



Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton on Thames
Surrey. KT12 2TP
t: 01932 230940
f: 01932 230941
e: info@eec.co.uk

Project:

**Land Incorporating 1A Stanley Street,
3-5 Ogden Lane and 1292 Ashton Old
Road, Manchester**

Title:

**External Noise Ingress and Plant
Noise Impact Assessment**



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Client	Sterling Investment Projects Ltd		
Author	Alex Oakes BSc(Hons) Acoustic Engineer 		
Checked	Tim Meed BSc(Hons) MIOA Director 		
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1 INTRODUCTION

- 1.01 Environmental Equipment Corporation Limited has been commissioned by Sterling Investment Projects Ltd to undertake an assessment of external noise ingress and plant noise limits for the proposed new residential apartment block to be located in Openshaw, Manchester.
- 1.02 This assessment has been undertaken in accordance with National and Professional design guidance including the requirements of Manchester City Council (MCC), BS4142:2014, and BS8233:2014, and utilises environmental noise data captured at the site over a representative period.
- 1.03 This assessment includes:
- A summary of the existing external noise levels impinging upon the proposed facades of the building;
 - An assessment of plant noise limits in accordance with the requirements of Manchester City Council and national planning policy, standards and guidance;
 - The prediction of noise impacts at the worst affected noise sensitive receptors based on the proposed MCC plant noise limits; and
 - Guidance on minimum façade sound insulation performance to achieve the ideal design targets of BS8233:2014 for the new dwellings, including outline guidance on suitable glazing specifications.
- 1.04 This report is prepared solely for Sterling Investment Projects Ltd. 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 Sterling Investment Projects Ltd 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 1A Stanley Street, 3-5 Ogden Lane and 1292 Ashton Old Road are three existing properties encompassing a corner plot of land located in a mixed commercial and residential area of Openshaw, Manchester. Current proposals for the site outline the demolition of the existing

structures, which are to be replaced with a multi-storey residential apartment building, six-storeys tall, creating nominally 24 new dwellings.

2.02 The property is immediately bound by the following:

- North – 1291 Ashton Old Road, consisting of retail units at ground floor with residential dwellings on the above floors;
- East – 1296 Ashton Old Road, a large multi-use property with retail units at ground floor;
- South – Residential dwellings of Ryan Street, approximately 65m from the nearest site boundary; and
- West – 1290 Ashton Old Road, consisting of ground floor amenities with residential dwellings above.

2.03 This report details an assessment of external noise ingress into the new dwellings, including outline guidance on minimum glazing specifications, the effects of summary ventilation strategies and the setting of plant noise limits in accordance with Local Authority requirements for new external mechanical services plant. No specific plant data or layouts are available at this stage, though we understand that a number of condenser units will be located at roof level. The site layout is presented in Appendix B.

2.04 The closest and most affected noise sensitive receptors to the roof plant location are expected to be:

- First-floor south-facing windows of 1293 Ashton Old Road. This should be reviewed once the specific plant proposals and positions have been finalised.

3 GUIDANCE

3.01 In the context of government and National Planning policy, Manchester City Council publish a “Planning & Noise Technical Guidance, May 2022” document which outlines the Local Authority aims in respect to assessing the suitability of new developments in the context of noise.

Plant Noise Limits – Local Authority Policy:

3.02 Plant noise limits are given in section 3.7.1.5 for the guidance document:

‘Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location’.

3.03 ‘Rating Levels’ are given with reference to ‘BS4142:2014 + A1 2019: ‘Methods for rating and assessing industrial and commercial sound’’, a summary of which is included in Appendix C.

External Noise Ingress – New Dwellings:

3.04 The MCC noise guidance document states (section 3.7.1.1) that the following internal ambient noise limits are to be adopted within new dwellings:

- **Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)**
- **Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}**
- **Gardens and terraces (daytime) 55 dB L_{Aeq}**

3.05 These targets are based upon maximum recommended Internal Ambient Noise levels (IANLs) for dwellings and those in external amenity areas as given in BS8233:2014 *Guidance on sound insulation and noise reduction for buildings*.

3.06 Ideal values are given based on daytime average ($L_{Aeq,16hour}$) and night-time average ($L_{Aeq,8hour}$) internal noise levels, and apply to all sources of ‘anonymous’ noise found within dwellings – i.e. external noise ingress including traffic noise and the general ambient soundscape.

3.07 The standard recommends the following maximum internal noise levels for residential properties:

Activity	Location	07:00 to 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$

Table 3.1: BS8233:2014 Internal Noise Guidance for Residential Properties.

3.08 With respect to noise affecting external amenity areas and the proposed 55dB L_{Aeq} limit, BS8233 includes the following additional guidance note:

“...it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

3.09 Achieving the above noise levels (as a maximum) is considered consistent with the requirements of the NPPF and offers a typical level of acoustic comfort.

3.10 NOTE 4 in BS8233:2014 additionally states:

‘Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax} , depending on the character and number of events per night. Sporadic events could require separate values.’

3.11 World Health Organisation guidance states that:

‘For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{AFmax} more than 10-15 times per night.’

3.12 On this basis, it is considered that an acceptable further design criterion would be to ensure that the 15th highest maximum noise level is used as the basis for confirming the suitability of the building facade to provide reasonable sleeping conditions overnight.

3.13 The assessment of external noise ingress detailed below has been undertaken using the above design guidance and the noise levels measured at the site in order to advise on the minimum façade sound insulation requirements needed to achieve suitable acoustic conditions.

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekend period, between 1530 hours on Friday 14th May 2022 and concluded 1150 hours Monday 16th May 2022, 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 positions, as shown in Appendix B and described as:

- Position 1: located approximately 2.5m above ground level, mounted to an extendable tripod. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.
- Position 2: located approximately 1.5m above the floor level of the first-floor pitched roof of 1A Stanley Street. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

4.03 These positions are considered to be representative of the existing noise climate at the site and existing neighbouring premises.

5 EQUIPMENT

5.01 The equipment used for the survey at position 1 was as follows:-

- 01dB Fusion Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- GRAS 40CD Condenser Microphone, PRE22 S Pre-amp and Connecting Leads;
- Tripod.

