1840	4.8	487	4.8	60	31972
50 Street NB to AHD WB Ramp	217	8.2	58	8.2	60	3780
50 Street SB to AHD WB Ramp	478	3.3	126	3.3	60	8303
AHD WB to 50 Street NB/SB Ramp	324	5.7	86	5.7	60	5632
AHD EB to 50 Street NB/SB Ramp	694	6.1	184	6.1	60	12058
50 Street NB/SB to AHD EB Ramp	325	6.1	86	6.1	60	5645
34 Street	246	11.8	65	11.8	60	4284
17 Street	381	10.6	101	10.6	60	6628
AHD WB to 17 Street NB/SB Ramp	75	11.5	20	11.5	60	1310
17 Street NB/SB to AHD WB Ramp	137	10.8	36	10.8	60	2381
AHD EB to 17 Street NB/SB Ramp	136	9.6	36	9.6	60	2356
17 Street NB/SB to AHD EB Ramp	75	9.5	20	9.5	60	1310
Hwy 14 WB to AHD NB Ramp	303	8.0	80	8.0	100	5267
Hwy 14 WB to AHD SB Ramp	220	5.6	58	5.6	100	3818
AHD NB to Hwy 14 EB Ramp	220	7.4	58	7.4	100	3818
AHD SB to Hway 14 EB Ramp	303	8.8	80	8.8	100	5267
Collector Roads	483	3.0	128	3.0	60	8400
Residential Streets	12	3	2	3	50	200

Future Conditions (Year 2027)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
AHD North of Stony Plain Road NB	3727	11.2	986	11.2	100	64785
AHD North of Stony Plain Road SB	3335	11.2	882	11.2	100	57960
AHD South of Stony Plain Road NB	3993	11.3	1056	11.3	100	69405
AHD South of Stony Plain Road SB	3486	11.3	922	11.3	100	60585
AHD South of 87 Avenue NB	3081	11.3	815	11.3	100	53550
AHD South of 87 Avenue SB	3371	11.3	892	11.3	100	58590
AHD South of Whitemud Drive NB	3039	10.4	804	10.4	100	52815
AHD South of Whitemud Drive SB	3184	10.4	842	10.4	100	55335
AHD South of 62 Avenue NB	2598	11.4	687	11.4	100	45150
AHD South of 62 Avenue SB	2555	11.4	676	11.4	100	44415
AHD South of Lessard Road NB	2634	11.1	697	11.1	100	45780
AHD South of Lessard Road SB	2658	11.1	703	11.1	100	46200
AHD East of Cameron Heights Drive NB	2779	10.6	735	10.6	100	48300
AHD East of Cameron Heights Drive SB	2749	10.6	727	10.6	100	47775
AHD South of Terwillegar Drive NB	2404	10.9	636	10.9	100	41790
AHD South of Terwillegar Drive SB	2374	10.9	628	10.9	100	41265
AHD East of Rabbit Hill Road WB	2851	9.9	754	9.9	100	49560
AHD East of Rabbit Hill Road EB	2845	9.9	753	9.9	100	49455
AHD East of 127 Street WB	2882	8.8	762	8.8	100	50085
AHD East of 127 Street EB	2863	8.8	758	8.8	100	49770
AHD East of 111 Street WB	2809	8.1	743	8.1	100	48825
AHD East of 111 Street EB	2809	8.1	743	8.1	100	48825
AHD East of Gateway Boulevard WB	2821	11.3	746	11.3	100	49035
AHD East of Gateway Boulevard EB	2821	11.3	746	11.3	100	49035
Gateway Boulevard South of AHD NB	4501	9.6	1191	9.6	100	78225
Calgary Trail South of AHD SB	4054	9.6	1072	9.6	100	70455
Gateway Boulevard South of Ellerslie Road NB	4501	10.7	1191	10.7	110	78225
Calgary Trail South of Ellerslie Road SB	4054	10.7	1072	10.7	110	70455
Stony Plain Road East of AHD EB	2205	4.9	583	4.9	70	38325
Stony Plain Road East of AHD WB	2018	6.1	534	6.1	70	35070
Stony Plain Road West of AHD EB	1734	10.7	459	10.7	80	30135
Stony Plain Road West of AHD WB	1655	13.1	438	13.1	80	28770
AHD NB to Stony Plain Road EB Ramp	640	3.6	169	3.6	80	11130
AHD NB to Stony Plain Road WB Ramp	501	19.5	133	19.5	80	8715
Stony Plain Road WB to AHD NB Ramp	507	3.9	134	3.9	70	8820
Stony Plain Road WB to AHD SB Ramp	640	7.5	169	7.5	60	11130
AHD SB to Stony Plain Road WB Ramp	284	26.5	75	26.5	80	4935
AHD SB to Stony Plain Road EB Ramp	671	5.3	177	5.3	80	11655
Stony Plain Road EB to AHD SB Ramp	471	16.4	125	16.4	80	8190
Stony Plain Road EB to AHD NB Ramp	369	16.1	97	16.1	80	6405
87 Avenue East of AHD EB	477	4.0	126	4.0	60	8295
87 Avenue East of AHD WB	399	3.5	105	3.5	60	6930
87 Avenue West of AHD EB	423	6.1	112	6.1	60	7350
87 Avenue West of AHD WB	429	5.8	113	5.8	60	7455
AHD NB to 87 Avenue EB Ramp	217	1.4	58	1.4	70	3780
AHD NB to 87 Avenue WB Ramp	97	6.2	26	6.2	70	1680
87 Avenue WB to AHD NB Ramp	266	3.2	70	3.2	60	4620
87 Avenue WB to AHD SB Ramp	157	2.4	42	2.4	60	2730
AHD SB to 87 Avenue WB Ramp	272	7.4	72	7.4	70	4725
AHD SB to 87 Avenue EB Ramp	272	3.3	72	3.3	70	4725
87 Avenue EB to AHD SB Ramp	157	4.5	42	4.5	60	2730
87 Avenue EB to AHD NB Ramp	266	6.4	70	6.4	60	4620
Whitemud Drive East of AHD EB	2235	8.8	591	8.8	80	38850
Whitemud Drive East of AHD WB	2755	9.3	729	9.3	80	47880
Whitemud Drive West of AHD EB	1649	3.9	436	3.9	80	28665

Future Conditions (Year 2027) (Cont.)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
Whitemud Drive West of AHD WB	1426	10.6	377	10.6	80	24780
AHD NB to Whitemud Drive EB Ramp	393	2.8	104	2.8	90	6825
AHD NB to Whitemud Drive WB Ramp	109	5.6	29	5.6	70	1890
Whitemud Drive WB to AHD NB Ramp	1045	15.9	276	15.9	80	18165
Whitemud Drive WB to AHD SB Ramp	677	2.5	179	2.5	80	11760
AHD SB to Whitemud Drive WB Ramp	284	3.7	75	3.7	80	4935
AHD SB to Whitemud Drive EB Ramp	779	14.8	206	14.8	70	13545
Whitemud Drive EB to AHD SB Ramp	193	3.5	51	3.5	80	3360
Whitemud Drive EB to AHD NB Ramp	393	5.9	104	5.9	80	6825
Callingwood Road East of AHD EB	477	3.3	126	3.3	60	8295
Callingwood Road East of AHD WB	399	3.3	105	3.3	60	6930
62 Avenue West of AHD EB	779	3.9	206	3.9	60	13545
62 Avenue West of AHD WB	882	4.0	233	4.0	60	15330
AHD NB to Callingwood Road EB Ramp	109	3.7	29	3.7	70	1890
AHD NB to 62 Avenue WB Ramp	133	5.9	35	5.9	70	2310
Callingwood Road WB to AHD NB Ramp	127	4.1	34	4.1	60	2205
Callingwood Road WB to AHD SB Ramp	96	3.7	25	3.7	60	1669
AHD SB to 62 Avenue WB Ramp	584	4.2	154	4.2	70	10143
AHD SB to Callingwood Road EB Ramp	226	3.9	60	3.9	70	3927
62 Avenue EB to AHD SB Ramp	122	4.5	32	4.5	60	2121
62 Avenue EB to AHD NB Ramp	550	4.4	145	4.4	60	9555
Lessard Road East of AHD EB	308	3.8	82	3.8	60	5355
Lessard Road East of AHD WB	248	4.2	66	4.2	60	4305
Lessard Road West of AHD EB	507	5.4	134	5.4	60	8820
Lessard Road West of AHD WB	375	5.4	99	5.4	60	6510
AHD NB to Lessard Road EB Ramp	161	3.8	43	3.8	70	2803
AHD NB to Lessard Road WB Ramp	135	7.7	36	7.7	70	2341
Lessard Road WB to AHD NB Ramp	60	4.0	16	4.0	70	1050
Lessard Road WB to AHD SB Ramp	139	5.3	37	5.3	60	2415
AHD SB to Lessard Road WB Ramp	145	7.6	38	7.6	70	2520
AHD SB to Lessard Road EB Ramp	115	5.1	30	5.1	70	1995
Lessard Road EB to AHD SB Ramp	230	9.1	61	9.1	70	3990
Lessard Road EB to AHD NB Ramp	205	8.1	54	8.1	60	3570
Cameron Heights Drive South of AHD NB	254	3.2	67	3.2	70	4410
Cameron Heights Drive South of AHD SB	266	3.2	70	3.2	70	4620
Cameron Heights Drive North of AHD NB	224	9.3	59	9.3	60	3885
Cameron Heights Drive North of AHD SB	242	9.3	64	9.3	60	4200
AHD WB to Cameron Heights Drive NB Ramp	103	6.2	27	6.2	60	1790
AHD WB to Cameron Heights Drive SB Ramp	193	2.7	51	2.7	60	3355
Cameron Heights Drive SB to AHD WB Ramp	181	9.1	48	9.1	60	3150
Cameron Heights Drive SB to AHD EB Ramp	103	8.6	27	8.6	60	1790
AHD EB to Cameron Heights Drive SB Ramp	60	2.9	16	2.9	60	1050
AHD EB to Cameron Heights Drive NB Ramp	115	12.2	30	12.2	60	1995
Cameron Heights Drive NB to AHD EB Ramp	193	3.3	51	3.3	60	3355
Cameron Heights Drive NB to AHD WB Ramp	57	2.2	15	2.2	60	997
170 Street South of AHD NB	1353	7.1	358	7.1	70	23520
170 Street South of AHD SB	1299	7.1	344	7.1	70	22575
Terwillegar Drive North of AHD NB	1347	4.2	356	4.2	70	23415
Terwillegar Drive North of AHD SB	1232	4.2	326	4.2	70	21420
AHD NB to Terwillegar Drive NB Ramp	184	4.6	49	4.6	70	3202
AHD NB to 170 Street SB Ramp	184	11.4	49	11.4	70	3202
Terwillegar Drive SB to AHD NB Ramp	254	4.8	67	4.8	70	4410
Terwillegar Drive SB to AHD SB Ramp	184	4.2	49	4.2	70	3202
AHD SB to 170 Street SB Ramp	498	9.1	132	9.1	70	8662
AHD SB to Terwillegar Drive NB Ramp	275	4.3	73	4.3	70	4777

Future Conditions (Year 2027) (Cont.)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
170 Street NB to AHD SB Ramp	184	13.2	49	13.2	70	3202
170 Street NB to AHD NB Ramp	459	11.4	121	11.4	70	7969
156 Street South of AHD NB	864	9.4	229	9.4	60	15015
156 Street South of AHD SB	689	9.4	182	9.4	60	11970
Rabbit Hill Road North of AHD NB	954	5.7	253	5.7	60	16590
Rabbit Hill Road North of AHD SB	761	5.7	201	5.7	60	13230
AHD WB to Rabbit Hill Road NB Ramp	441	5.6	117	5.6	60	7665
AHD WB to 156 Street SB Ramp	369	7.5	97	7.5	60	6405
Rabbit Hill Road SB to AHD WB Ramp	160	12.1	42	12.1	60	2782
Rabbit Hill Road SB to AHD EB Ramp	462	5.9	122	5.9	60	8032
AHD EB to 156 Street SB Ramp	213	21.6	56	21.6	60	3701
AHD EB to Rabbit Hill Road NB Ramp	163	8.9	43	8.9	60	2835
156 Street NB to AHD EB Ramp	384	16.6	101	16.6	60	6667
156 Street NB to AHD WB Ramp	208	10.9	55	10.9	60	3622
127 Street South of AHD NB	547	3.7	145	3.7	60	9500
127 Street South of AHD SB	503	3.7	133	3.7	60	8750
127 Street North of AHD NB	46	1.3	12	1.3	60	800
127 Street North of AHD SB	49	1.3	13	1.3	60	850
AHD WB to 127 Street NB Ramp	32	1.3	8	1.3	60	550
AHD WB to 127 Street SB Ramp	81	1.3	21	1.3	60	1400
127 Street SB to AHD WB Ramp	37	1.3	10	1.3	60	650
127 Street SB to AHD EB Ramp	12	1.3	3	1.3	60	200
AHD EB to 127 Street SB Ramp	411	1.3	109	1.3	60	7150
AHD EB to 127 Street NB Ramp	9	1.3	2	1.3	60	150
127 Street NB to AHD EB Ramp	457	1.3	121	1.3	60	7950
127 Street NB to AHD WB Ramp	83	1.3	22	1.3	60	1450
111 Street South of AHD NB	1335	4.4	353	4.4	60	23205
111 Street South of AHD SB	1130	4.4	299	4.4	60	19635
111 Street North of AHD NB	1130	4.2	299	4.2	60	19635
111 Street North of AHD SB	924	4.2	245	4.2	60	16065
AHD WB to 111 Street NB Ramp	211	2.0	56	2.0	70	3675
AHD WB to 111 Street SB Ramp	340	4.1	90	4.1	70	5901
111 Street SB to AHD WB Ramp	236	5.4	62	5.4	70	4095
111 Street SB to AHD EB Ramp	176	3.2	47	3.2	60	3066
AHD EB to 111 Street SB Ramp	309	6.1	82	6.1	70	5376
AHD EB to 111 Street NB Ramp	198	5.5	52	5.5	70	3444
111 Street NB to AHD EB Ramp	283	4.7	75	4.7	60	4914
111 Street NB to AHD WB Ramp	369	6.4	97	6.4	70	6405
Gateway Boulevard North of AHD NB	4180	3.3	1106	3.3	100	72660
Calgary Trail North of AHD SB	3528	3.3	933	3.3	100	61320
AHD WB to Gateway Boulevard NB Ramp	610	1.8	161	1.8	80	10605
AHD WB to Calgary Trail SB Ramp	846	16.2	224	16.2	80	14700
Calgary Trail SB to AHD WB Ramp	689	4.0	182	4.0	80	11970
Calgary Trail SB to AHD EB Ramp	302	2.1	80	2.1	80	5250
AHD EB to Calgary Trail SB Ramp	677	13.8	179	13.8	80	11760
AHD EB to Gateway Boulevard NB Ramp	695	2.8	184	2.8	70	12075
Gateway Boulevard NB to AHD EB Ramp	846	16.8	224	16.8	80	14700
Gateway Boulevard NB to AHD WB Ramp	773	13.5	205	13.5	80	13440
Ellerslie Road East of Gateway Boulevard EB	1301	2.6	344	2.6	60	22614
Ellerslie Road East of Gateway Boulevard WB	1301	2.6	344	2.6	60	22614
Ellerslie Road West of Gateway Boulevard EB	1161	2.4	307	2.4	60	20173
Ellerslie Road West of Gateway Boulevard WB	1161	2.4	307	2.4	60	20173
Gateway Boulevard NB to Ellerslie Road EB Ramp	273	5.4	72	5.4	70	4738
Gateway Boulevard NB to Ellerslie Road WB Ramp	146	3.7	39	3.7	70	2533
Ellerslie Road WB to Gateway Boulevard NB Ramp	378	1.8	100	1.8	70	6562

Future Conditions (Year 2027) (Cont.)

