

**ENVIRONMENTAL NOISE MONITORING AT
REDMILLS FEED MILL SITE,
GOESBRIDGE CO. KILKENNY**

Prepared for:

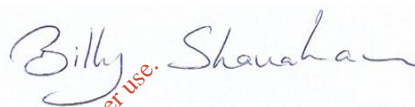
**Redmills Feed Mill,
Goresbridge,
Co. Kilkenny**

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ISSUE/REVISION INDEX

#	Revision			Pages Revised	Remarks
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1. INTRODUCTION

JRE Ltd. (JRE) was commissioned by Redmills Feed Mill (Redmills) to complete an environmental noise assessment at four (4) locations at their facility located Goresbridge, Co. Kilkenny. Environmental noise measurements were recorded at four (4) locations at the site boundary (i.e., measurement locations N1, N2, N3 and N4) to assess noise emission output from the Redmills facility and the potential for impact on the surrounding environment. All environmental noise measurements were completed as part of an Industrial Emissions licence application for the facility.

The Redmills facility (Site) is situated on the edge of Goresbridge Village, Co. Kilkenny. The Site is located in an agricultural area and the nearest potential noise sensitive receptors (i.e., residential houses) are located approximately 30 metres to the east of the site (adjacent to N4), 75 metres to the north west of the site and 120 metres to the south of the site. A description of all noise measurement locations are provided in Table A below.

Table A – Environmental Noise Measurement Locations

Location ID	Location Description
N1	South Western Boundary of the Site
N2	Northern Boundary of the Site beside the Transformer Room
N3	North Eastern Boundary of the Site beside the Pump House
N4	Western Boundary of the Site

All environmental noise measurement locations are identified on Drawing 14/020/01 – 2014 Plan Layout Drawing, attached. This report deals with the findings of the noise survey carried out at the Redmills Site on January 31st and February 1st, 2017. The following should be noted:

- Noise measurement locations are shown on Drawing 14/020/01 and were based on monitoring locations selected by JRE to assess noise emissions from the facility that could impact external noise sensitive receptors.
- All noise levels quoted in relation to specific sources are given in terms of L_{Aeq} , L_{A90} and L_{A10} .
- Attempts were made to carry out measurements during periods when wind speed did not have an adverse impact on the measurements, however, there were gust conditions at times that may have influenced readings.

1.1. Regulatory Framework

The noise survey also included the determination of the contribution of natural (e.g., birds, vegetation, people) and anthropogenic (e.g., facility noise emissions, traffic activities) to the noise climate in the area during the day, evening and night-time periods. The results were assessed against the limits outlined in section 4.3 of the “*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), EPA 2016*”, outlined in Table B below.

Table B – Typical Limit Values for Noise from licensed Sites

Measurement Period	Timeframe	Limit
Daytime	07:00 – 19:00	55dB L _{Ar, T}
Evening	19:00 – 23:00	50 L _{Ar, T}
Night-time	23:00 – 07:00	45 L _{Ar, T}

The environmental noise monitoring was completed with reference to the EPA Guidance document NG4. Noise readings were recorded over daytime, evening time and night-time periods at the selected monitoring locations. The noise monitoring was conducted on the January 31st and February 1st, 2017 in accordance with the ISO 1996: Acoustics- Description and measurement of environmental noise and the EPA Guidance Note – Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). The monitoring survey schedule was completed with reference to NG4 and is outlined in Table C below.

Table C – NG4 Noise Survey Schedule

Period	Minimum Survey Duration
Daytime (07:00 to 19:00hrs) ¹	4-hour survey with a minimum of 3 sampling periods at each noise monitoring location.
Evening (19:00 to 23:00hrs) ¹	2-hour survey with a minimum of 1 sampling period at each noise monitoring location.
Night-time (23:00 to 07:00hrs) ²	3-hour survey with a minimum of 2 sampling periods at each noise monitoring location.

¹ Sampling period is to be the time period T stated within the relevant licence. Typically, this will be either 15 minutes or 30 minutes in duration. This applies to day, evening and night time periods.

² Night-time measurements should normally be made between 23:00hrs and 04:00hrs, Sunday to Thursday, with 23:00hrs being the preferred start time.

1.1.1. Tonal Component

The NG4 guidance document provides for identification and application of penalty for a prominent tonal noise source. The use of the simplified methodology for the objective identification of tones that is advocated in Annex D of ISO 1996-2:2007(E) is required, whereby a prominent, discrete tone can be identified if the time-average sound pressure level in the one-third-octave band of interest exceeds the time-average sound pressure levels of both adjacent one-third-octave bands by a constant level difference. The appropriate level differences vary with frequency and are outlined below. For penalties to be applied noise levels should be greater than or equal to the following values in both adjacent one-third-octave bands:

- 15dB in low-frequency one-third-octave bands (25Hz to 125Hz)
- 8dB in middle-frequency bands (160Hz to 400Hz), and;
- 5dB in high-frequency bands (500Hz to 10,000Hz).

2. SCOPE OF WORK

The scope of work was to determine the noise levels on site (N1, N2 N3 and N4) during typical daytime operations (i.e., between 07.00 and 19.00 hrs), evening time operations (19.00 and 23.00 hrs) and during night-time operations (i.e., between 23:00 and 07:00 hrs). The scope of work included the following:

- Complete a noise monitoring assessment at the four identified noise monitoring locations on the Redmills Site boundary;

The primary measurement parameter used to establish the noise climate in the area was the equivalent continuous A-Weighted Sound Pressure level ($L_{Aeq, T}$) for the duration of the monitoring survey. A statistical analysis of the measurement results was also completed so that the percentile levels, LAN, T, for N = 90% and 10% over the measurement intervals were also recorded. The percentile levels represent the noise level in dB(A) exceeded for N% of the measurement time and outlined below:

- L_{A10} values during daytime and night-time periods to account for and describe intermittent, high-energy noise events such as passing traffic;
- L_{A90} values during daytime and night-time periods that were representative of background noise levels; and
- 1/3rd octave band analysis at each location for the day and night time scenarios

All sources of noise from the Redmills Site and all external noise sources (i.e., noise sources from outside the site operations) were noted and recorded on the field monitoring sheets.

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3. METHODOLOGY

To ensure the quality of noise measurements recorded at the Redmills Site, the following methodology was used for the monitoring programme.

3.1. Equipment Calibration

Environmental noise levels were measured using a Larson Davis SoundExpert LxT precision integrating sound level meter that measured the 'A'-weighted equivalent sound level (L_{Aeq}). The calibration certificate for the meter is provided in Appendix I. The statistical sound level meter also calculated the statistical noise measurement parameters including L_{A90} , L_{A10} as well as L_{Aeq} and also contained an integral frequency filter which is used in 1/3 octave frequency analysis. An explanation of relevant acoustical parameters is provided in Appendix II.

3.2. Sound Level Meter Settings

For all noise measurement recordings, the meter settings were as follows:

- Response : Fast
- Range : 40 – 90 dB
- Weighting : dB (A) – broadband measurements
- dB(Z) – one third octave band measurements

3.3. Noise Measurement Methodology

Measurements were conducted based on procedures outlined in ISO 1996: *Description and Measurement of environmental noise* and, BS4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas*. All measurements were recorded at a distance of 1.2 to 1.5 m above ground level with the sound level meter hand held. All measurements were also recorded at a distance not less than 3.0 m from any reflecting surface, excluding ground surface.

3.3.1. Quiet Area Screening

Before completing the noise monitoring survey, a screening assessment was completed to determine if the site was located in a 'Quiet Area' to ascertain the noise criteria and noise monitoring approach that would be applicable in the area of the site. The screening was conducted as per the EPA document "Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)". The results of the initial screening are provided in Table D below.

Table D: Quiet Area Screening Results

	Yes	No
Is the site >3km away from urban areas with a population >1,000 people?	✓	
Is the site >10km away from urban areas with a population >5,000 people?		✓
Is the site >15km away from urban areas with a population >10,000 people?		✓
Is the site >3km away from any local industry?	✓	
Is the site >10km away from any major industry centre?	✓	
Is the site >5km away from any national primary route		✓
Is the site >7.5km away from any motorway or dual carriageway		✓
QUIET AREA?		✓

Based on the results of the screening assessment, the Site is not located in a “Quiet Area”

3.4. Exclusion of Extraneous Noise Sources

The Redmills site is located in a rural area on the outskirts of Gorsebridge Village. The main consistent background noise measured on site was operations in the Site including traffic related to the site and traffic on the adjacent local road (L7000) (located adjacent to the north of the site). Other noted outside noise sources that may influence noise levels on site were; wind gusts and intermittent rain falling on metal sheeting roofs. Based on the extraneous noise sources at the site it is considered that L_{A90} noise levels may be a better reflection of consistent background noise levels on and in the vicinity of the site.

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4. RESULTS

The results of the noise-monitoring programme completed on January 31st and February 1st, 2016 are presented in the following section. Results for 1/3 frequency analysis are provided in Appendix III.