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

Sound Level Meter 01dB Fusion	Serial No.	12241
	Calibration Date	20 th December 2021
	Cal Certificate No.	U33533
	Serial No.	330667

½" Condenser Mic. GRAS 40CD	Calibration Date	20 th December 2021
	Cal Certificate No.	33532
Calibrator CAL 31	Serial No.	89090
	Calibration Date	12 th January 2021
	Cal. Certificate No.	U36745

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

5.03 The equipment used for the survey at position 2 was as follows:-

- 01dB Metravib Black Solo Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- 01dB Metravib MCE 212 Condenser Microphone, PRE 21 S Pre-amp and Connecting Leads;
- 01dB Outdoor Microphone Kit and a
- Tripod.

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

Sound Level Meter 01dB Black Solo	Serial No.	65736
	Calibration Date	21 st October 2021
	Cal Certificate No.	U32975
½" MCE 212 Condenser Mic.	Serial No.	175307
	Calibration Date	21 st October 2021
	Cal Certificate No.	32974
Calibrator CAL 21	Serial No.	34634297
	Calibration Date	21 st October 2021
	Cal. Certificate No.	U37247

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

5.05 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 include local and distant road traffic. There were no other significant sources of noise observed during the attended portions of the survey.
- 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 representative L_{A90} is in this instance the modal 15-minute measurement value in each time period. In accordance with BS8233:2014 and WHO guidance, the 15th highest night-time L_{AFMax} value has also been presented.

Position	Period	Average $L_{Aeq,T}$ – dB	Representative L_{A90} – dB	Range L_{A90} – dB	15 th Highest L_{AFMax}
1 (Front Courtyard Area)	Day time (0700-2300 hrs)	60	44	40 – 58	N/A
	Night-time (2300-0700 hrs)	56	38	34 – 59	76 dB(A)
2 (Rear Roof-Level)	Day time (0700-2300 hrs)	53	42	39 – 57	N/A
	Night-time (2300-0700 hrs)	49	38	36 – 57	69 dB(A)

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

7 PLANT NOISE LIMITS

- 7.01 This report details the calculation of, and setting of, plant noise limits for the proposed new external mechanical services plant to be installed at the above site. At the time of writing, no plant selections have been made or locations confirmed by the Project Team. As such, cumulative plant noise limits have been calculated for the closest and most-affected receiver, identified as the first-floor residential windows of 1293 Ashton Old Road, at approximately 22m from the northern boundary of the site. It is recommended that the most affected receiver location(s) be reviewed once the plant locations are finalised.
- 7.02 Based on the standard requirements of Manchester City Council and the measured background noise levels in each time period, Table 7.1 sets out the recommended noise limits that the proposed items of plant should meet once coordinated and installed.
- 7.03 In order to achieve the requirements of Manchester City Council, the proposed noise limits are based on a level of 5 dB below background noise level.

Location	Period	Measured Existing $L_{A90,T}$	Proposed Noise Limit L_{Ar}
1 (Front Courtyard Area)	Day (0700 – 2300)	44 dB	39 dB
	Night (2300 – 0700)	38 dB	33 dB
2 (Rear Rooftop Area)	Day (0700 – 2300)	42 dB	37 dB
	Night (2300 – 0700)	38 dB	33 dB

Table 7.1: Suggested Plant Noise Emission Limits Based on Lowest Measured L_{A90} , Free-field dB

- 7.04 Note that the limits suggested above are rating levels and as such any design should take into account the acoustic characteristics of the plant. Acoustic character corrections will be subject to the final plant installation location and plant models proposed.
- 7.05 Assuming the proposed items meet with the most onerous noise limits set out in Table 7.1, noise will be below the LOAEL with respect to the NPPF.
- 7.06 The final plant proposals shall be fully coordinated and assessed by a suitably qualified acoustician prior to installation to ensure that the above targets are achieved. This includes the implementation of noise mitigation measures or limited hours of operation as necessary.
- 7.07 As the plant is to be installed to structures common with the proposed new dwellings, all units shall be installed on high deflection vibration isolation mounts offering no less than 95% isolation efficiency in-situ to mitigate the transfer of acoustic energy into the building fabric.

8 EXTERNAL NOISE INGRESS

- 8.01 The Land incorporating 1A Stanley Street, 3-5 Ogden Lane and 1292 Ashton Old Road, Manchester, is undergoing significant redevelopment works, including the demolition of the existing buildings and the creation of a multi-storey multiple occupancy residential building. An assessment of noise ingress into the new dwellings is detailed below, with minimum façade sound insulation performance requirements given to ensure typical design standards are achieved.
- 8.02 It is recommended that the external building fabric of the new dwellings are specified to ensure, as a minimum, that the existing external noise is reduced to the levels proposed in Section 3. The required sound insulation performance is therefore based on the proposed lowest internal noise criteria for the associated period, i.e. BS8233:2014 living room criterion during the daytime of 35dB $L_{Aeq, 16hour}$ and bedroom criterion during the night-time of 30dB $L_{Aeq, 8hour}$, which represents the worst-case scenario. The WHO sleep disturbance criterion of 45dB L_{AFmax} inside is also considered.
- 8.03 The site survey established that sound pressure levels impinging on the relevant facades were typically influenced by:
- Front facade – Predominantly road traffic noise and pedestrian noise generated by surrounding amenities;
 - Rear facade – General ambient road traffic noise.
- 8.04 It is proposed that the sound reduction performance required of the external building fabric for the new elevations is calculated based on the typical/representative noise levels measured at the front and rear of the site and the ideal limits given in paragraph 8.02 to ensure that the noise ingress from existing noise sources meets appropriate standards and limits the risk of disturbance. The results of the calculations are shown in Table 8.1, where the controlling requirement has been highlighted in bold.
- 8.05 The sound reduction performance requirements set out below apply to the overall building fabric. However, since the windows are typically the limiting factor in the external building fabric in terms of acoustic performance, the values below will apply to glazing particularly.
- 8.06 Table 8.1 gives an indication of the overall acoustic performance that the glazing elements should provide, based on single figure values. However, windows do not reduce noise equally across the frequency spectrum so the overall sound reduction performance of a given window will be influenced by the frequency content of the sound. Therefore, as road traffic noise is the most

prominent noise source at the site, glazing with the $R_w + C_{tr}$ descriptor has been specified as it accounts for the low frequency characteristics of these types of noise.

- 8.07 As the Western side of the property may have a direct line of sight to the main road and local amenities to the front elevation, it is expected that the noise climate at these windows will be similar to that at the front façade. Front glazing specifications will therefore also apply to the side elevations.

Position	Period	Measured External Noise Level, dB	Internal Noise Level Requirement, dB	Sound Reduction Performance Required, dB $R_w + C_{tr}$
Front/side of Property	07:00-23:00hrs	60 L_{Aeq}	35 L_{Aeq}	25
	23:00-07:00hrs	56 L_{Aeq}	30 L_{Aeq}	26
		76 L_{AFmax}	45 L_{AFmax}	31
Rear of Property	07:00-23:00hrs	53 L_{Aeq}	35 L_{Aeq}	18
	23:00-07:00hrs	49 L_{Aeq}	30 L_{Aeq}	19
		69 L_{AFmax}	45 L_{AFmax}	24

Table 8.1: Required Sound Insulation Performance for BS8233:2014 Compliance.

- 8.08 In order to achieve the time-averaged (16-hour daytime, 8-hour night-time) internal ambient noise levels and target L_{AFmax} levels outlined in BS8233:2014, the building fabric should be designed to achieve no less than 31 dB $R_w + C_{tr}$ at the front and side facades, and 24 dB $R_w + C_{tr}$ at the rear.
- 8.09 Table 8.2 below presents an example of glazing recommendations for the site that could be incorporated into the facade design to provide the maximum/worst-case sound insulation values from Table 8.1, and so achieve the most stringent internal noise requirements. Note, these values apply to the overall glazing construction (glass, frames, seals etc); the glazing manufacturer should be able to supply laboratory test data for their full glazing systems upon request.
- 8.10 The surrounding façade construction should offer a minimum of 10dB greater performance at all frequencies to ensure the internal noise levels are maintained.

Location	Example Glazing configuration	Octave Band Sound Insulation Performance, dB							
		125	250	500	1000	2000	4000	R_w	$R_w + C_{tr}$
Front Facade	10mm / 16mm / 6mm	24	24	32	37	37	44	35	32
Rear Facades	4mm / 16mm / 4mm	21	17	25	35	37	31	29	25

Table 8.2: Minimum Glazing performance specification ($R_w + C_{tr}$) (configurations based upon Pilkington sample data).

- 8.11 Based on the calculated façade sound insulation requirements, it is expected that standard thermal double glazing will offer sufficient reduction of external noise ingress on all elevations.
- 8.12 It should be noted that the sound insulation values given in Table 8.1 & 8.2 are only relevant for habitable rooms. For non-habitable spaces, for example bathrooms, common stairwells and corridors, the sound insulation requirements could be reduced if this is felt to be beneficial. Using glazing offering the minimal thermal insulation would ensure levels typically accepted for these more transient spaces would be achieved.
- 8.13 Glazing arrangements other than those suggested above may be suitable and it is the responsibility of the glazing manufacturer to recommend and provide appropriate systems that meet the desired sound insulation values based on the range of values presented in Table 8.2. We would recommend that glazing proposals be supported by independently tested and certified acoustic data demonstrating that systems (glazing/frames/spandrels and ventilators) meet the minimum acoustic requirements (ventilators in open position).
- 8.14 The above analysis is provided to demonstrate that a design solution that meets the requirements is feasible at the site and the specified glazing performance in Table 8.2 makes sufficient allowances for in-situ flanking and performance losses that might compromise the laboratory published sound insulation values of the glazing/window systems.
- 8.15 The detailed design of the proposed development will have an influence on both the required sound reduction performance and the appropriate selections of glazing units. The aspects of the detailed design that are important are the room dimensions, room finishes, window dimensions and the sound reduction performance of non-glazing elements. However, should the site be finished to a 'standard' specification and include some soft furnishings, the above glazing specifications are considered appropriate.

Ventilation Considerations:

- 8.16 Further to the glazing requirements, ingress of external sounds should be considered in the context of room ventilation requirements.
- 8.17 *Approved Document F* (ADF 2010) presents dwelling ventilation rates in terms of the number of bedrooms within each dwelling and describes whole building ventilation (for continuous occupation), intermittent extract ventilation of wet rooms and intermittent purge ventilation throughout the dwelling. Purge ventilation that is required to "*aid the removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water*". Purge ventilation is intermittent, i.e. required only when such occasional activities occur.
- 8.18 The Building Research Establishment (BRE) has published an Information Paper on the acoustic performances of passive ventilation systems. IP4/99: Ventilators: *Ventilators and Acoustic Effectiveness* (1999) details a study into the sound reduction performances of fourteen different window mounted trickle ventilators and seven different through-wall ventilators. The measured sound reduction performance, after taking into account flanking sound paths (i.e. sound paths that do not travel directly through the vent) and the effective area of the ventilator, ranged from 14-46dB.
- 8.19 Passive vents to provide background ventilation are therefore available that meet or exceed the sound reduction required by the glazing elements. However, conversation with a mechanical services engineer will be required to establish the exact type of trickle ventilation product and

equivalent free area requirements of each space to ensure that the correct acoustic performance of the products is selected.

- 8.20 With regard to rapid or purge ventilation rates, it is generally accepted that an open window provides a reduction in external noise levels of up to 15dB. In light of this and the sound reduction requirements outlined in both table 8.1 and 8.2, it can be seen that the target internal noise levels of BS8233:2014 will likely not be met at any façade with partially open windows. In the event of purge ventilation being provided by open windows, the internal noise levels will therefore be exceeded, potentially leading to disturbance.
- 8.21 Guidance on the acceptability of increased noise levels during rapid ventilation is given in the Association of Noise Consultant's *Acoustics Ventilation and Overheating Residential Design Guide (AVO Guide)*. The guide outlines an assessment protocol to identify the risk of acoustic disturbance during ventilation and whether alternative mechanical ventilation schemes should be sought.
- 8.22 Following the Level 1 assessment of the AVO guide to identify initial risk, this site would be considered 'Medium' risk, and so reliance on open windows on any elevation for rapid ventilation may lead to adverse effects.
- 8.23 We would therefore recommend that alternative overheating and purge ventilation systems are investigated for habitable rooms at the site, and the benefits of these weighted against the other considerations such as cost and scope of works. Should mechanical ventilation and comfort cooling schemes be implemented, these should be reviewed and approved by a suitably qualified acoustician prior to installation to ensure acoustic comfort will be achieved during all operational duties (i.e. daily and purge rates).

9 EXTERNAL AMENITY AREAS

- 9.01 The development includes the following external amenity areas:

Balconies	Ogden Lane and Ashton Old Road elevations
Balconies	Stanley Street, rear elevation
Roof top Terraces	Over looking Ogden Lane and Ashton Old Road
Courtyard Terrace	At second floor level (screened by the existing two storey adjacent building). A communal area.

- 9.02 The following levels are expected in these areas based upon the on site measured ambient noise:

Ogden Lane and Ashton Old Road balconies	60 dBA
Stanley Steet balconies	53 dBA
Roof top Terraces	55 dBA
Internal courtyard	50 dBA

- 9.03 With the exception of the front and side balconies overlooking Ogden Lane and Ashton Old Road, all external amenity areas are expected to meet the prescribed MCC/BS8233 noise limits. Whilst the limits are exceeded on the more exposed elevations, these excesses should be weighed up in the context of the wider benefits presented by the development. It should also be borne in mind

that the central courtyard terrace is a communal space available to occupants of dwellings with balconies exposed to the elevated external noise.

10 CONCLUSIONS

- 10.01 Sterling Investment Projects Ltd has appointed Environmental Equipment Corporation Limited to undertake an assessment of plant noise limits and external noise ingress for the proposed development of a residential apartment block at the Land incorporating 1A Stanley Street. 3-5 Ogden Lane and 1292 Ashton Old Road, Manchester.
- 10.02 The assessment has been carried out in accordance with national planning guidance, typical design standards including BS8233:2014, and Building Regulations, and is based on environmental noise surveys conducted at the site over a weekend period.
- 10.03 The assessment of external noise ingress has found that the standard requirements of MCC and BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings', will be met for internal ambient noise required for acoustic comfort. These can be achieved based on the use of double glazing with appropriate acoustic properties installed on relevant elevations of the development (as indicated in Table 8.1 & 8.2).
- 10.04 Plant noise limits have been set based on the methodology contained in BS4142, the results of a background noise survey and the requirements of Manchester City Council. In accordance with associated guidance, the noise limit has been set so as to be at least 5dB less than the background noise at all times. Absolute noise limits have therefore been given at the closest and most affected noise sensitive receiver, identified as 1293 Ashton Old Road. This noise sensitive receiver location should be reviewed and confirmed once plant locations and designs have been confirmed.
- 10.05 Achieving these noise limits would ensure the LOAEL is achieved.
- 10.06 The final designs and detailing of the building facades and plant installations should be fully reviewed and approved by a suitably qualified acoustician prior to installation.

APPENDIX A

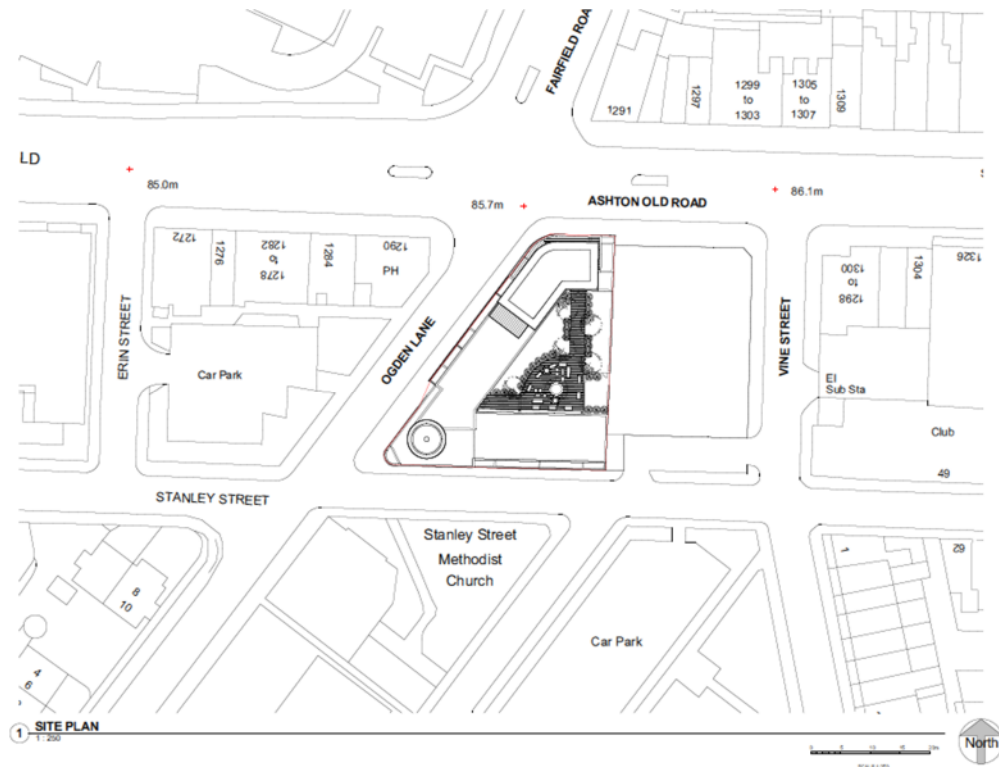
GLOSSARY OF TECHNICAL TERMS

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





APPENDIX C

PLANNING POLICY AND GUIDANCE

PLANNING POLICY AND GUIDANCE

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 20th July 2021) 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 174 in Section 15 of the NPPF (2021), 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 185 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.

BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings'

Section 7 of this standard gives guidance on acoustic criteria and noise levels appropriate for various internal spaces that have different functions. Section 7.7 relates specifically to buildings having a

residential purpose and offers guidance on appropriate internal ambient noise levels for dwellings (when unoccupied) with specific consideration:

- for bedrooms, the acoustic effect on sleep; and
- for other rooms, the acoustic effect on resting, listening and communicating.

The guidance applies to external noise as it affects the internal acoustic environment from sources without a specific character.

Table 4 of section 7.7.2 recommends the following internal noise limits based on the presence of steady, external noise sources:

Table 4 Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

The guidance criteria are based upon research and existing guidelines provided by the World Health Organisation.

It is generally considered that the sound insulation provided by a partially open window will be 10-15dB, dependent on window type, extent of opening and source frequency content.

It can be seen that in the worst case, with a partially open window reduction of 10-15dB, indoor ambient noise targets for bedrooms at night will be met where the external ambient noise level is below 40-45dB(A). This is based upon steady noise of an anonymous nature and is consistent with the World Health Organisations LOAEL.

APPENDIX D

SURVEY RESULTS
(TABULAR)

**EC 18998 - Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and
1292 Ashton Old Road, Manchester
Sterling Investment Projects**

**Tabulated Noise data
Front Courtyard**

Sheet 1 of 3

Time	L _{Aeq}	L _{AMax}	L _{A90}
15:45	62	83	54
16:00	61	86	53
16:15	59	74	54
16:30	59	76	54
16:45	60	79	53
17:00	59	77	53
17:15	61	83	53
17:30	60	82	53
17:45	59	75	53
18:00	60	81	54
18:15	59	76	52
18:30	59	80	53
18:45	58	70	52
19:00	59	75	52
19:15	58	69	52
19:30	75	101	52
19:45	59	80	51
20:00	58	74	51
20:15	57	70	50
20:30	57	71	51
20:45	57	67	51
21:00	56	67	50
21:15	57	75	50
21:30	58	77	50
21:45	57	74	50
22:00	59	77	50
22:15	57	66	50
22:30	58	75	50
22:45	56	77	48
23:00	57	72	50
23:15	55	64	49
23:30	56	68	48
23:45	55	69	46
00:00	56	75	47
00:15	55	74	46
00:30	56	76	46
00:45	54	71	42
01:00	56	76	43
01:15	53	65	42
01:30	53	69	41
01:45	53	65	42
02:00	54	70	41
02:15	53	68	40
02:30	53	66	41
02:45	53	67	42
03:00	52	65	41
03:15	52	63	40
03:30	52	65	40

Time	L _{Aeq}	L _{AMax}	L _{A90}
03:45	54	72	40
04:00	52	68	41
04:15	53	70	42
04:30	56	76	41
04:45	54	68	42
05:00	54	64	43
05:15	56	67	43
05:30	57	78	46
05:45	57	78	44
06:00	59	79	45
06:15	56	69	46
06:30	57	72	45
06:45	56	68	46
07:00	56	68	46
07:15	57	71	50
07:30	58	69	50
07:45	58	70	49
08:00	61	84	50
08:15	57	68	50
08:30	66	90	49
08:45	59	76	51
09:00	58	71	50
09:15	60	82	51
09:30	58	67	51
09:45	58	70	50
10:00	59	79	51
10:15	58	74	51
10:30	60	78	51
10:45	60	80	51
11:00	58	75	51
11:15	61	81	51
11:30	58	75	51
11:45	58	71	51
12:00	59	79	51
12:15	59	81	50
12:30	57	66	50
12:45	58	74	50
13:00	58	79	50
13:15	58	76	51
13:30	59	81	50
13:45	61	83	51
14:00	57	70	50
14:15	58	77	51
14:30	61	91	50
14:45	57	75	49
15:00	59	79	50
15:15	58	73	50
15:30	57	75	49

**EC 18998 - Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and
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**Tabulated Noise data
Front Courtyard**

Sheet 2 of 3

Time	L _{Aeq}	L _{AMax}	L _{A90}
15:45	57	66	50
16:00	57	70	50
16:15	57	75	49
16:30	59	86	51
16:45	56	72	48
17:00	65	90	50
17:15	57	73	52
17:30	61	82	52
17:45	58	80	52
18:00	57	73	51
18:15	58	78	51
18:30	62	83	52
18:45	57	76	51
19:00	62	88	51
19:15	56	68	51
19:30	58	82	52
19:45	61	86	52
20:00	57	76	51
20:15	57	68	50
20:30	60	80	50
20:45	59	82	49
21:00	57	75	50
21:15	56	74	49
21:30	70	89	49
21:45	56	71	47
22:00	55	64	49
22:15	56	69	49
22:30	62	84	49
22:45	55	67	47
23:00	55	67	47
23:15	55	64	46
23:30	55	67	44
23:45	54	65	46
00:00	55	66	46
00:15	57	75	47
00:30	55	75	45
00:45	54	64	44
01:00	53	62	41
01:15	53	72	43
01:30	53	65	41
01:45	53	65	43
02:00	53	64	41
02:15	53	63	42
02:30	52	70	39
02:45	57	81	39
03:00	53	70	39
03:15	55	68	37
03:30	54	67	37

Time	L _{Aeq}	L _{AMax}	L _{A90}
03:45	52	63	37
04:00	52	67	38
04:15	52	66	40
04:30	52	66	38
04:45	51	67	37
05:00	52	68	41
05:15	53	66	41
05:30	53	65	40
05:45	55	77	40
06:00	53	65	40
06:15	56	78	41
06:30	54	65	42
06:45	53	65	41
07:00	54	65	44
07:15	54	67	44
07:30	55	67	45
07:45	55	66	45
08:00	55	68	45
08:15	55	68	46
08:30	56	72	49
08:45	54	64	47
09:00	55	70	47
09:15	58	77	51
09:30	59	81	50
09:45	58	82	50
10:00	57	65	49
10:15	59	79	50
10:30	57	69	49
10:45	57	68	50
11:00	63	91	51
11:15	57	77	51
11:30	56	66	50
11:45	58	75	51
12:00	57	75	51
12:15	57	73	50
12:30	57	77	50
12:45	57	74	50
13:00	58	79	51
13:15	61	85	51
13:30	58	79	50
13:45	58	73	50
14:00	58	80	51
14:15	60	83	51
14:30	60	81	50
14:45	60	84	51
15:00	59	76	51
15:15	58	73	50
15:30	60	84	50

**EC 18998 - Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and
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Tabulated Noise data

Sheet 3 of 3

Front Courtyard

Time	L _{Aeq}	L _{AMax}	L _{A90}
15:45	57	69	50
16:00	57	70	50
16:15	59	81	51
16:30	65	91	50
16:45	58	75	51
17:00	61	83	50
17:15	59	80	50
17:30	57	69	49
17:45	57	70	50
18:00	58	75	50
18:15	57	70	49
18:30	56	70	49
18:45	57	68	49
19:00	58	79	50
19:15	57	66	50
19:30	57	72	48
19:45	58	82	49
20:00	56	68	49
20:15	57	75	48
20:30	60	78	50
20:45	56	67	48
21:00	57	77	48
21:15	56	72	46
21:30	55	68	48
21:45	56	72	47
22:00	58	79	47
22:15	54	70	46
22:30	54	64	45
22:45	54	64	42
23:00	54	67	45
23:15	55	72	43
23:30	57	70	48
23:45	59	78	50
00:00	58	75	45
00:15	58	73	47
00:30	59	77	52
00:45	58	73	44
01:00	57	73	40
01:15	55	74	39
01:30	57	72	40
01:45	58	77	42
02:00	57	77	43
02:15	56	71	41
02:30	54	70	39
02:45	55	70	39
03:00	52	67	38
03:15	52	68	38
03:30	55	69	41

Time	L _{Aeq}	L _{AMax}	L _{A90}
03:45	56	68	40
04:00	58	72	42
04:15	57	71	42
04:30	60	76	47
04:45	58	71	43
05:00	59	74	49
05:15	63	84	51
05:30	62	76	52
05:45	61	72	51
06:00	62	71	53
06:15	62	72	52
06:30	64	77	54
06:45	62	73	54
07:00	63	73	57
07:15	64	86	54
07:30	62	77	54
07:45	61	73	53
08:00	63	82	53
08:15	63	82	53
08:30	61	72	55
08:45	63	85	54
09:00	63	84	53
09:15	63	79	54
09:30	67	88	56
09:45	64	80	56
10:00	64	82	56
10:15	63	75	54
10:30	63	74	54
10:45	62	75	53
11:00	61	74	53
11:15	61	72	53

**EC 18998 - Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and
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Tabulated Noise data

Sheet 1 of 3

Rear Rooftop Area

Time	L _{Aeq}	L _{AMax}	L _{A90}
16:15	54	65	50
16:30	54	74	50
16:45	54	69	50
17:00	54	70	50
17:15	53	68	50
17:30	54	73	50
17:45	54	72	51
18:00	54	67	50
18:15	54	66	50
18:30	54	68	50
18:45	53	69	48
19:00	52	64	48
19:15	53	66	49
19:30	54	77	48
19:45	63	88	47
20:00	53	77	48
20:15	51	63	47
20:30	51	61	46
20:45	51	67	47
21:00	50	64	46
21:15	52	80	46
21:30	51	69	45
21:45	52	73	46
22:00	52	68	46
22:15	51	68	47
22:30	49	61	45
22:45	51	69	45
23:00	49	65	45
23:15	49	66	45
23:30	49	61	45
23:45	48	59	44
00:00	48	58	43
00:15	49	68	43
00:30	47	57	42
00:45	48	67	41
01:00	46	62	40
01:15	46	69	41
01:30	45	56	40
01:45	44	58	39
02:00	46	61	39
02:15	44	57	39
02:30	44	57	39
02:45	44	55	39
03:00	44	56	39
03:15	44	58	38
03:30	44	57	39
03:45	43	57	38
04:00	46	63	40

Time	L _{Aeq}	L _{AMax}	L _{A90}
04:15	45	64	39
04:30	48	71	40
04:45	47	64	38
05:00	46	59	40
05:15	46	60	40
05:30	48	58	42
05:45	49	67	41
06:00	52	72	42
06:15	50	74	43
06:30	49	64	41
06:45	50	61	42
07:00	49	68	42
07:15	49	62	43
07:30	51	61	46
07:45	52	64	45
08:00	52	69	44
08:15	52	68	44
08:30	50	59	45
08:45	55	75	45
09:00	52	66	45
09:15	51	64	46
09:30	51	68	45
09:45	51	62	46
10:00	51	66	46
10:15	52	67	46
10:30	52	70	46
10:45	53	73	46
11:00	52	70	46
11:15	51	63	46
11:30	53	66	46
11:45	51	64	47
12:00	52	69	46
12:15	51	64	46
12:30	53	79	46
12:45	51	70	46
13:00	53	77	46
13:15	52	73	46
13:30	55	83	46
13:45	53	71	47
14:00	51	73	45
14:15	51	73	46
14:30	52	78	46
14:45	56	89	45
15:00	51	66	45
15:15	51	65	46
15:30	52	70	45
15:45	51	63	45
16:00	50	63	45

**EC 18998 - Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and
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Tabulated Noise data

Sheet 2 of 3

Rear Rooftop Area

Time	L _{Aeq}	L _{AMax}	L _{A90}
16:15	53	80	46
16:30	54	79	45
16:45	50	63	45
17:00	50	76	44
17:15	58	78	49
17:30	54	74	51
17:45	53	67	50
18:00	55	76	51
18:15	54	78	51
18:30	55	73	50
18:45	53	69	51
19:00	55	77	50
19:15	52	61	50
19:30	52	61	50
19:45	54	72	50
20:00	55	68	53
20:15	54	67	51
20:30	50	62	44
20:45	50	65	44
21:00	51	72	44
21:15	49	66	44
21:30	60	83	45
21:45	54	75	44
22:00	49	69	44
22:15	49	60	45
22:30	49	60	44
22:45	56	80	44
23:00	49	61	44
23:15	47	61	43
23:30	47	59	42
23:45	47	57	42
00:00	48	60	43
00:15	48	65	43
00:30	48	60	42
00:45	47	63	41
01:00	46	61	41
01:15	46	57	40
01:30	45	55	40
01:45	46	64	40
02:00	45	57	39
02:15	44	55	39
02:30	44	56	39
02:45	48	72	39
03:00	43	56	38
03:15	46	70	39
03:30	46	59	39
03:45	43	53	38
04:00	43	55	37

Time	L _{Aeq}	L _{AMax}	L _{A90}
04:15	44	57	38
04:30	49	72	41
04:45	43	57	37
05:00	44	60	39
05:15	46	63	41
05:30	45	60	40
05:45	45	64	39
06:00	50	75	41
06:15	49	68	41
06:30	49	69	40
06:45	46	61	40
07:00	46	58	41
07:15	47	61	40
07:30	48	63	41
07:45	48	59	42
08:00	48	58	43
08:15	48	61	44
08:30	48	58	43
08:45	50	63	44
09:00	48	59	43
09:15	48	62	44
09:30	51	67	46
09:45	51	73	45
10:00	49	59	45
10:15	52	71	46
10:30	51	67	45
10:45	50	63	45
11:00	54	81	46
11:15	51	61	47
11:30	51	69	46
11:45	50	63	46
12:00	51	67	47
12:15	50	61	46
12:30	51	61	47
12:45	52	66	47
13:00	53	64	49
13:15	54	71	48
13:30	55	74	47
13:45	52	67	48
14:00	52	77	47
14:15	51	69	46
14:30	52	68	47
14:45	52	72	48
15:00	53	68	48
15:15	51	65	47
15:30	53	72	47
15:45	52	67	47
16:00	51	69	46

**EC 18998 - Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and
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Sterling Investment Projects

Tabulated Noise data

Sheet 3 of 3

Rear Rooftop Area

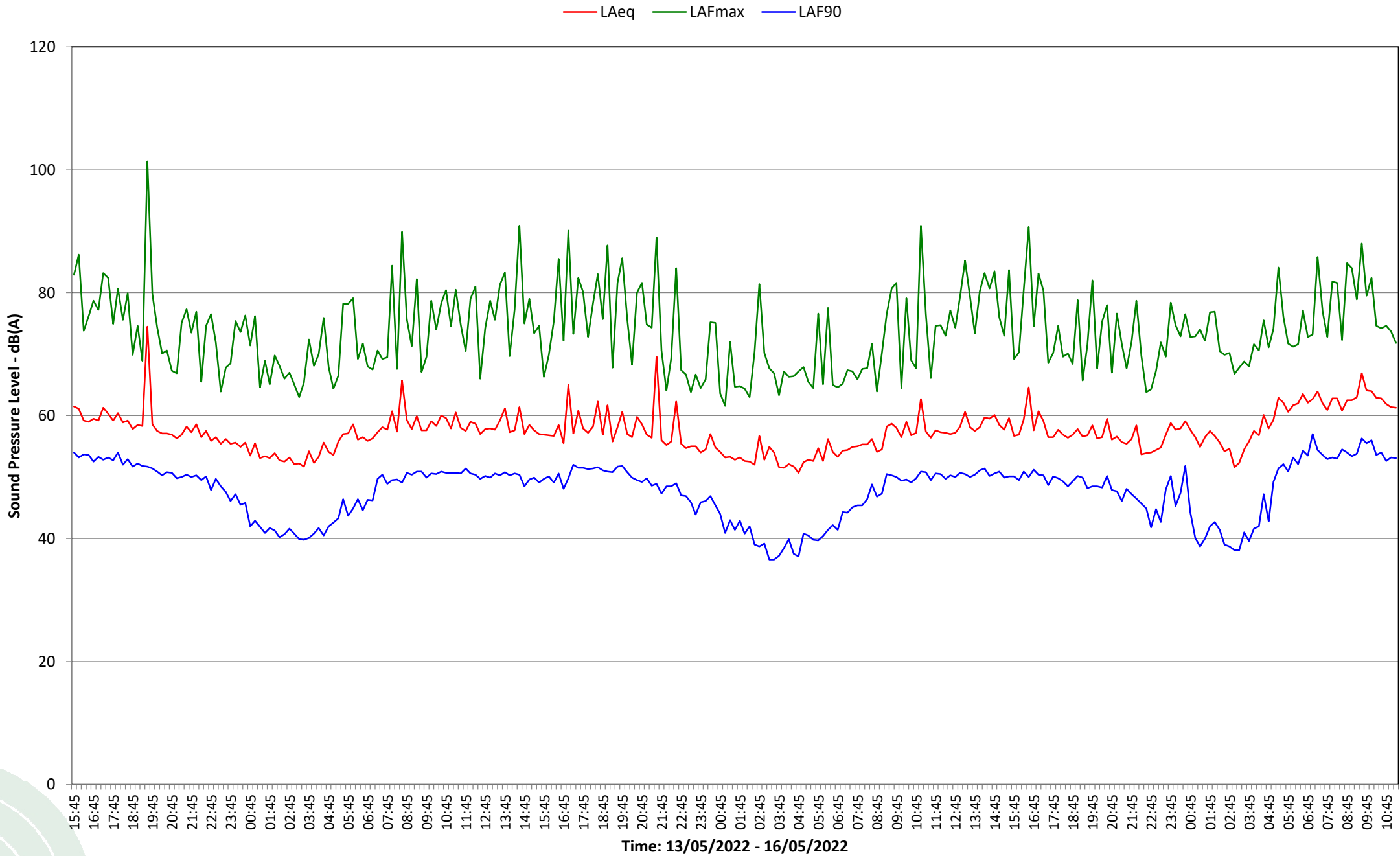
Time	L _{Aeq}	L _{AMax}	L _{A90}
16:15	52	71	46
16:30	53	79	45
16:45	53	74	46
17:00	51	63	46
17:15	53	73	46
17:30	52	73	46
17:45	50	64	45
18:00	50	71	46
18:15	51	64	46
18:30	51	64	45
18:45	50	62	46
19:00	51	69	45
19:15	50	68	45
19:30	50	73	45
19:45	53	70	45
20:00	49	60	44
20:15	50	62	44
20:30	50	68	44
20:45	52	67	45
21:00	51	70	43
21:15	49	62	44
21:30	48	62	42
21:45	50	65	44
22:00	51	69	43
22:15	47	61	42
22:30	47	63	41
22:45	47	58	41
23:00	47	58	41
23:15	46	58	41
23:30	55	62	43
23:45	55	62	49
00:00	54	62	47
00:15	51	63	46
00:30	56	63	49
00:45	55	61	49
01:00	48	62	42
01:15	48	61	40
01:30	46	58	39
01:45	47	60	40
02:00	49	63	42
02:15	48	63	43
02:30	47	56	41
02:45	44	56	39
03:00	45	58	39
03:15	45	54	40
03:30	45	59	40
03:45	50	60	40
04:00	48	65	40

