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Report E21139/PCA/R1-
Issue Date 20 October 2021

Project **Plot 4A Dunsbury Park**
Fitzwygram Way, Havant, PO9 4EE

Title **Planning Compliance Assessment**
Sub Title **Mechanical Plant Equipment**

Client Area Europe Ltd
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Case No APP/20/00508

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Revision	Reason	Checked	Signature

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CONTENTS

1.	INTRODUCTION	1
2.	PLANNING CONDITION REQUIREMENTS AND GUIDANCE	2
3.	SITE DESCRIPTION	4
4.	ASSESSMENT METHODOLOGY	5
5.	NOISE IMPACT ASSESSMENT AND DISCUSSION	7
6.	CONCLUSION	10

List of Tables

Table E21139/T1 - Sound Power Levels (Chiller and Dry Coolers)	7
Table E21139/T2 - Sound Pressure Levels (Pump Motors)	7
Table E21139/T3- BS 4142:2014 Assessment (Night time)	8
Table E21139/T4 - Assessment Summary	8

List of Attachments

Appendix A: GLOSSARY OF ACOUSTIC TERMS
Appendix B: STANTEC NOISE IMPACT ASSESSMENT REPORT
Appendix C: PROPOSED PLANT NOISE DATA
Appendix D: PROPOSED PLANT LOCATIONS

Figure E21139/ NM 1 : Noise Contour Map at 4m height

Figure E21139/ SP 1 : Site Plan Showing Plant Locations and Nearest Noise Sensitive Receptors

1. INTRODUCTION

- 1.1 Adnitt Acoustics have been commissioned by Area Europe Ltd to undertake an acoustic assessment in support of the new fixed mechanical at Plot 4A Dunsbury Park, Fitzwygram Way, Havant, PO9 4EE.
- 1.2 An assessment of the impact from the mechanical plant equipment is required as part of the Reserved Matters Application, APP/20/00508, Condition 7.
- 1.3 This assessment is for the fixed mechanical plant equipment only.
- 1.4 This assessment refers to the noise survey results published within the Stantec Noise Impact Assessment Report (ref. 48359/3001 01 Rev. 00, dated July 2020).
- 1.5 Since this is a technical report it will be necessary to make use of some technical terms. To assist the reader, a glossary has been included in Appendix A.

Statement of Qualification

- 1.6 This report has been prepared by Sarah Barnes. Sarah holds an undergraduate degree, in Audio Technology from Buckinghamshire New University.
- 1.7 Sarah is a Technician member of the Institute of Acoustics and joined Adnitt Acoustics in November 2020. Sarah was supervised by Juan L. Rioperez.
- 1.8 The assessment was undertaken by Juan L. Rioperez BEng(Hons) MSc MIOA for and on behalf of Adnitt Acoustic Services Ltd.
- 1.9 Juan holds a Beng(Hons) in Telecommunications Engineering (Sound and Image) from the Technical University of Madrid (UPM) (2014) and an MSc in Environmental and Architectural Acoustics from London South Bank University.
- 1.10 Juan has over six years' post-graduate experience as an Acoustic Consultant having joined Adnitt Acoustics in September 2014 and is a corporate member of the Institute of Acoustics (MIOA).

2. PLANNING CONDITION REQUIREMENTS AND GUIDANCE

- 2.1 The following planning condition was imposed in the Reserved Matters Approval, APP/20/00508.

7 The development shall be carried out in strict accordance with the Plot 4 Noise Assessment
Reason: To safeguard the amenities of nearby residents and having due regard to policies CS16 and DM10 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.

- 2.2 We understand that the 'Plot 4 Noise Assessment' referred to in the condition is the Stantec Noise Impact Assessment Report (ref. 48359/3001 01 Rev. 00, dated July 2020) which is appended for reference in Appendix B, and referred to as the Stantec Report.

- 2.3 We have been commissioned by Area to undertake an assessment of the proposed fixed mechanical plant equipment only. The relevant criteria from the Stantec Report are as follows:

- 2.3.1 The mechanical plant noise limit at 1m from the nearest noise sensitive premises provided in the Stantec Noise Impact Assessment Report:

2.3 Proposed Assessment Criteria

- 2.3.1 Based on guidance provided within BS 4142:2014+A1 2019, the assessment criteria for industrial noise are proposed below.

Table 2.1: Proposed Criteria - Industrial Noise

Location	Period	Difference between the Rating Level ($L_{A,T}$) and the Background Sound Level ($L_{A90,15mins}$)
1 m from nearest noise sensitive premises	24 Hours	+5 dB

- 2.3.2 The specific noise level for the fixed mechanical plant in the Stantec Report is highlighted in red.

- 5.8.1 **Table 5.6** details the results of the BS4142:2014 assessment of the proposed development.

Table 5.6: BS4142:2014 Assessment Results

Description	Operational Periods		
	Daytime (07:00 – 23:00 hours) T = 1 hour	Night-Time (23:00 – 07:00 hours) T = 15mins	Night-Time (06:30 – 07:00 hours) T = 15mins
Calculated Specific Sound Level from Delivery Yard	23	-	28
Calculated Specific Sound Level from Atmospheric Building Services	34	34	34
Calculated Specific Sound Level from Internal Operations	25	25	25
Calculated Rating Sound Level at Receptor A (dB $L_{A,T}$)	35	35	35
Background Sound Level (dB $L_{A90,T}$)	48	31	45
Excess of Rating over Background Sound Level (dB)	-13	+4	-10
Assessment of Impact	Indication of a low impact, depending on the context	Indication of a less than adverse impact, depending on the context	Indication of a low impact, depending on the context

2.4 To comply with the requirements of Condition 7 the following noise limits will be used in the assessment:

- The difference between the Rating Level ($L_{A,r,Tr}$) and the Background Sound Levels ($L_{A90,15mins}$) is below the Stantec assessment criteria of +5dB; and
- The specific sound levels from atmospheric building services (fixed mechanical plant equipment) are equal to or below the levels defined in Table 5.6 of the Stantec Report (i.e. 34dB $L_{Aeq,1hour}$ during the daytime and 34dB $L_{Aeq,15min}$ during the night-time period).

3. SITE DESCRIPTION

- 3.1 The site is located at Plot 4A Dunsbury Park, Fitzwygram Way, Havant, PO9 4EE.
- 3.2 The local area is mainly industrial and commercial units to the west of Plot 4a and mainly residential dwellings to the east.
- 3.3 The nearest noise sensitive receptors have been identified to be the residential properties on Calshot Road to the east of the site.
- 3.4 Based on the Planning Noise Assessment undertaken by Stantec (report ref. 48359/3001 01 Rev. 00 dated July 2020), the existing noise environment has been found to be dominated mainly by 'vehicular movements on the surrounding road network, specifically the A3(M) to the west of the site'.
- 3.5 There are two main mechanical plant areas to the rear of the building; 3x chillers, 2x dry coolers and 2x motor pumps.
- 3.6 The mechanical plant locations are detailed in Section 5 and on the appended site plan E21139/SP 1 and proposed drawings provided by the client included Appendix D.

4. ASSESSMENT METHODOLOGY

Stantec Noise Survey

- 4.1 A planning noise survey and impact assessment were undertaken by Stantec in July 2020 (report ref. 48359/3001 01 Rev. 00 dated July 2020).
- 4.2 Unattended noise measurements were undertaken by Stantec between approximately 08:00 hours on Wednesday 04 March 2020 and approximately 12:00 on Thursday 05 March 2020 at a location considered representative of the nearest noise sensitive receptors located to the east of the site.
- 4.3 The acoustic parameters L_{Aeq} , L_{A90} and L_{Amax} were measured over 15-minute periods during the noise survey.
- 4.4 The noise survey results reported by Stantec have been used for this assessment and have been reproduced below:

4 Environmental Sound Survey Results

4.1.1 The results of the survey are presented in the time history graph in **Appendix C**.

4.1.2 A summary of the survey results is detailed in **Tables 4.1**.

Table 4.1: Summary of Measured Environmental Sound Survey Results – LT1

Date	Period, T	Measured Sound Level (dB)		
		$L_{Aeq,T}$	Typical* L_{A90max}	Typical** $L_{A90,T}$
04/03/2020 – 05/03/2020	Daytime (07:00 – 23:00 hours)	54	-	48
	Night-time (23:00 – 07:00 hours)	48	66	31

* Based on the 10th highest measured L_{Amax} level.

** Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with guidance in BS4142:2014.

- 4.5 The noise measurements are understood to be undertaken under free field conditions and the above noise levels are therefore free field values.
- 4.6 Refer to the attached Stantec Report for further details on measurement equipment, methodology, meteorological conditions, etc.
- 4.7 The nearest noise sensitive receptors have been identified to be the residential properties on Calshot Road to the east of the site.

