

External Plant Noise Assessment

1 Albert Road
Caversham
Reading
RG4 7AL

1.0 Overview

2.0 Appendix A – Plant Noise Assessment

3.0 Appendix B – Louvre Specification

4.0 Appendix C - Calculation

1.0 Overview

We appointed MLM to undertake a noise assessment to check if the noise produced from the kitchen extract fan was 10dB less than the background noise. (Appendix A)

Unfortunately the findings of their report were:

'The predicted sound level at the nearest noise-sensitive receptor, 3 Albert Road, is 34 dB, which exceeds the local authority requirement by 4 dB. Therefore, it is recommended that the breakout sound from the kitchen extract fan is reduced by at least 6 dB'

As a result of this we asked the mechanical and electrical subcontractor to reduce the breakout sound by min. 4dB. They have installed a Noico 150 louvre (Appendix B) which will reduce the breakout sound by 6dB.

In order to calculate this the Kitchen Extract Breakout noise was taken from the fan data provided on page 4 of Appendix A and the insertion losses that the Noico 150 louvre will offer were deducted. (Appendix C) This provides a noise level reduction to the nearest noise sensitive receptor (3 Albert Road) of 6dB.

As a result of installing the Noico 150 Louvre the noise level produced by the fan is 28dB which is 12db below the background noise level meeting the criteria of the planning condition.

2.0 Appendix A

Feltham Construction

Extracare Homes External Plant

Plant Noise Assessment



MLM.
Group

Notice

This document and its contents have been prepared and intended solely for Feltham Construction information and use in relation to Extracare Homes External Plant.

MLM Consulting Engineers Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

Certifying Body

MLM are full members of the ANC:



Document History

Client: Feltham Construction
Project: Extracare Homes External Plant
Document Title: Plant Noise Assessment
Document Reference: 102638-MLM-ZZ-XX-RP-U-0001
MLM Reference: 102638

Revision	Status	Description	Author	Checked/Approved	Date
00	I	For Information	Tamasine Leighton-Crawford	Victor R. Valeron	18/12/2018
01	I	Client comments	Tamasine Leighton-Crawford	Victor R. Valeron	20/12/2018
02	I	Client comments	Tamasine Leighton-Crawford	Victor R. Valeron	21/12/2018

Contents

1	Introduction	1
2	Assessment Methodology and Criteria.....	2
2.1	BS 4142:2014 Method for Rating and Assessing Industrial and Commercial Sound	2
2.2	Planning Condition	2
3	Site Description	3
4	Proposed Plant Equipment	4
5	Baseline Sound Survey.....	9
6	Assessment	10
7	Conclusion	12
Appendix A - Glossary of Acoustic Terminology		

1 Introduction

MLM Consulting Engineers Ltd has been appointed by Feltham Construction Ltd to undertake an assessment of the likely noise impact of the proposed new external plant equipment at Extracare Homes at Dovedale Close, Caversham, Reading, RG4 7AL on the nearest noise-sensitive receptors.

An Environmental Sound Survey was undertaken by MLM Consulting Engineers between Wednesday 15 and Thursday 16 July 2015. The background sound levels during this survey are considered to be representative of the typical prevailing background sound levels at the nearest noise-sensitive receptors. Details of the survey are given in Noise Survey Report by MLM Consulting Engineers Ltd, document reference 100963, dated July 2015.

It is understood that the Local Authority has stated that no externally located plant shall be installed until a noise assessment has been undertaken according to the Planning Condition provided. This report presents the results of the assessment.

This report contains references of a technical nature, a glossary of acoustic terminology has therefore been provided in Appendix A.

2 Assessment Methodology and Criteria

The assessment is made in accordance with the following British Standard and Local Authority Planning Condition.

2.1 BS 4142:2014 Method for Rating and Assessing Industrial and Commercial Sound

BS 4142 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people residing at dwellings or premises used for residential purposes in the vicinity.

The procedure contained in BS 4142 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

BS 4142 states: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs"*. An estimation of the impact of the specific sound can be obtained by the difference between the rating sound level and the background sound level and considering the following:

- *"Typically, the greater this difference, the greater the magnitude of the impact."*
- *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*
- *"A difference of around +5dB 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."*

For the daytime, the assessment is carried out over a reference time period of one hour, but at night-time it is carried out over a 15 minute period. The periods associated with day or night, for the purposes of the Standard, are considered to be 07:00 to 23:00 and 23:00 to 07:00, respectively.

2.2 Planning Condition

The installation of external plant on the building of Dovedale Close is subject to the Planning Condition provided by Reading Borough Council.

"No externally located mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the local planning authority. The assessment shall be carried out in accordance with BS4142:2014 methodology and shall thereafter be maintained to the same standard. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment."

Site Description

The proposed new plant equipment is located to the north east of the development at Dovedale Close, Caversham, Reading, RG4 7AL. The development is bounded by Dovedale Close to the south, Albert Road to the east and residential buildings to the north and west. The plant is highlighted in the red hatched area in Figure 1. The nearest identified noise-sensitive receptor (NSR) is No. 3 Albert Road, also shown in the Figure below, which is approximately 7m from the closest plant equipment.

