

SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report 1 (Rev1)

**Jacksons Corner, Reading,
RG1 2EA**

Plant noise assessment

Prepared by

Phil Blakemore MSc. MIOA.

Date 14th September 2023

Project No 2221627

Head Office

Sharps Redmore

The White House, London Road,
Copdock, Ipswich, IP8 3JH

T 01473 730073

E contact@sharpsredmore.co.uk

W sharpsredmore.co.uk

Regional Locations

South England (Head Office),
North England, Wales, Scotland

Sharps Redmore Partnership Limited

Registered in England No. 2593855

Directors

RD Sullivan BA(Hons), PhD, CEng, MIOA, MAAS, MASA;

KJ Metcalfe BSc(Hons), MIOA;

N Durup BSc(Hons), MSc, PhD, CEng, FIOA, MInstP, MASA, MAES;

GJ King MIOA, MCIEH

Company Consultant

TL Redmore BEng, MSc, PhD, MIOA



Contents

- 1.0 Introduction
- 2.0 Assessment methodology and criteria
- 3.0 Environmental noise survey details
- 4.0 Fixed plant noise impact
- 5.0 Assessment conclusions

Appendices

- A. Third Party Noise Surveying Report Excerpts
- B. Plant Layout Drawings & Noise Data
- C. Acoustic Terminology

This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

1.0 Introduction

- 1.1 Sharps Redmore (SR) has been instructed to undertake a noise impact assessment of the proposed new fixed building services plant being installed as part of the fit-out for the Fat Hippo, Jacksons Corner, Reading.
- 1.2 The proposal includes for the installation of a new kitchen extract fan which is only expected to be operational between the hours of 09:00-23:00. See Appendix B for the site layout and plant drawings which indicate the proposed plant locations.
- 1.3 The area in which the building is located can be viewed as mixed use development, with several similar retail establishments alongside commercial office space and existing residential accommodation. Windows of existing properties to the rear of the High Street have been considered as the nearest noise sensitive receptors to the proposed plant items which are to be located at ground level within an existing external compound, the closest of which sit approximately 5m from discharge duct cowl.
- 1.4 The objective of the assessment is to determine how noise that may be generated as a result of the proposed new fixed building services plant equipment would affect the amenity of the residential properties (NSRs).
- 1.5 Section 2 of this report contains a discussion of the available methods of assessment and assessment criteria. Section 3 of this report sets out the findings of an environmental noise survey, Section 4 presents an assessment of noise from fixed plant equipment.
- 1.6 The assessment conclusions are contained in section 5 of this report.

2.0 Assessment Methodology and Criteria

Local Authority Planning Requirements

- 2.1 SR understands that a previous application to the Local Authority for the proposed equipment was denied as no consideration to the potential impact of noise from such plant on existing properties was given. Requirements of the Environmental Health Department of Reading Borough Council are understood as follows:

“Applications which include noise generating plant when there are nearby noise sensitive receptors should be accompanied by an acoustic assessment carried out in accordance with BS4142:2014+A1:2019 methodology.

The predicted specific sound level ($L_{Aeq,TR}$) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade should be at least 10dB below the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. 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 the nearest noise-sensitive façade (habitable window of a dwelling) should not exceed the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation.”

It is understood that following consultation between the Landlord and the Environmental Health Department of the Local Authority with reference to the $L_{A90,T}$ background noise level, assessment that adopts the statistically most repeated (SMR) measured L_{A90} would be acceptable.

British Standard 4142:2014+A1:2019 (BS 4142)

- 2.2 As required, assessment of fixed plant noise is principally undertaken in accordance with the methodology in BS 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’. The scope of this standard states that it is suitable for the assessment of:

“a) sound from industrial and manufacturing processes;

b) sound from fixed installations which comprise mechanical and electrical plant and equipment;

c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.”

- 2.3 The significance of sound impact is to be determined according to the following summary process:
- i) Determine the background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.
 - ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level ($T = 1$ hour for day or 15 minutes for night), at the receptor location of interest.

- iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
- iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.
- v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. 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 upon context.

2.4 BS 4142:2014 introduces the concept of ‘context’ to the process of identifying noise impact. Section 11 of BS 4142:2014 explains *“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 (our emphasis). An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context”* (our emphasis).