Noise Model

- 4.8 A 3D noise model has been produced using proprietary software Cadna(A) v.2021 to calculate the specific sound levels at Calshot Road.
- 4.9 The model was created using the drawings and mechanical plant locations provided by the client.
- 4.10 The following parameters were used in setting up the Cadna(A) 2021 model:
- Industry: ISO 9613 (for sound propagation and barrier calculations)
 - Ground absorption set to 0.5;

- All buildings except for the proposed building set to 'Structured façade';
- Proposed building set to fully reflect
- Order of reflections set to 2;
- Noise sources defined based on manufacturer's noise data;
- Open Street Map data has been used for the buildings.

5. NOISE IMPACT ASSESSMENT AND DISCUSSION

5.1 The nearest noise sensitive receptor has been identified to be the adjacent residential dwellings at Calshot Road located approximately 250m away from the proposed plant.

5.2 Details of the plant noise manufacturer's data and the proposed plant locations provided by the client are included in Appendix C and Appendix D as follows:

- Plant Area 1
 - 3x Ciat Aquaciat -LD1800R Ultra low noise chillers
- Plant Area 2
 - 2x Piovan - AFCV290 dry cooler units
 - 2x Piovan - Pump Motors

5.3 The following table summarises the noise levels for the proposed mechanical plant items that were provided by the client. The proposed locations are shown on the attached site plan, E21139/SP1.

Manufacturer and Model	A-Weighted Global Sound Power (dB(A))	Sound Power Levels (dB re 10 ⁻¹² W)							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Ciat LD1800R	87	86	83	84	86	82	80	72	68
Piovan - AFCV290	86	65	64	74	80	80	80	78	69

Table E21139/T1 - Sound Power Levels (Chiller and Dry Coolers)

All values are partial free-field

*Overall Levels Supplied

Manufacturer and Model	Distance	Sound Pressure Level dB(A)
Piovan - Pump Motor	1m	75*

Table E21139/T2 - Sound Pressure Levels (Pump Motors)

All values are partial free-field

*Sound Pressure Level measured at 1 meter distance in free field according to manufacturer's data. 5.5 kW has been assumed for each pump motor.

Assessment

5.4 The noise impact from the proposed plant have been assessed at 1m from the façade of the nearest noise sensitive receptors.

5.5 As the mechanical plant equipment has the potential to be running for 24hrs a day the worst-case assessment during the night time has been undertaken.

5.6 The following table summarises the night time BS 4142:2014 assessment:

Results		Relevant BS4142:2014 Section	Comments
Mechanical plant sound level	Various - as measured on site.	7.1 7.3.1	Taken from the data provided by the client.
Typical background sound level at nearest noise sensitive receiver	$L_{A90(15\text{ min})}$ 31dB	8.1.3 8.3	Taken from the Santec report (this is a minimum background sound level at night time)
Specific sound level at 1m from the window nearest noise sensitive property on residential properties.	$L_{Aeq(15\text{ min})}$ 33dB	7.3.4 7.3.5	Taken from the Cadna model
Acoustic feature correction	0dB	9.2	The condenser units operate continuously and are not tonal or impulsive, so no feature correction is applied. In any case the units are inaudible at the nearest residential receptors.
Rating level: Nearest noise sensitive property on the nearest residential properties.	33dB	9.2	
Excess of rating level over background sound level	+2dB	11	
Uncertainty of the assessment	± 3 dB	10	This is the uncertainty estimated in ISO 9613-2:1996 for source of receiver heights of less than 5m and receivers that are less than 100m away from the source. Refer to the end of section 5 for a more detailed discussion regarding uncertainty.
Table E21139/T3- BS 4142:2014 Assessment (Night time)			

5.7 The overall summary of the assessment is as follows:

Time Period	Background Sound Level LA90(15 min)	Predicted Specific Sound Level at Nearest Noise Sensitive Receptor LAeq,T	Predicted Rating Level at Nearest Noise Sensitive Receptor LAr,Tr	Excess of Rating Level over Background Sound Level	Stantec Criteria - Specific Level (Atmospheric Building Services Only) LAeq,T	Stantec Criteria - Excess of Rating Level over Background Sound Level	Stantec Criteria for Condition 7 Achieved?
Daytime	48dB	33dB	33dB	-15dB	34dB	+5dB	Yes
Night-time	31dB			+2dB	34dB	+5dB	Yes
Table E21139/T4 - Assessment Summary							

5.8 The difference between the cumulative rating level ($L_{Ar,Tr}$) and the Background Sound Levels ($L_{A90,15\text{mins}}$) at the nearest noise sensitive receptor is predicted to be below the assessment criteria of +5dB as defined in the Stantec report.

5.9 The specific sound levels from atmospheric building services at the nearest noise sensitive receptor are predicted to be below the levels defined in Table 5.6 of the Stantec report.

- 5.10 On this basis, the proposed mechanical plant is considered to comply with Condition 7 with no additional mitigation measures required.

Uncertainty Discussion

- 5.11 As the Cadna model utilises the prediction model from ISO 9613-2:1996, the uncertainty can be estimated using the methodology provided in the ISO standard as follows:

Height, h ^{*1}	Distance, d ^{*1}	
	$0 < d < 100$ m	$100 \text{ m} < d < 1\,000$ m
$0 < h < 5$ m	± 3 dB	± 3 dB
$5 \text{ m} < h < 30$ m	± 1 dB	± 3 dB
^{*1} h is the mean height of the source and receiver. d is the distance between the source and receiver.		
NOTE — These estimates have been made from situations where there are no effects due to reflection or attenuation due to screening.		

- 5.12 It can be seen that, the uncertainty estimated in ISO 9613-2:1996 for source of receiver heights of less than 5m and receivers that are less than 100m away from the source is ± 3 dB.

6. CONCLUSION

- 6.1 Adnitt Acoustics have undertaken an acoustic assessment in support of the new fixed mechanical plant equipment at Plot 4A Dunsbury Park, Fitzwygram Way, Havant, PO9 4EE.
- 6.2 An assessment of the impact from the mechanical plant equipment is required as part of the Reserved Matters Application, APP/20/00508, Condition 7.
- 6.3 We have been commissioned by Area to undertake an assessment of the proposed fixed mechanical plant equipment only.
- 6.4 This assessment refers to the noise survey results published within the Stantec Noise Impact Assessment Report (ref. 48359/3001 01 Rev. 00, dated July 2020).
- 6.5 The difference between the cumulative rating level ($L_{A,T,r}$) and the Background Sound Levels ($L_{A90,15mins}$) at the nearest noise sensitive receptor is predicted to be below the assessment criteria of +5dB as defined in the Stantec report.
- 6.6 The specific sound levels from atmospheric building services at the nearest noise sensitive receptor are predicted to be below the levels defined in Table 5.6 of the Stantec report.
- 6.7 On this basis, the proposed mechanical plant is considered to comply with Condition 7 with no additional mitigation measures required.

Sarah Barnes BA TechIOA

Under Supervision of Juan L. Rioperez BEng(Hons) MSc MIOA

for ADNITT ACOUSTICS

APPENDIX A: GLOSSARY OF ACOUSTIC TERMS

Ambient Noise	The noise climate heard over a period of time due to all normal sources, in the absence of extraneous or atypical sounds. Used to describe noise in the absence of the introduced sound, generally.		
Ambient Noise Level	Describes the average noise level of the ambient noise over a stated period of time, e.g. hourly noise		
	Parameter: A-weighted Continuous Equivalent Sound Pressure Level determined over the time period T.	$L_{eq,T}$ or $L_{Aeq,T}$	
	Expressed in decibels / A-weighted decibels		dB(A) or dB
Decibel scale dB	A linear numbering scale used to define a logarithmic amplitude scale, thereby compressing a wide range of amplitude values to a small set of numbers		
dB(A)	An electronic filter in a sound level meter, which approximates under defined conditions the frequency response of the human ear.		
$L_{Aeq,T}$	The equivalent continuous sound level. The steady dB(A) level which would produce the same A-weighted sound energy over a stated period of time as the measured sound pressure level.		
L_{Amax}	The maximum dB(A) level measured during a survey period.		
L_{A10}	The dB(A) level exceeded for 10% of the survey period, often used as a quantifier of traffic noise level.		
L_{A90}	The dB(A) level exceeded for 90% of the survey period. Used in BS 4142:1997/2014 as being representative of the background noise level.		
Acoustic screening	Physical barrier to sound formed by fence, wall, building or other structure, which has the effect of reducing the sound transmitted.		
Individual Event Noise	The noise of a distinctive event with the varying noise climate, usually a transient activity, such as a vehicle pass-by, aircraft flyover or similar, rather than an isolated impulsive noise.		
Individual Event Noise Level	Describes the highest noise level during the event as measured under particular conditions of time-weighting		
	Parameter: A-weighted Maximum Sound Pressure Level with FAST or SLOW time weighting	$L_{Amax,FAST}$ or $L_{Amax,F}$ $L_{Amax,SLOW}$ or $L_{Amax,S}$	
	Expressed in decibels / A-weighted decibels		dB(A) or dB
Sound Reduction Index R_w	Single number rating used to describe the sound insulation of building elements as defined in BS EN ISO 717 1997.		
Weighted element-normalized level difference $D_{n,e,w}$	Single number rating used to describe the sound insulation of building elements as defined in BS EN ISO 717 1997.		

APPENDIX B: STANTEC NOISE IMPACT ASSESSMENT REPORT



Dunsbury Hill Farm – Plot 4a

Noise Impact Assessment

On behalf of **Portsmouth City Council**

Project Ref: 48359/3001 | Rev: 00 | Date: July 2020

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Document Control Sheet

Project Name: Dunsbury Hill Farm – Plot 4a

Project Ref: 48359/3001

Report Title: Noise Impact Assessment

Doc Ref: 01

Date: July 2020

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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved

This report has been prepared by Stantec UK Limited ('Stantec') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which Stantec was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). Stantec accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

Contents

1	Introduction	1
1.1	Background	1
1.2	Objectives	1
1.3	Site Description, Location and Noise Sensitive Receptors	1
2	Planning Policy, Standards and Guidance	3
2.1	Planning Condition B5	3
2.2	Guidance	3
2.3	Proposed Assessment Criteria	4
3	Baseline Environmental Sound Survey	5
3.1	Procedure	5
3.2	Measurement Locations	5
3.3	Meteorological Conditions	6
3.4	Assumptions/Limitations	6
3.5	Environmental Sound Climate	6
4	Environmental Sound Survey Results	7
5	BS 4142:2014 Assessment	8
5.1	Purpose of assessment	8
5.2	Noise Sensitive Receptor	8
5.3	Background Sound Levels	8
5.4	Proposed Site Layout	8
5.5	Calculation Parameters	9
5.6	Calculation Procedure	10
5.7	Acoustic Feature Correction	12
5.8	BS 4142:2014 Assessment	13
5.9	Context and Mitigating Factors	13
5.10	Uncertainty	14
5.11	Assessment Summary	14
6	Conclusion	16

Figures

Figure 1: Site Location Plan	2
Figure 2: Environmental Sound Measurement Location	5

Tables

Table 1.1: Noise Sensitive Receptors	2
Table 2.1: Proposed Criteria - Industrial Noise	4
Table 3.1: Description of Measurement Location	5
Table 3.2: Meteorological Conditions	6
Table 4.1: Summary of Measured Environmental Sound Survey Results – LT1	7
Table 5.1: Typical Background Sound Level	8
Table 5.2: Drawings and Documentations	9
Table 5.3: Noise Levels Associated with Deliveries	10
Table 5.4: Plant Sound Emission Data	11
Table 5.5: Assumed Sound Reduction Performances of Cladding System	12
Table 5.6: BS4142:2014 Assessment Results	13

Appendices

Appendix A	Acoustic Terminology
Appendix B	Instrumentation
Appendix C	Time History Graphs

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1 Introduction

1.1 Background

- 1.1.1 Stantec UK Ltd has been commissioned by Portsmouth City Council to provide a noise impact assessment to support the discharge of Condition B5 associated with the application for Plot 4a of a proposed development at Dunsbury Hill Farm in Havant.
- 1.1.2 The proposed development has been granted outline planning permission by Havant Borough Council, subject to several planning conditions (Ref No. APP/12/00338).
- 1.1.3 This report details the assessment of the existing sound climate at the site and considers mitigation measures relevant to meet the requirements of Planning Condition B5, in relation to protecting the existing residential development from noise associated with industrial sources.
- 1.1.4 An explanation of the acoustic terminology used in this report is included in Appendix A.

1.2 Objectives

- 1.2.1 The objectives of this report are as follows:
 - To establish, by means of a detailed 24-hour daytime and night-time environmental sound survey, the existing environmental sound levels at the closest noise sensitive receptors; and
 - To undertake a noise impact assessment associated with the operation of the proposed development in accordance with BS 4142:2014.

1.3 Site Description, Location and Noise Sensitive Receptors

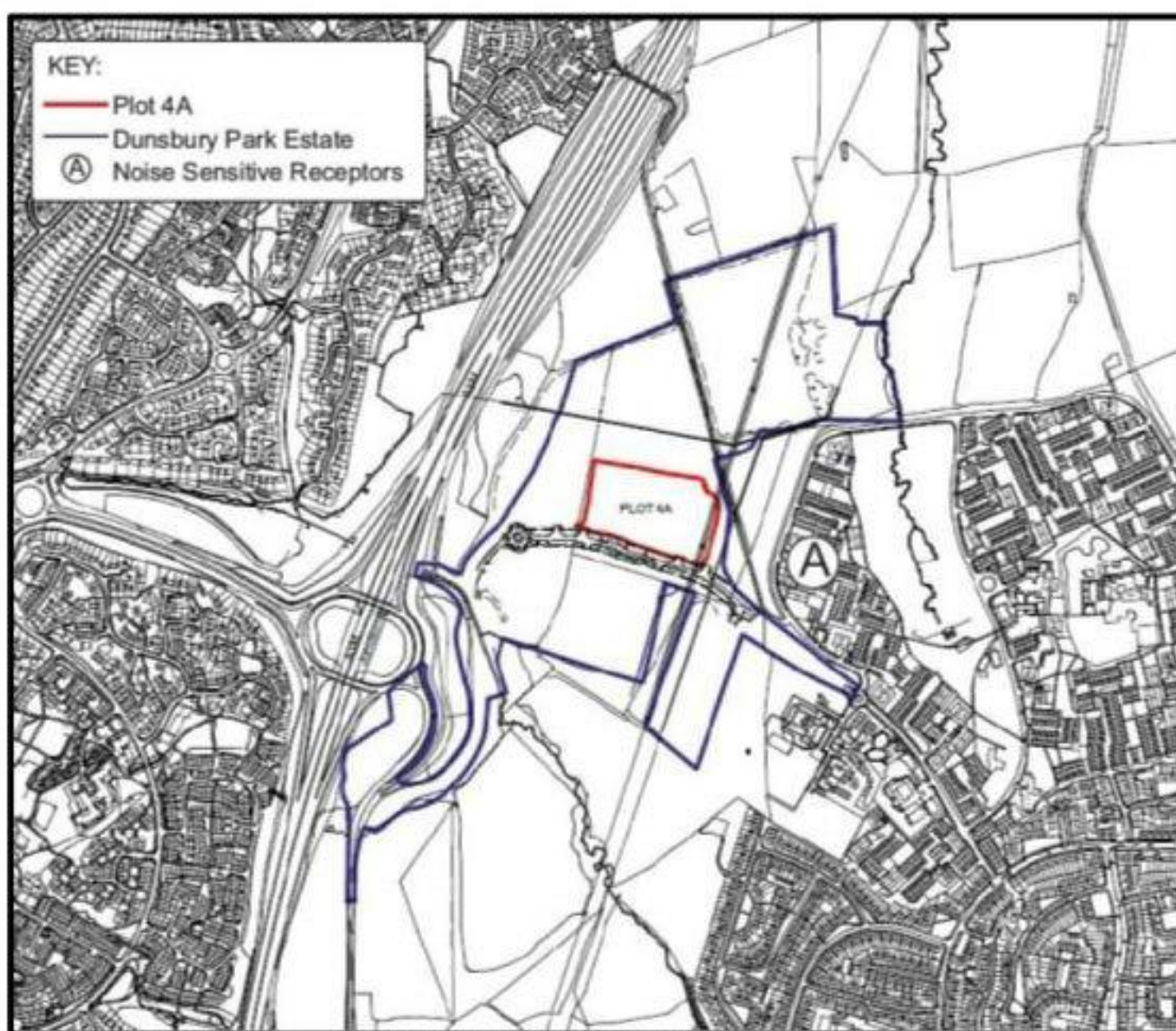
- 1.3.1 The proposed development site is located in the Dunsbury Park Business Site, approximately 3 km to the north west of Havant and falls within the jurisdiction of Havant Borough Council.
- 1.3.2 The site consists of open land. The site is bound by Park Lane and Calshot Road to the east and Fitzwygram Way to the south.
- 1.3.3 The proposal is for approximately 120,000 sq. ft. of B2 manufacturing space (B2 Use Class) on Plot 4a.
- 1.3.4 Receptors are those aspects of the environment sensitive to changes in baseline conditions. The sensitivity of a particular receptor depends upon the extent to which it is susceptible to such changes.
- 1.3.5 Residential receptors (both inside and outside) are considered to have a high sensitivity. Commercial and industrial receptors are considered to have a low sensitivity.
- 1.3.6 **Table 1.1** details the approximate location of the main noise sensitive receptors in proximity to the site. For clarity, individual receptors have been grouped where appropriate however in all cases where there are a number of grouped receptors impacts at the worst-case receptor within the group has been considered.

Table 1.1: Noise Sensitive Receptors

Receptor	Noise Sensitive Receptor	Type of Receptor	Sensitivity of Receptor
A	Properties off Calshot Road to the east of the Site	Residential	High

1.3.7 The location of the site and nearest noise sensitive receptors is detailed in **Figure 1**.

Figure 1: Site Location Plan



Source: Site Location Plan ref DHF-BMD-Z4A-XX-DR-A-10000 rev P01.0 dated 20/02/20 by BAM Design

2 Planning Policy, Standards and Guidance

2.1 Planning Condition B5

- 2.1.1 Condition B5 of the outline planning permission (Ref No. APP/12/00338) states that:

"Application for approval of each reserved matters for new buildings, structures or uses of land pursuant to this permission shall be accompanied by information and plans concerning the following other matters, unless otherwise agreed in writing by Local Planning Authority:

[...]

h. A noise assessment for any development for General Industrial purposes (Class B2) or Storage and Distribution purposes (Class B8)."

2.2 Guidance

British Standard 4142:2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

- 2.2.1 BS 4142:2014 +A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 2.2.2 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.
- 2.2.3 The standard should not be used to assess sound from the passage of vehicles on public roads and railway systems; recreational activities; music and other entertainment; shooting grounds; construction and demolition; domestic animals; people; public address systems for speech and other sources falling within the scopes of other standards or guidance. The standard cannot be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.2.4 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur. It is noted that a BS 4142 assessment is reliant on measuring relevant background sound levels.
- 2.2.5 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:
- 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; and

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.2.6 In order to consider the context, BS 4142 advises that the following factors should be considered:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- 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:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open to provide rapid or purge ventilation; and
 - Acoustic screening.

2.3 Proposed Assessment Criteria

2.3.1 Based on guidance provided within BS 4142:2014+A1 2019, the assessment criteria for industrial noise are proposed below.

Table 2.1: Proposed Criteria - Industrial Noise

Location	Period	Difference between the Rating Level ($L_{A,T,r}$) and the Background Sound Level ($L_{A90,15mins}$)
1 m from nearest noise sensitive premises	24 Hours	+5 dB

3 Baseline Environmental Sound Survey

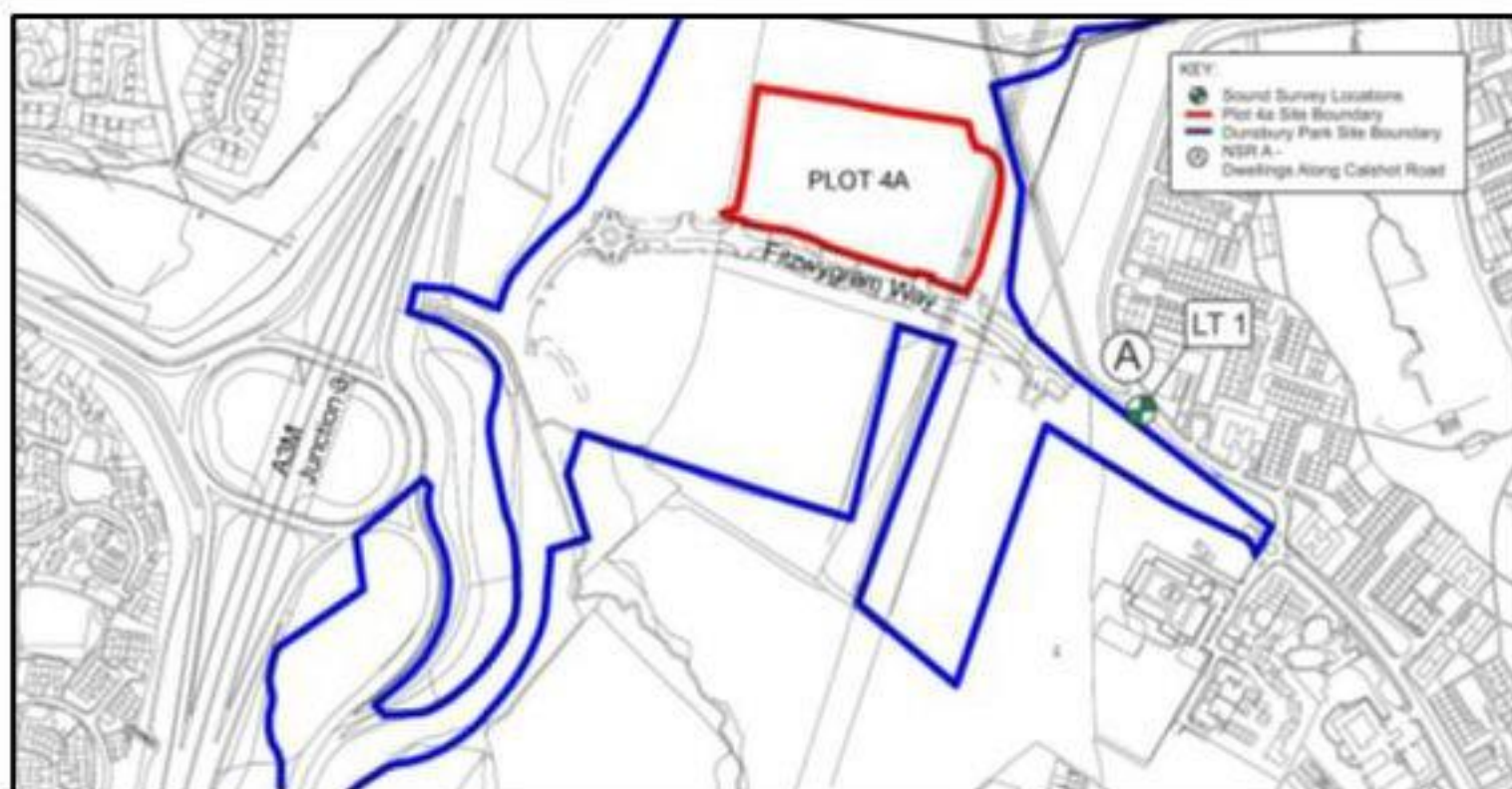
3.1 Procedure

- 3.1.1 An unattended environmental sound survey was undertaken between approximately 08:00 hours on Wednesday 4 March 2020 and approximately 12:00 hours on Thursday 5 March 2020 to determine the existing sound climate at a location considered representative of the nearest noise sensitive receptors located to the east of the site.
- 3.1.2 The survey was undertaken over a typical weekday period. Measurements were made over 15-minute periods of the L_{Aeq} , L_{A90} and L_{AFMax} sound levels.
- 3.1.3 The sound level meter was located in an environmental case. The microphone was connected to the meter via an extension cable and fitted with the manufacturer's windshield.
- 3.1.4 The instrumentation used in the survey (including calibration information) is listed in **Appendix B**.
- 3.1.5 Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.5 dB). Calibration certificates are available upon request.

3.2 Measurement Locations

- 3.2.1 Sound measurements were undertaken at one position at the site. The measurement position is detailed in **Figure 2** and described in **Table 3.1**.

Figure 2: Environmental Sound Measurement Location



Source: Contains Ordnance Survey data © Crown copyright and database right 2020

Table 3.1: Description of Measurement Location

Position	Description
LT1	The microphone was located to the east of the Dunsbury Park Business Park approximately 15 m to the north of Fitzwygram Way and 15 m to the south east of Calshot Road. The microphone was located approximately 45 m to the south of the residential dwellings No. 2-16 Calshot Road. The microphone was at a height of 1.5 m in free field conditions.

3.3 Meteorological Conditions

- 3.3.1 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the meteorological conditions throughout the entire survey period. However, based on a review of publicly available weather forecasts and observations at the beginning and end of the survey period, the weather conditions are detailed in **Table 3.2**.

Table 3.2: Meteorological Conditions

Description	Meteorological Conditions	
	04/03/2020	05/03/2020
Temperature (°C)	6	6
Precipitation (mm)	0	0
Wind Speed (m/s)	< 5	< 5

- 3.3.2 These conditions are considered suitable for obtaining representative sound level measurements.

3.4 Assumptions/Limitations

- 3.4.1 The engineer noticed nothing unusual in terms of the sound climate at the time of the survey. This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary. No warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

3.5 Environmental Sound Climate

- 3.5.1 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the dominant noise sources or specific noise events during the entire survey period. However, at the beginning and end of the survey period, it was noted that on-site sound levels were dominated by vehicular movements on the surrounding road network, specifically the A3(M) to the west of the site.

4 Environmental Sound Survey Results

- 4.1.1 The results of the survey are presented in the time history graph in **Appendix C**.
- 4.1.2 A summary of the survey results is detailed in **Tables 4.1**.

Table 4.1: Summary of Measured Environmental Sound Survey Results – LT1

Date	Period, T	Measured Sound Level (dB)		
		L _{Aeq,T}	Typical* L _{AfMax}	Typical** L _{A90, T}
04/03/2020 – 05/03/2020	Daytime (07:00 – 23:00 hours)	54	-	48
	Night-time (23:00 – 07:00 hours)	48	66	31

* Based on the 10th highest measured L_{Amax} level.

** Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with guidance in BS4142:2014.

5 BS 4142:2014 Assessment

5.1 Purpose of assessment

- 5.1.1 An assessment has been undertaken in general accordance with BS 4142:2014 + A1 2019 to determine the likely noise impact associated with the operations of the proposed development on the nearest existing noise sensitive receptors.

5.2 Noise Sensitive Receptor

- 5.2.1 The nearest noise sensitive receptors, identified as Receptor A in **Figure 1**, are located approximately 180 m to the east of the Site.

5.3 Background Sound Levels

- 5.3.1 For the purpose of this assessment background sound levels during the operational periods are derived from the environmental sound survey location LT 1 which is described in Section 4 of this report.
- 5.3.2 The daytime and night-time background sound levels have been calculated for measurement locations LT1 using the statistical analysis method as detailed in BS 4142. **Table 5.1** presents the typical background sound levels.
- 5.3.3 Deliveries during the night-time will only occur between 06:30 hours and 07:00 hours. Therefore, two assessments have been undertaken during the night-time. The first one with the internal and external fixed plant operating 24/7 and the second with the internal and external plant and delivery noise between 06:30 and 07:00.

Table 5.1: Typical Background Sound Level

Period	Comment	Typical LA90, 15 min (dB)
Daytime (07:00 – 23:00)	External and internal plant and delivery plant noise	48
Night-time (23:00 – 06:30)	External and internal plant noise only	31
Night-time – delivery time (06:30 – 07:00)	External and internal plant and delivery plant noise	45

5.4 Proposed Site Layout

- 5.4.1 Our calculations and recommendations are based on the following drawings provided by BAM Design Ltd.

Table 5.2: Drawings and Documentations

Drawing Number	Title	Revision	Date
DHF-BMD-Z4A-00-DR-A-11000	Ground Floor Plan	P01.4	23/01/20
DHF-BMD-Z4A-01-DR-A-11001	First Floor Plan	P01.4	23/01/20
DHF-BMD-Z4A-02-DR-A-11002	Second Floor Plan	P01.4	23/01/20
DHF-BMD-Z4A-XX-DR-A-10000	Site Location Plan	P01.0	28/02/20
DHF-BMD-Z4A-XX-DR-A-12000	GA Elevations	P01.3	23/02/20
DHF-BMD-Z4A-XX-DR-A-12001	Site Elevation	P01.0	18/07/19
DHF-BMD-Z4A-XX-DR-A-17800	External Envelope Materials	P01.0	11/03/20
-	Chaffinch Equipment Location	-	19/05/20

5.5 Calculation Parameters

5.5.1 The following has been assumed:

- The primary proposed operational times are Monday – Friday between 06:30 and 18:30 hours, with 5 HGV movements per hour on average;
- The service yard is located on the eastern side of the building;
- The proposed units will be equipped with loading docks and all loading and unloading activities will happen inside the units;
- External equipment will be located on a concrete pad that runs along the north wall of the building and will be operational 24 hours a day. It will include:
 - 5 x Adiabatic process water coolers; and
 - 5 x Chillers for HVAC system.
- Internal equipment will be located on a mezzanine floor that runs along the internal north wall of the building. The equipment will run 24 hours a day and will include:
 - 25 x Material driers;
 - 5 x Material system vacuum pumps;
 - 4 x Compressors; and
 - 40 x Moulding Machines.
- The main building is to be constructed of a horizontally laid built-up wall cladding system with a lightweight, cladding style roof system.

5.6 Calculation Procedure

- 5.6.1 Calculations have been undertaken of the likely noise levels at the nearest noise sensitive receptor associated with the operation of the site during a worst-case one-hour operation period during the daytime (07:00 – 18:30 hours) and during a worst-case 15-minute period during the night-time period (23:00 – 07:00 hours).
- 5.6.2 Additional calculations of plant noise and delivery noise during the night-time have been undertaken during a worst-case 15-minute period between (06:30 – 07:00 hours). Calculations assume that all plant is in continuous operating for the duration of the assessment period.
- 5.6.3 There will be an average of five HGV movements during the one-hour assessment period during the daytime. For calculation purposes, it is assumed that there will be two HGV movements during the 15-minute assessment period during the night-time (06:30 – 07:00 hours).
- 5.6.4 Noise from the external plant, noise breakout from internal plant and the noise from deliveries have been calculated separately before being combined and compared to the background sound level, in accordance with BS4142.
- 5.6.5 **Table 5.3** details the activities associated with the delivery operations of the site. Unless otherwise stated, sound levels are based on measurements from our in-house database. °

Table 5.3: Noise Levels Associated with Deliveries

Measurement Description	Sound Pressure Level SEL (dB)	Source Level Measurement Distance (metres)
Lorry arriving	82	1
Reversing alarm	94	1
Lorry door slam	83	1
Lorry door slam	83	1
Lorry starting	89	1

- 5.6.6 The manufacturers' sound emission data of plant is detailed in **Error! Reference source not found..**

Table 5.4: Plant Sound Emission Data

Building Services Plant	Manufacturer / Model	Data Type	Manufacturer's Sound Levels (dB) at Octave Band Centre Frequency (Hz)							dB(A)
			63	125	250	500	1000	2000	4000	
Water cooler (external)	Piovan – AFCV290	L _p at 10 m	59	48	51	51	48	47	45	54
Chillers (external)	York – CH3	L _p at 10 m	71	63	57	46	41	36	30	47*
Material drier (internal)	Piovan – HRM 150	L _p at 1 m	-	-	-	-	-	-	-	80
Material system vacuum pumps (internal)	Piovan – F Series 5.5 kw	L _p at 1 m	-	-	-	-	-	-	-	73**
Compressors (internal)	SpiralAir – SPR 8T/10	L _p at 1 m	-	-	-	-	-	-	-	59**
Moulding machines (internal)	Krauss Maffei – PX Series	L _p at 1 m	-	-	-	-	-	-	-	65**

*At 20 °C ambient temperature

**The distance at which this data was measured was not available. For the purposes of our assessment we have assumed that the stated sound pressure level was measured at 1 m. We should be advised if this is incorrect.

- 5.6.7 The main building is to be constructed in a combination of composite & built-up insulated steel cladding, and curtain walling. We understand that the built-up insulated cladding would be similar to Euroclad system incorporating 19/1000 liner sheet, 220 mm Quattro brackets and Quattro bars, 220 mm thick rockwool quilt and 50/1000 halfround HPS200 top sheet.
- 5.6.8 The roof covering would be similar to a Euroclad built-up system. The liner sheet is MW5, 300 mm Quattro brackets and bars, 300 mm Rockwool insulation quilt and Euroclad 32/1000 HPS200 top sheet. Approximately 10% of the roof area will comprise integral polycarbonate rooflights.
- 5.6.9 Manufacturer's test data is not available for the proposed constructions. Test data for similar constructions has therefore been used in the assessment. **Table 5.5** details the assumed sound reduction performance values for each building element based on test data for similar systems.

Table 5.5: Assumed Sound Reduction Performances of Cladding System

Building Element	Description	Sound Reduction Index (R) at Octave Band Centre Frequency (Hz)							R _w
		63	125	250	500	1000	2000	4000	
Wall and roof	Lightweight cladding with mineral wool insulation and steel liner sheet	13	14	29	38	40	45	55	38
Rooflight	polycarbonate rooflights	7	10	13	17	19	19	27	19
Door	Roller door	8	10	13	14	15	15	15	15

5.7 Acoustic Feature Correction

5.7.1 Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound levels and the background sound level. The calculated specific sound level should therefore be modified in accordance with the following guidance as outlined in BS 4142:2014+A1 2019. Due to the type of assessment, the subjective method has been used to determine the type and level of acoustic feature corrections applied to each source.

5.7.2 BS 4142 offers the following guidance on the subjective assessment of acoustic feature corrections.

Tonality

For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0 dB and + 6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to + 9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time... If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

Other Sound Characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

5.7.3 The sound emission data suggest that none of the fixed plant will be tonal.

- 5.7.4 Some of the noise sources have the potential to be impulsive (e.g. door slam). However, based on the survey results and the calculated levels at Receptor A, none of the source of noise will be individually distinguishable at Receptor A, 180 m away.
- 5.7.5 Based on the data provided and experience, none of the noise sources will be intermittent or will have other sound characteristics.
- 5.7.6 Therefore, no acoustic feature correction has been applied to the calculations presented in the next section.

5.8 BS 4142:2014 Assessment

- 5.8.1 **Table 5.6** details the results of the BS4142:2014 assessment of the proposed development.

Table 5.6: BS4142:2014 Assessment Results

Description	Operational Periods		
	Daytime (07:00 – 23:00 hours) T = 1 hour	Night-Time (23:00 – 07:00 hours) T = 15mins	Night-Time (06:30 – 07:00 hours) T = 15mins
Calculated Specific Sound Level from Delivery Yard	23	-	28
Calculated Specific Sound Level from Atmospheric Building Services	34	34	34
Calculated Specific Sound Level from Internal Operations	25	25	25
Calculated Rating Sound Level at Receptor A (dB L _{A,r,T})	35	35	35
Background Sound Level (dB L _{A90,T})	48	31	45
Excess of Rating over Background Sound Level (dB)	-13	+4	-10
Assessment of Impact	Indication of a low impact, depending on the context	Indication of a less than adverse impact, depending on the context	Indication of a low impact, depending on the context

- 5.8.2 The difference between the rating level and the background sound level during both the daytime and the night-time is likely to be below the proposed criteria of +5 dB.

5.9 Context and Mitigating Factors

- 5.9.1 The above assessment details the results of the initial numerical assessment of sound levels at the nearest noise sensitive receptor. It is important to recognise context in the assessment of the likely noise impact on the proposed development site arising from the operation of the proposed development.
- 5.9.2 The following factors should be taken into consideration:
- The absolute sound level;
 - The character and level of the residual and specific sound levels; and
 - The sensitivity of the receptor.

Absolute Sound Levels

- 5.9.3 The calculated specific sound level at the worst affected façade of existing noise sensitive receptors, falls below the relevant criteria in World Health Organisation and BS8233 guidelines with respect to noise levels in external amenity areas. In addition, it is over 10 dB lower than the measured night-time residual sound level of 48 dB $L_{Aeq,8 \text{ hours}}$.

Character and Level of Residual and Specific Sound Levels

- 5.9.4 The proposed unit is part of a wider business park. The activities proposed reflect existing and future permitted activities which take place on site or will take place when the business park is fully operational. The character and level associated with the proposed activities is therefore considered to be similar to the character and level of the permitted activities.

Receptor Sensitivity

- 5.9.5 As presented in **Table 1.1**, Receptor A is a residential receptor with a high sensitivity to the potential noise impact.
- 5.9.6 The residential dwellings are fitted with double glazing windows and the majority of private amenity spaces face away from Dunsbury Park.

5.10 Uncertainty

- 5.10.1 Care has been taken to reduce uncertainty as far as reasonably possible. However, it should be recognised that in any environmental sound survey and assessment process uncertainty exists.

Measured Environmental Sound Levels

- 5.10.2 The assessment relies on the results of the environmental sound survey undertaken by Stantec. Uncertainty in measured background sound levels can occur due to variation in temporary/non-representative meteorological conditions however steps were taken to minimise the risk of meteorological conditions affecting the survey results.

Calculation and Assessment Procedure

- 5.10.3 Uncertainty in the sound power levels used in the assessment can occur due to variations in the sound emissions of the source and the operating conditions under which the source is expected to operate.
- 5.10.4 The assessment undertaken has been based on 24-hour operation and conditions provided to us. However, it should be recognised that there is a degree of uncertainty associated with the exact operating conditions if different from those assumed. Nevertheless, it is considered that the assessment undertaken is suitably robust in determining the likely noise impact of the proposed development.

5.11 Assessment Summary

- 5.11.1 The results of the preliminary assessment indicate that the level of impact associated with the operation of the proposed development during the daytime is likely to be an indication of having a low impact, depending on the context.
- 5.11.2 The results of the preliminary assessment indicate that the level of impact associated with the operation of the proposed development during the night-time is likely to be an indication of having a less than adverse impact, depending on the context.

5.11.3 It is also likely that the criterion would be met during both the daytime and the night-time.

5.11.4 Considering the results of the assessment and the contextual and mitigating factors detailed above, the operation of the proposed facility should be considered acceptable.

6 Conclusion

- 6.1.1 Stantec UK Ltd has been commissioned by Portsmouth City Council to provide a noise impact assessment to support the discharge of Condition B5 associated with the application for Plot 4a of a proposed commercial development at Dunsbury Hill Farm in Havant
- 6.1.2 An unattended environmental sound survey was undertaken between approximately 08:00 hours on Wednesday 4 March 2020 and approximately 12:00 hours on Thursday 5 March 2020 in order to determine the existing sound climate at a location considered representative of the nearest noise sensitive receptors located to the east of the site.
- 6.1.3 Assessment criteria have been proposed based on the requirements of planning Condition B5.
- 6.1.4 An assessment in general accordance with BS4142:2014 has also been undertaken to determine the likely impact associated with the proposed facility at the nearest noise sensitive receptors.
- 6.1.5 The assessment indicates that the operations are likely have a low impact during both the daytime and the night-time, at existing noise sensitive receptors.
- 6.1.6 The criteria detailed herein are likely to be achieved, without the need for specific mitigation measures.

Appendix A Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Daytime	The period 07:00-23:00 hours.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10}(s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound.
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
Insertion Loss	Insertion loss is the difference in sound pressure level at a single fixed position before and after a noise control element (e.g. enclosure, barrier etc) is installed.
L_{AE} or SEL	A noise level which, if maintained for a period of 1 second, would cause the same A-weighted sound energy to be received as is actually received from a given noise event.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

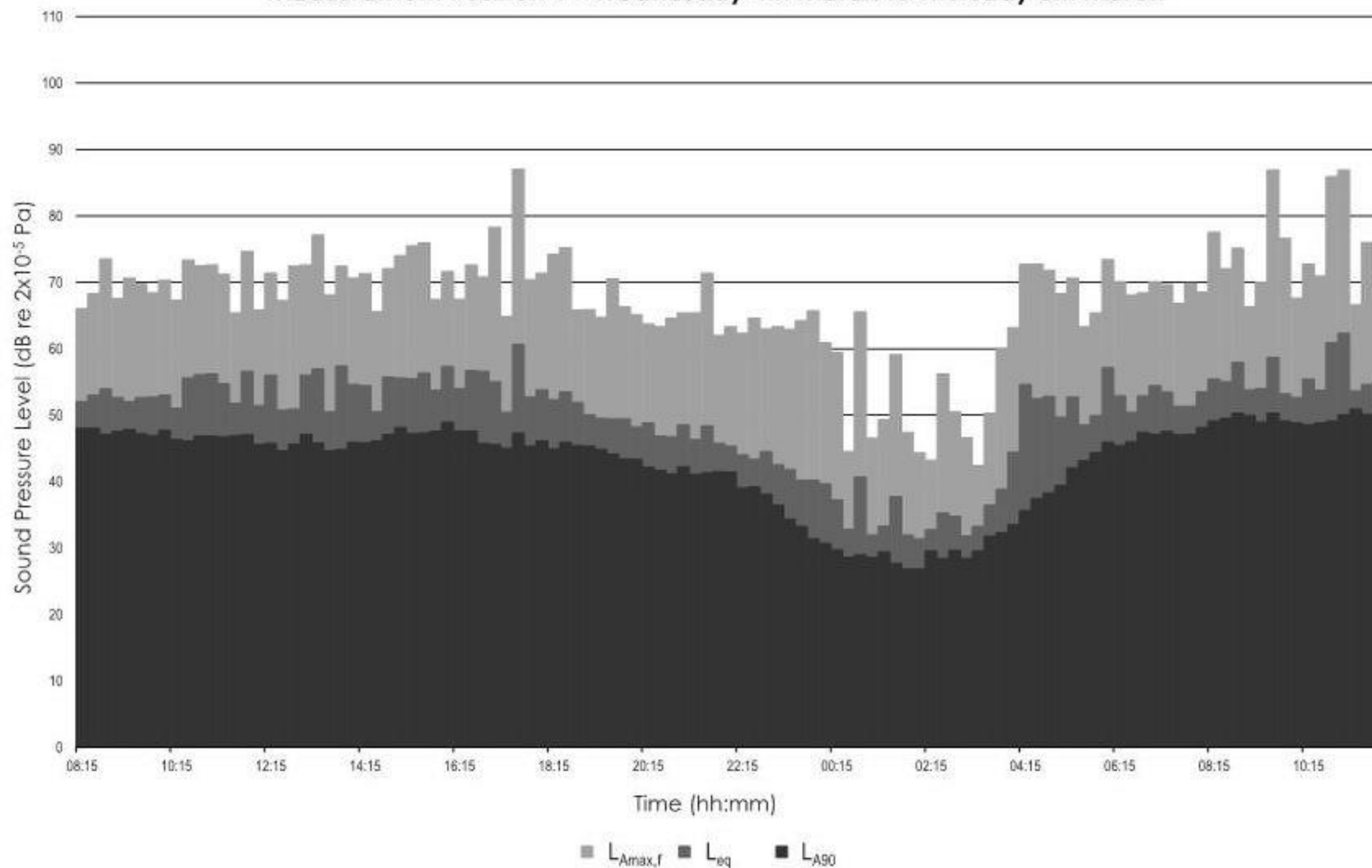
Parameter	Description
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$ or Background Noise Level	A noise level index. The noise level exceeded for 90 % of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Night-time	The period 23:00-07:00 hours.
NOEL	No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
Noise Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Rating Noise Level	The specific noise source plus any adjustment for the characteristic features of the noise, denoted by $L_{A,r,T}$.
SOAEL	Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level, L_p	The sound pressure level, L_p is the sound pressure relative to a standard reference pressure of 20 mPa (20×10^{-6} Pascals) on a decibel scale.
Specific Noise Level	The noise source under investigation measured as and $L_{Aeq,T}$

