



**Attachment 7-5-1 Noise Impact
Assessment**

**William Connolly & Sons Unlimited
Company**

IEL Reg. No. P1069-01

**Grange Lower, Goresbridge,
Co. Kilkenny**



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EXECUTIVE SUMMARY

Malone O'Regan Environmental (MOR) was appointed by William Connolly & Sons Unlimited Company, herein referred to as 'Red Mills' to prepare a Noise Impact Assessment Report for emissions from their facility with respect the Request for Further Information (RFI) issued by the EPA dated the 20th November 2018 with respect to the Industrial Emission (IE) Licence Application, Reference No. P1069-01.

The Red Mills site is located approximately 0.5km north of Goresbridge along the L2639 road in Grange Lower, Goresbridge, Co. Kilkenny (the Facility).

The Facility operates in two distinct stages with regards to noise emissions, the non-harvest season which is approximately 10 months, (September - June) and the harvest season which is approx. 2 months (July – August). During the short duration Harvest season (ca.6-8weeks) which is weather dependent, the Facility operates on a 24-hour basis and the onsite Dryers are operational.

The Harvest season is deemed to be when 'peak noise emissions' occur, i.e., all plant and equipment onsite are operational and continuous (24-hour) basis. The 6-8week Harvest season is therefore deemed to be a 'worst-case scenario' with regards noise emissions to the local environment. During the non-harvest season, grain drying and associated activities do not occur therefore noise levels experienced at NSLs are reduced and likely to be compliant with typical EPA limits. The Facility has not received any complaints regarding noise.

A baseline noise survey was undertaken during the 2021 harvest season by competent MOR personnel on the 17th and 18th August 2021. Although the Facility is not currently licensed, it was determined that the Site was likely to be compliant with typical EPA noise limits at noise sensitive locations to the north, east and south of the Facility. Potential breaches of the typical EPA noise limits occurred to the west of the Facility at a noise sensitive location identified as NSL04.

A noise model was developed to assess predicted future operations at the Facility when the facility will be subject to an IE licence. This model took into account the proposed replacement of older equipment, mitigation of identified existing noise emissions and the addition of two modern grain stores and associated dryers. This model predicted a decrease of 8dB at NSR04 and reductions at all other identified NSRs when compared to the 2021 baseline noise survey.

MOR propose that Table 7-1 below be incorporated into any future IE Licence for the facility in Schedule B:4 Emission Limits.

Table 7-1: Proposed B.4 Noise Emission Limits

Receptor	Daytime <small>L_{Ar}(30 minute)</small> 07:00 to 19:00 hours	Evening-time <small>L_{Ar}(30 minute)</small> 19:00 to 23:00 hours	Night –time <small>L_{Aeq}(15 minute)</small> 23:00 to 07:00 hours
NSL	55	50	45
There shall be no clearly audible tonal or impulsive component in the noise emission from the Site, audible at any Noise Sensitive Location (NSL).			

MOR propose that a condition of similar standard wording as outlined below, be included within the licence:

'The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) as published by the Agency.'

The Facility Management is dedicated to the reduction of Facility noise emissions to ensure no adverse noise impacts occur at noise sensitive locations from noise emissions associated with the existing or future operations of the Facility at identified noise sensitive locations during the peak noise emissions associated with the harvest season. This proactive approach should ensure that the Facility will be compliant with the recommended licence conditions during the 2022 harvest season.

1 INTRODUCTION

Malone O'Regan Environmental (MOR) was appointed by William Connolly & Sons Unlimited Company, herein referred to as 'Red Mills' to prepare a Noise Impact Assessment Report for emissions arising from their facility. This study has been prepared in support of the Request for Further Information (RFI) issued by the EPA dated the 20th November 2018 with respect to the Industrial Emission (IE) Licence Application, Reference No. P1069-01.

The Red Mills site is located approximately 0.5km north of Goresbridge along the L2639 road in Grange Lower, Goresbridge, Co. Kilkenny (the Facility), refer to Figure 1-1.

Figure 1-1: Site Location



1.1 Description of the Existing Development

The Facility has been operating in Goresbridge since 1908. The Facility consists of:

- Grain Mill;
- Silos;
- Storage Buildings/Warehouses;
- Administration Block;
- Shop;
- Weighbridge;
- Grain Dryers;
- Car park; and
- Miscellaneous plant.

The Facility operates in two distinct stages with regards to noise emissions:

1. Non-harvest season, (September -June); and
2. Harvest season (July – August).

During the short duration Harvest season (ca.6-8weeks) which is weather dependant and subject to change each year, the Facility operates on a 24-hour basis and the onsite Dryers are operational.

The Harvest season is deemed to be when 'peak noise emissions' occur, i.e. all plant and equipment onsite are operational on a continuous (24-hour) basis. The Harvest season is therefore deemed to be a 'worst-case scenario' with regards noise emissions.

Outside of the Harvest season for ca.10months of the year, onsite grain dryers and associated activities (vehicle movement, tipping, Intake areas) do not operate.

The main external noise sources during the Harvest season are:

- Loading and unloading activities;
- Intake Areas;
- Movement (tipping and haulage routes) of onsite vehicles;
- Grain Dryers; and
- Noise breakout from louvres, air extraction fans, pre-cleaners and building facades.

1.2 Competency

The analysis of the data and project management was conducted by a principal MOR acoustician – Kenneth Goodwin, with over 15 years' experience and a Member of the Institute of Acoustics (MIOA) and Association of Acoustic Consultants of Ireland (AACI).

The project is therefore deemed to be completed by a 'competent person' as per the criteria outlined within Section 2 of the NG4 Guidance Document. Kenneth was supported by Gus Egan, IOA and ACCI member with over 5 years of experience in environmental monitoring.

2 RELEVANT NOISE STANDARDS

2.1 NG4 Noise Limits

A glossary of terms, utilised within this report, is given in Appendix A. It is acknowledged within NG4 that:

'Noise is unlike many other pollutants, however, in that there is typically no residual effect and once the noise emission ceases, the acoustical energy attributable to it is eliminated until the emission recommences. Noise is also different in that its potential impact is dependent on a wide range of factors.'

The primary factor determining the application of suitable criteria is the current background noise present in the locality. Louder environments, by their very nature of having notable noise emissions, require more complex noise assessments to apply suitable noise criteria, while protecting the local environment from site specific noise emissions. Furthermore, the limits must be applied at a location where it is practical to carry out compliance monitoring in the future.

Noise limits, typically imposed by the EPA and noted in NG4, applicable to noise emitted from the Facility audible at Noise Sensitive Locations (NSL's) are:

Daytime (07:00 to 19:00)	-	55dB L _{Ar,T} ;
Evening time (19:00 to 23:00)	-	50 dB L _{Ar,T} ;
Night-time (23:00 to 07:00)	-	45dB L _{Aeq,T} .

These limits are applicable where external factors do not unduly impact the Facility emissions.

Tonal and impulsive emissions should be avoided with penalty weightings during the day and evening periods, and non-compliance if they are detected at night. These values are relative to outside (free-field) at NSL's.

This report includes an assessment on the locality, as per NG4, for both 'Quiet Area', Section 2.4 of this report, and 'Low Noise', Section 3.6.1 of this report, to confirm the 'typical' noise limits, as outlined above are relevant.

2.2 Sensitive Receptors

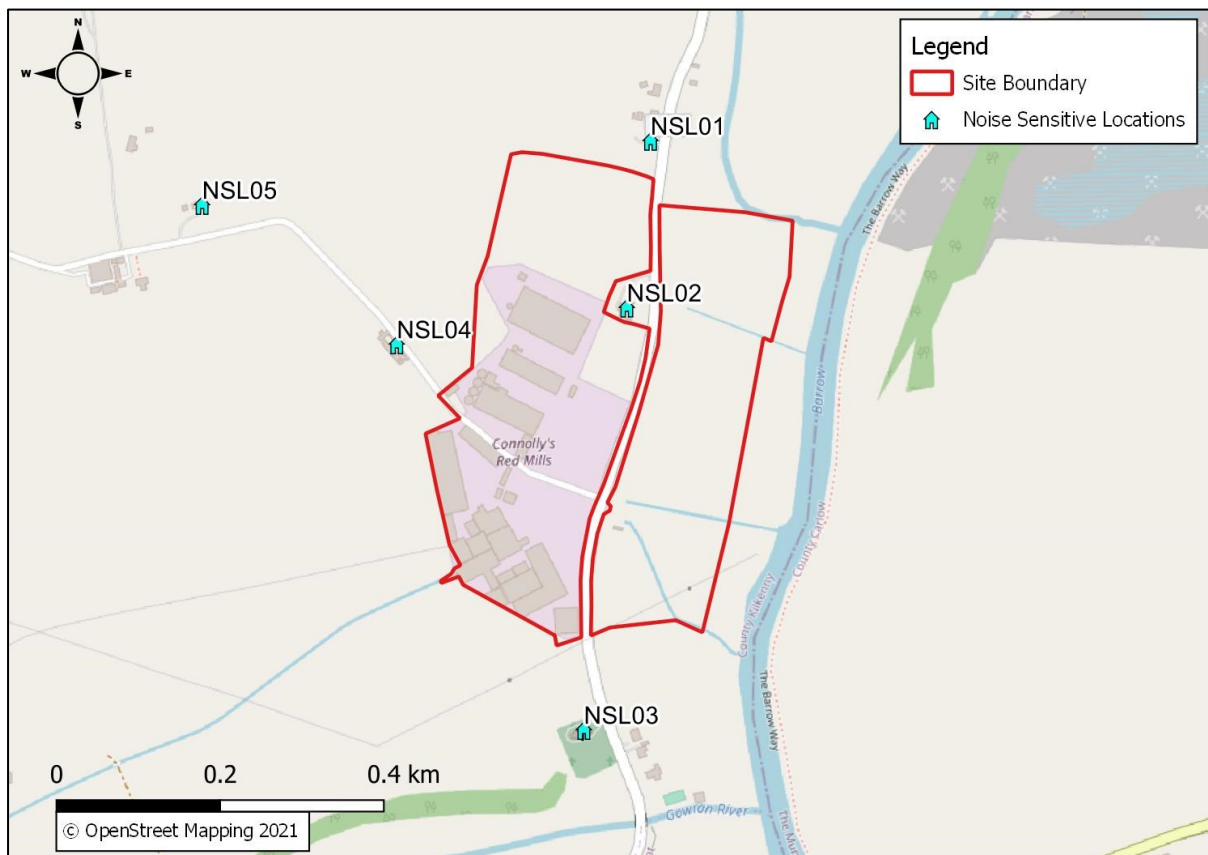
Sensitive receptors in the vicinity of the Site were identified as Noise Sensitive Locations (NSLs) and are detailed in Table 2-1 below and shown in Figure 2-2. NSL02 is the closest noise sensitive location as it is located ca.6 meters to the east of the boundary of the Facility.

Table 2-1: Noise Sensitive Locations

ID	Location Relevant to Site	Distance to Site Boundary (m)	Eastings (ITM)	Northings (ITM)	Note
NSL01	North	40m	668137	668137	Proxy for dwellings to the north of the Site.
NSL02	East	6m	668105	668105	Dwelling to the east of the Site.
NSL03	South	110m	668059	668059	Church and proxy for dwellings to the south of the Site.
NSL04	Southwest	75m	667835	667835	Proxy for dwellings to the southwest of the Site.

ID	Location Relevant to Site	Distance to Site Boundary (m)	Eastings (ITM)	Northings (ITM)	Note
NSL05	West	350m	667605	667605	Proxy for dwellings to the west of the Site.

Figure 2-1: Noise Sensitive Locations to the Site



2.3 Existing Site Compliance Criteria

Condition 6 of Planning Reference 17/641 in relation to the demolition of buildings and construction of extensions to the Facility, states:

'The developer shall ensure that all operations on site during both the construction and operational phase of the development are carried out in a manner such that noise, air emissions and/or odours do not result in significant impairment of, or significant interference with, amenities or the environment beyond the site.'

The condition does not prescribe a specific limit value, nor a methodology or guidance document to be followed.

2.4 Quiet Area Screening

As part of the desk-based assessments, the Facility has been screened for Quiet Area.

NG4 identifies a specific screening mechanism for Quiet Areas, and the screening process is shown in Table 2-2.

Table 2-2: Screening for Quiet Area

Parameter	Quiet Noise Criteria Distance	Criteria Met	Note
Distance to urban area with population >1,000 persons.	>3km	Yes	Muinebeag (Bagenalstown), ca. 7km to the north, population of 2,837 (CSO,2016). Kilkenny City, ca.16km to the northwest, population of 26,512 (CSO,2016).
Distance to urban area with population >5,000 persons.	>10km	Yes	
Distance to urban area with population >10,000 persons.	>15km	Yes	
Distance to local industry (small or individual activities).	>3km	No	Goresbridge ca.500m to the south of the Site. Nurseries (Duninga) ca.870m northwest of Site.
Distance to major industry centre.	>10km	No	Gowran ca.4.3km to the west of the Site. Muinebeag (Bagenalstown), ca. 7km to the north
Distance to National Primary Route.	>5km	Yes	No National Roads within 5km of the Site.
Distance to Motorway or Dual Carriageway.	>7.5km	No	M9 motorway ca.7km to the west.
Site locality is 'Quiet Area'		No	Proximity to local and major industry centres and M9 motorway.

The Facility is not located in a 'Quiet Area'. The Quiet Area screening does not identify if an area has high, moderate, or low ambient noise, rather only whether the locality is at distance to select anthropogenic /human noise emission sources. Therefore, it is always necessary to monitor the local environment.

3 AMBIENT ACOUSTIC ENVIRONMENT

To characterise the existing acoustic environment surrounding the Facility, sound measurements were taken in the locality.

3.1 Methodology – Baseline Monitoring

All ambient sound monitoring was conducted in line with best practice as outlined within the EPA NG4 (EPA, 2016d). The on-site monitoring, data analysis and assessment was completed by a competent acoustician, refer to Section 1.2.

3.2 Equipment – Baseline Monitoring

Noise monitoring was conducted utilising Class 1 sound level meters (SLM), which were calibrated to a traceable standard within 24 months of the survey event. The sound level meters were field calibrated utilising a field calibrator which was itself calibrated to a traceable standard within 12 months of the survey event. Laboratory calibration certificates for these instruments are in Appendix B.

At all monitoring locations the SLM was positioned to maximise distance from reflective surfaces (>3meters) and mounted on a tripod to an approximate height of 1.2 to 1.5 meters over ground level.

3.3 Weather – Baseline Monitoring

The monitoring event was conducted during the harvest season on the 17th and 18th of August 2021 in order to assess a worst case scenario (i.e. Harvest Season). The monitoring was undertaken during suitable weather conditions and the Facility was fully operational. Onsite weather data taken by MOR is shown in Appendix C. In addition, the daily reports from the closest synoptic station by Met Éireann, Oak Park, Carlow, are also contained in Appendix C.

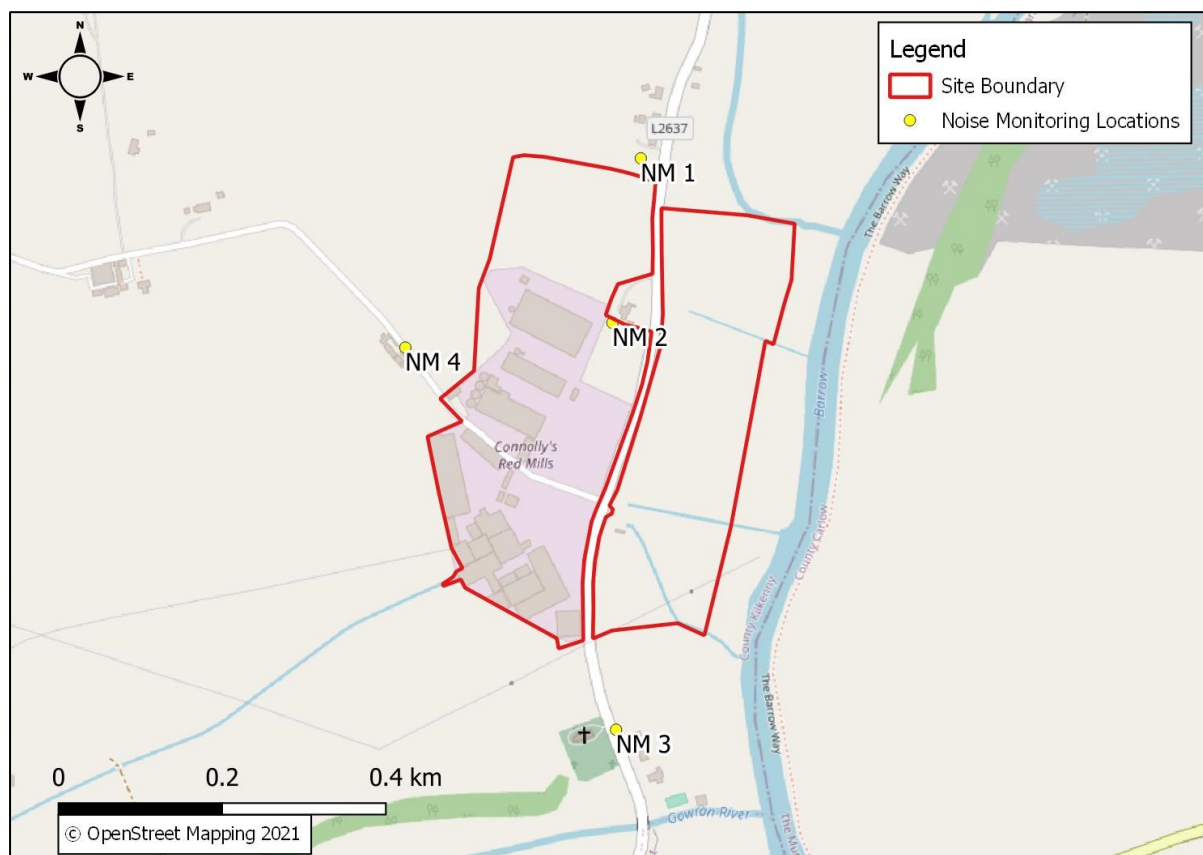
3.4 Baseline Monitoring Locations

Four noise monitoring locations were selected, based on a review of the site layout and the known NSLs to the Facility. The measurement locations were selected to characterise the ambient acoustic environment, refer to Table 3-1 and Figure 3-1 below.

Table 3-1: Noise Monitoring Locations

Monitoring Point	Description of Location	ITM Easting	ITM Northing	Boundary or NSL
NM1	Proxy for dwellings to the north of the Site.	668131	654741	NSL
NM2	Proxy for dwelling to the east of the Site.	668097	654541	NSL
NM3	Proxy for dwellings to the south of the Site.	668102	654069	NSL
NM4	Proxy for dwellings to the west of the Site.	667845	654520	NSL

Figure 3-1: Noise Monitoring Locations



3.5 Frequency Analysis

Real time 1/3 octave band frequency analysis was carried out at each monitoring location, during both daytime, evening, and night-time monitoring events.

Tones were objectively assessed in accordance with Section 5 of NG4 which advocates *BS 4142: 2014: Annex C (normative): Objective method for assessing the audibility of tones in sound: One-third octave method*. The standard states that

“for a prominent, discrete tone to be identified as present, the time-averaged linear sound pressure level in the one-third octave band of interest is required to exceed the time-averaged linear sound pressure levels of both adjacent one-third-octave bands by some constant level difference”.

