



Plant Noise Assessment



Twyford
United
Reformed
Church,
Church Street,
Twyford RG10
9DR

August 2025

Ref: 23-11241
Rev B

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	5
2. INTRODUCTION	6
3. PLANNING CONDITIONS AND GUIDANCE DOCUMENTS.....	7
4. BASELINE NOISE LEVELS	9
5. PLANT NOISE LEVELS.....	11
6. PLANT NOISE ASSESSMENT	13
7. CONCLUSION	15
8. APPENDIX 1: GLOSSARY OF ACOUSTIC TERMINOLOGY	16
9. APPENDIX 2: PROFESSIONAL STATEMENT	17
10. APPENDIX 3: LIST OF EQUIPMENT	17
11. APPENDIX 4: DETAILED NOISE MEASUREMENT RESULTS	18

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1. Executive Summary

A plant noise assessment has been carried out for the proposed installation at **Twyford United Reformed Church, Church Street, Twyford RG10 9DR**.

The proposals are for the installation of 2 No. Air Source Heat Pumps to provide heating in the Church and associated hall. The plant would be used on an as-required basis, potentially from 0600 hrs until the evening period.

The proposed plant will be located on the ground floor level on the west facade of the church building, housed within an acoustic chamber.

The proposed plant will be located on the ground floor level on the west façade of the church building. The nearest noise-sensitive receptors are 6 Church Street and 1-7 St. Church Court, located at approximately 12m from the proposed plant.

The results of the assessment have identified that the plant, as proposed, would have the potential to cause a low impact at the nearest noise-sensitive receptor during the most sensitive hours of operation.

This would achieve the requirements of Planning Condition 4.

2. Introduction

This report has been prepared to assess the impact of plant noise from **Twyford United Reformed Church, Church Street, Twyford RG10 9DR** due to the proposed plant installation.

The proposals are for the installation of 2No. Air Source Heat Pumps to provide heating in the Church and associated hall. The plant would be used on an as required basis, potentially from 0600 hrs until the evening period.

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 proposed plant will be located on the ground floor level on the west façade of the church building. The nearest noise-sensitive receptors are 6 Church Street and 1-7 St. Church Court, located at approximately 12m from the proposed plant. The location of the proposed plant and nearest noise-sensitive receptors is provided in **Figure 2.1**.



Figure 2.1: Plant and Receptor Locations

3. Planning Conditions and Guidance Documents

3.1. Planning Conditions

The scheme was granted planning permission by Wokingham Borough Council on 13th June 2023 (application ref: 230072) and the following relevant planning conditions were set:

"2. Approved details - This permission is in respect of the submitted application plans and drawings numbered 00001, 00002 and 00003 received by the local planning authority on 26 April 2023. The development shall be carried out in accordance with the approved details unless other minor variations are agreed in writing after the date of this permission and before implementation with the Local Planning Authority.

Reason: For the avoidance of doubt and to ensure that the development is carried out in accordance with the application form and associated details hereby approved.

3. A noise impact assessment is to be carried out by an appropriately qualified consultant/engineer; this should be submitted to the local authority for approval prior to installation. This report can inform the design to achieve best practice and will need to address noise impact in line with World Health Organisation Guidelines for Community Noise.

The report should identify the noise sensitive receptors potentially affected. The character of the site and the nearby roads etc, and the impact on the amenity of nearby noise sensitive receptors during all the operational phases of the air source heat pumps day/night.

This report is to identify a clear scheme of recommended works such as acoustic barriers or screens, anti-vibration mounts or such other steps as may be necessary to minimize the effects of noise in line with condition 2.

Reason: To ensure that no nuisance or disturbance is caused to the occupiers of properties.

4. All plant, machinery and equipment installed or operated in connection with the carrying out of this permission shall be so enclosed and/or attenuated that noise therefrom does not exceed at any time a level of 5dB[A] below the existing background noise level when measured at a point one metre external to the nearest residential or noise sensitive property.

Any recommended noise mitigation measures should be retained and maintained thereafter.

Reason: To ensure that no nuisance or disturbance is caused to the occupiers of properties."

Whilst the planning conditions are not prescriptive in terms of methodology, it is normal good acoustic practice to assess plant noise in accordance with British Standard 4142:2014, a summary of which is set out below.