4.1. Location N1 – Southwest Boundary Close to Grain Intake

The noise measurements at N1 were recorded adjacent to the southwest boundary of the site, opposite Warehouse No. 5 and adjacent to the local road (L7000). The main audible noise noted during the measurement period was related to operations occurring at the main Intake shed, which is located north of N1. The yard where the measurements were recorded is used as a queuing area for delivery lorries waiting to unload. Some wind gusts also contributed to the noise level at N1. The measured noise levels during the survey period at location N1 are presented in Table E, and the 1/3 Octave Frequency results can be seen in Figures 1 and 2.

Table E – Noise Measurement Levels at Location N1 - South Western Boundary of the Site

Monitoring Location	Monitoring Period	Time	L _{Aeq} (dBA)	L _{A10} (dBA)	L _{A90} (dBA)
N1	Daytime	10.45 – 11.15	63.3	63.1	47.8
		11.16 – 11.46	65.8	63.5	50.8
		11.47 - 12.17	63.3	64.8	51.1
	Evening	20.45 – 21.00	49.7	50.2	46.9
	Night time	23.15 – 23.30	45.3	46.4	44.0
		23.32 – 23.47	45.5	45.7	43.7

Figure 1 – 1/3 Octave Day Frequencies at Location N1

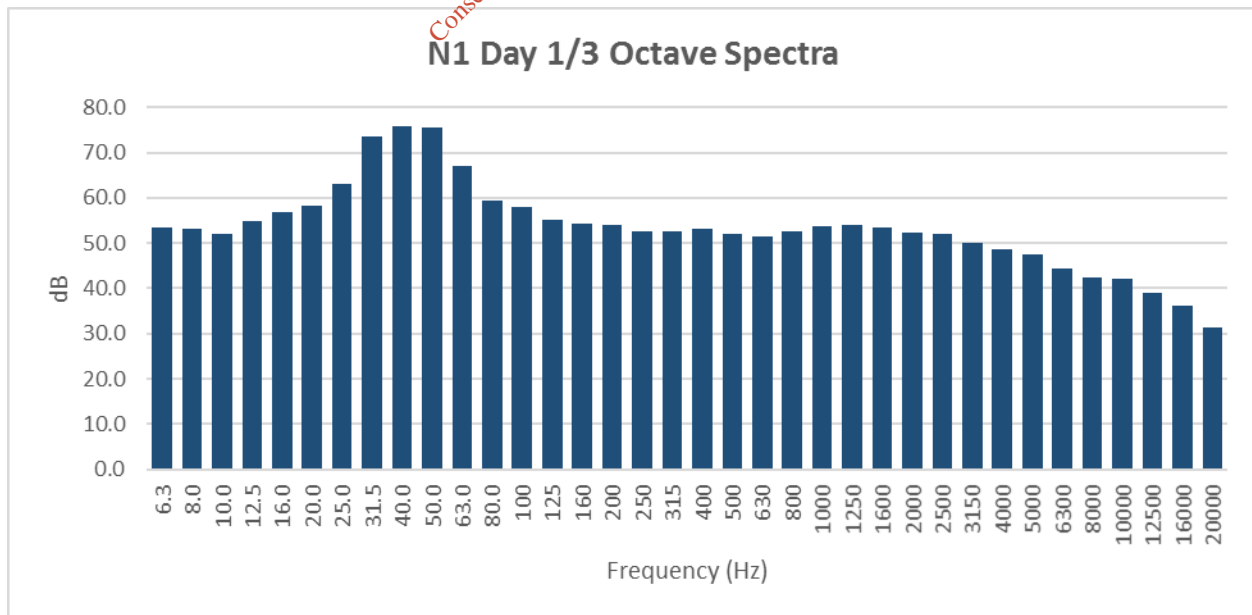
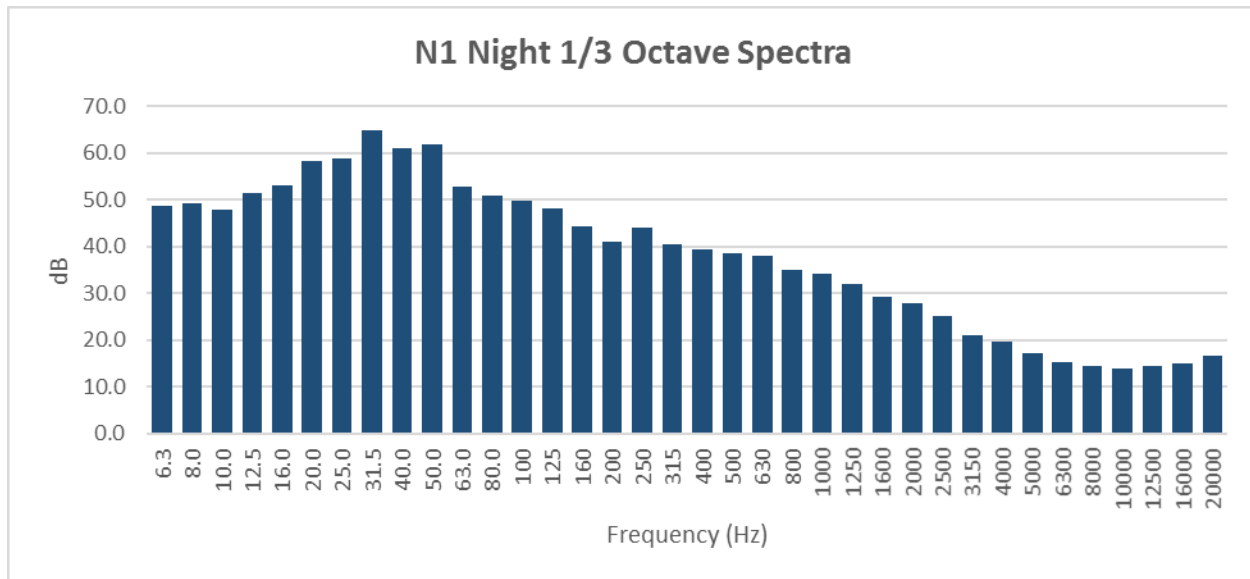


Figure 2 – 1/3 Octave Night Frequencies at Location N1



The noise climate at N1 during day time operations at the Redmills site is dominated by trucks completing grain deliveries. The truck movements resulted in L_{Aeq} readings at the site boundary of between 63.3 dBA and 65.8 dBA. It should be noted that this location is a boundary location and not a noise sensitive receptor, the closest noise sensitive receptor is a further 170 meters further southeast of the site. The L_{A90} readings at N1 during daytime operations were between 47.8 dBA and 51.1 dBA which, when excluding traffic related noise impacts to that location, are less than the 55 dBA limit. The noise levels at N1 reduced considerably during the evening and at night when the deliveries reduced. Evening (49.1 dB L_{Aeq}) and night time (45.5 dB L_{Aeq}) noise levels at N1 were very close to or less than the evening and night time limits set in NG4 guidance.

4.2. Location N2 – Northern Boundary of the Site adjacent to the Transformer Room

The noise measurements at N2 were recorded at the northern boundary of the Site adjacent to the Transformer Room. The main noise source at N2 during daytime monitoring were the forklifts operating in the area of the site, grinders No. 1 and No. 4 and intermittent wind gusts. There was also some limited contribution from vehicles entering and leaving the site at the customer service area to the south of N2, adjacent to the office, shop and laboratory. The monitoring results indicated L_{Aeq} readings at the site boundary of between 53.6 dBA and 60.9 dBA with the highest levels recorded when the grinders were in operation. It should be noted that this location is a boundary location and not a noise sensitive receptor, the closest noise sensitive receptor is a further 75 meters further west of the site. The L_{A90} readings at N2 during daytime operations were between 43.4 dBA and 57.8 dBA with the highest levels recorded when the grinders were operating and the noise level dropping significantly when they were turned off for the second and third daytime monitoring event. During the evening the L_{Aeq} reading was elevated at N2 but when the influence of a forklift operating in the area is discounted the L_{A90} level (38.3 dBA) was less than the NG4 guidance limit of 50 dBA. Night-time monitoring results at N2 (i.e., 42.0 dB L_{Aeq} and 42.9 dB L_{Aeq}) indicated measured noise levels less than the night time NG4

Guideline limit of 45 dB L_{Aeq} . The monitoring results for N2 are presented in Table F and the 1/3 Octave results can be seen in Figures 3 and 4.

