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acoustic consulting

Hayes Data Centre – DP3442QV
Blocks 1 and 2

Plant Noise Assessment Report

24 October 2024

For

Ark Data Centres Ltd

Contents

SUMMARY

auricl has been commissioned by HDR on behalf of Amazon Data Services UK Ltd (ADS) to undertake a Noise Impact assessment to support the Environmental Permit application (ref: DP3442QV) to operate the Hayes Data Centre Emergency Back-up Generation Facility.

The Data Centre is located in Bulls Bridge Industrial Estate, North Hyde Gardens, Hayes, UB3 4DG ("the site"). The National Grid Reference for the centre of the site is 510440, 179240.

The background noise levels measured during daytime and night-time periods are considered to be reasonable, taking into account the site location and lack of noise sources nearby.

A noise assessment has been undertaken to predict noise impact associated with the operation of the 24No. emergency back-up generators at the nearest noise sensitive receptors (28No. emergency back-up generators are located on the site).

The noise levels are predicted to achieve the noise limits at the nearest noise sensitive properties and therefore noise impacts are not considered to be significant.

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1.0 Introduction

auricl has been commissioned by HDR on behalf of Amazon Data Services UK Ltd (ADS) to undertake a noise impact assessment to support the Environmental Permit application (ref: DP3442QV) to operate the Hayes Data Centre Emergency Back-up Generation Facility.

Once fully operational the data centre will see 28No emergency back-up generators installed. These generators are to be used solely for the purpose of providing emergency electricity in the event of grid power failure / power outage. In an emergency, only 24 of the generators would be required to carry the site's electrical load, with 4 providing redundancy to the system.

This report presents the methodology and results of a noise survey to determine background noise levels that are representative of the nearest noise sensitive properties, as well as an acoustic assessment of the unit in relation to the London Borough of Hillingdon requirements.

2.0 Description of Site

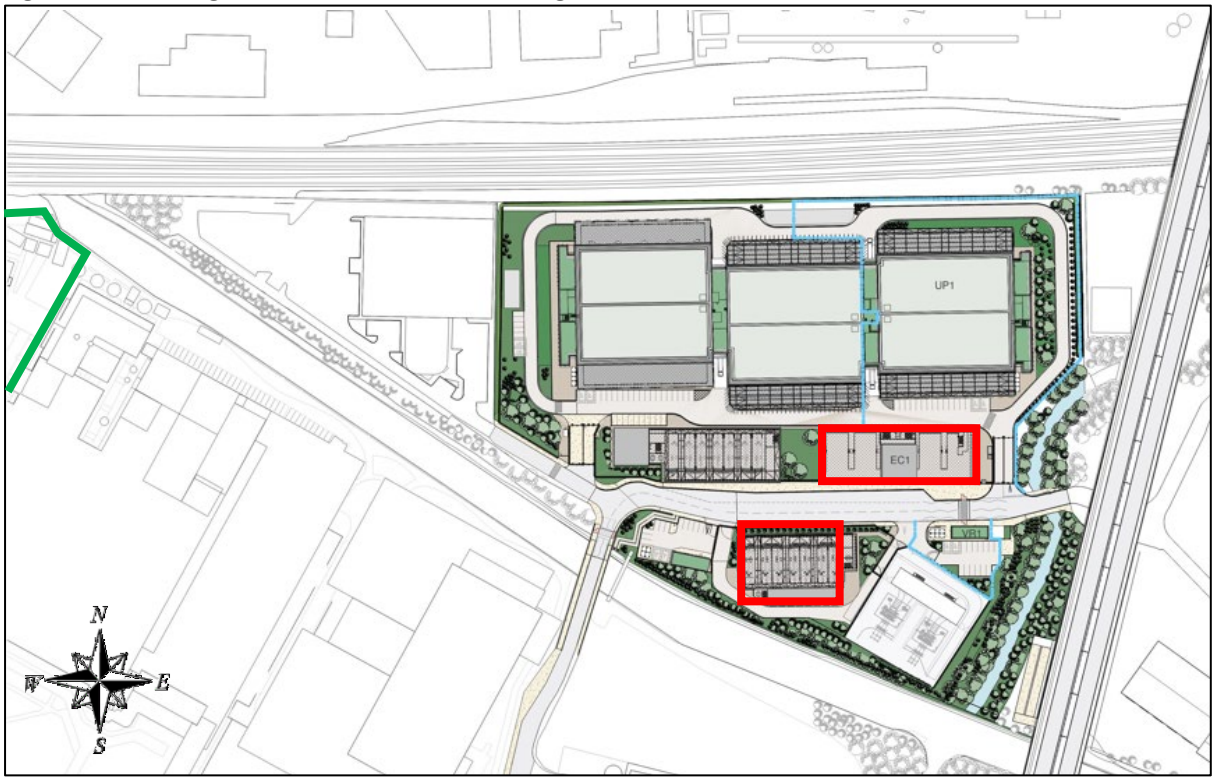
The Data Centre is located in Bulls Bridge Industrial Estate, North Hyde Gardens, Hayes, UB3 4DG ("the site"). The National Grid Reference for the centre of the site is 510440, 179240.

