SYNTEGRA CONSULTING

Plant Noise Assessment



Unit 4 – Building 5, Corsham Science Park, Corsham SN13 9FU

March 2024

Ref: 24-12742

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 5

2. INTRODUCTION 6

3. PLANNING POLICY 8

4. GUIDANCE DOCUMENTS 10

5. BASELINE NOISE LEVELS 12

6. PLANT NOISE LEVELS 14

7. PLANT NOISE ASSESSMENT 16

8. CONCLUSION 18

9. APPENDIX 1: GLOSSARY OF ACOUSTIC TERMINOLOGY 19

10. APPENDIX 2: PROFESSIONAL STATEMENT 20

11. APPENDIX 3: LIST OF EQUIPMENT 20

12. APPENDIX 4: DETAILED NOISE MEASUREMENT RESULTS 20

13. APPENDIX 5: DETAILED PLANT NOISE LEVELS AND TONALITY ASSESSMENT 25

Quality Standards Control

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it is has been signed by the originators and approved by a director.

Revision	-
Date	07.03.2024
Prepared by	D. Yates MIOA
Checked by	S. Holthe
Authorised by	D. Yates MIOA

Limitations

Syntegra Consulting Ltd ("SC") has prepared this report for the sole use of the client in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by SC.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by SC has not been independently verified by SC, unless otherwise stated in the report.

The methodology adopted and the sources of information used by SC in providing its services are outlined in this report. The work described in this report was undertaken in **February and March 2024** and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

SC disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to SC's attention after the date of the report.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. SC specifically does not guarantee or warrant any estimate or projections contained in this report.

Costs may vary outside the ranges quoted. Whilst cost estimates are provided for individual issues in this report these are based upon information at the time which can be incomplete. Cost estimates for such issues may therefore vary from those provided. Where costs are supplied, these estimates should be considered in aggregate only. No reliance should be made in relation to any division of aggregate costs, including in relation to any issue, site or other subdivision.

No allowance has been made for changes in prices or exchange rates or changes in any other conditions which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made, these are based upon measures which, in SC's experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

Forecast cost estimates do not include such costs associated with any negotiations, appeals or other non-technical actions associated with the agreement on measures to meet the requirements of the authorities, nor are potential business loss and interruption costs considered that may be incurred as part of any technical measures.

Copyright

© This report is the copyright of SC. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

1. Executive Summary

A plant noise assessment has been carried out for the proposed installation at **Unit 4 – Building 5, Corsham Science Park, Corsham SN13 9FU**.

The proposals include 5No. condenser units and 3No. fume stack extraction systems for the building which Syntegra understands will be operational during daytime office hours only.

The nearest noise sensitive receptor to Building 5 are the residential properties at Monks Drive to the north. The condenser units will be located in front of Unit 4, Building 5 within the current car parking area at a distance of approximately 60m from the receptor. The fume stacks will extract at the rear of the building, approximately 80m from the receptor.

The results of the assessment have identified that the noise levels from the plant as proposed will be significantly below the existing ambient noise levels and below the existing background noise level at the nearest noise sensitive receptor. Accordingly, adverse impacts would not be expected.

Achievement of the target noise criteria will ensure compliance with the aims of the NPPF and the PPG in that it will avoid noise from giving rise to significant adverse impacts on health or quality of life on nearby noise sensitive receptors.

2. Introduction

This report has been prepared to assess the impact of plant noise from **Unit 4 – Building 5, Corsham Science Park, Corsham SN13 9FU** due to the proposed plant installation.

The proposals include 5No. condenser units and 3No. fume stack extraction systems for the building which Syntegra understands will be operational during daytime office hours only.

The report assesses, through on-site noise measurements, the impact of the proposed plant on the surrounding noise sensitive receptors.

A glossary of acoustic terminology is provided in **Appendix 1**.

The nearest noise sensitive receptor to Building 5 are the residential properties at Monks Drive to the north. The condenser units will be located in front of Unit 4, Building 5 within the current car parking area at a distance of approximately 60m from the receptor. The fume stacks will extract at the rear of the building, approximately 80m from the receptor. The location of the proposed development site and receptor is provided in **Figure 2.1** and the plant locations are provided in **Figure 2.2**.