3.2. 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.’*

4. Baseline Noise Levels

In order to determine the baseline noise levels in the vicinity of the proposed plant, measurements have been carried out in order to characterise the existing noise climate during the most sensitive times of operation over a 48-hour period. The noise climate at the site was dominated by road traffic noise from Church Street.

The noise measurements utilised a Rion NL-52 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 1300 hrs on Saturday 22nd July 2023 and 1400 hrs on Monday 24th July 2023.

During the noise measurement survey the temperature was up to 22°C during the daytime, dropping to a low of 14°C overnight. There was a moderate (3-4 m/s) south-westerly wind throughout most of the survey, which reduced to low (approximately 1 m/s) south-westerly wind on Monday 24th July 2023. Cloud cover was noted to 100% during set up and 80% at collection. Some rain showers were noted during the survey period, however the weather was dry and suitable for measurements during the main periods of interest (early mornings). A close analysis of the noise measurement data does not suggest that the noise level measurements were significantly affected by raised noise levels from rain or wet roads, especially during the main periods of interest (early mornings).

Noise measurements were carried out at Measurement Position 1 (MP1) in a free-field location at a height of 1.2m above the existing flat roof (approximately 4.2m height total) on the west of the church building. The position was chosen as representative in terms of background noise levels of the nearest noise sensitive receptors at 12m distance.

The noise monitoring position is shown in **Figure 4.1**.



Figure 4.1: Noise Monitoring Location

Table 4.1 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)	53	40
	Night-time (2300-0700)	44	23
	Early Morning (0600-0900)	49	34

Table 4.1: 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 measured $L_{A90,5min}$ during the assessment time period (a detailed assessment is provided in Appendix 4).

5. Plant Noise Levels

5.1. Plant Noise Levels – Manufacturers' Data

The plant noise levels have been obtained from the manufacturer's data. A summary of the manufacturers' noise levels are presented in **Table 5.1**.

Plant Reference	Mode	Quoted Sound Pressure Level L_{Aeq} (dB) @ 1m
Fujitsu AOYG24KMTA	Maximum Fan Speed	65
	Low Noise Mode	54

Table 5.1: Unmitigated Plant Noise Levels

The plant in **Table 5.1** is to be housed in an acoustic enclosure.

The details of the enclosure have been presented in the data sheet provided by the client for Environ F8-T4-1200.

The reduction from the enclosure has been calculated on the data sheet and is presented in **Table 5.2**.

Plant Reference	Quoted Sound Pressure Level L_{Aeq} (dB) @ 1m
Fujitsu AOYG24KMTA housed in Environ F8-T4-1200	35

Table 5.2: Mitigated Plant Noise Levels

5.1.1. 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
- Impulsivity: 0 dB
- Noticeable feature (e.g. hum, whine, hiss): +3 dB for a potentially audible hum will be added as these units typically have a low frequency bias.

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

5.2. 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 5.3**. The units have been selected to run in low noise mode all the time.

	Receptor	
	1-7 Church Court	6 Church Street
Sound Pressure Level from Source (L_{Aeq} dB) @ 1m	35	35
Correction for additional unit (dB)	+3	+3
Distance to Nearest Habitable Room Window (approx.)	12m	12m
Distance Correction (dB)	-22	-22
Angle of View Correction (dB)	0	0
Predicted Noise Level at Receptor (L_{Aeq} dB)	16	16

Table 5.3: Predicted Plant Noise Levels

6. Plant Noise Assessment

The background noise level and plant noise data presented in **Sections 4** and **5** have 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 Planning Condition 4 which is to be 5 dB below the background noise level.

Table 6.1 below summarises the BS 4142 assessment procedure carried out for the most sensitive hours of proposed operation (0600 hrs – 0900 hrs).

Results	1-7 Church Court	6 Church Street	Relevant Clauses of BS 4142:2014	Commentary
Measured Ambient Sound Level	49	49	7.3.2	Refer to Table 4.1
Residual Sound Level	49	49	7.3.3	<i>The ambient noise level without the plant operating.</i> Refer to Table 4.1
Typical Background Sound Level L_{A90} (dB)	34	34	8.1, 8.2	Refer to Table 4.1
Specific Sound Level	16	16	9.1, 9.2	Refer to Table 5.2
Acoustic Feature Correction	+3	+3	9.2	Refer to Section 5.1.1
Rating Level L_{Ar} (dB)	19	19	9.1	Specific Sound Level + Acoustic Feature Correction
Excess of Rating over Background Sound Level	-15	-15	11	
	Assessment indicates a <i>low impact</i> depending on context	Assessment indicates a <i>low impact</i> depending on context	11	
Achievement of Identified Criteria	Yes	Yes	n/a	5 dB below L_{A90}

Table 6.1: BS 4142 Assessment – 0600 hrs – 0900 hrs

Table 6.1 identifies that an assessment in line with BS 4142 indicates that the plant noise is at a level where there is the potential for a low impact upon the residents at the nearest noise-sensitive receptor during the most sensitive hours of operation.