2.5 There are many *context* points to consider when undertaking an assessment of sound impact including:

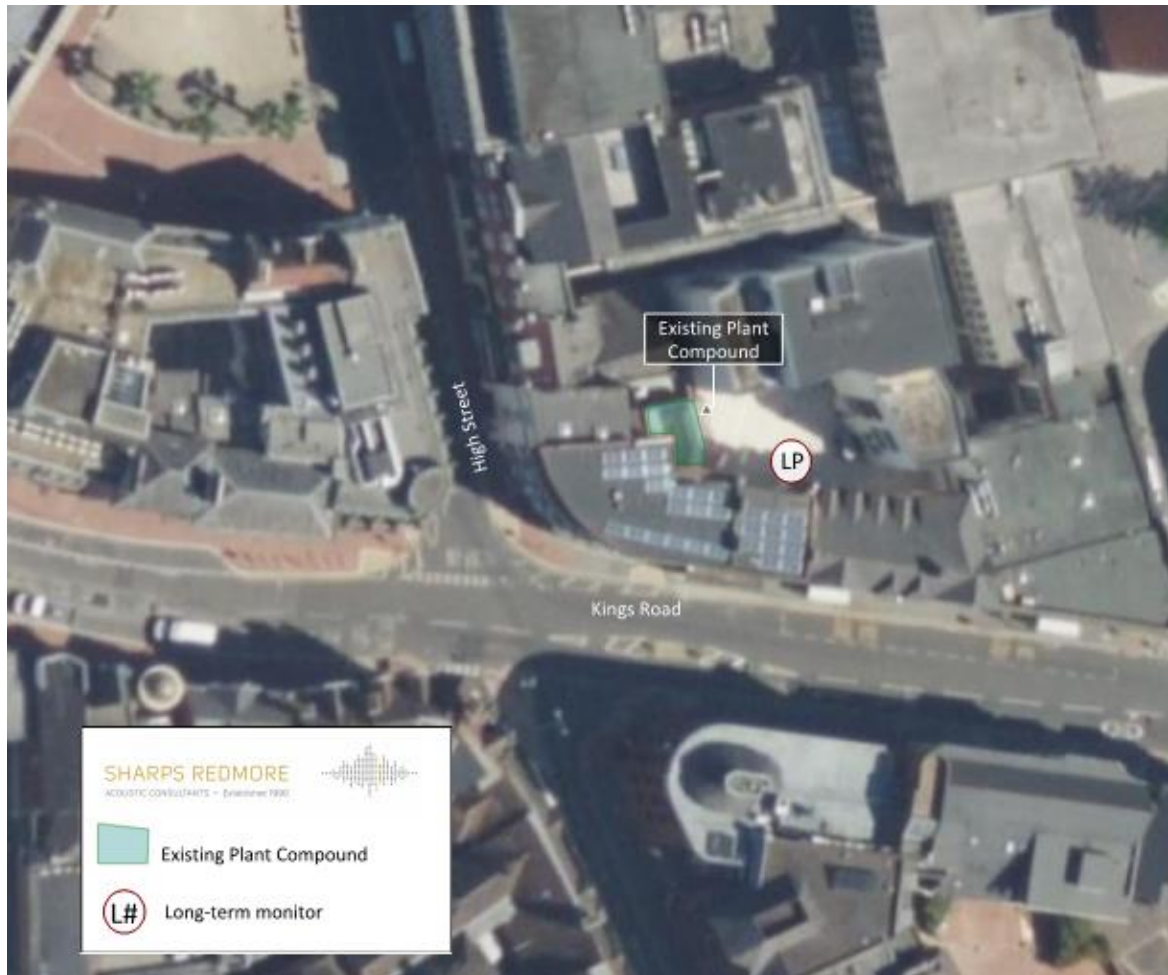
- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;

2.6 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

3.0 Environmental Noise Survey Details

- 3.1 A noise survey was undertaken by a third party at the site previously. The survey is understood to have consisted of continuous unattended long-term measurement at a position considered to represent existing prevailing background noise levels at the nearest noise sensitive receptor.
- 3.2 The measurement location is shown in Figure 1.

Figure 1: Plan showing survey location



- 3.3 Full details of the survey can be found in noise impact assessment report reference 6919DC prepared for Desa Construction Ltd. dated 3rd December 2021, relevant sections of which have been provided in Appendix A of this report.
- 3.4 Based on information provided within the above referenced report, the following noise levels were considered to have been measured.