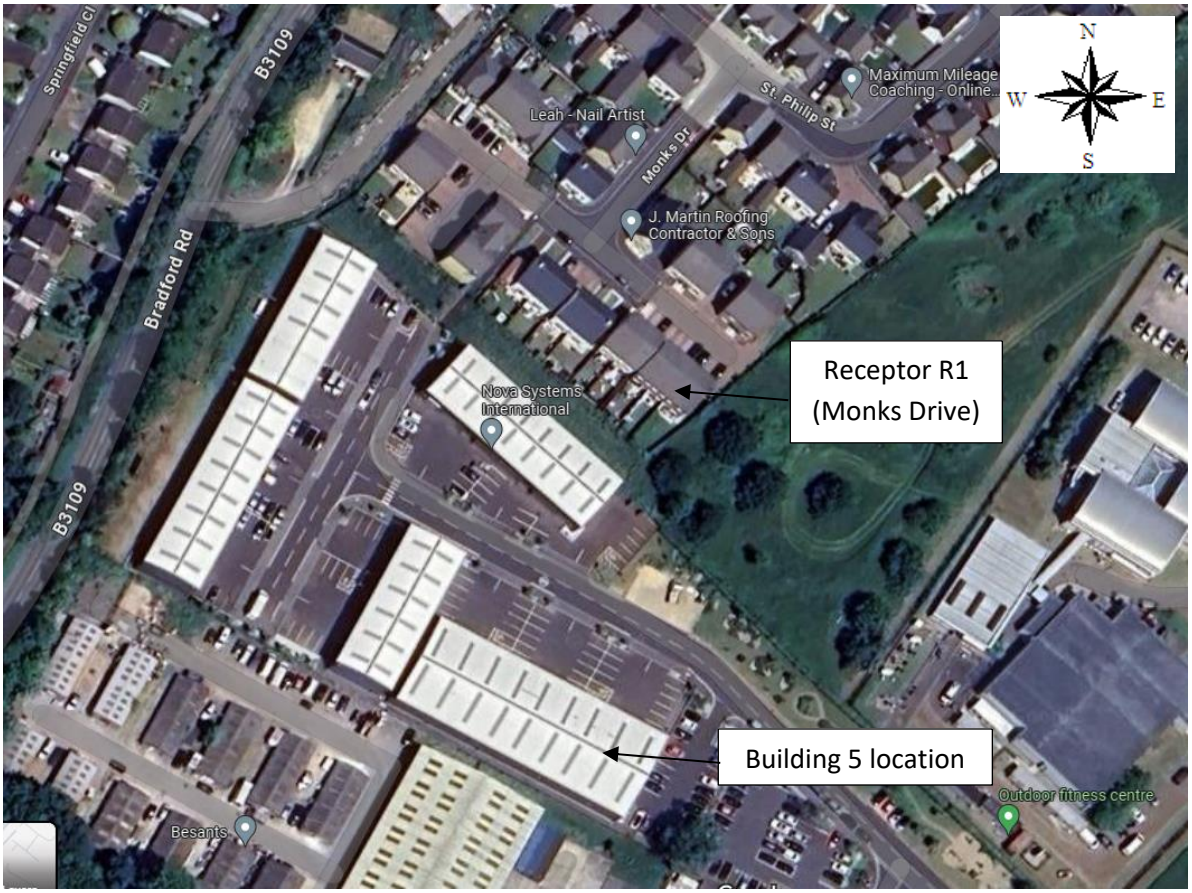


Figure 2.1: Site Location

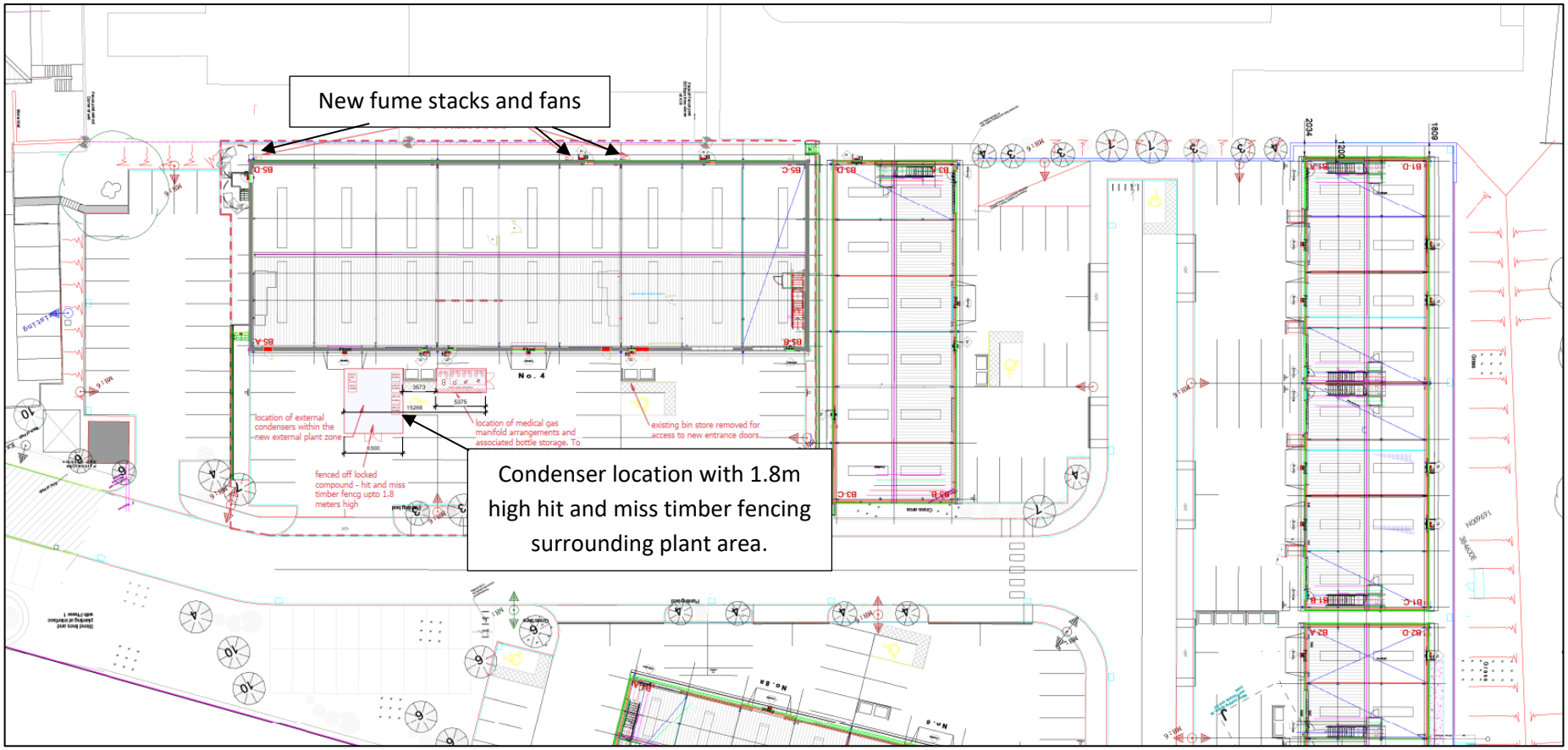


Figure 2.2: Plant Locations

3. Planning Policy

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was released in March 2012 and last updated in December 2023. The purpose of the planning system is to contribute to the achievement of sustainable development and to encourage good design. There are three dimensions to sustainable development: economic, social and environmental.

Central to the NPPF, paragraph 10 states: *'At the heart of the National Planning Policy Framework is a* ***presumption in favour of*** **[permitting]** ***sustainable development****'*. This is expanded upon in paragraph 11, where it is stated:

'…For ***decision-taking*** *this means:*

- *approving development proposals that accord with an up-to-date development plan without delay; or*
- *where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*
    - *the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or*
    - *any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole'*

Paragraph 174 states '*Planning policies and decisions should contribute to and enhance the natural and local environment by… preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of… noise pollution…*'.

Paragraph 185 states: '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

- *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 the quality of life (see Explanatory Note to the Noise Policy Statement for England (DEFRA)).*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'*

3.2. Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) aims to '*through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *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'.*

3.3. Local Planning Policy

The site is located within the administrative boundary of Wiltshire Council.

Wiltshire Core Strategy (adopted January 2015) contains the following related core policy:

"Core Policy 57

Ensuring high quality design and place shaping

A high standard of design is required in all new developments, including extensions, alterations, and changes of use of existing buildings. Development is expected to create a strong sense of place through drawing on the local context and being complementary to the locality. Applications for new development must be accompanied by appropriate information to demonstrate how the proposal will make a positive contribution to the character of Wiltshire through:

…

vii. having regard to the compatibility of adjoining buildings and uses, the impact on the amenities of existing occupants, and ensuring that appropriate levels of amenity are achievable within the development itself, including the consideration of privacy, overshadowing, vibration, and pollution (e.g. light intrusion, noise, smoke, fumes, effluent, waste or litter).

…"

Additionally, the Wiltshire Core Strategy references the following related saved policy from the North Wiltshire Local Plan 2011.

"NE18 NOISE AND POLLUTION

Development will only be permitted where it would not generate, or itself be subject to, harm upon public health or cause pollution to the environment by the emission of excessive noise, light intrusion, smoke, fumes, other forms of air pollution, heat, radiation, effluent or vibration."

4. Guidance Documents

4.1. Planning Practice Guidance for Noise

The Planning Practice Guidance for Noise (PPG-Noise) was published in March 2014 and last updated in July 2019. The PPG provides advice on how to determine the noise impact on development:

'Plan-making and decision making need to 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 of amenity can be achieved.*

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. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.'

The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:

*'**Significant observed adverse effect level:** this is the level of noise exposure above which significant adverse effects on health and quality of life occur.*

***Lowest observed adverse effect level:** this is the level of noise exposure above which adverse effects on health and quality of life can be detected.*

***No observed effect level:** this is the level of noise exposure below which no effect at all on health and quality of life can be detected.'*

It is important to understand that as the PPG-Noise does not provide any advice with respect to specific noise levels/ limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment.

4.2. British Standard 4142:2014

British Standard 4142:2014 "*Methods for rating and assessing industrial and commercial sound*" provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is used to rate the noise source outside residential dwellings (this is defined as the "specific sound level").

The rating level is determined by assessing the character of the noise and applying an acoustic feature correction if appropriate. Corrections are applied for the tonality and intermittency of the noise source which can both make noise more noticeable.

The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise level outside the

residential property of interest. The British Standard states that the following points should be considered:

- *'Typically, the greater this difference, the greater the magnitude of the 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.*
- *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.'*

Where it is considered that the initial assessment of the impact needs to be modified due to the context in which the noise is occurring, BS 4142 suggests that all pertinent factors are taken into consideration, including:

1) *'The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

   Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

   Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*

   i) facade insulation treatment;

   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

   ii) acoustic screening.'

5. Baseline Noise Levels

In order to determine the baseline noise levels in the vicinity of the proposed plant, a detailed noise measurement survey has been carried out in order to characterise the existing noise climate. The local noise climate consisted of distant road traffic noise and intermittent construction noise.

The noise measurements utilised a Rion NL52 Type 1 Precision Sound Level Meter with a current certificate of calibration, the full list of equipment is detailed in **Appendix 3**. Before and after the measurement period the equipment was calibrated in order to ensure that the equipment had remained within reasonable calibration limits (+/- 0.5 dB). Noise Measurements were carried out in consecutive 5 minutes periods with a 1 second resolution.

Measurements were carried out between 1600 hrs on Tuesday 27th February 2024 and 1000 hrs on Thursday 29th February 2024.

During the noise measurement survey, the temperature was up to 11°C during the daytime dropping to a low of 6°C overnight. The was generally a low to moderate (1-3 m/s) south-westerly wind throughout the survey, with some stronger winds occurring towards the end of the survey period on Thursday 29th February. Cloud cover was noted to be 100% at set up and collection. A period of heavy rain was noted, along with the stronger winds, on the morning of Thursday 29th February and this period has been removed from the analysis of the data as a precaution.

Noise measurements were carried out at Measurement Position 1 (MP1) in a free-field location at a height of 1.2m above the ground in front of Unit 4 of Building 5. The position was chosen as reasonably secure location with a similar noise climate and levels to the nearest noise sensitive receptor and is therefore considered to be representative of the noise conditions at the nearest noise sensitive receptor.

The noise monitoring position is shown in **Figure 5.1**.