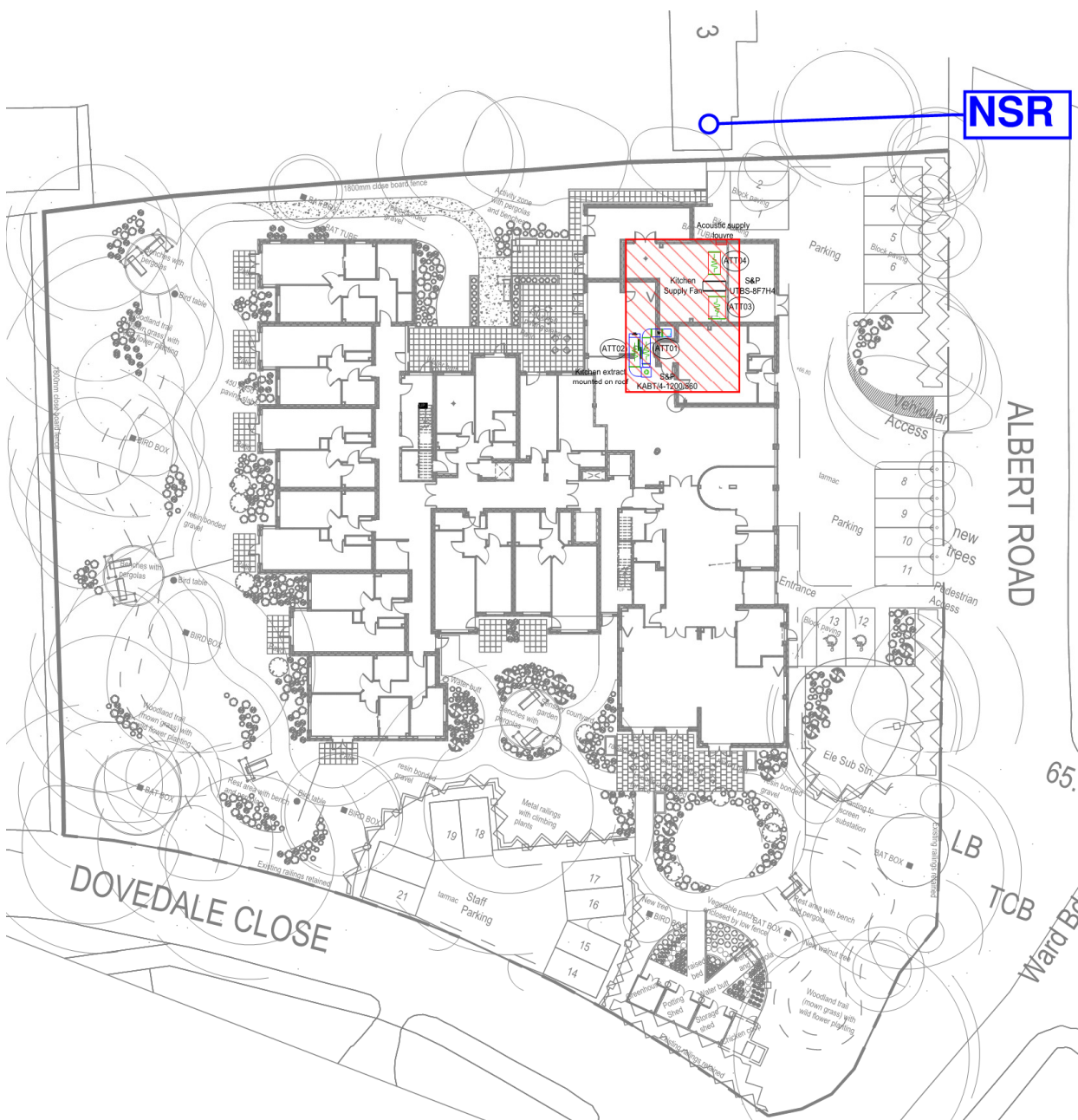


Figure 1 New plant location and the Nearest Noise-Sensitive Receptor

4 Proposed Plant Equipment

The proposed new plant equipment comprises:

- 1No. Supply Air Handling Unit, model UTBS PRO-REG Series;
- 1No. Extract Fan, model KABT/4-12000/560 2,2KW 230/400V50 VE.

It is understood that the proposed plant equipment will only operate during the daytime and the operational hours will be from 06:00 – 20:00. According to BS 4142:2014, the period 06:00 – 07:00 is considered to be night-time and Section 6 of this report will provide further information on this.

The sound level data was provided by QODA Consulting and Lawton (BES) Ltd. The octave frequency band data provided was A-weighted, therefore for the purposes of the calculations, the values provided have been un-weighted. Tables below reflect un-weighted octave frequency bands (dB) and A-weighted broadband level (dBA). Values have been rounded to the nearest whole number.

Relevant sound power level data for the supply air handling unit is given in the table below. The proposed model has an airflow of 5000 m³/h and total pressure 400 Pa.

Table 1: Sound Power Level Data for UTBS PRO-REG Series (dB)

	Octave Band Centre Frequency (Hz)								dBA
Sound Power Level	63	125	250	500	1k	2k	4k	8k	
Outlet	85	82	80	69	62	55	52	49	74

Sound power level data for the extract fan is given in the table below.