Table 1: Third Party noise survey data

Daytime (0700-2300)		Night (2300-0700)	
Ambient L_{Aeq}	SMR L_{A90}	Ambient L_{Aeq}	SMR L_{A90}
47dB	45 dB	39 dB	35 dB

Noise criteria and receptors

- 3.5 The nearest noise sensitive receivers (NSR's) to the proposed new plant items are considered as the rear windows belonging to buildings on the High Street the closest of which are located approximately 5m from the fan discharge, the receptors relative to the items of plant are shown in Appendix B.
- 3.6 SR consider noise prediction at such windows to result in a worst-case impact, as other NSR's will be afforded greater distance loss attenuation and potential screening from the proposed plant thus, lower incident noise is expected.
- 3.7 To satisfy Reading Borough Council, the cumulative rating noise limit ($L_{Ar,Tr}$) giving consideration to the most repeated statistically measured background noise level during the operational period is set out in Table 2.

Table 2: Background noise level and plant noise limits

Receptor	Period	SMR $L_{A90,T}$ dB	Cumulative plant noise limit rating dB $L_{Ar,Tr}$
Existing NSR's	0900-2300 hrs	$L_{A90,T} = 45$	35

4.0 Fixed Plant Noise Impact

Fixed buildings services plant

- 4.1 The proposed plant which is detailed in Table 3 consists of a new Kitchen Extract fan which is to mounted on the ground floor within an existing external plant zone, ductwork will then run vertically alongside of an existing building where it will discharge to atmosphere at a height of approximately 8m above ground. A site plan and the mechanical layout drawings are included in Appendix B.
- 4.2 Fixed plant will be operational when the Fat Hippo unit is in use although the fan itself may be operational at any time between the hours of 09:00--23:00 and assessment is undertaken as such. SR understands that no other plant items are being proposed as part of these works.

Table 3: Proposed plant items

Unit model ref	Number of Units	Location	Manufacturer Noise Data
Systemair MUB/T 062 630D4 <i>Kitchen Extract Fan</i>	1	Internal	Discharge S_{wl} = 89 dBA Breakout = S_{wl} = 65 dBA

Atmospheric noise assessment

- 4.3 In our experience, the operation of ducted plant is not impulsive, tonal or intermittent. Neither does Manufacturer data provided suggest such characteristics and no penalties have therefore been applied in accordance with BS 4142:2014.
- 4.4 Initial assessment indicates an attenuator will need to be fitted to the Kitchen extract discharge ductwork to meet the noise limits which are set out in detail in Section 3. Dynamic insertion losses for an attenuator, which if fitted would be expected to result in compliance with the rating limits is given in Table 4.
- 4.5 Breakout noise from the external element of the duct will also need to be controlled prior to the attenuator, through either cement particle board boxing or wrapping the duct with weather proof lagging material such as 25mm thick 5kg/m² acoustic lagging such as Tap acoustic Muftilag-R as shown in Figure 2.

Table 4: Attenuator

Plant Item	Dynamic Insertion Losses (octave bands) (Hz)							
	63	125	250	500	1k	2k	4k	8k
Kitchen Extract Discharge	14	22	41	50	50	50	50	36

- 4.6 The resultant noise level has been predicted at NSRs as outlined in Table 5, inclusive of losses with the above mitigation.