Road	Day (Vehicles Per Hour)	Day % Heavy Vehicles	Night (Vehicles Per Hour)	Night % Heavy Vehicles	Speed (km/hr)	Total Volume (vehicles per day)
Ellerslie Road WB to Calgary Trail SB Ramp	273	6.1	72	6.1	70	4738
Calgary Trail SB to Ellerslie Road WB Ramp	347	1.4	92	1.4	70	6037
Calgary Trail SB to Ellerslie Road EB Ramp	378	1.3	100	1.3	70	6562
Ellerslie Road EB to Calgary Trail SB Ramp	145	5.6	38	5.6	70	2520
Ellerslie Road EB to Gateway Boulevard NB Ramp	347	1.0	92	1.0	70	6037
91 Street	2049	4.4	542	4.4	70	35621
AHD WB to 91 Street NB Ramp	190	4.8	50	4.8	60	3294
AHD WB to 91 Street SB Ramp	253	7.4	67	7.4	60	4397
91 Street SB to AHD WB Ramp	329	6.6	87	6.6	60	5722
91 Street SB to AHD EB Ramp	190	4.1	50	4.1	60	3294
AHD EB to 91 Street SB Ramp	310	5.6	82	5.6	60	5381
AHD EB to 91 Street NB Ramp	329	6.9	87	6.9	60	5722
91 Street NB to AHD EB Ramp	253	4.9	67	4.9	60	4397
91 Street NB to AHD WB Ramp	310	5.6	82	5.6	60	5381
66 Street	831	9.1	220	9.1	60	14437
50 Street	2299	4.8	608	4.8	60	39966
50 Street NB to AHD WB Ramp	272	8.2	72	8.2	60	4725
50 Street SB to AHD WB Ramp	597	3.3	158	3.3	60	10379
AHD WB to 50 Street NB/SB Ramp	405	5.7	107	5.7	60	7040
AHD EB to 50 Street NB/SB Ramp	867	6.1	229	6.1	60	15073
50 Street NB/SB to AHD EB Ramp	406	6.1	107	6.1	60	7056
34 Street	308	11.8	82	11.8	60	5355
17 Street	477	10.6	126	10.6	60	8284
AHD WB to 17 Street NB/SB Ramp	94	11.5	25	11.5	60	1638
17 Street NB/SB to AHD WB Ramp	171	10.8	45	10.8	60	2977
AHD EB to 17 Street NB/SB Ramp	169	9.6	45	9.6	60	2945
17 Street NB/SB to AHD EB Ramp	94	9.5	25	9.5	60	1638
Hwy 14 WB to AHD NB Ramp	379	8.0	100	8.0	100	6583
Hwy 14 WB to AHD SB Ramp	275	5.6	73	5.6	100	4772
AHD NB to Hwy 14 EB Ramp	275	7.4	73	7.4	100	4772
AHD SB to Hway 14 EB Ramp	379	8.8	100	8.8	100	6583
Collector Roads	483	3.0	128	3.0	60	8400
Residential Streets	12	3.0	2	3.0	50	200

Updated and New Noise Model Receptors

Updated Model Receptors	Updated Model Receptors	New Model Receptors
R_030	R_206	Region4-A
R_031	R_207	Region4-B
R_032	R_208	Region4-C
R_033	R_209	Region4-D
R_034	R_210	Region4-E
R_035		Region4-F
R_036	R_253	Region4-G
R_037	R_254	Region4-H
R_038	R_255	Region4-I
R_039	R_256	Region4-J
	R_257	Region4-K
R_137	R_258	
R_138	R_259	Region6-A
	R_260	Region6-B
R_141	R_261	Region6-C
R_142	R_262	Region6-D
R_143	R_263	Region6-E
		Region6-F
R_151	R_283	Region6-G
R_152		Region6-H
R_153	R_291	
R_154		
R_155	R_307	
R_156		
R_157	R_309	
	R_310	
R_165	R_311	
	R_312	
R_204	R_313	
	R_314	

Appendix V NOISE MONITORING ISOLATED DATA

Noise Monitor M01

Start Time	End Time	Duration (min)	Reason
8/14/2017 15:50	8/14/2017 15:51	1.75	Dog Barking
8/14/2017 20:13	8/14/2017 20:16	2.75	Dog Barking
8/15/2017 11:28	8/15/2017 11:30	2.25	Dog Barking
8/15/2017 11:52	8/15/2017 11:55	3.00	Dog Barking
	TOTAL	**9.75**	

Noise Monitor M02

Start Time	End Time	Duration (min)	Reason
6/8/2017 8:08	6/8/2017 8:08	0.25	Excessive Bird Noise
6/8/2017 8:08	6/8/2017 8:09	1.25	Excessive Bird Noise
	TOTAL	**1.50**	

Noise Monitor M03

Start Time	End Time	Duration (min)	Reason
6/12/2017 23:01	6/12/2017 23:03	1.75	Excessive Bird Noise
6/13/2017 9:42	6/13/2017 9:44	1.75	Excessive Bird Noise
6/13/2017 10:37	6/13/2017 10:37	0.25	Excessive Bird Noise
6/13/2017 10:37	6/13/2017 10:39	1.25	Excessive Bird Noise
6/13/2017 15:56	6/13/2017 15:59	2.75	Excessive Bird Noise
6/13/2017 19:48	6/13/2017 19:50	1.5	Excessive Bird Noise
6/13/2017 20:05	6/13/2017 20:42	37.25	Wind Wrong Direction
	TOTAL	**46.5**	

Noise Monitor M04

Start Time	End Time	Duration (min)	Reason
8/14/2017 15:29	8/14/2017 15:31	2.25	Machine Nearby
8/15/2017 8:55	8/15/2017 8:57	2.75	Dog Barking
8/15/2017 11:28	8/15/2017 11:29	1.50	Machine Nearby
	TOTAL	**6.50**	

Noise Monitor M6b

Start Time	End Time	Duration (min)	Reason
5/4/2017 1:20	5/4/2017 1:22	2	Aircraft Flyover
5/4/2017 11:25	5/4/2017 11:27	1.5	Aircraft Flyover
5/4/2017 11:46	5/4/2017 11:47	1.75	Aircraft Flyover
	TOTAL	**5.25**	

Noise Monitor M08

Start Time	End Time	Duration (min)	Reason
8/16/2017 13:07	8/16/2017 13:09	2.00	Machine Nearby
8/16/2017 13:43	8/16/2017 13:45	1.25	Aircraft Flyover
8/16/2017 14:08	8/16/2017 14:12	3.25	Aircraft Flyover
8/16/2017 15:44	8/16/2017 15:45	1.25	Aircraft Flyover
8/16/2017 18:09	8/16/2017 18:11	1.75	Aircraft Flyover
8/16/2017 18:13	8/16/2017 18:15	1.75	Aircraft Flyover
8/16/2017 20:12	8/16/2017 20:14	1.50	Excessive Bird Noise
8/17/2017 6:35	8/17/2017 6:37	2.00	Aircraft Flyover
8/17/2017 11:41	8/17/2017 12:14	32.50	Lawn Mower Nearby
8/17/2017 12:40	8/17/2017 12:42	1.25	Aircraft Flyover
8/17/2017 12:50	8/17/2017 12:53	3.50	Aircraft Flyover
	TOTAL	**52.00**	

Noise Monitor M11

Start Time	End Time	Duration (min)	Reason
6/6/2017 6:56	6/6/2017 6:58	1.75	Aircraft Flyover
6/6/2017 13:21	6/6/2017 13:23	1.5	Aircraft Flyover
6/6/2017 22:17	6/6/2017 22:19	1.5	Aircraft Flyover
	TOTAL	**4.75**	

Noise Monitor M12

Start Time	End Time	Duration (min)	Reason
6/13/2017 5:26	6/13/2017 5:33	6.5	Excessive Bird Noise
6/13/2017 5:41	6/13/2017 5:45	3.5	Excessive Bird Noise
6/13/2017 6:19	6/13/2017 6:21	2.5	Aircraft Flyover
6/13/2017 9:03	6/13/2017 9:05	2.25	Excessive Bird Noise
6/13/2017 16:03	6/13/2017 16:07	3.25	Aircraft Flyover
6/13/2017 17:49	6/13/2017 17:51	1.75	Aircraft Flyover
6/13/2017 18:33	6/13/2017 18:35	1.75	Aircraft Flyover
	TOTAL	**21.50**	

Noise Monitor M13

Start Time	End Time	Duration (min)	Reason
8/8/2017 8:48	8/8/2017 8:49	1.00	Aircraft Flyover
	TOTAL	**1.00**	

Noise Monitor M14

Start Time	End Time	Duration (min)	Reason
6/6/2017 8:16	6/6/2017 8:17	1	Aircraft Flyover
6/6/2017 13:47	6/6/2017 13:48	1	Aircraft Flyover
6/6/2017 14:11	6/6/2017 14:25	14.25	Lawnmower
	TOTAL	**16.25**	

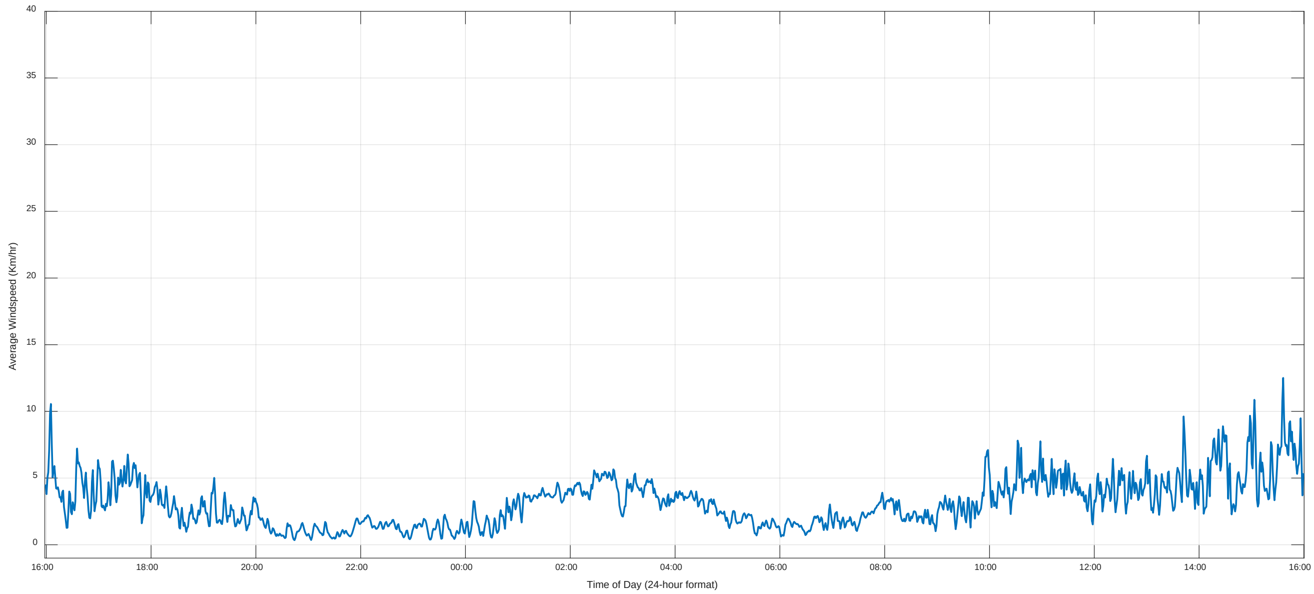
Noise Monitor M15

Start Time	End Time	Duration (min)	Reason
8/17/2017 12:39	8/17/2017 12:41	2.25	Machine Nearby
8/17/2017 12:41	8/17/2017 13:08	26.75	Machine Nearby
8/17/2017 13:50	8/17/2017 13:52	1.75	Aircraft Flyover
	TOTAL	**30.75**	