Table 2: Sound Power Level Data for Extract Fan, model KABT/4-12000/560 2,2KW 230/400V50 VE (dB)

	Octave Band Centre Frequency (Hz)								dBA
Sound Power Level	63	125	250	500	1k	2k	4k	8k	
Outlet	85	98	89	86	83	80	77	71	90
Breakout	81	84	75	67	66	63	60	55	74

The insertion loss for the proposed attenuators was provided by Caice and is given below.

Table 3: Insertion loss for proposed attenuators by Caice

Reference	Description	Insertion Loss (dB)							
		63	125	250	500	1k	2k	4k	8k
ATT02	Kitchen Exhaust	13	19	35	55	55	35	22	15
ATT04	Kitchen Intake	11	17	29	51	55	49	30	24

Plant

Bins

Kitchen

dry store

WC

Lobby

Technical specifications and dimensions:

- 800x1500 Fan Extract
- 1500x1000x1850x240
- 500 ref
- 1900
- Kitchen Supply Fan 2500
- 750
- 600
- 1500
- 1830
- 400x420 Drop to run below supply duct
- 400x Connection to canopy
- 600x450 Fire rated kitchen extract duct rose 1A
- 400x Connection to canopy
- 1100 x 2575
- 980x400
- 400x Connection to canopy
- Firework to be altered to main ductwork

Figure 2 Plan of plant equipment in Kitchen and Plant Room

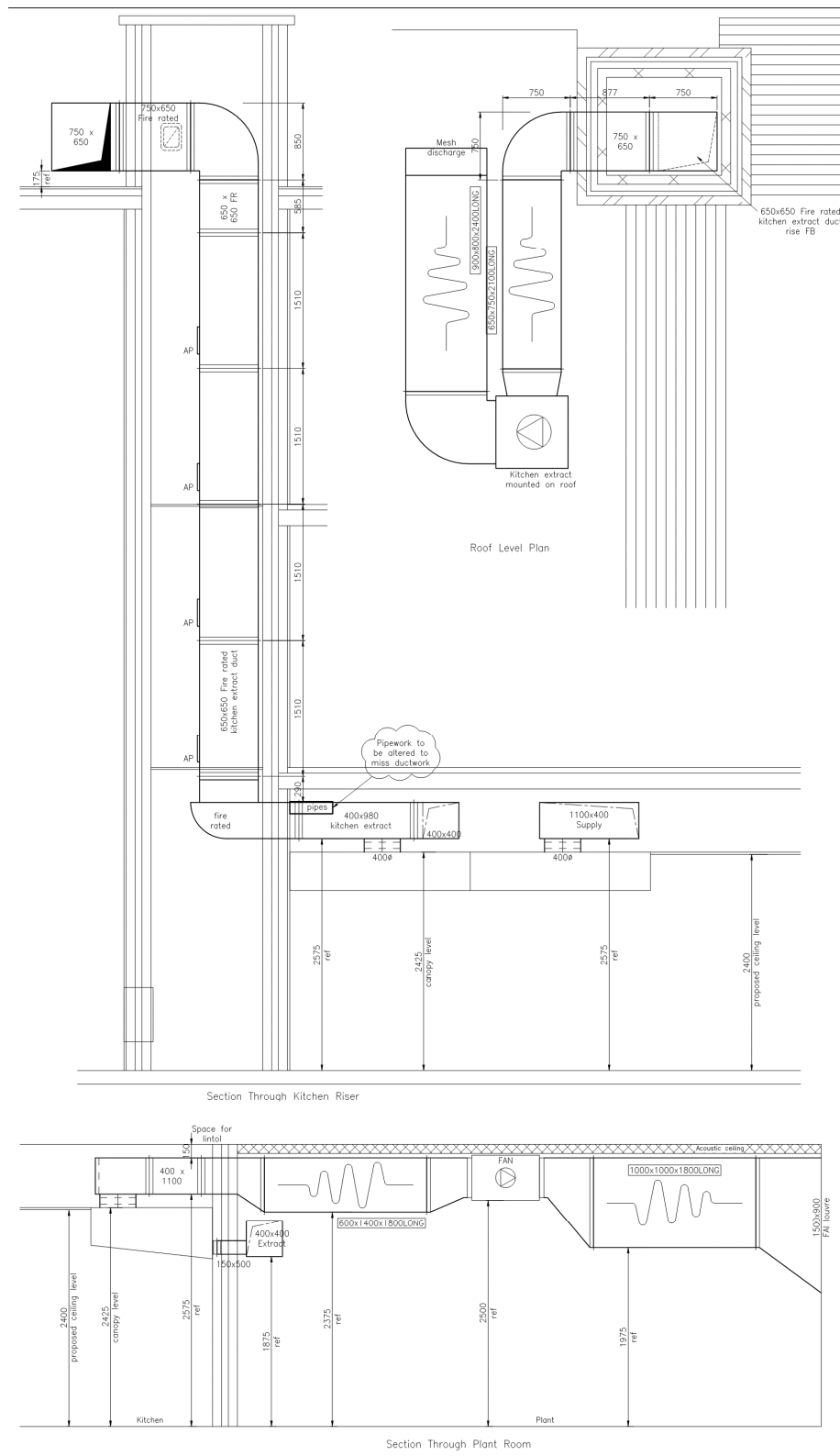


Figure 3 Section Drawings for Kitchen Riser and Plantroom and Roof Level Plan

Figure 4 identifies the extract fan on grid line G and between grid lines 17 and 18. Figure 5 is a section drawing of grid line 18.