Appendix B Instrumentation

Item	Type	Manufacturer	Serial Number	Laboratory Calibration Date
Sound Calibrator	NC-74	Rion	34746691	30/08/2019
Sound Level Meter	NL-52	Rion	542901	09/01/2020
Microphone	UC-59	Rion	06478	09/01/2020
Pre-Amplifier	NH-25	Rion	42929	09/01/2020

Appendix C Time History Graphs

Dunsbury Hill Farm - Plot 4a
 L_{Aeq} , $L_{Amax,f}$ and L_{A90} Time History
Measurement Position 1 - Wednesday 4th March to Thursday 5th March



APPENDIX C: PROPOSED PLANT NOISE DATA

C.1 Pump motors

Electrical motor features

- **Nominal voltage: 400V / 3ph / 50 Hz - PE**
- Squirrel cage induction motor with two poles in short-circuit with external ventilation closed (TEFC)
- IP55 protection (EN 60034-5)
- Performance according to EN 60034 – 1
- Motor Efficiency IE3 (three phase from 0,75 up to 375 kW)
- 155 (F) isolation level
- Maximum environment working temperature: 40 °C

Other

- Rotation must be anticlockwise by looking at the inlet mouth of aspiration of the pump.
- Counterflanges are not included
- Sound pressure level on the table beside

Power	Sound pressure level LpA
kW	dB
1,1	< 70
1,5	< 70
2,2	< 70
3	< 70
4	< 70
5,5	< 75
7,5	71
11	71
15	71
18,5	73
22	69
30	69
37	69
45	74

The tables below show the mean sound pressure levels (Lp) measured at 1 meter distance in a free field according to EN ISO 11203.

The noise values are measured on 50 Hz motors and have a tolerance of 3 dB (A) according to EN ISO 4871.



Standard Report AQUACIAT^{POWER} LD 1800R

Prepared By: David Tennant

Project: Havant Chillers

Date: 09/29/21 15:44

Seasonal Efficiency (3)

Allowed applications for CE mark:

Comfort Cooling : T ₂ 2°C*	SEER 12M°C η _p cool	5.37 212
Comfort Cooling : T ₂ 13°C*	SEER 22M°C η _p cool	6.21 245
High Temp. Process Cooling : T ₂ 2°C*	SEPR 12M°C	6.33

* ECODSIGN Compliant per (EU) N°2016/2281

R-32

(3) All data related to seasonal efficiency are given for standard units and main options (Brine, pump, energy efficiency,...).

Operating Conditions

System element		Cooling
Fluid	Fluid Type	Fresh Water
	Fouling Factor (sqm-K)/kW	0
	Leaving Temperature °C	6.0
	Entering Temperature °C	12.0
	Fluid Flow l/s	18.0
Hydraulic Module	External Static Pressure kPa	218
	Pump Power Input kW	6.86
Air	Entering Air Temperature °C	35.0
Altitude	m	0

Unit Information

Refrigerant Type		R32
Refrigerant Weight	kg	44
Tonnes CO2 Equivalent	Tonnes	30
Number of Refrigerant Circuit		2
Number Of Compressor		7
Number Of Fan		7
Fan Power Input	kW	4.88
Fan Speed	RPM	720
Fan Air Flow	l/s	27013
Operating / Shipping Weight	kg	3163/3111
Unit Dimensions (LxWxH)	mm	4798x2253x2324

Unit Option

HP VSD dual-pump hydraulic module
Bacnet over IP
Ultra low noise level
Circuit Soft Starter
MCHE anti-corrosion protection Protect2
Anti-vibration mounts (kit)
Exchangers water filter (kit)
Exchanger & hydraulic frost protection
Master/slave operation
Commodity Surcharge



aquaciat^{POWER} R-32

Performance

Mode		Cooling
Cooling Capacity (1)	kW	455
Cooling Efficiency (EER) (1)	kW/kW	2.97
Unit Power Input (1)	kW	153
Sound Power Level (LwA) (1)	dB(A)	87
Sound Pressure Level at 10.0 m (LpA) (1)	dB(A)	55
Minimum Capacity (2)	kW	73.1
Maximum Capacity	kW	455

(1) All performances are compliant with EN14511 – 3 : 2018. Sound power level according to ISO9614 – 1.

(2) Due to the minimum flow rate allowable, a lower inlet water temperature might have to be specified to achieve this performance.

Electric Data

Unit Voltage	V-Ph-Hz	400-3-50
Standby Power	kW	0.453
Power Factor		0.839
Electrical Circuit		Supply 1
Maximum Current	A	358
Start Up Current	A	519

Documentation



Technical Description



Acoustic Sound Power Level Radiated

Sound Power at Chiller Acoustic Center (dB)

Load (%)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Global sound power(dB)	A-Weighted Global sound power (dB(A))
Max	86	83	84	86	82	80	72	68	92	87

Estimated Sound Power levels - dB re: 1 picowatt

Sound Power level L_w in accordance with ISO 9614-1. Only the Total Sound Power level L_w is certified by Eurovent, at Full Load in cooling mode, with all fans and pumps running at nominal speed, and for inlet air temperature at the condenser between 30°C and 35°C. The sound levels by octave band are guideline values only and not contractually binding.

Acoustic Sound Pressure Level Radiated

Sound Pressure in free field at 10.0 m (dB)

Load (%)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Global sound pressure(dB)	A-Weighted Global sound pressure (dB(A))
Max	53	50	52	53	50	47	40	35	59	55

Estimated Sound Pressure levels - dB re: 20 micropascal

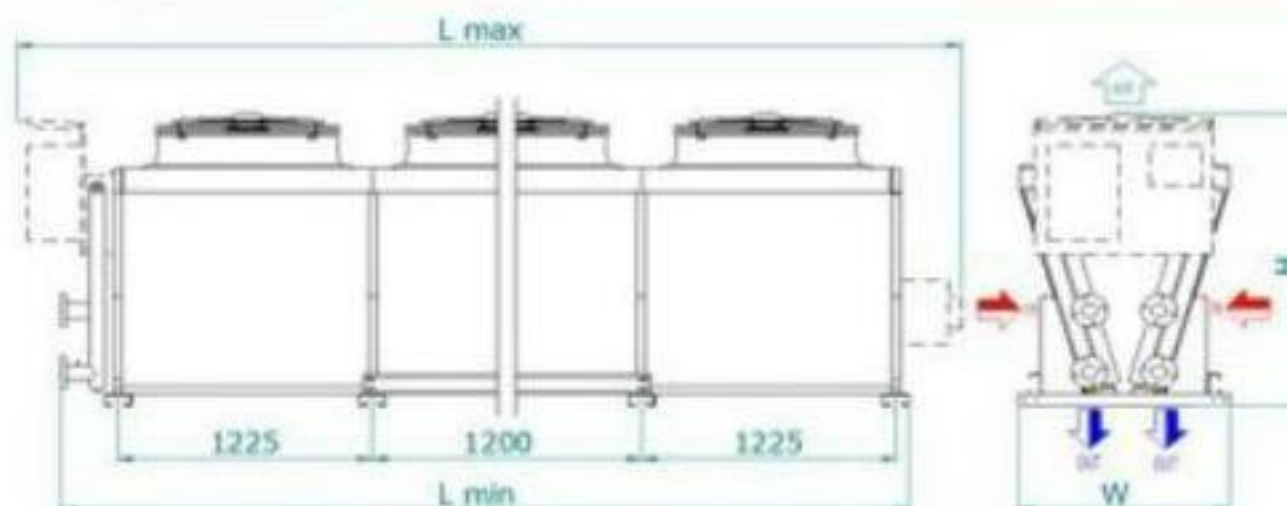
Estimated average sound pressure L_p at a given distance on a reflective surface in a free field environment.