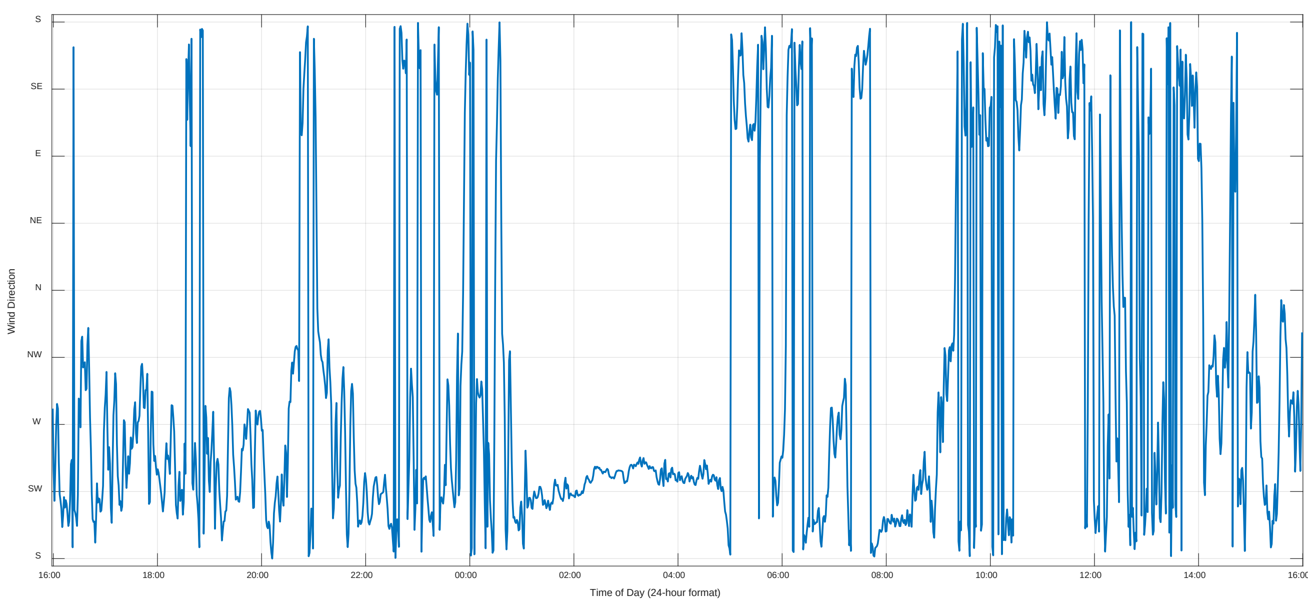
Noise Monitor M16

Start Time	End Time	Duration (min)	Reason
6/6/2017 17:52	6/6/2017 17:53	1.00	Aircraft Flyover
	TOTAL	**1.00**	

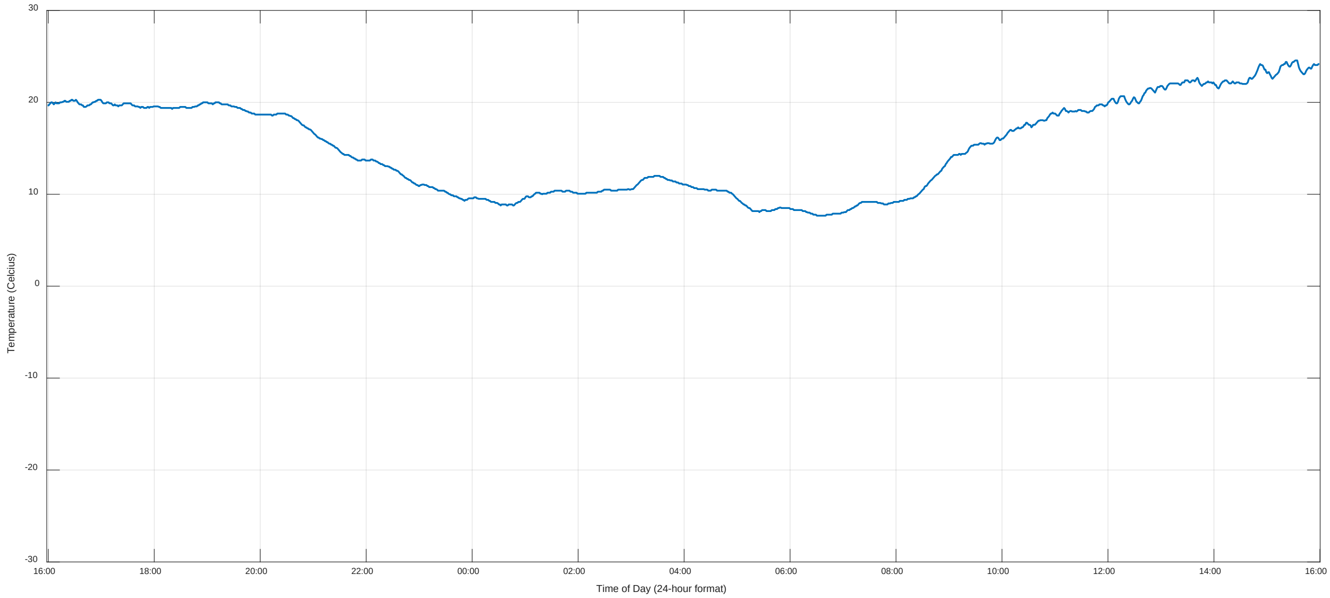
Appendix VI. WEATHER DATA



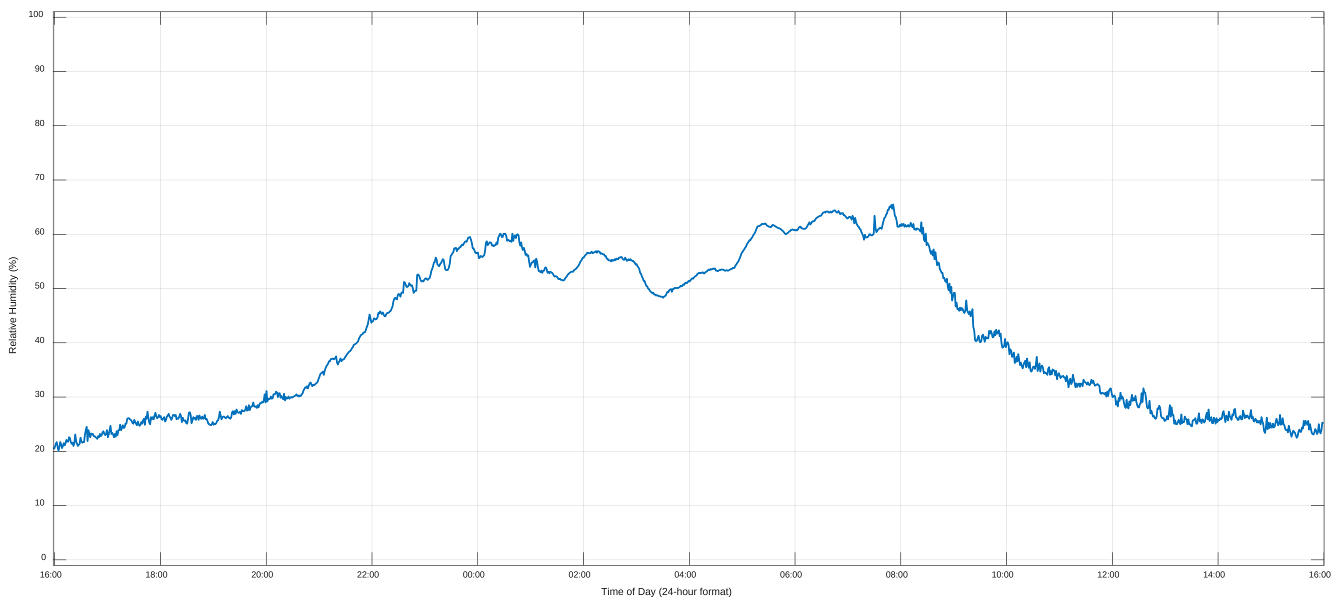
May 03 – 04, 2017 Monitored Wind Speed



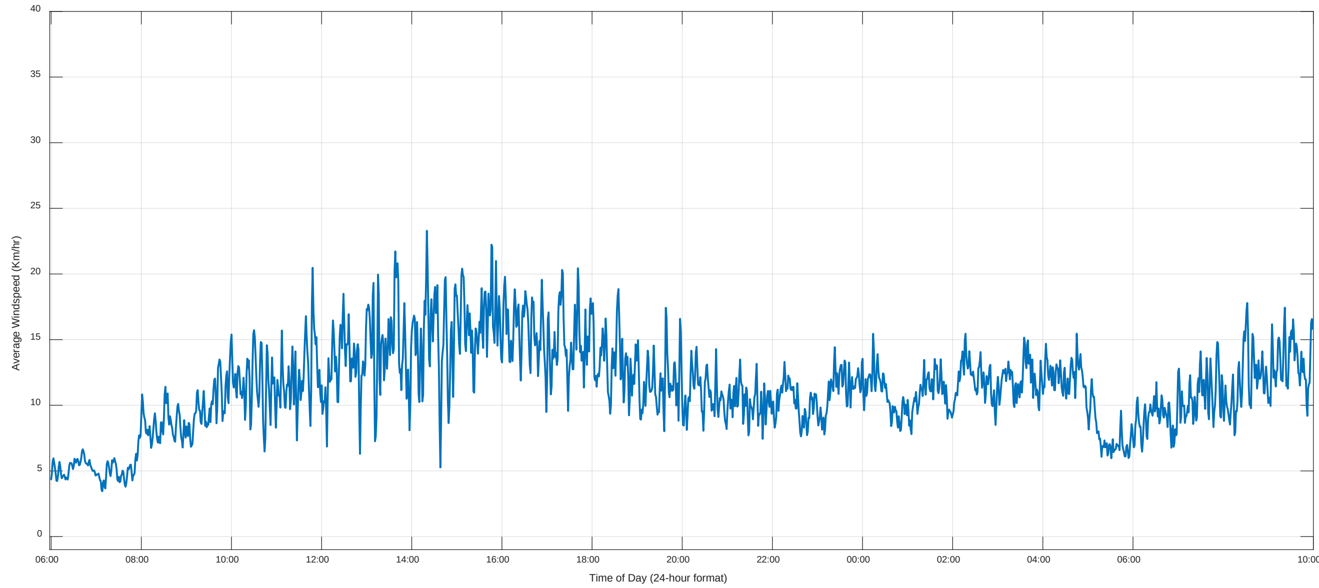
May 03 – 04, 2017 Monitored Wind Direction



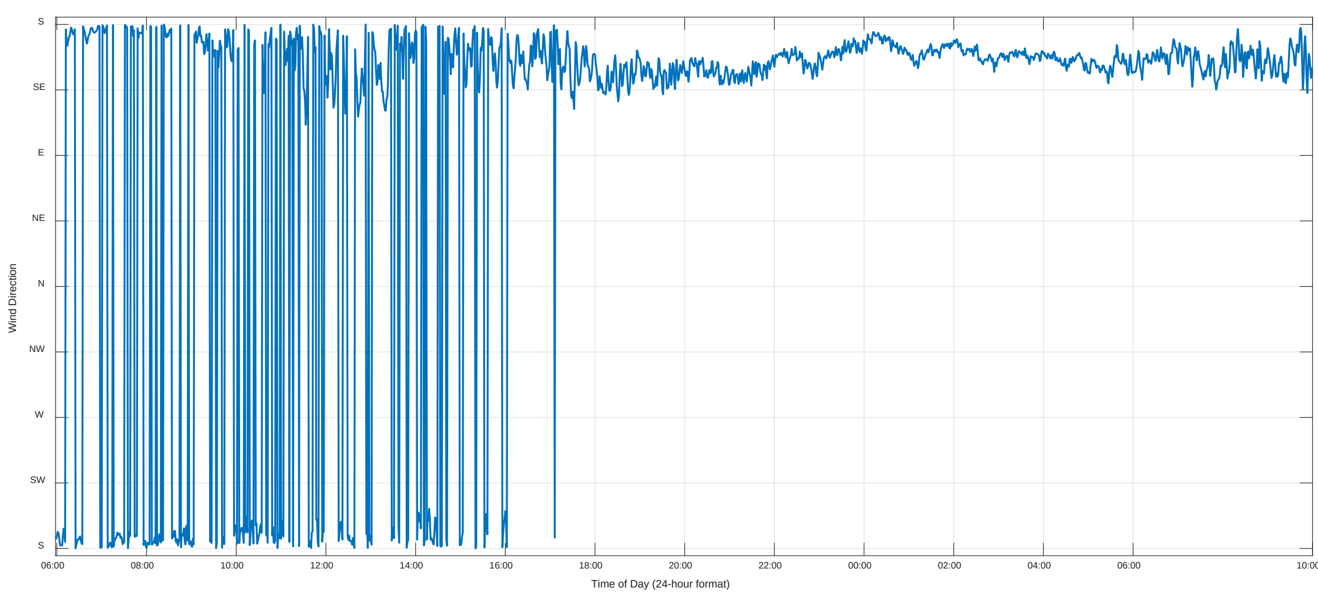
May 03 – 04, 2017 Monitored Temperature



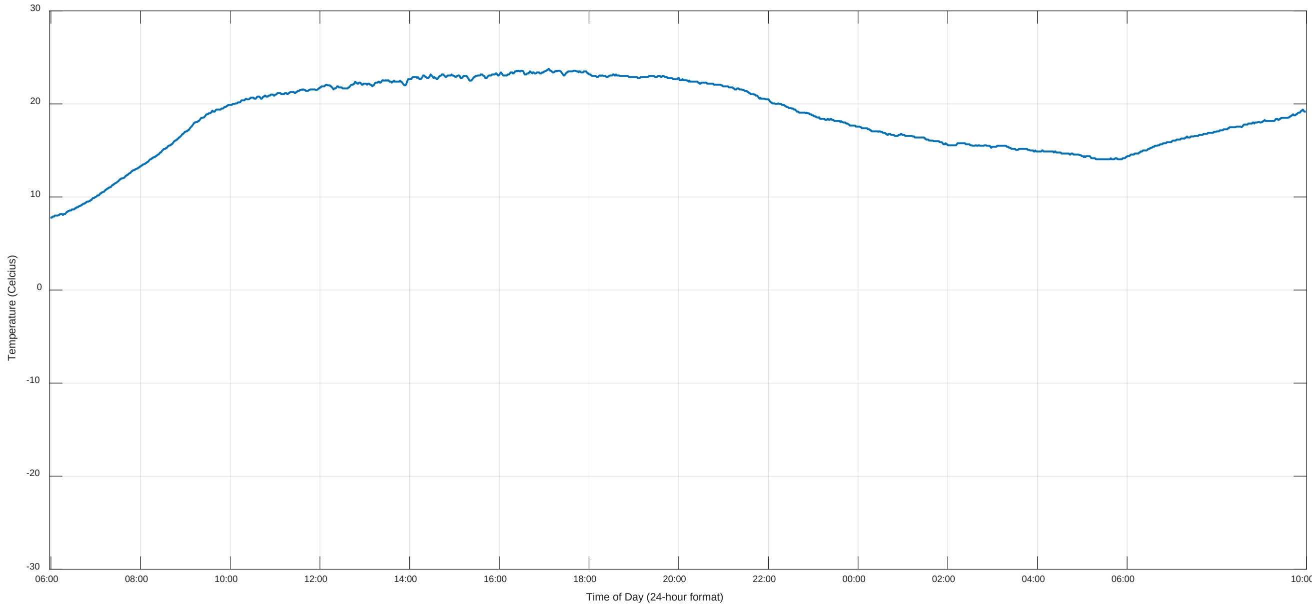
May 03 – 04, 2017 Monitored Relative Humidity