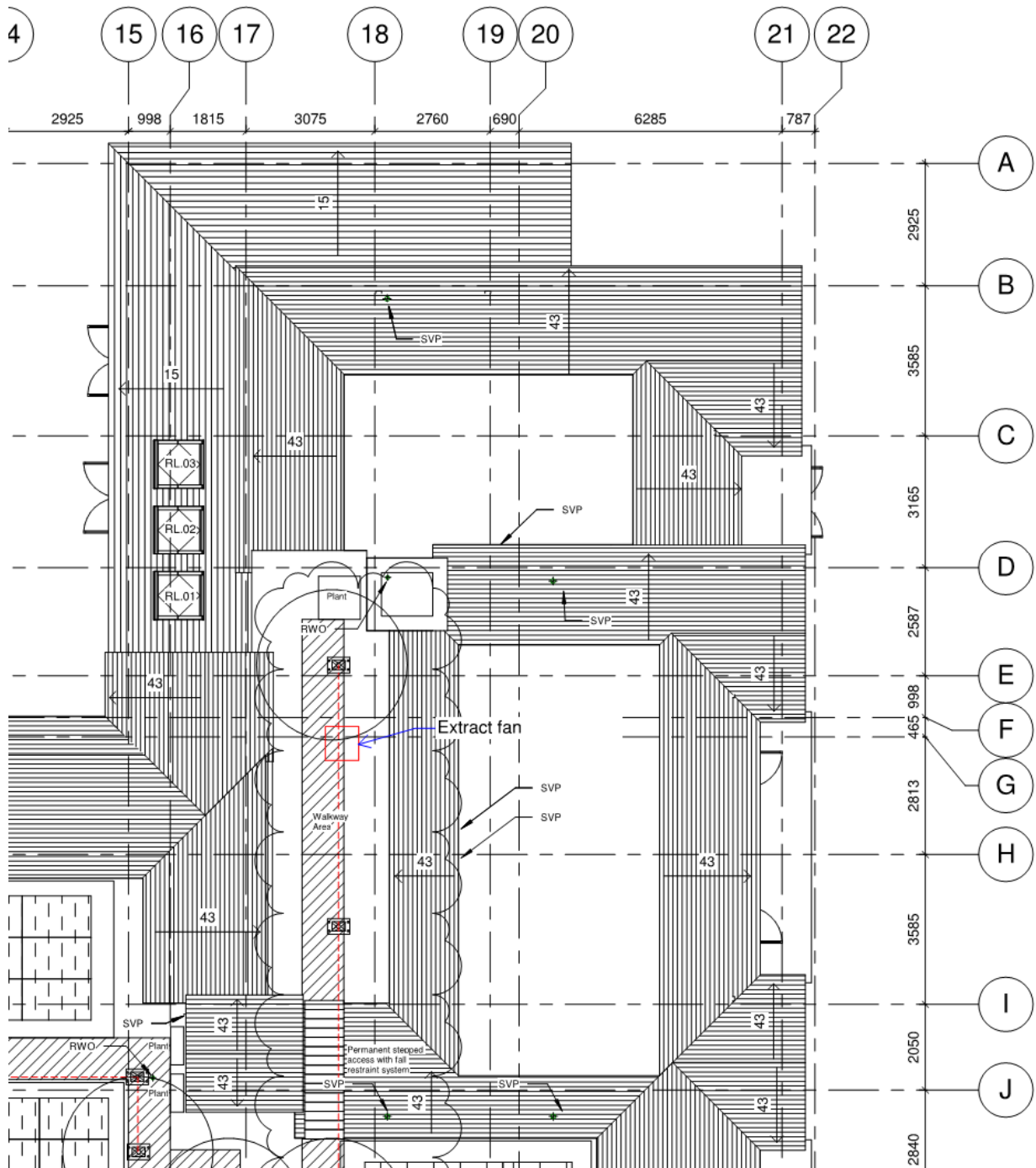


Figure 4 Extract from Roof Plan drawing FC420-1-05

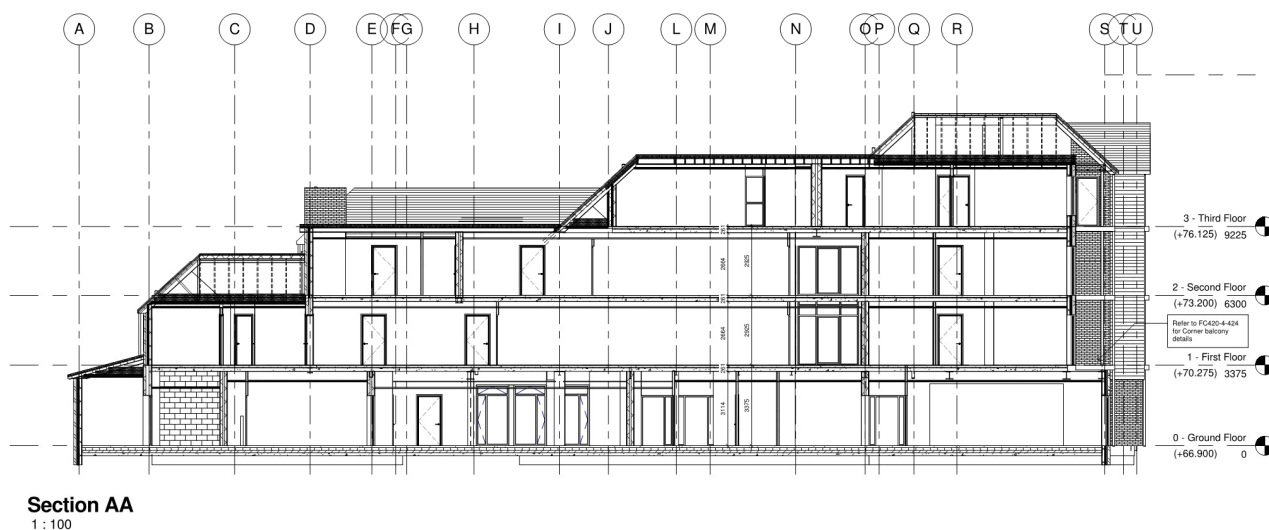


Figure 5 Extract from Sections A-A and B-B drawing number FC420-3-04

The architect Mark Slater from Archadia confirmed that the location of the extract fan is as shown in MLM's mark-up provided in Figure 6 below.

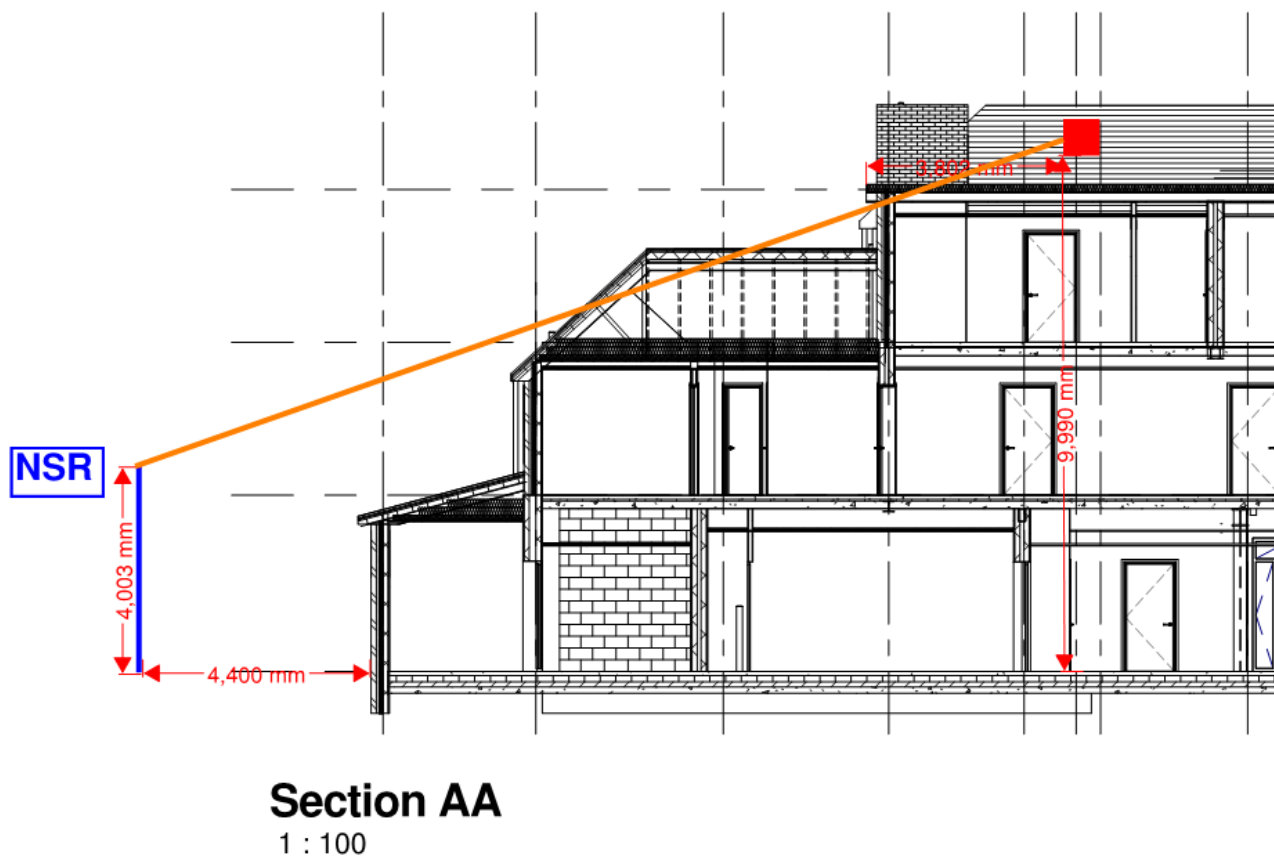


Figure 6 Extract from Section A-A identifying 1st floor level assessment location of 3 Albert Road (NSR) and the extract fan on roof (red)

5 Baseline Sound Survey

An Environmental Sound survey was undertaken by MLM Consulting Engineers between Wednesday 15 and Thursday 16 July 2015. Details of the survey are given in Noise Survey Report by MLM Consulting Engineers Ltd, document reference 100963, dated July 2015.