Figure 2: Location of duct lagging

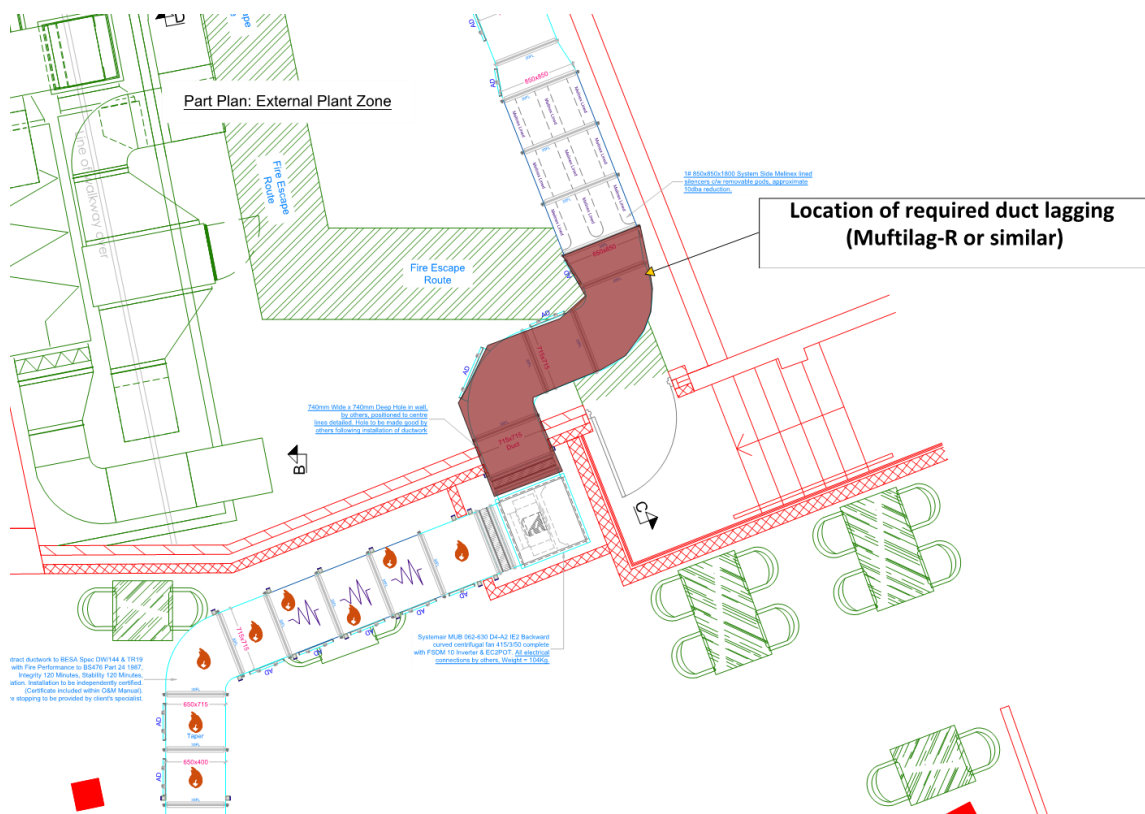


Table 5: Predicted noise level at worst affected windows

	Predicted noise level
Location	Dwelling windows: approx. 5m
Predicted Combined Plant Noise Rating Level $L_{Ar,Tr}$	34 dBA
Typical Background L_{A90} dB (Hours of operation)	45 dBA
Difference	-11 dBA
BS 4142 Impact	Low
Required Rating Limit $L_{Ar,Tr}$	35 dBA

- 4.7 The comparison in Table 5 indicates that the proposed new plant items will not exceed a level of 10 dB below the current background noise climate, which in accordance with BS 4142 is considered to result in a low impact.

Uncertainty in calculation

- 4.8 As assessment of uncertainty in measurement and calculation is required and has been evaluated considering the '*good practice guide on the sources and magnitude of uncertainty arising in the practical measurement of environmental noise*' (2007).
- 4.9 The uncertainty in quoted manufacturer noise data from source measurements in accordance with in BS EN ISO 3740P:2001 is considered as well as that associated with acoustic calculation and field site measurement.
- 4.10 SR are of the opinion that following review of such considerations, the resultant outcome of the BS 4142 assessment is unlikely to be influenced.

5.0 Assessment conclusions

- 5.1 This assessment has been undertaken in general accordance with BS 4142:2014+A1:2019 “Methods for rating and assessing industrial and commercial sound.”
- 5.2 The Environmental Health Department of the local authority usually require noise from items of fixed building services plant to not exceed a level equal to 10 dB below the existing prevailing background noise level at windows of noise sensitive properties. When considering data obtained from background noise surveying in the site vicinity by others this equates to a plant noise rating limit $L_{A,T,r}$ of 35 dB.
- 5.3 Based on the proposed plant selection, noise at the nearest noise sensitive receiver during operation has been predicted to be of a level that would not exceed 10 dB below the existing background noise climate, which in accordance with BS 4142 is considered to be of “low impact.”
- 5.4 In addition, consideration has been given to uncertainty in measurement and calculation and this has been found to have no influence on assessment outcome.

APPENDIX A:

Third Party Noise Surveying Report Excerpts

2. Environmental Noise Survey

Measurement Methodology

In order to characterise the sound profile of the area at the closest sensitive receptor (NSR), an environmental sound survey has been carried out from the 23/11/2021 to 24/11/2021. The monitoring position was chosen in order to collect representative sound levels at the NSR during the typical operational periods of the proposed development. The sound level meter was positioned through a window at third floor level and 1m away from a residential window (see Appendix D for SLM setup). The monitoring location is shown in Figure 1.0.



Figure 1.0 - Indicative Site Layout

Context & Subjective Impression

The area surrounding the site is primarily mixed in nature with both residential dwellings and commercial premises such as retail shops (Jacobs the Jewellers), takeaways and restaurants (Perry's, Honest Burgers). The site is situated at the intersection between The King's Road (south of the site) and the High Street (west), facilitating moderate to high levels of traffic flow. The noise profile of the area is dominated by traffic flow mixed with other noise sources secondary in nature e.g. patron noise, commercial activity. To the rear of the site, facing northeast, the noise profile comprises a more distant traffic noise mixed with works being undertaken in the vicinity of a commercial nature.

Environmental Noise Survey Results

The operational time of the proposed system is still unknown at the time of this report; therefore it is assumed that the proposed plant will operate only during day time hours (07:00 – 23:00) as a conservative approach. The table below outlines the background sound levels, during the assumed operational period of the plant, that will be used as the baseline for the noise assessment. Further summary results for the entire measurement period can be found in Appendix D.

Measurement Position MP1				
Measurement Period ('t')	L _{A90,15min}	*SMR L _{A90,15min}	Min. L _{A90,15min}	Max. L _{A90,15min}
Day 2 – 24/11/2021 – 07:00 – 23:00	42.0	45.0	38.0	46.0

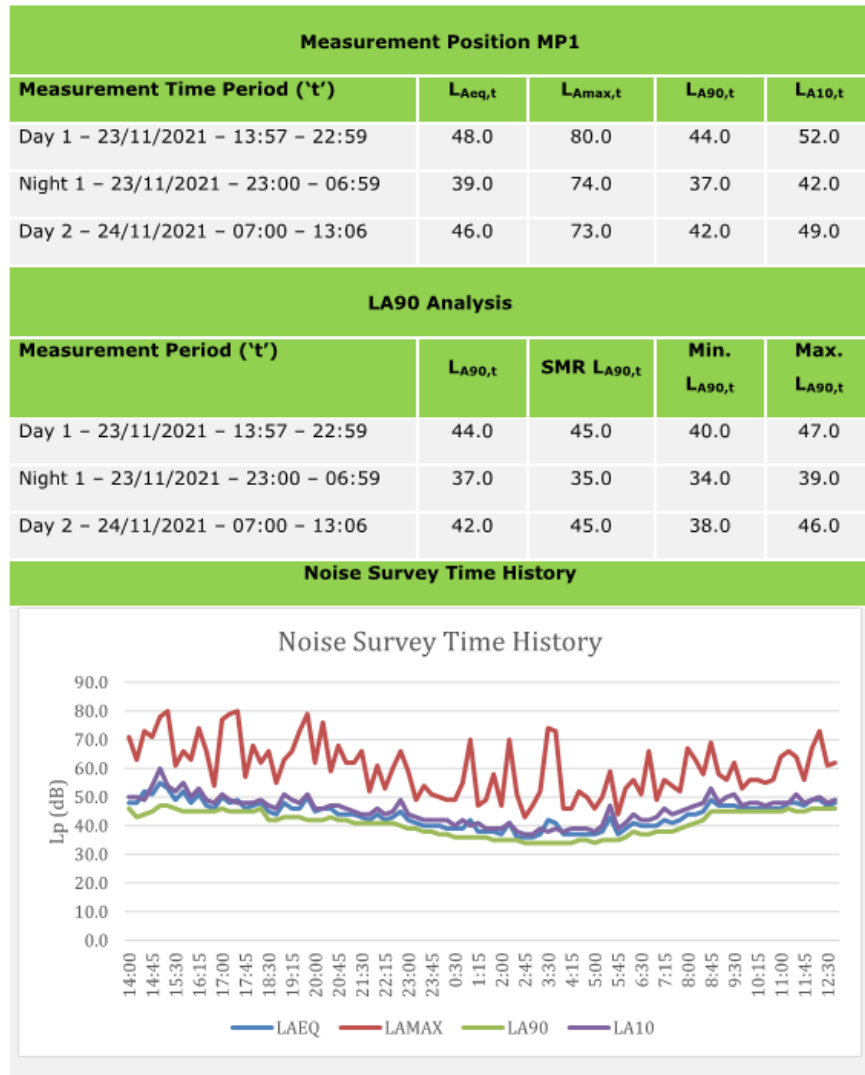
Table 1.0 – Background Sound Level Summary Results

**Statistically Most Repeated*

As can be seen in the table above the lowest measured L_{A90,15min} value is 38 dB. The range of measured background sound levels is moderate and as such, the lowest measured L_{A90,15min} value will be used in the following analysis providing a robust assessment as stated in Section 6.2 of the "Supplementary Planning Document – Adopted 2009 – Local Development Framework".

Appendix D – Environmental Survey

D.1 Tabulated Summary Noise Data



APPENDIX B:
Plant Layout Drawings & Noise Data



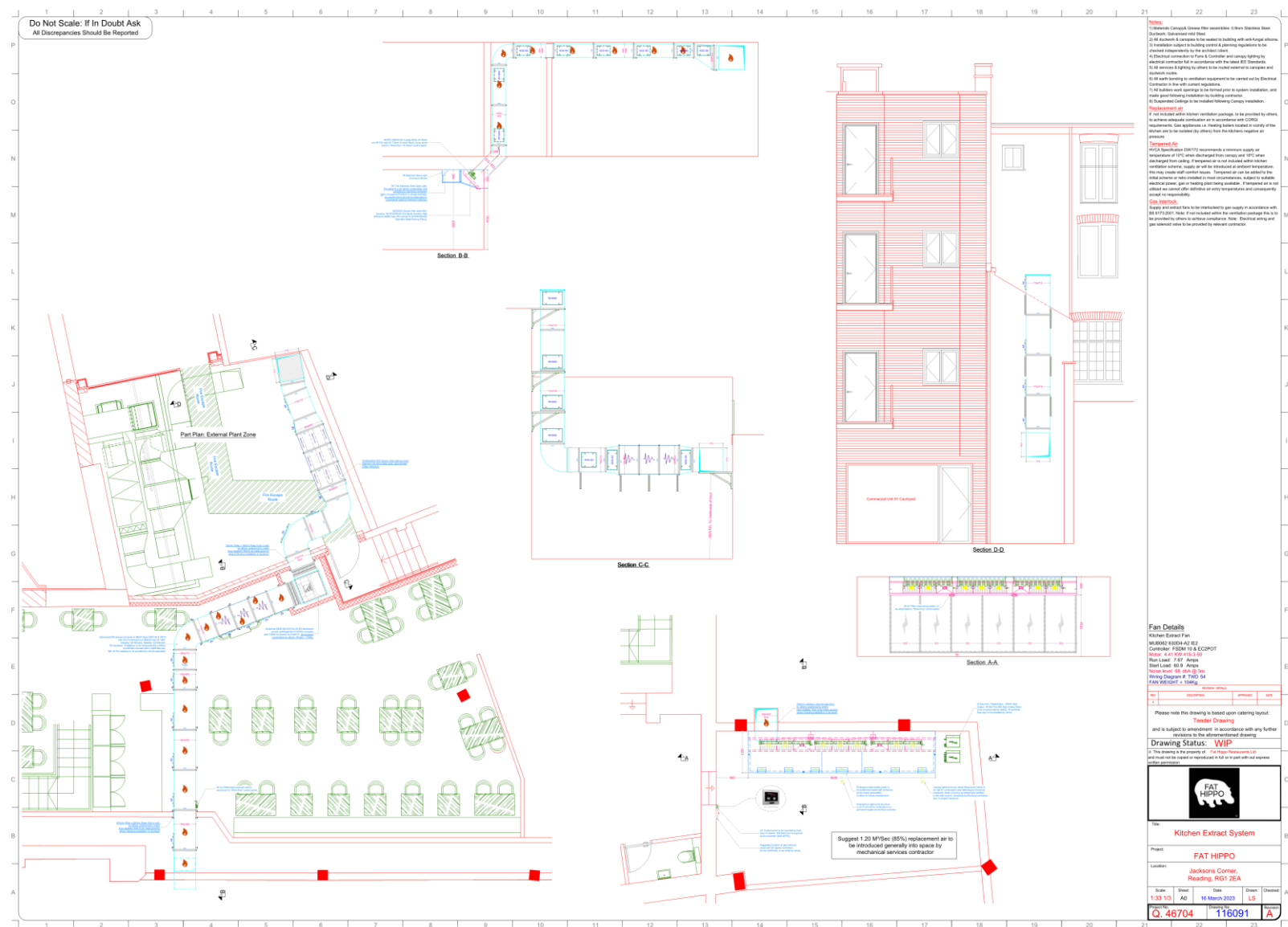
SITE / BLOCK PLAN

N.B.		
ALL DIMENSIONS ARE TO BE VERIFIED ON SITE BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE CLIENT/ARCHITECT PRIOR TO CONSTRUCTION.		
REV	DESCRIPTION	DATE
A	SCALE BAR ADDED	15.09.22



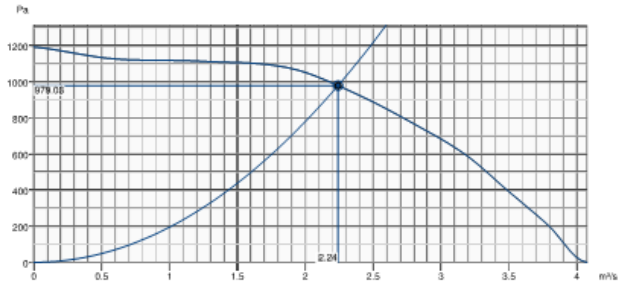
John Taylor
Architects Ltd.
The Studio, 44 High West Road
Gresham, Cheshire, CH13 9ET
Tel/Fax: 01368 761724 / 01368 761910
E-mail: info@jta-architects.co.uk

client	FAT HIPPO GROUP
dep	PROPOSED SITE/BLOCK PLAN
site	UNIT 2 JACKSONS CORNER KINGS WALK REAR WALL FOOT WAY
scale	1:250 @ A1
dep. no.	22.10.PL.008.A



Performance

Performance curve



Hydraulic data

Required air flow	2.24 m³/s
Required static pressure	979 Pa
Working air flow	2.24 m³/s
Working static pressure	979 Pa
Air density	1.204 kg/m³
Power	4298.4 W
Fan control - RPM	1465 rpm
Current	7.73 A
SFP	1.918 kW/m³/s
Control voltage	400.0 V
Supply voltage	400 V

Sound power level		63	125	250	500	1k	2k	4k	8k	Total
Inlet	dB(C)	80	95	87	85	83	78	74	65	97
Outlet	dB(C)	82	97	88	87	85	79	76	67	98
Surrounding	dB(C)	60	79	60	53	53	49	42	30	79
Sound pressure level at 3m (20m² Sabine)	dB(C)	-	-	-	-	-	-	-	-	72