The site is bounded to the north by a railway line, to the south-west by a river and to the east by a raised carriageway (The Parkway).

The site surroundings are predominantly industrial.

Figure 2.1 shows the proposed site layout with the proposed buildings highlighted in **red** and the surrounding properties, including the nearest noise sensitive properties at the Hayes Village development in **green** (see Figure 2.2 also).

Figure 2.1 Existing Site Extent and Surroundings



The construction of the Hayes Data centre will see 28No emergency back-up diesel generators installed in the Energy Centre.

A residential development (Hayes Village) is currently under construction to the south-west of the site. The current proposed site plan for this development is shown in Figure 2.2 with the nearest noise sensitive properties considered in our assessment indicated in **green**.

Figure 2.2 Hayes Village Site Plan

The proposed residences at the north-eastern corner of the Hayes Village development site are considered to represent the nearest noise sensitive properties to the proposed data centre site.

There are not noted to be any neighbouring hotels, fitness and wellbeing gyms, or amenity space such as a public park or gardens nearby that require assessment.

3.0 Acoustic Criteria

3.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's core policies and principles with respect to land use planning in England. In respect to noise, the Framework states at paragraph 180 that planning policies and decisions should aim to:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and quality of life; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The Noise Policy Vision is to 'promote good health and a good quality of life through the effective management of noise within the context of government policy on sustainable development". Through

effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development, there are the following aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

3.2 Planning Practice Guidance (PPG) on Noise

The Planning Practice Guidance on Noise (PPG) ensures noise be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustics environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard or amenity can be achieved.

3.3 Noise Policy Statement for England (NPSE)

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

The Observed Effect Levels are as follows:

- Significant Observed Adverse Effect Level (SOAEL): This is the level of noise exposure above which adverse effects on health and quality of life occur;
- Lowest Observed Adverse Effect Level (LOAEL): This is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- No Observed Effect Level (NOEL): This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 3.1 summarises the noise exposure hierarchy, based on the likely average response.

Table 3.1 – Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any changes in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required

Perception	Examples of Outcomes	Increasing Effect Level	Action
Lowest observed adverse effect level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant observed adverse effect level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed effect	
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable adverse effect	Prevent

3.4 London Borough of Hillingdon Supplementary Planning Document (SPD)

It is understood that London Borough of Hillingdon's requirements for external plant noise emissions are as follows:

"*The rating level of noise emitted from the plant and/or machinery hereby approved shall be at least 5 dB below the existing background noise level. The noise levels shall be determined at the nearest residential property. The measurements and assessment shall be made in accordance with British Standard 4142 "Method for rating industrial noise affecting mixed residential and industrial areas""*

The above requirements are taken from London Borough of Hillingdon's document "*Supplementary Planning Document – Development Control for Noise Generating and Noise Sensitive Development*" (2016).