The standard gives the level differences as follows:

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

In addition, the on-site acoustician noted any subjective tonality or defining characteristic arising from site specific noise emission sources, as per Section 5.1 of NG4.

3.6 Receiving Environment

The general area in which the Facility is located can be described as rural in nature. Traffic on the local roads also impacts on the categorisation as a ‘rural’ noise environment. There is also an influence from agricultural activities.

Local infrastructural developments influencing the local ambient noise include:

- Traffic on the adjacent local road (L2639);
- Distant traffic from Regional Road (R702) ca.550m to the south; and
- Agricultural activities (machinery and animals).

3.7 Baseline Monitoring Survey Results

Monitoring locations (refer to Figure 3-1) are identified as boundary¹, spot, or as proxy locations² to NSLs in Table 3-1 in Section 3.3. Tables 3-2 to 3-4 below details the results of the monitoring event and a description of noise sources.

¹ Boundary locations are at the Site's boundary and are utilised to assess ambient sound levels.

² NSL proxy locations are deemed to be representative of NSL's, in proximity to the Facility, these may be an individual or group of sensitive receptors.

Table 3-2: Daytime Noise Levels (17th August 2021)

Location	Start Time	L _{Aeq} , 30 mins (dB)	L _{A10} , 30 mins (dB)	L _{A90} , 30 mins (dB)	L _{AF} max (dB)	Description of Noise Sources
NM1	17/8/2021 12:00	61	58	45	87	Wind speed 0-1m/s. Birdsong/call audible. Dog barking to the north frequently audible. Occasional tractor and trailer / tipper trucks passing near SLM tipping grain audible. Traffic on adjacent local road (L2639) frequently audible. The Facility (dryers, conveyors, stacks and vents) audible.
	17/8/2021 13:00	51	54	43	77	
	17/8/2021 15:00	59	62	51	73	
NM2	17/8/2021 12:10	56	59	49	78	Wind speed 0-1m/s. Birdsong/call audible. Traffic on adjacent local road (L2639) frequently audible. The Facility (dryers, conveyors, stacks and vents) audible. Vehicle movements onsite frequently audible. Tractor and trailer / tipper trucks tipping grain to the south occasionally audible.
	17/8/2021 12:41	53	57	47	75	
	17/8/2021 13:19	53	57	47	71	
NM3	17/8/2021 14:19	69	71	47	91	Wind speed 0-2m/s. Birdsong/call audible. Traffic on adjacent local road (L2639) frequently audible. The Facility in distance (dryers, conveyors, stacks and vents) audible. <u>5-minute Traffic Count (L2639):</u> Run 1: 14No. vehicles Run 2: 17No. vehicles Run 3: 16No. vehicles
	17/8/2021 14:51	70	68	47	108	
	17/8/2021 15:22	67	69	46	87	
NM4	17/8/2021 12:22	63	59	55	91	Wind speed 0-1m/s. Birdsong/call audible. Animal calls to the south occasionally audible. Traffic on adjacent road occasionally audible and passing near SLM. Peak events (L _{AF} max 91dB) due to passing tractor. The Facility (dryers, conveyors, stacks and vents) audible.
	17/8/2021 12:55	58	58	55	80	
	17/8/2021 13:28	59	57	54	87	

Table 3-3: Evening Noise Levels (17th August 2021)

Location	Start Time	L _{Aeq} , 30 mins (dB)	L _{A10} , 30 mins (dB)	L _{A90} , 30 mins (dB)	L _{AF max} (dB)	Description of Noise Sources
NM1	17/8/2021 21:34	49	51	47	59	Wind speed 0-2m/s. Birdsong/call audible. Dog barking to the north occasionally audible. Traffic on adjacent local road (L2639) occasionally audible. The Facility (dryers, conveyors, stacks and vents) audible.
NM2	17/8/2021 22:48	49	52	45	66	Wind speed 0-1m/s. Birdsong/call audible. Traffic on adjacent local road (L2639) occasionally audible. The Facility (dryers, conveyors, stacks and vents) audible. Vehicle movements onsite frequently audible.
NM3	17/8/2021 20:07	66	61	42	96	Wind speed 0-2m/s. Birdsong/call audible. Traffic on adjacent local road (L2639) occasionally audible. The Facility in distance (dryers, conveyors, stacks and vents) audible. Peak event (L _{AFmax}) due to passing tractor. <u>5-minute Traffic Count (L2639): 9No. vehicles</u>
NM4	17/8/2021 20:44	58	59	56	66	Wind speed 0-1m/s. Birdsong/call audible. Animal calls to the south occasionally audible. Traffic on adjacent road occasionally audible and passing near SLM. The Facility (dryers, conveyors, stacks and vents) audible.

Table 3-4: Night-Time Noise Levels (17th and 18th August 2021)

Location	Start Time	L _{Aeq, 15 mins} (dB)	L _{A10, 15 mins} (dB)	L _{A90, 15 mins} (dB)	L _{AF max} (dB)	Description of Noise Sources
NM1	17/8/2021 23:00	49	51	46	56	Wind speed 0-1m/s. Traffic on adjacent local road (L2639) occasionally audible. The Facility (dryers, conveyors, stacks and vents) audible.
	17/8/2021 23:15	55	52	46	78	Run 2 - tipper truck passing near SLM tipping grain.
NM2	17/8/2021 23:19	47	50	44	65	Wind speed 0-1m/s. Birdsong/call audible. Traffic on adjacent local road (L2639) occasionally audible.
	17/8/2021 23:35	45	46	44	54	The Facility (dryers, conveyors, stacks and vents) audible. Vehicle movements onsite frequently audible.
NM3	18/8/2021 00:35	49	42	38	77	Wind speed 0-2m/s. Dog barking in distance occasionally audible. Traffic on adjacent local road (L2639) occasionally audible.
	18/08/2021 00:53	40	41	38	61	The Facility in distance (dryers, conveyors, stacks and vents) audible. Runs 1 and 2 peak events (L _{AFmax}) due to passing traffic.
NM4	17/8/2021 23:56	60	61	59	65	Wind speed 0-1m/s. Birdsong/call audible. Animal calls to the south occasionally audible.
	18/8/2021 00:14	59	61	58	67	Traffic on adjacent road occasionally audible and passing in close proximity to SLM. The Facility (dryers, conveyors, stacks and vents) audible. JCB movement onsite audible along the western boundary.

3.7.1 Acoustic Characterisation

The monitoring data collected from measurement locations NM1 to NM4 were influenced by offsite traffic, onsite noise (Dryers, fans, vents, and louvres). Vehicle movements and loading bay activities along the western and northern boundaries were also audible at some monitoring locations.

As a result of the steady nature of the source noise onsite (e.g. Dryers etc.), and the strong influence of local proximity sources (the traffic on local roads, birdsong, bird call, animal call and offsite human activities), the $L_{A90,T}$ was considered to be a more representative parameter.

NM1

NM1 located to the north of the Facility was relatively consistent in recorded $L_{A90,T}$ sound pressure levels in the daytime (43dB to 51dB), evening (47dB) and night-time (45dB to 47dB) periods. The higher daytime value was attributed to a tractor and trailer / tipper trucks passing near SLM and tipping grain, an activity which was of sufficient duration to influence the L_{A90} parameter.

This location is likely to be compliant with typical EPA limits during the daytime, evening time. During the night-time there was a slight breach of ca. 1dBA based on the survey undertaken by MOR during the Harvest season in 2021.

NM2

NM2 located to the east of the Facility experienced $L_{A90,T}$ sound pressure levels which decreased during the evening (45dB) and night-time (44dB) periods when compared to the daytime (47dB to 49dB). This location was influenced by traffic to the east and onsite noise emissions such as Dryers, vents, fans, and louvres.

This location was compliant with typical EPA limits during the daytime, evening time and night-time based on the survey undertaken by MOR during the Harvest season in 2021.

NM3

NM3 located to the south of the Facility experienced $L_{A90,T}$ sound pressure levels which decreased during the evening (42dB) and night-time (38dB) periods when compared to the daytime (46dB to 47dB). This location was influenced by traffic to the east and onsite noise emissions such as Dryers, vents, fans, and louvres.

This location was compliant with typical EPA limits during the daytime, evening time and night-time based on the survey undertaken by MOR during the Harvest season in 2021.

NM4

NM4 located to the west of the Facility along a local road, was relatively consistent in recorded $L_{A90,T}$ sound pressure levels in the daytime (54dB to 55dB) and evening time (56dB). During the night-time there was a slight increase in $L_{A90,T}$ values (58dB-59dB).

NM4 was influenced by industrial noise (Dryers, louvres, fans, vents) and HGV movements to the north and northeast during the daytime, evening and night-time periods. During daytime period, traffic on the adjacent local road influenced the monitoring results. JCB movements onsite along the western boundary increased during the night-time monitoring.

This location was not compliant with typical EPA limits during the evening time and night-time based on the survey undertaken by MOR during the Harvest season in 2021.

Low Noise Environment Screening

The results above show that the low background noise level criteria, as per NG4 Section 4.4 are not met. Therefore, the locality is deemed to be compatible with the standard noise emission limit values, as specified in NG4 Section 4.4.2, Step 4.

4 NOISE MODELLING

This section details the methodology, inputs, outputs, and discussion regarding the completed noise modelling.

The plant and equipment will impact locally on the existing acoustic environment. These noise emissions can be broadly split into:

- Mobile emissions; and
- Fixed plant emissions.

Mobile emissions incorporate the movement of vehicles delivering goods and removing goods from the Facility, along with the movement of smaller plant such as the front loaders.

Fixed plant emissions incorporate all building services associated with the facility, pumps, compressors, louvres, dryers, pre-cleaners, conveyors etc. required within the Facility along with breakout from louvered doors.

A detailed noise model has been developed for the Facility during the Harvest Season which is a worst-case scenario with regards to noise emissions, to incorporate the diverse range of source emission points, and the topography of the local environment, along with the buildings and structures. The noise model only assesses site specific emissions – i.e. it does not incorporate existing ambient sources such as offsite industrial noise or road traffic.

4.1 Model Calculations

The Noise Model calculation formula is based on ISO 9613 – 1 & 2. Utilising this standard Predictor calculates the noise level as follows:

$$L|t.per = L_{dw} - C_{m,per} - C_{t,per}$$

Where

$$L_{dw} = L_W + D_c - A$$

$L_{t,per}$	Long-term average octave (or 1/3-octave) SPL during the evaluation period in dB
L_{dw}	Equivalent continuous downwind octave (or 1/3-octave) SPL in dB
$C_{m,per}$	Meteorological correction during the evaluation period in dB
$C_{t,per}$	Correction for the active time of the source during the evaluation period in dB
L_W	Sound power level in dB(A) per octave (or 1/3-octave), re 1 pW
D_c	Directivity correction in dB
A	Attenuation (octave-band) in dB per octave (or 1/3-octave)

The attenuation A is calculated as follows:

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{fol} + A_{site} + A_{hous}$$

A_{div}	Geometrical divergence in dB
A_{atm}	Atmospheric absorption in dB/octave (or 1/3-octave)

A_{gr}	Ground effect in dB/octave (or 1/3-octave)
A_{bar}	Screening in dB/octave (or 1/3-octave)
A_{fol}	Attenuation due to foliage in dB/octave (or 1/3-octave)
A_{site}	Attenuation due to installations on an industrial site in dB/octave (or 1/3-octave)
A_{hous}	Attenuation due to housing in dB

4.2 Model Inputs

Modelling inputs and assumptions for the prediction of the site-specific noise impact included the following:

- Aerial photography and background mapping;
- Two-dimensional topographical survey data to create a digital ground model for the study area;
- AutoCAD drawings of the proposed development and all emission points.

The following noise sources were included within the noise model assessment:

- Dryers;
- Intake;
- Aeration fans;
- Hoppers;
- Stack and fan emissions;
- Louvre emissions;
- Front loader loading; and
- Haulage movements;

The model incorporates 61No. noise emissions onsite. The list of sources and their acoustic qualities are outlined in Appendix D.

4.3 Assumptions

The model has assumed that all relevant plant and equipment are emitting a sound level as identified by the supplier's technical data sheets or as recorded during MOR site spot monitoring.

Under normal conditions all plant will not be operational at the same time, nor necessarily operating to duty capacity. However, to assess a likely worst case, this modelling exercise has assumed this to be the case, a method that ensures the conservative aspect of the results.

The meteorological correction within the model was left at the default of $C_0 = 5$, thereby calculating that conditions are optimal for spreading source noise towards all NSL's.

Majority of onsite fixed plant were modelled as operating 24 hours with no notable variation in sound emission hour on hour. Where cyclic sound emission was noted during the spot measurements the highest recorded $L_{Aeq,T}$ value was used in determining the modelled sound power emission.

On-site buildings height data was obtained from the aerial survey supplied. Buildings further afield have been placed either through OSI mapping and public mapping suppliers.

4.4 Noise Modelling Results

Following the review of the baseline monitoring and taking cognisance of proposed improvement works that the management of the Facility are committed to implementing a proposed Future Model during the Harvest season when peak emissions are likely to occur, was developed for the Facility.

4.4.1 Future Model 1 – Harvest Season

The Future Model 1, is based on the existing baseline environment, as described in Section 3 above of this report but also a number of planned improvements. The model incorporates the following noise emission sources and/or mitigation:

- 2No. Modern Grain Store buildings under Planning Ref: 21/573;
- 2No. Modern Grain Dryers 1 & 3 under Planning Ref: 21/573;
- Grain Dryer 6 replaced with a modern Panford twin column vertical Dryer;
- Dryer 6 Intake mitigated by 12dB;
- Dryer 4 stacks mitigated by 15dB;
- Dryer 5 stacks mitigated by 5dB;
- Dryers 4a/4b and Dryer 5 pre-cleaners / doors mitigated by 5dB;
- Boilers flues mitigated by 10dB; and
- Seed Plant mitigated by 10dB.

Assumptions

These values are a likely worst-case scenario. General plant emissions are modelled as working 24 hours a day, at duty capacity and at the same time, however this is not typical even during harvest season. Therefore, as per this model, there is no discernible difference between day, evening or night-time emissions with the exception of vehicle movements onsite.

Weather conditions are modelled to present the spread of the noise emissions in all directions equally, which is not realistic, as typically conditions will favour one orientation over another.

Receptor positions are external to the receptor building and at the closest point of the property to the source, therefore not representative of the likely receptor position. Furthermore, local obstructions, including walls and hedging at the receptor positions have not been modelled.

The baseline monitoring, Section 3 of this report, identified three locations as likely to be compliant with typical EPA noise limits. Therefore, the modelling results for NSR04 in proximity to the NM4 are shown from the Future Model, to assess the future impact at this receptor.

Model Outputs

The results are shown in Table 4-3 below for NSR04 and all contributing sources, i.e. emissions within 10dB of the dominant emission, and are displayed at 4m height in Figure 4-3 below for the night-time period. Noise Contour Charts are presented in Appendix D.

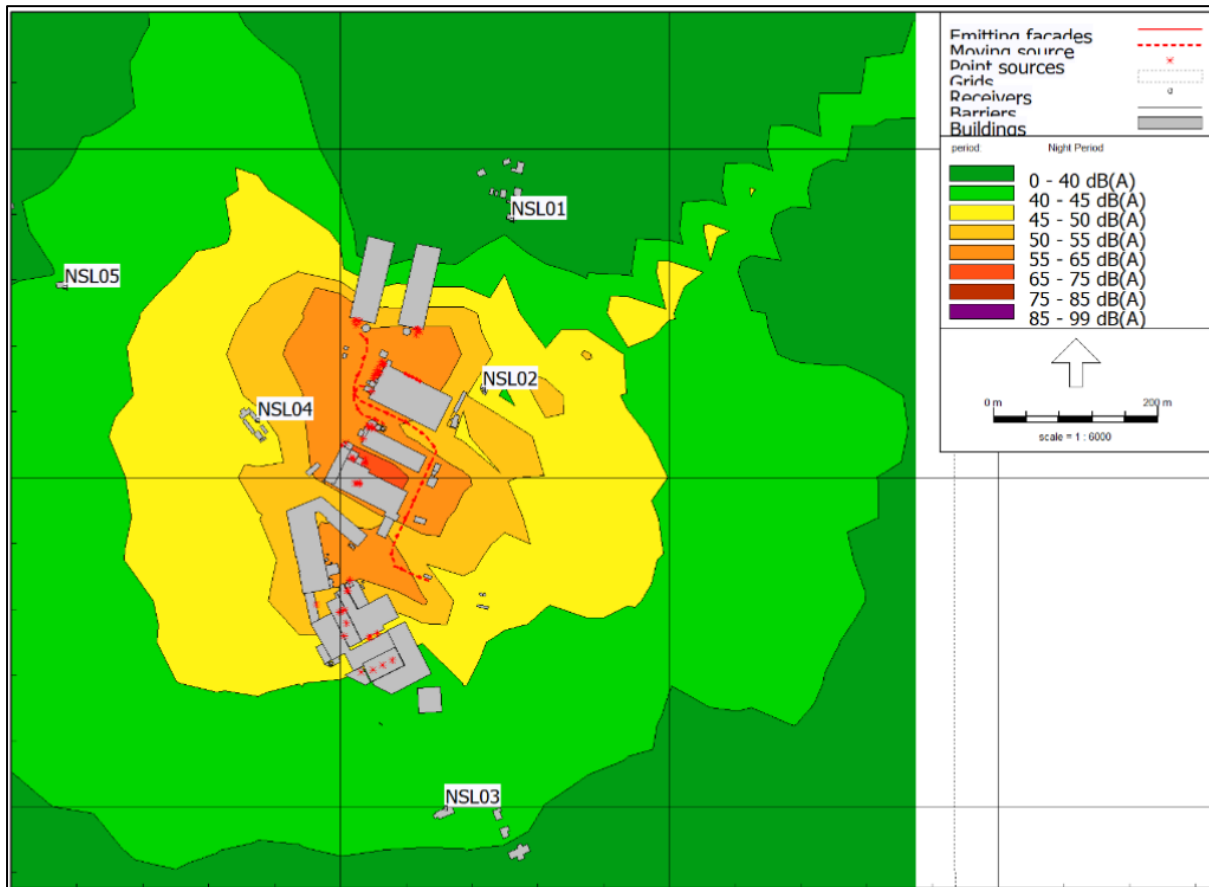
The predicted Future Model 1 shows a decrease of 8dB at NSR04 and reductions at all other identified NSRs when compared to the baseline noise survey.