The typical background sound level measured during the daytime was 40 dB L_{A90} and during the night-time it was 26 dB L_{A90} . The background sound levels during this survey are considered to be representative of the typical prevailing background sound levels at the nearest noise-sensitive receptors.

6 Assessment

Calculations have been undertaken using the data and plans provided, and the sound level of the proposed plant equipment has been predicted at the nearest noise-sensitive receptor.

Table 4 presents the predicted sound rating level at the most exposed noise-sensitive receptor, and compares this level with the local authority sound level requirement. It is understood that the plant is to operate between 06:00 – 20:00. Analysing the results of the measured background sound level for the period 06:00 – 07:00, it is considered that the typical daytime background sound level is also representative during this time period. Accordingly, the assessment has only been carried out for the daytime. Values have been rounded to the nearest whole number.

Location	Period	Predicted Rating Sound Level $L_{A,T}$ (dB)	Typical Background Sound Level $L_{A90,T}$ (dB)	Local Authority Requirement 10 dB Below Background Level (dB)	Excess of $L_{A,T}$ above Local Authority Requirement (dB)	Significance of Sound (Depending on the context)
Nearest noise-sensitive receptor, 3 Albert Road	Daytime (07:00 – 23:00)	34	40	30	4	Low to adverse impact

The predicted sound rating level at the nearest noise-sensitive receptor due to external plant equipment is 34 dB, which exceeds the local authority requirement by 4 dB.

Proposed Mitigations

It has been found that the noise exceedance is mostly due to the noise breakout from the extract fan at roof level. In order to reduce the predicted sound level at the nearest noise-sensitive receptor to comply with the planning condition, it is recommended to reduce the breakout sound from the kitchen extract fan by at least 6 dB, or to add a parapet of 1.5m height. The proposed location for the parapet is highlighted below.

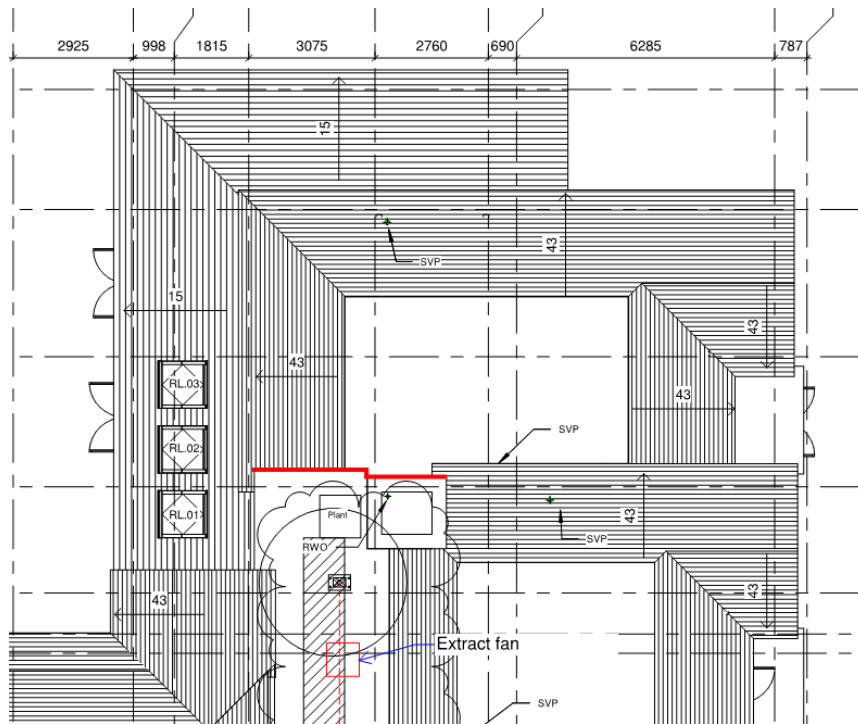


Figure 7 Location for Parapet

It is understood that the kitchen riser provides some screening. In combination with the kitchen riser, the parapet will need to provide screening at 1.5m height as shown in Figure 7.

7 Conclusion

An Assessment has been carried out to predict the sound level due to external plant equipment at Extracare Homes at Dovedale Close, Caversham, Reading, RG4 7AL on the nearest noise-sensitive receptors.

An Environmental Sound Survey was undertaken by MLM Consulting Engineers between Wednesday 15 and Thursday 16 July 2015. The background sound levels during this survey are considered to be representative of the typical prevailing background sound levels at the nearest noise-sensitive receptors. Details of the survey are given in Noise Survey Report by MLM Consulting Engineers Ltd, document reference 100963, dated July 2015.