This would achieve the requirements of the Local Authority.

6.1. 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 has the potential to operate from approximately 0600 hrs which is considered a sensitive time for sleeping, particularly on a Sunday and there is a good chance the plant will operate on a Sunday.

The noise levels, however, are not excessively loud and are significantly below the existing ambient noise level.

In consideration of the context of the noise source, there is potential for minor adverse impacts on the health or quality of life of the nearest noise-sensitive receptors during the most sensitive of the proposed operational hours.

6.2. 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.

7. Conclusion

A plant noise assessment has been carried out for the proposed installation at **Twyford United Reformed Church, Church Street, Twyford RG10 9DR.**

The proposals are for the installation of 2No. Air Source Heat Pumps to provide heating in the Church and associated hall. The plant would be used on an as-required basis, potentially from 0600 hrs until the evening period.

The proposed plant will be located on the ground floor level on the west facade of the church building, housed within an acoustic chamber.

The results of the assessment have identified that the plant as proposed would have the potential to cause a low impact at the nearest noise sensitive receptor during the most sensitive hours of operation.

This would achieve the requirements of Planning Condition 4.

8. Appendix 1: Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	<i>This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.</i>
Decibel (dB)	<i>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.</i>
$L_{Aeq,T}$	<i>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.</i>
L_{A10}	<i>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.</i>
L_{A50}	<i>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}.</i>
L_{A90}	<i>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.</i>
L_{Amax}	<i>The 'A'-weighted maximum sound pressure level measured over a measurement period.</i>

9. Appendix 2: Professional Statement

David Yates

David Yates is a full member of the Institute of Acoustics (MIOA) and has over ten 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 managed the acoustic department and is responsible for maintaining Syntegra's ANC membership.

Stephen Hale BSc (Hons), MIOA

Stephen Hale is a full member of the Institute of Acoustics (MIOA) and holds a Bachelor of Science degree in Sound Engineering with honours, backed by a decade of experience in the field of acoustics.

Specialising in environmental noise measurement, Stephen excels in providing expert acoustic consultancy services for residential and mixed-use planning applications, managing plant noise for large-scale industrial projects, and contributing to the innovative design of music studios.

Additionally, Stephen offers valuable expertise in sound insulation testing and design advisory.

10. 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

11. Appendix 4: Detailed Noise Measurement Results

Measured Noise levels – MP1 – 22.07.2023

Time	L _{Aeq,T} (dB)	L _{AF(max)} (dB)	L _{A10} (dB)	L _{A90} (dB)
1300-1400	54	80	55	53
1400-1500	57	92	54	52
1500-1600	53	70	55	52
1600-1700	53	72	55	52
1700-1800	53	68	53	52
1800-1900	53	74	54	52
1900-2000	52	69	52	51
2000-2100	52	77	54	50
2100-2200	51	73	52	49
2200-2300	50	70	51	49
2300-0000	50	67	52	48
1300-2300	53	74	53	51
2300-0000	50	67	52	48

