Noise Assessment for Environmental Permit:
Etex Bristol Substantial Permit Variation

March 2023

Experts in noise and vibration assessment and management

Document Control

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Principal Contact	Richard José – BU Environmental Advisor (Building Performance)
Site Address	Royal Portbury Docks, Redland Avenue, Easton-in-Gordano Bristol, BS20 0FB
Existing Permit No.	EPR/XP3036SZ

Job Number	12012C-20

Report Prepared By:	David Sproston BSc MIOA MCIEH (Principal Consultant)

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Synopsis

This report describes the noise assessment to support the substantial permit variation for the Etex Bristol site in North Somerset, situated within the port of Bristol and falls within the administrative district of North Somerset Council (NSC).

The assessment has been carried out by Noise Consultants Ltd (NCL) on behalf of Etex Building Performance (Etex), in line with current Guidance published by the Environment Agency, and in accordance with the methodology set out in BS 4142:2014.

With the exception of Sheephouse Park (a caravan park 175m to the north-west of the Site boundary), the nearest noise sensitive receptors (NSRs) to the Site are typically dwellings >800m from the Site.

A baseline noise survey found the underlying noise climate comprised of steady noise from the nearby Port, or road traffic. During this time, the existing Etex plant was fully operational, but importantly, was observed as being inaudible, and therefore the measured baseline noise levels are considered representative of those which would prevail in the absence of the Etex site. This is also a positive indication that current operational noise from the site does not result in an unacceptable noise impact, and that industrial noise from other land uses is a constituent part of the existing noise climate at some receptors.

The new plant will house comparable activities and processes as existing. A noise survey has been undertaken to establish plant source noise levels within the existing plant, and the results used in a computer noise modelling exercise to calculate future operational sound levels at the nearest dwellings resulting from significant sources of internal and external sound at the site. It was not feasible to measure, or obtain, source noise levels for all sources and source noise data from established sources, NCL's in-house data library, or noise surveys carried out by others at the Site in connection with the planning application have been used. It has been necessary to calculate the sound insulation performance of various building elements of the new plant, which has included a conservative approach and corrections for uncertainty.

Modelling results demonstrate that operational sound levels will be well below the existing typical background and residual sound levels at all assessment locations around the Site. Furthermore, as the predicted operational sound levels are well below the underlying noise climate at the nearest noise sensitive receptors, it is likely that noise from the Site will be inaudible.

Consequently, the operation of all plant at the Site should not result in an unacceptable noise impact at any nearby noise sensitive receptors, and no specific noise mitigation measures are considered necessary.

1 Introduction

1.1 This report describes a noise assessment prepared by Noise Consultants Ltd (NCL) on behalf of Etex Building Performance (Etex), to support the substantial permit variation for the Etex Bristol site in North Somerset, situated within the port of Bristol that falls within the administrative district of North Somerset Council (NSC).

Site Description, Environs, and Existing and Consented Development

1.2 Etex is located on land off Redland Avenue, Easton-in-Gordano Bristol. The Site location is shown in **Figure 1**.

1.3 Etex has extant planning consent[1] for a new plasterboard production line and warehouse facility (the 'Development') alongside their existing Bristol plasterboard plant (collectively, the 'Site'). Operations at the existing plant are permitted by the Environment Agency (ref. EPR/XP3036SZ).

1.4 The Development (new plant) includes the construction of 3 no. new buildings in the southernmost area of the Site, consisting of a Gypsum store, Calcination Workshop and a main building housing a 50 million square metre per year capacity board line (plasterboard production line, compressor room, warehouse storage, office space and other ancillary uses). The Development will allow the combined Bristol Site to double its present output capacity and be an autonomous facility but will have a symbiotic relationship between the existing and new warehouses in order to maintain the efficiency of the distribution transport load out. The various areas of the existing and consented buildings are shown in **Figure 2.**

1.5 Gypsum, a soft mineral composed of calcium sulphate dehydrate, is the primary raw material used in the production of plasterboard. Gypsum is imported twice-annually by oceangoing vessels to Royal Portbury Dock to the north of Site, and subsequently transported to the existing Gypsum store via an existing conveyor system during both the day and night, until unloading is complete. This process will continue, with the new plant requiring an increase in imported gypsum, although the approved Development allows the existing conveyor serving the existing Gypsum Store to be decommissioned and will be switched to a part-repurposed and part-new conveyors (see **Figure 2).**

1.6 The Site will operate continuously throughout the day and night. Consequently, noise from fixed plant and equipment will be steady and continuous. Several Distribution Tractors will move empty trailers into the main building (Storage and Distribution, **Figure 2)** and loaded trailers to a trailer park to await export from the Site. Visiting HGV's import/export non-gypsum materials and finished goods throughout the daytime. HGV trips to/from the site do not currently occur at night. It is anticipated that visiting HGVs will park an empty trailer in on one of the three new trailer parks (Trailer Parks 2-4, **Figure 2)** and depart after with a loaded trailer from one of the trailer parks.

[1] North Somerset Council, Planning Application ref: 20/P/2122/FUL, Approved 9th April 2021

1.7 The nearest and most exposed noise-sensitive receptors (NSRs) are Sheephouse Park (residential park home) approximately 175m north-west, Court House Farm on Marsh Lane approximately 750m to the south, and dwellings and a hotel to the east the River Avon approximately 900m to the east, of the Site boundary. NCL are not aware of any recent noise complaints associated with the operation of the existing plant and operations.

Previous Noise Assessments

1.8 A noise impact assessment[2] was undertaken in connection with the planning application for the Development and included;

- Source noise measurements to quantify levels associated with the main sources of noise at the existing plant;
- Use of the measured noise levels to calculate operational noise level at NSRs to the east that were considered to be the most exposed to operational noise from the Site;
- Assessment of the calculated operational sound from the site at NSRs to the east.

1.9 The noise assessment was undertaken by Acoustical Control Consultants Ltd (ACC) during the first national lockdown of the Covid-19 pandemic when environmental sound levels were atypical as a result of significant reductions in traffic flows on the local and strategic road network. Consequently, residual and background sound levels were also atypical and not representative, and an assessment in accordance with the methodology set out in BS 4142:2014[3] was not carried out. Nevertheless, the outcome of the assessment found that sound from the existing and now consented Development was low at NSRs to the east, typically <35 dB $L_{Aeq,T}$. It is noted that;

- Noise from HGV movements was not included;
- Noise from the future conveyor system was found to be low, and not a significant contributor to overall sound from the Development; and
- The sitting Environmental Health Officer at NSC was satisfied with the assessment methodology and findings.

Assessment Summary

1.10 This noise assessment has been requested in connection with the permit variation for the consented Development as it will;

- introduce new noise sources to the Site;
- require alteration of some existing equipment associated with the existing site, and;
- generate some additional HGV movements around the site.

[2] Acoustical Control Consultants Limited (ACC), *'Acoustic Assessment of Proposed Extension, ETEX Manufacturing Facility'*, Report Ref: B5268 2020-07-07 R (7th July 2020).
[3] British Standards Institute, BS 4142: 2014 *'Methods for rating and assessing industrial and commercial sound'* (2014)

1.11 This noise assessment has been prepared with regard to The Environment Agency's *'Guidance – Noise and vibration management: environmental permits'* (the 'Guidance'), replaces Environment Agency *'Horizontal Guidance for Noise'* (H3) Parts 1 and 2; and SEPA's *'Guidance on the control of noise at PPC installations'*) which requires sound from the Site to be assessed in accordance with the methodology set out in BS 4142:2014[3].

Report Structure

1.12 This report is structured to align with that recommended in the Guidance. The assessment locations, survey equipment and meteorology, assessment methodology, noise data and predictions, assessment, noise control, discussion on uncertainty and conclusions are provided in the report body. Report appendices contain relevant equipment certificates, the results and analysis of noise survey data, and other supporting material referred to in the report body.

Competency

1.13 The surveys, calculations, noise modelling and assessment have been undertaken by the report author, David Sproston (Principal Consultant, NCL) who holds a BSc in Audio Technology from the University of Salford, is a corporate member of the Institute of Acoustics (MIOA), member of the Chartered Institute of Environmental Health (MCIEH), and has over 16yrs' of continuous experience in the measurement, prediction and assessment of environmental noise in a wide range of sectors and is therefore deemed competent to undertake this assessment.

Figure 1: Site Location and Layout

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Figure 2: Existing and Proposed Building Uses

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Figure 3: Conveyor Utilisation

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2 Assessment and Baseline Survey Locations

Noise Sensitive Receptors - Assessment Locations

2.1 This report includes an assessment of operational sound at existing NSRs to the Site, which have been identified as residential dwellings which are regarded as having a high sensitivity. There are a significant number of NSRs within the wider vicinity of the Site that could be affected by operational sound. However, it is not reasonably practicable to undertake a noise assessment at each of these NSRs individually. Therefore, a selection of NSRs have been chosen for this assessment;

- that are in closest proximity to the site;
- where exposure to existing environmental sound levels (not attributable to the Development) is low; and/or,
- where acoustic screening by intervening buildings is minimal.

2.2 The assessment locations are shown in **Figure 4,** numbered (NSR Ref) to align with those in the ACC noise assessment for consistency. Pertinent details for each assessment location are summarised in **Table 1**. Heights for each NSR have been set to be representative of windows of likely habitable rooms on the highest floor of the receptor building.

2.3 R11 (Sheephouse Park), is at ground floor, and therefore predicted site noise levels at this location are representative of those in external amenity spaces. Predicted operational noise levels at the remaining assessment locations are at upper floors, and consequently, are likely to be lower in private external amenity spaces (i.e. rear gardens) due to acoustic screening provided by intervening buildings, and self-screening by dwellings at receptors R12 and R14.

Baseline Survey Locations and Conditions

2.4 Existing baseline sound levels have been measured in the day and night on a weekday, at locations representative of each NSR identified in **Table 1**. It was not possible to measure baseline sound levels directly outside each NSRs due to access and safety concerns. Therefore, surrogate noise measurement locations (NMLs) have been used where the residual (L_{Aeq}) and background (L_{A90}) sound levels were considered reasonably representative of its associated NSR. The existing Etex plant was operational at the time of the baseline survey, but was inaudible at each NML/NSR. Ongoing construction activities at the new plant site were also inaudible. Therefore, the baseline noise data obtained is therefore considered representative of the underlying noise climate, and therefore considered appropriate for use in this assessment.

2.5 The baseline NMLs are identified in **Figure 4** with pertinent details summarised in **Table 2**, and discussed below.

- **R9** - It was not possible to gain access within the curtilage of this property. Consequently, baseline noise levels were measured at a surrogate location (**NML9**), approximately 6m from

Marsh Lane. Noise levels were measured over a 16hr period including the day and night on a part-attended basis.

- **R11** - Baseline levels were logged towards the centre of Sheephouse Park (**NML11**) on a part attended basis, over a 16hr period including the day and night.
- **R12** - Baseline levels were only able to be measured on an attended basis (**NML12**), during a representative period of one day and night.
- **R14** - Baseline levels were only able to be measured on an attended basis (**NML14**), during representative period of one day and night.

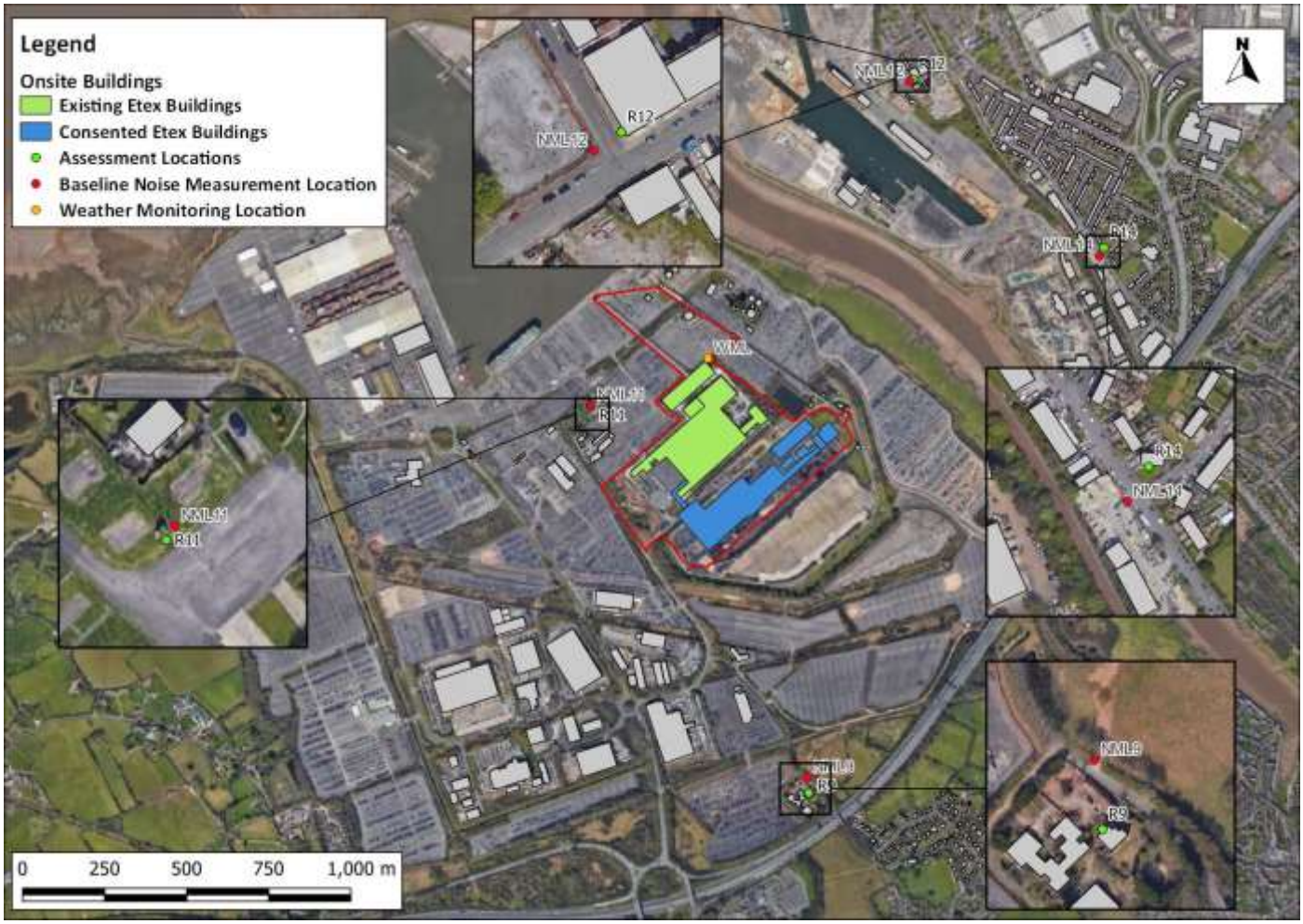
Table 1: Details of Assessment Locations (NSRs)

Assessment Location (NSR Ref)	Description / Address	Type	Grid Reference (O.S. X,Y)	Assessment Height (m above local ground)	Intervening Ground Type	Representative Baseline Measurement Location
R9	Court House Farm, Marsh Lane, Bristol BS20 0ND	3 Storey, Residential	351113, 175956	6.5m	Hard (predominantly tarmac)	**NML9**
R11	Sheephouse Park, Marsh Lane, Bristol, BS20 0NL	Single Storey, Residential	350448, 177135	1.5m		**NML11**
R12	The Royal Hotel, 28 Gloucester Rd, Avonmouth, Bristol BS11 9AD	3 Storey, Hotel	351431, 178132	9.5m	Hard (predominantly tarmac, and water)	**NML12**
R14	3 Pages Mead, Avonmouth, Bristol BS11 9LA	2 Storey, Residential	352013, 177618	4.0m		**NML14**

Table 2: Summary Baseline Sound Measurement Locations (NMLs)

Measurement Location (NML Ref)	Description / Address	Measurement Conditions	Grid Reference (O.S. X,Y)	Underlying Noise Climate (ranked)
NML9	6m from, Marsh Lane, Bristol BS20 0ND	1.4m above local ground, free-field	351108, 176004	Road traffic (M5) Road Traffic (Marsh Lane)
NML11	Toward Centre of Sheephouse Park, Marsh Lane, Bristol, BS20 0NL		350448, 177135	Steady plant/engine noise from Royal Portbury Dock
NML12	Corner of Gloucester Rd, Avonmouth, Bristol BS11 9AD		351420, 178125	Road traffic (Gloucester Road) Steady plant/engine noise from Royal Portbury Dock
NML14	On footpath of Portview Road, Avonmouth, Bristol BS11 9LA		351998, 177594	Road traffic (Portview Road) Distant road traffic (M5 and surrounding roads)

Figure 4: Assessment, Background Sound and Meteorological Survey Locations



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3 Survey Instrumentation, Meteorology and Conditions

Survey Instrumentation

3.1 Details of the survey instrumentation deployed during the baseline and source noise surveys are summarised in **Table 3**.

3.2 All noise measurements were undertaken using instrumentation confirming to conform to BS EN 61672-1:2013[4], Class 1, each calibrated within the preceding 2 years. The calibration level (94dB @ 1kHz) of each SLM was checked before and after the survey using an acoustic field calibrator conforming to BS EN 60942:2003[5], Class 1, calibrated with the preceding 12 months. No drift in the calibration levels noted. Calibration certificates of the sound level meters used are provided in Appendix **A1**.

3.3 A suitable windshield was fitted to the measurement microphones to minimise the effects of any wind induced turbulent sound for the duration of the measurements.

Baseline Noise Survey

3.4 Baseline noise measurements were conducted, where possible, in accordance with BS 7445-1:2003[6] and BS 4142:2014, between 16:55hrs on Wednesday 7 December 2022 until Thursday 8 December 2022

3.5 Baseline noise levels were;

- Measured out at a height of 1.4m-1.5m above ground, as required by BS 4142:2014;
- Carried out under free-field conditions (i.e. the sound level meter (SLM) was positioned at least 3.5m from all surrounding reflective surfaces other than the ground); and
- Measured in consecutive 5-minute periods, with the L_{AFmax}, L_{Aeq}, and L_{A90} descriptors.

Source Noise Survey

3.6 In addition to the baseline survey, source noise measurements within the noisiest areas within the existing Etex building were undertaken under various conditions, representative of the reverberant internal noise level at that location. The noise climate in these areas was dominated by fixed plant and equipment, was typically steady, permitting measurements of short duration to be undertaken to quantify internal noise levels for this assessment.

