A specialist energy consultancy

Noise Impact Assessment

Asphalt Plant: Rover Way, Celsa Site

EAME

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Document Control

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TABLES

APPENDICES

Appendix E – Figures

1 Introduction

TNEI have been commissioned to undertake an environmental Noise Impact Assessment (NIA) in order to support the planning applications and environmental permit applications for a number of developments located within the Celsa owned site on Rover Way, Cardiff. Three developments are proposed, specifically, a Metal Recycling Centre (already consented), a Shredder and Shear and an Asphalt Plant.

This report considers operations of the Asphalt Plant only (the Proposed Development), and is provided in order to support the Proposed Development's planning application, however, it should be noted that a cumulative noise impact assessment for all three developments will also be undertaken and this will be incorporated within a report to be issued at a later date for the Environmental Permitting application.

The Proposed Development is at approximate OS coordinates 321460, 176264.

The aims of the NIA are to:

- Identify potential noise sensitive receptors in the vicinity of the Proposed Development and quantify the existing baseline noise levels at these locations;
- Identify the noise sources associated with the operation of the Proposed Development;
- Calculate the likely levels of noise at the nearest receptors to determine the noise impacts associates with the Proposed Development; and,
- Indicate any requirements for mitigation measures, if required, in order to provide sufficient levels of protection for nearby receptors.

1.1 Nomenclature

Please note the following terms and definitions, which are used throughout this report:

- Emission refers to the noise level emitted from a noise source, expressed as either a sound power level or a sound pressure level;
- Immission refers to the sound pressure level received at a specific location from a noise source;
- SWL indicates the sound power level in decibels (dB);
- SPL indicates the sound pressure level in decibels (dB);
- NML refers to any location where baseline noise levels have been measured, Noise Monitoring Location.
- NSRs are all identified receptors which are sensitive to noise, Noise Sensitive Receptors; and
- NAL refers to any location where the noise immission levels are calculated and assessed, Noise Assessment Location.

In the interests of clarity, a Glossary of Terms is also provided as Appendix A. All Figures can be found in Appendix F.

Unless otherwise stated, all noise levels refer to free field levels i.e. noise levels without influence from any nearby reflective surfaces;

All grid coordinates refer to the Ordnance Survey grid using Eastings and Northings.

2 Project Description

2.1 Development Description

The Proposed Development is located within the Celsa site to the South of Rover Way, Cardiff.

The Proposed Development will consist of a Parker StarMix 4000 asphalt production plant. A drawing of the site layout is provided within Appendix B. The asphalt production facility will introduce new noise sources to the local area in the form of externally located fixed plant as well as some mobile plant. Specifically, the dominant noise sources which require consideration within the assessment will be:

- Tracked Excavator (loading materials into cold feed system);
- Cold Feed Conveyor;
- Aggregate Dryer;
- Loading Car;
- Loading Car Winch; and,
- Loading of asphalt into lorries.

The local noise environment at the site of the Proposed Development is dominated by noise from the existing industrial activities and processes being undertaken within the Celsa site and also road traffic on Rover Way.

2.2 Study Area

NSRs are properties, people or fauna which are sensitive to noise and, therefore, may require protection from nearby noise sources. A large number of residential NSRs are located to the north of the wider Celsa site, with the closest NSRs being located at approximately 500 m North West of the Proposed Development on Willows Avenue. A traveller site is located approximately 650 m to the North East on Rover Way. No nearby NSRs have been identified in any other directions.

The area around the coastline to the south and east of the development site is designated as SPA, Ramsar and SAC and as such it is also important to consider any noise effects that may occur to wildlife within these areas.

The Study Area, which is detailed within Figure 1 (in Annex E), has been defined through the identification of the closest NSRs to the development. Specifically, the study area is defined by the closest NSRs to the Proposed Development on the assumption that if noise levels are within acceptable levels at the closest receptors then it is reasonable to assume they will also be acceptable at more distant locations.

3 Assessment Methodology

3.1 Legislation and Policy Context

The overarching European legislation in respect of environmental noise is the 'Environmental Noise Directive' (END) (2002). The END aims to limit people's exposure to noise and requires each member state to provide data on noise exposure and to adopt action plans to prevent or reduce noise exposure and preserve environmental noise quality where it is already good.

3.1.1 Noise and Soundscape Action Plan 2018–2023

The Welsh Government, in 2018, published the Noise and Soundscape Action Plan 2018–2023 (NSAP), which outlines the Welsh public sector's strategic policy direction in relation to noise and soundscape management.

With regards to industrial noise the NSAP explains how noise from major industrial sources is regulated by Natural Resources Wales (NRW) through the Environmental Permitting Regulations 2016 (EPR). Paragraph 8.2.5 states;

"Under EPR, noise is regulated through the use of standard noise conditions and each site's environmental management plan, rather than through the use of specific limits. This provides greater flexibility for adaptation to a changing soundscape."

3.2 Assessment Methods

A number of standards and guidelines are available for the assessment of environmental noise from industrial developments. Typically, assessments are based on a comparison of likely noise levels against either 'context' based limits or a set of fixed limits.

Context based limits are set relative to the existing noise environment and may also consider the characteristics of the noise source(s), whilst fixed limits are usually set regardless of the existing noise environment or type of noise source(s).

In order to determine the most appropriate method of assessment TNEI undertook consultation with an Environmental Health Officer at Cardiff Council. It was agreed that where noise level modelling showed that noise immission levels from the proposed developments were at least 10 dB below the existing ambient levels then no further assessment would be necessary. If however, noise levels were above or within 10dB of the existing levels then a BS4142 'context based' assessment would be required. Baseline monitoring locations were also agreed with the EHO.

3.3 Calculation Methods

In order to predict the noise immission levels attributable to the Development a noise propagation model is constructed using the propriety noise modelling software CadnaA. Within the software, complex models can be produced in order to simulate the propagation of noise according to a range of international calculation standards.

For this assessment, noise propagation is calculated in accordance with ISO9613 '*Acoustics – Attenuation of sound during propagation outdoors*' using the following input parameters:

- Temperature is assumed to be 10°C and relative humidity as 70%;
- A ground attenuation factor of 0 (hard ground) is used; and

- Receiver heights are set to 4 m for residential buildings (to represent a first floor bedroom) and 1.5 m for the single story dwellings within the traveller site.

The noise propagation model is intended to give a good approximation of the specific sound level and the contribution of each individual sound source, however, it is expected that measured levels are unlikely to be matched exactly with modelled values and the following limitations in the model should be considered:

- In accordance with ISO9613, all assessment locations are modelled as downwind of all sound sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night. These conditions are favourable to the propagation of sound;
- Table 5 of ISO9613 estimates overall accuracy for broadband noise predictions of ± 3dB, with average source to receiver heights <5m, at distances of up to 1000m;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation will have been accounted for; and
- The model assumes all sound sources are operating continuously and simultaneously, estimating a worst-case source noise level.

4 Baseline Sound Level Monitoring

Attended baseline sound level monitoring was undertaken at the three locations agreed with the EHO on the 12th and 13th May 2019 during daytime periods only. No night-time working is proposed however some operations may occur from 06:00 onwards and include Sundays. As such, baseline monitoring was conducted during early morning and Sunday time periods as well as during regular daytime working hours.

Table 4-1 details the Noise Monitoring Locations (NMLs), which are also displayed on Figure 1 (in Annex E).

Table 4-1: Baseline Noise Monitoring Locations

NML		Coordinates		Comments
ID	Descriptor	Easting	Northing	
NML01	Willow Avenue	321084	176583	Representative of closest NSRs to the North West on Willows Avenue.
NML02	Rover Way	321788	176715	Representative of NSRs within the traveller site on Rover Way.
NML03	Runway Road	321283	177044	Representative of closest NSRs to North in the area of Pengam Green and Tremorfa Park.

Throughout all of the monitoring periods wind speeds were low and no precipitation events were noted.

The noise monitoring equipment consisted of a Cirrus Optimus Green integrating sound level meter (SLM) fitted with a standard wind shield. All noise monitoring equipment (calibrator, SLM and microphone) used for the study are categorised as Class 1, as specified in IEC 61672-1 'Electroacoustics. Sound level meters. Specifications' (IEC, 2002). The equipment was calibrated on site at the beginning and end of each measurement period with no significant deviations noted. Appendix C contains the equipment and laboratory calibration details.

All measurements were made with the sound level meter (SLM) and microphone mounted on a tripod approximately 1.5 meters above the ground and away from nearby reflective surfaces i.e. building façades, fences etc.

At all locations, measurements were logged in 5 minute periods. Table 4-2 details the arithmetic average $LAeq_{(5mins)}$ Ambient Sound Level, for a number of periods of interest including, early mornings, Sundays and weekdays.

Early morning measurements consisted of at least a 15-minute survey at each NML between 06:00 and 07:10 per day.

Measurements made after 07:00 for all NMLs were conducted during both morning and afternoon periods for a minimum of 75 mins total survey time per day.

A breakdown of the logged LAeq sound levels can be found in Appendix C.