The local authority has provided a Planning Condition, stating that the requirement for the sound level from plant equipment at the proposed development is 10 dB below the prevailing background sound level at the nearest noise-sensitive receptor.

The predicted sound level at the nearest noise-sensitive receptor, 3 Albert Road, is 34 dB, which exceeds the local authority requirement by 4 dB. Therefore, it is recommended that the breakout sound from the kitchen extract fan is reduced by at least 6 dB, or that a 1.5m high parapet is installed.

Following discussions with the design team, it is understood that building a parapet is not feasible at this stage. As such, the breakout fan noise will be mitigated by the use of an 'Acoustic Fan Jacket' or 'Acoustic Lagging' with a minimum sound reduction performance of 6 dB, which is expected to reduce the noise levels at the nearest dwellings to be compliant with the relevant planning condition.

Appendix A - Glossary of Acoustic Terminology

Wording	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of $20\mu\text{Pa}$ (20×10^{-6} Pascals) on a decibel scale.
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 $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level 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.
$L_{eq,T}$	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 during the 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.
$L_{90,T}$	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.
$L_{10,T}$	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.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in sound, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A1: Typical Sound Levels Found in the Environment	
Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain



MLM.
Group

T +44 117 244 5510
A Temple 1852
Lower Approach Road
Temple Meads, Bristol, BS1 6QS

www.mlmgroupp.com

3.0 Appendix B

Acoustic Louvres



Sound Transmission Loss (dB)								
Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
150mm deep	2	3	4	8	13	11	9	8
270mm deep	4	7	10	12	15	16	13	12
540mm deep	5	8	14	27	38	40	33	31

Pressure Drop: Pascal's (N/m ²)					
Face Velocity (m/s)	0.5	1.0	1.5	2.0	2.5
150mm deep	2	8	18	31	48
270mm deep	2	8	18	32	50
540mm deep	3	12	26	46	72

Construction & Finish

All metal construction from either pre-galvanised steel, aluminium or stainless steel.

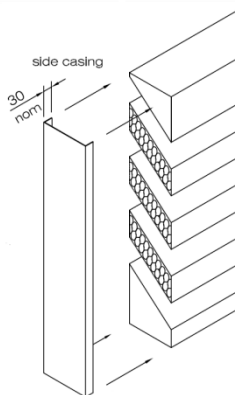
Standard depth's are 150mm, 270mm and 540mm deep.

Perforated metal forms the underside of the louvre blades to retain the absorptive mineral fibre which is packed under 10% compression.

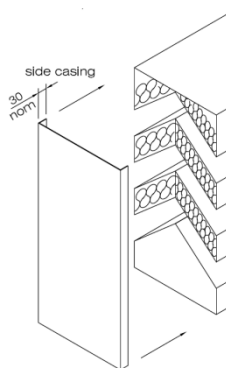
There are a range of finishes available:

- Un-painted
- Plastisol coated steel (to standard colour range)
- Polyester powder paint finish (to a standard RAL or BS colour)

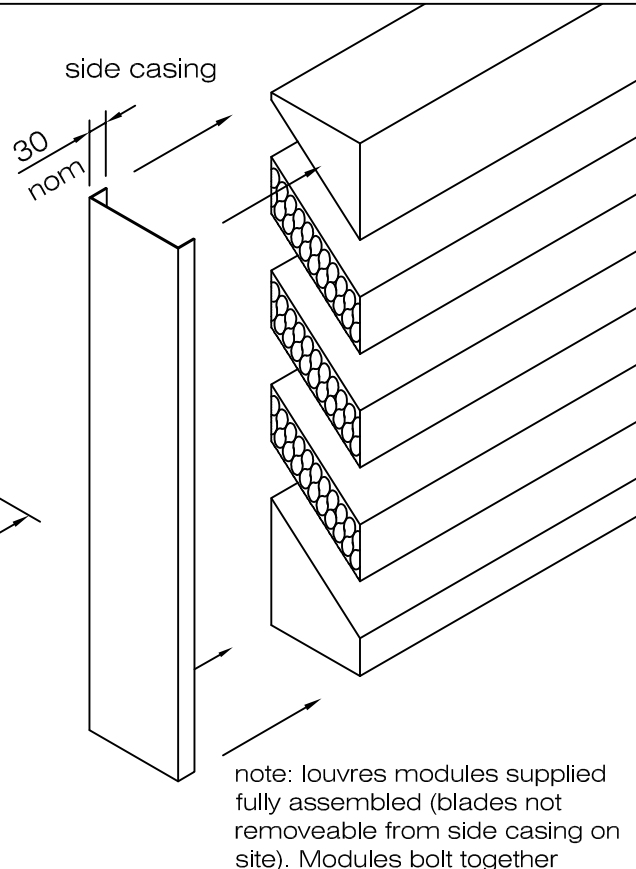
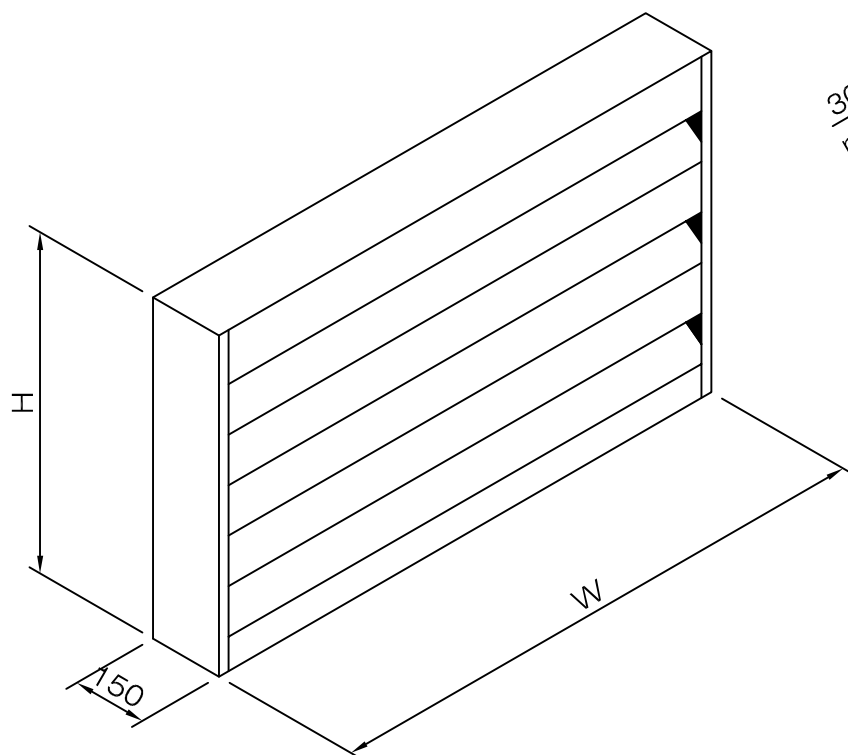
Birdscreen and insect mesh are an optional feature mechanically fixed to the rear of the louvre.