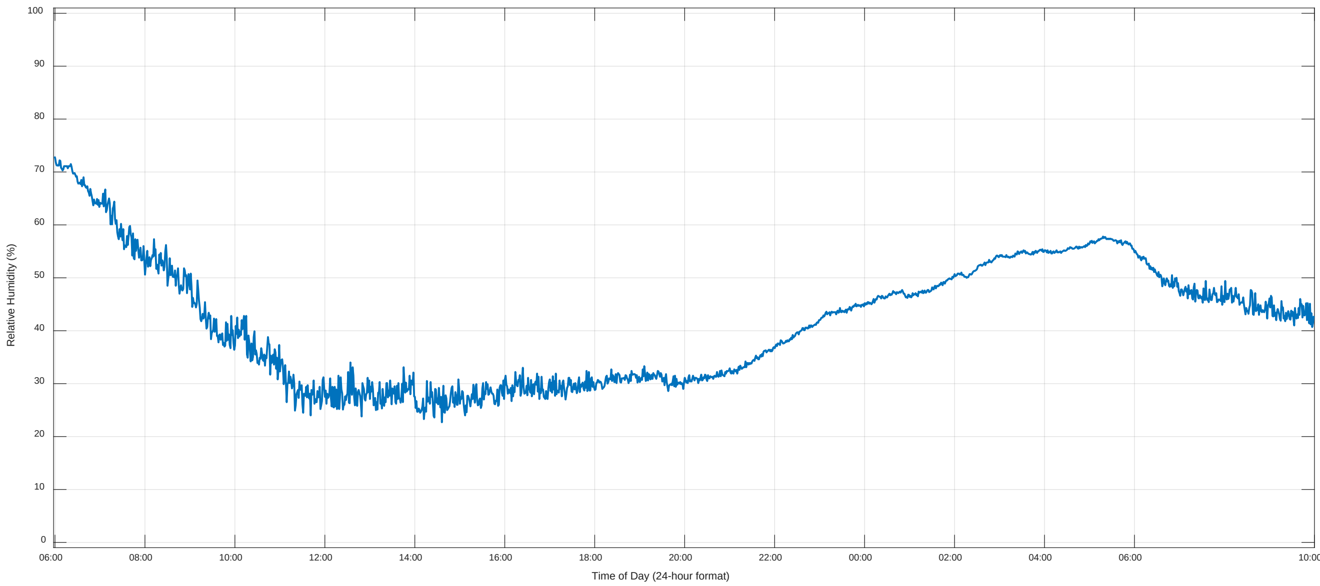
June 06 – 07, 2017 Monitored Wind Speed



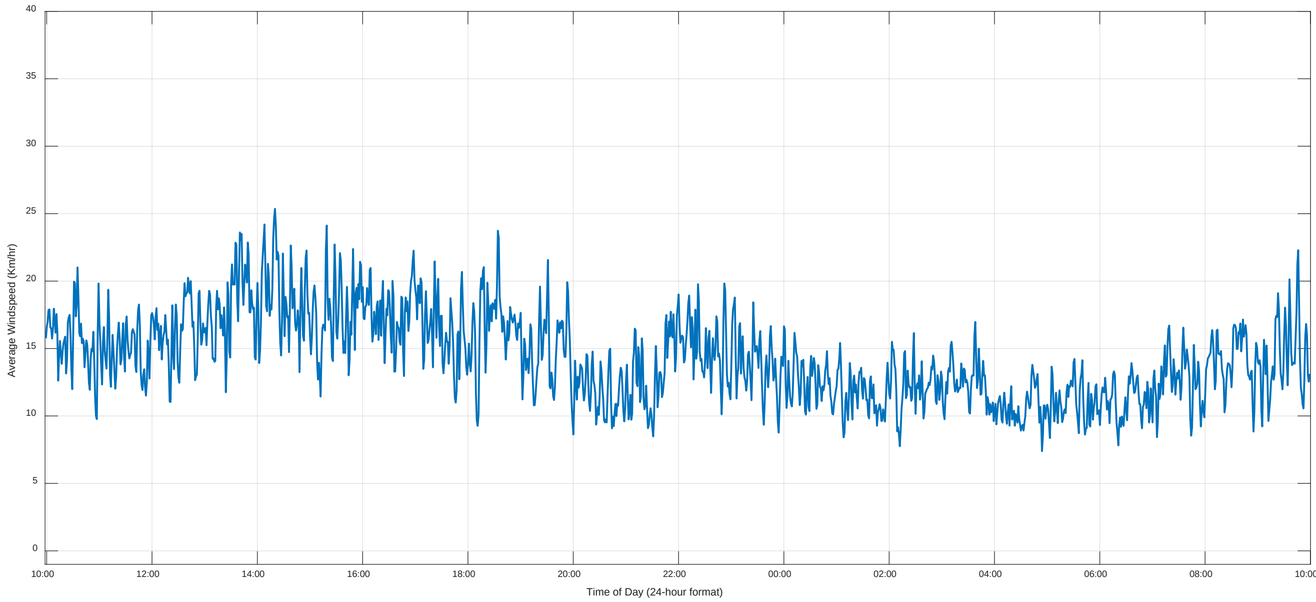
June 06 – 07, 2017 Monitored Wind Direction



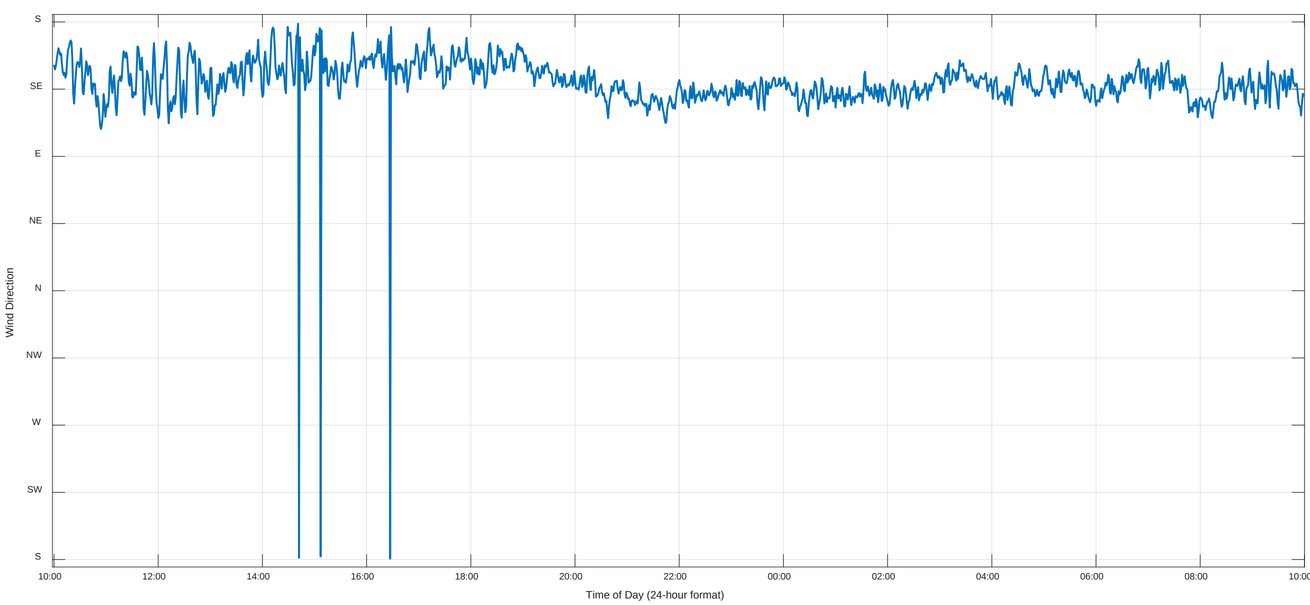
June 06 – 07, 2017 Monitored Temperature



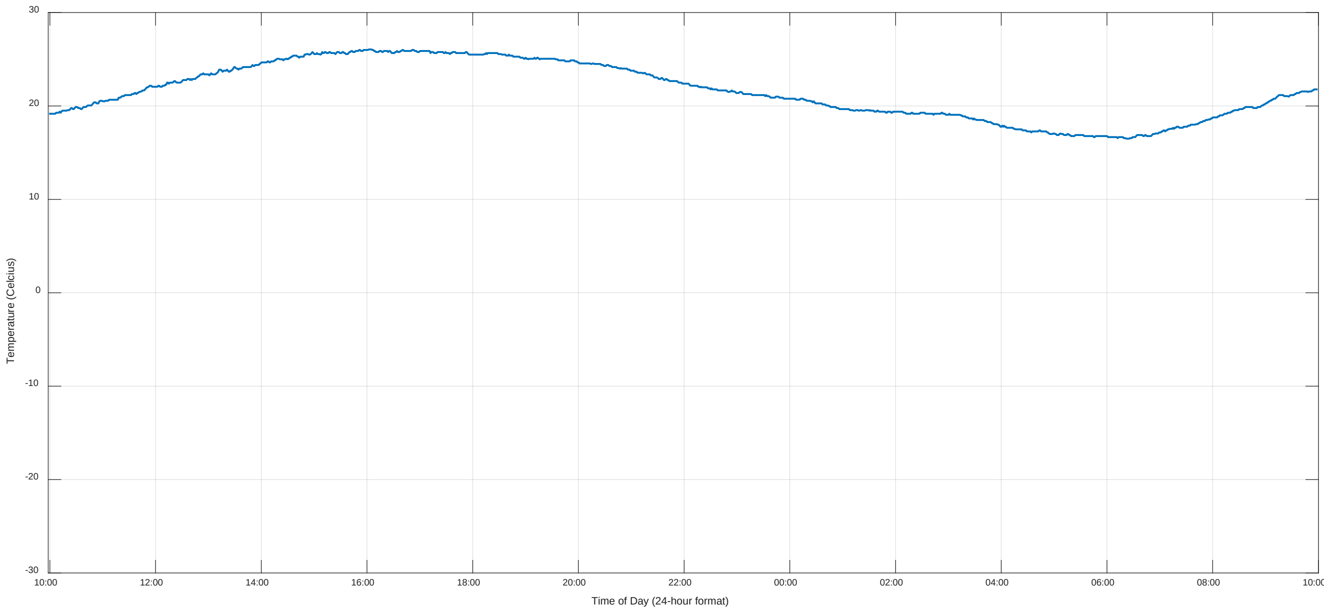
June 06 – 07, 2017 Monitored Relative Humidity