Table F - Noise Measurement Levels at Position N2

Monitoring Location	Monitoring Period	Time	L_{Aeq} (dBA)	L_{Amax} (dBA)	L_{A10} (dBA)	L_{A90} (dBA)
N2	Daytime	12.35 – 13.05	60.1	78.7	60.9	57.8
		13.09 – 13.39	60.9	90.7	61.0	43.5
		13.39 – 14.09	53.6	77.7	53.9	43.4
	Evening	21.11 – 21.26	61.9	86.2	57.5	38.3
	Night time	01.02 - 01.17	42.9	68.0	44.5	40.3
		01.17 – 01.32	42.0	67.8	42.7	39.9

Figure 3 – 1/3 Octave Day Frequencies at Location N2

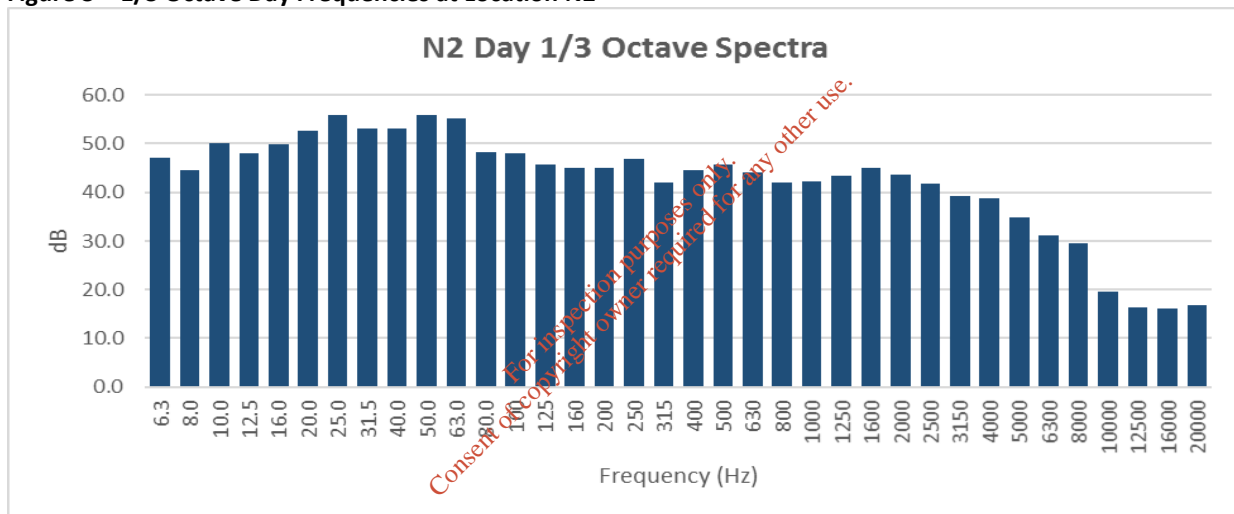
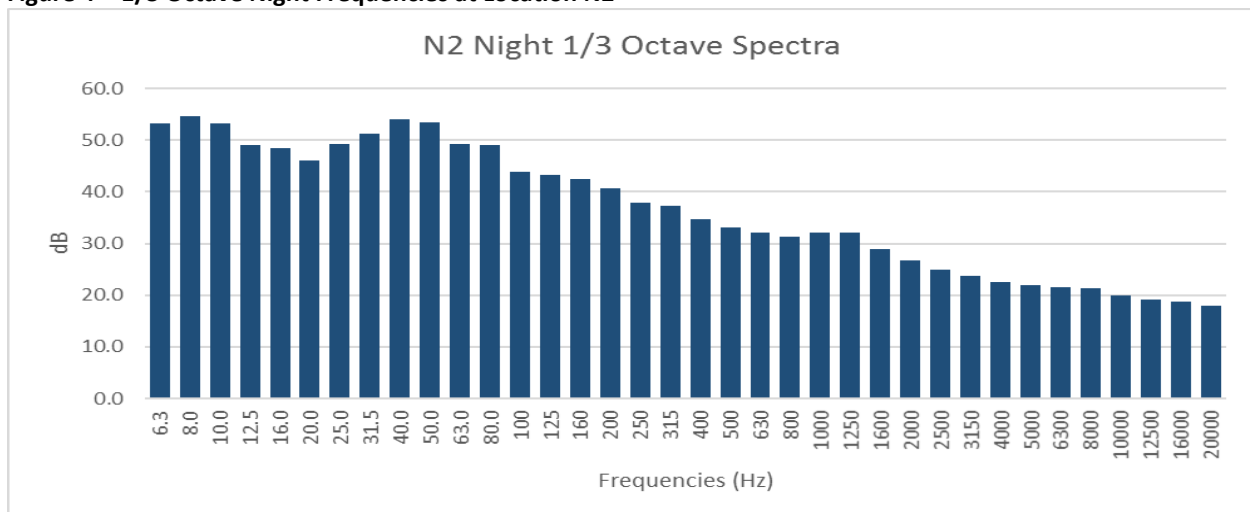


Figure 4 - 1/3 Octave Night Frequencies at Location N2



4.3. Location N3 – North Eastern Boundary of the Site beside the Pump House

The noise measurements at N3 were recorded adjacent to the pump house on the northeastern boundary of the site. The main noise source at N3 was from distant site activities at other areas of the site. There was also some limited contribution from vehicles moving on the adjacent local access road to the west of N3. The monitoring results indicated L_{Aeq} readings at the site boundary of between 45.4 dBA and 52.4 dBA which is below the NG4 Guidance limit. The L_{A90} readings at N3 during daytime operations were between 34.8 dBA and 35.7 dBA. During the evening the L_{Aeq} reading (43.1 dBA) was less than the Guidance limit of 50 dB L_{Aeq} and the night-time monitoring results at N3 (i.e., 45.1 dB L_{Aeq} and 45.6 dB L_{Aeq}) indicated measured noise levels equal to the night time NG4 Guideline limit at the site boundary. The measured noise levels during the survey period at location N3 are presented in Table G and the 1/3 Octave results can be seen in Figure 5 and 6.

Table G - Noise Measurement Levels at Position N3

Monitoring Location	Monitoring Period	Time	L_{Aeq} (dBA)	L_{Amax} (dBA)	L_{A10} (dBA)	L_{A90} (dBA)
N3	Daytime	14.26 – 14.56	48.8	80.9	48.1	35.7
		14.58 – 15.28	52.4	75.4	50.2	35.1
		15.30 – 16.00	45.4	78.3	49.9	34.8
	Evening	21.30 – 21.45	43.1	71.4	45.8	31.8
	Night time	23.50 – 00.05	45.1	64.1	47.6	38.4
		00.07 – 00.22	45.6	61.8	47.7	38.2

Figure 5 – 1/3 Octave Day Frequencies at Location N3

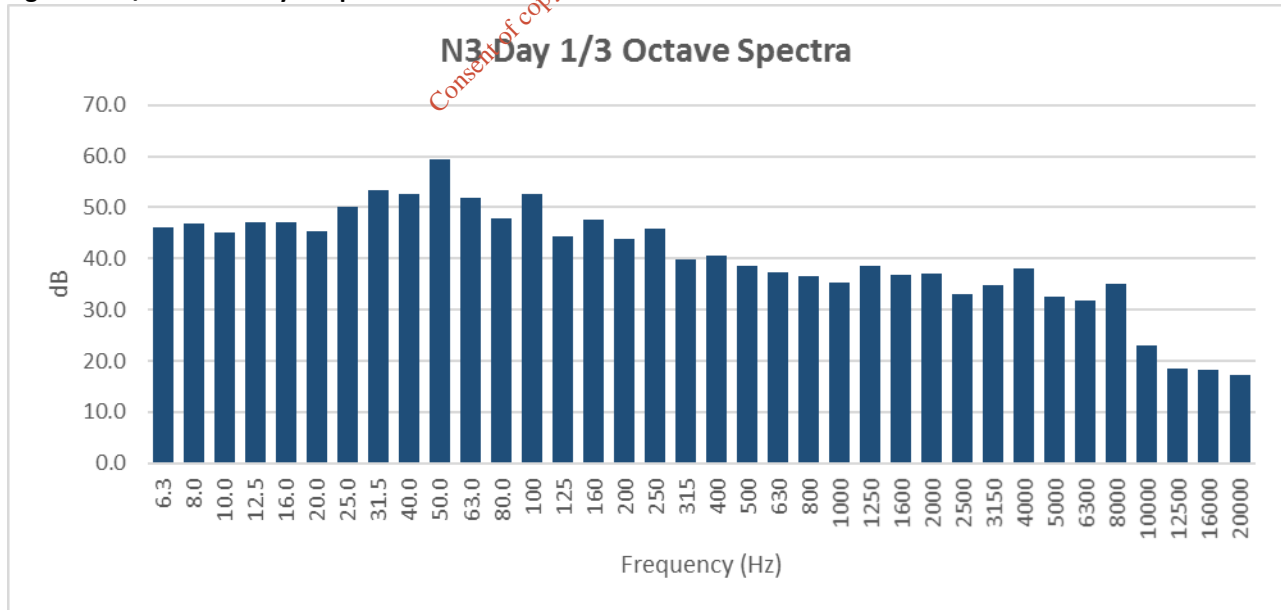
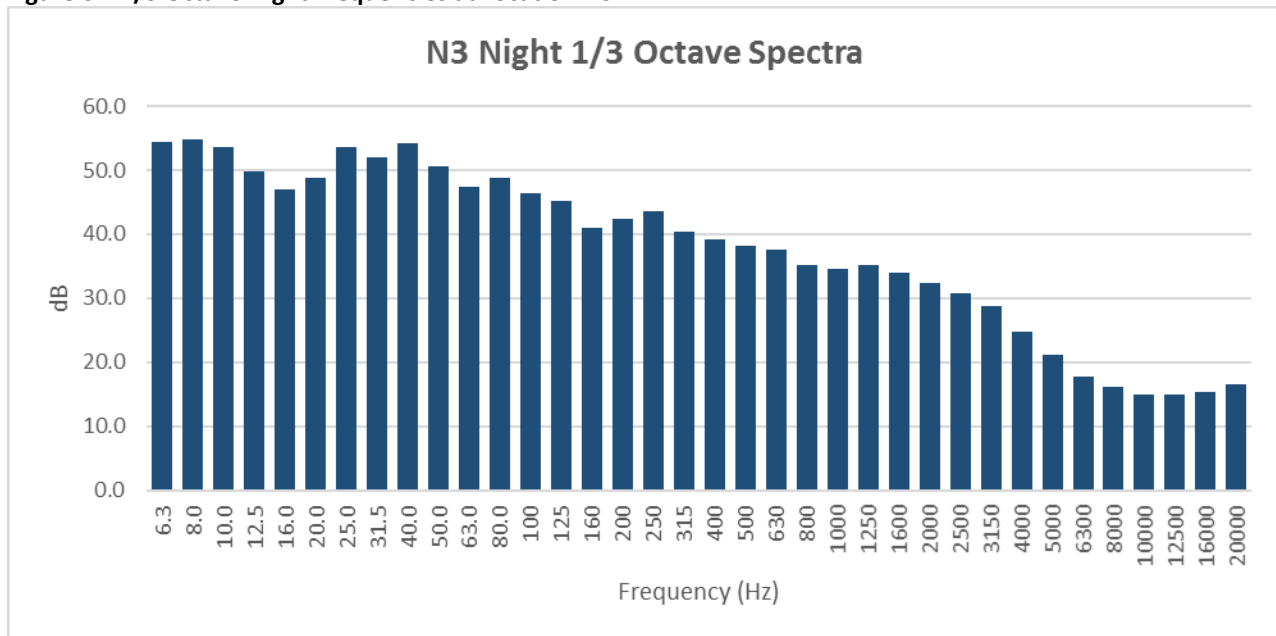


Figure 6 – 1/3 Octave Night Frequencies at Location N3



4.4. Location N4 - Eastern Boundary of the Site

The noise measurements at N4 were recorded adjacent to the eastern boundary of the site and at the boundary with a residential property. The main noise source at N4 was from site activities in the main site facility approximately 150 metres to the east of the measurement location. There was also some limited contribution from vehicles moving on the adjacent L7000 road. The monitoring results indicated L_{Aeq} readings at the site boundary of between 48.7 dBA and 58.3 dBA. The elevated reading of 58.4 dB L_{Aeq} was mainly due to a truck turning in the vicinity of the meter during the measurement. The L_{A90} readings at N4 during daytime operations were between 42.0 dBA and 42.9 dBA. During the evening the L_{Aeq} reading (47.6 dBA) was less than the Guidance limit of 50 dB L_{Aeq} and the night-time monitoring results at N3 (i.e., 45.6 dB L_{Aeq} and 46.1 dB L_{Aeq}) indicated measured noise levels very close to the night time NG4 Guideline limit with L_{A90} measurements less than 44 dBA indicating no persistent noise impact at N4 from the site operations. The measured noise levels during the survey period at location N4 are presented in Table H and the 1/3 Octave results can be seen in Figure 7 and 8.

Table H - Noise Measurement Levels at Position N4

Monitoring Location	Monitoring Period	Time	L_{Aeq} (dBA)	L_{Amax} (dBA)	L_{A10} (dBA)	L_{A90} (dBA)
N4	Daytime	16.05 – 16.35	48.9	79.4	51.0	42.4
		16.36 – 17.06	58.3	86.0	56.5	42.9
		17.06 – 17.36	48.7	68.2	51.3	42.0
	Evening	21.49 – 22.04	47.6	73.0	48.3	45.4
	Night time	00.28 – 00.43	45.6	69.8	46.7	43.2
		00.44 – 00.59	46.3	68.8	47.9	43.5

Figure 7 – 1/3 Octave Day Frequencies at Location N4

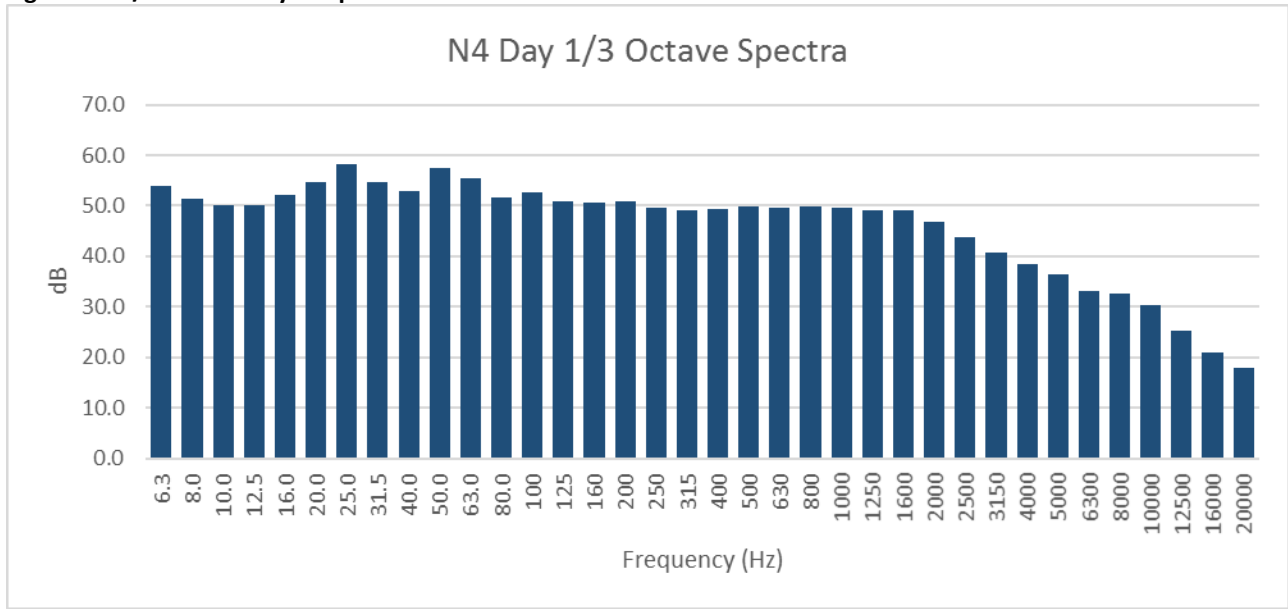
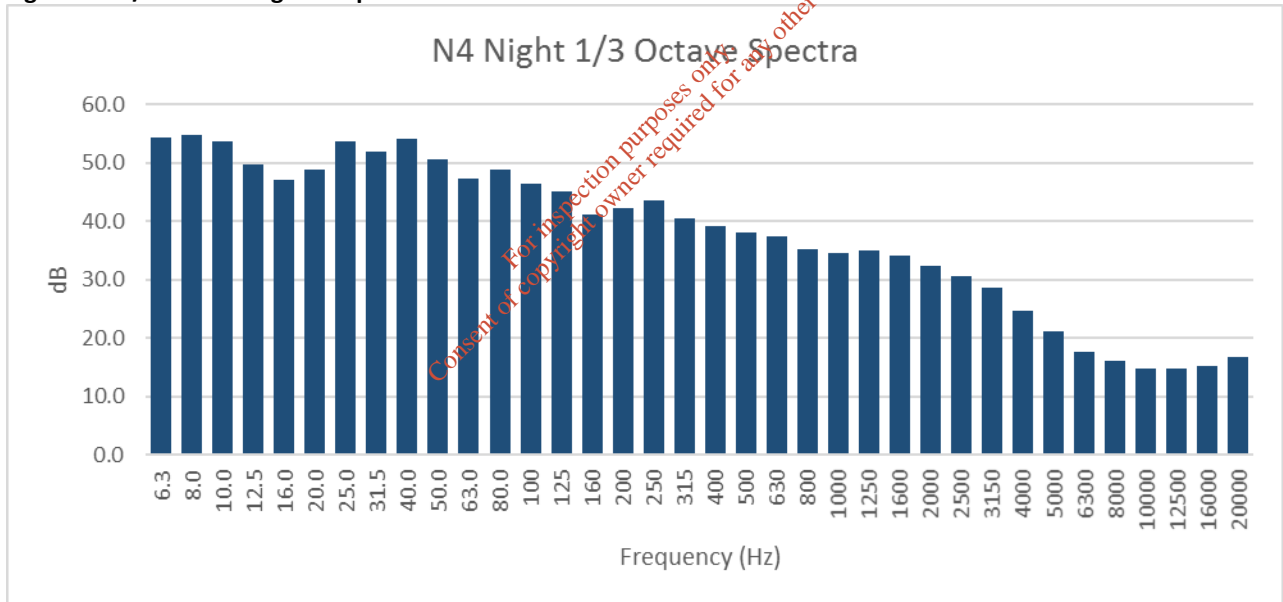


Figure 8 – 1/3 Octave Night Frequencies at Location N4



5. CONCLUSIONS

Based on the results of the noise monitoring programme completed at the Redmills Site, JRE found the following:

- The noise climate at N1 during day time operations at the Redmills site is dominated by trucks completing grain deliveries. The truck movements resulted in L_{Aeq} readings at the site boundary of between 63.3 dBA and 65.8 dBA. It should be noted that this location is a boundary location and not a noise sensitive receptor, the closest noise sensitive receptor is a further 170 meters further southeast of the site. The L_{A90} readings at N1 during daytime operations were between 47.8 dBA and 51.1 dBA which, when excluding traffic related noise impacts at that location, are less than the 55 dBA limit.