Sound pressure level at 3m free field	dB(C)	-	-	-	-	-	-	-	-	58

Accessories

APPENDIX C:

Acoustic Terminology

C.1 These are the main noise indices in use in the UK:

dB(A): The human ear does not hear all frequencies with the same intensity. It is most sensitive to sounds in the 500 Hz-8 kHz range. Above and below this range the ear becomes progressively less sensitive. To compensate for this, sound level meters incorporate electronic filtering to correspond with the varying sensitivity of the ear. This filtering is called A-weighting and Sound Pressure Levels obtained with this weighting are referred to as A-weighted and signified as dB(A).

L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This unit gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the “background noise level” of an area.

$L_{Aeq, T}$: The equivalent continuous sound pressure level over a period of time, T; (in dBA). This unit may be described as “the notional steady noise level that would provide, over a period, the same energy as the varying noise in question”. In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as road traffic, aircraft and trains.

L_{A1} : The sound pressure level (in dBA) exceeded for 1% of the time. This unit can give an indication of a regular maximum noise level from such activities as dance music.

L_{Ae} : The sound exposure level, (previously denoted SEL) is the noise level of an event, such as a train or aircraft event, normally expressed in a 1 second time period.

L_{Amin} : The minimum sound pressure level (in dBA) measured over the time period.

L_{Amax} : The maximum level of sound (in dBA), i.e. the peak level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.