Table 4-1: Future Model 1 – Predicted Site-Specific Noise Emissions at NSR04

Noise Model ID / Item	Orientation / Description	Day L _{Aeq} dB	Evening L _{Aeq} dB	Night L _{Aeq} dB
NSR04_A	Western	51	50	49
Dryer 4a	A2-41	37	37	37
Replacement Dryer 6	Fan 3	37	37	37
Replacement Dryer 6	Fan 4	37	37	37
Dryer 5	A2-37	36	36	36
Replacement Dryer 6	Fan 1	35	35	35
Dryer 2	A2-30A/B Dryer 2 exhaust vents	35	35	35
D6 Intake	Intake	35	35	35
Dryer4a	A2-42	35	35	35
Dryer 5	A2-36	35	35	35

Noise Model ID / Item	Orientation / Description	Day L _{Aeq} dB	Evening L _{Aeq} dB	Night L _{Aeq} dB
Dryer 5	A2-35	35	35	35
Replacement Dryer 6	Fan 2	35	35	35
Dryer 5	Pre-cleaner A2-42	35	35	35
Dryer 5	A2-34	35	35	35
GS Dryer 3	Fan 2	35	35	35
GS Dryer 3	Fan 1	34	34	34
Seed Plant	A2-49	33	33	33
Boiler	A1-2 Boiler Flue 1	33	33	33
Boiler	A1-1 Boiler Flue 2	33	33	33
Dryer 5	A2-33	33	33	33
Seed Plant	Stack 1	33	33	33
Seed Plant	Stack 2	33	33	33
Seed Plant	Stack 3	32	32	32
Replacement Dryer 6	Burner B3	31	31	31
Replacement Dryer 6	Aspirator 2	31	31	31
Replacement Dryer 6	Aspirator 1	31	31	31
Replacement Dryer 6	BurnerA3	30	30	30
Replacement Dryer 6	BurnerA2	30	30	30
Replacement Dryer 6	BurnerA1	30	30	30
Replacement Dryer 6	BurnerB2	30	30	30
Replacement Dryer 6	BurnerB1	30	30	30
Dryer 4a Door	Door to Pre-cleaner	29	29	29

Figure 4-1: Predicted Site-specific Noise Contours L_{night}



4.5 Noise Management Plan

It is proposed that in compliance with a future IE Licence, the Facility will develop a Noise Management Plan for the site which will:

- Identify areas of 'high' noise (>80dB) within the Facility's boundary;
- Identify the impact of Facility noise sources at noise sensitive locations (NSLs); and,
- Enable a timeframe and programme of continued noise management and reduction through targeted future mitigation measures.

It is important to note that to date the Facility has not received any complaints regarding noise. Regardless, the monitoring conducted in 2021 and the modelling completed as part of this assessment, have indicated that improvements can be made to improve acoustic conditions for the local environment.

Management at the Facility have proactively commenced to either immediately implement or commenced the design of the following measures to reduce noise emissions arising from the Facility:

- Weekly site walkovers, to identify any malfunctioning equipment, plant and/or vehicles;
- More regular maintenance of mobile vehicles and plant onsite;
- Modifications to existing plant on-site to reduce the noise emissions;
- Increased the use of buildings to contain noisy fixed plant by undertaking noisy activities indoors, where practicable;
- Seek to design noise reducing technologies at key locations, such as attenuators or enclosures, where practicable;
- Will ensure that any noise control measures will be maintained as per the manufacturers' requirements;
- Started to use screens around plant or equipment,
- Have started to ensure that all enclosures and doors/windows are properly sealed and/or closed.
- Switching off idling engines where possible and preventing excessive revving;
- All yard surfaces will be maintained to ensure that they will be kept in good order;
- The use of alternative varieties of reversing alarms with reduced noise output where safety is not impacted;
- All drivers are being made of the potential for noise to cause annoyance/disturbance to local residents – to ensure that they will show due regard to this, particularly when entering and leaving the site (e.g. no unnecessary sounding of horn);
- Onsite speed limits are being more strictly enforce to ensure vehicles are compliant with speed limits and installed traffic calming devices;
- Seeking to reschedule onsite Heavy Goods Vehicles (HGVs) to outside key night-time hours (23:00-05:00) where possible.

The Facility will implement acoustic management procedures as part of their proposed new Environmental Management System (EMS), which will include:

- Prior to purchasing or hiring plant and equipment, noise emission data from the supplier or manufacturer will be obtained, to confirm that the noise emissions will be below the noise levels of the existing plant that has been replaced;
- Where the purchase of equipment involves installing more than one item in the same location, the combined noise level will not exceed the noise levels of the existing plant.
- Acoustic control measures will be integrated early in the design process to eliminate or minimise the risks associated with noise.
- Agreements with contractors for the supply of goods or services on-site will be subject to the same noise exposure limits and requirements described in this procedure.

5 NOISE IMPACT ASSESSMENT

5.1 Non-Harvest Season

The noise emissions associated with the non-harvest season (10 months of the year) are likely to be compliant with the typical EPA limits at all identified NSLs as the major noise emissions identified in the noise model are associated with Harvest season operations such as grain dryers. The Facility has not received any complaints with regards to noise.

5.2 Harvest Season

The Facility is currently not licensed by the EPA and therefore not subject to annual noise compliance reports.

This report provides the assessment of the:

- Existing (Harvest Season); and
- Proposed mitigation and new plant (Future 1).

The mitigation measures input into the noise model specifies reduction in decibel levels as opposed to abatement works. The additional modelling of the proposed new sources and mitigation measures has been completed. The engineering works required to achieve these reductions are subject to more detailed design and will be agreed with the Agency prior to installation. In all cases, individual assessments, industry standards, best practice and techniques will be assessed.

The locality was assessed as per Step 1 of Section 4.4.2 of NG4 for Quiet Area. The assessment shows the locality is not a Quiet Area, arising from its proximity to local industrial areas, national road infrastructure and population centres.

The locality was assessed, as per Step 3 of Section 4.4.2 of NG4 for Low noise. The assessment shows the locality is not a Low noise environment, arising from the ambient background sound levels recorded at local dwellings.

Therefore, as per Sections 4.3 and 4.4 of NG4, the relevant sound emission limits, as measured at NSLs, should be:

- Daytime (07:00 to 19:00) - 55dB $L_{Ar,T}$;
- Evening time (19:00 to 23:00) – 50 dB $L_{Ar,T}$;
- Night-time (23:00 to 07:00) – 45dB $L_{Aeq,T}$.

This is as per typical conditions and Schedule B.4 of numerous existing EPA licenses.

Noise prediction modelling, incorporating the existing primary noise emissions, mitigated noise emissions and the new emissions associated with the Facility, has been completed. The results of this modelling show that in all cases, the typical sound emission limits will be complied with at all NSLs to north, east and south of the Facility.

Noise prediction modelling indicates no potential impact at the closest NSR, NSR04 during the daytime and evening time based on the compliance with the emission limits. A potential impact at NSR04 during the night-time period of ca.4dB may occur. However, it is noted that the noise model is a worst-case scenario, refer to section 3.1 above. Furthermore, the model does not incorporate the additional benefits of the noise management plan principles outlined in section 4.5 above. Taking into account the above, the noise emission audible at NSR04 is likely to be compliant at all times.

Therefore, the predicted impact, from the proposed Future Model 1. For the Facility is deemed negligible to local receptors. The management at the Facility are committed to implementing these measures as much as practicable prior to the commencement of the 2022 harvest season.

6 COMPLIANCE MONITORING

All monitoring for compliance purpose needs to comply with the requirements of the EPA's noise guidance, currently NG4 (EPA, 2016). This will specifically include:

- NG4 Chapter 2 – Competency of acoustician;
- NG4 Chapter 4.2 – Noise guidance, standards and legislation;
- NG4 Chapter 4.5 – Assessing compliance with criteria and limits;
- NG4 Chapter 5 – Assessment of tonality and impulsivity; and,
- NG4 Chapter 7 – Environmental noise surveys.

The pertinent noise criteria from NG4 for this Site, applicable at NSLs, is given in Table 6-1 and are deemed relevant for licensing purposes in this instance.

Table 6-1: Applicable Noise Criteria at NSLs

Parameters	Daytime 07:00 to 19:00 hours	Evening-time 19:00 to 23:00 hours	Night – time 23:00 to 07:00 hours
L _{Ar} (30 minutes)	55	50	-
L _{Aeq} (15 minutes)	-	-	45
There shall be no clearly audible tonal or impulsive component in the noise emission from the Site, audible at any Noise Sensitive Location (NSL).			

It is recommended that the Site utilises four (4No.) local NSLs. This will enable a stronger criterion for assessing any change that could occur during works onsite. A monitoring programme should be conducted by competent acousticians, each year to demonstrate noise compliance during the Harvest season, or such other times as a complaint may, in the future, arise, utilising the limits shown in Table 6-1 above at NSLs.

7 CONCLUSIONS

For the majority of the year the Facility is likely to be compliant with typical EPA noise limits.

The Facility Management is dedicated to the reduction of Facility noise emissions to ensure no adverse noise impacts occur at NSLs from noise emissions associated with the existing or future operations of the Facility at identified NSLs during the Harvest Season.

MOR propose that Table 7-1 below be incorporated into the IE Licence in Schedule B:4 Emission Limits.

Table 7-1: Proposed B.4 Noise Emission Limits

Receptor	Daytime L _{Ar} (30 minute) 07:00 to 19:00 hours	Evening-time L _{Ar} (30 minute) 19:00 to 23:00 hours	Night –time L _{Aeq} (15 minute) 23:00 to 07:00 hours
NSL	55	50	45
There shall be no clearly audible tonal or impulsive component in the noise emission from the Site, audible at any Noise Sensitive Location (NSL).			

MOR propose that a condition of similar standard wording as outlined below, be included within the licence:

‘The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the ‘Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) as published by the Agency.’

REFERENCES

- BSI. (2019). *BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound provides a method of assessing the impact of a source of industrial or commercial sound*. BSI.
- EPA. (2016). *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*.
- ISO. (2016). *ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise Part 1: Basic quantities and assessment procedures*. Geneva: ISO.
- ISO. (2017). *ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels*. Switzerland: International Organization for Standardization.
- ISO. (2017). *ISO 9613-2:2017: Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation*. ISO.

Appendices

Appendix A

Glossary of Acoustic Terminology

Abbreviation / Description Descriptor

A Weighted	A time weighting given to noise values to amend the values to suit the human ear response to the various frequency components of the sound.
Acoustic environment	Sound from all sound sources as modified by the environment (BS ISO 12913-1:2013).
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. <i>Note: The ambient sound comprises the residual sound and the specific sound when present.</i>
Ambient sound level, $L_a = L_{Aeq, T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T. <i>Note: the ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Background sound level, $L_{A90, T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
dB (decibel)	A relative unit of measurements, based on a logarithmic scale to describe the ratio between the measured level and a reference or threshold level of 0dB. Unless otherwise stated 0dB within this report is 2×10^{-5} pascals (Pa).
Day	A 24 hour period from midnight to midnight.
Daytime	A 12 hour period between 07:00 – 19:00 hours, as per NG4
Evening-Time	A 4 hour period between 19:00 – 23:00 hours, as per NG4
Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T=t_2-t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given the following equation: $L_{Aeq,T} = 10 \lg_{10} \left\{ (1/T) \int_{t_1}^{t_2} [p_A(t)^2 / p_0^2] dt \right\}$ <p>where: p_0 is the reference sound pressure (20 μPa); and $p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t</p> <i>Note: The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.</i>
$L_{AN,T}$	The Fast interval, A-Weighted noise level in the for the 'N' percentile of the sampling interval 'T'.
$L_{A10,T}$	The A-Weighted noise level for the 10%ile of the sampling interval 'T', typically utilised to represent peak noise events such as intermittent passing traffic.
$L_{A90,T}$	The A-Weighted noise level in the lower 90 percentile of the sampling interval 'T', excludes intermittent features typical of traffic. See also background sound level.
$L_{A95,T}$	The A-Weighted noise level for the 95%ile of the sampling interval 'T'. Representative of steady noise events at a monitoring location.

L _{Aeq,T}	The equivalent continuous sound level, used to describe the fluctuating noise in terms of a single noise level over the same sampling time period (T). Also see ambient sound.
L _{den}	Day-evening-night equivalent level, calculated as: $L_{den} = 10 \log \frac{1}{24} \left(12 * 10^{\frac{L_{day}}{10}} + 4 * 10^{\frac{L_{evening} + 5}{10}} + 8 * 10^{\frac{L_{night} + 10}{10}} \right)$ <p>Where the L_{day}, L_{evening} and L_{night} are as defined in ISO1996-2:1987, and for the duration of 12 hours, 4 hours and 8 hours respectively, are A-weighted long term Leq sound level.</p>
L _{day}	Day equivalent level. A-weighted Leq sound level measured over the 12 hour period from 07:00 hours to 19:00 hours.
L _{evening}	Evening equivalent level. A-weighted Leq sound level measured during the evening period of 19:00 hours to 23:00 hours.
L _{Amax}	The maximum RMS A-Weighted sound pressure level occurring within a specified time period.
L _{night}	Night equivalent level. A-weighted Leq sound level measured during the night period of 23:00 hours to 07:00 hours.
Measurement time interval, T _m	total time over which measurements are taken. <i>Note: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
Rating level, L _{A,r, T_r}	specific sound level plus any adjustment for the characteristic features of the sound.
Reference time interval, T _r	specified interval over which the specific sound level is determined. <i>Note: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h</i>
Residual sound	ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, L _r = L _{Aeq,T}	equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Specific sound level, L _s = L _{Aeq,Tr}	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T _r .
Specific sound source	sound source being assessed.
Night-Time	An 8 hour period between 23:00 – 07:00 hours, as per NG4
Noise Ambient	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. Also see ambient sound.
Noise Background	The steady existing noise level present without contribution from any intermittent sources, The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, 'T' (L _{AF90,T}). Also see background sound level, L _{A90, T} .
Noise Specific	The sound arising from the source under investigation, disregarding all external and residual sources. Also see specific sound source.
NSR	Noise Sensitive Receptor - an identified dwelling, amenity area, recreational zone or other such place where a change in noise may result in a nuisance impact.
RMS	Root Mean Squared, mathematical method to account for swells and troughs within wave forms, such as sound.

Sound Power Level (L_W)	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m ² . Utilised to express the intensity at source of a noise emission.
Sound Pressure Level (L_P)	Fluctuations in air pressure caused by the passage of a sound wave. The measurement of sound/noise through the use of a sound level meter, is a representation of these fluctuations in air pressure as they pass the instrument microphone.
Time Weighting	One of the averaging time for noise monitoring instrumentation: F – Fast, instrument samples every 125 milliseconds; S – Slow, instrument samples every 1 second; I – Impulsive, instrument samples every 35 milliseconds.

Note:

Unless otherwise stated all broadband noise values are A-weighted with a fast response.

Where 0dB is referenced it refers to the threshold of hearing – 2×10^{-5} Pa.

All 1/3 octave values are unweighted/linear. (z-weighted on the Bruel and Kjaer software)

Appendix B



Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

No pattern approval is available for this sound level meter configuration.

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2	S/N	A2A-18871-E0
Firmware	V4.50		
Reference Level Range	mid		
Microphone Model	M2230		
Preamplifier	MA220	S/N	8112
Microphone Capsule	MC230A	S/N	A16684
Performance class	Class 1		
Customer Inventory Nr.			

Customer


Malone O'Regan Environmental
Unit 3 Bracken Business Park
Bracken Road
Sandyford
Dublin 18

Date 01 February 2021

Certificate UK-21-007

Results **PASSED**
(for detailed report see next pages)

Operator


David Young

Measurement equipment

Test System

Model	NTi Audio FX100, S/No. 11095
Last Calibration	27 October 2020
Cal Certificate	FX100 Cal #6585
Next Calibration	27 October 2021

Reference Microphone

Model	M2230 S/N #9565, Mic Capsule MC230A S/No. #A19844
Last Calibration	08 January 2021
Cal Certificate	44204-9565-M2230
Next Calibration	08 January 2022

Sound Calibrator

Model	Larson Davis S/No. #17889
Reference Level	113.91 dB
Calibration Frequency	1000 Hz
Last Calibration	02 October 2020
Cal Certificate	44106-17889-CAL200
Next Calibration	02 October 2022

Environmental conditions

Temperature	22.7 °C
Humidity	33 %
Pressure	990 hPa

Notes

- This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the international Systems of Units (SI).
- The user is obliged to have the object recalibrated at appropriate intervals.
- This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature are not valid.
- All limits listed in this report are acceptance limits in accordance with IEC61672.
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

1. Indication at the calibration check frequency

The indication of the sound level meter at the calibration check frequency is checked by application of the sound calibrator and adjusted, if necessary, to indicate the required sound level for the environmental conditions under which the tests are performed. All levels in [dB].

Sensitivity before calibration	Sensitivity after calibration	Meas level	Limit -	Limit +	Uncert.	Status
43.4 mV/Pa	43.6 mV/Pa	114.1	112.91	114.91	0.2	Passed

2. Self-generated noise

2.1 Microphone cartridge installed

The self-generated noise is measured in the most-sensitive level range as a time-averaged sound pressure level with frequency-weighting A and an averaging time of 30 seconds. All levels in [dB].

Weighting	Meas level	Limit +	Uncert.	Status
A	17.0	18.0	0.1	Passed

2.2 Microphone cartridge replaced by the capsule replacement NTI-K65-15

The self-generated noise is measured in the most-sensitive level range as a time-averaged sound pressure level for all frequency-weightings and an averaging time of 30 seconds. All levels in [dB] referenced to $S = 42 \text{ mV/Pa}$.

Weighting	Meas level	Limit +	Uncert.	Status
A	10.0	13.0	0.1	Passed
C	13.7	16.0	0.1	Passed
Z	19.7	24.0	0.1	Passed

3. Acoustic signal tests of a frequency weighting

The frequency weighting is tested for frequency-weighting A, using an acoustic test facility. The sound level meter is set to a fast time-weighted sound level in the reference level range. All levels in [dB].

Freq. [Hz]	Gen. level	Meas level	Dev	Limit -	Limit +	Uncert.	Status
125	69.8	69.8	0.0	-1.0	1.0	0.4	Passed
250	77.4	77.3	-0.1	-1.0	1.0	0.4	Passed
500	82.8	82.7	-0.1	-1.0	1.0	0.4	Passed
1000	86.0	85.9	-0.1	-0.7	0.7	0.4	Passed
2000	87.2	87.1	-0.1	-1.0	1.0	0.4	Passed
4000	87.0	87.0	0.0	-1.0	1.0	0.4	Passed
8000	84.9	85.1	0.2	-2.5	1.5	0.4	Passed

4. Electric signal tests of frequency weightings

Frequency weightings are determined relative to the response at 1 kHz using steady sinusoidal electrical input signals. The sound level meter is set to display F-time-weighted sound level in the reference level range. All available frequency weightings provided in the sound level meter are verified. All levels in [dB].

4.1 A-Weighting

Freq. [Hz]	Gen. level	Meas level	Dev	Limit -	Limit +	Uncert.	Status
1000	80.0	80.0	0.0	-0.7	0.7	0.1	Passed
63	106.2	79.8	-0.2	-1.0	1.0	0.1	Passed
125	96.1	79.8	-0.2	-1.0	1.0	0.1	Passed
250	88.6	79.9	-0.1	-1.0	1.0	0.1	Passed
500	83.2	79.9	-0.1	-1.0	1.0	0.1	Passed
2000	78.8	80.0	0.0	-1.0	1.0	0.1	Passed
4000	79.0	79.9	-0.1	-1.0	1.0	0.1	Passed
8000	81.1	79.9	-0.1	-2.5	1.5	0.1	Passed
12500	84.3	79.8	-0.2	-2.5	1.5	0.1	Passed
16000	86.6	79.8	-0.2	-2.5	1.5	0.1	Passed

4.2 C-Weighting

Freq. [Hz]	Gen. level	Meas level	Dev	Limit -	Limit +	Uncert.	Status
1000	80.0	80.0	0.0	-0.7	0.7	0.1	Passed
63	80.8	79.8	-0.2	-1.0	1.0	0.1	Passed
125	80.2	79.9	-0.1	-1.0	1.0	0.1	Passed
250	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
500	80.0	80.0	0.0	-1.0	1.0	0.1	Passed
2000	80.2	80.0	0.0	-1.0	1.0	0.1	Passed
4000	80.8	79.9	-0.1	-1.0	1.0	0.1	Passed
8000	83.0	79.9	-0.1	-2.5	1.5	0.1	Passed
12500	86.2	79.8	-0.2	-2.5	1.5	0.1	Passed
16000	88.5	79.7	-0.3	-2.5	1.5	0.1	Passed

4.3 Z-Weighting

Freq. [Hz]	Gen. level	Meas level	Dev	Limit -	Limit +	Uncert.	Status
1000	80.0	79.9	-0.1	-0.7	0.7	0.1	Passed
63	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
125	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
250	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
500	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
2000	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
4000	80.0	79.9	-0.1	-1.0	1.0	0.1	Passed
8000	80.0	79.9	-0.1	-2.5	1.5	0.1	Passed
12500	80.0	79.9	-0.1	-2.5	1.5	0.1	Passed
16000	80.0	79.9	-0.1	-2.5	1.5	0.1	Passed

5. Frequency and time weightings at 1kHz

While injecting a constant steady signal at the reference frequency of 1 kHz the F-time-weighted sound level, S-time-weighted sound level and time-averaged sound level are verified with frequency weighting A. Additionally the F-time-weighted sound level for frequency weightings C and Z is measured. The first measurement serves as reference and differences in the reading with respect to this first one are determined. All levels in [dB].

Level	Exp level	Meas level	Dev	Limit -	Limit +	Uncert.	Status
LAF	114.0	114.0	0.0	-0.7	0.7	0.1	Passed
LAS	114.0	113.7	-0.3	-0.7	0.7	0.1	Passed
LAeq	114.0	114.0	0.0	-0.7	0.7	0.1	Passed
LCF	114.0	114.0	0.0	-0.7	0.7	0.1	Passed
LCEq	114.0	114.0	0.0	-0.7	0.7	0.1	Passed
LZF	114.0	114.0	0.0	-0.7	0.7	0.1	Passed
LZeq	114.0	114.0	0.0	-0.7	0.7	0.1	Passed

6. Level linearity on the reference level range

The level linearity on the reference level range is determined by applying steady sinusoidal electrical signals at a frequency of 8 kHz with the sound level meter set for frequency-weighting A and fast time-weighting. All levels in [dB].

Exp abs level	Meas. level	Abs dev	Abs Limit -	Abs Limit +	Exp rel level	Rel dev	Rel Limit -	Rel Limit +	Uncert.	Status
114.0	114.0	0.0	-0.8	0.8	0.0	0.0	-0.3	0.3	0.1	Passed
119.0	119.0	0.0	-0.8	0.8	119.0	0.0	-0.3	0.3	0.1	Passed
124.0	124.0	0.0	-0.8	0.8	124.0	0.0	-0.3	0.3	0.1	Passed
125.0	125.0	0.0	-0.8	0.8	125.0	0.0	-0.3	0.3	0.1	Passed
114.0	114.0	0.0	-0.8	0.8	0.0	0.0	-0.3	0.3	0.1	Passed
109.0	109.0	0.0	-0.8	0.8	109.0	0.0	-0.3	0.3	0.1	Passed
104.0	104.0	0.0	-0.8	0.8	104.0	0.0	-0.3	0.3	0.1	Passed
99.0	99.0	0.0	-0.8	0.8	99.0	0.0	-0.3	0.3	0.1	Passed
94.0	94.0	0.0	-0.8	0.8	94.0	0.0	-0.3	0.3	0.1	Passed
89.0	89.0	0.0	-0.8	0.8	89.0	0.0	-0.3	0.3	0.1	Passed
84.0	84.0	0.0	-0.8	0.8	84.0	0.0	-0.3	0.3	0.1	Passed
79.0	79.0	0.0	-0.8	0.8	79.0	0.0	-0.3	0.3	0.1	Passed
74.0	74.0	0.0	-0.8	0.8	74.0	0.0	-0.3	0.3	0.1	Passed
69.0	69.0	0.0	-0.8	0.8	69.0	0.0	-0.3	0.3	0.1	Passed
64.0	64.0	0.0	-0.8	0.8	64.0	0.0	-0.3	0.3	0.1	Passed
59.0	59.0	0.0	-0.8	0.8	59.0	0.0	-0.3	0.3	0.1	Passed
54.0	54.0	0.0	-0.8	0.8	54.0	0.0	-0.3	0.3	0.1	Passed
49.0	49.0	0.0	-0.8	0.8	49.0	0.0	-0.3	0.3	0.1	Passed
44.0	44.0	0.0	-0.8	0.8	44.0	0.0	-0.3	0.3	0.1	Passed
39.0	39.0	0.0	-0.8	0.8	39.0	0.0	-0.3	0.3	0.1	Passed
34.0	34.1	0.1	-0.8	0.8	34.0	0.1	-0.3	0.3	0.1	Passed
33.0	33.1	0.1	-0.8	0.8	33.1	0.0	-0.3	0.3	0.1	Passed
32.0	32.1	0.1	-0.8	0.8	32.1	0.0	-0.3	0.3	0.1	Passed
31.0	31.2	0.2	-0.8	0.8	31.1	0.1	-0.3	0.3	0.1	Passed
30.0	30.2	0.2	-0.8	0.8	30.2	0.0	-0.3	0.3	0.1	Passed

7. Level linearity including the level range control

The test is performed with steady sinusoidal electrical input signals at a frequency of 1 kHz and with the sound level meter set for frequency weighting A and fast time weighting. With the input signal level kept constant, the indicated signal level is recorded for all level ranges where the applied signal level is displayed. All levels in [dB].

Starting Range	Source level	Low Range		Mid Range		High Range		Uncert.	Status
		Dev	Limit +/-	Dev	Limit +/-	Dev	Limit +/-		
Low	94	0.0	0.40	0.0	0.15	0.0	0.15	0.1	Passed
Mid	114			0.0	0.30	0.0	0.55	0.1	Passed
High	134					0.0	0.30	0.1	Passed
Low	29	0.1	0.30					0.1	Passed
Mid	36			0.1	0.30			0.1	Passed
High	58					0.1	0.30	0.1	Passed

8. Toneburst response

The response of the sound level meter to short-duration signals is tested on the reference level range with 4 kHz tonebursts that start and stop at zero crossings and are extracted from steady 4 kHz sinusoidal electrical input signals. The sound level meter is set for frequency weighting A. All levels in [dB].

The continuous signal level is 123 dB.

Burst signal	Burst duration [ms]	Exp level	Meas level	Dev	Limit -	Limit +	Uncert.	Status
LAF	200	122.0	122.0	0.0	-0.5	0.5	0.2	Passed
LAF	2	105.0	104.9	-0.1	-1.5	1.0	0.2	Passed
LAF	0.25	96.0	95.8	-0.2	-3.0	1.0	0.2	Passed
LAS	200	115.6	115.5	-0.1	-0.5	0.5	0.2	Passed
LAS	2	96.0	96.0	0.0	-3.0	1.0	0.2	Passed
LAeq10s	200	106.0	106.0	0.0	-0.5	0.5	0.2	Passed
LAeq10s	2	86.0	85.9	-0.1	-0.5	0.5	0.2	Passed
LAeq10s	0.25	77.0	76.8	-0.2	-0.5	0.5	0.2	Passed

9. C-weighted peak sound level

The sound level meter is tested on the least-sensitive level range with fast time weighting and C frequency weighting. The test signals are a single complete cycle of an 8 kHz sinusoid starting and stopping at zero crossings and positive and negative half cycles of a 500 Hz sinusoid that also start and stop at zero crossings. All levels in [dB].

Burst signal	Source level	Exp LCp-LCF	Meas LCp-LCF	Dev	Limit -	Limit +	Uncert.	Status
8kHz	129.0	3.4	3.3	-0.1	-2.0	2.0	0.2	Passed
500Hz +	132.0	2.4	2.2	-0.2	-1.0	1.0	0.2	Passed
500Hz -	132.0	2.4	2.2	-0.2	-1.0	1.0	0.2	Passed

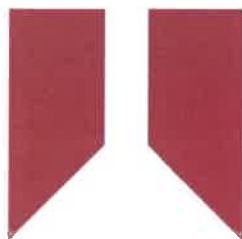
10. Overload Indication

Overload indication is tested on the least-sensitive level range with the sound level meter set to A-weighted, time-averaged sound level. Positive and negative one-half-cycle sinusoidal electrical signals at a frequency of 4 kHz are used. All levels in [dB].

Start level	OV +	OV -	Dev	Limit -	Limit +	Uncert.	Status
136.7	139.0	138.9	0.1	-1.5	1.5	0.3	Passed

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**
DATE OF ISSUE **04/08/21** CERTIFICATE NUMBER **160867**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Test engineer:
D.Swalwell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc

Model: MK:224

Serial Number: 213946A

Calibration procedure

Open circuit: 47.7 mV/Pa

Sensitivity at 1 kHz: -26.4 dB rel 1 V/Pa

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to a National Measurement Institute.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Environmental conditions

Pressure: 100.90 kPa

Temperature: 20.0 °C

Humidity: 25.0 %

CERTIFICATE OF CALIBRATION

Certificate Number:
160866

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 102.29 kPa Temperature: 20.0 °C Humidity: 33.7 %
After Pressure: 102.30 kPa Temperature: 19.8 °C Humidity: 33.3 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	421872
Attenuator	Cirrus Research	ZE:952	80380
Environmental Monitor	Comet	T7510	17963955

Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

Preamplifier

Model: MV:200F

Serial number: 11430F

Microphone

Model: MK:224

Serial number: 213946A

Test results summary

Test	Result
Internal settings adjustment	Complies
Toneburst response	Complies
Electrical noise-floor	Complies
Linearity	Complies
Electrical Frequency weightings	Complies
Frequency and time weightings at 1 kHz	Complies
C-weighted peak	Complies
Overload indication	Complies
High level stability	Complies
Long-term stability	Complies



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to **Malone O'Regan Environmental Services**
Unit 3, Ground Floor
Bracken Business Park
Bracken Road
Sandyford
Dublin 18

Attention of **Kenneth Goodwin**

Certificate Number 193683
Item Calibrated Bruel and Kjaer 2250 Sound Level Meter with Type 4189 Microphone
Serial Numbers 3003910 (Sound Level Meter), 2887163 (Microphone)
ID Number MOR Asset No. 48
Order Number 2261
Date Received 24 Sep 2019
NML Procedure Number AP-NM-09

Method The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).

Calibration Standards Norsonic 1504A Calibration System incorporating:
SR DS360 Signal Generator, No. 0735 [Cal Due Date: 31 Dec 2019]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 19 Nov 2019]
B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 24 Apr 2021]
B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 19 Jan 2020]
B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 21 Jun 2020]

Calibrated by


David Fleming

Approved by


Paul Hetherington

Date of Calibration

03 Oct 2019

Date of Issue

03 Oct 2019



This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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4. This certificate relates only to the item(s) described on the front page and shall not be reproduced, except in full.
5. This contract is governed by the laws of Ireland whose courts shall have exclusive jurisdiction.

Ambient laboratory conditions:

Barometric Pressure:	100.3 kPa ± 0.5 kPa
Temperature:	22.6 °C ± 1 °C
Relative Humidity:	42 % ± 5 %

Summary of Results:

The following table summarises the results of the verification tests. The detailed results are given in the subsequent tables.

IEC 61672 Test	Test Title	Status
10	Self-generated Noise (Electrical)	See Notes
11	Acoustical Signal	PASS
12	Frequency Weighting	PASS
13	Frequency and Time Weighting @ 1 kHz	PASS
14	Level Linearity Test on Reference Level Range	PASS
15	Level Linearity including Range Control	Not Applicable
16	Toneburst Response	PASS
17	Peak C	PASS
18	Overload Indication	PASS

Detailed Results.

Prior to carrying out the verification tests the Sound Level Meter was confirmed to be reading correctly for pressure response using NML's reference Acoustical Calibrator.

All verification tests were carried out with the microphone extension cable connected to the Sound Level Meter.

Self-generated Noise Test (Electrical Input) (Test #10) ⁽¹⁾

Range: 140 dB
 Mode: Leq

SLM Configuration	Freq. Weighting Network	SLM Reading ^{(2),(3)}
Microphone installed	A	19.2 dB
Microphone replaced by electrical signal device and Fitted with a short-circuit	A	16.2
	C	17.7
	Z (Linear)	22.9

Acoustical signal test of a frequency weighting (Test #11) ⁽¹⁾

Range: 140 dB
 Frequency Weighting setting: C
 Time Weighting response: Slow

Input Level ⁽⁴⁾	Input Freq.	SLM Error of Indication ⁽⁵⁾	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
94.0 dB	1000 Hz	0.0 dB	1.1 dB	0.3 dB
	125	+0.1	1.5	0.3
	4000 ⁽⁷⁾	0.0	1.6	0.5
	8000 ⁽⁷⁾	-0.3	2.1, -3.1 dB	0.9

**Electrical signal tests of frequency weightings (Test #12)⁽¹⁾**

Range: 140 dB

Freq. (nominal)	Input Level ⁽⁴⁾	SLM Reading	SLM Error of Indication ⁽⁵⁾	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
A-Weighting					
63 Hz	95 dB	95.0 dB	0.0 dB	1.5 dB	0.20 dB
125	95	95.0	0.0	1.5	0.20
250	95	95.0	0.0	1.4	0.20
500	95	95.0	0.0	1.4	0.20
1000	95	95.0	0.0	1.1	0.20
2000	95	95.0	0.0	1.6	0.20
4000	95	95.0	0.0	1.6	0.20
8000	95	95.0	0.0	2.1, -3.1	0.20
16000	95	94.1	-0.9	3.5, -17	0.20
C-Weighting					
63 Hz	95 dB	95.0 dB	0.0 dB	1.5 dB	0.20 dB
125	95	95.0	0.0	1.5	0.20
250	95	95.0	0.0	1.4	0.20
500	95	95.0	0.0	1.4	0.20
1000	95	95.0	0.0	1.1	0.20
2000	95	95.0	0.0	1.6	0.20
4000	95	95.0	0.0	1.6	0.20
8000	95	95.0	0.0	2.1, -3.1	0.20
16000	95	94.1	-0.9	3.5, -17	0.20
LIN Weighting					
63 Hz	95 dB	95.0 dB	0.0 dB	1.5 dB	0.20 dB
125	95	95.0	0.0	1.5	0.20
250	95	95.0	0.0	1.4	0.20
500	95	95.0	0.0	1.4	0.20
1000	95	95.0	0.0	1.1	0.20
2000	95	95.0	0.0	1.6	0.20
4000	95	95.0	0.0	1.6	0.20
8000	95	95.0	0.0	2.1, -3.1	0.20
16000	95	94.1	-0.9	3.5, -17	0.20

Frequency and time weightings at 1 kHz (Test #13)⁽¹⁾

Range: 140 dB

Time Weighting Setting	Frequency Weighting Setting	Input Level ⁽⁴⁾	Deviation from Reference	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
Fast	A	94.0 dB	0.0 dB	0.4 dB	0.20 dB
	C		0.0		0.20
Slow	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
Leq.	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
SEL	A	114.0 dB	0.0 dB	0.3 dB	0.20 dB

**Linearity level on the reference range (Test #14)⁽¹⁾**

Input Frequency: 8 kHz
 SLM Measuring Mode: SPL

Range	Input Level ⁽⁴⁾	SLM Reading	SLM Error of Indication ⁽⁵⁾	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
140 dB	94 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	99	99.0	0.0	1.1	0.20
	104	104.0	0.0	1.1	0.20
	109	109.0	0.0	1.1	0.20
	114	114.0	0.0	1.1	0.20
	119	119.0	0.0	1.1	0.20
	124	124.0	0.0	1.1	0.20
	129	129.0	0.0	1.1	0.20
	134	134.0	0.0	1.1	0.20
	137	137.0	0.0	1.1	0.20
	138	138.0	0.0	1.1	0.20
	139	139.0	0.0	1.1	0.20
	94	94.0	0.0	1.1	0.20
	89	89.0	0.0	1.1	0.20
	84	84.0	0.0	1.1	0.20
	79	79.0	0.0	1.1	0.20
	74	74.0	0.0	1.1	0.20
	69	68.9	-0.1	1.1	0.20
	64	63.9	-0.1	1.1	0.20
	59	58.9	-0.1	1.1	0.21
	54	53.9	-0.1	1.1	0.21
	49	48.9	-0.1	1.1	0.21
	44	44.0	0.0	1.1	0.21
	39	39.0	0.0	1.1	0.21
	34	34.0	0.0	1.1	0.23
	28	28.1	+0.1	1.1	0.25
	27	27.1	+0.1	1.1	0.25
26	26.2	+0.2	1.1	0.25	
25	25.2	+0.2	1.1	0.25	
24	24.3	+0.3	1.1	0.25	

Toneburst response (Test #16)⁽¹⁾

Range: 140 dB

Burst Type	SLM Mode	Input Level ⁽⁴⁾	SLM Error of Indication ⁽⁵⁾	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
200 ms	LAF	119.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	LAF	102.0	-0.1	1.3	0.3
0.25 msec	LAF	93.0	-0.2	1.3, -3.3	0.3
200 ms	LAS	112.6 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	LAS	93.0	-0.1	1.3, -1.8	0.3
200 ms	SEL	113.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	SEL	93.0	-0.1	1.3	0.3
0.25 ms	SEL	84.0	-0.2	1.3, -3.3	0.3



Peak C sound level (Test #17)⁽¹⁾

Range: 140 dB

Pulse Type	Pulse Frequency	Input Level ⁽⁴⁾ (peak value)	SLM Error of Indication ⁽⁵⁾	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
1 cycle	8 kHz	138.4 dB	0.1 dB	2.4 dB	0.35 dB
Pos. 1/2 cycle	500 Hz	137.4 dB	-0.3 dB	1.4 dB	0.35 dB
Neg. 1/2 cycle	500 Hz	137.4 dB	-0.3 dB	1.4 dB	0.35 dB

Overload indication (Test #18)⁽¹⁾

Range: 140 dB

SLM Measuring Mode: LAEq

Test description	Overload occurred at (±)	Meas. Diff. (Pos - Neg)	Tolerance ⁽⁶⁾ (±)	Uncertainty of Measurement (±)
Positive 1/2 cycle at 4 kHz	141.8 dB	-	-	-
Negative 1/2 cycle at 4 kHz	142.1 dB	-	-	-
Level difference of positive & negative pulses	-	0.3 dB	1.8 dB	0.30 dB

Notes:

- (1) The test number, given in parentheses after the section heading, refers to the relevant clause in IEC 61672-3 (2006).
- (2) SLM denotes Sound Level Meter
- (3) The measured self generated noise was found to be marginal to specification. This is likely due to the influence of ambient noise levels.
- (4) All input levels are given in dB relative to a 20 μ Pa reference level.
- (5) The SLM Error of Indication is defined as follows:
$$\text{SLM Error of Indication} = (\text{SLM Reading} - \text{Input Level})$$

Any error of indication that exceeds the relevant tolerance limits [see note (6)] is indicated using a \$ symbol.
- (6) The figures in the column labelled 'Tolerance' are the acceptance limits given in IEC 61672-1(2003). These tolerance limits include an allowance for the maximum expanded uncertainty of the test laboratory. The criteria for compliance with the tolerance is that the measurement result, extended by its associated uncertainty, lies within the specified limits.
- (7) Microphone response at 4 and 8 kHz was measured using an electrostatic actuator. Free field corrections of +0.9 and +2.8 dB respectively were applied to the measured actuator response.
This measurement is not included in NML's tables of Calibration and Measurement Capabilities, approved under the CIPM MRA.
For information, the measured sensitivity and frequency response of the microphone is given in an addendum to this certificate

Comments:

The instrument was found to meet the requirements of IEC 61672-1 (2003) using the verification procedures set out in IEC 61672-3 (2006) at the time of calibration.

Uncertainty of Measurement:

The measurement uncertainty is reported as a standard uncertainty multiplied by a coverage factor $k=2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. The given uncertainty refers to the measured values only and carries no implication regarding the long-term stability of the item calibrated.

Traceability:

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML), to internationally accepted realisations of the SI units.



NSAI

National Metrology Laboratory

Addendum to Certificate 193683

Brüel & Kjær
Type: 4189

Serial no: 2887163

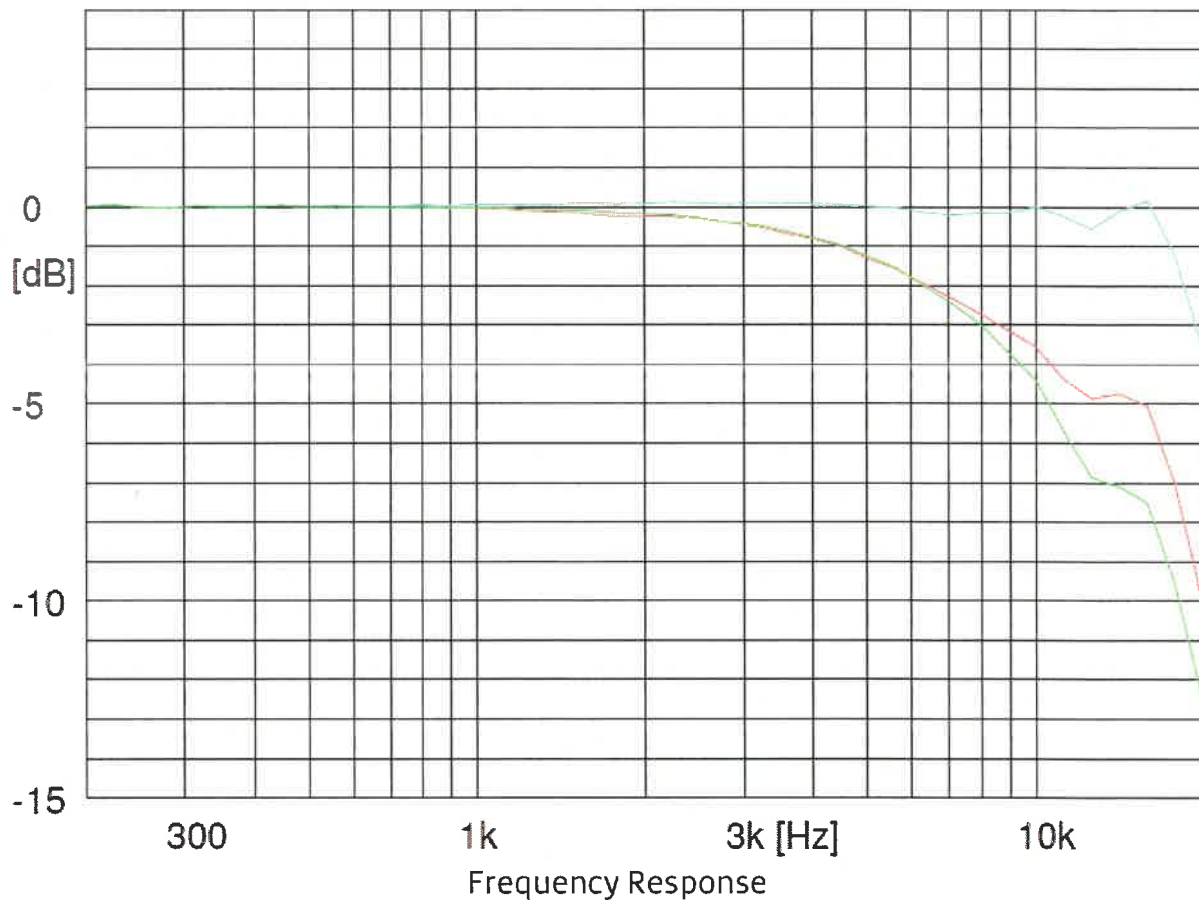
Sensitivity: 53.1 mV/Pa
-25.5 ±0.10 dB re. 1 V/Pa

Date: 03/10/2019

Measurement conditions:

Polarisation voltage: 0.0 V
Pressure: 100.64 ±0.51 kPa
Temperature: 22.2 ±1.1 °C
Relative humidity: 41.1 ±5.1 %RH
Results are normalized to
the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response





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National Metrology Laboratory

Certificate of Calibration

Issued to **Malone O'Regan Environmental Services**
Ground Floor Unit 3
Bracken Business Park
Bracken Road
Sandyford
Dublin 18

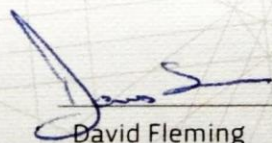
Attention of **Martin Kearns**

Certificate Number **213063**
Item Calibrated **Bruel & Kjaer Type 4231 Sound Level Calibrator**
Serial Number **2217952**
ID Number **None**
Order Number **00043**
Date Received **26 Jul 2021**
NML Procedure Number **AP-NM-13**

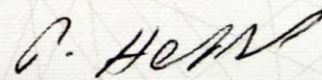
Method **The above calibrator was allowed to stabilize for a suitable period in laboratory conditions. It was then calibrated by measuring the sound pressure level generated in its measuring cavity (half-inch configuration). The calibrator's operating frequency was also measured.**

Calibration Standards **Norsonic 1504A Calibration System incorporating:
Agilent 34401A Digital Multimeter, File No. 0736 [Cal due: 10 Jun 2022]
B & K 4134 Measuring Microphone, File No. 0743 [Cal due: 27 May 2022]
B & K 4228 Pistonphone, File No. 0741 [Cal due: 26 May 2022]**

Calibrated by


David Fleming

Approved by


Paul Hetherington

Date of Calibration

28 Jul 2021

Date of Issue

28 Jul 2021



This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)



Standard Terms & Conditions for Calibration, Testing and Consultancy Assignments

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Decision Rule and Compliance Statement

The rule that describes how measurement uncertainty is accounted for when stating conformity with a specified requirement is known as a decision rule. The rule used by NSAI NML follows the guidelines set out in the document ILAC-G8:09/2019 published by the International Laboratory Accreditation Co-operation. Further information on the decision rule is available on the NSAI website:

(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

The symbols used to indicate the state of compliance of the instrument calibration and their meanings are given in the following table.

Statement of compliance and associated symbol	Description
PASS	The absence of a symbol indicates that the measurement result is inside the specification limit by a margin greater than its associated expanded uncertainty; the instrument meets its accuracy specification.
Conditional PASS Symbol: £	The measurement result is inside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state compliance. There is a risk that the instrument fails to meet its specification.
Conditional FAIL Symbol: &	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: \$	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: #	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
Outside CIPM MRA Symbol: †	Indicates that the calibration result is traceable to SI units but is not currently included in the table of NSAI NML's calibration and measurement capabilities approved under the CIPM MRA.

Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Measuring Conditions:
 Ambient Pressure: (99.8 ± 0.5) kPa
 Ambient Temperature: (22.1 ± 1.0) °C
 Ambient Rel. Humidity: (52 ± 5) %RH

Results:

The measured sound pressure level reported below refers to the reference conditions specified by the manufacturer. Corrections were applied using sensitivity coefficients provided by the manufacturer, where available. These reference conditions and sensitivity coefficients are listed below.

Parameter	Reference Value	Sensitivity Coefficient
Ambient Pressure	101.325 kPa	0.000 8 dB/kPa
Ambient Temperature	20 °C	0.000 dB/°C ⁽¹⁾
Ambient Relative Humidity	65 %RH	0.000 dB/%RH ⁽¹⁾

Calibrator Setting	Measured Parameter	Measured Value ⁽²⁾		Tol. ⁽³⁾ (±)	Meas. Uncertainty (±)
		Before Adj.	After Adj.		
94 dB	Sound Pressure Level	94.10 dB	*	0.40 dB	0.15 dB
	Frequency	1000.0 Hz	*	10 Hz	0.25 Hz
114 dB	Sound Pressure Level	114.08 dB	*	0.40 dB	0.15 dB
	Frequency	1000.0 Hz	*	10 Hz	0.25 Hz

- Notes: (1) No sensitivity coefficient information was available for this influence parameter.
 (2) * indicates that no calibration adjustment was made.
 (3) Tolerances given in IEC 60942 (2003), Sound Level Calibrators, Class 1.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to comply with the requirements of IEC 60942 (2003), Class 1, for the sound pressure level and frequency outputs measured at the time of calibration.

Note that for acoustic calibrators which meet IEC 60942 (2003), the instrument is considered out of tolerance if the measured deviation from the set level, extended by its associated uncertainty, exceeds the specified tolerance limits.

When using the calibrator with a sound level meter any manufacturer's guidelines regarding free-field corrections should be observed.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

Appendix C

Date	Time	Temp Out	Hi Temp	Low Temp	Out Hum	Dew Pt.	Wind Speed	Wind Dir	Wind Run	Hi Speed	Hi Dir	Wind Chill	Heat Index	THW Index	Bar	Rain	Rain Rate	Heat D-D	Cool D-D	In Temp	In Hum	In Dew	In Heat	In EMC	In Air Density	Wind Samp	Wind Tx	ISS Receipt	Arc. Int.
17/08/21	10:00	15.9	15.9	15.9	78	12.1	0.0	---	0.00	0.0	---	15.9	15.8	15.8	814.0	0.00	0.0	0.100	0.000	20.3	61	12.5	20.1	11.25	1.2719	22	1	1.6	60
17/08/21	11:00	17.3	17.3	15.9	82	14.2	0.0	E	0.00	0.9	E	17.3	17.5	17.5	813.6	0.51	4.8	0.042	0.000	19.4	69	13.6	19.4	12.97	1.2736	1008	1	73.7	60
17/08/21	12:00	17.1	17.5	17.0	81	13.8	0.4	E	1.61	1.8	ESE	17.1	17.2	17.2	813.5	0.25	3.3	0.051	0.000	19.3	68	13.3	19.3	12.68	1.2744	1400	1	100.0	60
17/08/21	13:00	17.2	17.2	16.8	83	14.3	0.4	E	1.61	1.3	SE	17.2	17.4	17.4	813.7	0.00	0.0	0.046	0.000	17.9	73	13.0	17.8	14.04	1.2810	1399	1	100.0	60
17/08/21	14:00	17.4	17.4	16.9	83	14.5	0.4	ENE	1.61	1.3	E	17.4	17.7	17.7	813.6	0.00	0.0	0.037	0.000	17.6	76	13.3	17.6	14.88	1.2824	1400	1	100.0	60
17/08/21	15:00	19.3	19.5	17.4	79	15.5	0.4	E	1.61	2.2	E	19.3	19.7	19.7	813.1	0.00	0.0	0.000	0.039	19.7	75	15.1	20.0	14.45	1.2700	1397	1	100.0	60
17/08/21	16:00	18.4	19.7	18.4	81	15.1	0.4	ENE	1.61	2.2	NE	18.4	18.8	18.8	813.0	0.00	0.0	0.000	0.005	19.2	74	14.4	19.3	14.25	1.2729	1398	1	100.0	60
17/08/21	17:00	18.1	18.5	18.1	81	14.8	0.4	E	1.61	1.8	NE	18.1	18.4	18.4	813.3	0.00	0.0	0.009	0.000	18.7	75	14.2	18.8	14.45	1.2756	1400	1	100.0	60
17/08/21	18:00	17.6	18.1	17.6	83	14.7	0.4	E	1.61	1.3	ENE	17.6	17.8	17.8	813.2	0.00	0.0	0.030	0.000	18.3	76	14.0	18.4	14.85	1.2773	1400	1	100.0	60
17/08/21	19:00	17.2	17.7	17.1	83	14.3	0.4	E	1.61	1.8	SE	17.2	17.3	17.3	813.2	0.00	0.0	0.049	0.000	17.9	77	13.9	18.0	15.35	1.2793	1400	1	100.0	60
17/08/21	20:00	16.7	17.2	16.7	83	13.8	0.0	E	0.00	1.3	ESE	16.7	16.8	16.8	813.0	0.00	0.0	0.069	0.000	17.5	77	13.4	17.5	15.35	1.2814	1400	1	100.0	60
17/08/21	21:00	15.8	16.7	15.8	85	13.3	0.4	E	1.61	1.3	ENE	15.8	15.8	15.8	813.1	0.00	0.0	0.104	0.000	17.0	77	12.9	16.9	15.35	1.2843	1398	1	100.0	60
17/08/21	22:00	15.1	15.8	15.1	86	12.7	0.0	E	0.00	0.9	ENE	15.1	15.1	15.1	813.2	0.00	0.0	0.137	0.000	16.6	77	12.5	16.4	15.35	1.2869	1396	1	100.0	60
17/08/21	23:00	14.1	15.1	14.1	86	11.7	0.4	E	1.61	2.2	ENE	14.1	14.0	14.0	813.2	0.00	0.0	0.178	0.000	16.0	77	12.0	15.8	15.35	1.2900	1397	1	100.0	60
18/08/21	00:00	13.7	14.1	13.7	83	10.8	0.4	E	1.61	1.3	NE	13.7	13.6	13.6	813.4	0.00	0.0	0.194	0.000	15.5	74	10.9	15.2	14.26	1.2937	1398	1	100.0	60
18/08/21	1:00	13.6	13.7	13.6	84	10.9	0.0	E	0.00	0.9	E	13.6	13.4	13.4	813.2	0.00	0.0	0.199	0.000	15.2	75	10.8	14.9	14.67	1.2947	1399	1	100.0	60
18/08/21	2:00	13.3	13.6	13.2	85	10.8	0.0	E	0.00	0.9	NE	13.3	13.2	13.2	812.7	0.00	0.0	0.211	0.000	15.0	75	10.6	14.7	14.69	1.2953	1399	1	100.0	60
18/08/21	3:00	12.9	13.3	12.9	87	10.8	0.0	E	0.00	0.4	ESE	12.9	12.9	12.9	812.2	0.00	0.0	0.225	0.000	14.8	76	10.6	14.6	15.00	1.2952	1399	1	100.0	60
18/08/21	4:00	12.8	12.9	12.8	87	10.7	0.0	ESE	0.00	0.4	ESE	12.8	12.8	12.8	812.0	0.00	0.0	0.229	0.000	14.7	77	10.7	14.4	15.38	1.2954	1399	1	100.0	60
18/08/21	5:00	12.9	12.9	12.8	86	10.6	0.0	E	0.00	0.4	ESE	12.9	12.8	12.8	811.9	0.00	0.0	0.227	0.000	14.6	77	10.6	14.3	15.38	1.2956	1399	1	100.0	60
18/08/21	6:00	12.9	13.1	12.9	85	10.4	0.0	E	0.00	1.3	E	12.9	12.8	12.8	811.5	0.00	0.0	0.227	0.000	14.5	76	10.3	14.2	15.03	1.2958	1399	1	100.0	60
18/08/21	7:00	12.7	12.9	12.7	88	10.8	0.0	E	0.00	0.4	E	12.7	12.7	12.7	811.5	0.00	0.0	0.234	0.000	14.3	78	10.5	14.1	15.69	1.2964	1399	1	100.0	60
18/08/21	8:00	13.2	13.2	12.7	90	11.6	0.0	E	0.00	0.9	NE	13.2	13.2	13.2	811.6	0.00	0.0	0.215	0.000	14.6	80	11.2	14.4	16.35	1.2945	1400	1	100.0	60
18/08/21	9:00	14.0	14.0	13.2	84	11.3	0.0	E	0.00	1.3	NE	14.0	13.9	13.9	811.3	0.00	0.0	0.181	0.000	15.6	77	11.6	15.4	15.35	1.2891	1400	1	100.0	60
18/08/21	10:00	15.1	15.1	14.0	82	12.0	0.4	E	1.61	0.9	E	15.1	14.9	14.9	811.2	0.00	0.0	0.137	0.000	16.3	75	11.9	16.1	14.59	1.2855	1400	1	100.0	60
18/08/21	11:00	16.8	16.8	15.1	78	12.9	0.4	E	1.61	1.3	ENE	16.8	16.8	16.8	810.9	0.00	0.0	0.065	0.000	17.5	73	12.6	17.3	14.02	1.2790	1395	1	100.0	60
18/08/21	12:00	17.2	17.2	16.7	78	13.4	0.4	E	1.61	1.3	E	17.2	17.2	17.2	810.6	0.00	0.0	0.046	0.000	18.3	71	12.9	18.2	13.55	1.2747	1401	1	100.0	60
18/08/21	13:00	17.4	17.6	17.0	76	13.2	0.0	E	0.00	0.9	ENE	17.4	17.4	17.4	810.4	0.00	0.0	0.037	0.000	18.4	70	12.8	18.2	13.35	1.2740	1400	1	100.0	60
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18/08/21	15:00	19.7	19.7	17.7	69	13.8	0.4	E	1.61	1.3	SE	19.7	19.7	19.7	809.7	0.00	0.0	0.000	0.056	19.4	66	12.9	19.4	12.15	1.2682	1400	1	100.0	60
18/08/21	16:00	19.6	21.1	19.6	67	13.3	0.4	E	1.61	1.3	E	19.6	19.6	19.6	809.2	0.00	0.0	0.000	0.053	19.8	64	12.8	19.7	11.70	1.2661	1398	1	100.0	60
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18/08/21	18:00	22.0	22.0	19.1	60	13.9	0.0	E	0.00	1.3	W	22.0	21.9	21.9	808.2	0.00	0.0	0.000	0.153	19.6	65	12.8	19.4	11.91	1.2656	1400	1	100.0	60
18/08/21	19:00	18.8	22.3	18.7	69	13.0	0.0	ENE	0.00	1.3	NW	18.8	18.7	18.7	807.9	0.00	0.0	0.000	0.019	19.0	66	12.5	18.8	12.15	1.2679	1400	1	100.0	60
18/08/21	20:00	17.1	18.9	17.1	74	12.4	0.0	ESE	0.00	0.4	ESE	17.1	16.9	16.9	807.7	0.00	0.0	0.053	0.000	18.4	67	12.2	18.2	12.45	1.2702	1400	1	100.0	60
18/08/21	21:00	14.3	17.1	14.3	82	11.3	0.0	---	0.00	0.0	---	14.3	14.2	14.2	807.7	0.00	0.0	0.167	0.000	17.3	69	11.6	17.1	13.01	1.2757	1400	1	100.0	60
18/08/21	22:00	12.5	14.3	11.9	90	10.9	0.0	ESE	0.00	0.4	ESE	12.5	12.6	12.6	807.4	0.00	0.0	0.243	0.000	15.9	70	10.5	15.6	13.26	1.2825	1398	1	100.0	60
18/08/21	23:00	13.9	13.9	12.5	87	11.8	0.0	S	0.00	0.4	ESE	13.9	13.8	13.8	807.2	0.00	0.0	0.185	0.000	16.2	74	11.5	15.9	14.25	1.2802	1399	1	100.0	60

DAILY DATA

Weather station Data is available from 16/10/2015 to 03/11/2021

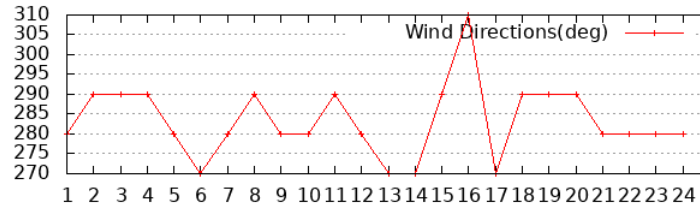
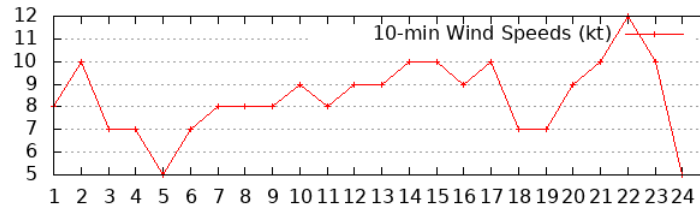
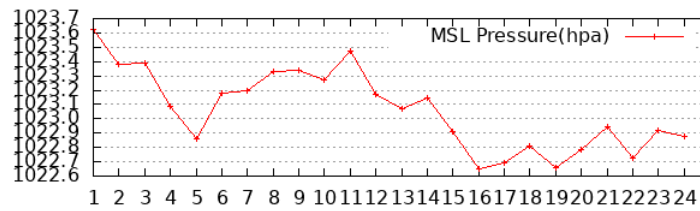
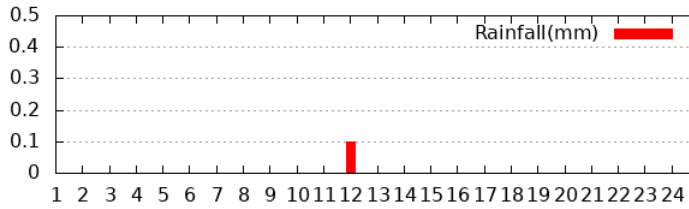
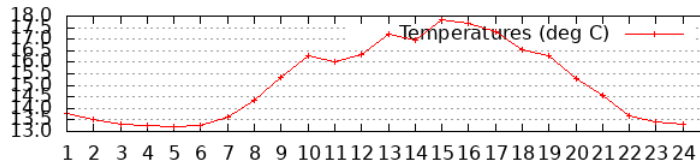
Select Station & Date:

Station **Oak Park** Date **17/08/2021** GO

WEATHER STATION REPORTS FROM OAK PARK

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)	Max Gust (>= 34 knots)	Sunshine (hours)
17/08/2021	0.1	18.3	13.2	12.0	8.4		

HOURLY VALUES (UTC) 17 Aug 2021 OAK PARK



DAILY DATA

Weather station Data is available from 16/10/2015 to 03/11/2021

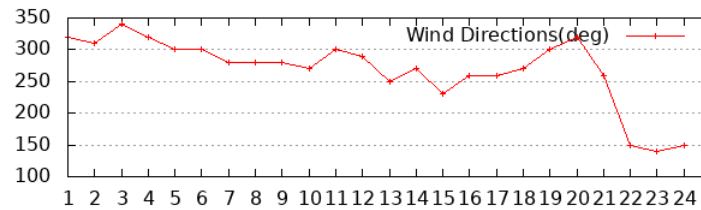
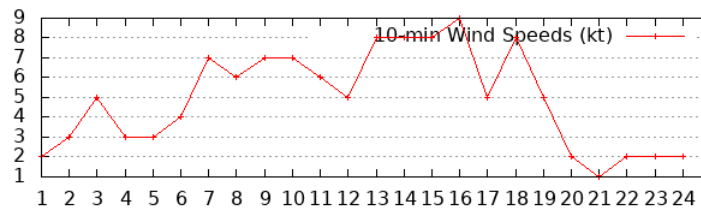
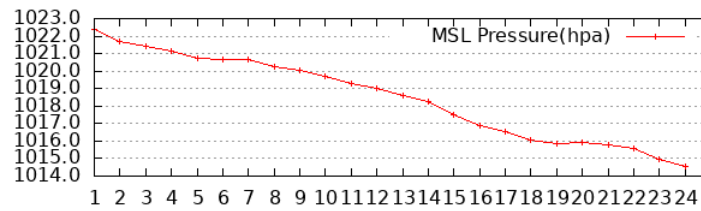
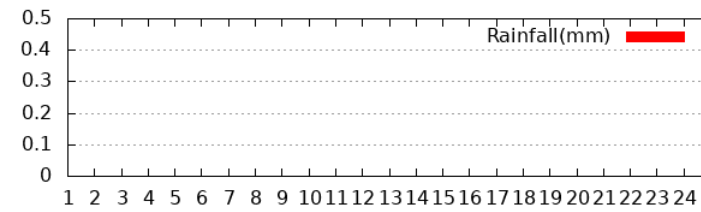
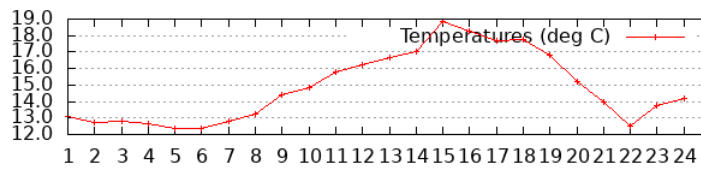
Select Station & Date:

Station **Oak Park** Date **18/08/2021** GO

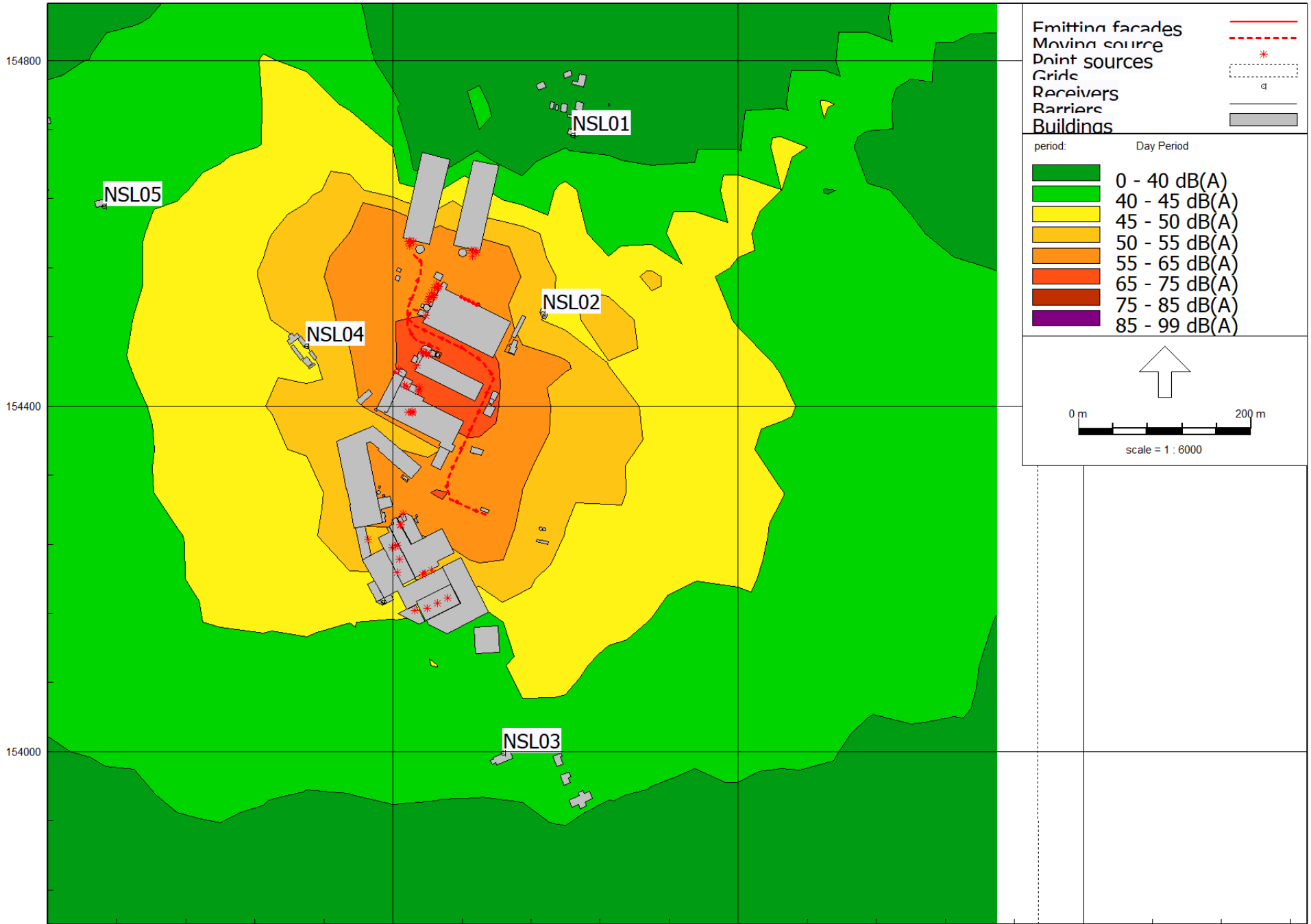
WEATHER STATION REPORTS FROM OAK PARK

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)	Max Gust (>= 34 knots)	Sunshine (hours)
18/08/2021	0.0	19.2	12.0	7.0	5.1		

HOURLY VALUES (UTC) 18 Aug 2021 OAK PARK



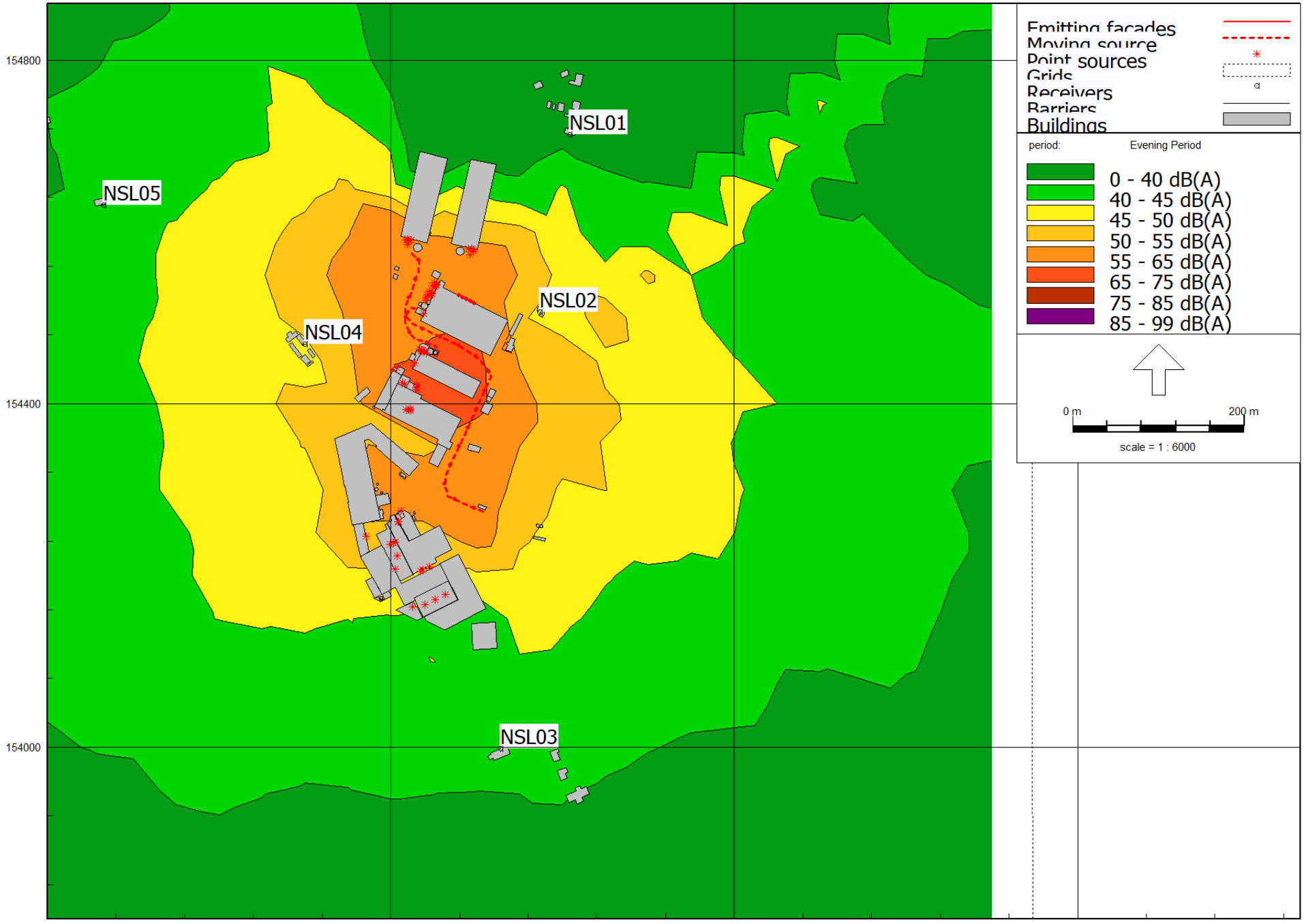
Appendix D



Emitting facades
 Moving source
 Noise sensitive locations
 Grid
 Receivers
 Barriers
 Buildings

period: Day Period
 0 - 40 dB(A)
 40 - 45 dB(A)
 45 - 50 dB(A)
 50 - 55 dB(A)
 55 - 65 dB(A)
 65 - 75 dB(A)
 75 - 85 dB(A)
 85 - 99 dB(A)

0 m 200 m
 scale = 1 : 6000



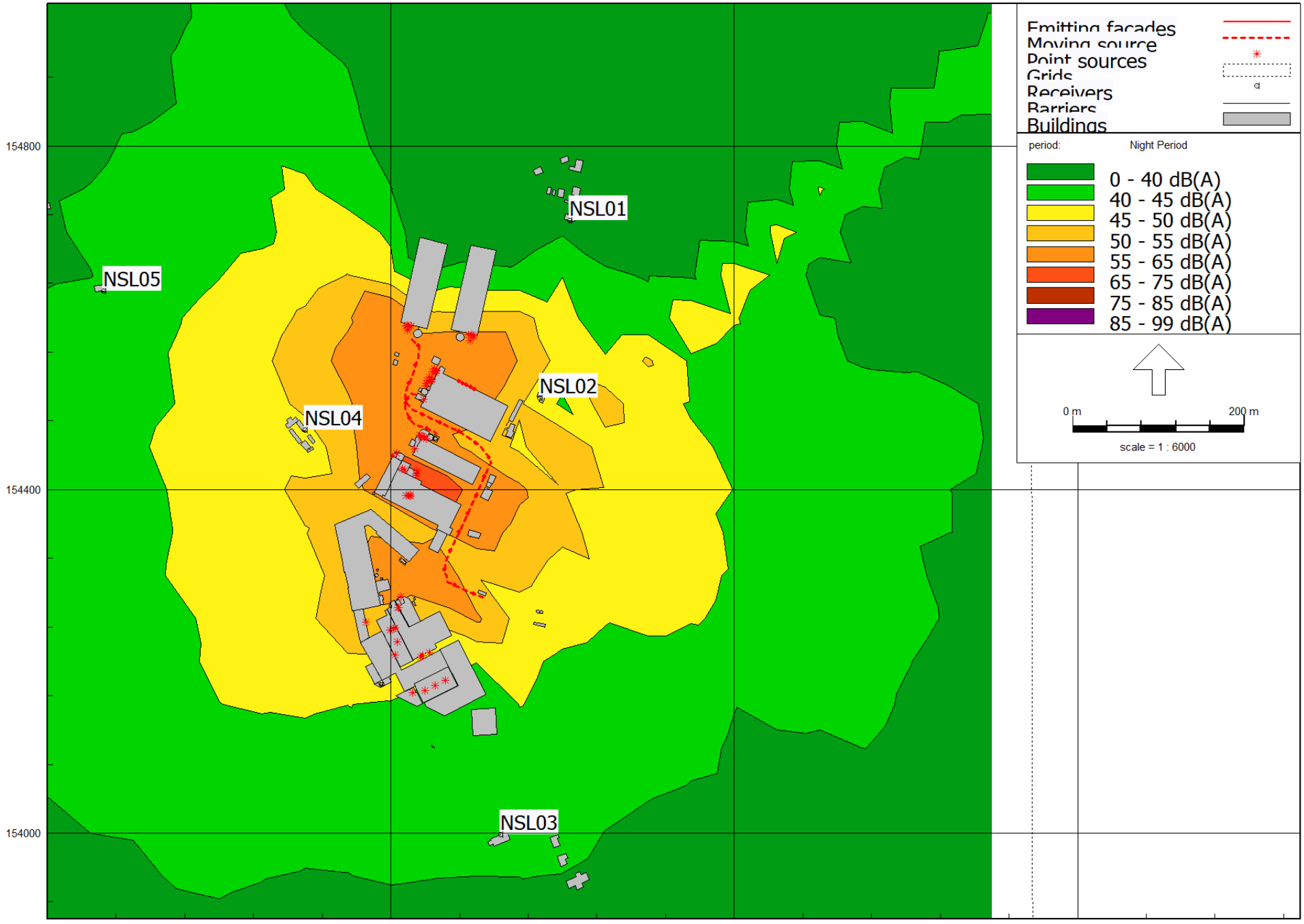
Emitting facades ———
 Moving source - - - - -
 Print sources *
 Grids
 Receivers
 Barriers
 Buildings

period: Evening Period
 0 - 40 dB(A)
 40 - 45 dB(A)
 45 - 50 dB(A)
 50 - 55 dB(A)
 55 - 65 dB(A)
 65 - 75 dB(A)
 75 - 85 dB(A)
 85 - 99 dB(A)

↑

0 m 200 m

scale = 1 : 6000



Emitting facades
 Moving source
 Point sources
 Grids
 Receivers
 Barriers
 Buildings

period: Night Period
 0 - 40 dB(A)
 40 - 45 dB(A)
 45 - 50 dB(A)
 50 - 55 dB(A)
 55 - 65 dB(A)
 65 - 75 dB(A)
 75 - 85 dB(A)
 85 - 99 dB(A)

0 m 200 m
 scale = 1 : 6000

Name	Description	X	Y	Height	Day	Evening	Night
NSL01_A	Northern	268207.9	154713.1	1.5	40	40	40
NSL02_A	Eastern	268173.6	154506.5	1.5	49	47	45
NSL02_B	Eastern	268173.6	154506.5	4	50	48	45
NSL03_A	Southern - Church	268127.6	153998.4	1.5	44	44	43
NSL03_B	Southern - Church	268127.6	153998.4	4	44	44	44
NSL04_A	Western	267899.9	154469.2	1.5	51	50	49
NSL05_A	Western	267665.4	154630.8	1.5	45	44	44
NSL05_B	Western	267665.4	154630.8	4	45	45	44

Name	Description	X	Y	Height	Day	Evening	Night
NSL01_A	Northern	268207.91	154713.13	1.5	40	40	40
GS Dryer02	Fan 1	268095.77	154579.6	22	34	34	34
GS Dryer02	Fan 2	268093.72	154580	22	33	33	33
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73	6	31	31	31
Dryer 4	A2-39	268029.19	154416.92	2	28	28	28
Dryer 4	A2-38	268029.85	154418.18	2	28	28	28
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95	28	26	26	26
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18	28	26	26	26
Dryer 5	A2-37 Mitigated	268033.79	154463.2	2	24	24	24
Dryer 5	A2-33 Mitigated	268038.98	154460.61	2	23	23	23
Dryer 5	A2-34 Mitigated	268037.38	154461.33	2	23	23	23
Dryer 5	A2-36 Mitigated	268035.31	154462.4	2	22	22	22
Dryer 5	A2-35	268035.47	154460.45	2	22	22	22
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76	2	21	21	21
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27	2	21	21	21
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7	1	20	20	20
Mill	Mill building fans 1 - Inferred	268063.18	154177.8	0.5	19	19	19
SeedPlant	AXX-XX - Inferred	268022.76	154393.65	1	19	19	19
SeedPlant	A2-49 - Inferred	268017.34	154392.65	0.9	19	19	19
GS02Intake	Intake	268092.45	154573.63	0.5	19	19	19
SeedPlant	AXX-XX - Inferred	268022.6	154391.82	0.5	18	18	18
SeedPlant	AXX-XX - Inferred	268021.01	154392.74	0.5	18	18	18
D6 Intake	Intake Mitigated	268038.34	154504.89	8	17	17	17
Mill	Mill building fans 2 - Inferred	268051.26	154171.72	0.5	17	17	17
WHouse1&2	1st Storey Door (open)	268038.08	154207.67	2.5	16	16	16
GS01Intake	Intake	268019.27	154585.55	0.5	16	16	16
GS Dryer01	Fan 1	268023.38	154590.1	22	15	15	15
GS Dryer01	Fan 2	268021.2	154590.62	22	15	15	15
Dryer 4	Precleaner A2-40	268006.28	154442.06	10	13	13	13
NEW Dryers	BurnerB1	268051.45	154536.24	1.6	12	12	12
NEW Dryers	BurnerB2	268052.17	154537.52	1.6	11	11	11
NEW Dryers	BurnerB3	268052.86	154538.83	1.6	11	11	11
GS Dryer02	BurnerA1	268096.12	154578.03	3	11	11	11
NEW Dryers	Fan 1	268042.51	154527.04	6.65	11	11	11
NEW Dryers	Fan 2	268044.82	154531.23	6.65	11	11	11
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11	1.5	11	11	11
Burner	Dryer 4 burner	268030.02	154421.86	1	11	11	11
Aeration	Aeration Alleyway Store U	268079.28	154526.02	2.5	11	11	11
Mill	Mill building fans 3 - Inferred	268039.45	154165.67	0.5	10	10	10
NEW Dryers	Fan 3	268048.03	154536.88	6.65	10	10	10
GS Dryer02	Aspirator 1	268090.88	154580.43	3	10	10	10
NEW Dryers	Fan 4	268050.34	154540.85	6.65	9	9	9
NEW Dryers	BurnerA3	268048.14	154528.73	1.6	8	8	8
NEW Dryers	BurnerA2	268047.45	154527.42	1.6	8	8	8
NEW Dryers	BurnerA1	268046.73	154526.14	1.6	8	8	8
GS Dryer01	BurnerA1	268017.45	154590.19	3	8	8	8
GS Dryer01	Aspirator 1	268019.02	154591.32	3	7	7	7
NEW Dryers	Aspirator 2	268041.73	154523.37	2	7	7	7
Flaker	A2-8 Flaker 2	268005.11	154207.22	1.5	7	7	7
NEW Dryers	Aspirator 1	268040.48	154521.27	2	7	7	7
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18	53	7	7	7
Cuber 2	A2-4 Cuber4	268040.32	154207.8	53	6	6	6
Cuber 2	A2-2 Cuber2	268037.25	154206.25	53	6	6	6
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99	53	6	6	6
Boiler	Louvred Doors	268011.35	154275.28	1.5	4	4	4
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7	1.4	3	3	3
Soya Extruder	A2-22 Soya Extruder	267999.24	154236.58	0.5	1	1	1
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36	9	1	1	1
Soya Ex	A2-16 Soya Exhaust	268003	154237.76	0.5	0	0	0
JCB	JCB	268028.45	154510.5	0.75	8	9	0
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97	0.5	0	0	0
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31	3	-6	-6	-6
Truck/Trac	Trucks/Tractors	268107.02	154274.27	0.75	30	26	--

Name	Description	X	Y	Height	Day	Evening	Night
NSL02_A	Eastern	268173.56	154506.45	1.5	49	47	45
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95	28	38	38	38
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18	28	38	38	38
GS Dryer02	Fan 1	268095.77	154579.6	22	36	36	36
GS Dryer02	Fan 2	268093.72	154580	22	36	36	36
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73	6	35	35	35
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7	1	28	28	28
Dryer 4	A2-38	268029.85	154418.18	2	27	27	27
Dryer 4	A2-39	268029.19	154416.92	2	27	27	27
GS Dryer01	Fan 1	268023.38	154590.1	22	27	27	27
GS Dryer01	Fan 2	268021.2	154590.62	22	27	27	27
D6 Intake	Intake Mitigated	268038.34	154504.89	8	26	26	26
GS02Intake	Intake	268092.45	154573.63	0.5	26	26	26
Aeration	Aeration Alleyway Store U	268079.28	154526.02	2.5	20	20	20
WHouse1&2	1st Storey Door (open)	268038.08	154207.67	2.5	20	20	20
SeedPlant	AXX-XX - Inferred	268022.76	154393.65	1	19	19	19
SeedPlant	A2-49 - Inferred	268017.34	154392.65	0.9	19	19	19
Mill	Mill building fans 1 - Inferred	268063.18	154177.8	0.5	19	19	19
Mill	Mill building fans 3 - Inferred	268039.45	154165.67	0.5	19	19	19
GS Dryer02	BurnerA1	268096.12	154578.03	3	19	19	19
Mill	Mill building fans 2 - Inferred	268051.26	154171.72	0.5	18	18	18
GS01Intake	Intake	268019.27	154585.55	0.5	18	18	18
SeedPlant	AXX-XX - Inferred	268022.6	154391.82	0.5	18	18	18
Dryer 5	A2-33 Mitigated	268038.98	154460.61	2	18	18	18
Dryer 5	A2-34 Mitigated	268037.38	154461.33	2	18	18	18
SeedPlant	AXX-XX - Inferred	268021.01	154392.74	0.5	17	17	17
Dryer 5	A2-35	268035.47	154460.45	2	17	17	17
Dryer 5	A2-36 Mitigated	268035.31	154462.4	2	17	17	17
Dryer 5	A2-37 Mitigated	268033.79	154463.2	2	17	17	17
Burner	Dryer 4 burner	268030.02	154421.86	1	17	17	17
GS Dryer02	Aspirator 1	268090.88	154580.43	3	17	17	17
Dryer 4	Precleaner A2-40	268006.28	154442.06	10	16	16	16
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76	2	16	16	16
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27	2	15	15	15
NEW Dryers	Fan 4	268050.34	154540.85	6.65	15	15	15
NEW Dryers	Fan 3	268048.03	154536.88	6.65	14	14	14
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58	0.5	14	14	14
NEW Dryers	BurnerB2	268052.17	154537.52	1.6	14	14	14
NEW Dryers	BurnerB3	268052.86	154538.83	1.6	14	14	14
NEW Dryers	Fan 2	268044.82	154531.23	6.65	14	14	14
NEW Dryers	Fan 1	268042.51	154527.04	6.65	14	14	14
Soya Ex	A2-16 Soya Exhaust	268003	154237.76	0.5	14	14	14
NEW Dryers	BurnerB1	268051.45	154536.24	1.6	14	14	14
NEW Dryers	BurnerA1	268046.73	154526.14	1.6	14	14	14
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97	0.5	14	14	14
NEW Dryers	BurnerA3	268048.14	154528.73	1.6	14	14	14
NEW Dryers	BurnerA2	268047.45	154527.42	1.6	14	14	14
NEW Dryers	Aspirator 1	268040.48	154521.27	2	13	13	13
NEW Dryers	Aspirator 2	268041.73	154523.37	2	13	13	13
Cuber 2	A2-4 Cuber4	268040.32	154207.8	53	13	13	13
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18	53	13	13	13
Cuber 2	A2-2 Cuber2	268037.25	154206.25	53	12	12	12
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99	53	12	12	12
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11	1.5	11	11	11
Flaker	A2-8 Flaker 2	268005.11	154207.22	1.5	11	11	11
GS Dryer01	BurnerA1	268017.45	154590.19	3	11	11	11
GS Dryer01	Aspirator 1	268019.02	154591.32	3	10	10	10
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36	9	9	9	9
Boiler	Louvred Doors	268011.35	154275.28	1.5	8	8	8
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7	1.4	8	8	8
JCB	JCB	268028.45	154510.5	0.75	13	15	6
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31	3	0	0	0
Truck/Trac	Trucks/Tractors	268107.02	154274.27	0.75	47	43	--

Name	Description	X	Y	Height	Day	Evening	Night
NSL02_B	Eastern	268173.56	154506.45		4	50	48 45
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95		28	38	38 38
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18		28	38	38 38
GS Dryer02	Fan 1	268095.77	154579.6		22	37	37 37
GS Dryer02	Fan 2	268093.72	154580		22	37	37 37
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73		6	36	36 36
GS Dryer01	Fan 1	268023.38	154590.1		22	28	28 28
GS Dryer01	Fan 2	268021.2	154590.62		22	28	28 28
GS02Intake	Intake	268092.45	154573.63		0.5	28	28 28
Dryer 4	A2-38	268029.85	154418.18		2	27	27 27
Dryer 4	A2-39	268029.19	154416.92		2	27	27 27
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7		1	27	27 27
D6 Intake	Intake Mitigated	268038.34	154504.89		8	27	27 27
GS Dryer02	BurnerA1	268096.12	154578.03		3	22	22 22
Aeration	Aeration Alleyway Store U	268079.28	154526.02		2.5	22	22 22
GS Dryer02	Aspirator 1	268090.88	154580.43		3	20	20 20
WHouse1&2	1st Storey Door (open)	268038.08	154207.67		2.5	20	20 20
SeedPlant	AXX-XX - Inferred	268022.76	154393.65		1	20	20 20
SeedPlant	A2-49 - Inferred	268017.34	154392.65		0.9	20	20 20
Mill	Mill building fans 3 - Inferred	268039.45	154165.67		0.5	19	19 19
Mill	Mill building fans 1 - Inferred	268063.18	154177.8		0.5	19	19 19
Mill	Mill building fans 2 - Inferred	268051.26	154171.72		0.5	19	19 19
Dryer 5	A2-33 Mitigated	268038.98	154460.61		2	19	19 19
Dryer 5	A2-34 Mitigated	268037.38	154461.33		2	18	18 18
Dryer 5	A2-35	268035.47	154460.45		2	18	18 18
Dryer 5	A2-36 Mitigated	268035.31	154462.4		2	18	18 18
SeedPlant	AXX-XX - Inferred	268022.6	154391.82		0.5	18	18 18
Dryer 5	A2-37 Mitigated	268033.79	154463.2		2	18	18 18
GS01Intake	Intake	268019.27	154585.55		0.5	18	18 18
SeedPlant	AXX-XX - Inferred	268021.01	154392.74		0.5	18	18 18
Dryer 4	Precleaner A2-40	268006.28	154442.06		10	17	17 17
Burner	Dryer 4 burner	268030.02	154421.86		1	17	17 17
NEW Dryers	Fan 4	268050.34	154540.85		6.65	16	16 16
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76		2	16	16 16
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27		2	15	15 15
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58		0.5	15	15 15
NEW Dryers	Fan 3	268048.03	154536.88		6.65	15	15 15
Soya Ex	A2-16 Soya Exhaust	268003	154237.76		0.5	15	15 15
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97		0.5	15	15 15
NEW Dryers	Fan 2	268044.82	154531.23		6.65	15	15 15
NEW Dryers	Fan 1	268042.51	154527.04		6.65	15	15 15
NEW Dryers	BurnerB3	268052.86	154538.83		1.6	15	15 15
NEW Dryers	BurnerB2	268052.17	154537.52		1.6	15	15 15
NEW Dryers	BurnerB1	268051.45	154536.24		1.6	14	14 14
NEW Dryers	BurnerA1	268046.73	154526.14		1.6	14	14 14
NEW Dryers	BurnerA3	268048.14	154528.73		1.6	14	14 14
NEW Dryers	BurnerA2	268047.45	154527.42		1.6	14	14 14
NEW Dryers	Aspirator 1	268040.48	154521.27		2	13	13 13
Cuber 2	A2-4 Cuber4	268040.32	154207.8		53	13	13 13
NEW Dryers	Aspirator 2	268041.73	154523.37		2	13	13 13
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18		53	13	13 13
Cuber 2	A2-2 Cuber2	268037.25	154206.25		53	13	13 13
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99		53	13	13 13
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11		1.5	11	11 11
GS Dryer01	BurnerA1	268017.45	154590.19		3	11	11 11
Flaker	A2-8 Flaker 2	268005.11	154207.22		1.5	11	11 11
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36		9	10	10 10
GS Dryer01	Aspirator 1	268019.02	154591.32		3	10	10 10
Boiler	Louvred Doors	268011.35	154275.28		1.5	8	8 8
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7		1.4	8	8 8
JCB	JCB	268028.45	154510.5		0.75	13	15 5
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31		3	0	0 0
Truck/Trac	Trucks/Tractors	268107.02	154274.27		0.75	48	44 --

Name	Description	X	Y	Height	Day	Evening	Night
NSL03_A	Southern - Church	268127.64	153998.43	1.5	44	44	43
Dryer 4	A2-38	268029.85	154418.18	2	34	34	34
Dryer 4	A2-39	268029.19	154416.92	2	34	34	34
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73	6	33	33	33
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18	28	33	33	33
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95	28	33	33	33
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7	1.4	33	33	33
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99	53	32	32	32
Cuber 2	A2-2 Cuber2	268037.25	154206.25	53	32	32	32
Cuber 2	A2-4 Cuber4	268040.32	154207.8	53	32	32	32
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18	53	32	32	32
Mill	Mill building fans 3 - Inferred	268039.45	154165.67	0.5	26	26	26
Mill	Mill building fans 1 - Inferred	268063.18	154177.8	0.5	25	25	25
Mill	Mill building fans 2 - Inferred	268051.26	154171.72	0.5	25	25	25
Dryer 5	A2-33 Mitigated	268038.98	154460.61	2	21	21	21
Dryer 5	A2-34 Mitigated	268037.38	154461.33	2	21	21	21
Dryer 5	A2-35	268035.47	154460.45	2	21	21	21
Dryer 5	A2-36 Mitigated	268035.31	154462.4	2	21	21	21
Dryer 5	A2-37 Mitigated	268033.79	154463.2	2	21	21	21
WHouse1&2	1st Storey Door (open)	268038.08	154207.67	2.5	21	21	21
SeedPlant	AXX-XX - Inferred	268022.76	154393.65	1	20	20	20
SeedPlant	AXX-XX - Inferred	268022.6	154391.82	0.5	19	19	19
SeedPlant	AXX-XX - Inferred	268021.01	154392.74	0.5	19	19	19
GS Dryer01	Fan 1	268023.38	154590.1	22	19	19	19
GS Dryer01	Fan 2	268021.2	154590.62	22	19	19	19
SeedPlant	A2-49 - Inferred	268017.34	154392.65	0.9	19	19	19
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76	2	19	19	19
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27	2	18	18	18
GS Dryer02	Fan 1	268095.77	154579.6	22	18	18	18
GS Dryer02	Fan 2	268093.72	154580	22	18	18	18
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58	0.5	15	15	15
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97	0.5	15	15	15
Soya Ex	A2-16 Soya Exhaust	268003	154237.76	0.5	15	15	15
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11	1.5	15	15	15
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7	1	15	15	15
Flaker	A2-8 Flaker 2	268005.11	154207.22	1.5	13	13	13
GS01Intake	Intake	268019.27	154585.55	0.5	11	11	11
D6 Intake	Intake Mitigated	268038.34	154504.89	8	11	11	11
GS02Intake	Intake	268092.45	154573.63	0.5	9	9	9
Burner	Dryer 4 burner	268030.02	154421.86	1	8	8	8
Dryer 4	Precleaner A2-40	268006.28	154442.06	10	7	7	7
GS Dryer01	BurnerA1	268017.45	154590.19	3	6	6	6
GS Dryer01	Aspirator 1	268019.02	154591.32	3	4	4	4
GS Dryer02	BurnerA1	268096.12	154578.03	3	4	4	4
NEW Dryers	Fan 1	268042.51	154527.04	6.65	3	3	3
NEW Dryers	Fan 2	268044.82	154531.23	6.65	3	3	3
GS Dryer02	Aspirator 1	268090.88	154580.43	3	3	3	3
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36	9	2	2	2
NEW Dryers	Fan 3	268048.03	154536.88	6.65	2	2	2
NEW Dryers	Fan 4	268050.34	154540.85	6.65	1	1	1
NEW Dryers	BurnerA1	268046.73	154526.14	1.6	0	0	0
NEW Dryers	BurnerA2	268047.45	154527.42	1.6	0	0	0
NEW Dryers	BurnerA3	268048.14	154528.73	1.6	0	0	0
Boiler	Louvred Doors	268011.35	154275.28	1.5	0	0	0
NEW Dryers	BurnerB1	268051.45	154536.24	1.6	0	0	0
NEW Dryers	Aspirator 1	268040.48	154521.27	2	0	0	0
NEW Dryers	BurnerB2	268052.17	154537.52	1.6	0	0	0
NEW Dryers	BurnerB3	268052.86	154538.83	1.6	0	0	0
NEW Dryers	Aspirator 2	268041.73	154523.37	2	0	0	0
JCB	JCB	268028.45	154510.5	0.75	5	7	-2
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31	3	-7	-7	-7
Aeration	Aeration Alleyway Store U	268079.28	154526.02	2.5	-21	-21	-21
Truck/Trac	Trucks/Tractors	268107.02	154274.27	0.75	30	27	--

Name	Description	X	Y	Height	Day	Evening	Night
NSL03_B	Southern - Church	268127.64	153998.43		4	44	44
Dryer 4	A2-38	268029.85	154418.18		2	36	36
Dryer 4	A2-39	268029.19	154416.92		2	36	36
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18		28	33	33
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73		6	33	33
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95		28	33	33
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7		1.4	33	33
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99		53	32	32
Cuber 2	A2-2 Cuber2	268037.25	154206.25		53	32	32
Cuber 2	A2-4 Cuber4	268040.32	154207.8		53	32	32
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18		53	32	32
Mill	Mill building fans 3 - Inferred	268039.45	154165.67		0.5	26	26
Mill	Mill building fans 1 - Inferred	268063.18	154177.8		0.5	25	25
Mill	Mill building fans 2 - Inferred	268051.26	154171.72		0.5	25	25
Dryer 5	A2-33 Mitigated	268038.98	154460.61		2	21	21
Dryer 5	A2-34 Mitigated	268037.38	154461.33		2	21	21
Dryer 5	A2-35	268035.47	154460.45		2	21	21
Dryer 5	A2-36 Mitigated	268035.31	154462.4		2	21	21
Dryer 5	A2-37 Mitigated	268033.79	154463.2		2	21	21
SeedPlant	AXX-XX - Inferred	268022.76	154393.65		1	20	20
WHouse1&2	1st Storey Door (open)	268038.08	154207.67		2.5	20	20
GS Dryer01	Fan 1	268023.38	154590.1		22	19	19
GS Dryer01	Fan 2	268021.2	154590.62		22	19	19
SeedPlant	AXX-XX - Inferred	268022.6	154391.82		0.5	19	19
SeedPlant	AXX-XX - Inferred	268021.01	154392.74		0.5	19	19
SeedPlant	A2-49 - Inferred	268017.34	154392.65		0.9	19	19
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76		2	19	19
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27		2	19	19
GS Dryer02	Fan 1	268095.77	154579.6		22	18	18
GS Dryer02	Fan 2	268093.72	154580		22	18	18
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58		0.5	15	15
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97		0.5	15	15
Soya Ex	A2-16 Soya Exhaust	268003	154237.76		0.5	15	15
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11		1.5	15	15
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7		1	15	15
Flaker	A2-8 Flaker 2	268005.11	154207.22		1.5	13	13
GS01Intake	Intake	268019.27	154585.55		0.5	11	11
D6 Intake	Intake Mitigated	268038.34	154504.89		8	11	11
GS02Intake	Intake	268092.45	154573.63		0.5	9	9
Burner	Dryer 4 burner	268030.02	154421.86		1	8	8
Dryer 4	Precleaner A2-40	268006.28	154442.06		10	8	8
GS Dryer01	BurnerA1	268017.45	154590.19		3	6	6
GS Dryer01	Aspirator 1	268019.02	154591.32		3	5	5
GS Dryer02	BurnerA1	268096.12	154578.03		3	4	4
NEW Dryers	Fan 1	268042.51	154527.04		6.65	3	3
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36		9	3	3
NEW Dryers	Fan 2	268044.82	154531.23		6.65	3	3
GS Dryer02	Aspirator 1	268090.88	154580.43		3	3	3
NEW Dryers	Fan 3	268048.03	154536.88		6.65	2	2
NEW Dryers	Fan 4	268050.34	154540.85		6.65	1	1
NEW Dryers	BurnerA1	268046.73	154526.14		1.6	0	0
NEW Dryers	BurnerA2	268047.45	154527.42		1.6	0	0
NEW Dryers	BurnerA3	268048.14	154528.73		1.6	0	0
NEW Dryers	BurnerB1	268051.45	154536.24		1.6	-1	-1
NEW Dryers	BurnerB2	268052.17	154537.52		1.6	-1	-1
NEW Dryers	Aspirator 1	268040.48	154521.27		2	-1	-1
NEW Dryers	BurnerB3	268052.86	154538.83		1.6	-1	-1
NEW Dryers	Aspirator 2	268041.73	154523.37		2	-1	-1
Boiler	Louvred Doors	268011.35	154275.28		1.5	-1	-1
JCB	JCB	268028.45	154510.5		0.75	6	8
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31		3	-7	-7
Aeration	Aeration Alleyway Store U	268079.28	154526.02		2.5	-22	-22
Truck/Trac	Trucks/Tractors	268107.02	154274.27		0.75	32	28 --

Name	Description	X	Y	Height	Day	Evening	Night
NSL04_A	Western		267899.9	154469.16	1.5	51	50 49
NEW Dryers	Fan 4	268050.34	154540.85	6.65	37	37	37
NEW Dryers	Fan 2	268044.82	154531.23	6.65	37	37	37
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27	2	37	37	37
NEW Dryers	Fan 3	268048.03	154536.88	6.65	36	36	36
Dryer 5	A2-37 Mitigated	268033.79	154463.2	2	35	35	35
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73	6	35	35	35
D6 Intake	Intake Mitigated	268038.34	154504.89	8	35	35	35
NEW Dryers	Fan 1	268042.51	154527.04	6.65	35	35	35
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76	2	35	35	35
Dryer 5	A2-36 Mitigated	268035.31	154462.4	2	35	35	35
Dryer 5	A2-35	268035.47	154460.45	2	35	35	35
GS Dryer02	Fan 2	268093.72	154580	22	35	35	35
GS Dryer02	Fan 1	268095.77	154579.6	22	35	35	35
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36	9	35	35	35
Dryer 5	A2-34 Mitigated	268037.38	154461.33	2	34	34	34
SeedPlant	A2-49 - Inferred	268017.34	154392.65	0.9	33	33	33
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95	28	33	33	33
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18	28	33	33	33
Dryer 5	A2-33 Mitigated	268038.98	154460.61	2	33	33	33
SeedPlant	AXX-XX - Inferred	268022.76	154393.65	1	33	33	33
SeedPlant	AXX-XX - Inferred	268021.01	154392.74	0.5	33	33	33
SeedPlant	AXX-XX - Inferred	268022.6	154391.82	0.5	32	32	32
NEW Dryers	BurnerB1	268051.45	154536.24	1.6	31	31	31
NEW Dryers	BurnerB2	268052.17	154537.52	1.6	31	31	31
NEW Dryers	BurnerB3	268052.86	154538.83	1.6	31	31	31
NEW Dryers	Aspirator 2	268041.73	154523.37	2	30	30	30
NEW Dryers	BurnerA3	268048.14	154528.73	1.6	30	30	30
NEW Dryers	Aspirator 1	268040.48	154521.27	2	30	30	30
NEW Dryers	BurnerA2	268047.45	154527.42	1.6	30	30	30
NEW Dryers	BurnerA1	268046.73	154526.14	1.6	30	30	30
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31	3	29	29	29
JCB	JCB	268028.45	154510.5	0.75	36	38	29
GS Dryer01	Fan 1	268023.38	154590.1	22	28	28	28
GS Dryer01	Fan 2	268021.2	154590.62	22	28	28	28
Dryer 4	Precleaner A2-40	268006.28	154442.06	10	27	27	27
Dryer 4	A2-39	268029.19	154416.92	2	26	26	26
Dryer 4	A2-38	268029.85	154418.18	2	26	26	26
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7	1	24	24	24
GS01Intake	Intake	268019.27	154585.55	0.5	24	24	24
GS02Intake	Intake	268092.45	154573.63	0.5	23	23	23
WHouse1&2	1st Storey Door (open)	268038.08	154207.67	2.5	21	21	21
GS Dryer01	Aspirator 1	268019.02	154591.32	3	21	21	21
GS Dryer01	BurnerA1	268017.45	154590.19	3	21	21	21
GS Dryer02	BurnerA1	268096.12	154578.03	3	19	19	19
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58	0.5	17	17	17
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11	1.5	17	17	17
Flaker	A2-8 Flaker 2	268005.11	154207.22	1.5	17	17	17
Soya Ex	A2-16 Soya Exhaust	268003	154237.76	0.5	16	16	16
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97	0.5	16	16	16
Burner	Dryer 4 burner	268030.02	154421.86	1	15	15	15
Cuber 2	A2-4 Cuber4	268040.32	154207.8	53	11	11	11
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18	53	11	11	11
Cuber 2	A2-2 Cuber2	268037.25	154206.25	53	11	11	11
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99	53	11	11	11
Mill	Mill building fans 3 - Inferred	268039.45	154165.67	0.5	9	9	9
Mill	Mill building fans 1 - Inferred	268063.18	154177.8	0.5	9	9	9
Mill	Mill building fans 2 - Inferred	268051.26	154171.72	0.5	8	8	8
Boiler	Louvred Doors	268011.35	154275.28	1.5	8	8	8
GS Dryer02	Aspirator 1	268090.88	154580.43	3	8	8	8
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7	1.4	7	7	7
Aeration	Aeration Alleyway Store U	268079.28	154526.02	2.5	-15	-15	-15
Truck/Trac	Trucks/Tractors	268107.02	154274.27	0.75	47	43	--

Name	Description	X	Y	Height	Day	Evening	Night
NSL05_A	Western	267665.41	154630.77	1.5	45	44	44
D6 Intake	Intake Mitigated	268038.34	154504.89	8	37	37	37
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73	6	31	31	31
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95	28	30	30	30
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18	28	30	30	30
Dryer 4	A2-39	268029.19	154416.92	2	30	30	30
Dryer 4	Precleaner A2-40	268006.28	154442.06	10	30	30	30
NEW Dryers	Fan 1	268042.51	154527.04	6.65	28	28	28
NEW Dryers	Fan 2	268044.82	154531.23	6.65	28	28	28
NEW Dryers	Fan 3	268048.03	154536.88	6.65	28	28	28
Dryer 4	A2-38	268029.85	154418.18	2	28	28	28
NEW Dryers	Fan 4	268050.34	154540.85	6.65	28	28	28
GS01Intake	Intake	268019.27	154585.55	0.5	27	27	27
GS Dryer01	Fan 2	268021.2	154590.62	22	27	27	27
NEW Dryers	Aspirator 1	268040.48	154521.27	2	27	27	27
NEW Dryers	Aspirator 2	268041.73	154523.37	2	27	27	27
GS Dryer01	Fan 1	268023.38	154590.1	22	27	27	27
NEW Dryers	BurnerA1	268046.73	154526.14	1.6	27	27	27
NEW Dryers	BurnerA2	268047.45	154527.42	1.6	27	27	27
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27	2	26	26	26
NEW Dryers	BurnerA3	268048.14	154528.73	1.6	26	26	26
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76	2	26	26	26
SeedPlant	AXX-XX - Inferred	268022.76	154393.65	1	26	26	26
SeedPlant	A2-49 - Inferred	268017.34	154392.65	0.9	25	25	25
Dryer 5	A2-37 Mitigated	268033.79	154463.2	2	25	25	25
Dryer 5	A2-36 Mitigated	268035.31	154462.4	2	25	25	25
Dryer 5	A2-35	268035.47	154460.45	2	25	25	25
Dryer 5	A2-34 Mitigated	268037.38	154461.33	2	25	25	25
Dryer 5	A2-33 Mitigated	268038.98	154460.61	2	25	25	25
SeedPlant	AXX-XX - Inferred	268021.01	154392.74	0.5	25	25	25
SeedPlant	AXX-XX - Inferred	268022.6	154391.82	0.5	25	25	25
GS Dryer02	Fan 2	268093.72	154580	22	24	24	24
GS Dryer02	Fan 1	268095.77	154579.6	22	24	24	24
NEW Dryers	BurnerB1	268051.45	154536.24	1.6	22	22	22
GS Dryer01	BurnerA1	268017.45	154590.19	3	22	22	22
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97	0.5	22	22	22
NEW Dryers	BurnerB2	268052.17	154537.52	1.6	22	22	22
NEW Dryers	BurnerB3	268052.86	154538.83	1.6	22	22	22
Soya Ex	A2-16 Soya Exhaust	268003	154237.76	0.5	22	22	22
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11	1.5	21	21	21
GS Dryer01	Aspirator 1	268019.02	154591.32	3	21	21	21
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36	9	21	21	21
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58	0.5	21	21	21
WHouse1&2	1st Storey Door (open)	268038.08	154207.67	2.5	14	14	14
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7	1	14	14	14
JCB	JCB	268028.45	154510.5	0.75	21	23	14
GS02Intake	Intake	268092.45	154573.63	0.5	10	10	10
Mill	Mill building fans 2 - Inferred	268051.26	154171.72	0.5	8	8	8
Mill	Mill building fans 3 - Inferred	268039.45	154165.67	0.5	7	7	7
Mill	Mill building fans 1 - Inferred	268063.18	154177.8	0.5	6	6	6
Burner	Dryer 4 burner	268030.02	154421.86	1	6	6	6
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99	53	5	5	5
Cuber 2	A2-4 Cuber4	268040.32	154207.8	53	5	5	5
Cuber 2	A2-2 Cuber2	268037.25	154206.25	53	5	5	5
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18	53	5	5	5
GS Dryer02	BurnerA1	268096.12	154578.03	3	4	4	4
Flaker	A2-8 Flaker 2	268005.11	154207.22	1.5	4	4	4
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7	1.4	3	3	3
GS Dryer02	Aspirator 1	268090.88	154580.43	3	2	2	2
Boiler	Louvred Doors	268011.35	154275.28	1.5	-1	-1	-1
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31	3	-1	-1	-1
Aeration	Aeration Alleyway Store U	268079.28	154526.02	2.5	-21	-21	-21
Truck/Trac	Trucks/Tractors	268107.02	154274.27	0.75	37	33	--

Name	Description	X	Y	Height	Day	Evening	Night	
NSL05_B	Western	267665.41	154630.77		4	45	45	44
D6 Intake	Intake Mitigated	268038.34	154504.89		8	37	37	37
Dryer 2	A2-30A/B Dryer 2 exhaust vents	267971.41	154245.73		6	34	34	34
Boiler	A1-2 Boiler Flue 1 - Inferred	268008.62	154262.95		28	31	31	31
Boiler	A1-1 Boiler Flue 2 - Inferred	268009.53	154262.18		28	31	31	31
Dryer 4	A2-39	268029.19	154416.92		2	30	30	30
GS01Intake	Intake	268019.27	154585.55		0.5	30	30	30
Dryer 4	Precleaner A2-40	268006.28	154442.06		10	30	30	30
NEW Dryers	Fan 1	268042.51	154527.04		6.65	28	28	28
Dryer 4	A2-38	268029.85	154418.18		2	28	28	28
NEW Dryers	Fan 2	268044.82	154531.23		6.65	28	28	28
NEW Dryers	Fan 3	268048.03	154536.88		6.65	28	28	28
GS Dryer01	Fan 2	268021.2	154590.62		22	28	28	28
NEW Dryers	Fan 4	268050.34	154540.85		6.65	28	28	28
GS Dryer01	Fan 1	268023.38	154590.1		22	28	28	28
NEW Dryers	Aspirator 1	268040.48	154521.27		2	27	27	27
NEW Dryers	Aspirator 2	268041.73	154523.37		2	27	27	27
NEW Dryers	BurnerA1	268046.73	154526.14		1.6	27	27	27
NEW Dryers	BurnerA2	268047.45	154527.42		1.6	27	27	27
NEW Dryers	BurnerA3	268048.14	154528.73		1.6	27	27	27
SeedPlant	AXX-XX - Inferred	268022.76	154393.65		1	26	26	26
Dryer4a&b	A2-41 Mitigated	268013.33	154424.27		2	26	26	26
SeedPlant	A2-49 - Inferred	268017.34	154392.65		0.9	26	26	26
Dryer4a&b	A2-42 Mitigated	268016.21	154422.76		2	26	26	26
Dryer 5	A2-37 Mitigated	268033.79	154463.2		2	25	25	25
Dryer 5	A2-36 Mitigated	268035.31	154462.4		2	25	25	25
Dryer 5	A2-35	268035.47	154460.45		2	25	25	25
Dryer 5	A2-34 Mitigated	268037.38	154461.33		2	25	25	25
Dryer 5	A2-33 Mitigated	268038.98	154460.61		2	25	25	25
SeedPlant	AXX-XX - Inferred	268021.01	154392.74		0.5	25	25	25
SeedPlant	AXX-XX - Inferred	268022.6	154391.82		0.5	25	25	25
GS Dryer02	Fan 2	268093.72	154580		22	25	25	25
GS Dryer02	Fan 1	268095.77	154579.6		22	25	25	25
NEW Dryers	BurnerB1	268051.45	154536.24		1.6	22	22	22
A2-12 Fan	A2-12 GVRFB	268004.59	154238.97		0.5	22	22	22
GS Dryer01	BurnerA1	268017.45	154590.19		3	22	22	22
NEW Dryers	BurnerB2	268052.17	154537.52		1.6	22	22	22
NEW Dryers	BurnerB3	268052.86	154538.83		1.6	22	22	22
Soya Ex	A2-16 Soya Exhaust	268003	154237.76		0.5	22	22	22
Flaker	A2-11 Flaker Cyclone	268007.42	154223.11		1.5	21	21	21
GS Dryer01	Aspirator 1	268019.02	154591.32		3	21	21	21
Dryer 5	Precleaner A2-42 Mitigated	268028.11	154447.36		9	21	21	21
Soya Extru	A2-22 Soya Extruder	267999.24	154236.58		0.5	20	20	20
JCB	JCB	268028.45	154510.5		0.75	25	27	18
WHouse1&2	1st Storey Door (open)	268038.08	154207.67		2.5	14	14	14
Dryer 5	Conveyor Motor/Hopper	268041.62	154458.7		1	14	14	14
GS02Intake	Intake	268092.45	154573.63		0.5	13	13	13
Mill	Mill building fans 2 - Inferred	268051.26	154171.72		0.5	8	8	8
Mill	Mill building fans 3 - Inferred	268039.45	154165.67		0.5	7	7	7
Mill	Mill building fans 1 - Inferred	268063.18	154177.8		0.5	6	6	6
GS Dryer02	BurnerA1	268096.12	154578.03		3	6	6	6
Burner	Dryer 4 burner	268030.02	154421.86		1	5	5	5
Cuber 3	A2-3 Cuber 3 Exhaust	268034.93	154204.99		53	5	5	5
Cuber 2	A2-4 Cuber4	268040.32	154207.8		53	5	5	5
Cuber 2	A2-2 Cuber2	268037.25	154206.25		53	5	5	5
Cuber	A2- 1 Cuber 1 Exhaust	268044.76	154210.18		53	5	5	5
GS Dryer02	Aspirator 1	268090.88	154580.43		3	5	5	5
Flaker	A2-8 Flaker 2	268005.11	154207.22		1.5	4	4	4
Mill	A2-21 Main Grain Intake 4 - Inferred	268025.59	154163.7		1.4	3	3	3
Boiler	Louvred Doors	268011.35	154275.28		1.5	2	2	2
Dryer 4	Door to Precleaner Mitigated	268003.46	154438.31		3	-1	-1	-1
Aeration	Aeration Alleyway Store U	268079.28	154526.02		2.5	-21	-21	-21
Truck/Trac	Trucks/Tractors	268107.02	154274.27		0.75	39	35	--