The noise levels at N1 reduced considerably during the evening and at night when the number of deliveries reduced. Evening (49.1 dB L_{Aeq}) and night time (45.5 dB L_{Aeq}) noise levels at N1 were very close to or less than the evening and night time limits set in NG4 guidance indicating no impact from site activities on N1.

- The main noise source at N2 during daytime monitoring were the forklifts operating in the area of the site, grinders No. 1 and No. 4 and intermittent wind gusts. There was also some limited contribution from vehicles entering and leaving the site at the customer service area to the south of N2, adjacent to the office, shop and laboratory. The monitoring results indicated L_{Aeq} readings at the site boundary of between 53.6 dBA and 60.9 dBA with the highest levels recorded when the grinders were in operation. It should be noted that this location is a boundary location and not a noise sensitive receptor, the closest noise sensitive receptor is a further 75 meters further west of the site. The L_{A90} readings at N2 during daytime operations were between 43.4 dBA and 57.8 dBA with the highest levels recorded when the grinders were operating and the noise level dropping significantly when they were turned off for the second and third daytime monitoring event.

During the evening the L_{Aeq} reading was elevated at N2 but when the influence of a forklift operating in the area is discounted the L_{A90} level (38.3 dBA) was significantly less than the NG4 guidance limit of 50 dBA. Night-time monitoring results at N2 (i.e., 42.0 dB L_{Aeq} and 42.9 dB L_{Aeq}) indicated measured noise levels less than the night time NG4 Guidance limit.

- The main noise source at N3 during daytime readings was from distant site activities at other areas of the site. There was also some limited contribution from vehicles moving on the adjacent local access road to the west of N3. The monitoring results indicated L_{Aeq} readings at the site boundary of between 45.4 dBA and 52.4 dBA which is below the NG4 Guidance limit. The L_{A90} readings at N3 during daytime operations were between 34.8 dBA and 35.7 dBA.

During the evening the L_{Aeq} reading (43.1 dBA) was less than the Guidance limit of 50 dB L_{Aeq} and the night-time monitoring results at N3 (i.e., 45.1 dB L_{Aeq} and 45.6 dB L_{Aeq}) indicated measured noise levels equal to the night time NG4 Guideline limit at N3.

- The noise measurements at N4 were recorded adjacent to the eastern boundary of the site and at the boundary with a residential property. The main noise source at N4 was from site activities in the main site facility approximately 150 metres to the east of the measurement location. There was also some limited contribution from vehicles moving on the adjacent L7000 road. The monitoring results indicated L_{Aeq} readings at the site boundary of between 48.7 dBA and 58.3 dBA. The elevated reading of 58.4 dB L_{Aeq} was mainly due to a truck turning in the vicinity of the meter during the measurement. The L_{A90} readings at N4 during daytime operations were between 42.0 dBA and 42.9 dBA.

During the evening the L_{Aeq} reading (47.6 dBA) was less than the Guidance limit of 50 dB L_{Aeq} and the night-time monitoring results at N3 (i.e., 45.6 dB L_{Aeq} and 46.1 dB L_{Aeq}) indicated measured noise levels very close to the night time NG4 Guideline limit with L_{A90} measurements less than 44 dBA indicating no persistent noise impact at N4 from the site operations.

5.1 Frequency Analysis

Frequency analysis was carried out at each monitoring location to assess the spectrum of noise levels with respect to the frequencies (Hz) at which they occurred and to assess any tonal output from the facility. A one-third octave frequency analysis was completed at each location during daytime, evening and night-time measurement events which included the calculation of an average noise level to represent the frequencies within each third of an octave. The recorded noise levels were compared with levels for the adjacent one-third octave bands to determine if a significant tonal impact was taking place at a particular frequency.

The results indicated no discernible tonal impact from the facility at any measurement location during any measurements completed during the noise assessment. The full spectrum graphs for the measurements recorded are provided in Appendix 3

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DRAWING

- **14/020/01 – 2014 Plan Layout Drawing**



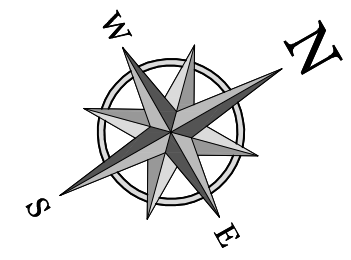
LAYOUT PLAN



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Goresbridge,
Co. Kilkenny, Ireland.
Tel: 059-9775800
Email: info@redmills.ie



Location: Goresbridge, Co. Kilkenny	
Surveyed By:	Graham
Drawn By:	Gary / Graham
Checked By:	Gary / Graham
© Copyright CARDINAL SURVEYORS.	



Seafield House, South Kilbride,
Tramore, Co. Waterford.
Tel: 051-393694 Mobile: 087-2737080 E: info@cardinal.ie

Client:	Connolly's RED MILLS		
Project:	2014 Update of Plans	Project No.	.
		14/020	Scale: 1:2000@A3
Drawing:	2014 Plan Layout Drawing	Drawing No.	Date: 23/02/2014
		14/020/01	Sheet No. 1 of 1.

APPENDIX I
Calibration Certificates

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Calibration Certificate

Certificate Number 2016004287

Customer:

Environmental Measurement

Unit 12

Dublin, 24, Ireland

Model Number LxT SE
Serial Number 0004725
Test Results Pass
Initial Condition As Manufactured
Description Sound Expert LxT

Procedure Number D0001.8384
Technician Ron Harris
Calibration Date 16 May 2016
Calibration Due
Temperature 23.26 °C ± 0.01 °C
Humidity 51.4 %RH ± 0.5 %RH
Static Pressure 85.92 kPa ± 0.03 kPa

Evaluation Method

Tested with:

PRMLxT1L. S/N 042618
377B02. S/N 153661

Data reported in dB re 20 µPa.

Compliance Standards

Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007) Class 1
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	06/24/2015	06/24/2016	006311
Hart Scientific 2626-H Temperature Probe	06/17/2015	06/17/2016	006798
Larson Davis CAL200 Acoustic Calibrator	08/12/2015	08/12/2016	007027
Larson Davis Model 831	03/01/2016	03/01/2017	007182
1/2 inch Microphone - P - 0V	03/07/2016	03/07/2017	007185
Larson Davis CAL291 Residual Intensity Calibrator	09/24/2015	09/24/2016	007287

Larson Davis, a division of PCB Piezotronics, Inc
1681 West 820 North
Provo, UT 84601, United States
716-684-0001



APPENDIX II
Acoustic Parameters

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Acoustical Parameters

L_{Aeq}	is the A-weighted equivalent continuous steady sound level and effectively represents an average value.
L_{Amax}	is the maximum A-weighted sound level measured during the sample period.
L_{Amin}	is the minimum A-weighted sound level measured during the sample period.
L_{A90}	is the A-weighted sound level which is exceeded for 90% of the sample period; used to quantify background noise.
L_{A10}	is the A-weighted sound level which is exceeded for 10% of the sample period; used to quantify traffic noise.
A-weighting	is the process by which noise levels are corrected to account for the non-linearity of human hearing.

All quoted noise levels are relative to 2×10^{-5} Pa.

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APPENDIX III

Broadband and 1/3 Octave Band Measurements

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REDMILLS FEED MILL - DAYTIME BROADBAND NOISE READINGS

Location	Date	Time	Run Duration	LAeq	LAE	LAFmin	LAF5.00	LAF10.00	LAF33.30	LAF50.00	LAF66.60	LAF90.00
N1	2017-01-31	10:40:54	00:35:25.3	63.3	96.6	42.4	68.5	63.1	54.3	53.2	52.0	47.8
	2017-01-31	11:16:32	00:31:45.1	65.8	98.6	46.9	69.6	63.5	57.9	53.6	52.7	50.8
	2017-01-31	11:48:24	00:31:11.9	63.3	96.0	46.0	69.2	64.8	56.2	54.5	53.5	51.1
N2	2017-01-31	12:36:27	00:32:06.9	60.1	92.9	56.8	62.8	60.9	59.1	58.6	58.3	57.8
	2017-01-31	13:08:44	00:30:25.4	60.9	93.5	41.9	62.7	61.0	49.5	46.1	44.5	43.5
	2017-01-31	13:39:17	00:30:20.3	53.6	86.2	41.7	57.2	53.9	48.1	45.7	44.6	43.4
N3	2017-01-31	14:25:22	00:33:22.7	48.8	81.8	33.0	53.6	48.1	41.5	39.4	37.8	35.7
	2017-01-31	15:29:29	00:30:58.2	52.4	85.0	32.4	54.7	50.2	40.0	37.7	36.5	35.1
	2017-01-31	14:58:54	00:30:27.2	45.5	78.1	32.3	49.9	46.0	38.8	37.3	36.3	34.8
N4	2017-01-31	16:06:07	00:30:07.9	48.9	81.5	40.1	52.9	51.0	47.3	45.8	44.4	42.4
	2017-01-31	17:06:52	00:30:05.2	58.3	90.8	40.0	58.5	56.5	48.8	46.8	45.3	42.9
	2017-01-31	16:36:31	00:30:05.0	48.7	81.3	39.2	53.5	51.3	47.6	46.0	44.5	42.0