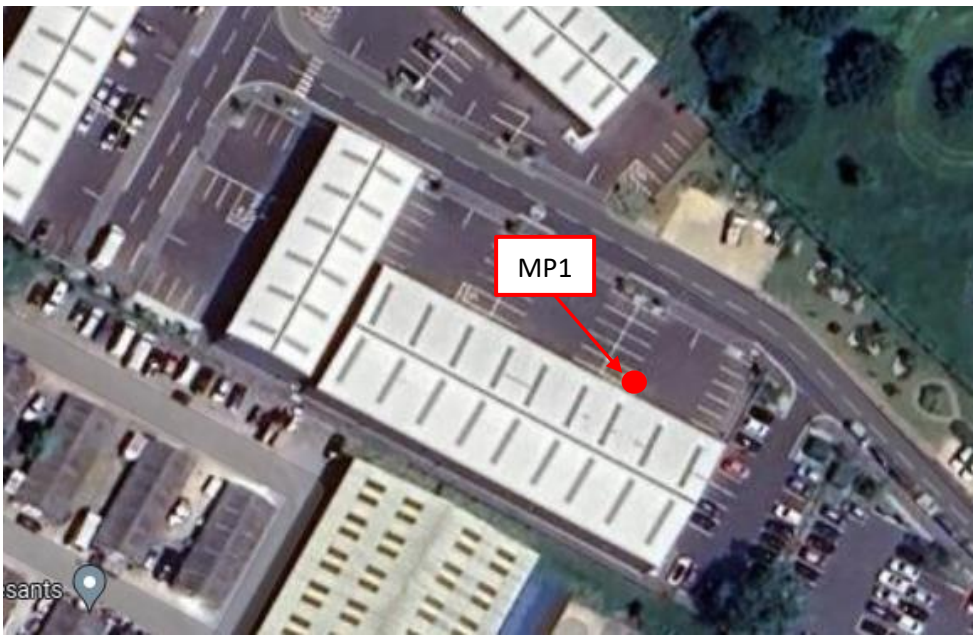


Figure 5.1: Noise Monitoring Location

Table 5.1 below displays a summary of the measured noise levels and detailed measurement results are presented in **Appendix 4**.

Measurement Position	Period (hours)	$L_{Aeq,T}$ (dB)	Typical L_{A90} (dB)
MP1	Daytime (0700-2300)	50	37
	Night-time (2300-0700)	39	30

Table 5.1: Summary of Free Field Semi-Permanent Noise Levels

Note: The average noise levels stated are logarithmic for L_{Aeq}. The typical L_{A90} is the most commonly exceeded $L_{A90,5min}$ during the assessment time period (a detailed assessment is provided in Appendix 3).

6. Plant Noise Levels

6.1. Plant Noise Levels – Manufacturers Data

The plant noise levels have been obtained from manufacturers data. A summary of the manufacturers noise levels are presented in **Table 6.1.** Detailed noise levels are presented in **Appendix 5**.

Plant Reference	Quoted Noise Level $L_{Aeq,T}$ (dB)	Quoted Distance from Source (m)	Quoted Sound Power Level L_{wA} (dB)	Commentary
Mitsubishi PURY 500 Condenser	64	1	-	Standard Operation
	53	1	-	Low Noise Mode
Mitsubishi PURY 450 Condenser	66	1	-	Standard Operation
	53	1	-	Low Noise Mode
Mitsubishi PURY 400 Condenser	65	1	-	Standard Operation
	52	1	-	Low Noise Mode
Toshiba MMY-MUP1001 Condenser	-	-	77	Heating and Cooling
Extract Fans	74	1	-	Highest operational level

Table 6.1: Plant Noise Levels

6.1.1. Plant Noise Levels – Penalties

The plant noise levels and operating conditions have been assessed by Syntegra in line with the advice provided within BS 4142:2014 and the following penalties will be added:

- Tonality: 0 dB (see **Appendix 5**)
- Impulsivity: 0 dB
- Noticeable feature (e.g. hum, whine, hiss): +3 dB for a potentially audible hum due to the low frequency content of the noise.

The total penalty for the plant noise level features will therefore be +3 dB.

6.2. Receptor Noise Levels

The future plant noise levels at the nearest noise sensitive receptors have been predicted using standard acoustic formulae based on the measured noise levels and are detailed in **Table 6.2** for all items of plant. A -5 dB screening correction has been taken for the condenser units for partial screening from the plant compound fence. A -15 dB screening correction has been taken for the

extract fans as they terminate below the higher part of the roof of the building and therefore there is an intervening building between the source and the receptor.

	Receptor
	Monks Drive
Mitsubishi PURY 500	
Sound Pressure Level at 1m from Source (L_{pA} dB)	64
Distance to Nearest Habitable Room Window (approx.)	60m
Distance Correction (dB)	-36
Screening Correction (dB)	-5
Predicted Noise Level at Receptor (L_{Aeq} dB)	23
Mitsubishi PURY 450	
Sound Pressure Level at 1m from Source (L_{pA} dB)	66
Distance to Nearest Habitable Room Window (approx.)	60m
Distance Correction (dB)	-36
Screening Correction (dB)	-5
Predicted Noise Level at Receptor (L_{Aeq} dB)	25
Mitsubishi PURY 400	
Sound Pressure Level at 1m from Source (L_{pA} dB)	65
Distance to Nearest Habitable Room Window (approx.)	60m
Distance Correction (dB)	-36
Screening Correction (dB)	-5
Predicted Noise Level at Receptor (L_{Aeq} dB)	24
Toshiba MMY-MUP1001	
Sound Power Level at Source (L_{wA} dB)	77
Distance to Nearest Habitable Room Window (approx.)	60m
Distance Correction (dB)	-36
Sound Power Level to Sound Pressure Level Correction (dB)	-8
Screening Correction (dB)	-5
Predicted Noise Level at Receptor (L_{Aeq} dB)	28
Extract Fans	
Sound Pressure Level at 1m from Source (L_{pA} dB)	74
Correction for Additional Units (3 total)	+5
Distance to Nearest Habitable Room Window (approx.)	80m
Distance Correction (dB)	-38
Screening Correction (dB)	-15
Predicted Noise Level at Receptor (L_{Aeq} dB)	26
Total Noise Level	
Predicted Total Noise Level at Receptor (L_{Aeq} dB)	**33**