3.5 Emergency Plant

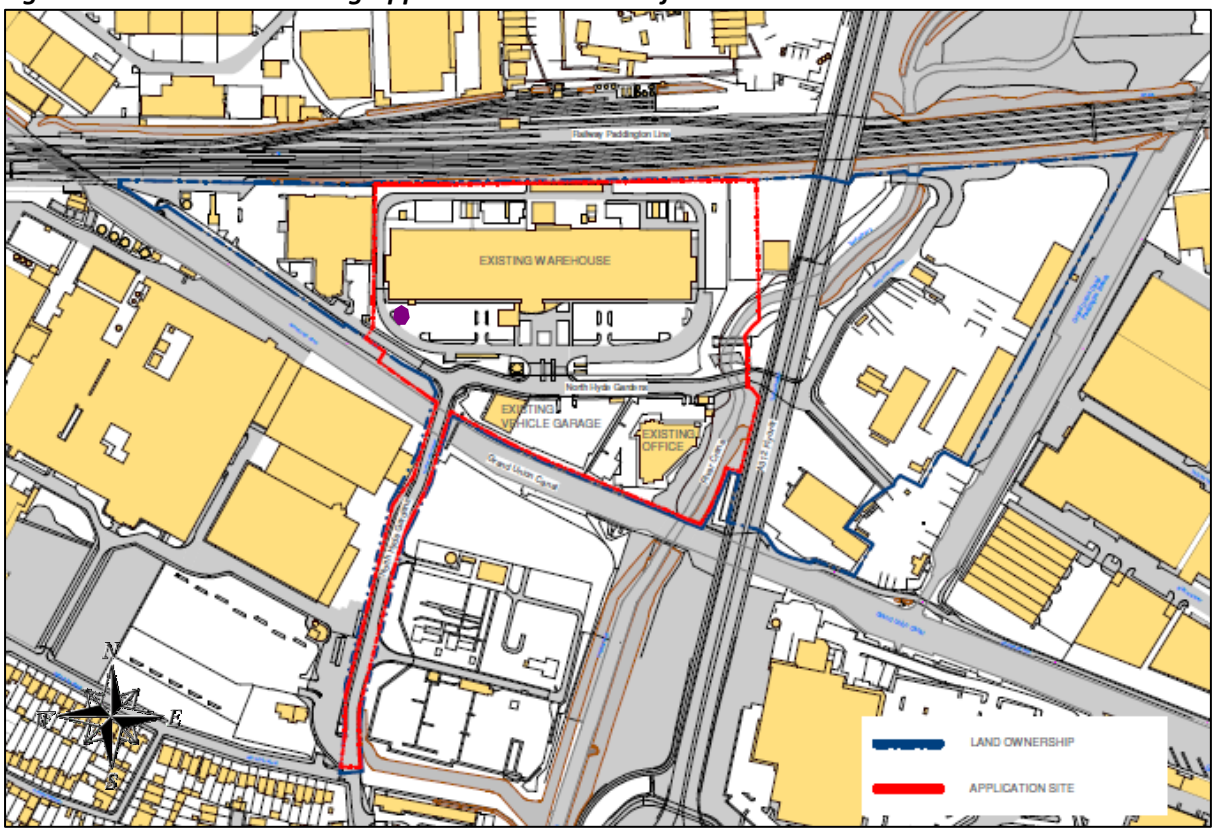
During the rare, short-term operation of the standby power generators during an emergency, noise emissions shall not exceed a 'significant adverse impact' when assessed in accordance with BS 4142: 2014.

4.0 Noise Survey Methodology

An unmanned environmental noise survey was undertaken at one measurement position over a 6-day period between Tuesday 10 December 2019 and Monday 16 December 2019. This period was selected to assess daytime and night-time background noise levels over weekday and weekend periods, when the site will be operational.

The measurement microphone was attached to a tree towards the south-west corner of the site in free-field, as indicated in **purple** on Figure 4.1.

Figure 4.1 Site Plan Indicating Approximate Location of Measurement Position



The measurement position was selected as being representative of background noise levels on the site and at the nearest noise sensitive properties to the south-west.

The equipment used for the noise survey is summarised in Table 4.1.

Table 4.1 Description of Equipment used for Noise Survey

Item	Make & Model	Serial Number
Type 1 automated logging sound level meter	01dB Duo	12373
Type 1 ½" microphone	GRAS 40CD	287751
Calibrator	01 dB CAL31	89093

L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels were measured throughout the noise survey over contiguous 125-millisecond intervals.

Due to the nature of the noise survey, i.e. unmanned, we are unable to comment on the weather conditions throughout the entire noise survey period. However, at the beginning and end of the survey period, there was noted to be no rainfall, a clear sky and only light wind. We understand these weather conditions are representative of the whole noise survey period and are considered appropriate for environmental noise measurements.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found. Laboratory equipment calibration certificates can be provided upon request.

5.0 Noise Survey Results

Appendix B presents a time history graph showing the L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels measured throughout the noise survey (shown as 15-minute periods).

The measured background (L_{A90}) noise levels during daytime and night-time periods are shown in Table 5.1.

Table 5.1 Summary of Noise Survey

Lowest Measured $L_{A90\ (15\ min)}$ Background Noise Level (dB)			
Daytime (07:00 – 23:00 hours)		Night-time (23:00 – 07:00 hours)	
Lowest	Typical	Lowest	Typical
51	55	44	51

We would consider the measured levels to be reasonable, taking into account the location of the measurement position and the dominant nearby noise sources.

Due to the nature of the unmanned noise survey, we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey period the daytime noise climate at the measurement position was noted to be affected by road traffic noise

associated with The Parkway to the east of the site and construction activities on the proposed residential site to the south-west of the site.

We anticipate that road traffic noise associated with The Parkway will also affect the site during night-time periods.

6.0 Building Services Plant Noise Emissions

6.1 External Noise Limits

Based on the measured background noise levels and the acoustic criteria detailed in Section 3.0, the plant noise limits for the generators (emergency operation) are shown in Table 6.1.

Table 6.1 Plant Noise Limits

Maximum $L_{Aeq\ (15\ min)}$ Noise Level (dB) at Nearest Noise Sensitive Property	
Daytime (07:00 – 23:00 hours)	**Night-time (23:00 – 07:00 hours)**
55	51

The noise limits are not to be exceeded at a distance of 1m from the nearest noise sensitive property and apply to the cumulative total noise level due to all plant operating during the relevant period.

6.2 Proposed Plant

The assessment has considered 12 generators associated with EC1 and 12 generators associated with EC2 (24No generators operating at once). The proposed generators are AVK MTU 20V4000 DS4000 and are to be fitted with appropriate attenuation to achieve the noise limits.

Noise levels for the generators are based on source noise data combined with reductions for part-load operation advised by the manufacturer (AVK). The noise levels used in our calculations are shown in Table 6.2.

Table 6.2 Generator Noise Levels

Building	Generator	Load (%)	Noise Level Reduction Compared to 100% Load (dB)	Sound Pressure Level (L_{pA} dB) at 1m		
				Outlet	Casing	Inlet
EC1 EC2	1	83	-1	64	72	67.8
	2	93	0	65	73	68.8
	3	93	0	65	73	68.8
	4	68	-2	63	71	66.8
	5	68	-2	63	71	66.8
	6	93	0	65	73	68.8
	7	93	0	65	73	68.8
	8	71	-2	63	71	66.8
	9	93	0	65	73	68.8
	10	83	-1	64	72	67.8
	11	93	0	65	73	68.8
	12	71	-2	63	71	66.8

Our calculations include attenuation due to architectural elements, in particular, no line of sight between any plant and the nearest noise sensitive properties, due to a solid external facing to the gantries (e.g. steel) and screening provided by intervening buildings and solid structures.

6.3 Nearest Noise Sensitive Properties

We have considered the nearest noise sensitive properties to be the proposed residences at the north-eastern corner of the Hayes Village development.

6.4 Plant Noise Predictions

Our calculations to predict the total plant noise level at the nearest noise sensitive properties are presented in full in Appendix C and summarised in Table 6.3.

Table 6.3 Plant Noise Emission Calculations – Summary

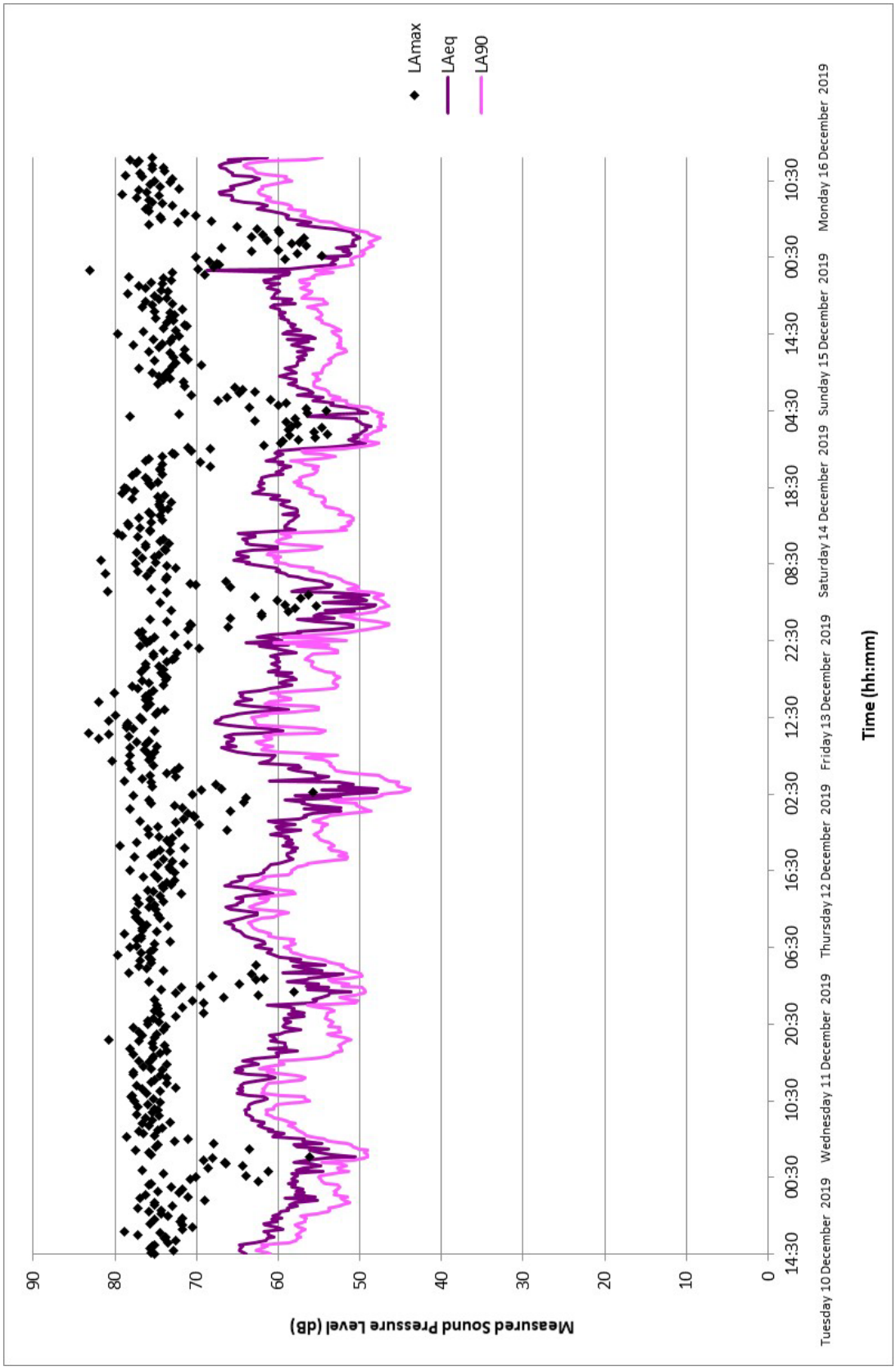
Parameter	Level (dB)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Predicted Noise Level at Receptor – EC1 Generators	44	44
Predicted Noise Level at Receptor – EC2 Generators	45	45
Total Noise Level	**48**	**48**
Limit	**55**	**51**

It can be seen that the noise levels associated with the plant are predicted to achieve the noise limits at the nearest noise sensitive properties.

Appendix A – Acoustic Terminology

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
L_{Amax}	The A-weighted maximum noise level measured during the measurement period.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T. This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{A90,\ T}$	The A-weighted noise level exceeded for 90% of the time (also referred to as the background noise level), measured over the time period T. BS 4142: 2014 specifies that T= 1 hour for daytime periods and T = 15 minutes for night-time periods.

Appendix B – Time History Graph



Appendix C – Detailed Plant Noise Calculations

EC1

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 93% Load	Outlet	65	-50	-5	10
	Casing	73	-34	-5	34
	Inlet	68.8	-47	-5	17
				TOTAL	**34**

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 83% Load	Outlet	64	-50	-5	9
	Casing	72	-34	-5	33
	Inlet	67.8	-47	-5	16
				TOTAL	**33**

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 71% Load	Outlet	63	-50	-5	8
	Casing	71	-34	-5	32
	Inlet	66.8	-47	-5	15
				TOTAL	**32**

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 68% Load	Outlet	63	-50	-5	8
	Casing	71	-34	-5	32
	Inlet	66.8	-47	-5	15
				TOTAL	**32**

Generator	Load (%)	Predicted Noise Level at Receptor (dB)
1	83	33
2	93	34
3	93	34
4	68	32
5	68	32
6	93	34
7	93	34
8	71	32
9	93	34
10	83	33
11	93	34
12	71	32
	TOTAL	**44**

EC2

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 93% Load	Outlet	65	-49	-5	11
	Casing	73	-33	-5	35
	Inlet	68.8	-46	-5	18
				TOTAL	**35**

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 83% Load	Outlet	64	-50	-5	10
	Casing	72	-34	-5	34
	Inlet	67.8	-47	-5	15
				TOTAL	**34**

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 71% Load	Outlet	63	-50	-5	9
	Casing	71	-34	-5	33
	Inlet	66.8	-47	-5	16
				TOTAL	**33**

Plant	Path	Source Noise Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Predicted Noise Level at Receptor (dB)
Generator at 68% Load	Outlet	63	-50	-5	9
	Casing	71	-34	-5	33
	Inlet	66.8	-47	-5	16
				TOTAL	**33**

Generator	Load (%)	Predicted Noise Level at Receptor (dB)
1	83	34
2	93	35
3	93	35
4	68	33
5	68	33
6	93	35
7	93	35
8	71	33
9	93	35
10	83	34
11	93	35
12	71	33
	TOTAL	**45**