Time	L _{Aeq}	L _{AMax}	L _{A90}
04:15	50	64	41
04:30	52	70	43
04:45	53	74	42
05:00	49	61	43
05:15	51	62	45
05:30	60	73	48
05:45	52	65	47
06:00	51	63	46
06:15	52	66	48
06:30	53	62	48
06:45	55	68	50
07:00	53	66	49
07:15	53	61	49
07:30	55	75	49
07:45	54	67	49
08:00	55	70	49
08:15	55	68	50
08:30	55	70	49
08:45	55	74	49
09:00	54	74	49
09:15	53	66	49
09:30	55	63	50
09:45	61	79	55
10:00	56	70	52
10:15	58	65	52
10:30	54	63	49
10:45	54	67	48
11:00	55	73	48
11:15	53	67	48
11:30	53	64	48

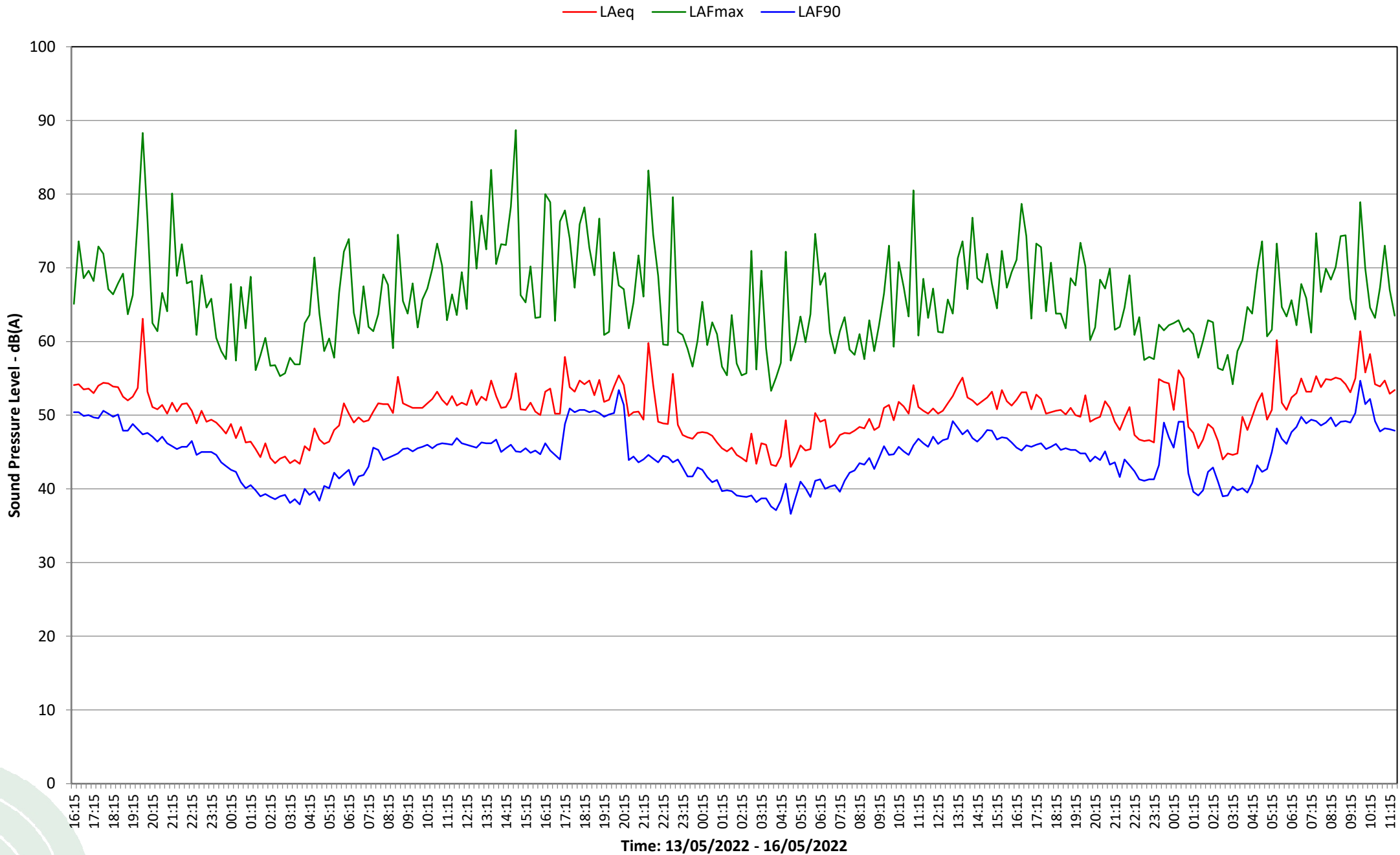
APPENDIX E

SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and 1292 Ashton Old Road, Manchester Front Courtyard



Noise Level Time History at Land Incorporating 1A Stanley Street, 3-5 Ogden Lane and 1292 Ashton Old Road, Manchester Rear Rooftop



APPENDIX F

PUBLISHED PLANT NOISE DATA