Measured Noise levels – MP1 – 23.07.2023

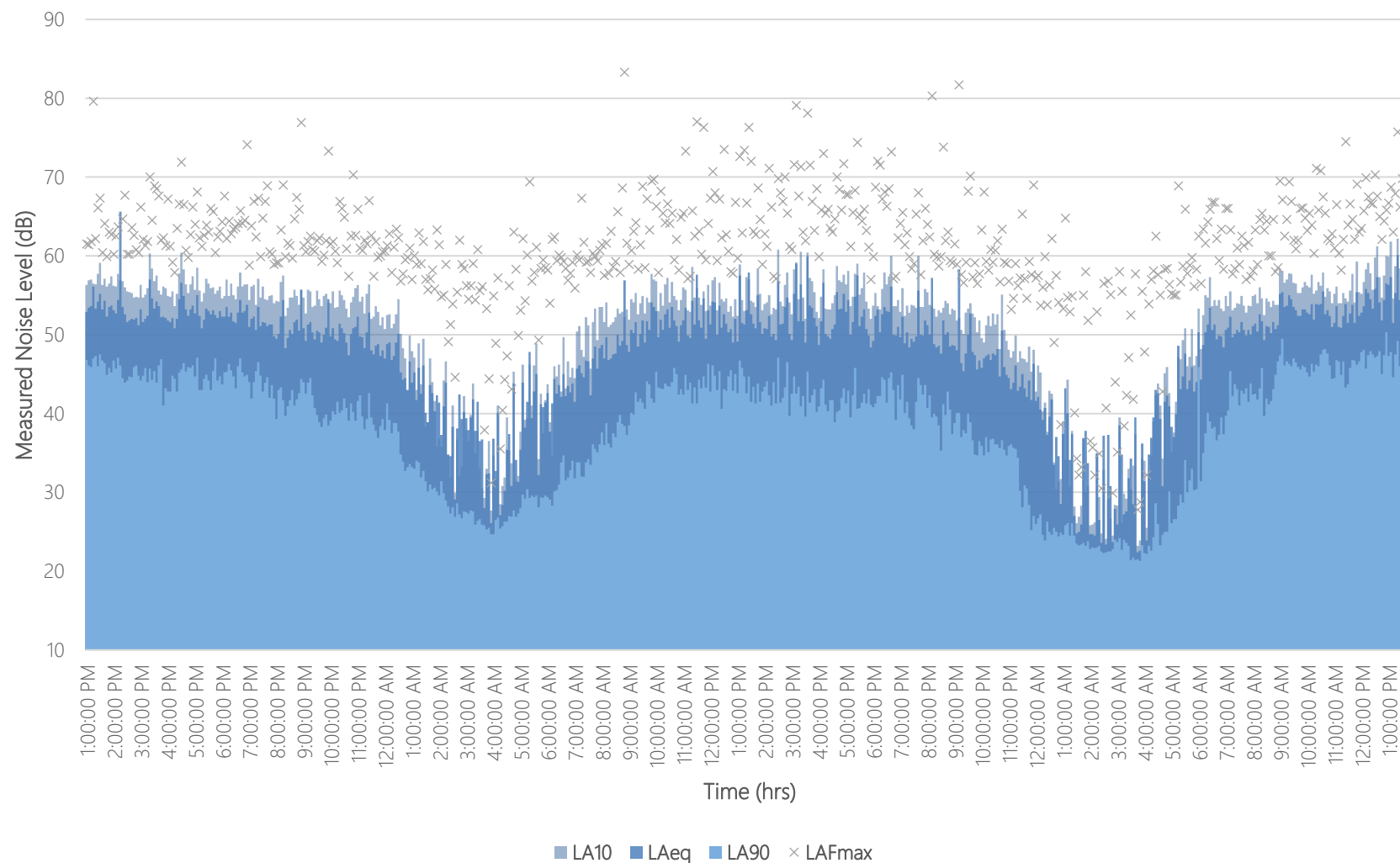
Time	L _{Aeq,T} (dB)	L _{AF(max)} (dB)	L _{A10} (dB)	L _{A90} (dB)
0000-0100	47	63	49	44
0100-0200	43	63	46	40
0200-0300	40	62	42	35
0300-0400	38	61	41	28
0400-0500	37	63	40	29
0500-0600	42	69	45	36
0600-0700	43	62	44	41
0700-0800	46	67	48	43
0800-0900	50	83	50	47
0900-1000	51	70	53	49
1000-1100	52	68	53	50
1100-1200	53	77	55	50
1200-1300	52	74	54	50
1300-1400	54	76	57	50
1400-1500	52	71	55	50
1500-1600	55	79	59	49
1600-1700	53	73	55	50
1700-1800	53	74	55	50
1800-1900	52	73	53	50
1900-2000	51	68	52	49
2000-2100	51	80	52	48

Time	L _{Aeq,T} (dB)	L _{AF(max)} (dB)	L _{A10} (dB)	L _{A90} (dB)
2100-2200	51	82	52	46
2200-2300	47	68	48	45
2300-0000	44	69	46	42
0700-2300	52	74	53	48
2300-0700	43	64	44	37