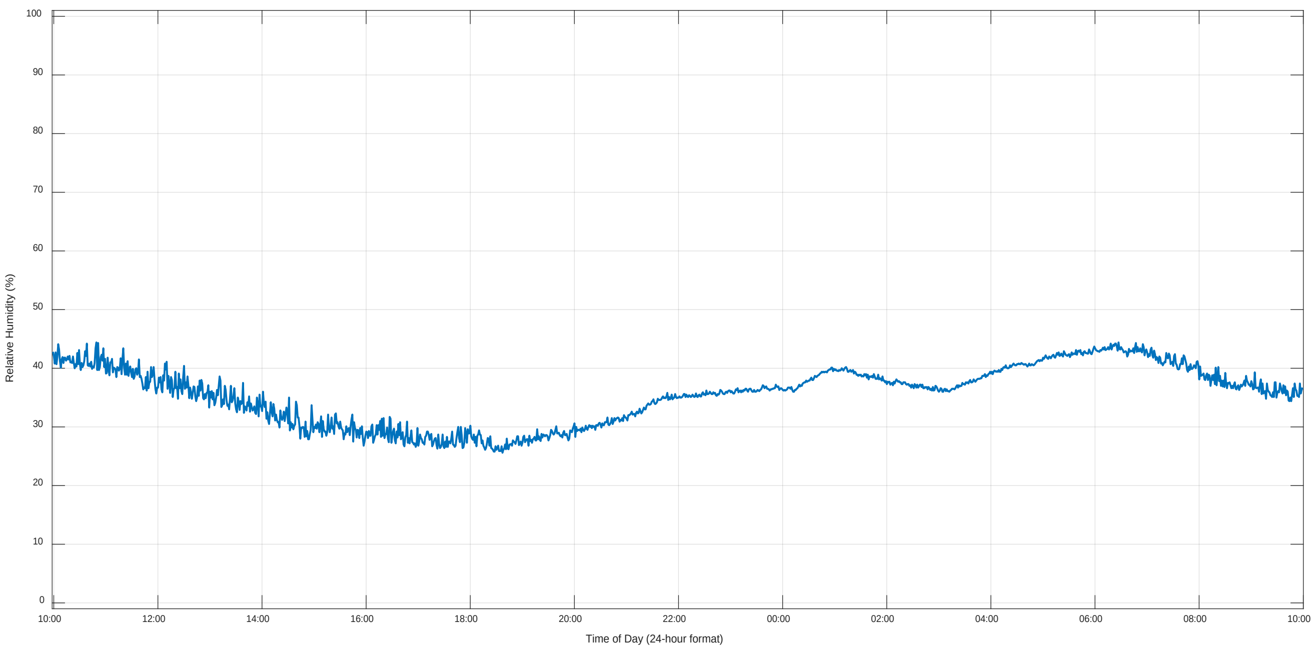
June 07 – 08, 2017 Monitored Wind Speed



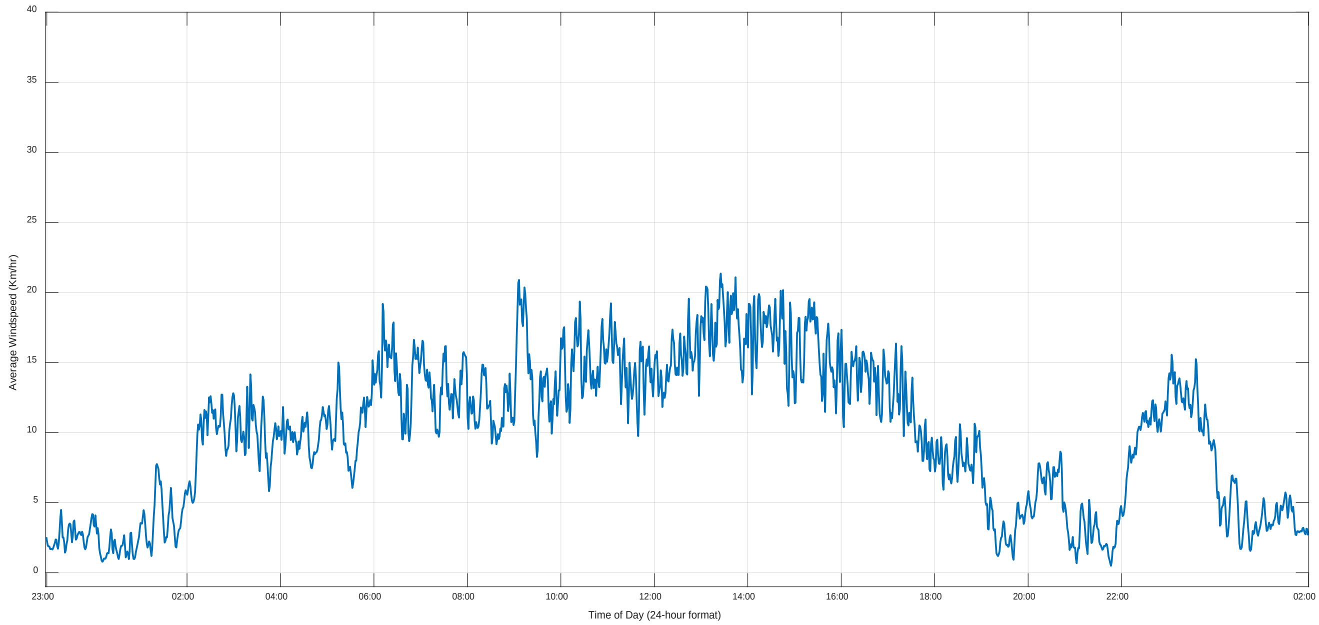
June 07 – 08,2017 Monitored Wind Direction



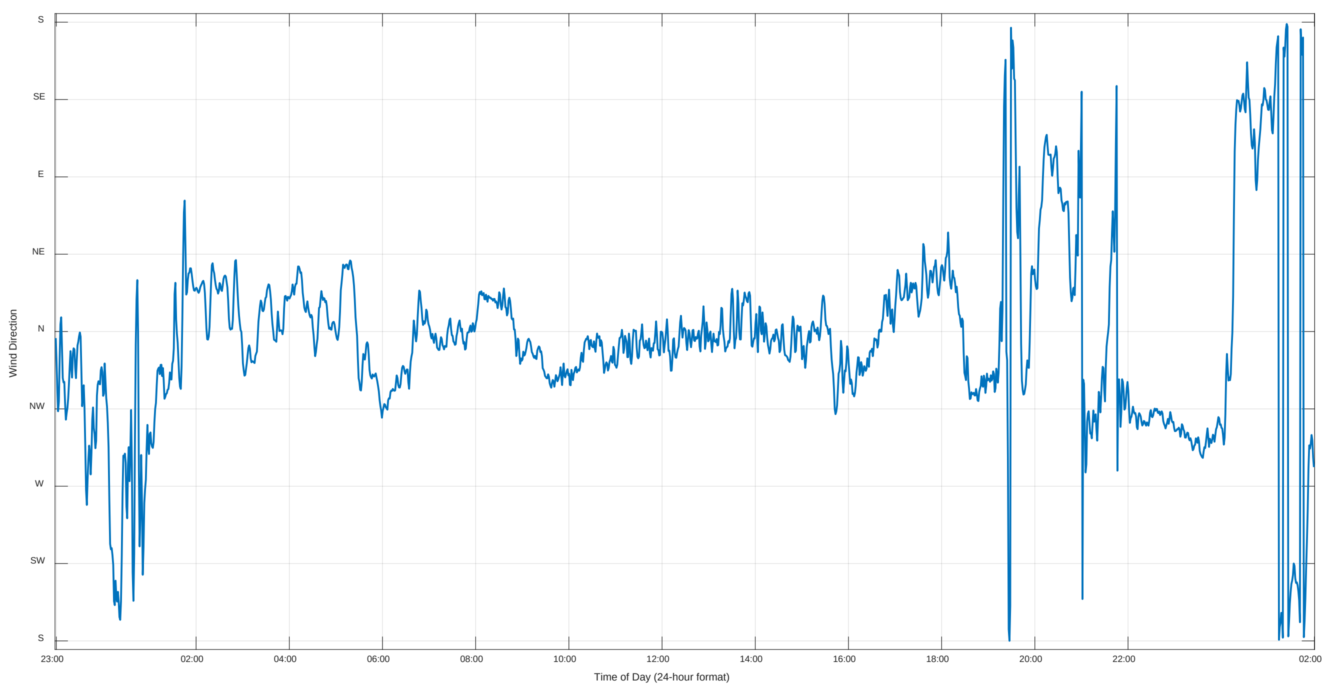
June 07 – 08, 2017 Monitored Temperature



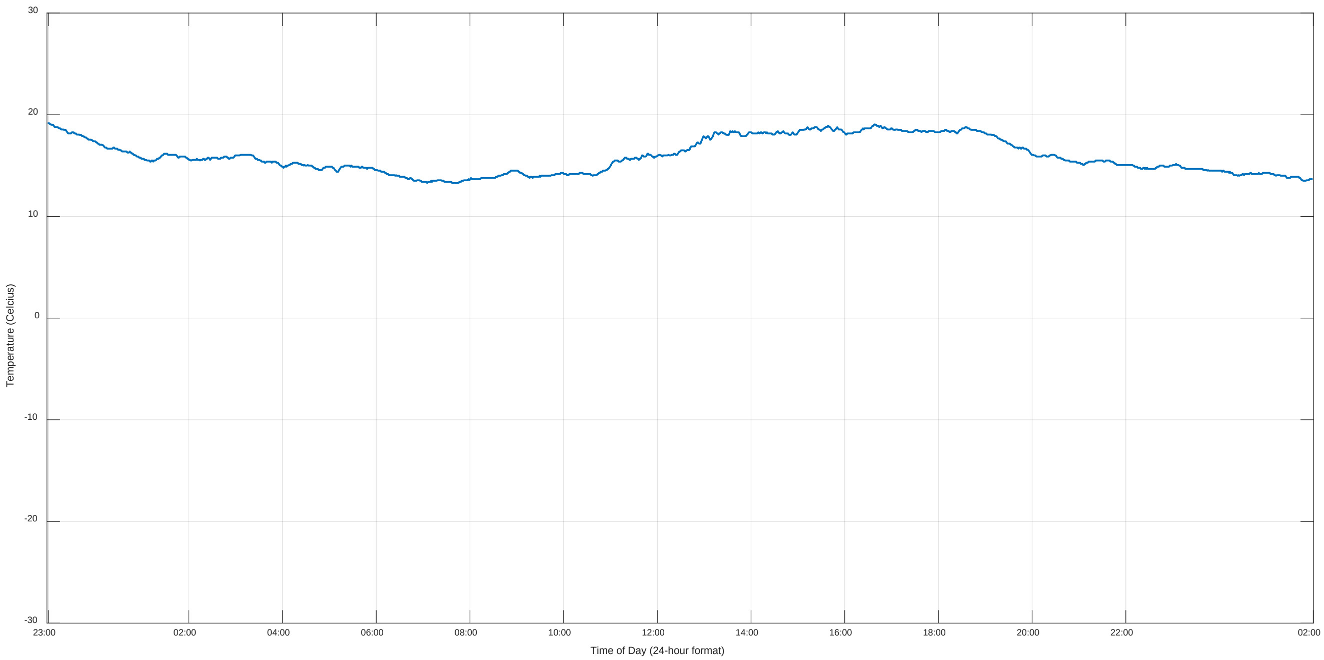
June 07 – 08, 2017 Monitored Relative Humidity



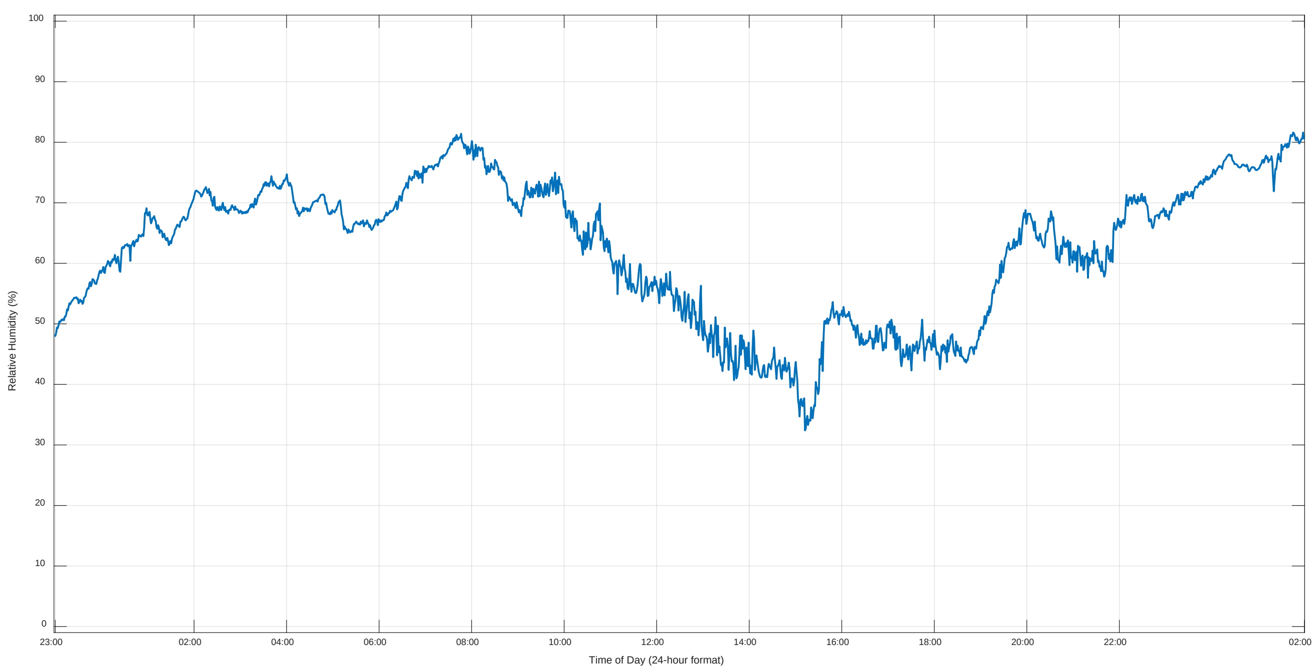
June 12 – 14, 2017 Monitored Wind Speed



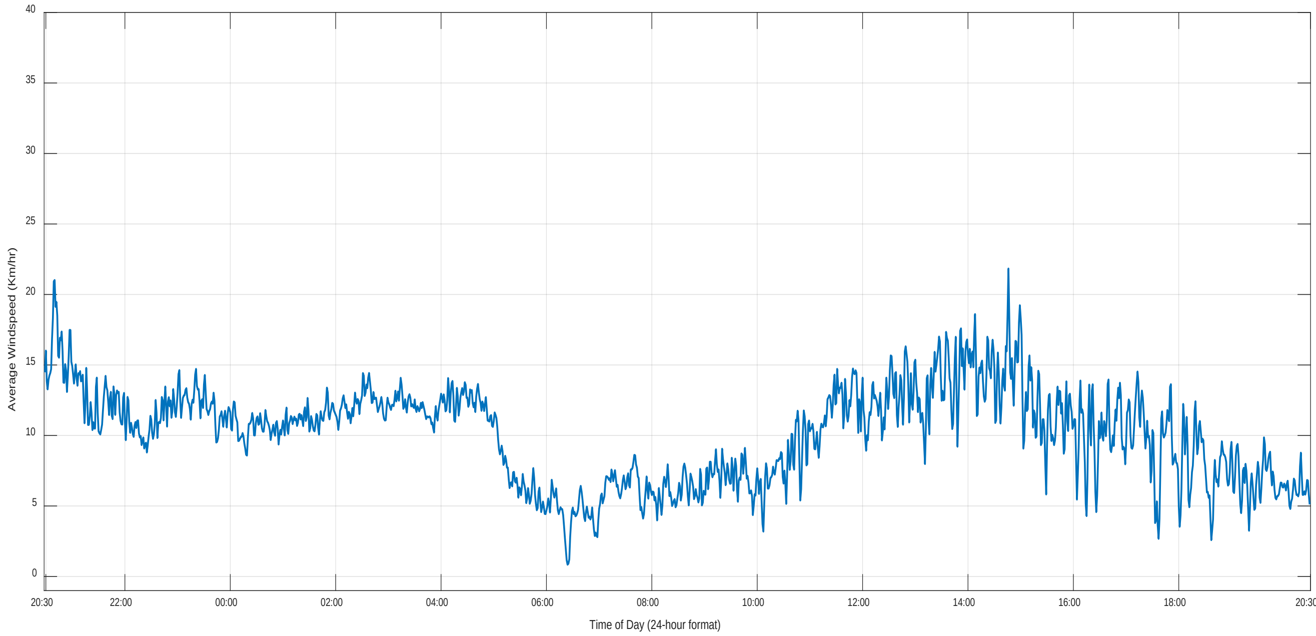
June 12 – 14, 2017 Monitored Wind Direction