Table 6.2: Predicted Plant Noise Levels

7. Plant Noise Assessment

The background noise level and plant noise data presented in **Sections 5** and **6** has been utilised to determine the noise impact at the nearest noise sensitive receptor when assessed using the methodology in BS 4142:2014. The aim is to meet the requirements of the Local Authority which is generally to maintain amenity and not cause harm to nearby noise sensitive receptors. In BS 4142 terms, Syntegra take this to mean to avoid adverse impacts, which strictly speaking would be for the rating level to be no greater than 5 dB above the background. It is noted by Syntegra that a rating level of no greater than the background noise level is commonly accepted as suitable to avoid adverse impacts and Syntegra therefore propose this as a criterion.

Table 7.1 below summarises the BS 4142 assessment procedure carried out for the site.

Results	Nearest Noise Sensitive Receptor (R1)	Relevant Clauses of BS 4142:2014	Commentary
Measured Ambient Sound Level	50	7.3.2	Refer to **Table 5.1**
Residual Sound Level	50	7.3.3	*The ambient noise level without the plant operating.* Refer to **Table 5.1**
Typical Background Sound Level L_{A90} (dB)	37	8.1, 8.2	Refer to **Table 5.1**
Specific Sound Level	33	9.1, 9.2	Refer to **Table 6.2**
Acoustic Feature Correction	+3	9.2	Refer to **Section 6.1.1**
Rating Level L_{Ar} (dB)	36	9.1	Specific Sound Level + Acoustic Feature Correction
Excess of Rating over Background Sound Level	-1	11	
	Assessment indicates around a *low impact*.	11	
Achievement of Identified Criteria	Yes	n/a	Equal to L_{A90}

Table 7.1: BS 4142 Assessment

Table 7.1 identifies that an assessment in line with BS 4142 indicates that **the plant noise would be around the level where a *low impact* may be expected upon the residents at the nearest noise sensitive receptor.**

7.1. Context of the Noise Source

BS 4142 advises that the "context" of the noise needs to be considered to determine the results of the assessment.

The plant will operate during the daytime only and is predicted be significantly below the residual (existing ambient) noise levels and below the current background noise levels at the nearest noise sensitive receptor.

In consideration of the context of the noise source, the plant would not be expected to cause any adverse impacts on the health or quality of life of the nearest noise sensitive receptors.

7.2. Consideration of Uncertainty

The assessment has considered uncertainty by taking a cautious approach in terms of the likely noise levels from the activities and by taking conservative losses for the distance attenuation. The cautious approach means that the noise impact is more likely to be overstated, as opposed to understated, although it is not likely that the predicted noise levels would be significantly different from those stated within the report. Overall, it is unlikely that the conclusions of the assessment would be changed as a result of any uncertainty in the assessment process.

8. Conclusion

A plant noise assessment has been carried out for the proposed installation at **Unit 4 – Building 5, Corsham Science Park, Corsham SN13 9FU**.

The proposals include 5No. condenser units and 3No. fume stack extraction systems for the building which Syntegra understands will be operational during daytime office hours only.

The results of the assessment have identified that the noise levels from the plant as proposed will be significantly below the existing ambient noise levels and below the existing background noise level at the nearest noise sensitive receptor. Accordingly, adverse impacts would not be expected.

Achievement of the target noise criteria will ensure compliance with the aims of the NPPF and the PPG in that it will avoid noise from giving rise to significant adverse impacts on health or quality of life on nearby noise sensitive receptors.

9. Appendix 1: Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	*This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.*
Decibel (dB)	*This is a tenth (deci) of a bel. The decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.*
$L_{Aeq,T}$	*The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.*
L_{A10}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 per cent of a given time and is the L_{A10T}. The L_{A10} is used to describe the levels of road traffic noise at a particular location.*
L_{A50}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 per cent of a given time and is the L_{A50T}.*
L_{A90}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time and is the L_{A90T}. The L_{A90} is used to describe the background noise levels at a particular location.*
L_{Amax}	*The 'A'-weighted maximum sound pressure level measured over a measurement period.*

10. Appendix 2: Professional Statement

David Yates

David Yates is a full member of the Institute of Acoustics (MIOA) and has 15 years' experience in acoustic consultancy. David has particular expertise in environmental noise providing acoustic consultancy for residential and mixed use planning applications, plant noise and vibration, construction noise and the design of acoustic, noise and vibration control. David is also experienced in providing sound insulation testing and design advice. David is familiar with the application of all relevant standards associated with his work, including but not limited to, BS 4142, BS 8233, BS 7445, BS 6472, BS 5228, BS 140 series, BS 16283 series and BS 717 series. David manages the acoustic department and is responsible for maintaining Syntegra's ANC membership.