UNIT MODEL:	AFCV290 SPEC		
LW(A) - db(A)	86	N° Fans.	6

Lp(A) - EN13487	54	Dist. (m)	10
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DIMENSIONS

Lmax [m]	8,16
Wmax [m]	1,18
Hmax [m]	1,79

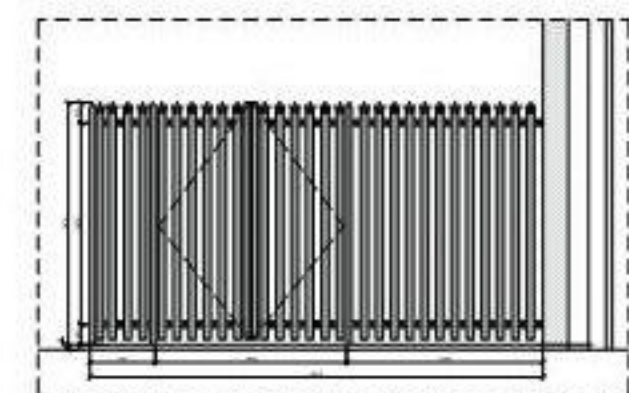
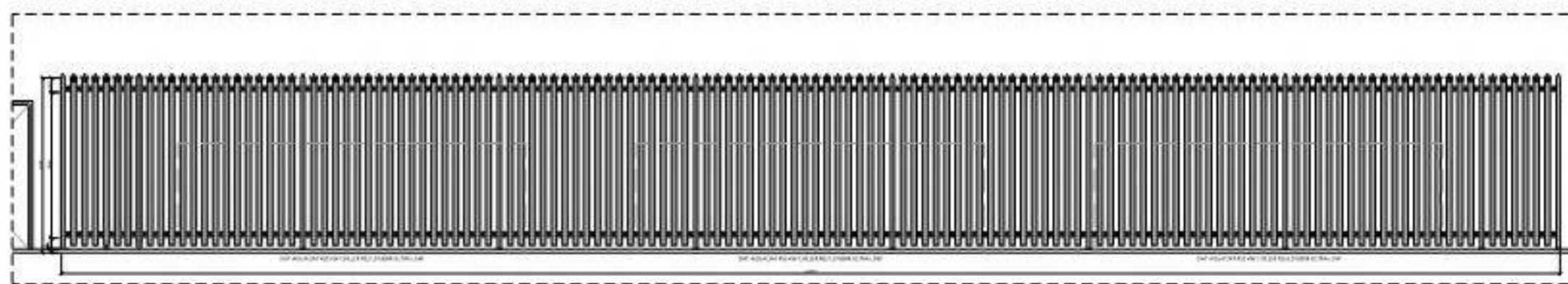
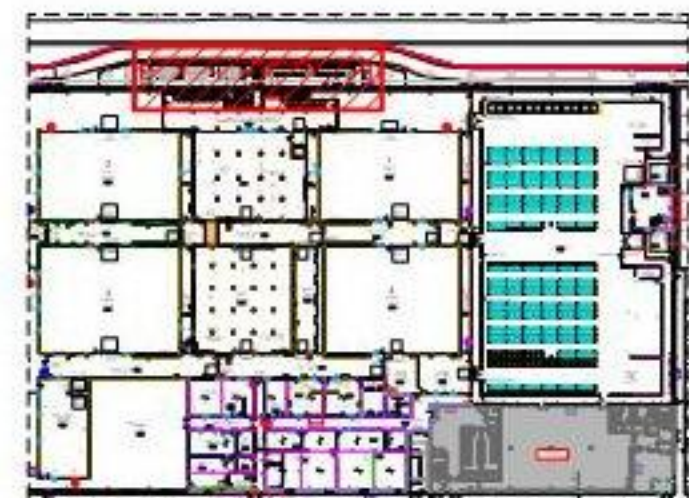
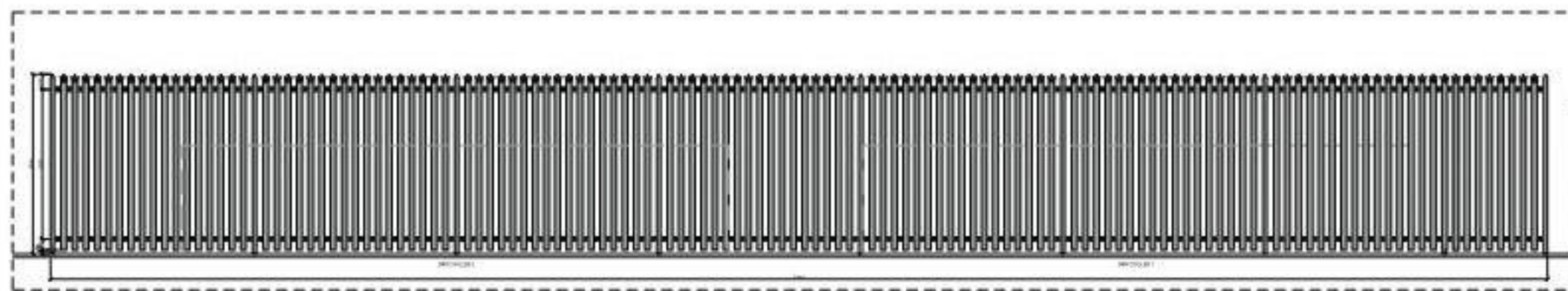
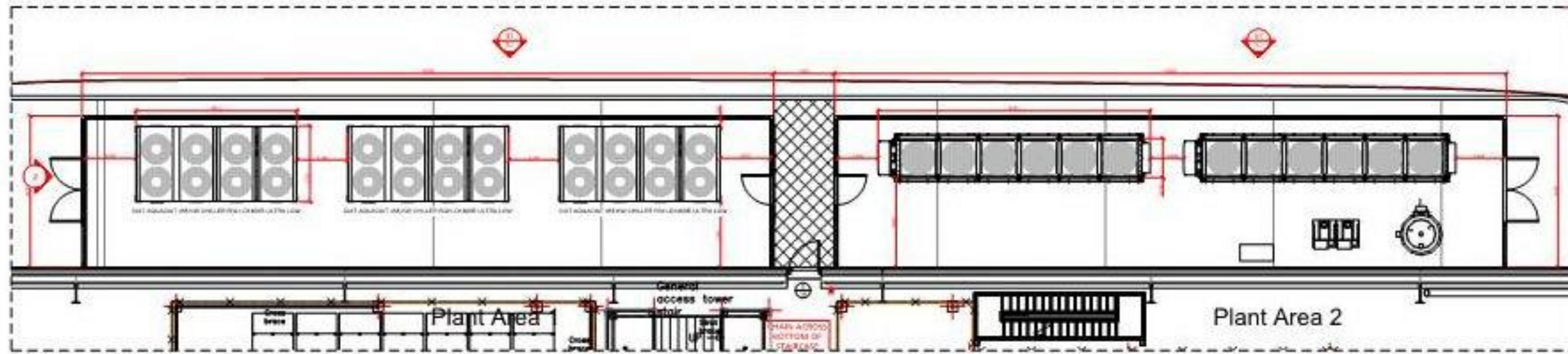


FREQUENCY (Hz)	Lwi(A) [db(A)]
60	65
125	64
250	74
500	80

FREQUENCY (Hz)	Lwi(A) [db(A)]
1000	80
2000	80
4000	78
8000	69

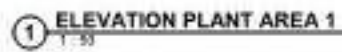
NOTE: Sound Power Levels according to EN13487. The Sound pressure Levels for this Dry Cooler are calculated in free-field conditions for every single fan as stated by the fans constructor in compliance with EN13487. The Sound Pressure figure is merely indicative as it is affected by the installation site characteristics.

APPENDIX D: PROPOSED PLANT LOCATIONS



EXTERNAL - NORTHERN PLANT COMPOUND

DRAWING TO BE USED IN CONSTRUCTION WITH SIGN OF WORK	DRAWING IS IN SKETCH FORM ONLY	area The Old Hut Office 53 Spence Road Surrey TW20 0AA T: 01753 624000 F: 01753 624001 The Old Hut Office Chapman House 181 Church Lane London SE1 1 8AA T: 020 3885 8855 F: 020 3885 8856 info@area.co.uk www.area.co.uk	WORKING STATUS INFORMATION ONLY		CLIENT BID PURE		
			PROJECT PLANT 4A DUNSBURY PARK FITZWIGRAM WAY PO6 4EE	DATE AUGUST 2021	DESIGNER BC	PROJECT NO 600176	DATE 1



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MD-EDGE-XX-XX-OR-M-7000

Figure E21139/ NM 1 : Noise Contour Map at 4m height



Figure E21139/ SP 1 : Site Plan Showing Plant Locations and Nearest Noise Sensitive Receptors