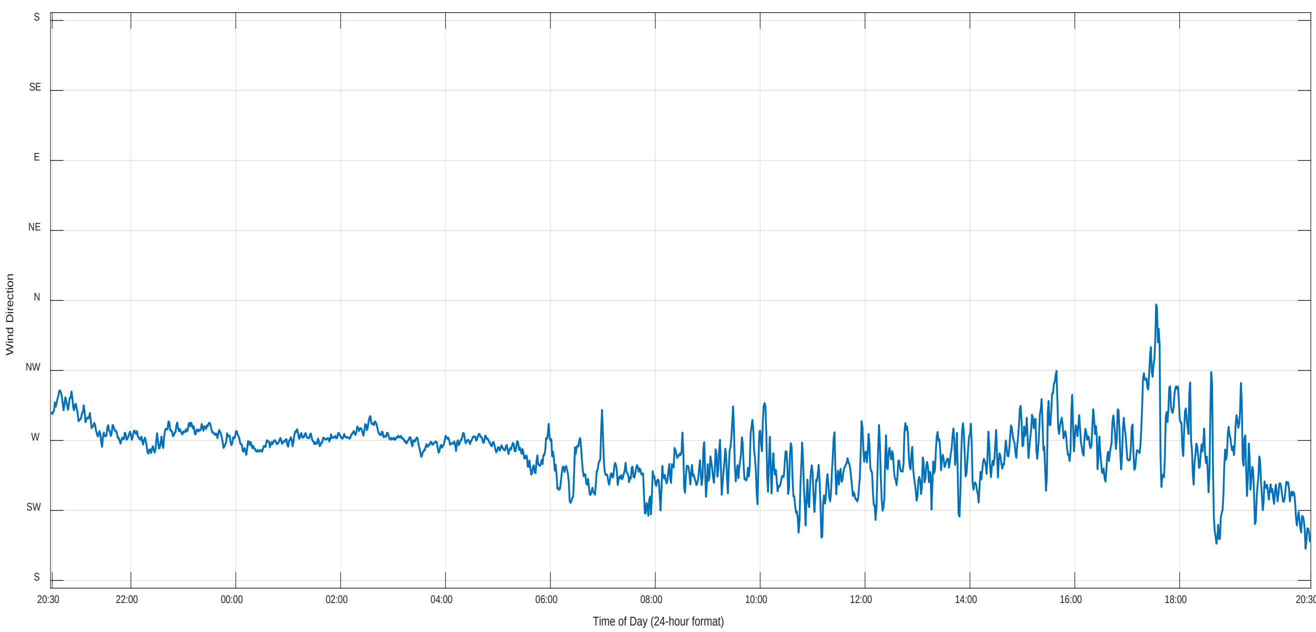
June 12 – 14, 2017 Monitored Temperature



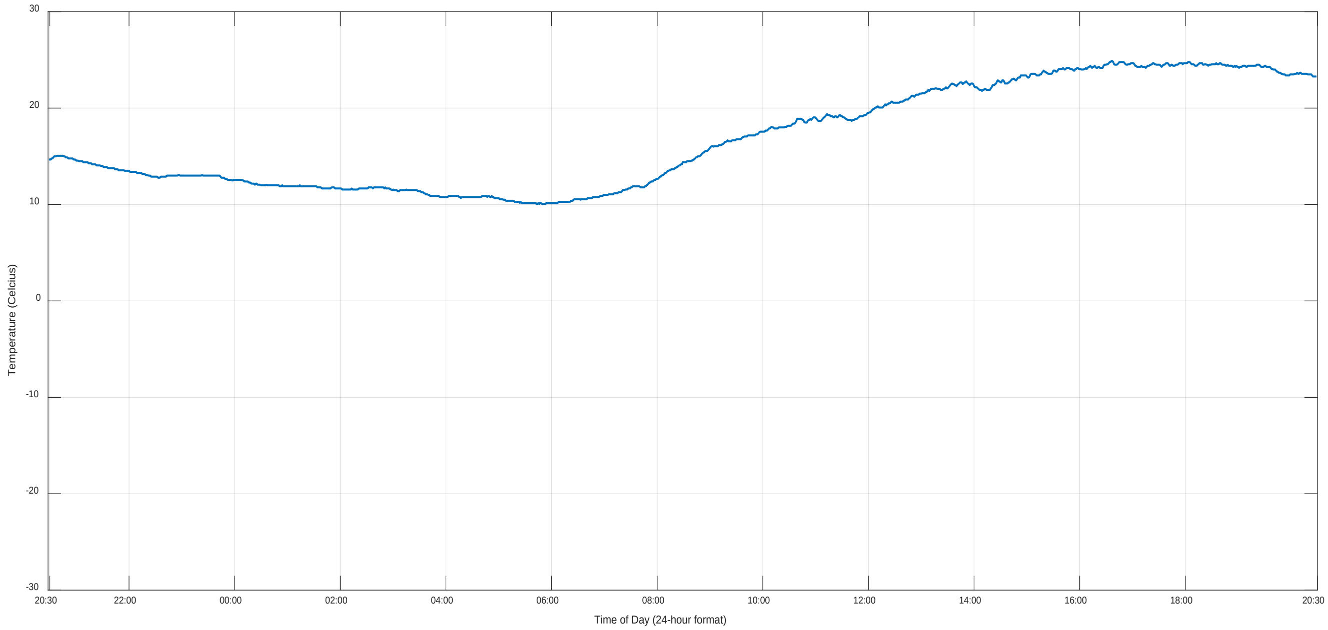
June 12 – 14, 2017 Monitored Relative Humidity



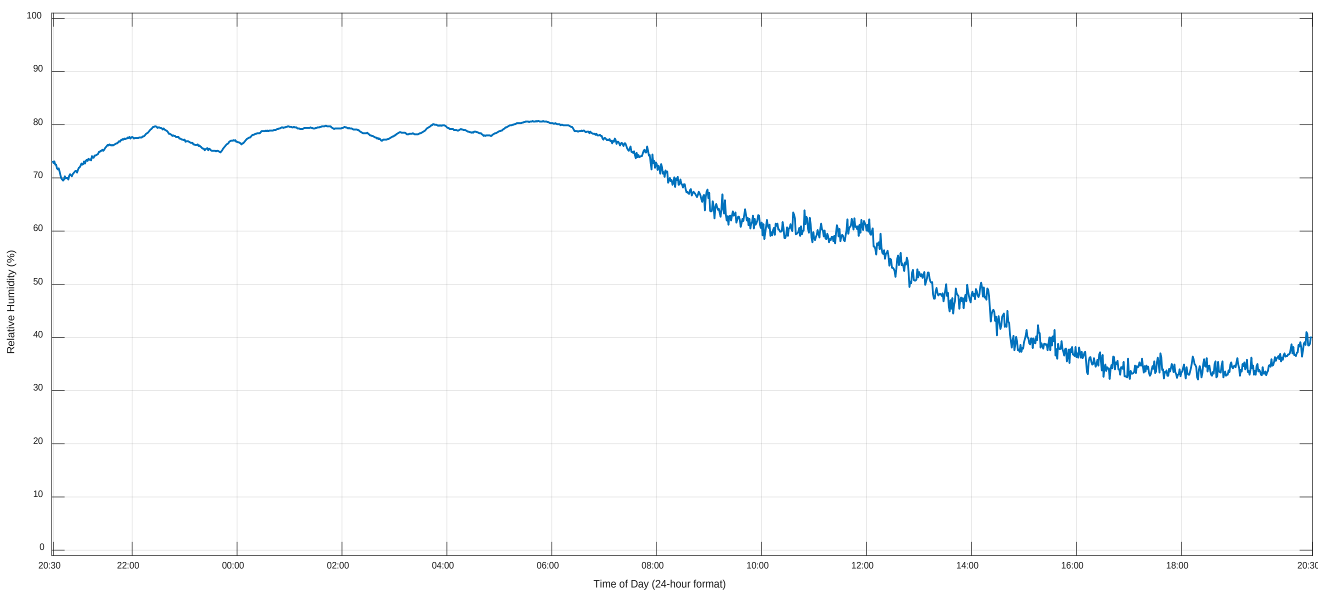
July 24 – 25, 2017 Monitored Wind Speed



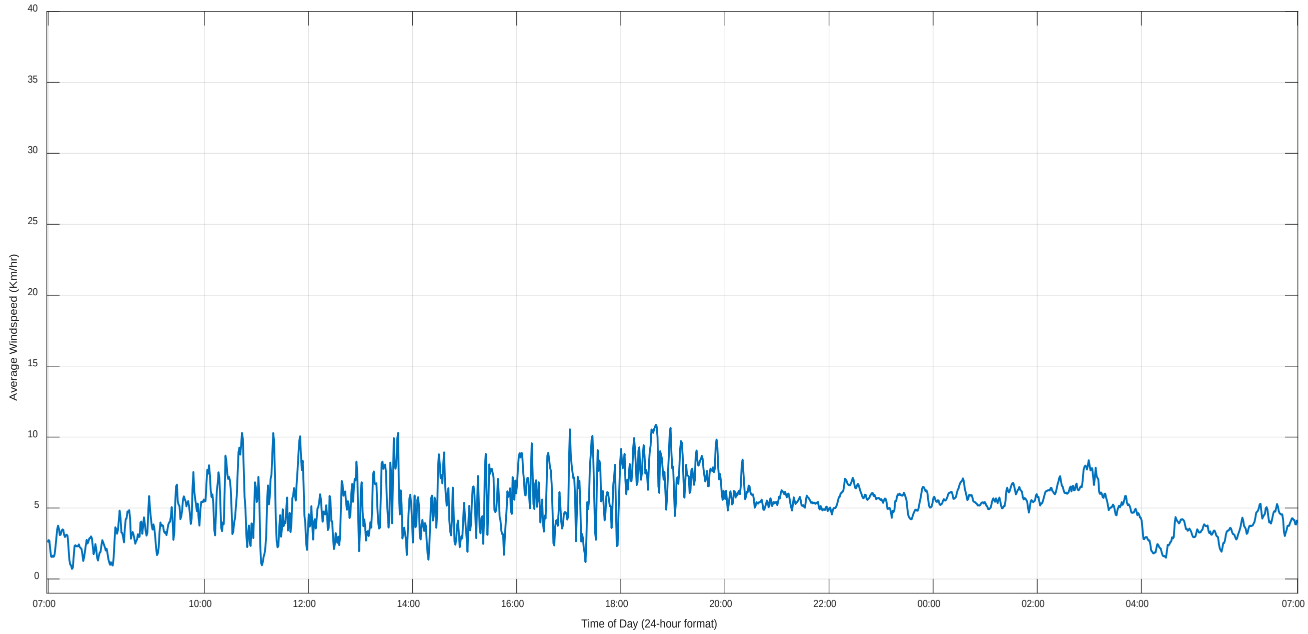
July 24 – 25, 2017 Monitored Wind Direction



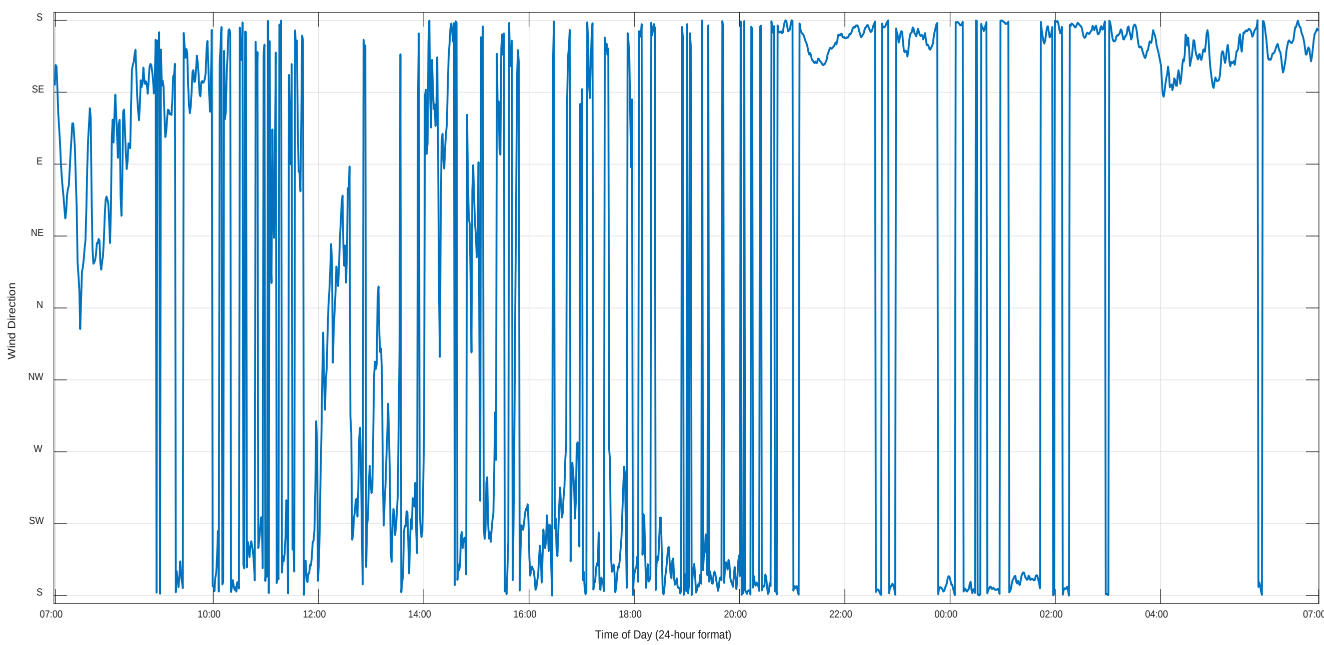
July 24 – 25, 2017 Monitored Temperature