Survey Data Processing

3.7 Processing and analysis of the measured noise data has been undertaken using Microsoft Excel.

[4] British Standards Institute. BS EN 61672-1:2013 'Electroacoustics. Sound level meters – Specifications' (2013)
[5] British Standards Institute. BS EN 60942:2003 'Electroacoustics. Sound calibrators' (2003)
[6] British Standards institute. BS 7445-1:2003 'Description and measurement of environmental noise. Guide to quantities and procedures' (2003)

Meteorological Conditions

3.8 A weather station was deployed during the noise surveys at the northern extent of the Site (Location WML, **Figure 4**) to monitor the prevailing weather conditions in the vicinity of the site throughout the noise surveys undertaken by NCL. Temperature and wind speed during the survey are summarised in **Appendix A2** and shows that the prevailing weather conditions were cold (0.5 - 3.5 °C) and calm with maximum wind speeds not exceeding 1m/s. No rain was observed during the measurement period whilst on site, cloud cover was minimal (<3 Okta).

3.9 The prevailing weather conditions were therefore considered acceptable for the purposes of the assessment.

Local Conditions

3.10 There were no known atypical traffic conditions, such as speed restrictions of traffic control (e.g. temporary traffic lights), and all road traffic at the measurement locations was free flowing.

3.11 The prevailing local conditions were therefore considered acceptable for the purposes of the assessment.

Table 3: Survey Instrumentation

Purpose	Make / Model	Serial No.	Date of Last Calibration	Measurement Locations
Baseline Noise Measurements	Rion NL-52	1009670	10 March 2021	NML11
	Rion NL-52	1176453	26 July 2022	NML9
	Rion NL-52	00687043	7 March 2022	NML12 NML14
Source Noise Measurements	Rion NL-52			Various (onsite)
Acoustic Field Calibrator	Rion NC-75	34212937	7 March 2022	n/a
Weather Monitoring	Davis Vantage Vue	TBC	n/a	WML

4 Assessment Methodology

Assessment Approach

4.1 The calculation of operational sound from the site has been undertaken by a noise modelling exercise, as this readily permits source noise levels, sound insulation, screening and the effects of dispersion to be input, the results analysed and evaluated, and any necessary mitigation to be evaluated and optimised.

4.2 As the site would operate continuously over a 24-hour period the assessment includes all significant sources that would be in operation at any one time. The assessment considers the sources summarised in **Table 4** that have been determined to result in potentially significant noise at the assessment locations.

Table 4: Summary of Potentially Significant Noise Sources

Potentially Significant Noise Sources	Summary Description
Fixed plant and equipment within the building	All potentially significant items of fixed plant and equipment will be located internally and be in continuous operation. Therefore, plant noise will be the same during both the day and night.
HGVs	HGV flows to/from the site will vary throughout the day and night. Miscellaneous makes/models expected
Distribution tractors	Terberg DT 183s will move un/loaded trailers to/from the main building/trailer parks throughout the day and night.

4.3 As required by the Guidance, the calculated operational sound levels have then been assessed in accordance with BS 4142:2014[3] at the assessment locations, with a 'typical' background sound level (dB L_{A90}) established from analysis of the baseline noise survey data. The assessment has been undertaken for a 1hr period in the daytime (07:00-23:00hrs) and 15 minutes at night (23:00-07:00hrs).

4.4 To inform the assessment and provide reliable source data for use in the noise modelling;

- a source noise survey has been undertaken of existing source and activities that will be located in the new plant has been undertaken at the existing plant; and
- architects' drawings have been reviewed and the sound insulation of the buildings calculated.

4.5 The predicted free-field specific sound level ($L_{Aeq,T}$) at the assessment locations take account of the temporal changes in activities and HGVs movements on the site to undertake the assessment in the day and night.

4.6 To supplement this report, operational noise from existing and future conveyors has been considered, although it is acknowledged that this occurs for a very limited period and is not representative of the standard operation of the Site.

4.7 Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. A character correction for tonality, impulsivity, and/or intermittency can be added. Where the specific sound has characteristics that do not fall into the tonal, impulsive or intermittent categories but are otherwise readily distinguishable against the residual acoustic environment, a penalty of +3 dB can be applied in isolation.

4.8 Any corrections for the character of noise have been added to determine the rated sound level ($L_{Ar,Tr}$) from the site which has then been compared to a typical background sound level ($L_{A90,T)}$ measured at the NML associated with the assessment location to determine an initial estimate of the impact of the operation on external receptors with regards to the adverse impacts set out in BS 4142:2014 that states:

- *"Typically, the higher the rating level is above the background sound level the greater the magnitude of impact;*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

4.9 The initial estimate of the impact is then modified due to the context in which the sound occurs and avoids rigid adherence to noise limits at the exclusion of any other relevant considerations, which is vital in providing a reasoned assessment.

5 Noise Monitoring Data and Predictions

Baseline Noise Monitoring Results and Analysis

5.1 The results of the baseline noise survey undertaken between the 7 and 8 of December 2022 are provided in **Appendix A2**

5.2 Due to the large amount of data, the full baseline sound survey data is presented as a time/level history in **Appendix A2** and summarised in **Table 5** (rounded to the nearest integer value). Noise levels at NML9 and NML11 exhibit the diurnal characteristics expected of locations exposed to transportation noise with daytime only operational hours. Survey results obtained at NML9 are noticeably higher than all other measurement locations due to its proximity to the M5.

5.3 The main source of noise at each location are described in **Table 2.** Noise from the Etex site was not audible at any time and therefore the measured sound levels are therefore representative of the underlying noise climate.

5.4 BS 4142 does not define how a 'typical' background sound level (BSL) is to be established, and therefore analysis of the measured background (L_{A90}) sound levels has been undertaken. The Mean (Average), Mode and Median for the day and night-time periods are shown in **Table 5**. The adopted typical background is based on the lowest of the statistical metrics to provide a balanced and robust assessment.

Table 5: Analysis of Measured Sound Levels and Adopted Background Sound Levels

Measurement Location	Associated Assessment Location	Period	Measured $L_{Aeq,\ T}$ (dB)	analysis of $L_{A90,T}$ (dB)			Adopted Background Sound Level $L_{A90,T}$ (dB)
				Mean	Mode	Median	
NML9	R9	Daytime (07:00-23:00)	70	66	70	67	66
		Night-time (23:00-07:00)	65	58	55	56	55
NML11	R11	Daytime (07:00-23:00)	52	52	52	52	52
		Night-time (23:00-07:00)	50	50	51	50	50
NML12	R12	Daytime (07:00-23:00)	54	49	46	48	46
		Night-time (23:00-07:00)	47	45	44	45	44
NML14	R14	Daytime (07:00-23:00)	63	53	50	53	50
		Night-time (23:00-07:00)	49	43	43	43	43

Noise Modelling

5.5 A sound propagation model has been developed using Predictor-LimA® computational sound modelling software, configured to calculate sound levels in accordance with ISO 9613-2:1996[7].

5.6 Geospatial data for model was informed by publicly available mapping data[8], the layout plans and drawings provided by the Client.

Calculation Parameters

5.7 The following parameters were used in the noise modelling;

- Order of reflections = 1
- Ground absorption, G = 0.0 (representative of hard ground between the Site and assessment locations, as noted in **Table 1**.
- Adverse weather conditions = no
- Building heights = based on a combination of site observations, development designs, and LIDAR DTM/DSM data[7].

5.8 External walls and roofs have been modelled as vertical and horizontal (respectively) noise emitting planes. Operational sound levels have been calculated as free-field noise levels at each assessment location (for ease of comparison to the measured background sound levels), at the heights specified in **Table 1**.

Source Data – Conveyor Systems

5.9 It was not possible to measure noise from the existing or repurposed conveyor system, nor does the ACC report provide sufficient details to establish a reliable location(s) or its noise emission value(s). However, the operation of the existing conveyor system is permitted and regulated by extant planning permissions, and is not believed to have resulted in noise complaints from nearby receptors. Previous planning permissions required noise from the existing conveyor to be ≤ 65dB $L_{Aeq,1m}$.

5.10 Similarly, new tube conveyors are to be installed between the new extension and existing DSG store. However, as the procurement of this conveyor is still ongoing, there is insufficient technical detail available to determine its likely noise emission level(s). Nevertheless, this plant is nestled between new buildings, removing the line of sight to nearby NSR, at which resulting specific sound levels attributable to this plant is likely to be low and inaudible.

5.11 NCL have recently undertaken source measurements of a similar conveyor system, which found that at a distance of 1m, the specific noise level was 65 dB $L_{Aeq,T}$ and aligns well with a previous noise

[7] International Standard Organisation. ISO 9613 2:1996 '*Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation*' (1996).
[8] DEFRA National LIDAR Programme - data.gov.uk

emission limit for the existing conveyor. Therefore, to guide this assessment, the noise emission of all conveyors (except the new tube conveyors) has been taken as 65 dB $L_{Aeq,T}$ at 1m, modelled as a line source.

5.12 Gypsum unloading at the Dock will continue to be carried over throughout the day and night. It is anticipated that 16 vessels per year will be unloaded.

Source Data – HGVs

5.13 Hourly traffic data contained within the Transport Assessment[9] submitted with the planning application for the new plant shows up to a total 16 HGV movements to/from the site in worst-case 1hr daytime period, (07:00-08:00hrs, **Appendix A3**), which have been used in the noise modelling exercise.

5.14 The Site is a 'shunt-only' operation at night (23:00-07:00) and the only mobile plant source within the Site boundary are Distribution Tractors. Nevertheless, in order to undertake a robust and future proof assessment night-time HGV movements have been included in the assessment. Transport assessment methodologies do not ordinarily consider the vehicle movements at night as they primarily focus on impacts during daytime peak traffic hours. Therefore, the worst-case daytime HGV movements have been included, pro-rata, into the noise model for the night-time.

5.15 It is assumed that the drop and collection of trailers by visiting HGVs would be spread equally between across Trailer Parks 2-4 (**Figure 2**).

5.16 Due to safety reasons, it was not possible to measure source noise levels from visiting HGVs at the Site. Therefore, octave-band (L_{AFmax}) source noise levels for HGVs have been obtained from BS 5228[10]. A summary of the noise data used in connection with HGV movements is summarised in **Table 7**. The HGV routes are show in **Figure 5**.

Source Data – Distribution Tractors

5.17 A number of distribution tractors (shunters) will operate around the site in the day and night to obviate the need for visiting HGVs to enter into the main building to collect loaded and awaiting trailers, and to effectively manage distribution activities.

5.18 Expectedly, neither the Transport Assessment[9] nor other available documents provide sufficient details of the likely distribution tractor movements within the Site which are likely to vary over time. Therefore, it has been assumed that the shunter movements will be distributed evenly to/from the main building to each of the trailer parks.

5.19 NCL have not been able to obtain source noise data for the distribution tractor units to be used. Therefore, a relatively high, broadband sound power level has been assumed for the shunters based

[9] Markides Associates, *'Transport Assessment, Etex Site, Marsh Lane, Bristol'*, Report Ref: 9357-01 TA01 Rev D (17 July 2020), Table 5.6.
[10] British Standards Institute, BS 5228-1:2009:+A1 (2014) 'Code of practice for noise and vibration control on construction and open sites. Noise', (2014)

on past experience. A summary of the noise data adopted for the shunters is summarised in **Table 7**. The shunter and HGV routes are show in **Figure 5**.

Figure 5: HGV and Distribution Tractor Routes

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Source Data – Internal Plant, Equipment and Activities

5.20 Internal noise resulting from the operation of a large number of numerous individual items of plant, equipment and activities can be calculated. However, this relies on a robust understanding of the noise emission, operating parameters and conditions, and location of each, as well as their interdependences and of the acoustics of each internal space being considered. Consequently, such an approach is exceedingly complex, time consuming and subject to significant degrees of uncertainty.

5.21 Therefore, given that the manufacturing processes in the areas of the existing plant will be duplicated in comparable areas of the new plant, reverberant internal ambient noise levels (IANLs) have first been measured in each of the noisiest areas of the existing plant, and then an appropriate IANL adopted (in terms of octave band levels and the L_{Aeq} descriptor) from those measurements for the same area in the new plant, and noise break-out calculated by the noise model.

5.22 Due to site Health and Safety, it was not possible to enter the main storage and distribution area within the existing building. Therefore, the broadband IANL measured by ACC has been adopted for this space.

5.23 A summary of the IANLs adopted for each area of the new plant site is summarised in

5.25 Table 6.

Sound Insulation Data – Building Envelope

5.26 To predict noise break-out from buildings, it is necessary to associate an appropriate sound reduction (sometimes referred to as the transmission loss) for the various elements of the building envelope, including the walls, roof, glazing, roller/sectional overhead shutter doors etc. It is often not possible to obtain sound reduction performance values for each element of the building envelope. Where data is available, its often provided as a single figure value (in terms of the R_w descriptor, a sound insulation performance measured under laboratory conditions), and without any octave-bands performance.

5.27 As reliable sound insulation performance was unable to be obtained for each of the elements in the building envelope, architectural drawings have been used to calculate the likely octave-band sound insulation performance for each element type. This has been done using Insul®, software capable of predicting the sound insulation of walls, floors, roofs, ceilings and windows and bespoke elements for use in noise transfer calculations, acoustical design or specification.

5.28 NCL understand that some external walls and roof will be constructed from profiled steel cladding (Euroclad 32/1000 profiled cladding sheet with reverse facing troughs) incorporating an internal steel liner forming a 120mm cavity, filled with 120mm Knauf Factoryclad 40 Quilt Insulation. At the time of this assessment, external walls incorporating this construction details were not confirmed. Therefore, for simplicity, and to further facilitate a robust assessment, one layer of profiled steel cladding has been assumed for all the external walls.

5.29 The roof and walls of the Calcination Workshop will be entirely profiled steel cladding (Euroclad 32/1000 profiled cladding sheet with reverse facing troughs). However, the majority of walls and roof of other buildings comprises a combination of profiled steel cladding, glazing, and roller/sectional overhead shutter doors in some walls. Therefore, for simplicity;

- the composite sound reduction of the Gypsum Store roof has been calculated based on the respective areas of steel cladding and windows;
- the composite sound reduction of the roof of the main building has been calculated based on the respective areas of cladding and roof lights (Zenon Pro 30 Outer Sheet);
- The sound insulation performance of roller/sectional overhead shutter doors and glazing in external wall exceeds that of the steel cladding, and has not been included for simplistic and robust approach as including the higher sound insulation performance of these elements has negligible effect on the overall noise immission at the assessment locations;
- The IANL for the storage/distribution area in the ACC report is provided in broadband terms only, and therefore, the calculated broadband reduction (R_w) provided by the roof/walls has been used when calculating noise break-out for this area.

5.30 To be within the confidence limits (95%) of Insul (in each octave-band) to reduce uncertainty, all adopted sound insulation values includes a correction of -3 dB, applied to the Insul calculated octave band values. Similarly, a -3 dB connection has been applied to the broadband (R_w) performance where the IANL is input as a broadband level.

5.31 Intermittent access is required to the Gypsum Store and Distribution Warehouse by mobile plant and equipment. Accordingly, the noise model also assumed that two shutter doors on the south-west elevation of the Distribution Warehouse and the main access door on the north-east elevation of the Gypsum Store will be fully open 100 % of the time, in both the day and night. In any event, the Environmental Permit requires all roller shutter doors to remain closed as far as reasonably practicable, and therefore this assumption adds further robustness to the assessment.

5.32 A summary of the adopted sound reduction of the various areas of the new plant site is summarised in

5.34 Table 8. Typically, the internal noise level in noisy production areas is 83-86 dB $L_{Aeq,T}$ and is due to the operation of a wide range of plant and equipment.

Excluded Buildings/Areas

5.35 Some spaces within the new plant will not contain significant source of noise, and have been excluded from the noise model, and include;

- Maintenance
- Raw Materials
- Paper Storage

Table 6: Noise Modelling Inputs - Internal Sound Levels

Area	Octave Centre Reverberant Sound Pressure Level (dB)								Broadband L_{Aeq} (dB)
	63	125	250	500	1K	2K	4K	8K	
Gypsum Store[11]	80	79	76	72	68	65	62	53	75
Calcination Workshop[11]	86	87	84	84	80	77	72	64	86
Start of Boardline[11]	86	85	83	82	78	74	72	67	84
Ovens[11]	78	80	80	79	74	71	70	77	82
End of Boardline[11]	85	85	84	85	81	76	74	75	86
Cutters / Packing[11]	81	85	81	78	77	76	74	67	83
Compressor Room[11]	73	85	83	83	77	71	63	54	83
Storage, Warehousing & Picking Area	-								79

Table 7: Noise Modelling Inputs – External Sources

Source	Make / Model / Source	Source Type	Height (relative to ground)	Speed / Capacity	L_{WA}	% On Time
HGV Movements[12]	BS 5228, Table C11, item 9: Road Lorry 313kw, 32t	Moving Point Source	1.0m	16km/h (10mph)	110[13]	-
Distribution tractor	Terberg DT 135	Moving Point Source	1.0m	16km/h (10mph)	104[14]	-
Brake Hiss[15]	At each side of gatehouse, and end of each Internal HGV and Distribution Tractor Route	Point Source	1.0m	-	110	2%
Tonal Reverse Alarm[15]	End of Each Internal HGV and Distribution Tractor Route	Point Source	1.0m	-	101	5%
Idling HGV[12]	One, each side of gatehouse	Point Source	1.0m	-	93	50%
Conveyor System	Conveyor carrying gypsum	Line Source	Elevated, Varies.	-	73	100%

[11] Based on the logarithmic average of noise levels measured in these areas of the existing plant
[12] Daytime only
[13] Modelling drive-by maximum sound pressure level in L_{max} (octave bands)
[14] Modelling as an assumed broadband sound power level, @1kHz
[15] Daytime only for HGV's

Table 8: Noise Modelling Inputs – Adopted Building Envelope SRI

Type	Construction	Building / Façade Element	Octave-band Sound Reduction (dB, Hz)								Broadband Sound Reduction (dB R_w)
			63	125	250	500	1k	2k	4k	8k	
Wall	Euroclad 32/1000 profiled sheet (100%)	All Main Building	6	9	12	14	13	16	18	18	15
		All Calcination									
		Gypsum Storage (NW and SE walls)									
	Euroclad 32/1000 profiled sheet (88%) + ArcoPlus® glazing (12%)	Gypsum Storage (NE and SW walls)	6	8	12	14	14	16	19	15	15
	2 x Louvres 3m x 2m (w x h)	Compressor Room (NW and NE walls)	1	1	2	4	4	6	6	4	3
	Open Access Door, 4m x 5m (w x h)	Gypsum Storage (NE and wall x 1)	0	0	0	0	0	0	0	0	0
		Distribution Access Door (SW wall)									
Roof	Euroclad 32/1000 profiled sheet (95%) + Zenon Pro 30 Outer Sheet Rooflights (5%)	All Main Building	6	9	12	14	13	16	19	15	15
	Euroclad 32/1000 profiled sheet (100%)	Calcination Workshop	6	9	12	14	13	16	18	18	15
	Euroclad 32/1000 profiled sheet (31%) + Zenon Pro 30 Outer Sheet Rooflights (69%)	Gypsum Storage	6	8	12	15	15	17	20	15	16

Results and Assessment – Main Operations

5.36 The predicted noise levels are summarised in **Table 9**.

Table 9: Assessment of Specific Sound Levels – Main Operations

Description	Assessment Location (NSR Ref)			
	R9	R11	R12	R14
Daytime (07:00-23:00hrs, inc. HGV Movements)				
Predicted Specific Sound Level dB $L_{Aeq,T}$	39	39	29	32
Character corrections, dB	0	0	0	0
BS 4142:2104 Sound Rating Level, rounded to nearest dB, dB $L_{Ar,Tr}$	39	39	29	32
Background Sound Level (BSL), dB L_{A90}	66	52	46	50
Sound Rating Level – BSL (dB)	-27	-13	-17	-18
Existing Residual Sound Level (RSL dB $L_{Aeq,T}$)	70	52	54	63
Sound Rating Level – RSL (dB)	-31	-13	-25	-31
Assessment Outcome	'Low Impact'			
Night-time (23:00-07:00hrs, inc. HGV Movements)				
Predicted Specific Sound Level dB $L_{Aeq,T}$	39	39	29	32
Character corrections, dB	0	0	0	0
BS 4142:2104 Sound Rating Level, rounded to nearest dB, dB $L_{Ar,Tr}$	39	39	29	32
Background Sound Level (BSL), dB L_{A90}	55	50	44	43
Sound Rating Level – BSL (dB)	-16	-11	-15	-11
Existing Residual Sound Level (RSL dB $L_{Aeq,T}$)	65	50	47	49
Sound Rating Level – RSL (dB)	-26	-11	-18	-17
Assessment Outcome	'Low Impact'			

5.37 The predicted Specific sound levels (dB $L_{Aeq,T}$) for the main operation of the new plant are at least 11 dB below the background (dB $L_{A90,T}$) and residual (dB $L_{Aeq,T}$) sound levels and are therefore unlikely to be audible or discernible against the underlying noise climate. Accordingly, no acoustic feature corrections have been applied. With reference to BS 4142 (2014) and prior to consideration of context, this indicates the operation of the new plant will have a 'low impact'.

5.38 At R9, the predicted specific sound levels are at least 16 dB(A) and 26 dB(A) below the background and residual sound levels (respectively) which are dominated by road traffic. At R11, the closest existing receptor(s) to the Site, the predicted specific sound levels are at least 11 dB(A) below the background and residual sound levels which are dominated by industrial noise from the Port and

wider area. This is a positive indication that noise from the new plant will be inaudible at both receptors.

5.39 Therefore, given that the rating levels for the new plant are well below the background sound levels, that operational sound from the new plant is unlikely to be audible, it is concluded that the operation of both the new and existing plant (which is inaudible), would not result in unacceptable noise impact at the nearest noise-sensitive receptors to the site.

Results and Assessment – With Conveyor System Operating

5.40 The results of the noise modelling indicate that at the receptor closest to the existing conveyor system (Receptor R11, Sheephouse Park), conveyor noise is 35 dB $L_{Aeq,T}$ which is low in absolute terms. When the new and repurposed conveyors are operational, the source of conveyor noise will move appreciably further way from this receptor, and conveyor noise will decrease by 1dB (to 34 dB $L_{Aeq,T}$).

5.41 The noise model indicates that with the new and repurposed conveyors operating, the cumulative sound from the conveyor and new plant would increase to 40dB $L_{Aeq,T}$ for the day and night. This small increase would not change the outcome of the assessment, and therefore cumulative noise (that includes the operation of the new plant, repurposed and new conveyor systems) would not increase significantly, and the assessment outcome ('Low Impact') would not change.

Uncertainty

5.42 Factors of uncertainty are summarised in **Table 10**. It is concluded that the magnitude of uncertainty is low and when considered would not change the outcome of the assessment.

Table 10: Considerations and Impact of Uncertainty

Source of Uncertainty	Uncertainty Relief	Impact on Assessment
Weather Conditions	The survey was carried out in acceptable weather conditions	Negligible
Survey equipment	Fully and field-calibrated equipment was used	Negligible
Source Directivity	Noise from the Etex site was not audible at the baseline noise measurement locations	Negligible
Baseline Noise Measurements	All baseline noise measurements were carried out at the same position are repeatable, and were undertaken under free-field conditions.	Negligible
Source Noise Measurements	Plant source noise measurements carried out at representative locations with the existing Etex plant. Noise levels were steady, and are comparable to those previously measured by ACC. The highest measured noise level in each area have been used in the calculations	Negligible
Broadband Source Noise Data	A high source noise level for the Distribution tractor has been adopted.	The contribution of noise from the tractors is likely to be higher than in practice, but the overall predicted specific sound levels will be significantly lower, and therefore has a negligible impact on the assessment
Sound Reduction of Building Elements	A -3 dB correction has been applied to the predicted values to ensure they are with the 95% confidence limits of Insul	A small uncertainty remains as the values are not based on test data obtained under laboratory conditions, but would not affect outcome of the assessment, and is therefore negligible
Operator Error	The consultant undertaking the survey, calculations an assessment is considered competent.	Negligible
Accuracy of Prediction Method	ISO 9613 is considered accurate to within ± 3dB.	This uncertainty would not change the outcome of the assessment, and is therefore negligible

6 Conclusions

6.1 This report describes a noise assessment prepared by Noise Consultants Ltd (NCL) on behalf of Etex Building Performance (Etex), to support the substantial permit variation for the Etex Bristol site in North Somerset, situated within the port of Bristol that falls within the administrative district of North Somerset Council (NSC).

6.2 Noise surveys have been undertaken to quantify existing background sound levels at the nearest identified noise sensitive receptors under acceptable conditions, and the results analysed to establish a 'typical' background sound level for use in the assessment.

6.3 A source noise survey has been undertaken at Etex's existing plant to quantify internal noise levels that are likely to be present in the noisiest areas of the Site, and, along with construction details provided by the client, noise break-out has been calculated at the nearest noise sensitive receptors. Source emission levels for some plant has been adopted from other sources as it was not possible to measure noise from some items/activities.

6.4 The calculation of operational sound from the site has been undertaken by a noise modelling exercise, and the results assessed in accordance with BS 4142:2014. The assessment found noise from the site to be well below the 'typical' background sound levels at all times, and therefore will not result in unacceptable noise impact at the nearest noise sensitive receptors. Consequently, no specific noise mitigation measures are considered necessary at this stage.

7 Glossary

dB	Decibel. The logarithmically scaled measurement unit of sound.
A-weighting	Frequency weighting applied to measured sound in order to account for the relative loudness perceived by the human ear.
$L_{Aeq,T}$	A-weighted equivalent continuous sound level over a given time period. It is the sound level of a steady sound that has the same energy as a fluctuating sound over the same time period.
$L_{A10,T}$	The A-weighted sound level exceeded for 10% of the measurement period. It is widely used as a descriptor of road traffic noise.
$L_{A90,T}$	The A-weighted sound level exceeded for 90% of the measurement period. Often referred to as the background sound level.
L_{Amax}	The A-weighted maximum recorded noise level during a measurement period.
Ambient sound level, $L_a = L_{Aeq,T}$	The A-weighted equivalent continuous sound level of the totally encompassing sound for a given situation and time interval, T.
Residual sound level	The A-weighted equivalent continuous ambient sound level remaining when the specific sound level has decreased to a degree in which it does not contribute to the ambient sound level.
Specific sound level, $L_s = L_{Aeq,Tr}$	The A-weighted equivalent continuous sound pressure level produced by the specific sound source at the reference location over a reference time interval, T
Rating level, $L_{Ar,Tr}$	The specific sound level plus any adjustment for the characteristic features of the sound.

A1 Noise Survey Instrumentation Calibration Certificates

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 10 March 2021

Certificate Number: UCRT21/1332

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer: Noise Consultants Limited
6 Bankside
Crosfield Street
Warrington
WA1 1UD

Order No. 151

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification:

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01009670
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	09975
Rion	Microphone	UC-59	18145
Rion	Calibrator	NC-75	34212937
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 10 March 2021 ANV Job No. UKAS21/03181

Date Calibrated 10 March 2021

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	Initial Calibration		

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 26 July 2021

Certificate Number: UCRT21/1917

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	Noise Consultants Limited 6 Bankside Crosfield Street Warrington WA1 1UD
Order No.	174
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01176453
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76472
Rion	Microphone	UC-59	12404
Rion	Calibrator	NC-75	34291339
	Calibrator adaptor type if applicable		NC-75-022

Performance Class	1
Test Procedure	TP 10. SLM 61672-3:2013
	Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2013	Yes
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013
Date Received	23 July 2021 ANV Job No. UKAS21/07486
Date Calibrated	26 July 2021

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	03 August 2020	UCRT20/1737	0653

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 07 March 2022 **Certificate Number: UCRT22/1318**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer: Noise Consultants Ltd, 6 Bankside, Crosfield Street, Warrington, WA1 1UP

Order No. 205

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification:

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00687043
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	87198
Rion	Microphone	UC-59	13561
Rion	Calibrator	NC-75	34212937
	Calibrator adaptor type if applicable		NC-75-022

Performance Class 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 04 March 2022 ANV Job No. UKAS22/03157

Date Calibrated 07 March 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	24 February 2020	UCRT20/1224	0653

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 07 March 2022

Certificate Number: UCRT22/1315

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	Noise Consultants Ltd 6 Bankside Crosfield Street Warrington WA1 1UP
Order No.	205
Test Procedure	Procedure TP 14 Calibration of Sound Calibrators (30942:2017)
Description	Acoustic Calibrator

Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Rion	Calibrator	NC-75	34212937
Public evidence of Type Approval		Yes	Approved by PTB	

The calibrator has been tested as specified in Annex B of IEC 60942:2017. As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2017, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2017.

ANV Job No.	UKAS22/03157
Date Received	04 March 2022
Date Calibrated	07 March 2022
Previous Certificate	*Dated* 10 March 2021 *Certificate No.* UCRT21/1329 *Laboratory* 0653

Figure A2.5: Analysis of Measured Background Sound, dB $L_{A90,5min}$, NML9

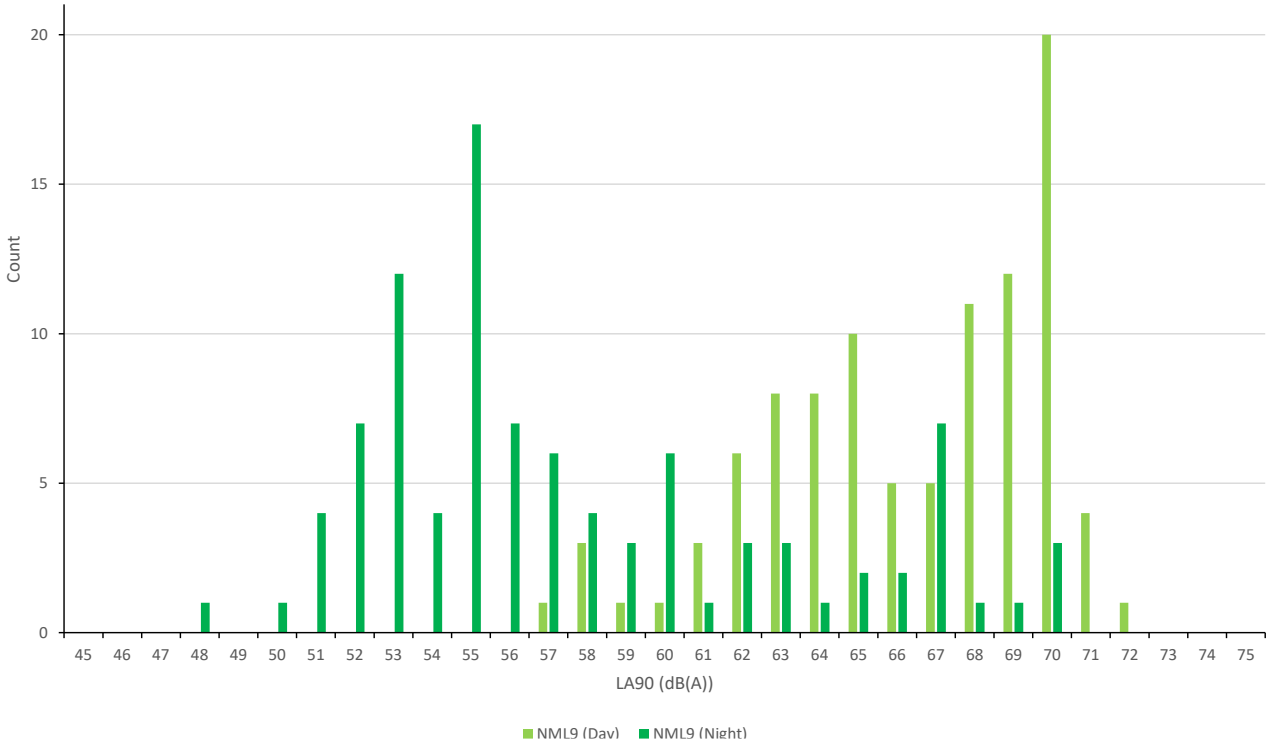
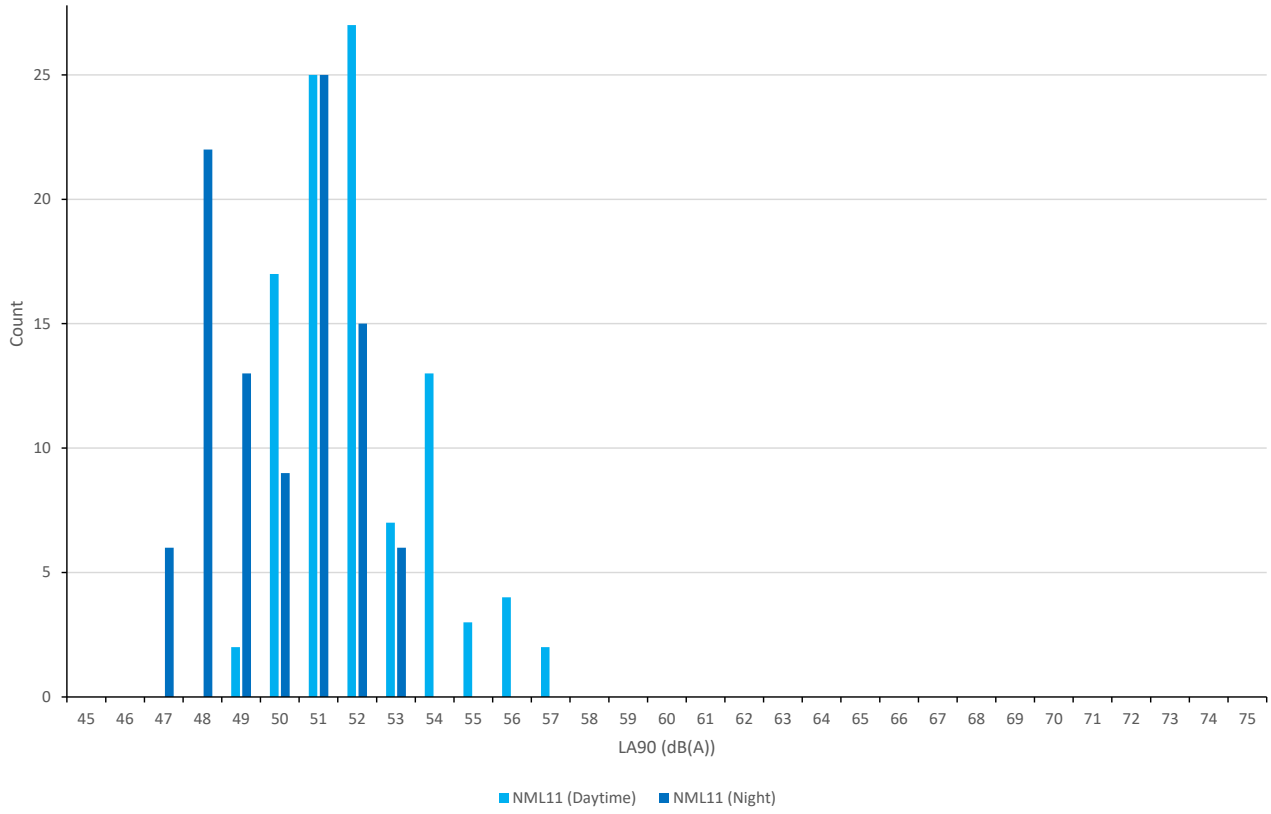


Figure A2.6: Analysis of Measured Background Sound, dB $L_{A90,5min}$, NML11



A2 Survey Data

Figure A3.1: Measured Weather Data

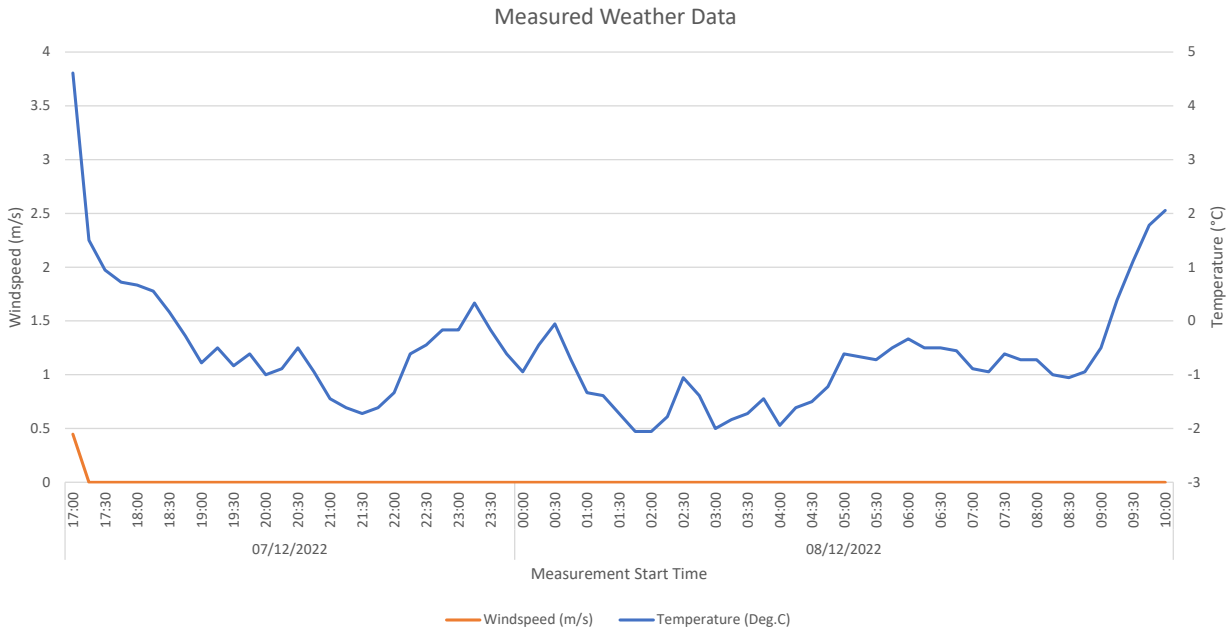


Figure A2.7: Measured Noise Data, NML9

Figure A2.8: Statistical Analysis of Measure L_{A90} Noise Data, NML9

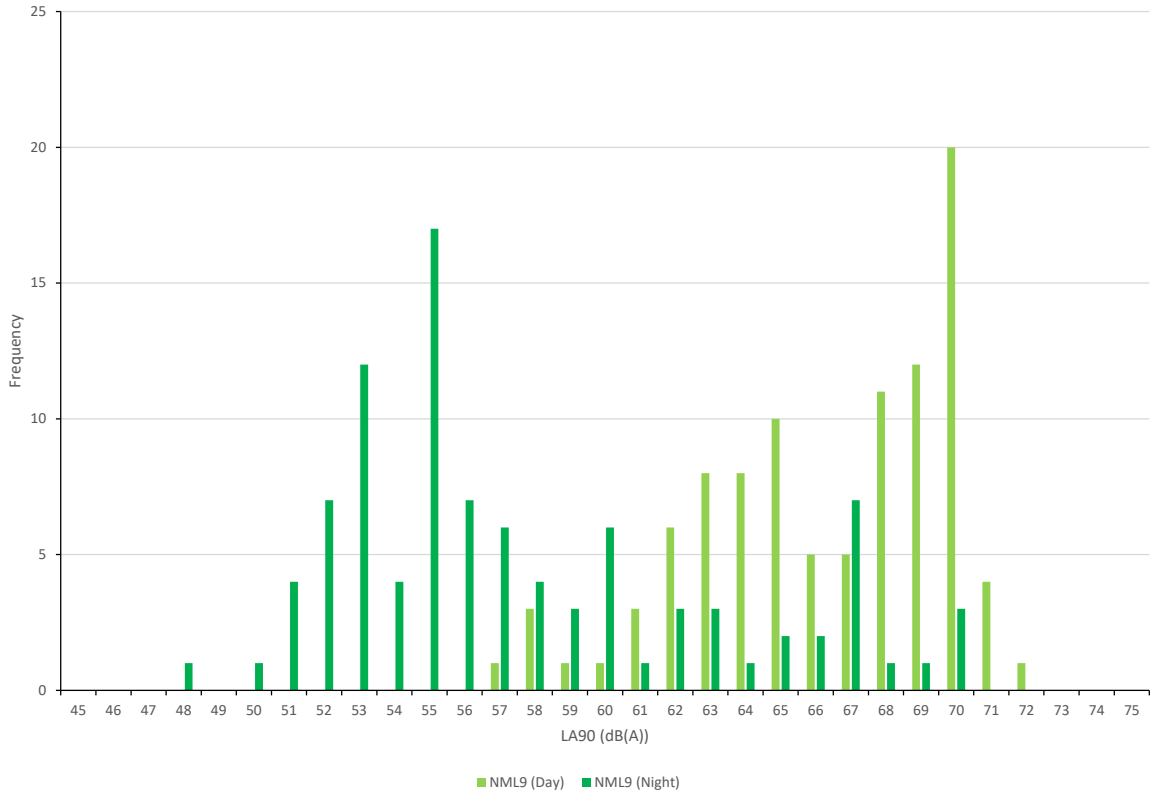


Figure A2.9: Measured Noise Data NML11

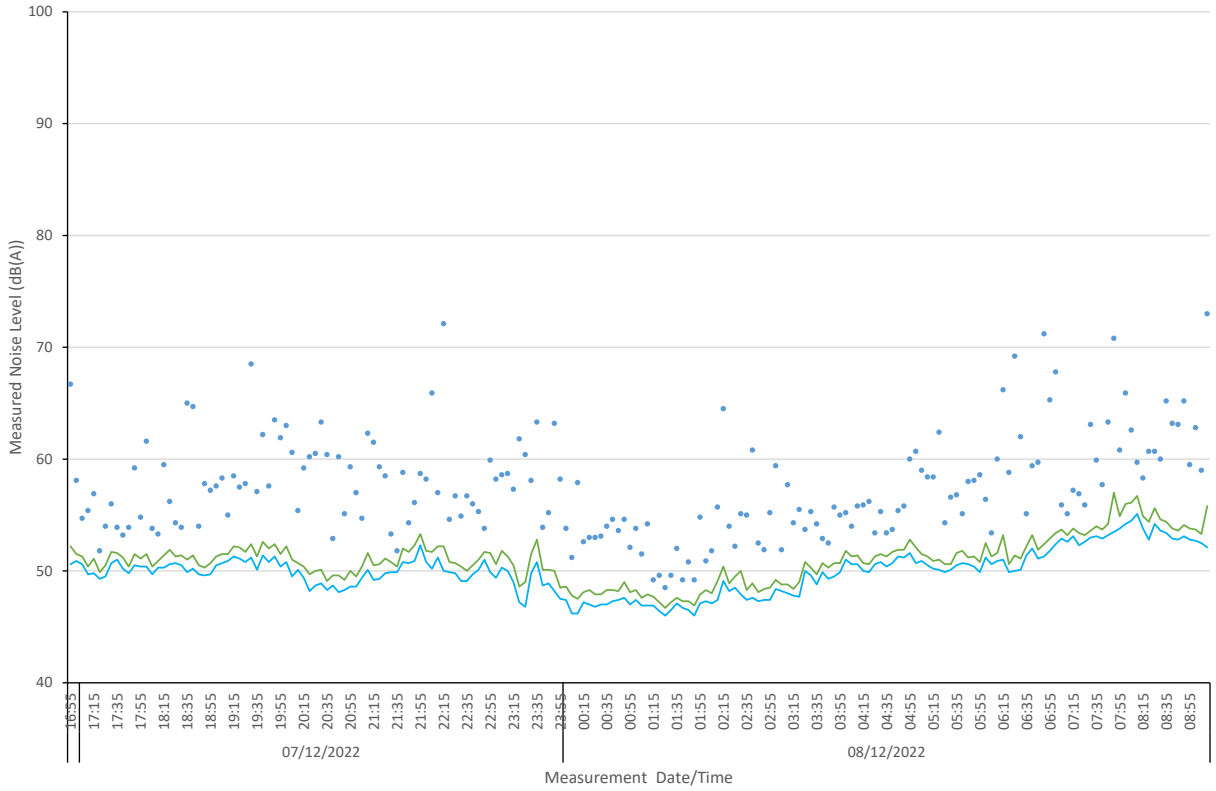


Figure A2.10: Statistical Analysis of Measure L_{A90} Noise Data, NML11

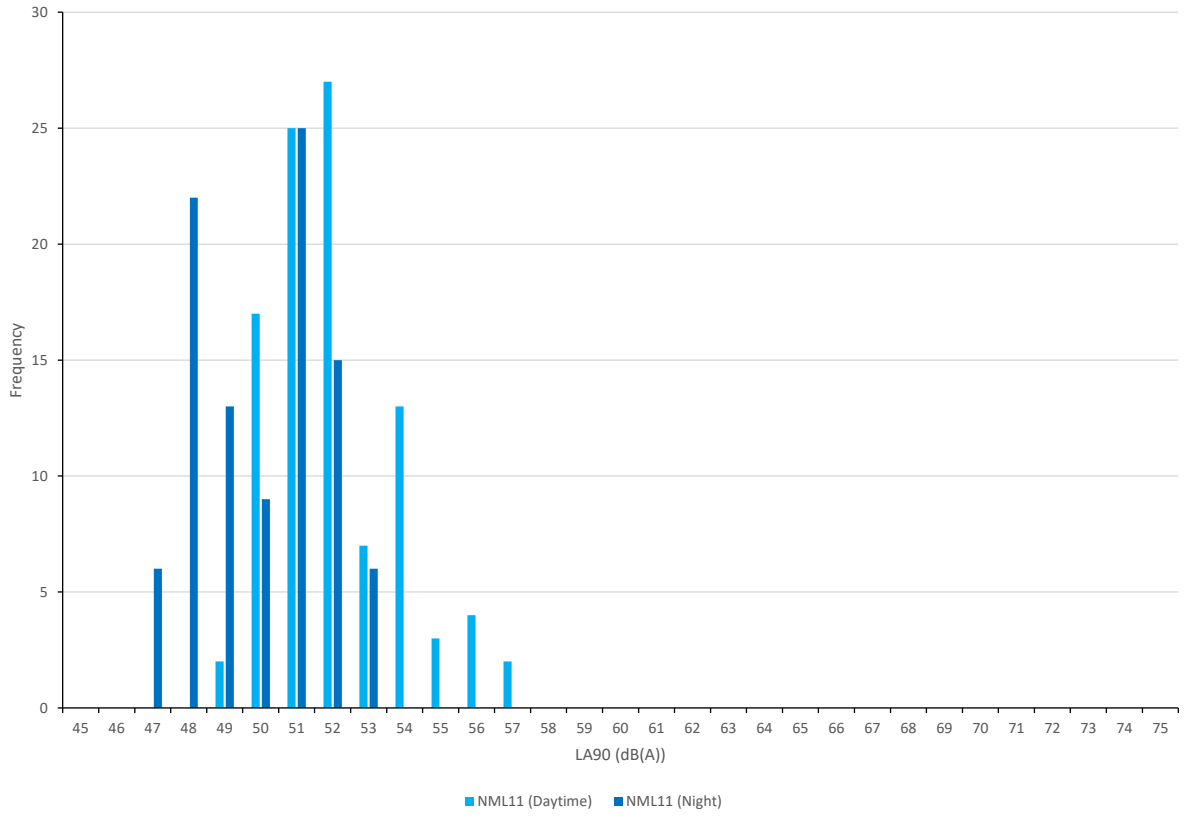


Table A 2.1: Measured Noise Data, NML12

Period	Start time (hh:mm)	Duration (hh:mm)	L_{AFmax}	L_{Aeq}	L_{A90}	Comment / Observations
Daytime	17:35	00:05	71.2	55.7	51.8	Steady plant at docks. Occasional posing road traffic. No discernible noise from Etex
	17:40	00:05	66.6	54.0	50.7	
	17:45	00:05	68.5	55.3	52.0	
	17:50	00:05	77.1	57.4	52.8	
	18:28	00:05	73.3	55.2	50.1	
	18:33	00:05	70.7	54.7	51.1	
	18:38	00:05	72.1	55	49	
	18:43	00:05	57.4	49.3	46.9	
	18:48	00:05	62.3	50.2	46.4	
	18:53	00:05	64.3	49.8	45.9	
	18:58	00:05	67.5	50.7	45.7	
	19:03	00:05	61.1	51.3	48.1	
	19:08	00:05	68.2	52.2	48.2	Steady plant at docks. Occasional posing road traffic. No discernible noise from Etex
Night-time	02:00	00:05	60.9	46.2	44	
	02:05	00:05	61.5	46.3	44.3	
	02:10	00:05	52.4	46.6	45.2	
	02:47	00:05	73.6	49.4	45.8	
	02:52	00:05	53.8	46.8	45.3	
	02:57	00:05	62.9	47.2	45.7	

Table A 2.2: Measured Noise Data, NML14

Period	Start time (hh:mm)	Duration (hh:mm)	L_{AFmax}	L_{Aeq}	L_{A90}	Comment / Observations
Daytime	18:01	00:05	84.9	64.4	55.8	Occasional road traffic. Distant motorway traffic. No discernible noise from Etex
	18:06	00:05	78.1	62.6	55.0	
	18:11	00:05	81.8	63.5	56.0	
	18:16	00:05	76.6	63.8	57.0	Occasional road traffic. Distant motorway traffic. Slow moving train @ 18:18. No discernible noise from Etex
	19:21	00:05	74.0	59.9	50.4	Occasional road traffic. Distant motorway traffic. No discernible noise from Etex
	19:26	00:05	74.4	59.7	49.6	
	19:31	00:05	81.8	62.2	49.3	
	19:36	00:05	80.2	61.4	49.5	
Night-time	02:19	00:05	58.1	45.4	42.7	

Period	Start time (hh:mm)	Duration (hh:mm)	L_{AFmax}	L_{Aeq}	L_{A90}	Comment / Observations
	02:24	00:05	50.3	45.3	42.4	Steady plant at docks. Occasional posing road traffic. No discernible noise from Etex
	02:29	00:05	60.4	46.4	43.2	
	02:34	00:05	70.7	49.6	39.9	
	02:39	00:05	63.7	46.7	41.3	
	03:05	00:05	58.8	46.3	44.0	
	03:10	00:05	77.0	54.5	44.6	
	03:15	00:05	54.5	46.3	44.6	

Table A 2.3: Measured Noise Data, Internal Noise

Plant Item – Measurement Ref	Measurement Location	Start time (hh:mm)	Duration (hh:mm:ss)	L_{AFmax}	L_{Aeq}	Comment / Observations
Calciner Workshop						
187 - 38	By Mill	11:44	00:00:59.7	88.6	85.4	Mainly Motor And Mill Working
182 - 39	By ID Fan for Calciner 102	11:50	00:03:30.4	95.2	86.0	Motor For ID Fan At Calciner 102
186 - 40	Rear of ID Fan for Calciner 102	11:54	00:01:16.2	83.8	81.0	Mainly ID Fans
181 and 182 (no access) - 41	Below Calciner Conveyor	11:56	00:01:45.5	84.5	79.7	General Plant In Building
180 (no access) - 42	Below Calciner Conveyor	11:59	00:00:53.2	89.8	80.6	General Plant In Building
111 - 43	ID Fan and Mill	12:01	00:01:05.3	87.4	86.1	Mill And ID Fan Adjacent
403 - 44	Centre of Mills and Kettles	11:44	00:02:03.4	91.3	90.0	Noise From ID Fans and Kettle Plant
Compressor House						
207 - 58	Sweep of Compressor House	14:09	00:00:56.7	84.3	82.6	Steady noise from 2 compressors
Cutter and Packing Area						
215 - 30	Side of Boardline 1 Quarantine Area	10:22	00:02:07.7	86.6	81.8	Steady Plant And Conveyor
223 - 31	Side of Boardline 1 Quarantine Area	10:31	00:02:00.5	87.8	82.9	Conveyor At End Of Oven
214 - 32	Side of Cutter Table	10:35	00:03:07.2	91.0	84.0	Conveyor To Cutter (Mainly Conveyor And Cutting Blades)

209 - 33	On Bridge Over Cutter Table	10:39	00:01:37.8	87.5	84.1	On Bridge Above Conveyor Feeding Cutter
212 - 34	Pallet Wrapping	10:48	00:00:35.1	85.5	80.4	General Internal Plant and Noise from Wrapper
End of Boardline 1						
220 - 24	On bridge over Conveyor	09:43	00:03:00.5	90.3	86.3	Boards Fed Underneath Measurements Position
222 & 210 - 25	Between Conveyors	09:52	00:02:00.5	87.6	85.2	Steady noise, Mainly from Conveyor and Ovens
219 - 26	By Conveyor	09:57	00:02:02.0	86.4	84.9	In Front Of Oven Entrance (Start Of Ovens)
217 - 48	Close to Ovens	13:13	00:00:51.2	90.1	89.1	Ovens
218 - 49	Between Conveyors and Electric Cabinets	13:15	00:03:11.8	88.3	85.0	Conveyor And General Fixed Plant
401 - 50	By ID Fan Close to External Wall	13:20	00:01:00.5	86.7	85.1	ID Fan Motor And Conveyor
Gypsum Store						
193 - 35	By External Wall	11:14	00:03:26.5	83.5	72.1	Front end loader working and conveyor system operating
101 - 36	By External Wall	11:18	00:02:19.8	82.9	77.0	Sample measurement of Loader working close by
194 - 37	By External Wall	11:27	00:01:09.0	76.8	72.3	Front end loader working and conveyor system operating
Ovens						
226 - 27	By Large ID Fan on External Wall	10:08	00:01:45.7	80.4	78.3	Ovens
216 - 28	By Ovens	10:12	00:02:02.7	84.6	82.4	By Oven 17 And Conveyor
227 - 29	By Ovens	10:19	00:02:16.4	86.1	83.9	End Of Ovens
Start of Boardline 1						
202 - 51	Mixer Outlet Area	13:36	00:01:15.3	95.4	87.8	Vibrating Conveyor at Start of Boardline 1
200 - 52	Rotary Machine	13:40	00:00:51.1	87.3	83.2	Motor And Steady Plant
199 - 53	Lower Assembly Area	13:42	00:00:35.5	85.4	80.9	Steady Plant Noise
203 - 54	Above Mixer	13:45	00:01:00.5	83.9	79.3	Steady Plant Noise
206 - 55	Silo Above Mixer	13:52	00:00:49.9	88.7	79.4	Steady Plant Noise
204 - 56	Funnel Feeder	13:56	00:01:13.4	98.6	83.5	Steady Plant Noise

A3 Site Generated Operational Road Traffic

Table A 3.1: Site Generated HGV Flows

Period	Time (hh:mm)	In	Out	Total
Daytime	07:00-08:00	+8	+8	+16
	08:00-09:00	+7	+7	+15
	10:00-07:00	+3	+5	+9