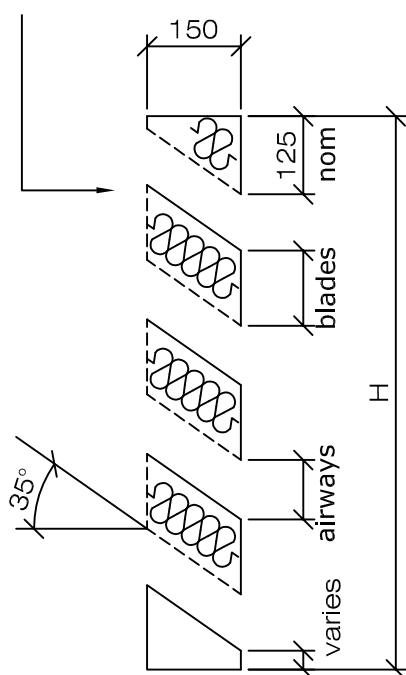
150 & 270mm
deep Single Bank



540mm deep
Double Bank



optional birdguard to rear



Typical Section

Acoustic Louvres

Perforated pre-galvanised sheet steel blade undersides. Modular unit frames and all blade uppers galvanised steel sheet. Inorganic non-toxic acoustic media.

Additional Finish Options:

- 1/ polyester powder coat paint or two pack acrylic paint to outer face.
- 2/ blade uppers and sides fabricated from plasitsol coated steel 'Colorcoat'.

Flanges optional.

Louvres supplied in modules to suit each application. Maximum module size nominally 1200 x 2500mm.

Approximate weight: 30Kg/m²

The number of blades will be dependent upon the height and free area of the louvre selected.



Noise Control Engineers

Product Acoustic Louvre

Data Sheet

Rev.

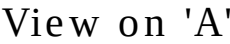
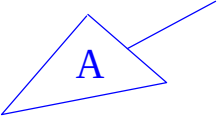
Date Jan 2013

Patrick House, Station Road
Hook, Hampshire RG27 9HU

Tel: 01256 766207
Fax: 01256 768413

Three Sided Acoustic Louvred Enclosure
All aspects fabricated from pre galvanised steel sheet.
Outer surfaces finished powder coated - RAL colour TBA.
Louvres sat in perimeter base channel.
Supplied flat-packed for site assembly.
Enclosure supplied with cleats and angles for fixing.
Self-drilling TEK screws recommended throughout
(fixings not supplied).
Maximum weight of any single item - 20kg.

Three Sided Acoustic Louvred Enclosure
All aspects fabricated from pre galvanised steel sheet.
Outer surfaces finished powder coated - RAL colour TBA.
Louvres sat in perimeter base channel.
Supplied flat-packed for site assembly.
Enclosure supplied with cleats and angles for fixing.
Self-drilling TEK screws recommended throughout
(fixings not supplied).
Maximum weight of any single item - 20kg.



NOICO
NOISE CONTROL

A	First issue	15/01/19

Client: Lawton BES Ltd.

File no. 490137

Project

Doverdale Close

Drawing No.		Rev.
01		A
Date	Scale	Drawn
15/01/2019	NTS	SJA

4.0 Appendix C

Notes: