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Project:

IVF Fertility Clinic, 1-6 Christopher Place, NW1

Title:

Plant Noise Impact Assessment

quietly moving forward

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Report Title	IVF Fertility Clinic, 1-6 Christopher Place, NW1 Plant Noise Impact Assessment
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Client	Wilby & Burnett LLP
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0			

CONTENTS:

1 INTRODUCTION

1.01 Environmental Equipment Corporation Limited has been commissioned by Wilby & Burnett LLP to undertake a noise assessment of mechanical services plant to serve a proposed IVF Fertility Clinic at 1-6 Christopher Place.

1.02 This noise assessment has been conducted in accordance with the policies and requirements of The London Borough of Camden Council (LBCC) and, in light of the ongoing Covid-19 restrictions in the UK, adopts the *Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments by the Association of Noise Consultants [ANC] and the Institute of Acoustics [IOA] Version 6* dated 12th January 2021.

1.03 This assessment includes a description of relevant metrics by which to determine the impact of proposed plant noise at the most affected noise sensitive receivers; this includes an assessment using LBCC's "traffic light system" as well as adopting guidance from the National Planning Policy Framework.

1.04 This report is prepared solely for Wilby & Burnett LLP. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party.

Note that the contents contained herein are produced for the purposes of review by relevant Planning Authority departments and do not constitute a detailed design or specification document to be used for the purposes of construction. Subsequent development of noise mitigation schemes shall engage EEC Ltd and Wilby & Burnett LLP so as to support the conclusions of this report.

1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

2 SITE

2.01 An IVF Fertility Clinic is proposed to be constructed as part of this application at the former site of Blossom Lower School, Christopher Place. The property lies behind four-storey mixed-use commercial and residential properties fronted on Chalton Street. The area immediately surrounding the proposed IVF Fertility Clinic is overlooked by residential apartment buildings situated between Chalton Street and Churchway.

As part of this application, it is proposed that a supply and extract air handling unit (AHU) and associated condenser unit is installed within a ground-floor courtyard at the north of the property.

2.02 The property is bound by the following:

North	21 – 27 Chalton Street a six-storey residential apartment building, with south facing windows that overlook the ground floor courtyard at 3rd floor and above;
East	13 – 19 Chalton Street four-storey mixed use commercial and residential properties with Chalton Street beyond;
South	Mixed use commercial and residential properties the tallest of these being the *Unison* commercial building at eleven-stories high; and
West	Residential apartment buildings, the closest being five-stories high with windows that overlook the courtyard.

Aerial views of the site are presented in Appendix B.

2.03 The closest noise sensitive receptors to the proposed plant items are the following;

- The top-floor east-facing residential windows of the five-storey apartment building to the west of the site; and
- The third-floor south-facing residential windows of 21 – 27 Chalton Street.

2.04 All other noise sensitive receptors are at a greater distance from the proposed location of the units, or are protected by more screening by the intervening structures, and as such will be subject to lower levels of noise.

3 GUIDANCE

3.01 LBCC's Local Plan outlines a framework within which the Authority assesses the acceptability of mechanical services noise as it affects existing residential amenity. Proposals are categorised using a traffic light system as follows:

- **Green** Where noise is considered to be at an acceptable level
  (plant noise is -10dB with respect to the background noise level)
  LOAEL (lowest observed adverse effect level)
- **Amber** A range over which the impact of the noise could be considered adverse to varying degrees though maybe acceptable when considered in context
  (plant noise ranges between -5dB to +5dB with respect to the background noise level)
  LOAEL – SOAEL
- **Red** Where noise is observed to have a significant adverse effect
  (plant noise is greater than 5dB above the background noise level)
  SOAEL (significant observed adverse effect level)

3.02 Plant noise levels are assessed in accordance with *BS4142:2014: 'Methods for rating and assessing industrial and commercial sound'*.

3.03 It is noted that normally, where plant noise rating level is 10 dB or more less than the background noise, this is usually considered as the NOEL (no observed effect level) rather than LOAEL (lowest observed adverse effect level). In the context of the background noise the LOAEL is commonly adopted as the point at which the introduction of a new noise would lead to a background increase greater than 1 dB, however such incremental changes are not generally perceptible in the general population so the impact of such a change would be considered to be 'minor' in the short term and 'negligible' in the long term.

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekday period, between 0955 hours on Friday 16th April 2021 and concluded 1255 hours Tuesday 20th April, to establish the existing noise levels at the site. The survey methodology and results are set out below.

4.02 Noise measurements have been carried out at the following position, as shown in Appendix B and described as being located in the rear courtyard at ground-floor level approximately 2 metres above the ground. The measurement was not located within 3.5 metres of any reflecting surfaces other than the mounting surface.

4.03 The survey was undertaken during a nationwide lockdown imposed due to the ongoing Covid-19 Pandemic. The restrictions imposed during the measurement period are expected to have resulted in subdued noise levels based on restrictions on the opening of non-essential retail and hospitality along with public movement. Therefore, the noise levels recorded are expected to be a likely representative of a worst-case background noise level at the assessed neighbouring noise sensitive windows.

5 EQUIPMENT

5.01 Equipment for the survey was as follows:-

- Brüel & Kjær type 2250 Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994.
- Brüel & Kjær Condenser Microphone and Connecting Leads.
- Brüel & Kjær Outdoor Microphone Kit, type UA1404.
- Tripod.

5.02 The equipment holds current UKAS or equivalent accreditation and serial numbers as follows:

Sound Level Meter B&K2250	Serial No.	3007298
	Calibration Date	18th June 2019
	Cal Certificate No.	U32099
½" Condenser Mic. B&K4189	Serial No.	2978645
	Calibration Date	18th June 2019
	Cal Certificate No.	32098
Calibrator B&K4231	Serial No.	3018006
	Calibration Date	30th July, 2020
	Cal. Certificate No.	U35359

N.B. Copies of calibration certificates are available upon request.

5.03 The equipment was calibrated both before and after the survey with no difference noted in the levels.

6 RESULTS

6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind for the duration of the survey.

6.02 Noise sources at the site included on-site construction activity on Friday 16th, Monday 19th and Tuesday 20th April between 0800 – 1600 hrs. At other times during the survey period, noise sources included local and distant road traffic and existing mechanical plant serving neighbouring apartment buildings.

6.03 A list of the levels measured is included in Appendix D and represented graphically in Appendix E.

6.04 A summary of the time averaged ambient levels and lowest measured background levels over the measurement periods are shown in Table 6.1. The minimum L_{A90} is the lowest five-minute measurement in the specified period.

Position	Period	Average $L_{Aeq,T}$ – dB	Minimum L_{A90} – dB
Surrounding residential windows	Day time (0700-1900 hrs)	68	41
	Evening (1900-2300 hrs)	48	42
	Night-time (2300-0700 hrs)	48	41

Table 6.1: Free-Field Measured Ambient and Lowest Background Noise Levels

7 PLANT ASSESSMENT

7.01 It is proposed that a *Swegon GOLD F SD CX* air handling unit (AHU) and a *Toshiba SM1603AT-E1* condenser unit are installed at the ground-floor level courtyard at the north of the property.

7.02 The proposed plant has the following noise levels:

Swegon GOLD F SD CX air handling unit (AHU):

Fresh Air Intake:	73 dB(A) induct sound power level
Exhaust Air:	69 dB(A) induct sound power level
Casing breakout:	55 dB(A) sound power level

Toshiba SM1603AT-E1: 70 dB(A) sound power level (heating mode)

The proposed plant is required to operate at any time.

7.03 The air handling unit will be housed within a fully sealed acoustic panelwork enclosure designed to reduce noise emissions by 12 dB. The atmospheric duct terminations will be fitted with attenuators designed reduce these noise emissions to levels described below.

The condenser unit will be installed within a bespoke acoustic enclosure designed to reduce noise emissions by 18 dB.

7.04 Predicted noise levels have been calculated to the identified most affected noise sensitive windows: the top-floor east-facing residential windows of the five-storey apartment building to the west of the site; and the third-floor south-facing residential windows of 21 – 27 Chalton Street.

7.05 Other residential receptors located further from the site will be subject to lower noise levels than those predicted at the above locations.