11. Appendix 3: List of Equipment

Equipment Type	Manufacturer	Serial Number	Calibration Certification Number	Date of Last Calibration Check
NL-52 Type 1 Sound Level Meter	Rion	00586904	UCRT23/1873	July 2023
UC-59 Microphone	Rion	13361	UCRT23/1873	July 2023
NH-25 Preamplifier	Rion	87023	UCRT23/1873	July 2023
NC-75 Sound Calibrator	Rion	34334835	UCRT23/1873	July 2023

12. Appendix 4: Detailed Noise Measurement Results

Measured Noise levels – MP1 – 27.02.2024

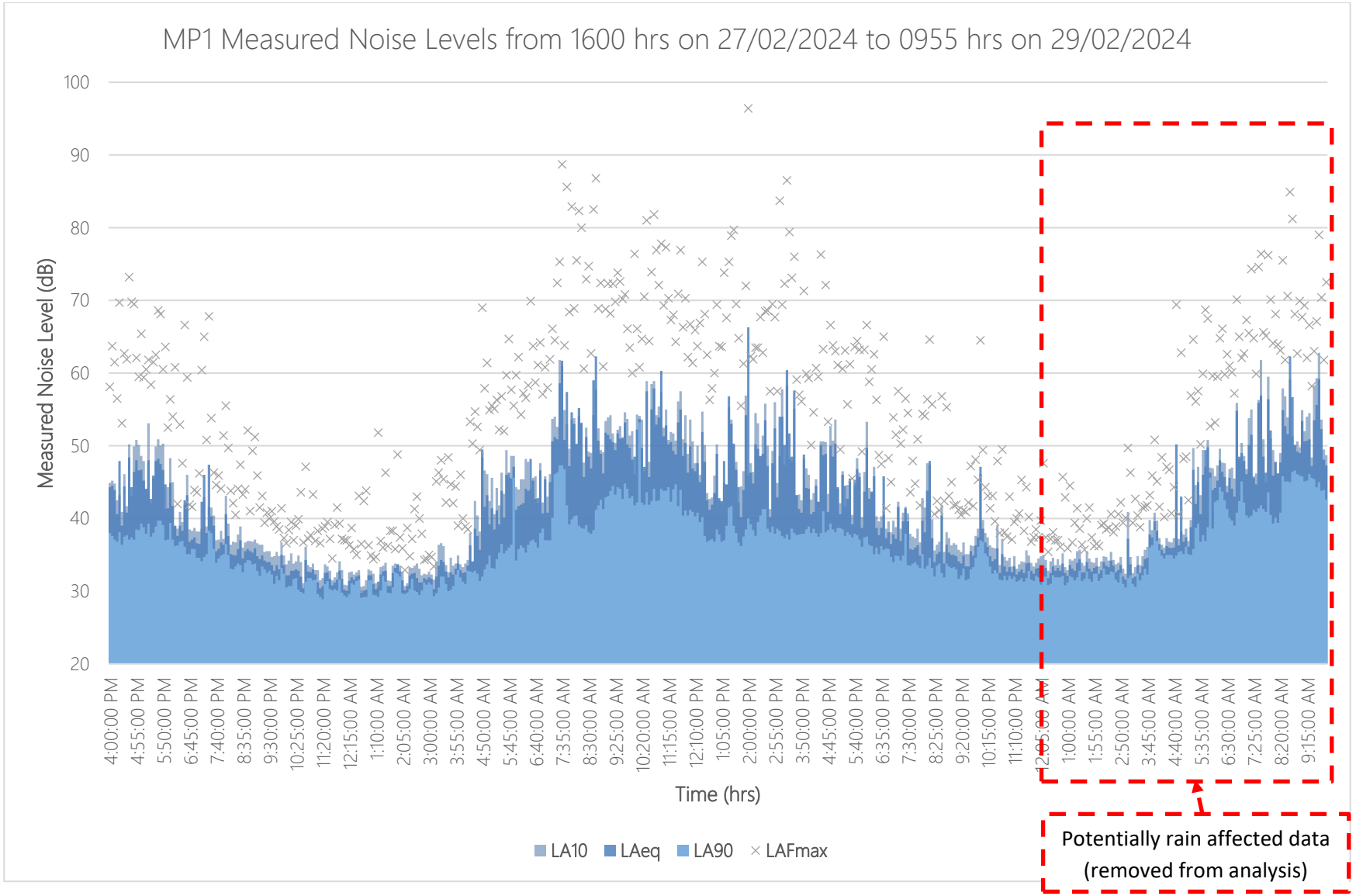
Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
1600-1700	45	73	48	41
1700-1800	46	69	48	44
1800-1900	41	67	43	37
1900-2000	41	68	46	36
2000-2100	36	56	38	35
2100-2200	34	51	35	33
2200-2300	33	47	34	32
2300-0000	32	43	33	31
1600-2300	**42**	**61**	**42**	**37**
2300-0000	**32**	**43**	**33**	**31**

Measured Noise levels – MP1 – 28.02.2024

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
0000-0100	31	44	32	30
0100-0200	32	52	33	31
0200-0300	32	43	32	31
0300-0400	33	48	34	32
0400-0500	41	69	41	33
0500-0600	44	65	46	39
0600-0700	44	70	46	41
0700-0800	55	89	58	45
0800-0900	55	87	59	47
0900-1000	51	74	52	49
1000-1100	53	82	57	47
1100-1200	53	78	55	49
1200-1300	47	75	50	42
1300-1400	50	80	54	42
1400-1500	56	96	53	45
1500-1600	53	87	57	41
1600-1700	47	76	50	41
1700-1800	45	64	47	39
1800-1900	44	67	46	37
1900-2000	38	58	41	36
2000-2100	41	65	43	34
2100-2200	35	48	36	33
2200-2300	39	65	38	33
2300-0000	33	45	34	32
0700-2300	**51**	**74**	**50**	**41**
2300-0700	**39**	**54**	**37**	**34**

Measured Noise levels – MP1 – 29.02.2024

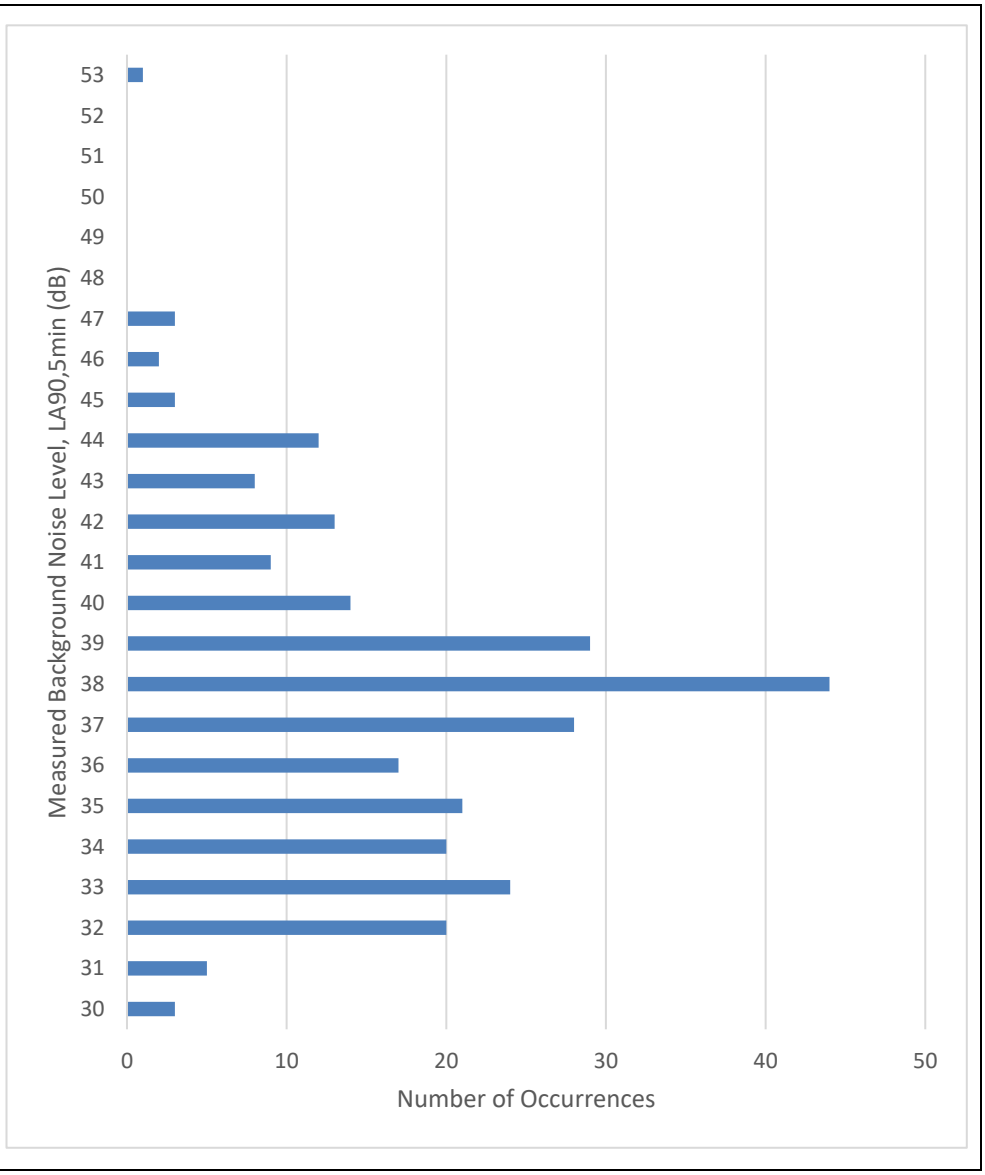
Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
0000-0100	33	48	33	33
0100-0200	33	45	34	33
0200-0300	33	42	34	32
0300-0400	35	50	37	32
0400-0500	42	69	43	36
0500-0600	45	69	49	37
0600-0700	48	70	48	44
0700-0800	52	76	56	46
0800-0900	54	85	57	46
0900-1000	53	79	55	47
0700-1000	**53**	**80**	**56**	**46**
0000-0700	**42**	**56**	**40**	**35**


MP1 Measured Noise Levels from 1600 hrs on 27/02/2024 to 0955 hrs on 29/02/2024
Measured Noise Level (dB)
100
90
80
70
60
50
40
30
20
4:00:00 PM
4:55:00 PM
5:50:00 PM
6:45:00 PM
7:40:00 PM
8:35:00 PM
9:30:00 PM
10:25:00 PM
11:20:00 PM
12:15:00 AM
1:10:00 AM
2:05:00 AM
3:00:00 AM
3:55:00 AM
4:50:00 AM
5:45:00 AM
6:40:00 AM
7:35:00 AM
8:30:00 AM
9:25:00 AM
10:20:00 AM
11:15:00 AM
12:10:00 PM
1:05:00 PM
2:00:00 PM
2:55:00 PM
3:50:00 PM
4:45:00 PM
5:40:00 PM
6:35:00 PM
7:30:00 PM
8:25:00 PM
9:20:00 PM
10:15:00 PM
11:10:00 PM
12:05:00 AM
1:00:00 AM
1:55:00 AM
2:50:00 AM
3:45:00 AM
4:40:00 AM
5:35:00 AM
6:30:00 AM
7:25:00 AM
8:20:00 AM
9:15:00 AM
Time (hrs)
LA10
LAeq
LA90
LAFmax
Potentially rain affected data
(removed from analysis)

12.1. Typical Background Noise Level Analysis for BS 4142:2014 Assessment

MP1 - Daytime (0700 hrs – 2300 hrs)

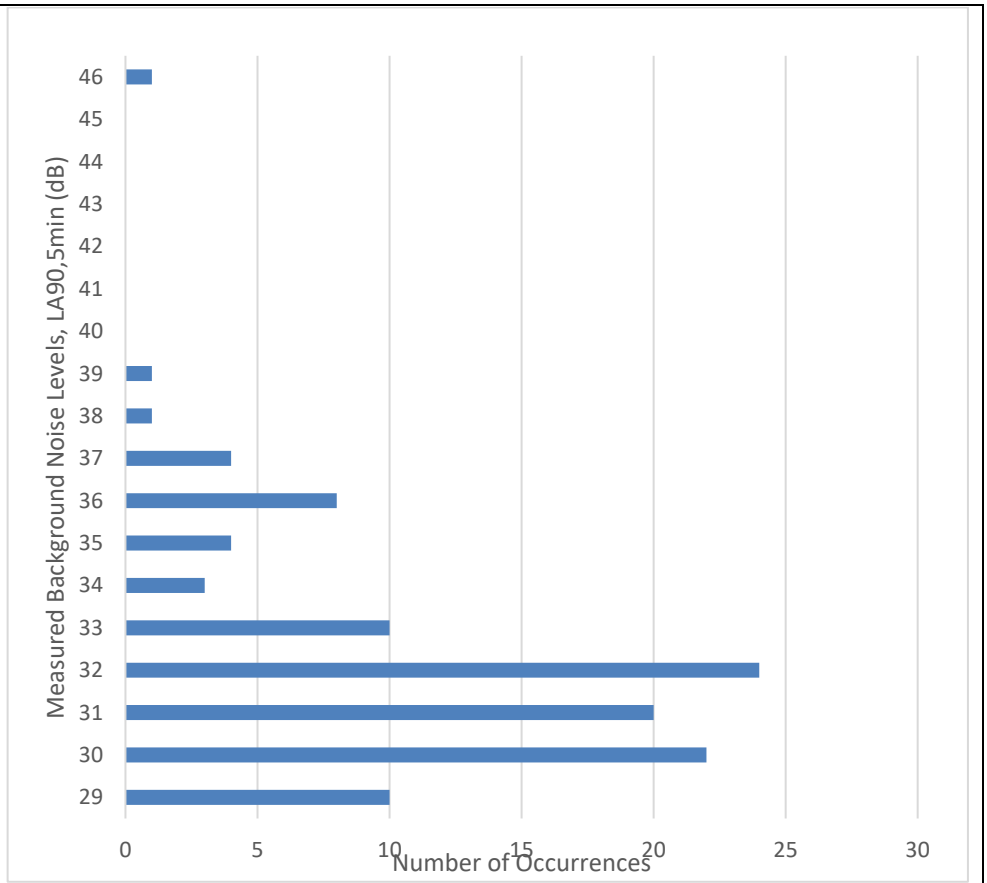
Measured $L_{A90,5min}$ (dB)	Number of Occurrences
30	3
31	5
32	20
33	24
34	20
35	21
36	17
37	**28**
38	44
39	29
40	14
41	9
42	13
43	8
44	12
45	3
46	2
47	3
48	0
49	0
50	0
51	0
52	0
53	1



Note: The row marked in bold is the chosen Typical L_{A90} for the BS 4142 plant noise assessment.

Night-time (2300 hrs – 0700 hrs)

Measured $L_{A90,5min}$ (dB)	Number of Occurrences
29	10
30	**22**
31	20
32	24
33	10
34	3
35	4
36	8
37	4
38	1
39	1
40	0
41	0
42	0
43	0
44	0
45	0
46	1



Note: The row marked in bold is the chosen Typical L_{A90} for the BS 4142 plant noise assessment.

13. Appendix 5: Detailed Plant Noise Levels and Tonality Assessment

Unit	Operational Mode	Type of Data	Noise Levels (dB) in Octave Bands (Hz)								dB(A)
			63	125	250	500	1000	2000	4000	8000	
Mitsubishi PURY 500 Condenser	Normal Operation	SPL@1m	77	68	66	61	56	54	51	44	64
	Low Noise Mode	SPL@1m	68	60	57	48	46	43	40	34	53
Mitsubishi PURY 450 Condenser	Normal Operation	SPL@1m	74	64	67	65	60	55	50	46	66
	Low Noise Mode	SPL@1m	65	57	52	50	48	44	40	44	53
Mitsubishi PURY 400 Condenser	Normal Operation	SPL@1m	74	64	66	64	59	55	49	45	65
	Low Noise Mode	SPL@1m	64	57	51	48	47	43	38	44	52
Toshiba MMY-MUP1001 Condenser	Heating and Cooling	SWL	-	-	-	-	-	-	-	-	77
Extract Fans	Highest Operational Level	SPL @ 1m	-	-	-	-	-	-	-	-	74

Spectral data for the Toshiba Condenser and the Extract Fans have not been provided.

In order to assess tonality, the plant noise levels should be assessed using the 'Objective Method' detailed in BS4142:2014. The 'Objective Method' states: "*for a discrete tone to be identified as present, the time-averaged sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by:*

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

The 'Objective Method' for assessing tonality, as set out in BS 4142:2014, strictly requires one-third octave band to assess. An analysis of the octave band data however does not suggest that any tones are likely to be present. The low frequency bias of the data however suggests the potential for an audible "hum". The same will be assumed of the Toshiba Condenser and the Extract Fans, with no tone but an audible "hum".