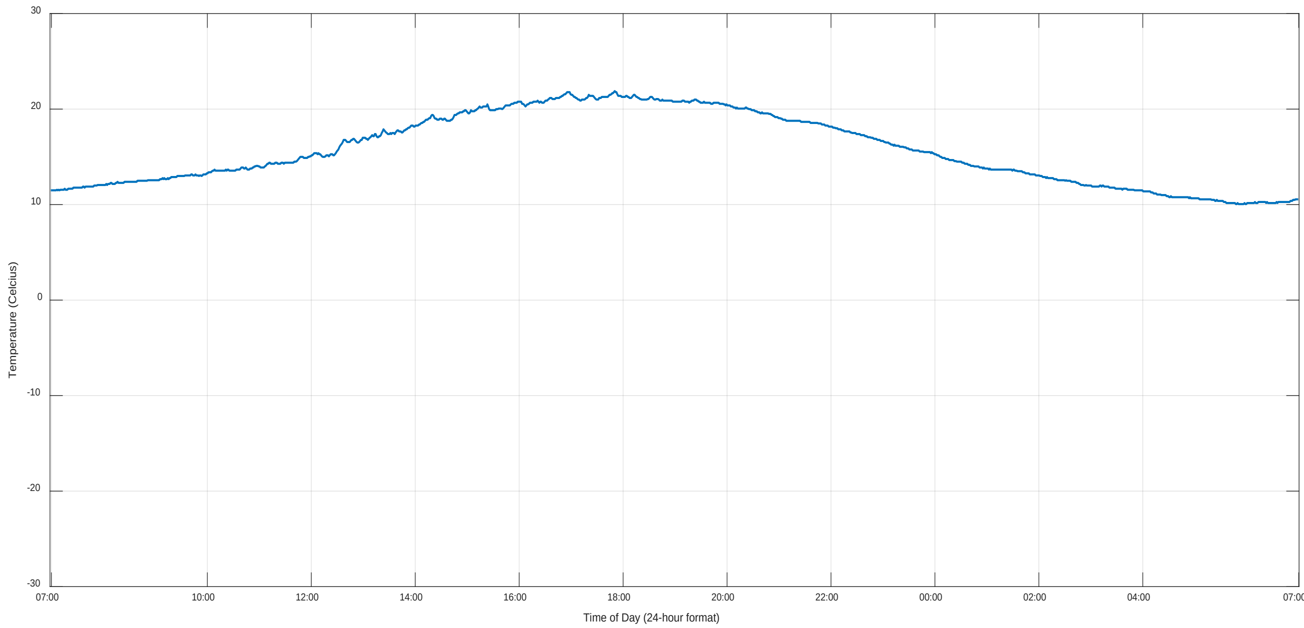
July 24 – 25, 2017 Monitored Relative Humidity



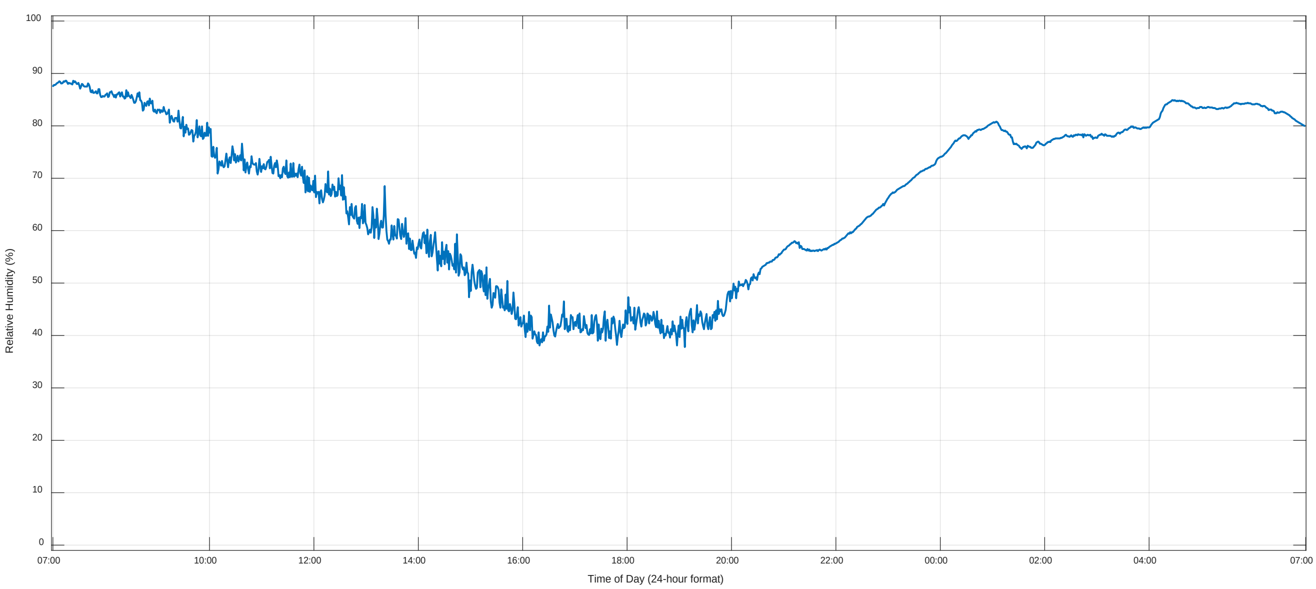
August 08 - 09, 2017 Monitored Wind Speed



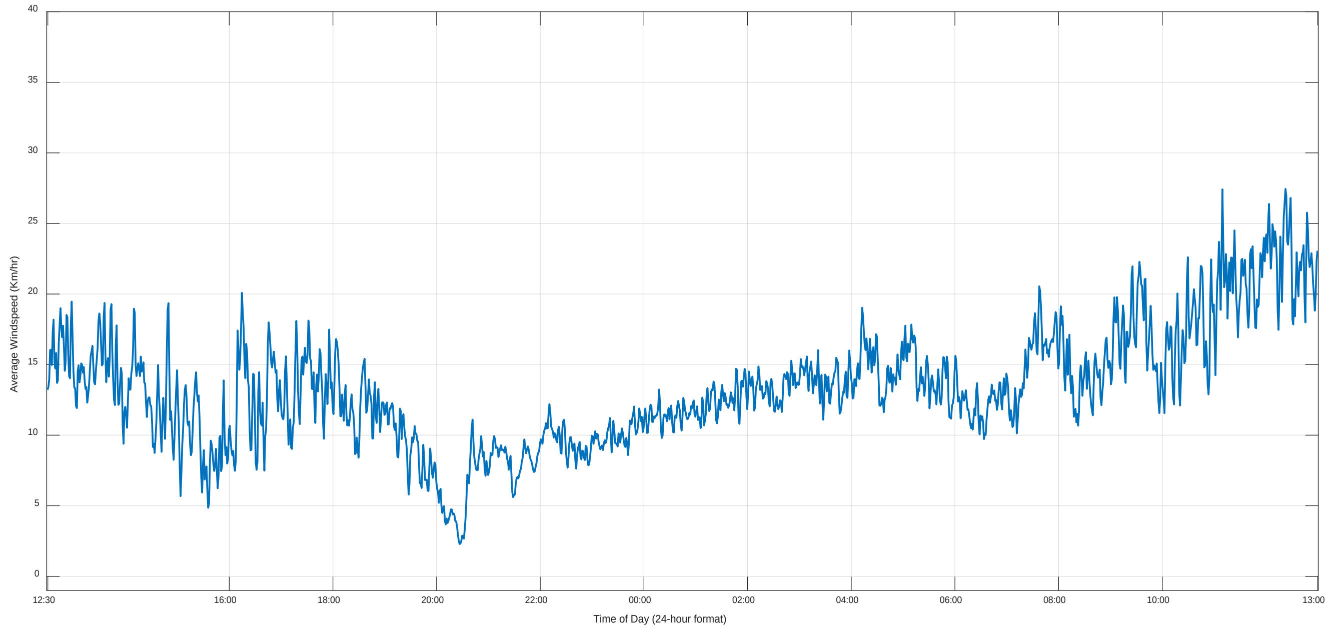
August 08 - 09, 2017 Monitored Wind Direction



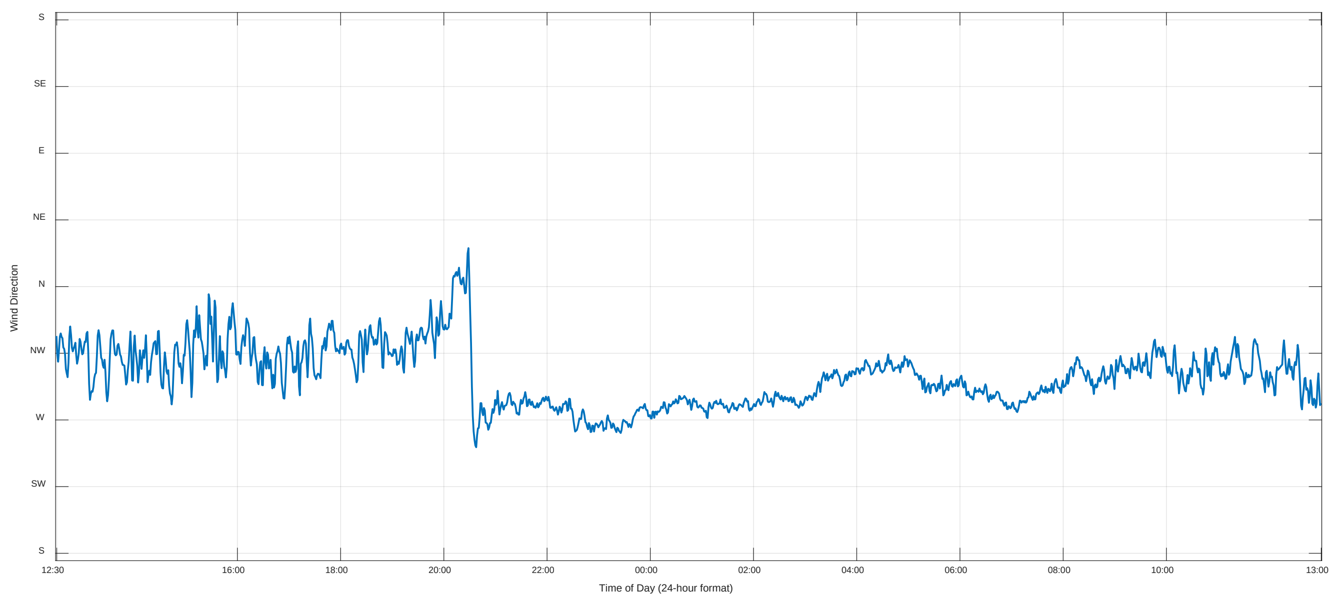
August 08 - 09,, 2017 Monitored Temperature



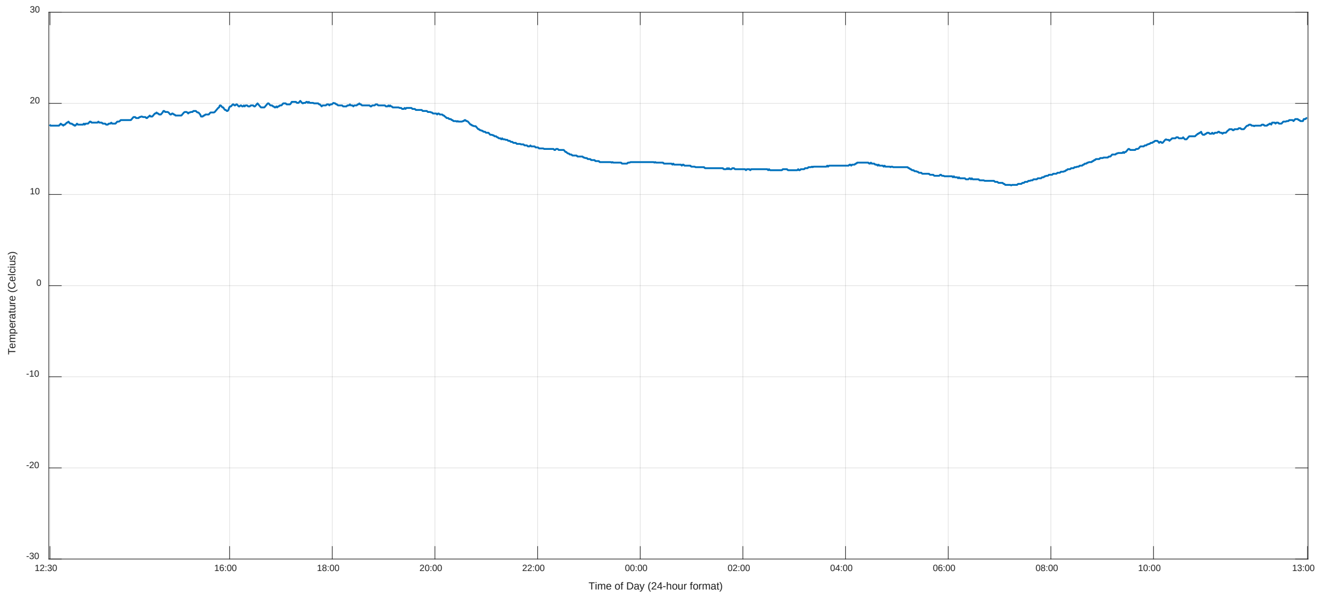
August 08 - 09, 2017 Monitored Relative Humidity



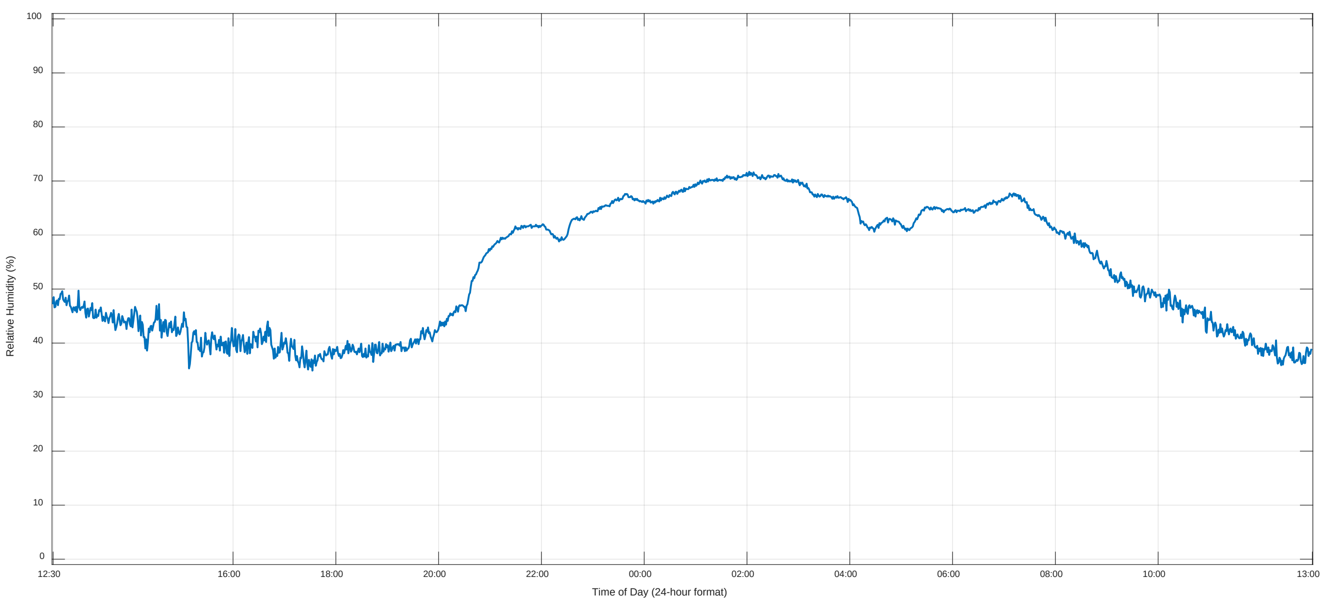
August 14 - 15, 2017 Monitored Wind Speed



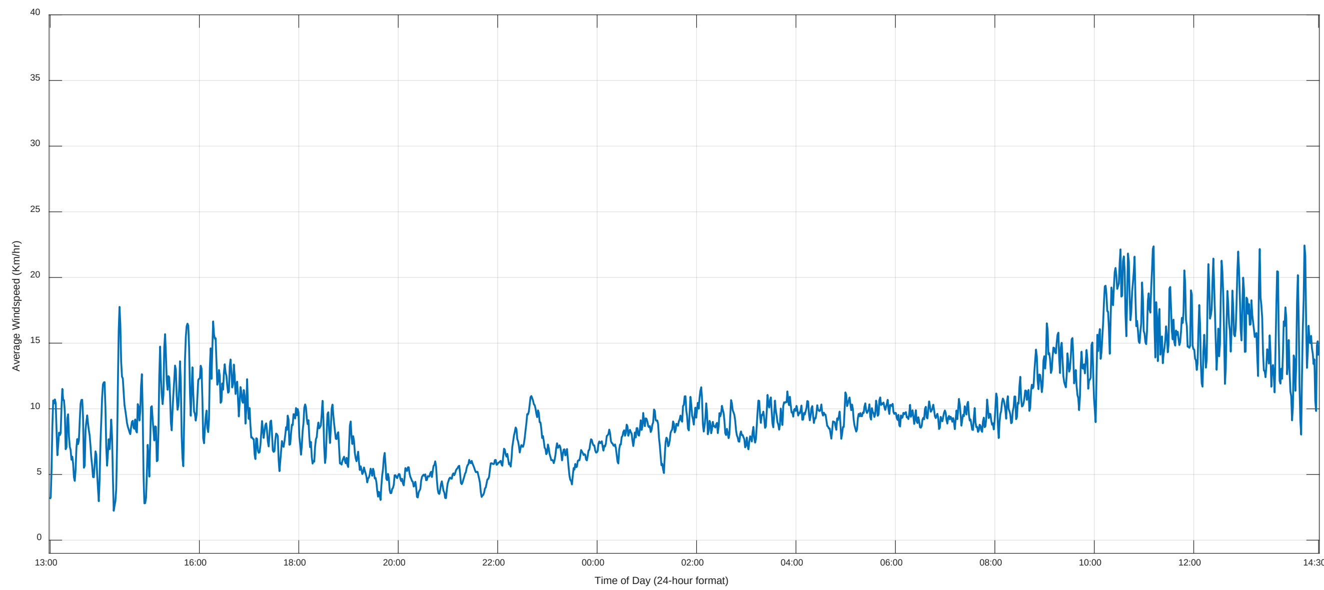
August 14 - 15, 2017 Monitored Wind Direction



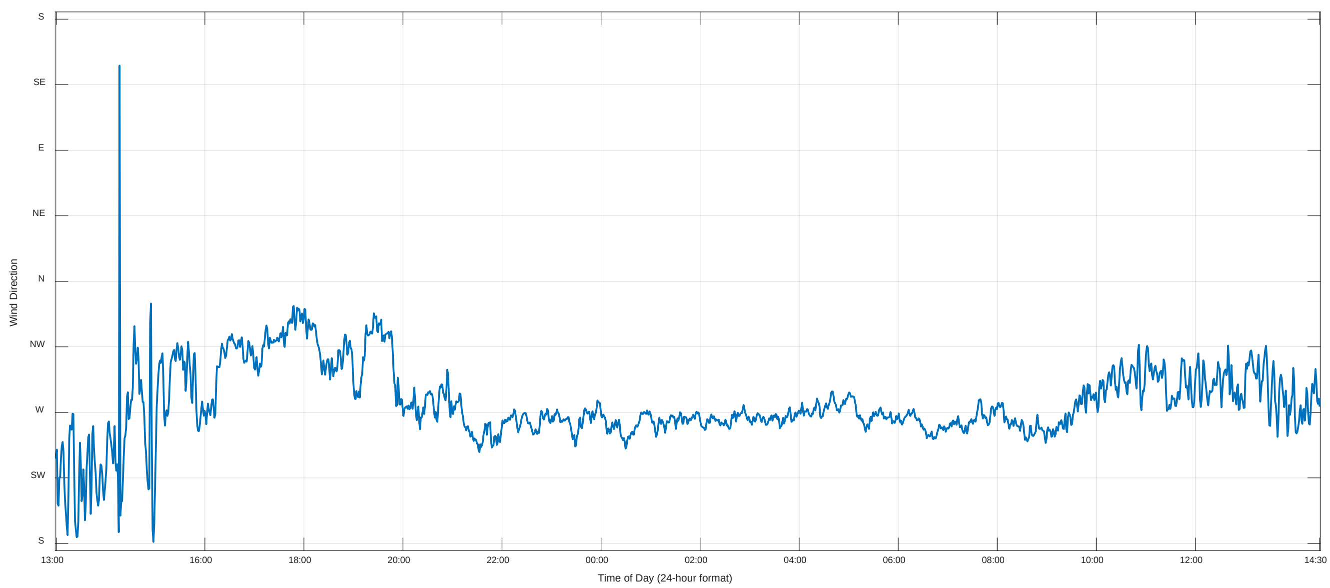
August 14 – 15, 2017 Monitored Temperature



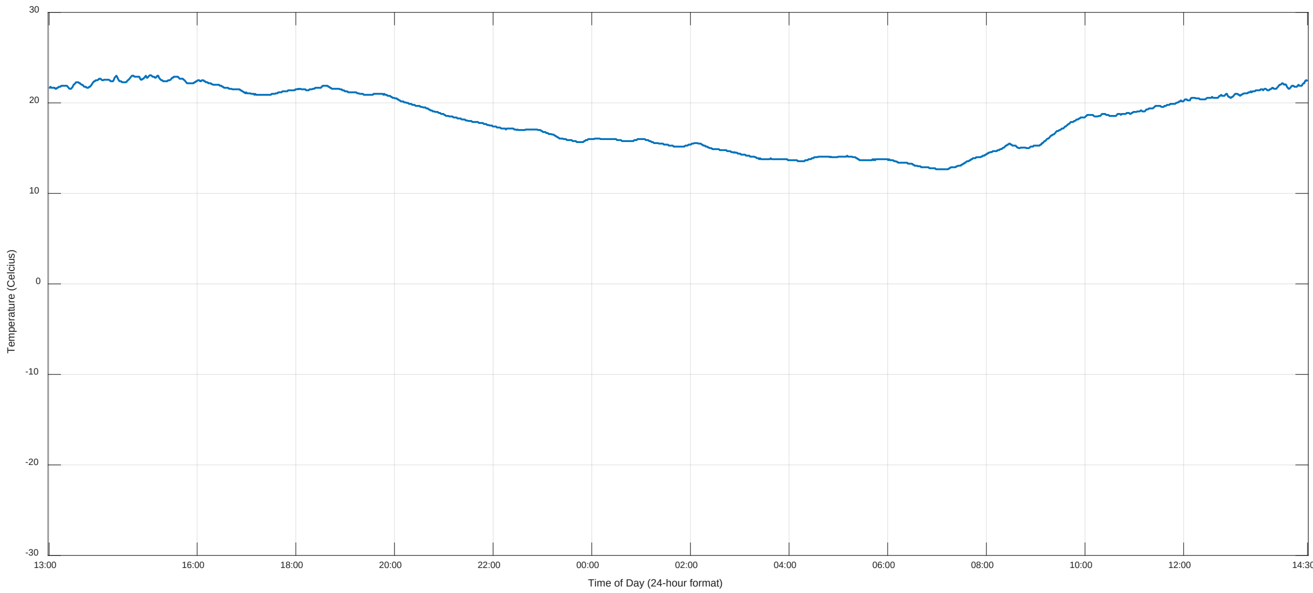
August 14 - 15, 2017 Monitored Relative Humidity



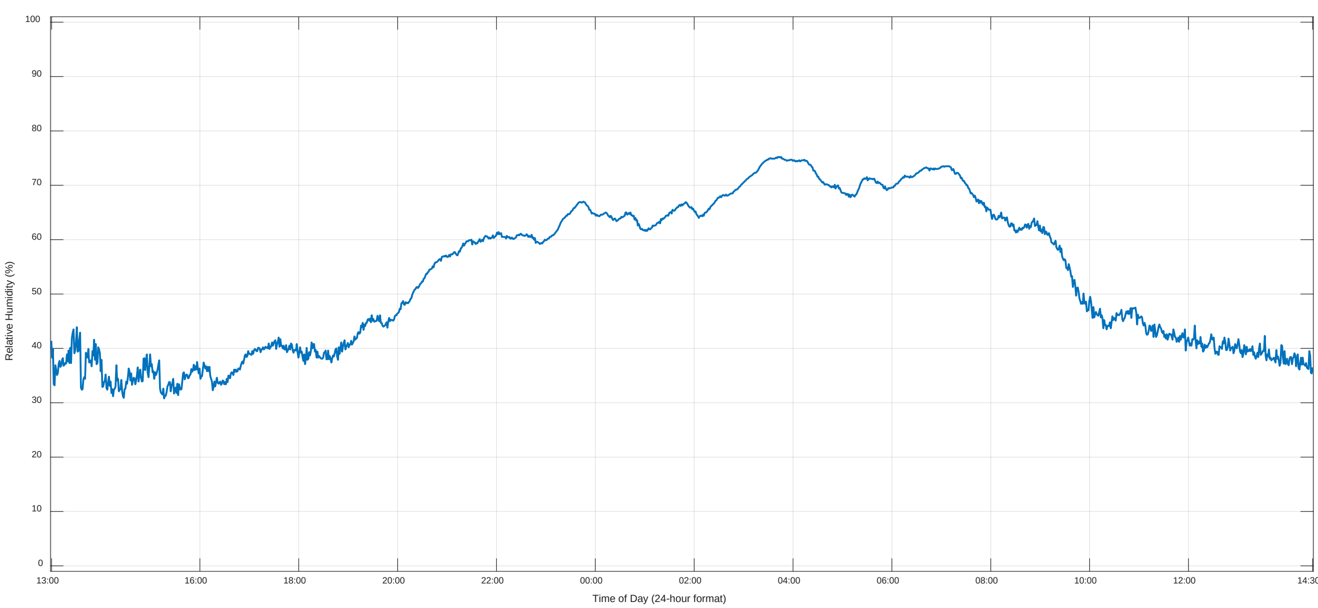
August 16 - 17, 2017 Monitored Wind Speed



August 16 - 17, 2017 Monitored Wind Direction



August 16 - 17, 2017 Monitored Temperature



August 16 - 17, 2017 Monitored Relative Humidity