Measured Noise levels – MP1 – 24.07.2023

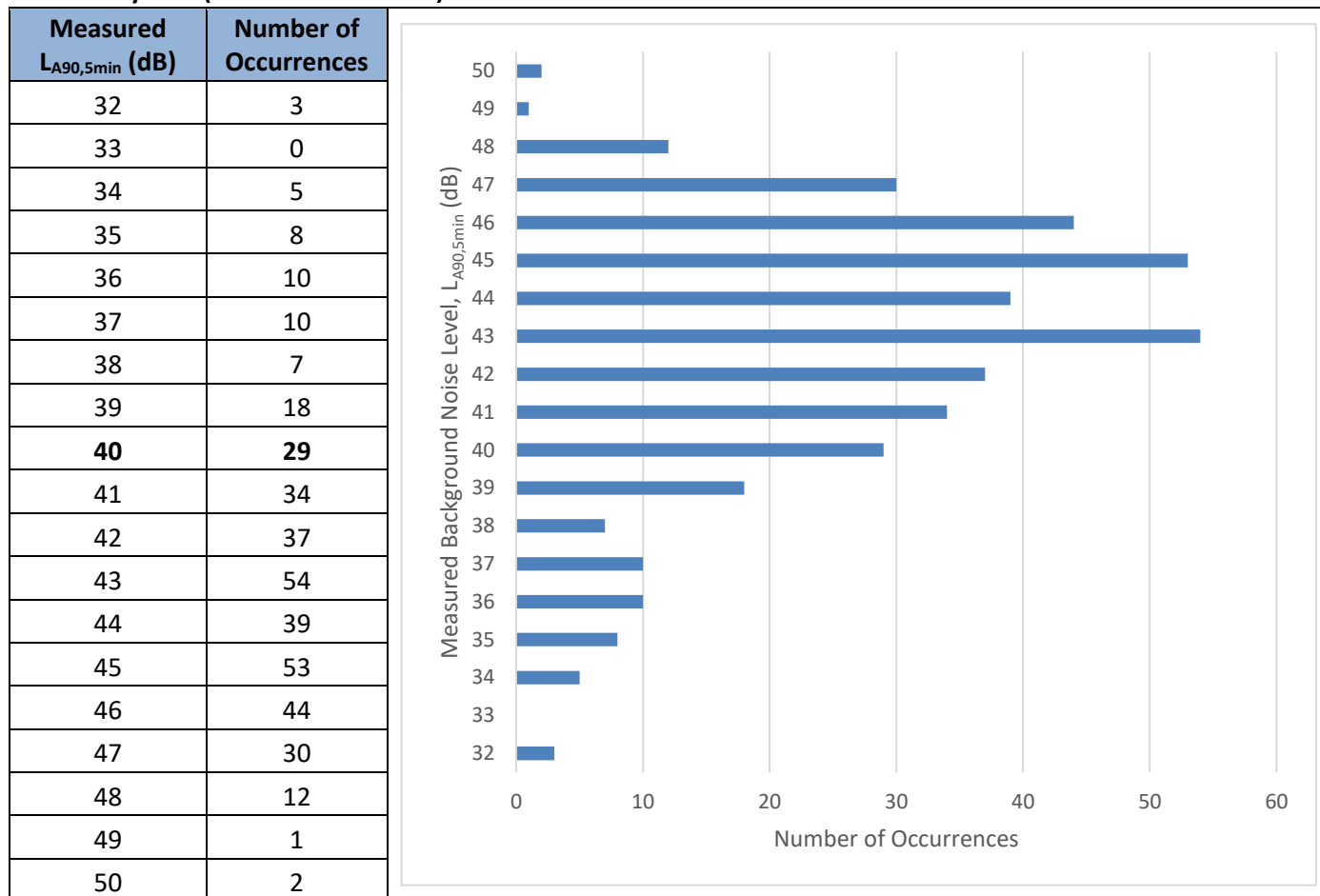
Time	L _{Aeq,T} (dB)	L _{AF(max)} (dB)	L _{A10} (dB)	L _{A90} (dB)
0000-0100	39	62	42	34
0100-0200	37	65	40	25
0200-0300	32	57	37	24
0300-0400	34	58	38	23
0400-0500	40	63	43	31
0500-0600	44	69	47	38
0600-0700	50	67	51	48
0700-0800	51	66	52	50
0800-0900	51	65	52	50
0900-1000	54	70	55	52
1000-1100	53	71	54	52
1100-1200	53	75	54	51
1200-1300	55	70	56	53
1300-1400	56	76	58	52
0700-1400	54	70	54	51
0000-0700	44	63	43	32

MP1 Measured Noise Levels from 1300 hrs on 22/07/2023 to 1355 hrs on 24/07/2023



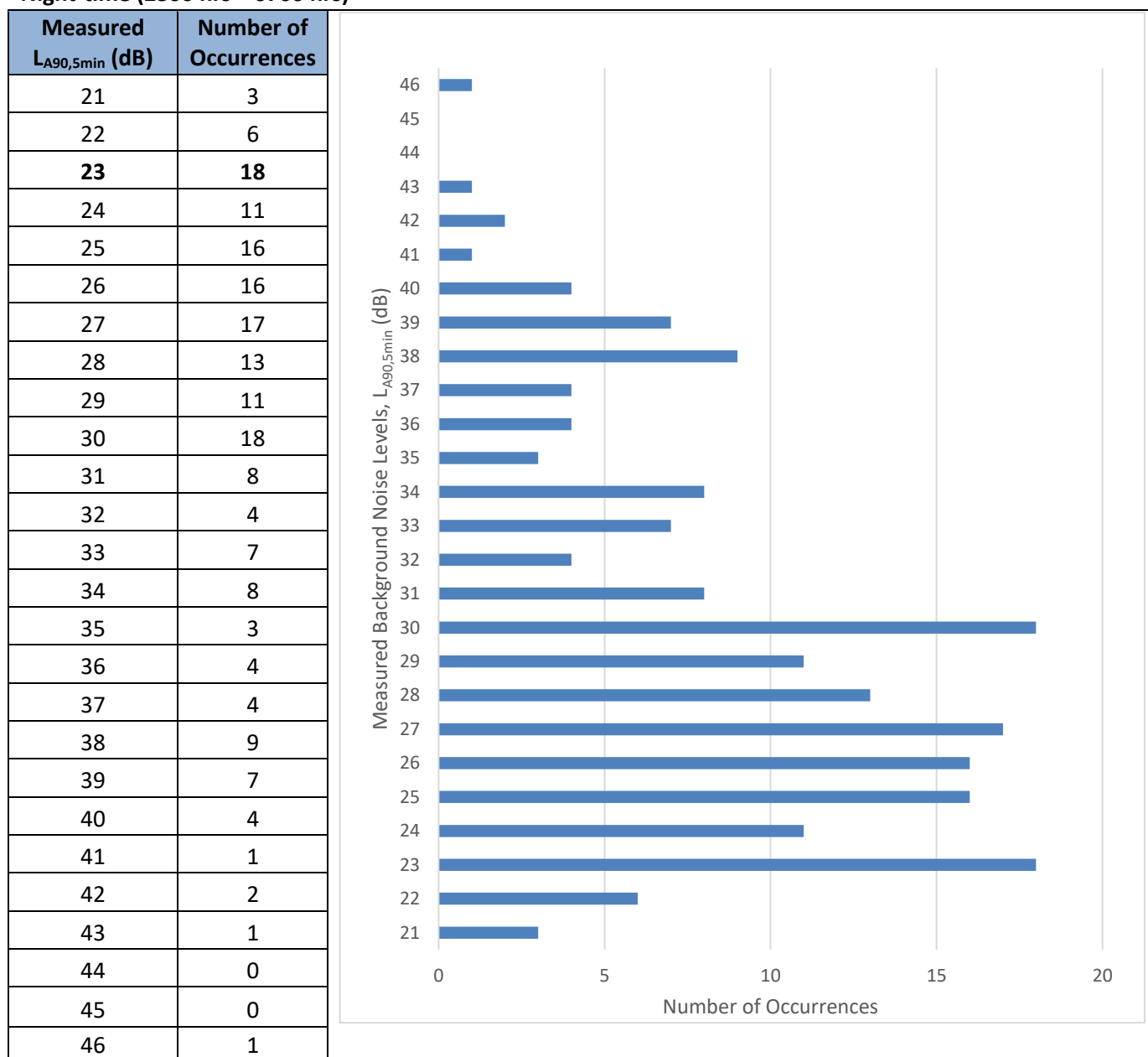
11.1. Typical Background Noise Level Analysis for BS 4142:2014 Assessment

MP1 - Daytime (0700 hrs – 2300 hrs)



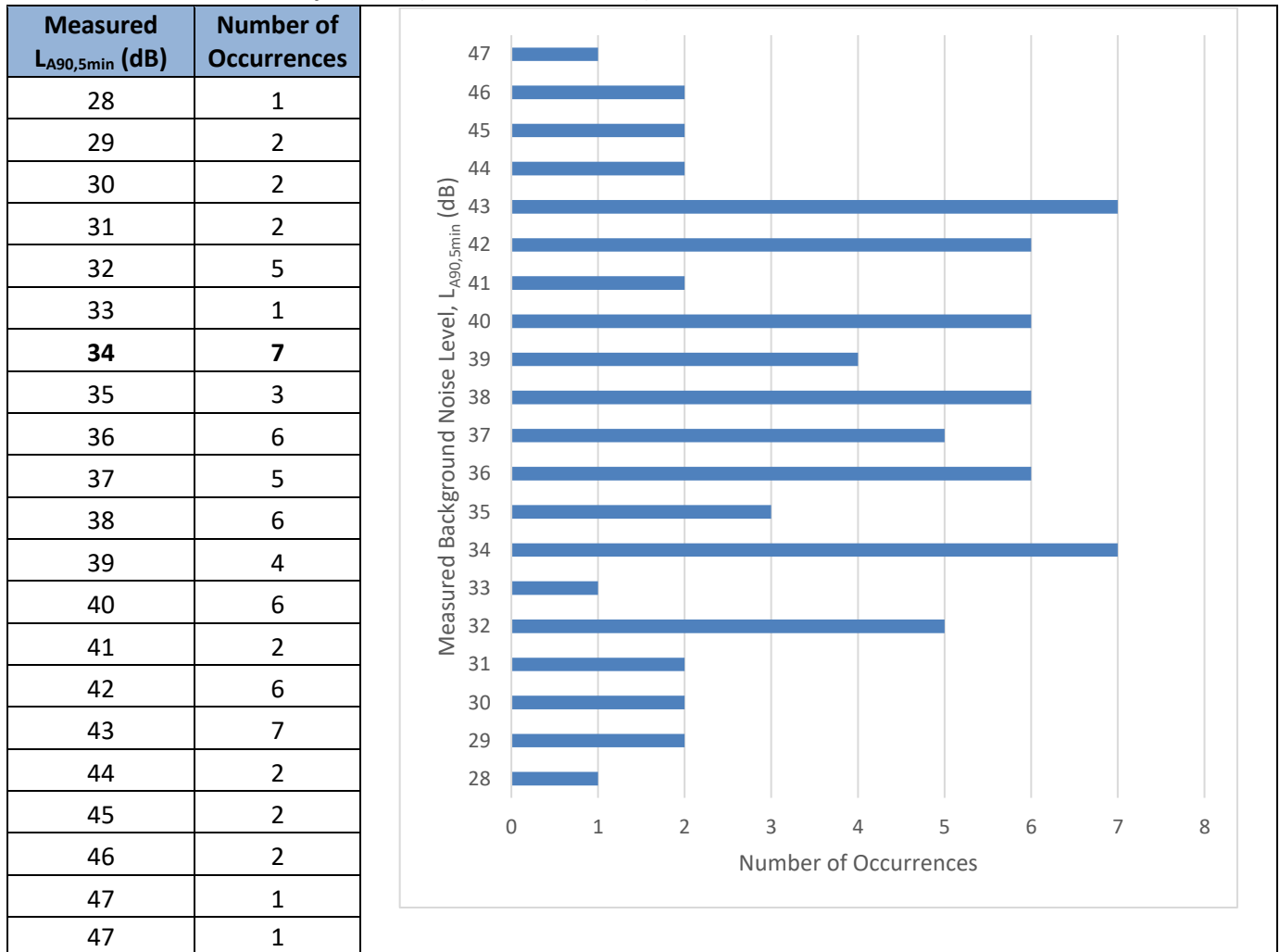
Note: The row marked in bold is the chosen Typical L_{A90} for the BS 4142 plant noise assessment.

Night-time (2300 hrs – 0700 hrs)



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

Most Sensitive Hours of Operation (0600 hrs – 0900 hrs)



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