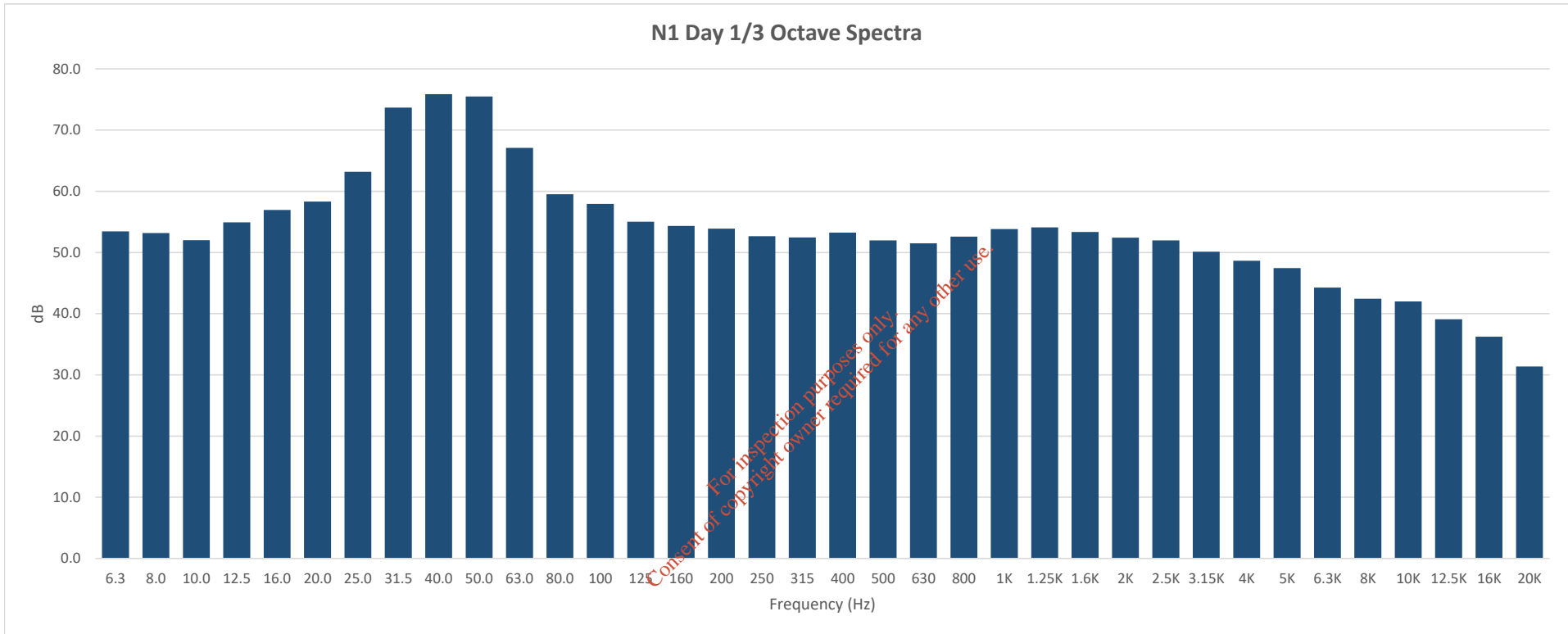
REDMILLS FEED MILL - EVENING BROADBAND NOISE READINGS

Location	Date	Time	Run Duration	LAeq	LAE	LAFmin	LAF5.00	LAF10.00	LAF33.30	LAF50.00	LAF66.60	LAF90.00
N1	2017-01-31	20:46:45	00:15:15.0	49.1	78.7	45.2	51.3	50.2	48.9	48.5	47.9	46.9
N2	2017-01-31	21:11:20	00:16:06.0	61.9	91.7	7.0	67.3	57.5	42.7	40.7	39.4	38.3
N3	2017-01-31	21:31:13	00:15:02.8	43.1	72.7	29.3	47.9	45.8	39.3	35.9	33.9	31.8
N4	2017-01-31	21:49:44	00:16:00.1	47.6	77.4	43.6	49.4	48.3	46.7	46.3	46.0	45.4

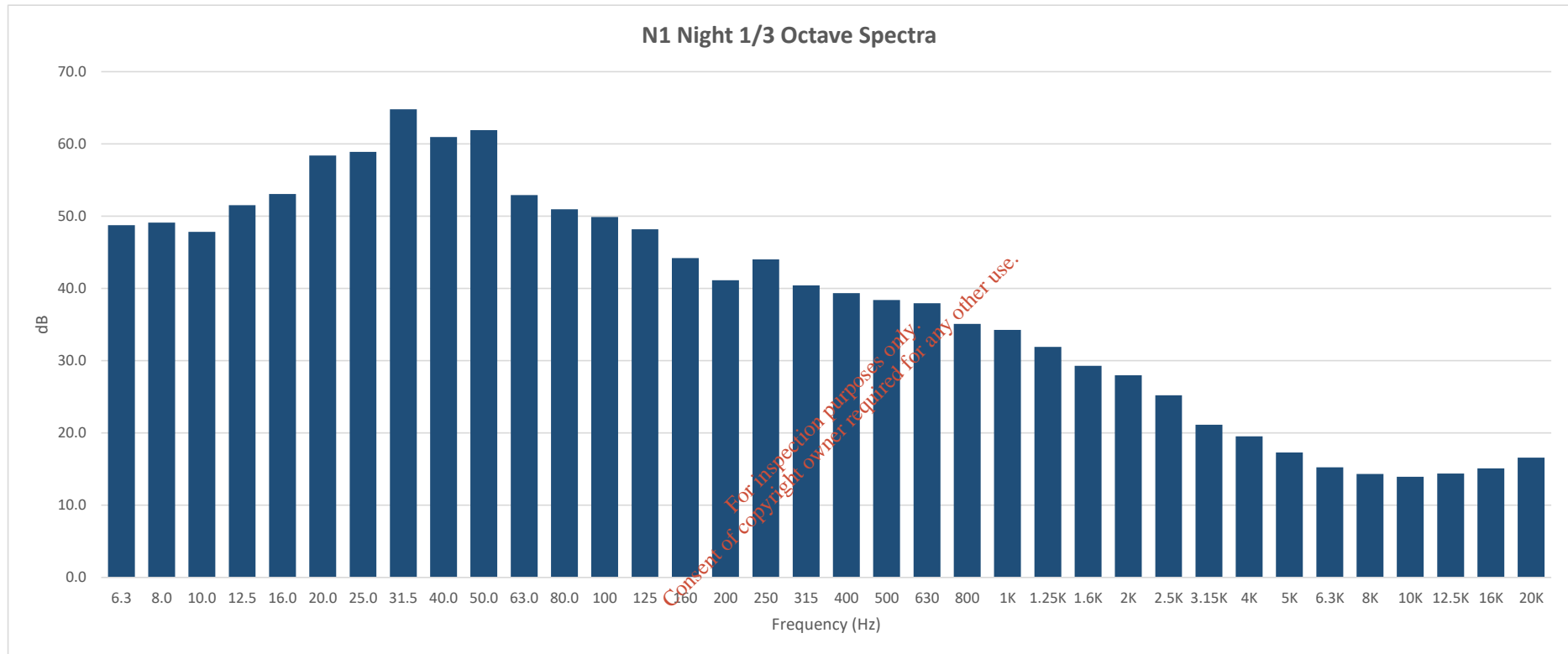
REDMILLS FEED MILL - NIGHT TIME BROADBAND NOISE READINGS

Location	Date	Time	Run Duration	LAeq	LAE	LAFmin	LAF5.00	LAF10.00	LAF33.30	LAF50.00	LAF66.60	LAF90.00
N1	2017-01-31	23:12:47	00:15:02.4	45.3	74.8	42.9	47.5	46.4	45.1	44.8	44.5	44.0
	2017-01-31	23:28:05	00:15:03.6	45.5	75.1	42.0	46.4	45.7	45.0	44.6	44.3	43.7
N2	2017-02-01	01:02:06	00:15:11.0	42.9	72.5	38.7	45.9	44.5	41.8	41.3	40.9	40.3
	2017-02-01	01:17:33	00:15:02.4	42.0	71.6	38.4	43.6	42.7	41.3	40.9	40.5	39.9
N3	2017-02-01	00:28:57	00:15:09.9	45.1	74.7	36.4	50.9	47.6	41.4	40.1	39.2	38.4
	2017-02-01	00:44:16	00:15:01.4	45.6	75.2	36.2	51.2	47.7	42.5	41.0	39.5	38.2
N4	2017-01-31	23:50:16	00:16:53.8	45.6	75.6	41.4	47.9	46.7	45.0	44.5	44.0	43.2
	2017-02-01	00:07:17	00:15:12.6	46.3	75.9	41.6	49.3	47.9	45.8	45.0	44.5	43.5

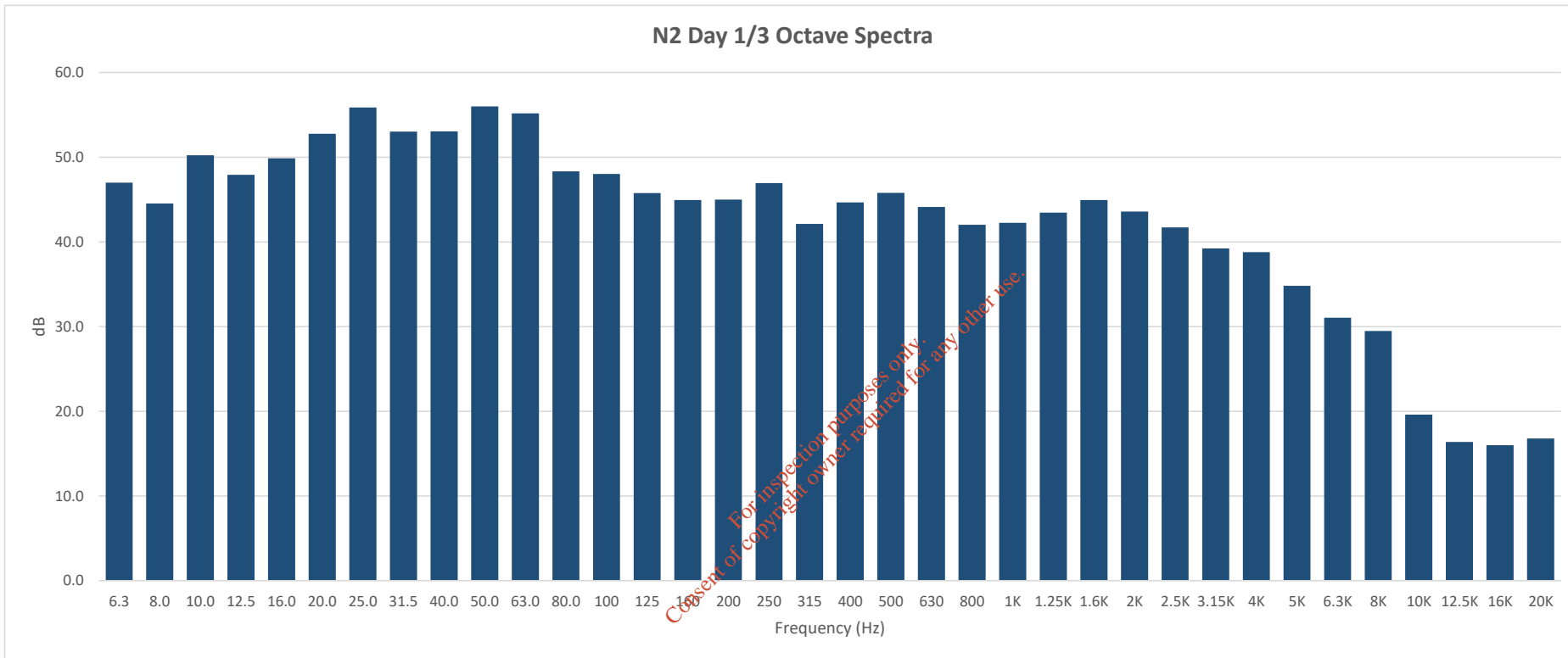
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	53.5	53.2	52.0	54.9	57.0	58.3	63.2	73.7	75.8	75.5	67.1	59.5	57.9	55.0	54.3	53.9	52.7	52.5	53.2	52.0	51.5	52.6	53.8	54.1	53.3	52.4	52.0	50.1	48.7	47.4	44.2	42.4	42.0	39.1	36.2	31.4



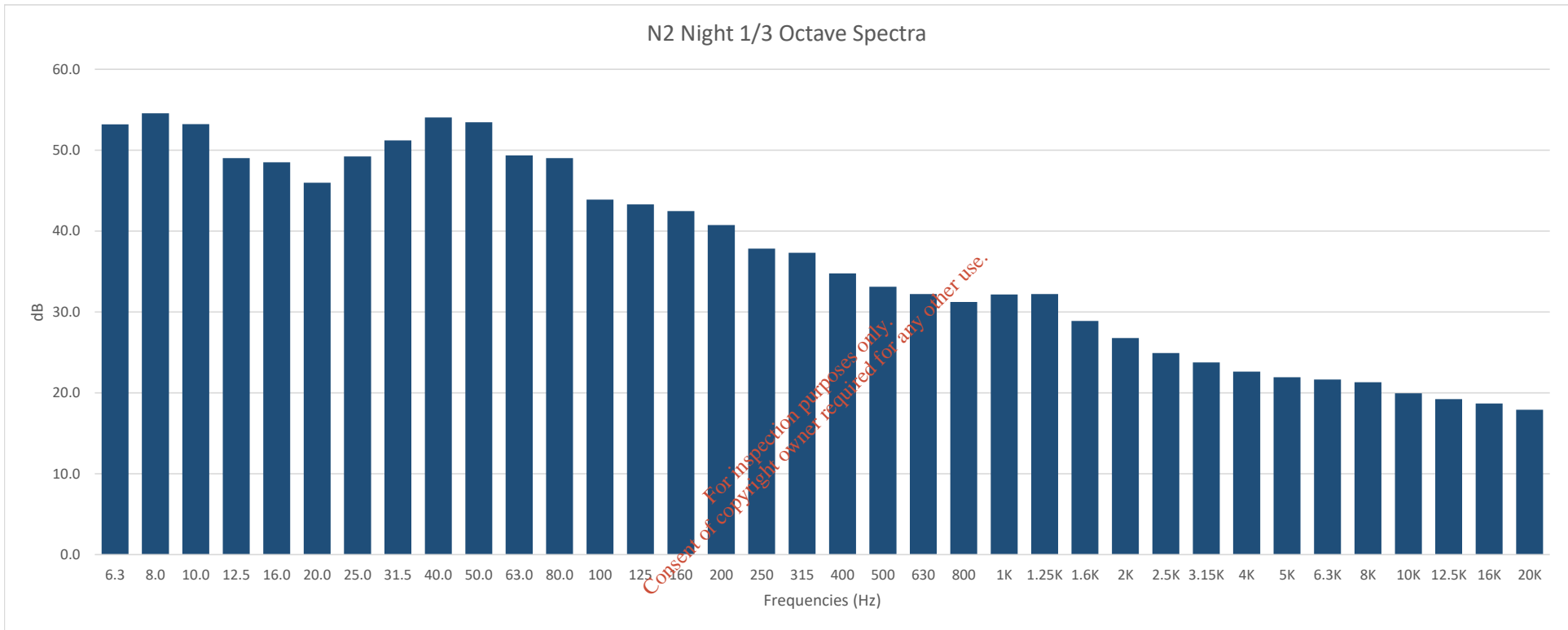
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	48.8	49.1	47.8	51.5	53.1	58.4	58.9	64.8	60.9	61.9	52.9	50.9	49.9	48.2	44.2	41.1	44.0	40.4	39.4	38.4	37.9	35.1	34.3	31.9	29.3	28.0	25.2	21.1	19.5	17.3	15.2	14.3	13.9	14.4	15.1	16.6



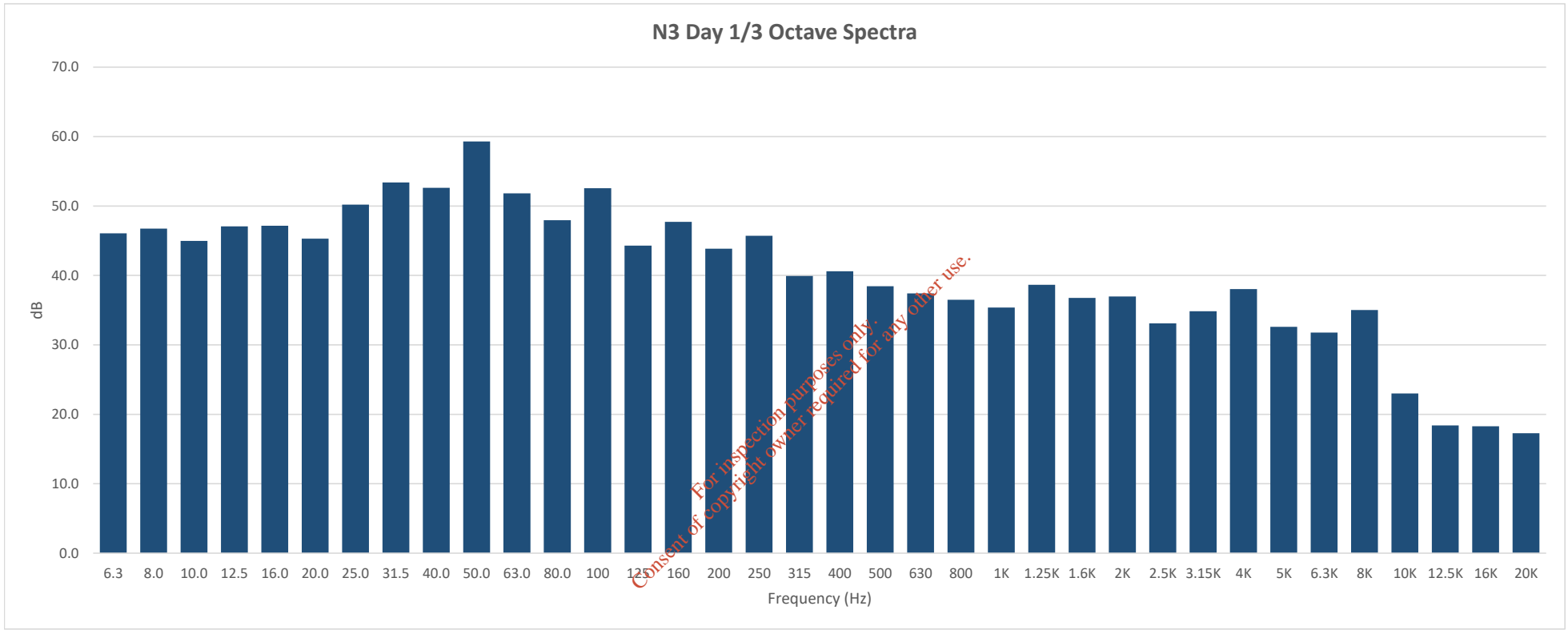
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	47.0	44.5	50.2	47.9	49.9	52.8	55.9	53.0	53.0	56.0	55.2	48.3	48.0	45.8	45.0	45.0	47.0	42.1	44.7	45.8	44.1	42.0	42.3	43.5	44.9	43.6	41.7	39.2	38.8	34.8	31.1	29.5	19.6	16.4	16.0	16.8



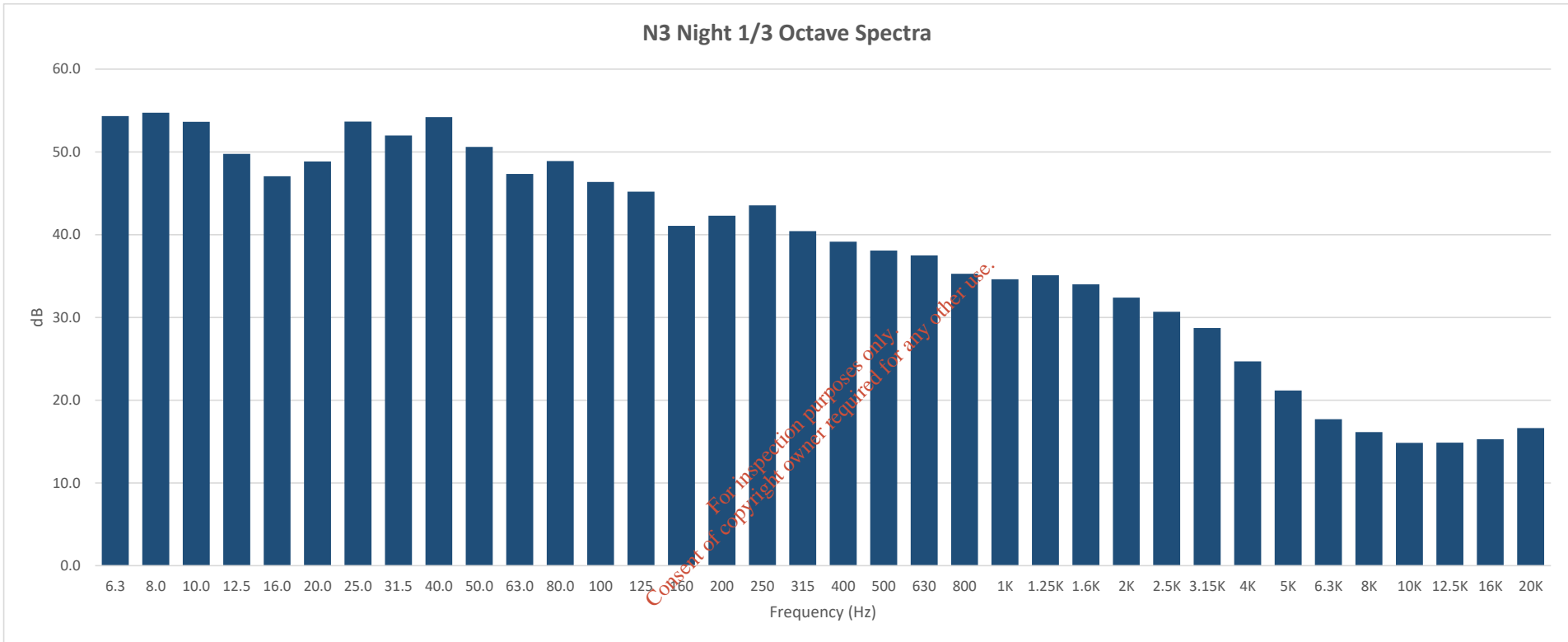
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	53.2	54.6	53.2	49.0	48.5	46.0	49.2	51.2	54.0	53.4	49.3	49.0	43.9	43.3	42.5	40.7	37.8	37.3	34.8	33.1	32.2	31.2	32.2	32.2	28.9	26.8	24.9	23.8	22.6	21.9	21.6	21.3	19.9	19.2	18.7	17.9



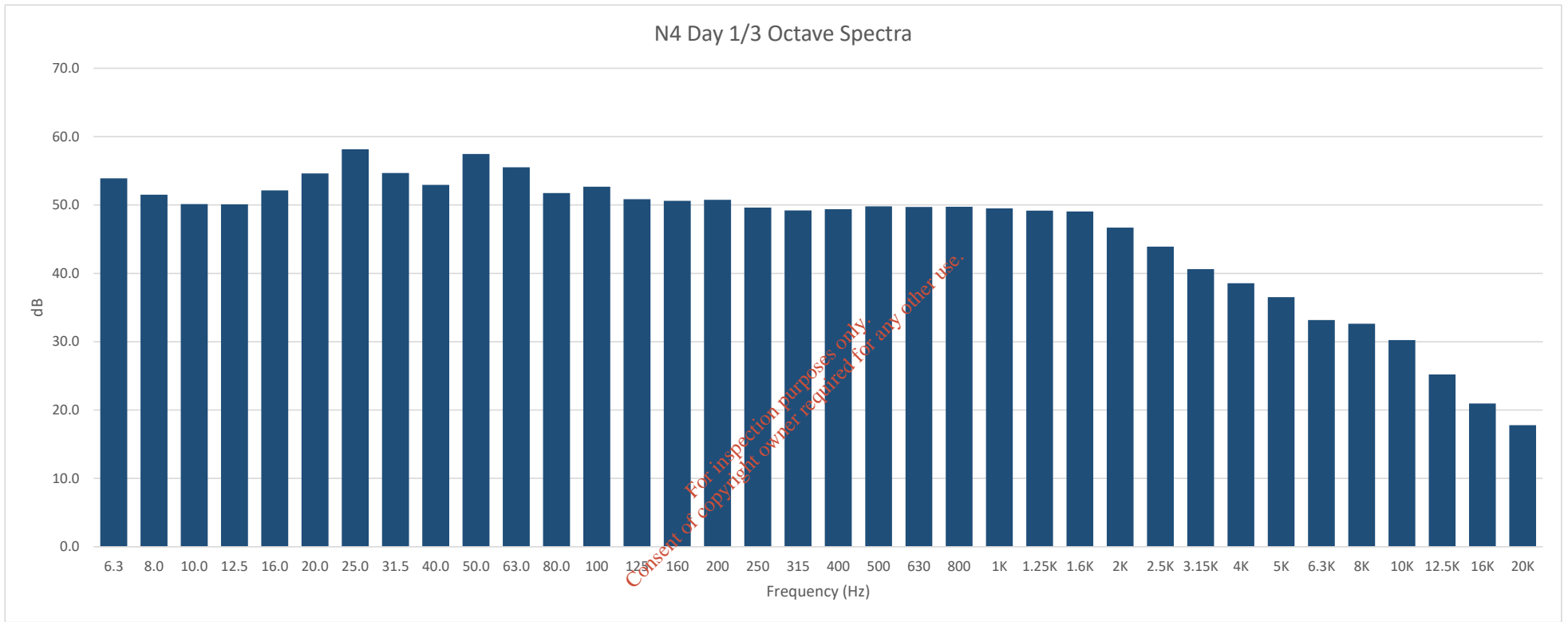
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	46.1	46.7	45.0	47.1	47.2	45.3	50.2	53.4	52.6	59.3	51.8	47.9	52.6	44.3	47.7	43.8	45.7	39.9	40.6	38.5	37.4	36.5	35.4	38.7	36.8	37.0	33.1	34.8	38.0	32.6	31.8	35.0	23.0	18.4	18.3	17.3



Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	54.3	54.7	53.6	49.7	47.1	48.8	53.7	52.0	54.2	50.6	47.3	48.9	46.4	45.2	41.1	42.3	43.5	40.4	39.2	38.1	37.5	35.3	34.6	35.1	34.0	32.4	30.7	28.7	24.7	21.2	17.7	16.1	14.8	14.9	15.3	16.6



Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	53.9	51.5	50.1	50.1	52.1	54.6	58.1	54.7	52.9	57.5	55.5	51.7	52.7	50.8	50.6	50.8	49.6	49.2	49.4	49.8	49.7	49.7	49.5	49.2	49.0	46.7	43.9	40.6	38.5	36.5	33.2	32.6	30.2	25.2	21.0	17.8



Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
1/3 Spectra	54.3	54.7	53.6	49.7	47.1	48.8	53.7	52.0	54.2	50.6	47.3	48.9	46.4	45.2	41.1	42.3	43.5	40.4	39.2	38.1	37.5	35.3	34.6	35.1	34.0	32.4	30.7	28.7	24.7	21.2	17.7	16.1	14.8	14.9	15.3	16.6