Table 4-2: Average Ambient Sound Levels, dB $L_{Aeq(5mins)}$

Measurement Location		Measurement period			
ID	Descriptor	Sunday: Early Morning 06:00 – 07:00	Sunday: Daytime	Weekday: Early Morning 06:00 – 07:00	Weekday: Daytime
NML01	Willow Avenue	61	61	62	64
NML02	Rover Way	70	74	76	75
NML03	Runway Road	44	46	51	48

5 Operational Noise Impacts

5.1 Modelling of Individual Sources

The noise model considers all of the individual sound sources detailed within Section 2.1.

In order to determine appropriate source noise levels (the Specific Sound Level) for input into the noise model TNEI undertook noise monitoring of a similar development operated by the planning applicant at their site in Rotherham.

The same SLM and associated equipment as used for the baseline data was used for the specific sound level monitoring, which was conducted on site during normal operations.

The measured SPL data for each noise source is provided in Appendix D. Table 5-1 details the calculated SWL data used in the noise model for each source. The conversion from SPL to SWL is undertaken automatically within the CadnaA software and is based on the measurement distance and the proximity of the source to any reflective surfaces during the measurement period.

Table 5-1: SWL for Parker StarMix 4000 Modelled Sound Sources, dB

Name	31.5	63	125	250	500	1000	2000	4000	8000	A	lin
Aggregate Dryer	101	99	99	96	94	89	87	82	77	96	106
Cold Feed Conveyor	87	91	86	83	81	78	74	69	64	83	94
Loading Car	115	115	114	109	103	100	98	94	89	107	120
Material loading into lorries	101	103	96	94	92	92	93	94	89	100	107
Winch for Loading	101	96	91	90	89	90	88	89	84	95	103

Along with the fixed plant detailed above, a tracked excavator will be used to load materials into the asphalt plant. This has been modelled as a fixed-point source in the area of the asphalt bins. In reality the excavator will move around the site, therefore, noise levels will fluctuate, however, given the separation distances between source and receiver and the fact that the point source is assumed to be operating continually it is thought that this provides a reasonable approach to modelling. Source level data for the excavator has been taken directly from Annex C of BS5228:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites. Noise*'. The BS5228:2009 standard contains sound power level data for a variety of construction plant. This data was obtained from field measurements of actual plant operating on construction and open sites in the United Kingdom and is therefore appropriate to use as source level data for the noise propagation calculations.

5.2 Calculated Noise Immission Levels

The broadband noise immission levels have been calculated assuming all plant is operating continuously and concurrently and at maximum capacity.

The predictions have been made for a total of four assessment locations and these are detailed in Table 5-2. In addition, Figures 2 and 3 presents an isopleth noise contour plot for a height of 4 m overlaid on digital mapping data. Figure 2 details the noise propagation towards the residential receptors. Figure 3 is provided to illustrate the noise propagation in the areas of the ecological receptors.

Table 5-2: Noise immission Levels, dB $LAeq_{(t)}$

Noise Assessment Location		Predicted Noise Level, dB $L_{Aeq(t)}$
NAL ID	**NAL Descriptor**	**NAL ID**
NAL01	Willows Avenue	37
NAL02	Traveller Site	34
NAL03	Greenbay Road	33
NAL04	Hind Close	33

6 Noise Impact Assessment

6.1 Noise Impacts on Residential Receptors

Table 6-1 compares the predicted noise levels with the lowest measured ambient sound levels, which in all cases were between 06:00 and 07:00 on Sunday morning.

Table 6-1: Comparison of Predicted Versus Existing Ambient Sound Levels (on Sunday mornings)

NAL ID	Ambient Sound Level, dB $L_{Aeq(t)}$	Predicted Noise Level, dB $L_{Aeq(t)}$	Margin Above/Below (+/-) Existing Levels, dB
NAL01	61	37	-24
NAL02	70	34	-36
NAL03	44	33	-11
NAL04	44	33	-11

It can be seen that for all NALs the predicted levels are more than 10 dB below the existing ambient sound levels. Accordingly, no further assessment for residential receptors is required.

6.2 Noise Impacts on Ecological Receptors

Figure 3 illustrates how the sound levels propagate outwards from the Proposed Development across the designated SPA/Ramsar/SAC sites. It can be seen that along the shoreline to the south of the Proposed Development the predicted noise level varies between 30 and 35 dB $L_{Aeq(t)}$. 35 dBA is the maximum level within any of the designated areas. No baseline sound level measurements have been undertaken in this area for comparison, however, given the amount of existing industrial activity in the area it is expected that ambient sound levels will be higher than the predicted levels.

It is noted that in a 2017 noise assessment report[1] for another nearby proposed development by Industrial Noise and Vibration Centre Ltd (INVC) the existing noise levels measured close to the Celsa site and approximately 250 m from the coast, were around 63 dB $L_{Aeq(85\ mins)}$.

With due regards to the above, it is assumed that noise levels across the designated areas will not be increased due to operations from the Proposed Development. Accordingly, no adverse noise impacts are anticipated.

[1] *Report number 8804, Environmental Noise Assessment — Industrial development at Parc Calon Gwyrdd, Rover Way, Cardiff:* (August 2017) INVC Ltd

7 Summary

In order to assess the impact of noise emissions from the proposed asphalt plant development, TNEI has produced a noise propagation model in accordance with ISO9613-2, which predicts the noise immission levels at the nearest identified NSRs.

The assessment has been made against the existing ambient sound levels, which were quantified through baseline noise level monitoring during early mornings, Sundays and regular weekday working hours.

During consultation with Cardiff Council it was agreed that if noise immission levels were predicted to be more than 10 dB below the existing noise levels then no further assessment would be necessary. The assessment has determined that noise immission levels are likely to be more than 10dB below the existing noise levels at all receptor locations and for all proposed working periods.

Figure 3 illustrates the predicted sound levels across the nearby SPA/Ramsar/SAC sites. The highest predicted noise level from the Proposed Development in these areas is approximately 35 dB $L_{Aeq(t)}$ and across the majority of the designated areas it will be lower than this. Given that the existing noise levels are expected to be significantly higher than the predicted levels it is unlikely that operational noise from the Proposed Development will result in an increase in overall noise levels.

Accordingly, it is considered that the Proposed Development will not have an adverse noise impact on the local area.

Nothwithstanding the above, it is noted that a cumulative noise assessment will be undertaken as part of the Proposed Development's Environmental Permit application, which will consider the overall noise output from the Celsa site, including existing, consented and other proposed activities and developments.

Appendix A – Glossary of Terms

Attenuation: the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.

Background Sound Level: the sound level rarely fallen below in any given location over any given time period, often classed according to daytime, evening or night-time periods. The LA90 indices (see below) are typically used to represent the background sound level.

Broadband Noise: noise with components over a wide range of frequencies.

Decibel (dB): the ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. A logarithmic scale is used in sound level measurements because of this wide range. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound level.

dB(A): the ear has the ability to recognise a particular sound depending on its pitch or frequency. Microphones cannot differentiate sound in the same way as the ear, and to counter this weakness the sound measuring instrument applies a correction to correspond more closely to the frequency response of the human ear. The correction factor is called 'A Weighting' and the resulting measurements are written as dB(A). The dB(A) weighting is internationally accepted and has been found to correspond well with people's subjective reaction to sound levels and noise. Some typical subjective changes in sound levels are:

- a change of 3dB(A) is just perceptible;
- a change of 5dB(A) is clearly perceptible;
- a change of 10dB(A) is twice (or half) as loud.

Directivity: the property of a sound source that causes more sound to be radiated in one direction than another.

Emission: the sound energy emitted by a sound source (e.g. a wind turbine).

Frequency: the pitch of a sound in Hz or kHz. See Hertz.

Ground Effects: the modification of sound at a receiver location due to the interaction of the sound waves with the ground along its propagation path from source to receiver. Described using the term 'G', and ranges between 0 (hard ground), 0.5 (mixed ground) and 1 (soft ground).

Hertz (Hz): sound frequency refers to how quickly the air vibrates, or how close the sound waves are to each other (in cycles per second, or Hertz (Hz)).

Immission: the sound pressure level detected at a given location (e.g. the nearest dwelling).

Isopleth: a line on a map connecting points of equal value, for example air pressure, noise level etc.

Noise: unwanted sound

Lw: is the sound power level. It is a measure of the total sound energy radiated by a sound source and is used to calculate sound levels at a distant location. The *LWA* is the A-weighted sound power level.

Leq: is the equivalent continuous sound level, and is the sound level of a steady sound with the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. The LAeq,T is the A-weighted equivalent continuous sound level over a given time period (T).

L90: index represents the sound level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The LA90,10min is the A-weighted background sound level over a ten minute measurement sample.

Sound Level Meter: an instrument for measuring sound pressure level.

Sound Pressure Level: a measure of the sound pressure at a point, in decibels.

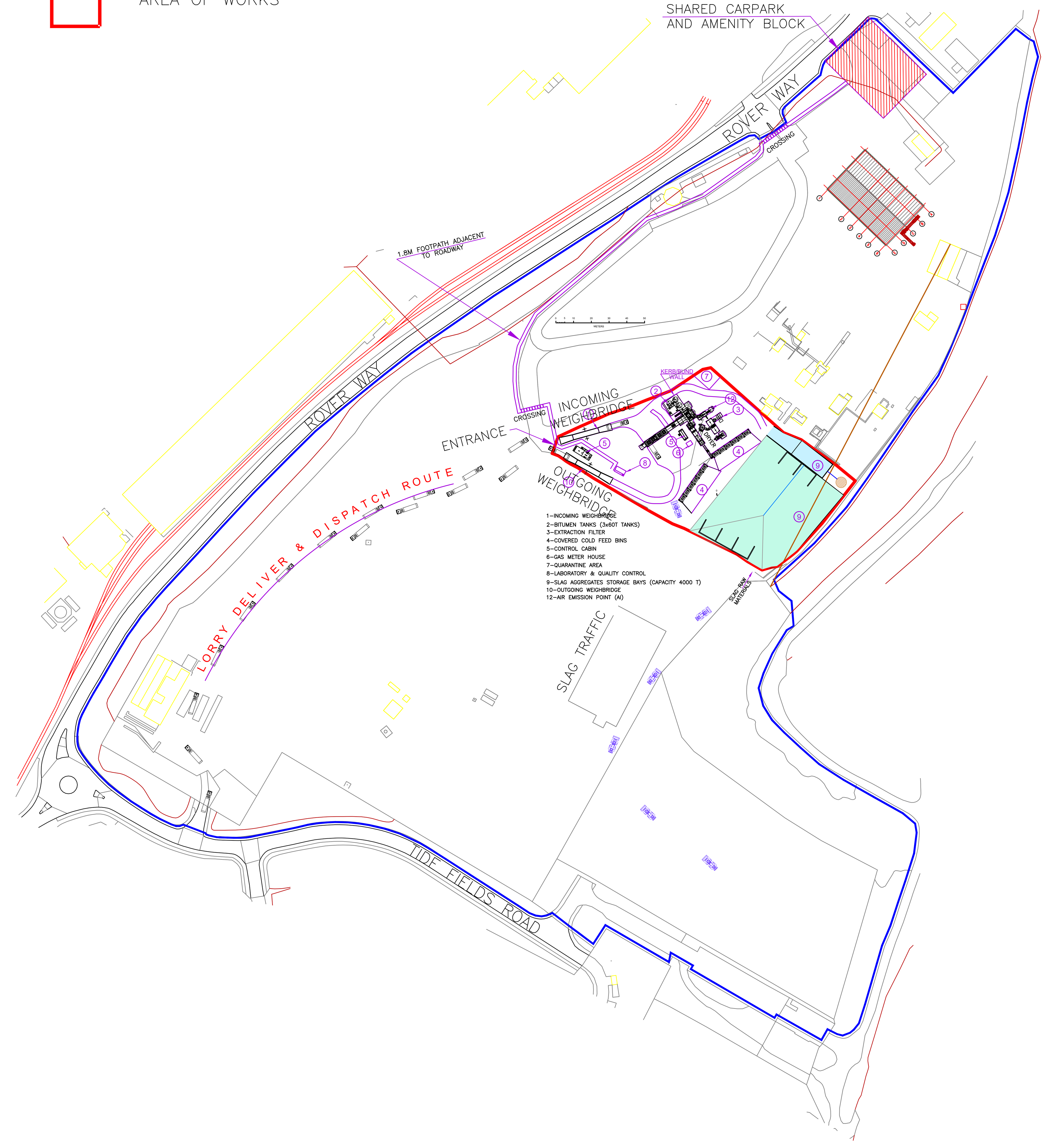
Tonal Noise: noise which covers a very restricted range of frequencies (e.g. a range of ≤20 Hz). This noise is subjectively more annoying than broadband noise.

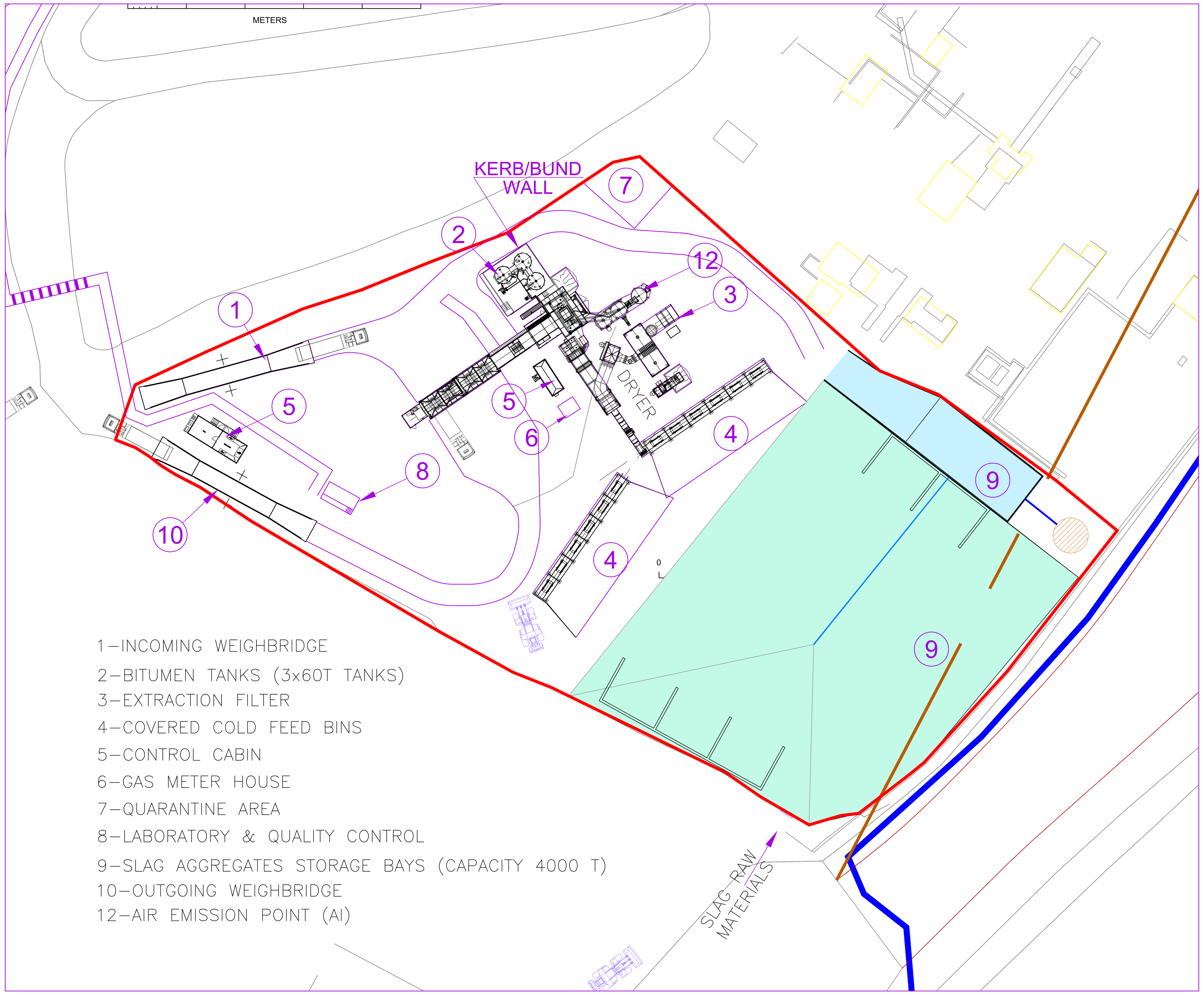
Appendix B – Site Information

LEGEND

DENOTES CELSA SITE OWNERSHIP
AREA = 150,669m² (15.07ha)

AREA OF WORKS





ASPHALT PLANT AREA

(CIRCA 10,022 M²)
SCALE 1:500 ON A0

NOTES

1. Do not scale from this drawing
2. Dimensions are for reference only
3. Plants' components and their locations are preliminary and may change during design stage
4. This drawing is prepared, in part, based on information provided by others. While this information is believed to be reliable, Harsco Metals assume no responsibility for inaccuracies, errors or omissions that might have been incorporated into this drawing as a result of incorrect information provided to us
5. This drawing is for planning purposes only. Not to be used for construction

RevNo	Revision note	Date	Signature	Checked
1	STREET NAMES ADDED	01.10.2018	AI	
0	RELEASED FOR DISCUSSION	26.09.2018	AI	

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VENDOR/CONSULTANT:

PROJECT: ASPHALT PRODUCTION AT CELSA CARDIFF

PROJECT No.: O1994

	NAME	SIGN	DATE
ENGR	AI		25.09.18
DRAWN	AI		26.09.18
CHKD			
APPD			

TITLE:- NEW ASPHALT PLANT AT CELSA CARDIFF. LOCATION PLAN OPTION 7.5

SCALE 1:1250

DRG. NO. O1994-00-01-07.05

SIZE A0 REV. 0

RELEASED FOR
☑ PRELIMINARY ☐ INFORMATION ☐ APPROVAL ☐ FABRICATION ☐ CONSTRUCTION

Appendix C – Baseline Data

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

Equipment Details

Instrument Manufacturer	Cirrus Research Plc
Instrument Type	CR:171B
Description	Sound Level Meter
Serial Number	G078532

Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2013, IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:2003, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.
Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	GRAS 40AP	Serial Number	173198	Calibration Ref.	0170
Calibrator Type	B&K 4231	Serial Number	2594796	Calibration Ref.	A1811

Calibrated by	
Calibration Date	28 September 2018
Calibration Certificate Number	264128

This Calibration Certificate is valid for 12 months from the date above.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28/09/18** CERTIFICATE NUMBER **122474**

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

Test engineer:
D.Swalwell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc

Model: MK:224

Serial Number: 211155D

Calibration procedure

Date of calibration: 18 September 2018

Open circuit: 48.1 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: 98.90 kPa

Temperature: 21.0 °C

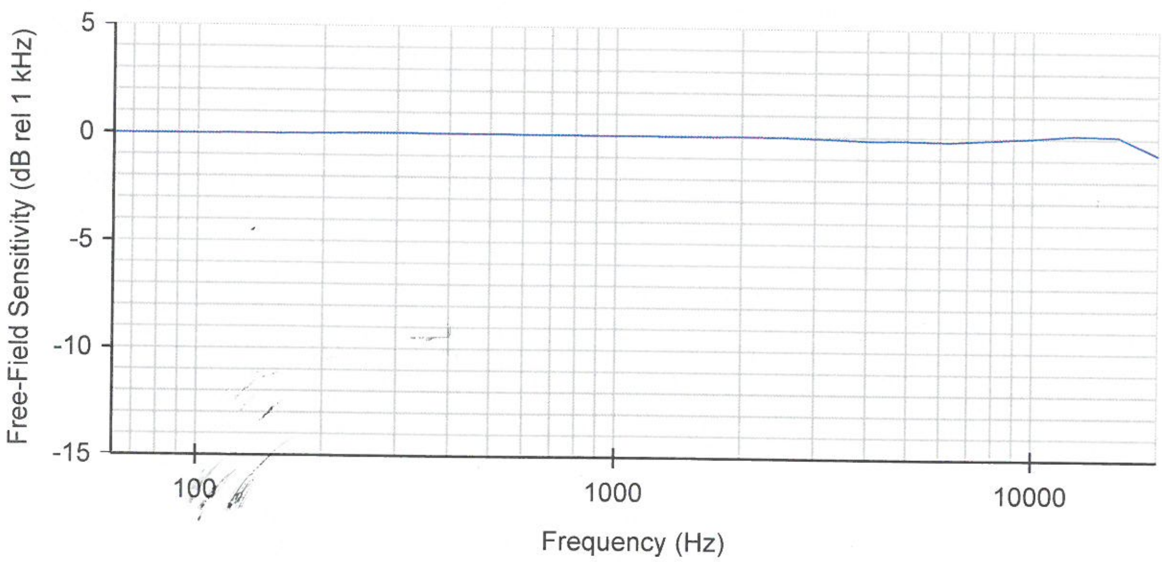
Humidity: 62.0 %

CERTIFICATE OF CALIBRATION

Free-Field Frequency Response : Tabular

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator Response (dB)
63	-0.02	-0.21
80	-0.02	-0.10
100	-0.02	-0.04
125	0.01	0.02
160	-0.01	0.02
200	0.02	0.05
250	0.05	0.04
315	0.04	0.05
400	0.03	0.04
500	0.03	0.04
630	0.02	0.03
800	0.01	0.00
1 000	0.00	-0.02
1 250	0.00	-0.05
1 600	-0.01	-0.13
2 000	0.00	-0.22
2 500	-0.01	-0.36
3 150	-0.06	-0.61
4 000	-0.14	-0.97
5 000	-0.13	-1.46
6 300	-0.17	-2.16
8 000	-0.07	-3.20
10 000	0.02	-4.70
12 500	0.17	-6.29
16 000	0.13	-7.66
20 000	-0.74	-9.76

Free-Field Frequency Response : Graphical



Certificate of Calibration

Certificate Number: **122473**
Date of Issue: **28 September 2018**

Instrument

Manufacturer: **Cirrus Research plc** Serial Number: **78218**
Model Number: **CR:515**

Calibration Procedure

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC 60942:2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer s data.

Date of Calibration: **28 September 2018**

Calibration Results

Measurement	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
1	94.04	1000.1	0.32
2	94.00	1000.1	0.34
3	94.00	1000.1	0.36
Average	**94.01**	**1000.1**	**0.34**
Uncertainty	± 0.13	± 0.1	± 0.10

The reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level.

Cirrus Research plc, Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH, United Kingdom
Telephone: 0845 230 2434 **Int**: +44 1723 891655
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk
UK Registration No. 987160

Environmental Conditions

Pressure:	**1025.10 kPa**
Temperature:	**23.0 °C**
Humidity:	**45.5 %**

Evidence of Pattern Approval

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC 60942:2003 Annex A to Class 1. This has been confirmed with the PhysikalischTechnische Bundesanstalt (PTB).

Statement of Calibration

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 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

Calibration Laboratory

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

Test Engineer: Nigel Smith

Measurement Time	Duration	Measurement ID	LAeq	Location
12/05/2019 06:30	00:05:00	5	62	NML01
12/05/2019 06:35	00:05:00	6	59.2	NML01
12/05/2019 06:40	00:05:00	7	62.5	NML01

Measurement Time	Duration	Measurement ID	LAeq	Location
12/05/2019 07:45	00:05:00	18	57.7	NML01
12/05/2019 07:50	00:05:00	19	51.6	NML01
12/05/2019 08:50	00:05:00	30	63.8	NML01
12/05/2019 08:55	00:05:00	31	67.3	NML01
12/05/2019 09:00	00:05:00	32	55.9	NML01
12/05/2019 11:00	00:05:00	38	62.1	NML01
12/05/2019 11:05	00:05:00	39	61	NML01
12/05/2019 11:10	00:05:00	40	58.9	NML01
12/05/2019 11:15	00:05:00	41	59.7	NML01
12/05/2019 11:20	00:05:00	42	61.2	NML01
12/05/2019 11:25	00:05:00	43	62.8	NML01
12/05/2019 11:30	00:05:00	44	62.1	NML01
12/05/2019 11:35	00:05:00	45	60.8	NML01
12/05/2019 11:40	00:05:00	46	61.4	NML01
12/05/2019 13:20	00:05:00	67	62.5	NML01

Measurement Time	Duration	Measurement ID	LAeq	Location
13/05/2019 06:25	00:05:00	88	62.7	NML01
13/05/2019 06:30	00:05:00	89	61.6	NML01
13/05/2019 06:35	00:02:03	90	62.3	NML01

Measurement Time	Duration	Measurement ID	LAeq	Location
13/05/2019 07:40	00:05:00	100	64.1	NML01
13/05/2019 07:45	00:05:00	101	63.6	NML01
13/05/2019 07:50	00:05:00	102	67.1	NML01
13/05/2019 08:45	00:05:00	112	60.9	NML01
13/05/2019 08:50	00:05:00	113	64.3	NML01
13/05/2019 08:55	00:05:00	114	64.9	NML01
13/05/2019 12:10	00:05:00	136	63.9	NML01
13/05/2019 12:15	00:05:00	137	63	NML01
13/05/2019 12:20	00:05:00	138	64.6	NML01
13/05/2019 12:25	00:05:00	139	64.4	NML01
13/05/2019 12:30	00:05:00	140	64.2	NML01
13/05/2019 12:35	00:05:00	141	63.6	NML01
13/05/2019 12:40	00:05:00	142	63.7	NML01
13/05/2019 12:45	00:05:00	143	63.7	NML01
13/05/2019 12:50	00:05:00	144	63.5	NML01
13/05/2019 12:55	00:05:00	145	65.7	NML01
13/05/2019 13:00	00:05:00	146	64.4	NML01
13/05/2019 13:05	00:05:00	147	63.5	NML01

Measurement Time	Duration	Measurement ID	LAeq	Location
12/05/2019 06:00	00:05:00	1	68.5	NML02
12/05/2019 06:05	00:05:00	2	70.2	NML02
12/05/2019 06:10	00:05:00	3	69.8	NML02

Measurement Time	Duration	Measurement ID	LAeq	Location
13/05/2019 06:00	00:04:37	83	76.8	NML02
13/05/2019 06:05	00:05:00	84	75.1	NML02
13/05/2019 06:10	00:05:00	85	76	NML02

Measurement Time	Duration	Measurement ID	LAeq	Location
12/05/2019 07:25	00:05:00	14	71.6	NML02
12/05/2019 07:30	00:05:00	15	70.9	NML02
12/05/2019 08:30	00:05:00	26	71.9	NML02
12/05/2019 08:35	00:05:00	27	72.8	NML02
12/05/2019 14:00	00:05:00	70	70.5	NML02
12/05/2019 14:05	00:05:00	71	73.6	NML02
12/05/2019 14:10	00:05:00	72	74.4	NML02
12/05/2019 14:15	00:05:00	73	74.8	NML02
12/05/2019 14:20	00:05:00	74	74.9	NML02
12/05/2019 14:25	00:05:00	75	74.8	NML02
12/05/2019 14:30	00:05:00	76	75.7	NML02
12/05/2019 14:35	00:05:00	77	75.4	NML02
12/05/2019 14:40	00:05:00	78	75.2	NML02
12/05/2019 14:45	00:05:00	79	72.9	NML02
12/05/2019 14:50	00:05:00	80	74.5	NML02
12/05/2019 14:55	00:05:00	81	74.7	NML02

Measurement Time	Duration	Measurement ID	LAeq	Location
13/05/2019 07:10	00:05:00	96	75.8	NML02
13/05/2019 07:15	00:05:00	97	75.6	NML02
13/05/2019 08:25	00:05:00	109	72.8	NML02
13/05/2019 08:30	00:05:00	110	73.6	NML02
13/05/2019 11:00	00:05:00	122	75	NML02
13/05/2019 11:05	00:05:00	123	75.2	NML02
13/05/2019 11:10	00:05:00	124	74.9	NML02
13/05/2019 11:15	00:05:00	125	74.5	NML02
13/05/2019 11:20	00:05:00	126	76	NML02
13/05/2019 11:25	00:05:00	127	74.7	NML02
13/05/2019 11:30	00:05:00	128	74.9	NML02
13/05/2019 11:35	00:05:00	129	74.1	NML02
13/05/2019 11:40	00:05:00	130	72.8	NML02
13/05/2019 11:45	00:05:00	131	74.8	NML02
13/05/2019 11:50	00:05:00	132	75.1	NML02
13/05/2019 11:55	00:05:00	133	74.8	NML02

Measurement Time	Duration	Measurement ID	LAeq	Location
12/05/2019 06:55	00:05:00	9	43.5	NML03
12/05/2019 07:00	00:05:00	10	43.8	NML03
12/05/2019 07:05	00:05:00	11	45.5	NML03

Measurement Time	Duration	Measurement ID	LAeq	Location
12/05/2019 08:05	00:05:00	22	40.7	NML03
12/05/2019 08:10	00:05:00	23	40	NML03
12/05/2019 09:10	00:05:00	34	47.8	NML03
12/05/2019 09:15	00:05:00	35	43.3	NML03
12/05/2019 09:20	00:05:00	36	43.6	NML03
12/05/2019 12:10	00:05:00	53	49.7	NML03
12/05/2019 12:15	00:05:00	54	50.7	NML03
12/05/2019 12:20	00:05:00	55	47.5	NML03
12/05/2019 12:25	00:05:00	56	46.7	NML03
12/05/2019 12:30	00:05:00	57	47.5	NML03
12/05/2019 12:35	00:05:00	58	45.9	NML03
12/05/2019 12:40	00:05:00	59	49.4	NML03
12/05/2019 12:45	00:05:00	60	45	NML03
12/05/2019 12:50	00:05:00	61	47.2	NML03
12/05/2019 12:55	00:05:00	62	46.1	NML03
12/05/2019 13:00	00:05:00	63	47.8	NML03
12/05/2019 13:05	00:05:00	64	50	NML03

Measurement Time	Duration	Measurement ID	LAeq	Location
13/05/2019 06:42	00:02:21	91	48.8	NML03
13/05/2019 06:45	00:05:00	92	51.5	NML03
13/05/2019 06:50	00:05:00	93	48.8	NML03
13/05/2019 06:55	00:03:02	94	53.6	NML03

Measurement Time	Duration	Measurement ID	LAeq	Location
13/05/2019 08:00	00:05:00	105	48.6	NML03
13/05/2019 08:05	00:05:00	106	47.2	NML03
13/05/2019 09:05	00:05:00	116	41.7	NML03
13/05/2019 09:10	00:05:00	117	46.9	NML03
13/05/2019 09:15	00:05:00	118	49.3	NML03
13/05/2019 09:20	00:05:00	119	45	NML03
13/05/2019 13:15	00:05:00	150	46.5	NML03
13/05/2019 13:20	00:05:00	151	47.1	NML03
13/05/2019 13:25	00:05:00	152	46.8	NML03
13/05/2019 13:30	00:05:00	153	46.5	NML03
13/05/2019 13:35	00:05:00	154	62.1	NML03
13/05/2019 13:40	00:05:00	155	54.8	NML03
13/05/2019 13:45	00:05:00	156	43.6	NML03
13/05/2019 13:50	00:05:00	157	49.7	NML03
13/05/2019 13:55	00:05:00	158	51.8	NML03
13/05/2019 14:00	00:05:00	159	52.4	NML03
13/05/2019 14:05	00:05:00	160	53.8	NML03
13/05/2019 14:10	00:05:00	161	43.4	NML03
13/05/2019 14:15	00:05:00	162	41.1	NML03
13/05/2019 14:20	00:05:00	163	48.3	NML03

Appendix D – Noise Modelling Data

Cirrus Research plc

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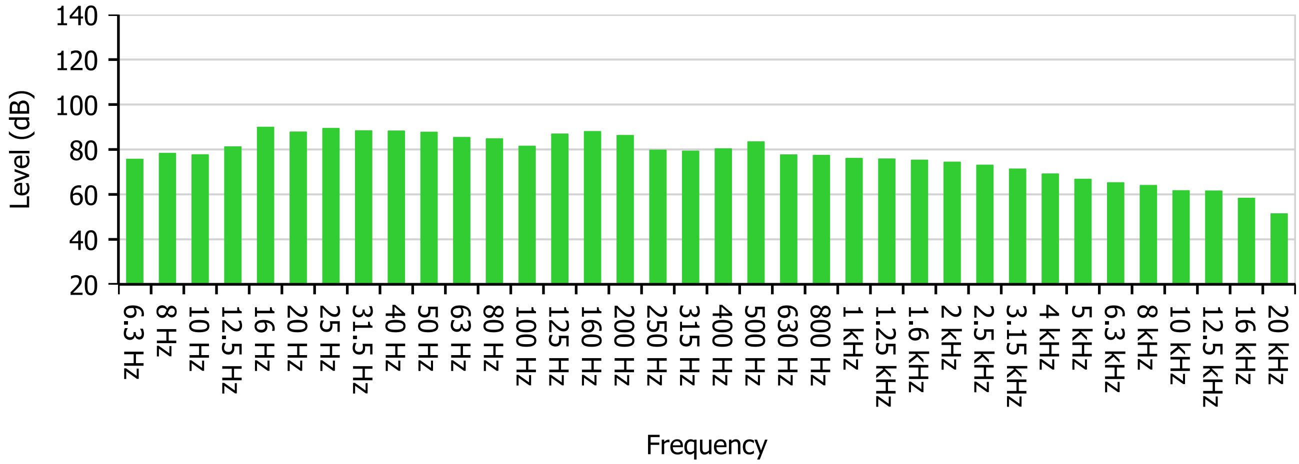
Measurement 1:3-Octave Report

Name	Aggregate Dryer at 1 m						
Time	30/05/2019 11:18:20	**Person**		**Place**		**Project**	
Duration	00:01:00	Ewan Watson		Harsco Rotherham		Cardiff Asphalt	
Instrument	G056468, CR:171B						

Calibration

Before 30/05/2019 10:06 Offset -0.28 dB **After** Offset



Frequency (Hz)	**6.3**	**8**	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**
Level (dB)	75.7	78.3	77.7	81.2	89.9	87.8	89.4	88.3	88.2
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	87.7	85.3	84.8	81.5	86.9	88.0	86.2	79.7	79.3
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	80.3	83.4	77.6	77.4	76.0	75.8	75.3	74.4	73.0
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	71.3	69.1	66.8	65.2	64.0	61.7	61.5	58.3	51.4

Highest Band	16 Hz	89.9 dB

ReportId

Cirrus Research plc

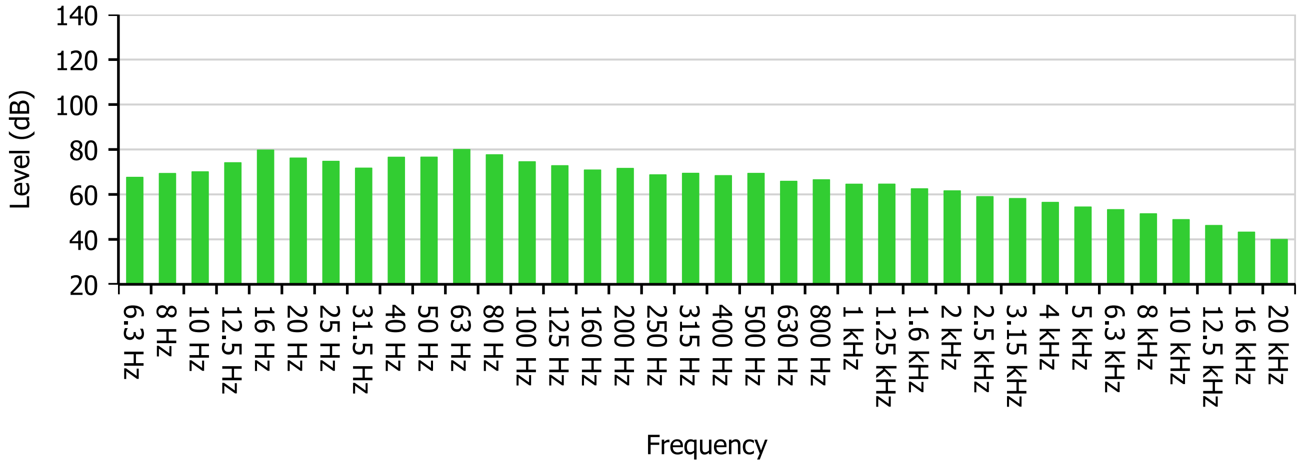
tnei

Measurement 1:3-Octave Report

Name	Cold Feed Conveyor at 1 m						
Time	30/05/2019 11:21:03	**Person**		**Place**		**Project**	
Duration	00:01:00	Ewan Watson		Harsco Rotherham		Cardiff Asphalt	
Instrument	G056468, CR:171B						

Calibration

Before 30/05/2019 10:06 Offset -0.28 dB **After** Offset



Frequency (Hz)	**6.3**	**8**	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**
Level (dB)	67.6	69.3	70.1	74.1	79.7	76.2	74.7	71.7	76.6
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	76.6	80.0	77.7	74.6	72.8	70.9	71.6	68.7	69.4
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	68.4	69.4	65.8	66.5	64.6	64.6	62.5	61.6	59.0
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	58.2	56.5	54.4	53.2	51.4	48.8	46.2	43.2	40.0

Highest Band	63 Hz	80.0 dB

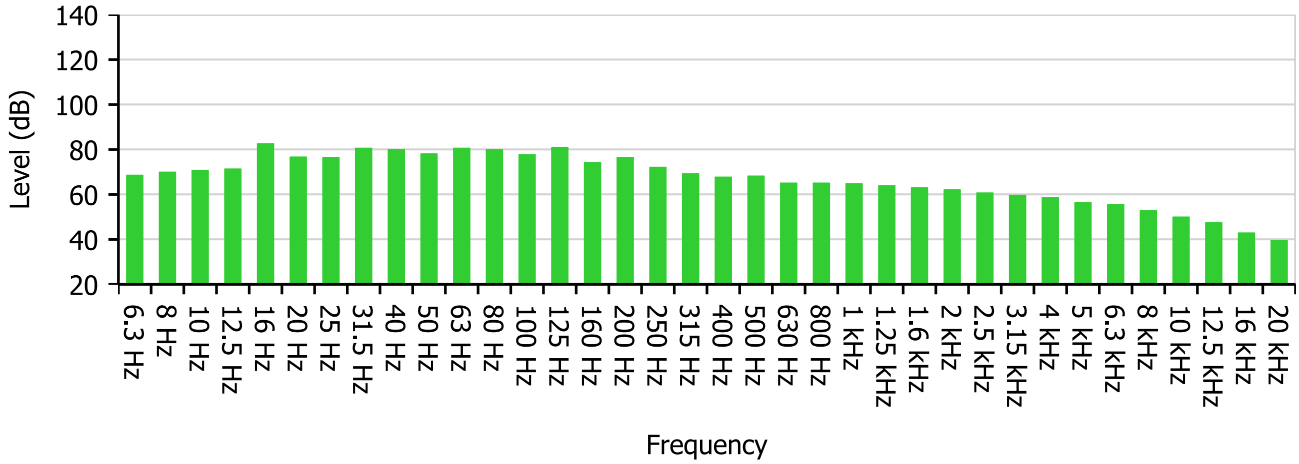
ReportId

Measurement 1:3-Octave Report

Name	Loading Car at 10 m						
Time	30/05/2019 11:24:14	**Person**		**Place**		**Project**	
Duration	00:01:00	Ewan Watson		Harsco Rotherham		Cardiff Asphalt	
Instrument	G056468, CR:171B						

Calibration

Before 30/05/2019 10:06 Offset -0.28 dB **After** Offset



Frequency (Hz)	**6.3**	**8**	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**
Level (dB)	68.6	69.9	70.7	71.3	82.6	76.7	76.5	80.6	80.0
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	78.1	80.6	79.9	77.8	80.9	74.2	76.5	72.1	69.2
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	67.7	68.2	65.1	65.1	64.8	63.9	63.0	62.1	60.7
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	59.6	58.6	56.4	55.5	52.9	50.0	47.4	42.9	39.5

Highest Band	16 Hz	82.6 dB

ReportId

Cirrus Research plc

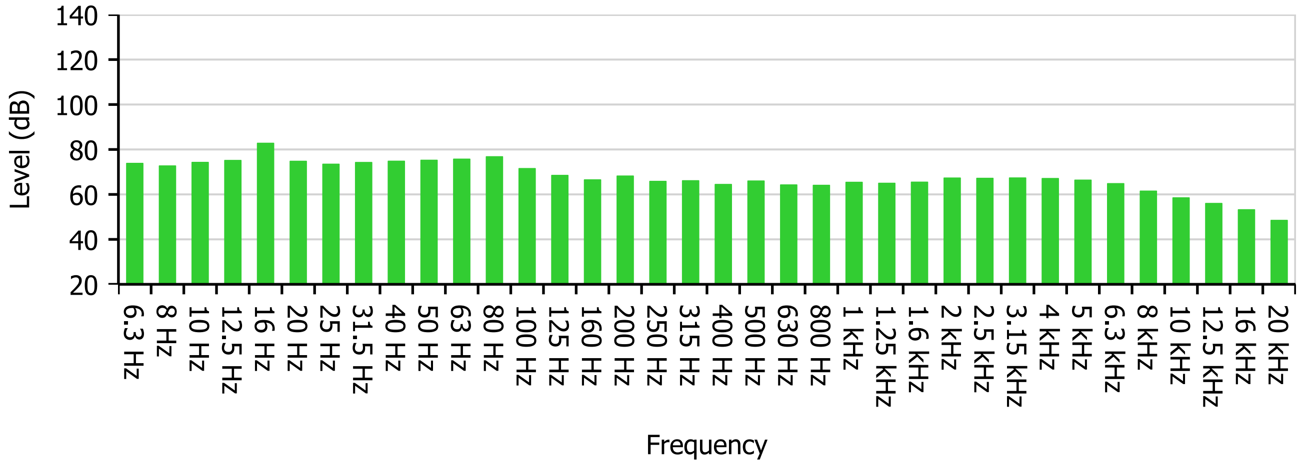
tnei

Measurement 1:3-Octave Report

Name	Loading material into lorries at 10 m						
Time	30/05/2019 11:27:32	**Person**		**Place**		**Project**	
Duration	00:01:34	Ewan Watson		Harsco Rotherham		Cardiff Asphalt	
Instrument	G056468, CR:171B						

Calibration

Before 30/05/2019 10:06 Offset -0.28 dB **After** Offset



Frequency (Hz)	6.3	8	10	12.5	16	20	25	31.5	40
Level (dB)	73.8	72.7	74.3	75.1	82.8	74.8	73.5	74.2	74.8
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	75.2	75.7	76.8	71.5	68.5	66.5	68.2	65.8	66.1
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	64.5	66.0	64.3	64.1	65.4	65.0	65.5	67.3	67.2
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	67.3	67.1	66.4	64.8	61.5	58.5	56.0	53.2	48.5

Highest Band	16 Hz	82.8 dB

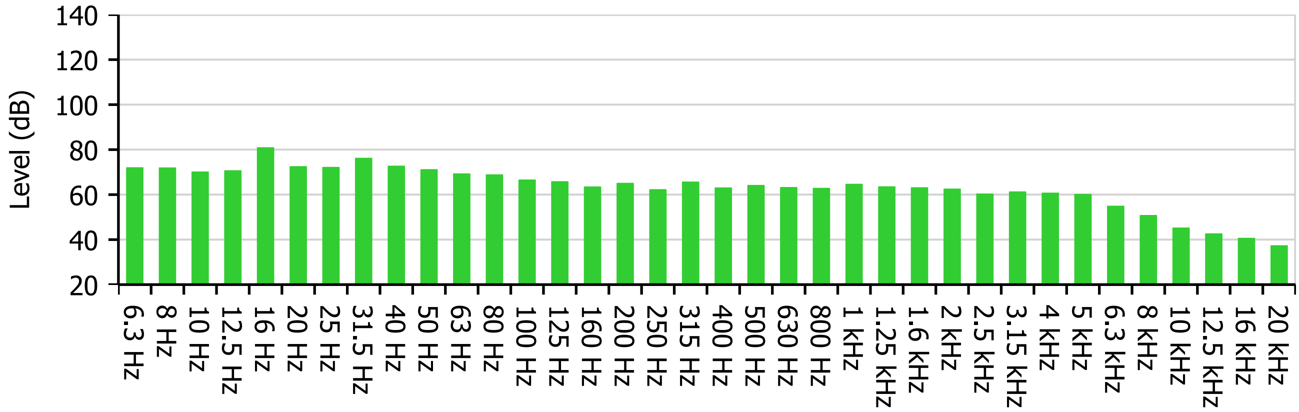
ReportId

Measurement 1:3-Octave Report

Name	Winch for skip car at 1 m (measurement #01)						
Time	30/05/2019 11:29:52	**Person**		**Place**		**Project**	
Duration	00:00:20	Ewan Watson		Harsco Rotherham		Cardiff Asphalt	
Instrument	G056468, CR:171B						

Calibration

Before 30/05/2019 10:06 Offset -0.28 dB **After** Offset



Frequency (Hz)	6.3	8	10	12.5	16	20	25	31.5	40
Level (dB)	72.0	71.9	70.1	70.6	80.8	72.4	72.1	76.2	72.7
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	71.1	69.2	68.8	66.5	65.8	63.4	65.0	62.2	65.6
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	63.0	64.1	63.2	62.8	64.6	63.5	63.1	62.5	60.3
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	61.2	60.7	60.1	54.9	50.7	45.2	42.6	40.6	37.3

Highest Band	16 Hz	80.8 dB

ReportId

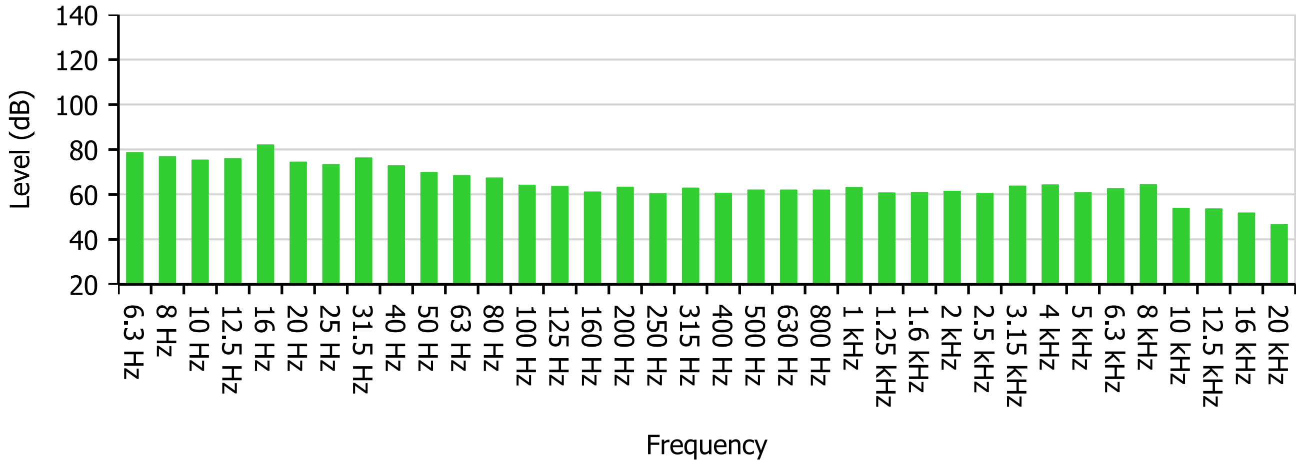
Measurement 1:3-Octave Report

Name 8

Time	30/05/2019 11:30:23	**Person**	**Place**	**Project**
Duration	00:01:01	Ewan Watson	Harsco Rotherham	Cardiff Asphalt
Instrument	G056468, CR:171B			

Calibration

Before 30/05/2019 10:06 Offset -0.28 dB **After** Offset

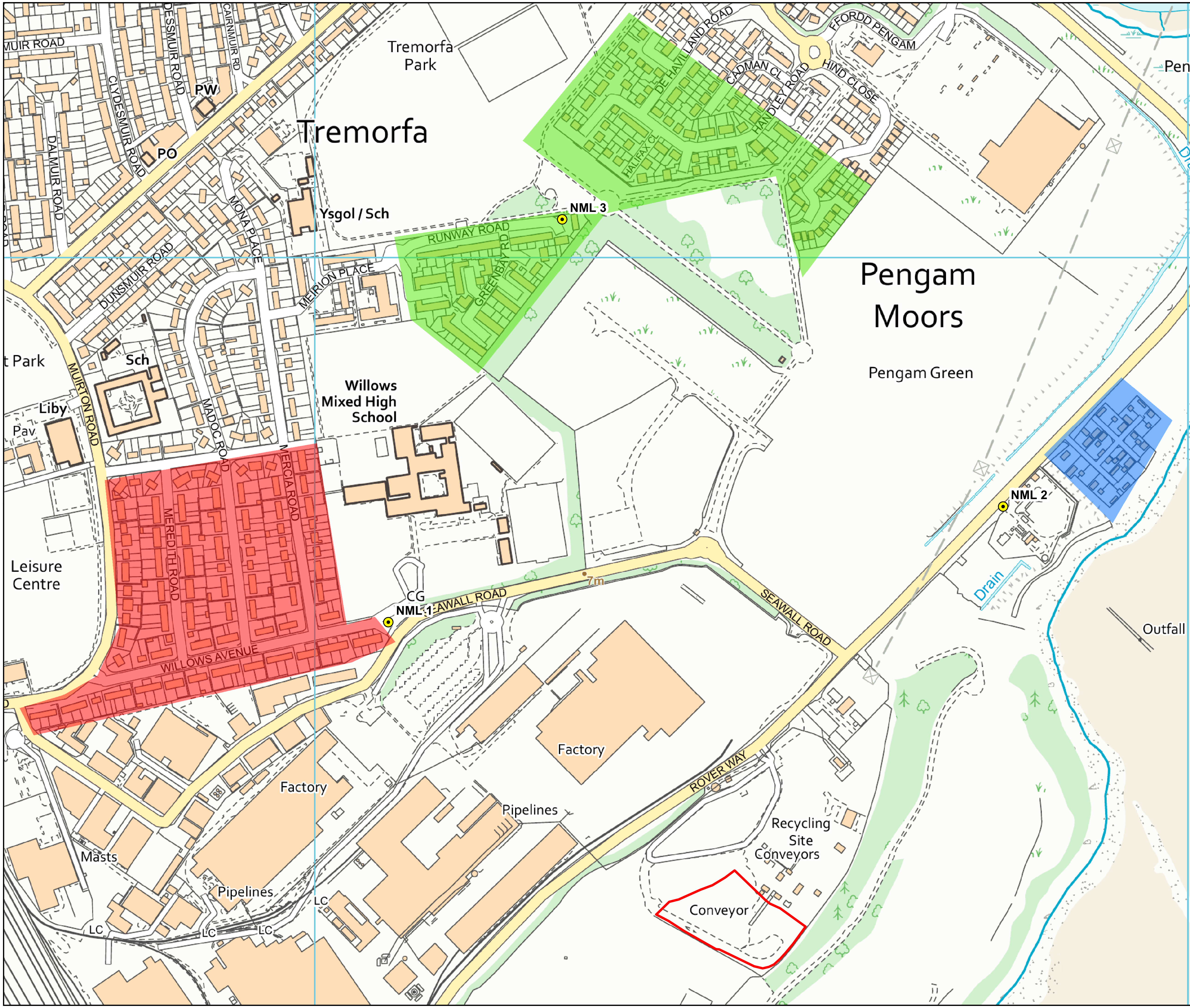


Frequency (Hz)	**6.3**	**8**	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**
Level (dB)	78.7	76.8	75.3	75.9	82.0	74.4	73.3	76.2	72.7
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	69.8	68.4	67.3	64.1	63.6	61.1	63.2	60.4	62.8
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	60.5	62.0	62.0	62.0	63.1	60.7	60.8	61.4	60.5
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	63.7	64.2	60.9	62.6	64.4	53.8	53.6	51.7	46.6

Highest Band	16 Hz	82.0 dB

ReportId

Appendix E – Figures



Legend

- Site Boundary
- Noise Monitoring Locations (NMLs)

Nearest Noise Sensitive Receptors (NSRs)

- NSRs represented by NML 1
- NSRs represented by NML 2
- NSRs represented by NML 3

0 50 100 Metres

N

R0	FIRST ISSUE	JR	JS	JS	20/06/2019
REV.	DETAILS	DRAWN	CHK'D	APP'D	DATE

Project	Cardiff Metal Recycling Plant
Client	EAME
Title	Noise Study Area
Figure No.	1
Scale	1:4,000 @A3
Doc. Ref.	13331-002

EAME Earth & Marine Environmental Consultants

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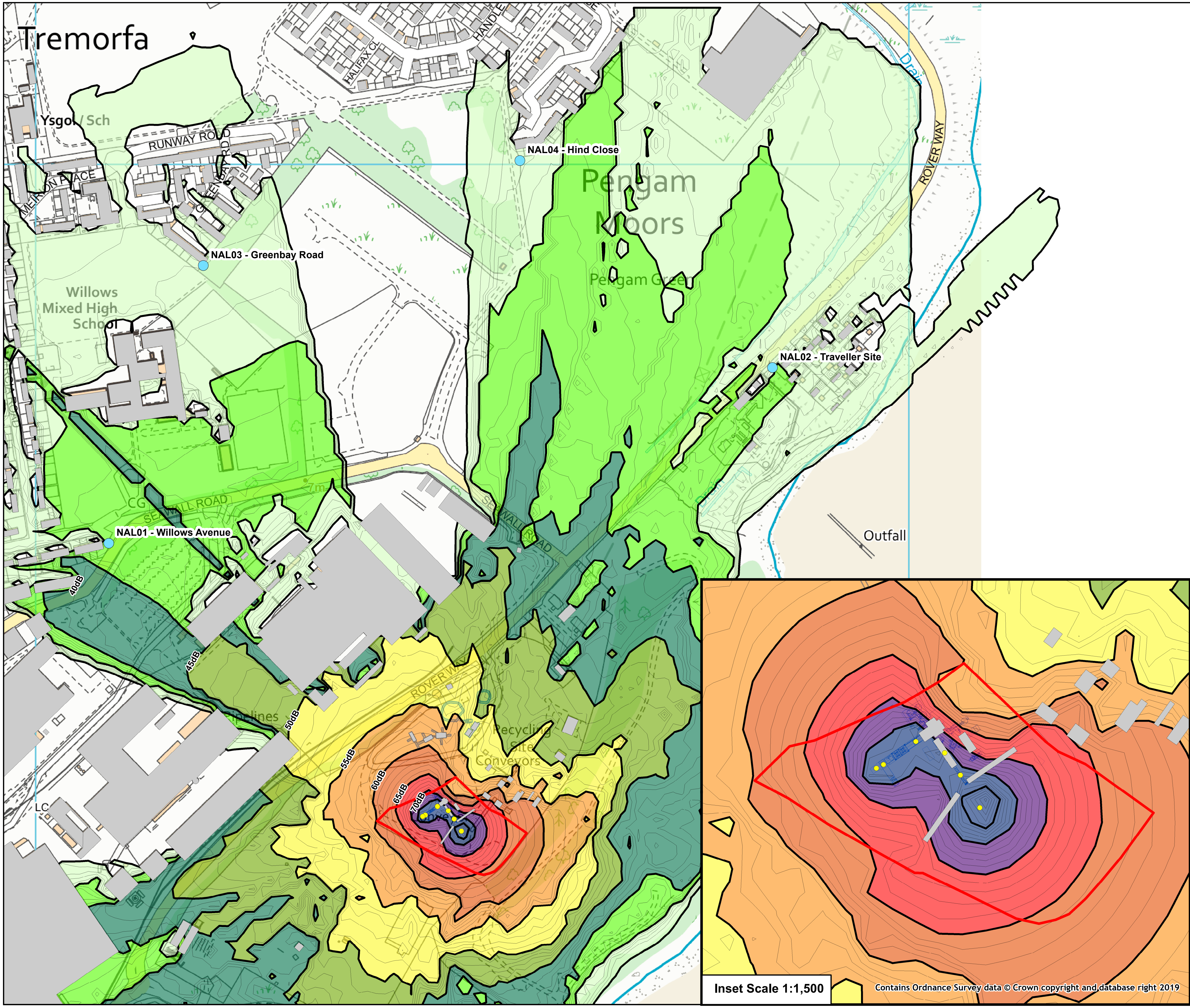


Legend

- Noise Assessment Location (NAL)
- Noise Sources
- Buildings
- Noise Contours (1dB Increments)
- Noise Contours (5dB Increments)

Predicted Noise Levels (dBA)

- 30-35
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80>

Noise contours modelled in accordance with ISO9613-2:1996 at a height of 4m and displayed on a 10m by 10m grid.

All noise sources assumed to be operating concurrently and continually at maximum output.

All levels shown as dB LAeq(t).

0 50 100 Metres

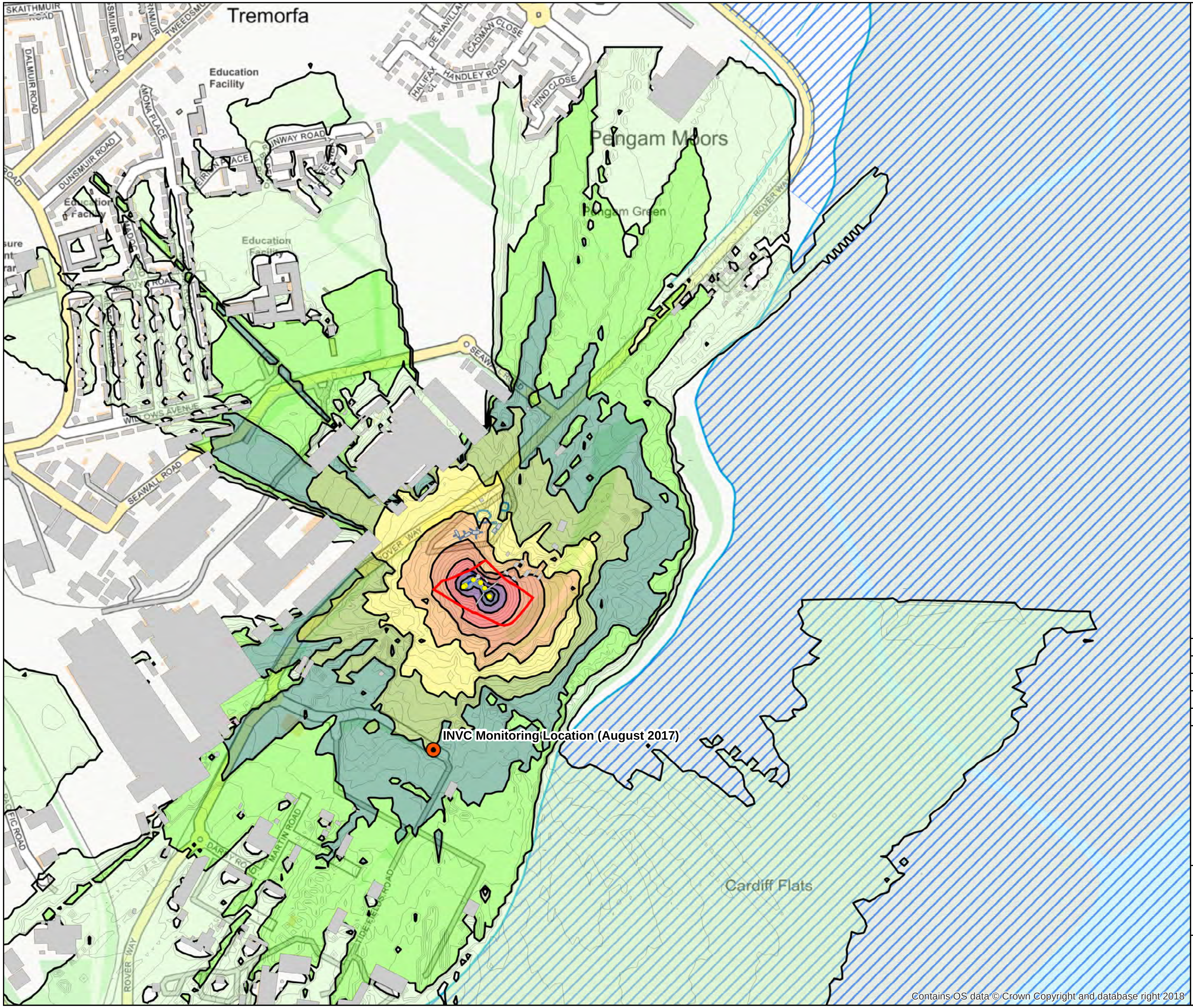
N

REV.	DETAILS	DRAWN	CHK'D	APP'D	DATE
R1	SECOND ISSUE	EW	JS	JS	04/07/2019
R0	FIRST ISSUE	JR	JS	JS	20/06/2019

Project	Cardiff Metal Recycling Plant
Client	EAME
Title	Noise Contour Plot (Asphalt Plant)
Figure No.	2
Scale	1:4,000 @A3
Doc. Ref.	13331-003

EAME Earth & Marine Environmental Consultants

tnei



Legend

- INVC Monitoring Location (August 2017)
- Noise Sources
- Buildings
- Noise Contours (1dB Increments)
- Noise Contours (5dB Increments)

Predicted Noise Levels (dBA)

- 30-35
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80>
- Special Area of Conservation

Noise contours modelled in accordance with ISO9613-2:1996 at a height of 4m and displayed on a 10m by 10m grid.

All noise sources assumed to be operating concurrently and continually at maximum output.

All levels shown as dB LAeq(t).

0 75 150 Metres

N

REV.	DETAILS	DRAWN	CHK'D	APP'D	DATE
R0	FIRST ISSUE	EW	JS	JS	04/07/2019

Project	Cardiff Metal Recycling Plant
Client	EAME
Title	Ecological Receptor Noise Contour Plot (Asphalt Plant)
Figure No.	3
Scale	1:6,000 @A3
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