7.06 Tables 7.2 – 7.11 present the results of worst-case plant noise predictions at the worst-case locations.

Item	Noise Level	Notes
Swegon GOLD F SD CX AHU Casing Breakout	55 dB(A)	Sound power level
Noise control	- 12 dB	Acoustic panelwork enclosure
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Conformal area losses over 10 metres	- 31 dB	Distance to closest window
Total Noise Level	18 dB(A)	Apartment building to west of site

Table 7.2: Top-floor east-facing residential windows of the five-storey apartment building to the west of the site AHU Breakout Noise Calculation

Item	Noise Level	Notes
Swegon GOLD F SD CX AHU Fresh air intake	73 dB(A)	Sound power level (in duct)
In-duct losses	- 26 dB	End reflections and duct attenuator
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Hemispherical losses over 10 metres	- 28 dB	Distance to closest window
Total Noise Level	25 dB(A)	Apartment building to west of site

Table 7.3: Top-floor east-facing residential windows of the five-storey apartment building to the west of the site AHU FAI Noise Calculation

Item	Noise Level	Notes
Swegon GOLD F SD CX AHU Exhaust air	69 dB(A)	Sound power level (in duct)
In-duct losses	- 21 dB	End reflections and duct attenuator
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Hemispherical losses over 10 metres	- 28 dB	Distance to closest window
Total Noise Level	26 dB(A)	Apartment building to west of site

Table 7.4: Top-floor east-facing residential windows of the five-storey apartment building to the west of the site AHU Exhaust Noise Calculation

Item	Noise Level	Notes
Toshiba SM1603AT-E1 Condenser unit	70 dB(A)	Sound power level
Noise control	- 18 dB	Acoustic panelwork enclosure
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Conformal area losses over 10 metres	- 31 dB	Distance to closest window
Total Noise Level	27 dB(A)	Apartment building to west of site

Table 7.5: Top-floor east-facing residential windows of the five-storey apartment building to the west of the site Condenser Noise Calculation

Item	Noise level at receiver
Swegon GOLD F SD CX AHU Casing Breakout	18 dB(A)
Swegon GOLD F SD CX AHU Fresh air intake	25 dB(A)
Swegon GOLD F SD CX AHU Exhaust air	26 dB(A)
Toshiba SM1603AT-E1 Condenser unit	27 dB(A)
Total Noise level at Five-storey apartment building to west of site	**31 dB(A)**

Table 7.6: Top-floor east-facing residential windows of the five-storey apartment building to the west of the site Total Plant Noise Calculation

Item	Noise Level	Notes
Swegon GOLD F SD CX AHU Casing Breakout	55 dB(A)	Sound power level
Noise control	- 12 dB	Acoustic panelwork enclosure
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Conformal area losses over 7.5 metres	- 29 dB	Distance to closest window
Barrier effect	- 5 dB	Screening due to courtyard boundary
Total Noise Level	15 dB(A)	21 – 27 Chalton Street

Table 7.7: Third-floor south-facing residential windows of 21 – 27 Chalton Street AHU Breakout Noise Calculation

Item	Noise Level	Notes
Swegon GOLD F SD CX AHU Fresh air intake	73 dB(A)	Sound power level (in duct)
In-duct losses	- 26 dB	End reflections and duct attenuator
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Hemispherical losses over 7.5 metres	- 26 dB	Distance to closest window
Barrier effect	- 5 dB	Screening due to courtyard boundary
Total Noise Level	22 dB(A)	21 – 27 Chalton Street

Table 7.8: Third-floor south-facing residential windows of 21 – 27 Chalton Street AHU FAI Noise Calculation

Item	Noise Level	Notes
Swegon GOLD F SD CX AHU Exhaust air	69 dB(A)	Sound power level (in duct)
In-duct losses	- 21 dB	End reflections and duct attenuator
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Hemispherical losses over 7.5 metres	- 26 dB	Distance to closest window
Barrier effect	- 5 dB	Screening due to courtyard boundary
Total Noise Level	23 dB(A)	21 – 27 Chalton Street

Table 7.9: Third-floor south-facing residential windows of 21 – 27 Chalton Street AHU Exhaust Noise Calculation

Item	Noise Level	Notes
Toshiba SM1603AT-E1 Condenser unit	70 dB(A)	Sound power level
Noise control	- 18 dB	Acoustic panelwork enclosure
Reverberant build up within courtyard	+ 6 dB	Reflections off courtyard walls
Conformal area losses over 7.5 metres	- 29 dB	Distance to closest window
Barrier effect	- 5 dB	Screening due to courtyard boundary
Total Noise Level	24 dB(A)	21 – 27 Chalton Street

Table 7.10: Third-floor south-facing residential windows of 21 – 27 Chalton Street Condenser Noise Calculation

Item	Noise level at receiver
Swegon GOLD F SD CX AHU Casing Breakout	15 dB(A)
Swegon GOLD F SD CX AHU Fresh air intake	22 dB(A)
Swegon GOLD F SD CX AHU Exhaust air	23 dB(A)
Toshiba SM1603AT-E1 Condenser unit	24 dB(A)
Total Noise level at 21 – 27 Chalton Street	**28 dB(A)**

Table 7.11: Third-floor south-facing residential windows of 21 – 27 Chalton Street Total Plant Noise Calculation

7.07 Putting the above calculated plant noise into context using relevant guidance discussed in Section 3 of this report, the following should be considered.

7.08 Based on the standard requirements of LBCC and as described in sections 3.02 – 3.04, the LOAEL or **Green** rating is achieved when plant noise is at least 10 dB below the lowest measured background noise level in each time period.

7.09 Following the guidance of the NPPF and NPSE achieving 10 dB below the background would be considered equivalent to the NOEL.

7.10 The proposed plant items do not display any tonal or intermittent characteristics whereby an acoustic correction should be applied.

7.11 The following table summarises the calculated plant noise emission levels for the day/evening and night-time periods and compares them to the background noise and compliance with the relevant standards, guidance and policy discussed above.

Location	Period	Measured Existing $L_{A90,T}$	Calculated Plant Noise Level at Receiver L_{Ar}	LBCC rating system	
				Calculated noise relative to background	LBCC Criteria
Five-storey apartment building to west of site	Day	41 dB	31 dB	- 10 dB	Green
	Evening	42 dB	31 dB	- 11 dB	Green
	Night	41 dB	31 dB	- 10 dB	Green
21 – 27 Chalton Street	Day	41 dB	28 dB	- 13 dB	Green
	Evening	42 dB	28 dB	- 14 dB	Green
	Night	41 dB	28 dB	- 13 dB	Green

Table 7.12: Plant noise compliance

7.12 Assuming that the proposed plant and noise control equipment and measures specified in section 7.03 are included in the installation, the below criteria is achieved at the most affected noise sensitive receptors:

Local Planning Policy In accordance with LBCC's policy the assessed noise levels would fall in to the category '***Green*** *- Where noise is considered to be at an acceptable level (plant noise is -10 dB with respect to the background noise level) LOAEL.*

8 CONCLUSIONS

8.01 Wilby & Burnett LLP has appointed Environmental Equipment Corporation Limited to undertake a noise assessment for proposed plant to be installed within an existing courtyard at the north a proposed IVF Fertility Clinic.

8.02 The assessment has been based on relevant metrics based on the requirements of the LBCC and adopts guidance from National Planning Policy Framework. This is based on an environmental noise survey conducted at the site over a mid-week period.

8.03 A noise assessment has been undertaken to evaluate the potential noise impact of the proposed plant at the most affected existing residential receptors using guidance from relevant standards.

8.04 Plant noise ratings have been assessed based on the methodology contained in BS4142. Using the results of a background noise survey and based on the "traffic light" metric adopted by LBCC, the resultant noise level will achieve a **'Green'** criterion.

8.05 Predictions have shown that the **'Green'** criteria is achieved at all assessment locations during all periods of the proposed plant operation, assuming, noise control equipment and measures specified in section 7.02 are installed and implemented.

8.06 Assessing the site in accordance with the principles of the National Planning Policy Framework has shown that predicted noise levels would be below the level at which no effects are observed to occur, the NOEL.

8.07 On the basis of this assessment, it is considered that noise does not pose a material constraint to the operation of proposed plant.

APPENDIX A

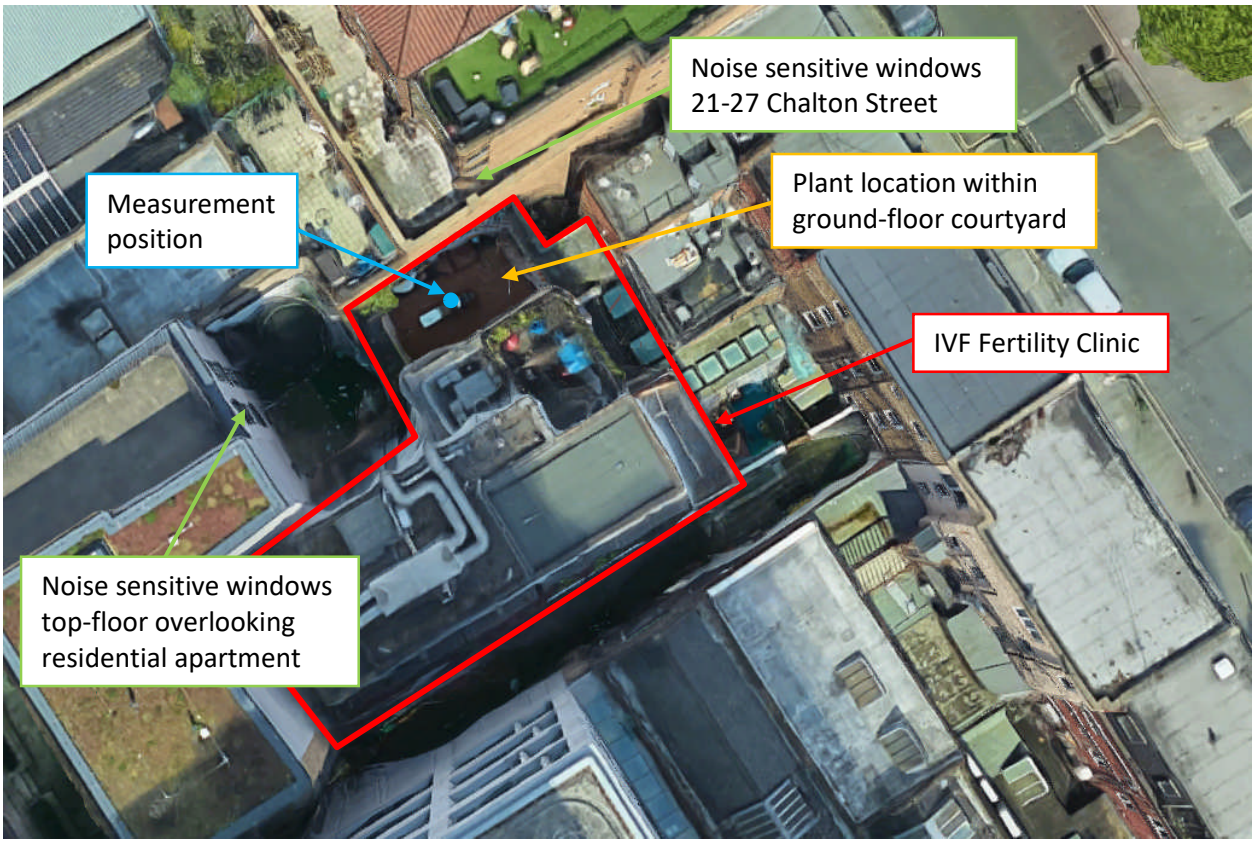
GLOSSARY OF TECHNICAL TERMS

ACOUSTIC TERMINOLOGY

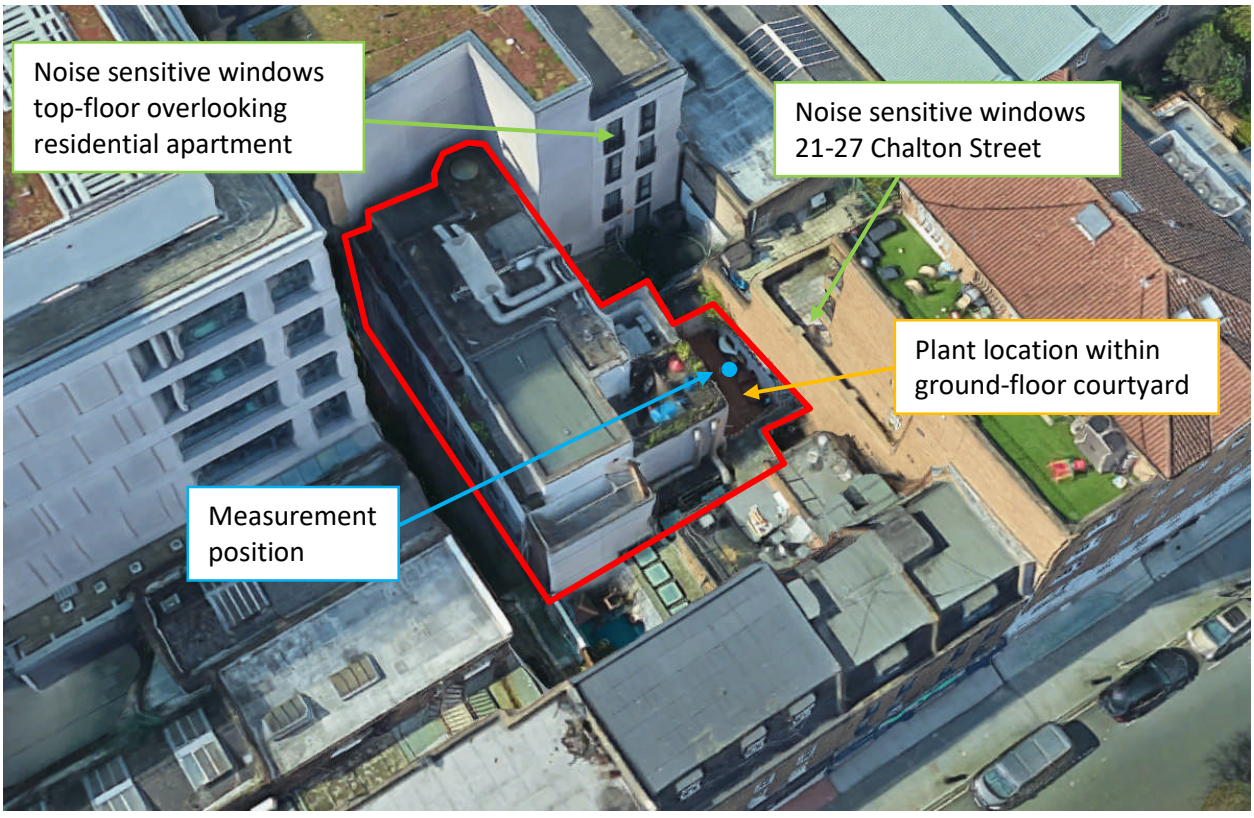
Absorption Classes	The sound absorption of a material is rated from Class A to Class E, where Class A materials provide the highest level of sound absorption.
Ambient Noise Levels	Noise levels measured in the absence of noise requiring control, frequently measured to determine the situation prior to the additional of a new noise source.
dB	Decibel. The logarithmic unit of sound level.
dBA	A-weighted decibel. The A-weighting approximates the response of the human ear.
$D_{nT,w}$	Weighted standardized level difference. A single number quantity of the sound level difference between two rooms. $D_{nT,w}$ is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling. Measured in accordance with BS EN ISO 16283-1 and weighted in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	The weighted element-normalized level difference. A single number rating of the sound reduction provided by a sound passing through an individual element. $D_{n,e,w}$ is typically used to define the sound insulation provided by ventilators. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4kHz, roughly equal to the range of frequencies on a piano.
Impact Sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
$L_{Aeq,t}$	The equivalent continuous sound level measured in dBA. This is commonly referred to as the average noise level. 't' is the interval time for the measurement. Typically 't' of 16hrs and 8hrs is used for day and night time ambient noise respectively or 't' is defined by the period of interest in BS4142 assessments.
$L_{A90,t}$	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L'_{nT,w}$	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard "tapper" machine. The lower the $L'_{nT,w}$, the better the acoustic performance. Measured in accordance with BBS EN ISO 140-7 and rated in accordance with BS EN ISO 717-2.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave Band	Frequencies are often grouped together into octaves for analysis. Octave bands are labelled by their centre frequency which are: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.
Reverberation Time (T_{mf})	Reverberation time is used for assessing the acoustic qualities of a space. It is defined as the time it takes for an impulse to decay by 60dB. T_{mf} is the arithmetic average of the reverberation time in the mid frequency bands (500Hz, 1kHz and 2kHz).
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Sound Absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. Sound absorption refers to the ability of a material to absorb sound, rated from 0, complete reflection, to 1, complete absorption.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to prevent the travel of sound.
Structure-borne transmission	Transmission of sound energy as vibrations via the structure of a building.

APPENDIX B

SITE PLAN
&
MEASUREMENT LOCATION



Plan view north top



Aerial view East

APPENDIX C

PLANNING POLICY AND GUIDANCE

PLANNING POLICY AND GUIDANCE

Planning Policy Camden Borough Council

London Borough of Camden's planning policy is set out in a range of documents that constitute its 'development plan'. This includes its Local Plan and Camden Planning Guidance (CPG) documents. The Local Plan was adopted on 3 July 2017 and has replaced the 'Core Strategy' and 'Camden Development Policy' documents; as the basis for planning decisions and future development in the borough. The CPG for amenity spaces has been adopted January 2021.

Policy A4 – *Noise and Vibration* outlines the following aims:

> *The Council will seek to ensure that noise and vibration is controlled and managed.*
>
> *Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:*
>
> *a. development likely to generate unacceptable noise and vibration impacts; or*
> *b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*
>
> *We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.*

Appendix 3 of the Local Plan outlines noise thresholds for both noise generating and noise sensitive developments and identifies three basic design criteria upon which the acceptability of any proposal is likely to be assessed:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

In the context of National Planning Policy Framework and Noise Policy Statement for England, Camden Council consider the above criteria to fall into three associated categories in terms of their noise 'effects':

- LOAEL Green
- LOAEL to SOAEL Amber
- SOAEL Red

Table C of Appendix 3 defines the target noise levels for mechanical services plant and machinery:

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

National Planning Policy Framework and the Noise Policy Statement for England

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 (as amended on 19th June 2019) and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

Paragraph 170 in Section 15 of the NPPF (2019), entitled Conserving and enhancing the natural environment, states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"*

Paragraph 180 in Section 15 also states that:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…"*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

> *"NOEL – No Observed Effect Level*
>
> *This is 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.*
>
> *LOAEL – Lowest Observed Adverse Effect Level*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:*

avoid significant adverse impacts on health and quality of life;

mitigate and minimise adverse impacts on health and quality of life; and

where possible, contribute to the improvement of health and quality of life."

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

2.25 This aim (the third aim)*, seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."*

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

British Standard 4142

To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' has been used to assess the likelihood any adverse impacts based on the resultant noise level from the new plant item, including any corrections for the character of the noise against the existing background noise level.

BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.
- A difference of +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 noise level, the less likely it is that the specific sound source will have an adverse impact or 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 sound impact, depending on the context.

This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq}.
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

BS 4142 goes onto state that:

'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 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.'

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX D

SURVEY RESULTS
(TABULAR)

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

Wilby & Burnett LLP

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
09:55	76	83	48
10:00	77	88	50
10:05	80	93	48
10:10	71	86	48
10:15	49	54	46
10:20	48	55	45
10:25	49	61	45
10:30	50	60	47
10:35	49	60	47
10:40	59	73	45
10:45	73	90	44
10:50	57	72	45
10:55	52	64	45
11:00	59	74	45
11:05	50	63	45
11:10	52	67	45
11:15	50	59	45
11:20	59	68	45
11:25	61	76	46
11:30	51	59	46
11:35	50	63	45
11:40	55	63	46
11:45	65	84	44
11:50	62	76	45
11:55	65	77	45
12:00	65	81	45
12:05	51	61	44
12:10	55	67	46
12:15	55	67	46
12:20	52	67	45
12:25	55	66	45
12:30	59	72	45
12:35	62	75	45
12:40	58	68	46
12:45	57	70	45
12:50	55	69	45
12:55	56	73	45
13:00	51	67	45
13:05	49	63	45
13:10	56	67	45
13:15	53	62	45
13:20	46	52	45
13:25	50	60	45
13:30	65	82	46
13:35	57	71	45
13:40	59	71	46
13:45	60	72	47
13:50	64	78	47

Time	L_{Aeq}	L_{AMax}	L_{A90}
13:55	75	89	47
14:00	71	86	48
14:05	69	86	47
14:10	57	69	46
14:15	59	73	45
14:20	66	85	45
14:25	57	72	45
14:30	59	73	45
14:35	68	82	46
14:40	68	86	45
14:45	59	71	46
14:50	67	85	45
14:55	55	64	45
15:00	51	60	45
15:05	54	64	45
15:10	59	72	45
15:15	53	64	44
15:20	49	59	45
15:25	53	66	45
15:30	50	64	45
15:35	56	72	45
15:40	59	75	45
15:45	72	88	44
15:50	60	71	45
15:55	50	64	44
16:00	49	64	44
16:05	48	60	44
16:10	48	59	44
16:15	49	59	44
16:20	46	52	44
16:25	46	55	43
16:30	48	57	44
16:35	46	51	44
16:40	49	60	44
16:45	47	56	44
16:50	46	56	44
16:55	46	53	44
17:00	47	53	44
17:05	57	77	44
17:10	47	53	44
17:15	47	53	44
17:20	47	56	43
17:25	48	63	44
17:30	55	68	44
17:35	48	58	44
17:40	55	67	45
17:45	52	67	45
17:50	47	54	44

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

Wilby & Burnett LLP

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
17:55	47	53	44
18:00	47	55	44
18:05	49	60	45
18:10	47	57	44
18:15	48	59	44
18:20	53	67	44
18:25	47	57	44
18:30	48	57	45
18:35	49	58	45
18:40	48	56	45
18:45	47	56	44
18:50	49	59	45
18:55	48	54	45
19:00	47	54	45
19:05	47	53	45
19:10	47	53	45
19:15	49	60	45
19:20	47	54	45
19:25	47	55	45
19:30	49	58	45
19:35	53	68	45
19:40	48	57	44
19:45	47	52	44
19:50	57	73	45
19:55	48	57	45
20:00	48	60	44
20:05	48	59	44
20:10	49	60	45
20:15	50	63	45
20:20	53	70	45
20:25	47	55	44
20:30	53	67	45
20:35	48	58	45
20:40	46	52	45
20:45	46	49	44
20:50	52	69	44
20:55	47	55	44
21:00	45	48	44
21:05	46	49	44
21:10	45	50	43
21:15	45	49	43
21:20	49	63	44
21:25	52	69	44
21:30	46	57	43
21:35	45	51	43
21:40	45	52	43
21:45	45	50	43
21:50	46	52	44

Time	L_{Aeq}	L_{AMax}	L_{A90}
21:55	47	59	43
22:00	49	60	43
22:05	47	54	44
22:10	46	52	43
22:15	45	49	43
22:20	46	57	43
22:25	49	65	43
22:30	52	67	43
22:35	45	53	43
22:40	45	50	43
22:45	45	50	43
22:50	47	59	42
22:55	48	64	43
23:00	44	47	42
23:05	48	60	43
23:10	44	48	42
23:15	45	50	42
23:20	45	47	43
23:25	45	54	42
23:30	44	49	42
23:35	44	51	42
23:40	45	47	43
23:45	45	50	42
23:50	44	47	42
23:55	46	54	43
00:00	47	61	42
00:05	45	51	43
00:10	45	52	42
00:15	44	48	42
00:20	44	48	42
00:25	46	57	42
00:30	44	48	42
00:35	44	48	42
00:40	45	58	42
00:45	44	49	43
00:50	44	48	42
00:55	45	55	42
01:00	44	58	41
01:05	44	50	41
01:10	44	49	42
01:15	44	53	42
01:20	44	47	42
01:25	43	45	42
01:30	46	60	41
01:35	43	52	42
01:40	43	48	41
01:45	44	49	42
01:50	43	47	42

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:55	43	49	42
02:00	43	49	41
02:05	43	45	42
02:10	43	47	42
02:15	43	47	41
02:20	43	51	41
02:25	43	45	41
02:30	43	47	41
02:35	43	48	41
02:40	43	46	42
02:45	43	46	42
02:50	43	49	42
02:55	43	47	41
03:00	43	46	41
03:05	43	50	41
03:10	43	53	41
03:15	42	44	41
03:20	43	47	41
03:25	43	47	41
03:30	43	45	42
03:35	43	50	41
03:40	43	47	41
03:45	43	46	41
03:50	43	46	41
03:55	43	46	41
04:00	43	46	41
04:05	43	45	41
04:10	43	47	41
04:15	43	47	41
04:20	43	47	41
04:25	43	46	41
04:30	43	45	41
04:35	43	46	41
04:40	43	50	41
04:45	43	51	41
04:50	43	50	41
04:55	43	50	42
05:00	43	47	42
05:05	43	47	41
05:10	51	65	42
05:15	44	47	42
05:20	46	55	42
05:25	44	49	42
05:30	47	61	42
05:35	46	54	42
05:40	47	56	43
05:45	45	55	42
05:50	48	64	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
05:55	53	68	42
06:00	54	65	43
06:05	45	50	43
06:10	45	51	43
06:15	45	54	42
06:20	50	66	43
06:25	45	49	42
06:30	47	60	43
06:35	47	61	43
06:40	45	54	43
06:45	46	58	43
06:50	49	62	43
06:55	47	59	43
07:00	46	61	43
07:05	55	69	43
07:10	45	52	43
07:15	45	49	43
07:20	45	49	43
07:25	46	54	43
07:30	50	64	43
07:35	50	62	43
07:40	46	56	43
07:45	52	65	44
07:50	54	65	43
07:55	46	53	43
08:00	56	68	43
08:05	49	60	43
08:10	50	69	43
08:15	64	74	44
08:20	47	56	43
08:25	49	60	44
08:30	46	56	43
08:35	46	54	43
08:40	52	69	43
08:45	46	55	43
08:50	48	58	43
08:55	46	52	44
09:00	46	54	44
09:05	47	62	44
09:10	46	53	44
09:15	47	60	44
09:20	47	61	44
09:25	46	59	43
09:30	47	61	44
09:35	50	67	43
09:40	45	57	42
09:45	45	50	43
09:50	45	53	43

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

Wilby & Burnett LLP

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
09:55	45	53	43
10:00	45	49	43
10:05	46	52	43
10:10	48	63	43
10:15	46	54	43
10:20	48	58	44
10:25	45	49	43
10:30	46	52	44
10:35	52	66	44
10:40	59	75	44
10:45	49	63	43
10:50	49	58	46
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11:25	51	66	43
11:30	45	48	43
11:35	45	49	43
11:40	46	53	43
11:45	46	55	43
11:50	48	61	43
11:55	50	63	43
12:00	46	55	43
12:05	45	49	43
12:10	45	48	43
12:15	45	51	43
12:20	45	51	43
12:25	45	51	43
12:30	50	68	43
12:35	45	51	43
12:40	45	57	43
12:45	45	54	43
12:50	46	55	43
12:55	45	50	43
13:00	45	51	43
13:05	45	52	43
13:10	46	55	43
13:15	50	64	43
13:20	45	54	43
13:25	47	63	43
13:30	46	54	43
13:35	45	54	43
13:40	45	50	43
13:45	45	49	43
13:50	48	64	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
13:55	50	64	43
14:00	45	52	43
14:05	48	60	43
14:10	46	56	43
14:15	49	58	43
14:20	46	57	43
14:25	45	58	43
14:30	48	58	43
14:35	53	66	44
14:40	45	54	43
14:45	45	51	43
14:50	47	60	43
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15:00	45	48	43
15:05	46	56	43
15:10	48	61	43
15:15	45	54	43
15:20	46	52	43
15:25	47	57	43
15:30	44	50	43
15:35	46	54	44
15:40	46	57	43
15:45	46	54	43
15:50	51	67	43
15:55	45	50	43
16:00	45	49	43
16:05	46	52	44
16:10	46	58	43
16:15	46	60	43
16:20	47	60	42
16:25	50	62	43
16:30	45	54	43
16:35	45	49	43
16:40	45	56	43
16:45	44	48	42
16:50	45	53	43
16:55	45	52	43
17:00	46	58	43
17:05	45	51	43
17:10	45	51	44
17:15	46	55	43
17:20	45	50	43
17:25	46	54	44
17:30	46	55	43
17:35	46	53	43
17:40	47	59	44
17:45	45	51	44
17:50	49	66	43

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

Wilby & Burnett LLP

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
17:55	46	56	43
18:00	46	54	43
18:05	46	55	43
18:10	45	52	43
18:15	45	52	43
18:20	46	57	43
18:25	49	60	44
18:30	46	53	43
18:35	46	61	43
18:40	45	50	44
18:45	49	61	44
18:50	48	58	44
18:55	47	56	44
19:00	49	61	44
19:05	45	50	44
19:10	45	51	43
19:15	46	54	43
19:20	45	50	43
19:25	46	53	44
19:30	49	59	44
19:35	47	56	43
19:40	52	64	43
19:45	46	49	44
19:50	46	50	43
19:55	46	56	43
20:00	47	57	44
20:05	50	67	43
20:10	45	52	43
20:15	46	53	44
20:20	47	60	44
20:25	47	60	44
20:30	48	59	44
20:35	46	51	44
20:40	46	52	44
20:45	46	51	44
20:50	47	55	44
20:55	52	65	44
21:00	45	49	43
21:05	46	58	43
21:10	46	54	43
21:15	49	61	43
21:20	45	54	43
21:25	45	48	43
21:30	46	50	44
21:35	45	49	43
21:40	46	52	44
21:45	51	64	43
21:50	46	56	43

Time	L_{Aeq}	L_{AMax}	L_{A90}
21:55	46	56	43
22:00	45	52	42
22:05	45	53	43
22:10	45	49	43
22:15	51	69	42
22:20	45	56	43
22:25	55	71	43
22:30	45	55	43
22:35	45	50	43
22:40	45	51	42
22:45	46	58	42
22:50	45	52	43
22:55	44	53	42
23:00	44	50	42
23:05	45	55	42
23:10	48	59	43
23:15	44	47	42
23:20	46	55	42
23:25	45	54	43
23:30	47	60	42
23:35	44	49	42
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23:45	44	56	42
23:50	44	50	42
23:55	44	52	42
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00:25	44	50	42
00:30	44	48	42
00:35	44	48	41
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00:50	44	52	42
00:55	44	48	42
01:00	44	53	41
01:05	44	52	41
01:10	43	46	42
01:15	43	47	42
01:20	43	47	42
01:25	43	46	42
01:30	43	48	42
01:35	43	48	42
01:40	44	55	41
01:45	43	45	42
01:50	44	56	42

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:55	44	52	41
02:00	48	61	41
02:05	43	46	41
02:10	43	49	42
02:15	43	45	41
02:20	43	48	41
02:25	44	50	42
02:30	43	45	41
02:35	44	55	42
02:40	43	46	41
02:45	43	49	42
02:50	42	44	41
02:55	43	48	41
03:00	43	49	41
03:05	43	47	41
03:10	43	49	41
03:15	43	49	41
03:20	42	45	41
03:25	42	45	41
03:30	42	45	41
03:35	42	47	41
03:40	42	45	41
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03:50	43	47	41
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04:15	44	51	41
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04:25	43	46	41
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04:35	43	47	41
04:40	43	50	41
04:45	42	48	41
04:50	43	50	41
04:55	44	54	41
05:00	44	48	41
05:05	44	47	41
05:10	45	58	42
05:15	43	49	41
05:20	50	68	42
05:25	57	65	42
05:30	59	65	42
05:35	59	65	42
05:40	61	70	42
05:45	62	72	42
05:50	58	71	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
05:55	45	51	42
06:00	45	59	42
06:05	43	46	42
06:10	44	51	42
06:15	44	49	42
06:20	44	49	42
06:25	44	52	42
06:30	45	59	42
06:35	44	47	42
06:40	49	66	43
06:45	44	49	42
06:50	47	63	42
06:55	45	59	42
07:00	44	48	42
07:05	46	57	42
07:10	46	61	41
07:15	44	53	41
07:20	46	60	42
07:25	46	56	42
07:30	44	48	42
07:35	44	47	42
07:40	44	51	42
07:45	44	52	42
07:50	46	62	42
07:55	44	47	42
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08:05	46	60	42
08:10	46	58	42
08:15	45	54	42
08:20	46	61	42
08:25	45	52	43
08:30	47	61	42
08:35	57	73	42
08:40	44	50	42
08:45	46	60	42
08:50	58	74	43
08:55	55	70	43
09:00	45	54	42
09:05	46	57	42
09:10	46	53	43
09:15	45	58	43
09:20	44	46	42
09:25	44	58	42
09:30	45	55	42
09:35	52	72	43
09:40	46	56	43
09:45	45	51	43
09:50	47	58	44

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
09:55	45	54	42
10:00	44	49	42
10:05	44	52	42
10:10	45	52	43
10:15	45	54	43
10:20	47	60	43
10:25	44	49	42
10:30	44	47	42
10:35	44	49	43
10:40	44	50	42
10:45	45	52	42
10:50	44	50	42
10:55	44	50	42
11:00	46	60	43
11:05	44	49	42
11:10	44	52	42
11:15	45	51	43
11:20	49	61	43
11:25	47	56	42
11:30	47	58	42
11:35	46	56	42
11:40	44	47	42
11:45	44	51	42
11:50	44	52	42
11:55	53	65	43
12:00	44	47	42
12:05	45	54	42
12:10	45	53	42
12:15	47	61	42
12:20	44	51	42
12:25	44	52	42
12:30	47	57	43
12:35	49	66	43
12:40	45	55	43
12:45	47	57	43
12:50	50	65	43
12:55	48	59	43
13:00	45	54	43
13:05	45	51	43
13:10	46	55	43
13:15	44	48	42
13:20	45	54	42
13:25	45	53	42
13:30	48	62	42
13:35	46	57	42
13:40	45	53	43
13:45	45	53	43
13:50	49	63	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
13:55	53	70	42
14:00	48	64	42
14:05	44	51	42
14:10	45	52	43
14:15	47	58	42
14:20	44	52	42
14:25	45	53	43
14:30	47	58	44
14:35	45	50	43
14:40	47	61	42
14:45	45	51	42
14:50	44	51	42
14:55	45	50	43
15:00	45	53	42
15:05	44	49	42
15:10	45	58	42
15:15	45	53	42
15:20	47	58	42
15:25	45	57	42
15:30	45	52	42
15:35	45	53	42
15:40	47	61	42
15:45	48	60	42
15:50	48	59	43
15:55	47	56	42
16:00	48	61	43
16:05	48	59	43
16:10	53	67	43
16:15	49	65	43
16:20	46	55	43
16:25	46	57	42
16:30	45	52	43
16:35	45	49	43
16:40	46	51	43
16:45	47	58	43
16:50	46	53	43
16:55	53	65	43
17:00	45	53	43
17:05	46	56	43
17:10	45	53	43
17:15	47	58	43
17:20	48	59	44
17:25	47	57	43
17:30	48	56	43
17:35	45	52	42
17:40	44	49	42
17:45	53	67	43
17:50	58	72	43

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
17:55	46	53	43
18:00	51	61	43
18:05	52	69	43
18:10	52	67	43
18:15	50	65	42
18:20	46	53	43
18:25	49	61	44
18:30	50	63	44
18:35	48	62	44
18:40	46	55	43
18:45	49	57	44
18:50	48	59	44
18:55	50	62	44
19:00	48	62	43
19:05	46	53	43
19:10	54	69	44
19:15	49	59	45
19:20	50	65	45
19:25	51	60	45
19:30	48	55	45
19:35	47	57	45
19:40	48	57	44
19:45	51	65	44
19:50	47	54	45
19:55	53	68	44
20:00	47	57	44
20:05	47	60	43
20:10	61	73	43
20:15	47	62	43
20:20	56	68	43
20:25	46	54	43
20:30	45	54	43
20:35	45	51	43
20:40	47	56	43
20:45	46	52	43
20:50	47	60	43
20:55	45	47	43
21:00	45	50	43
21:05	46	55	43
21:10	45	52	43
21:15	46	57	43
21:20	45	55	43
21:25	45	49	43
21:30	46	54	43
21:35	46	55	43
21:40	47	55	43
21:45	45	52	43
21:50	45	50	43

Time	L_{Aeq}	L_{AMax}	L_{A90}
21:55	45	52	43
22:00	46	54	43
22:05	46	53	43
22:10	45	51	43
22:15	48	57	43
22:20	44	49	43
22:25	45	49	43
22:30	46	56	43
22:35	44	48	42
22:40	44	53	42
22:45	44	47	43
22:50	44	48	42
22:55	44	48	42
23:00	44	47	42
23:05	44	48	42
23:10	44	46	42
23:15	45	55	42
23:20	46	57	42
23:25	45	56	43
23:30	44	48	42
23:35	49	67	42
23:40	44	50	42
23:45	44	48	42
23:50	50	68	43
23:55	46	57	43
00:00	49	62	42
00:05	44	51	42
00:10	44	53	42
00:15	44	53	42
00:20	44	47	42
00:25	43	46	42
00:30	43	49	42
00:35	43	46	42
00:40	43	48	42
00:45	57	74	42
00:50	43	48	41
00:55	43	45	42
01:00	43	47	41
01:05	43	48	41
01:10	46	61	41
01:15	43	46	41
01:20	43	50	41
01:25	43	48	41
01:30	43	48	41
01:35	43	51	41
01:40	43	47	41
01:45	43	46	41
01:50	42	47	41

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:55	43	46	41
02:00	43	48	41
02:05	43	48	41
02:10	43	46	41
02:15	43	53	41
02:20	44	55	41
02:25	43	49	41
02:30	45	53	41
02:35	48	66	41
02:40	43	47	41
02:45	42	45	41
02:50	46	55	41
02:55	42	46	41
03:00	45	56	41
03:05	42	45	41
03:10	42	46	41
03:15	42	44	41
03:20	43	49	41
03:25	42	45	41
03:30	42	46	41
03:35	42	48	41
03:40	42	45	41
03:45	43	46	41
03:50	42	46	41
03:55	43	47	41
04:00	43	46	41
04:05	43	48	41
04:10	44	53	41
04:15	44	49	41
04:20	43	46	41
04:25	46	61	41
04:30	43	47	41
04:35	47	56	41
04:40	49	54	41
04:45	47	54	42
04:50	46	52	42
04:55	44	50	42
05:00	46	55	42
05:05	61	71	42
05:10	44	49	42
05:15	46	52	42
05:20	46	61	42
05:25	44	53	42
05:30	45	50	42
05:35	44	48	42
05:40	43	46	42
05:45	53	68	42
05:50	50	63	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
05:55	46	61	42
06:00	44	49	42
06:05	47	63	42
06:10	46	50	43
06:15	51	68	43
06:20	47	58	43
06:25	46	52	43
06:30	46	55	43
06:35	53	71	43
06:40	46	55	43
06:45	46	55	43
06:50	50	63	43
06:55	47	52	43
07:00	47	57	43
07:05	47	54	44
07:10	53	69	43
07:15	48	61	43
07:20	49	59	44
07:25	49	57	44
07:30	49	55	45
07:35	48	62	44
07:40	49	62	44
07:45	51	59	44
07:50	51	64	45
07:55	55	71	45
08:00	52	63	45
08:05	52	60	45
08:10	52	66	45
08:15	52	62	45
08:20	51	59	46
08:25	51	64	45
08:30	52	68	44
08:35	51	65	45
08:40	52	68	45
08:45	52	63	45
08:50	53	69	45
08:55	53	67	45
09:00	52	64	44
09:05	49	57	45
09:10	55	67	45
09:15	57	74	45
09:20	53	66	44
09:25	55	68	45
09:30	52	64	44
09:35	53	66	44
09:40	55	72	45
09:45	52	67	45
09:50	57	73	45

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
09:55	51	62	45
10:00	53	68	45
10:05	47	56	44
10:10	48	63	44
10:15	53	67	44
10:20	47	58	44
10:25	51	65	44
10:30	51	60	45
10:35	54	67	45
10:40	53	64	45
10:45	53	67	45
10:50	50	60	45
10:55	56	73	44
11:00	54	71	45
11:05	53	69	45
11:10	57	69	46
11:15	58	77	45
11:20	54	70	44
11:25	49	57	44
11:30	50	63	44
11:35	49	60	44
11:40	60	76	44
11:45	62	76	45
11:50	77	95	45
11:55	80	95	45
12:00	61	73	45
12:05	70	81	45
12:10	65	84	45
12:15	63	78	44
12:20	65	84	44
12:25	67	80	45
12:30	67	84	45
12:35	74	89	45
12:40	66	81	45
12:45	54	67	45
12:50	54	66	45
12:55	62	80	44
13:00	49	59	44
13:05	48	62	44
13:10	49	61	44
13:15	48	56	44
13:20	49	65	44
13:25	57	73	44
13:30	54	64	45
13:35	54	64	45
13:40	59	72	45
13:45	61	71	46
13:50	63	74	45

Time	L_{Aeq}	L_{AMax}	L_{A90}
13:55	57	70	45
14:00	66	80	45
14:05	68	78	46
14:10	69	77	46
14:15	64	77	46
14:20	68	80	47
14:25	70	83	46
14:30	68	80	46
14:35	64	76	45
14:40	54	66	45
14:45	60	72	46
14:50	63	74	46
14:55	64	76	45
15:00	57	68	45
15:05	54	65	45
15:10	59	75	45
15:15	61	74	46
15:20	53	68	45
15:25	64	79	45
15:30	67	81	46
15:35	68	84	46
15:40	66	80	44
15:45	51	64	44
15:50	49	58	44
15:55	63	82	45
16:00	57	69	45
16:05	58	73	45
16:10	72	88	46
16:15	50	63	45
16:20	50	60	45
16:25	48	57	45
16:30	51	62	45
16:35	48	60	44
16:40	48	59	45
16:45	46	52	43
16:50	48	59	44
16:55	49	61	44
17:00	46	51	44
17:05	53	68	45
17:10	49	61	44
17:15	45	48	44
17:20	49	61	44
17:25	46	50	44
17:30	46	55	44
17:35	49	60	44
17:40	47	55	44
17:45	46	55	43
17:50	46	54	44

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
17:55	47	55	44
18:00	48	57	44
18:05	46	53	44
18:10	47	54	44
18:15	49	62	44
18:20	48	61	44
18:25	47	57	44
18:30	48	65	44
18:35	46	56	43
18:40	46	52	44
18:45	53	66	44
18:50	53	64	44
18:55	46	49	44
19:00	46	59	44
19:05	47	57	44
19:10	48	60	44
19:15	46	56	44
19:20	46	51	44
19:25	46	50	44
19:30	46	56	44
19:35	48	59	44
19:40	47	63	44
19:45	46	52	44
19:50	47	59	43
19:55	47	58	44
20:00	47	56	44
20:05	48	59	44
20:10	57	72	44
20:15	47	57	44
20:20	46	53	43
20:25	49	60	44
20:30	46	51	44
20:35	46	52	44
20:40	46	53	44
20:45	48	61	44
20:50	45	50	44
20:55	47	61	43
21:00	45	50	43
21:05	48	62	43
21:10	45	53	43
21:15	46	55	43
21:20	46	54	43
21:25	46	57	43
21:30	48	60	43
21:35	46	56	43
21:40	48	58	43
21:45	45	56	43
21:50	48	58	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
21:55	49	60	43
22:00	48	58	43
22:05	46	55	43
22:10	48	61	42
22:15	46	57	42
22:20	45	52	42
22:25	47	55	42
22:30	45	54	42
22:35	46	59	42
22:40	46	57	42
22:45	45	53	42
22:50	44	51	42
22:55	44	50	42
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23:05	44	53	42
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23:20	51	69	42
23:25	43	47	41
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23:45	43	52	41
23:50	43	47	42
23:55	44	52	42
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00:10	44	49	42
00:15	43	48	42
00:20	43	49	42
00:25	43	47	42
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00:35	43	46	41
00:40	43	54	42
00:45	43	47	41
00:50	44	57	42
00:55	43	48	41
01:00	43	45	41
01:05	43	54	41
01:10	43	45	41
01:15	43	46	42
01:20	42	48	41
01:25	43	46	42
01:30	42	44	41
01:35	42	46	41
01:40	42	46	41
01:45	43	50	41
01:50	43	51	41

EC 18202 - IVF Fertility Clinic, 1-6 Christopher Place

Wilby & Burnett LLP

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:55	43	53	41
02:00	43	46	41
02:05	42	46	41
02:10	43	47	41
02:15	42	45	41
02:20	43	50	41
02:25	42	53	41
02:30	43	50	41
02:35	44	52	41
02:40	43	46	41
02:45	42	46	41
02:50	42	49	41
02:55	43	46	41
03:00	43	47	41
03:05	42	48	41
03:10	48	64	41
03:15	43	50	41
03:20	43	49	41
03:25	42	46	41
03:30	43	49	41
03:35	42	46	41
03:40	43	50	41
03:45	42	47	41
03:50	44	57	41
03:55	42	45	41
04:00	43	47	41
04:05	43	46	41
04:10	43	53	41
04:15	43	49	41
04:20	43	46	41
04:25	43	47	41
04:30	43	48	41
04:35	43	47	41
04:40	43	50	41
04:45	44	48	42
04:50	44	48	42
04:55	43	48	42
05:00	49	63	42
05:05	43	47	41
05:10	43	46	42
05:15	46	53	42
05:20	59	70	42
05:25	57	67	42
05:30	56	66	42
05:35	55	61	42
05:40	65	72	42
05:45	64	73	42
05:50	56	73	42

Time	L_{Aeq}	L_{AMax}	L_{A90}
05:55	49	60	43
06:00	44	49	42
06:05	47	59	42
06:10	49	60	42
06:15	45	53	43
06:20	45	51	42
06:25	47	61	43
06:30	53	63	43
06:35	45	54	43
06:40	47	58	42
06:45	45	52	42
06:50	45	54	43
06:55	47	56	43
07:00	48	62	43
07:05	46	54	43
07:10	47	57	44
07:15	50	58	45
07:20	48	54	44
07:25	47	58	43
07:30	49	61	43
07:35	48	57	43
07:40	49	65	44
07:45	49	61	44
07:50	50	60	44
07:55	52	66	44
08:00	51	64	44
08:05	54	69	44
08:10	67	82	45
08:15	71	81	48
08:20	72	86	49
08:25	64	77	45
08:30	70	85	46
08:35	66	76	46
08:40	61	72	46
08:45	70	84	50
08:50	81	94	52
08:55	73	90	54
09:00	78	92	54
09:05	76	92	53
09:10	81	95	56
09:15	88	105	54
09:20	81	94	54
09:25	71	85	53
09:30	82	93	55
09:35	84	94	57
09:40	82	93	59
09:45	79	88	58
09:50	79	91	54

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Tabulated Noise data

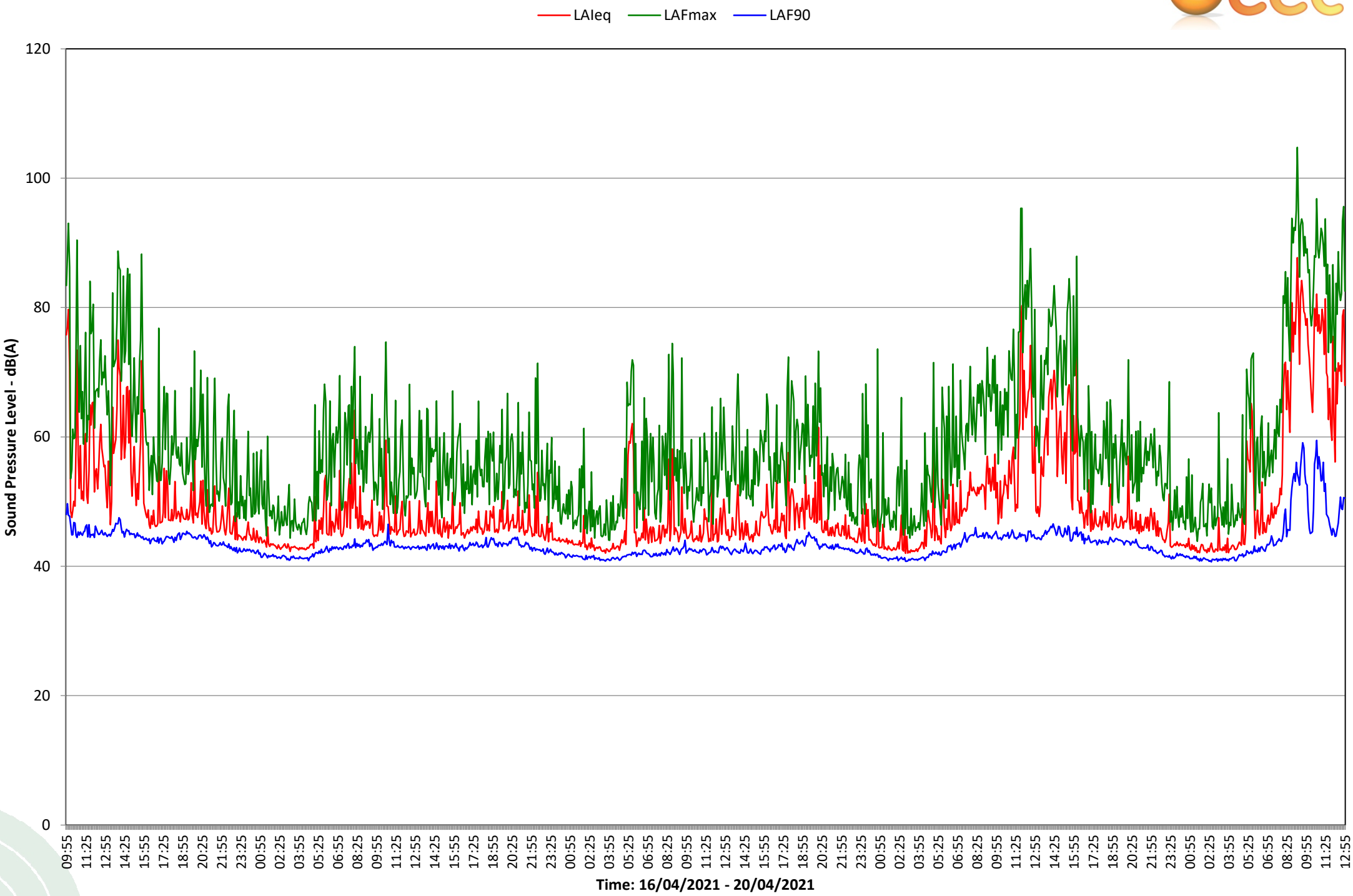
Time	L_{Aeq}	L_{AMax}	L_{A90}
09:55	*77*	*88*	*53*
10:00	*78*	*89*	*53*
10:05	*74*	*85*	*49*
10:10	*72*	*86*	*46*
10:15	*69*	*79*	*45*
10:20	*67*	*77*	*45*
10:25	*64*	*79*	*45*
10:30	*70*	*83*	*49*
10:35	*80*	*88*	*56*
10:40	*77*	*88*	*57*
10:45	*82*	*97*	*59*
10:50	*76*	*89*	*55*
10:55	*79*	*88*	*57*
11:00	*76*	*89*	*56*
11:05	*76*	*92*	*53*
11:10	*80*	*92*	*53*
11:15	*78*	*90*	*56*
11:20	*73*	*86*	*52*
11:25	*81*	*94*	*53*
11:30	*70*	*82*	*48*
11:35	*69*	*87*	*48*
11:40	*63*	*73*	*47*
11:45	*68*	*85*	*46*
11:50	*62*	*75*	*46*
11:55	*59*	*75*	*45*
12:00	*76*	*87*	*46*
12:05	*63*	*77*	*46*
12:10	*56*	*70*	*45*
12:15	*71*	*84*	*45*
12:20	*65*	*79*	*46*
12:25	*71*	*89*	*47*
12:30	*70*	*83*	*49*
12:35	*71*	*81*	*51*
12:40	*69*	*82*	*49*
12:45	*79*	*93*	*49*
12:50	*80*	*96*	*51*
12:55	*68*	*83*	*51*

Time	L_{Aeq}	L_{AMax}	L_{A90}

APPENDIX E

SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at IVF Fertility Clinic, 1-6 Christopher Place



APPENDIX F

PUBLISHED PLANT NOISE DATA

DIGITAL INVERTER

Digital Inverter Outdoor (continued)

CODE			140	200	250
Outdoor Unit		RAV-	**SM1603AT-E1**	**SM2246AT8-E**	**SM2806AT8-E**
Cooling Range (Min. - Max.)		kW	3.0 - 16.0	4.6 - 22.4	4.6 - 27.0
Heating Range (Min. - Max.)		kW	3.0 - 18.0	4.6 - 25.0	4.6 - 31.5
Ambient Operating Range Cooling/Heating		°C	43 to -15/15 to -15	52 to -15/15 to -27	52 to -15/15 to -27
Fan(s)	Motor Power	W	100 + 100	200 + 200	200 + 200
	Standard Air Flow	l/s	1717	2550	3033
	Standard Air Flow	m^3/min	103	153	182
	Standard Air Flow	m^3/h	6180	9180	10920
Sound	Pressure Level C/H	dB(A)	51/53	58/60	61/63
	Power Level C/H	dB(A)	68/70	76/76	78/80
Unit	Appearance		Silky Shade (Muncel 1Y 8.5/0.5)	Silky Shade (Muncel 1Y 8.5/0.5)	Silky Shade (Muncel 1Y 8.5/0.5)
	Heat Exchanger		Finned tube	Finned tube	Finned tube
	Compressor Type		Hermetic Twin Rotary	Hermetic Twin Rotary	Hermetic Twin Rotary
	Compressor Power	kW	3.8	5.6	5.6
	Height x Width x Depth	mm	1340 x 900 x 320	1550 x 1010 x 370	1550 x 1010 x 370
	Total Weight	kg	99	142	142
Refrigerant	Control		Pulse motor valve	Pulse motor valve	Pulse motor valve
	Gas Type		R410A	R410A	R410A
	Base Charge/Chargeless To	kg/m	3.1/30	5.9/30	5.9/30
	Additional Charge Main Liquid Side	g/m	40	80	80
	Replacement Technology	Yes	R22, R407C, R417A, R134a, R12	R22, R407C, R417A, R134a, R12	R22, R407C, R417A, R134a, R12
Pipe Connections	Min.-Max. Length	m	5-50	5-100	5-100
	Height Difference Outdoor To AHU	m	±30	±30	±30
	Gas Side	inch	5/8	1-1/8"	1-1/8"
	Liquid Side	inch	3/8	1/2	1/2
	Drain Port Connector Hose Inner Diameter	mm	16	16	16
Electrical	Power Supply	V/ph/Hz	220-240/1/50	380-415/3/50	380-415/3/50
	Maximum Run Current	A	21.70	10.78	15.06
	Suggested Fused Supply	A	32	16	20

RAV DI

AHU Design
Technical specification

Swegon

Project: IV Clinic (G1041303)
Unit name: 2 - Design data

Date: 08/02/2021
21 / 1.0.20210204.1180144
Unit ID: AD-10000859542

Damper motor: With spring return
Damper blade: Uninsulated
Static pressure drop 1 Pa

1 **Connection frame , outdoor air**
Static pressure drop 1 Pa

1 **Pre heating coil, water, in casing, TCLF008G01**
Valve kit heating/cooling
Incl. actuator, freeze guard sensor, connection cable and valve (kvs = 2,5)
Capacity variant 1
No.of tube rows 1
No.of circuits 4
Connection number 20 ext.
Fin spacing 4.0 mm
Pressure drop 9 Pa
Air velocity 1.86 m/s

	In	Out	
Air temperature	-5.0	10.0	°C
Relative humidity	90	31	%

Required coil capacity 10.06 kW
Excess capacity of the coil 5 %

	In	Out	
Liquid temperature	82.0	71.0	°C

Flow of liquid 0.235 l/s
Liquid pressure drop 7.2 kPa
Liquid volume of the coil 1 l
Liquid type Ethylene-glycol
Ethylene-glycol 30 %/kg
Nom. pipe connection size, valve 15 ext.
Liquid pressure drop, open valve 11.4 kPa

Quantity	Product	Article name
1	Valve kit, heating and cooling	TBVL-3-025-1
1	Controls for preheating coil	TBLZ-2-530

1 **Filter**
Filter class ePM1 50% (F7)
1x(885x407x130)
Velocity in the filter section 1.43 m/s

AHU Design
Technical specification

Swegon

Project: IV Clinic (G1041303)
Unit name: 2 - Design data

Date: 08/02/2021
21 / 1.0.20210204.1180144
Unit ID: AD-10000859542

Recommended design pressure drop	106	Pa
Initial pressure drop	56	Pa
Final pressure drop	156	Pa

1 Fan

Fan of type GOLD Wing+		
Withdrawable fan with integrated airflow measurement		
Direct drive with speed controlled EC motor		
Isolated with internal flexible connection and rubber anti-vibration mounting		
Standard connection, internal		
Supply air flow	0.553	m³/s
The fan system effect is included in the fan performances		
Design static pressure (wet conditions)	753	Pa
Static pressure rise in the SFPv calculation	692	Pa
Temperature rise caused by the fan	1.2	°C
Min speed	400	rpm
Speed in the SFPv calculation	2,290	rpm
Design speed	2,378	rpm
Max speed	3,050	rpm
Design electric power to motor(s)	0.82	kW
Electric power to motor(s) in the SFPv calculation	0.74	kW
Rated motor power/motor	1.60	kW
Motor option	2	
Motor code	DOMEL 747.3.397	
Number of fans/motors in the air stream	1	
Overall static efficiency drive	51.0	%
Maximum motor efficiency (incl. motor control 90.0%)	93.0	%
Efficiency grade; FMEG, plenum fan, incl. motor control	75	
Regulation(EU)No 327/2011 overall efficiency	67.4	%
Specific fan power efficiency	1.34	kW/(m³/s)

Frequency band	63	125	250	500	1k	2k	4k	8k		All	
To supply air duct	72	72	69	65	66	64	56	51	dB	70	dB(A)
To outdoor air duct	79	75	71	71	64	66	64	66	dB	73	dB(A)
To surroundings	71	64	52	54	43	41	36	36	dB	54	dB(A)
To surroundings incl. exh. air	72	65	53	55	44	42	37	37	dB	55	dB(A)

1 Coil heat exchanger, GOLD008F2SDP01

No.of tube rows	12	
No.of circuits	1	
Connection number	15	ext.
Fin spacing	2.0	mm