
Great Ormond Street Children's Hospital

Noise Statement for Planning

Doc No: MEDU-BDP-XX-XX-RP-YA-00001
Issue: For Information
Rev: P03
Date: 26/02/2019

Report Prepared by:	
Marie Gauthier AMIOA Acoustic Consultant	
Report Checked by:	
Jai Shikotra BSc (hons) MIOA Senior Acoustic Consultant	

Revision History

Revision	Section	Comments	Author	Checked by
P01	-	-	MG	JS
P02	-	Amended as per client's comments	MG	JS
P03	-	Amended as per client's comments	MG	JS

Executive Summary

BDP has been appointed to provide a noise statement in support of the planning application for the replacement and improvements in the MEDU area at Great Ormond Street Children's Hospital, London WC1N 3JH.

The assessment criteria and methodology have been developed with reference to the relevant standards, guidance and local planning policies and have been informed by way of measurement surveys conducted within and around the site.

This assessment has been based upon the baseline noise survey undertaken by BDP between 14th and 15th February 2019, in which measurements were undertaken to establish the existing background noise levels within the vicinity of the development, and at the nearest noise sensitive receptors.

The most common background noise levels were measured to be L_{A90} 57 dB during the day (07:00 – 23:00) and L_{A90} 55 dB during the night (23:00 – 07:00) at a position representative of the nearest noise sensitive receptors.

Based on the London Borough of Camden planning policy, the design and installation of new items of fixed plant shall be such that cumulative noise levels, L_{Aeq} , arising from any proposed plant measured or predicted at 1m from the facade of the nearest noise sensitive premises, shall be a rating level of 10 dB(A) below the existing background noise level L_{A90} . Where it is anticipated that noise emissions are likely to have a character as defined in Part 8.2 of BS 4142, then the predicted noise level at the façade shall be at least 15 dB(A) below the existing background level L_{A90} . The measurements and/or prediction of the noise should be carried out in accordance with the methodology contained within BS 4142:2014.

In order to comply with the London Borough of Camden planning policy with respect to noise, the cumulative noise emissions from all items of plant in simultaneous operations should not exceed 47 dB(A) during the day, when measured at 1m from the windows of the nearest noise sensitive premises taking into account all noise mitigation and attenuation applied to plant items. If the plant noise emissions exhibit a character then the noise emissions should not exceed 42 dB(A). Night-time levels should not exceed 45 dB(A) at 1m from NSR windows and 40 dB(A) as the proposed noise emissions limit, with acoustic feature correction.

Introduction

BDP has been appointed to provide a report in support of the planning application for the proposed refurbishment of the Medical Equipment Decontamination Unit (MEDU) area at Great Ormond Street Children's Hospital (GOSH), London WC1N 3JH, which is currently used as a Boiler House.

This report assesses the likely environmental effects of the proposed refurbishment on the local area with respect to noise.

With reference to the requirements set out in Appendix 3 'Noise Thresholds' of Camden Council's Local Plan, this report:

- Presents the baseline noise climate around the development site and the immediate noise sensitive receptors beyond the site boundary;
- Considers the potential noise effects generated by the development in operation;
- Proposes mitigation measures to reduce any effects.

Policy Context

In deriving an assessment methodology, consideration has been given to legislative framework, local policies and best practice guidance documents.

National Planning Policy Framework

The National Planning Policy Framework (NPPF), updated in July 2018, has superseded Planning Policy Guidance documents, and with specific regard to noise, PPG24.

In paragraph 170, chapter 15 the following is stated:

*'The planning system should contribute to and enhance the natural and local environment by...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or **noise** pollution or land instability'.*

Noise Policy Statement for England

Within the NPPF, the reader is referred to the Noise Policy Statement for England (NPSE). In order to achieve the aims of the NPPF from a noise perspective the NPSE was developed, stating its vision as follows:

'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development'

The mechanism by which the vision is proposed to be fulfilled is detailed in the Explanatory Note to the NPSE, which provides three definitions of noise impact as follows:

NOEL – No Observed Effect Level

The level below which no detectable effect on the health and quality of life due to noise can be detected.

LOAEL – Lowest Observed Adverse Effect Level

The level above which adverse effects on health and quality of life due to noise can be detected.

SOAEL – Significant Observed Adverse Effect Level

The level above which significant adverse effects on health and quality of life due to noise can be detected.

London Borough of Camden Noise Policy

Local planning guidance in relation to noise is provided by the London Borough of Camden (LBC) within their Camden Local Plan (2017).

Specific requirements related to *Industrial and Commercial Noise Source Uses* are given under Appendix 3: Noise Thresholds of the Local Plan. The criteria is reproduced below.

"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."

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 57dB LAmax	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB LAmax	'Rating level' greater than 5dB above background and/or events exceeding 88dB LAmax

Table [1]: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

**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 [1] 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."

Site Description

The MEDU development forms part of the GOSH estate located at Guilford St, London WC1N 3JH. The development is located internally under the existing Morgan Stanley Garden which is enclosed by other multi-storey GOSH estate. Existing mechanical plant is located either side of the garden, and on rooftop of the Morgan Stanley building. The upper floors of the Main Nurses Home (MNH) building was largely affected by noise from the plant on Morgan Stanley rooftop.

The garden is enclosed by multi-storey GOSH estate which comprises the Mother Unit within the Main Nurses Home building with 10 residential units on Level 3 used as a non-clinical accommodation along Guilford Street; the remainder of the building being used as offices, the GOSH School to the south, Morgan Stanley building to the east used as a Clinical ward, and the West Link building to the west located adjacent to the service yard.

With respect to the Mother Unit, these are not considered to be the nearest noise sensitive receptors as they do not overlook the MEDU development area; instead the other GOSH estate overlooking the MEDU development are considered to be the nearest noise sensitive receptors, NSRs.

Figure 1 below highlights the noise survey locations and GOSH estate. Figure 2 shows the Mother Unit configuration within the Main Nurses Home building with respect to Guilford Street and the MEDU development area.

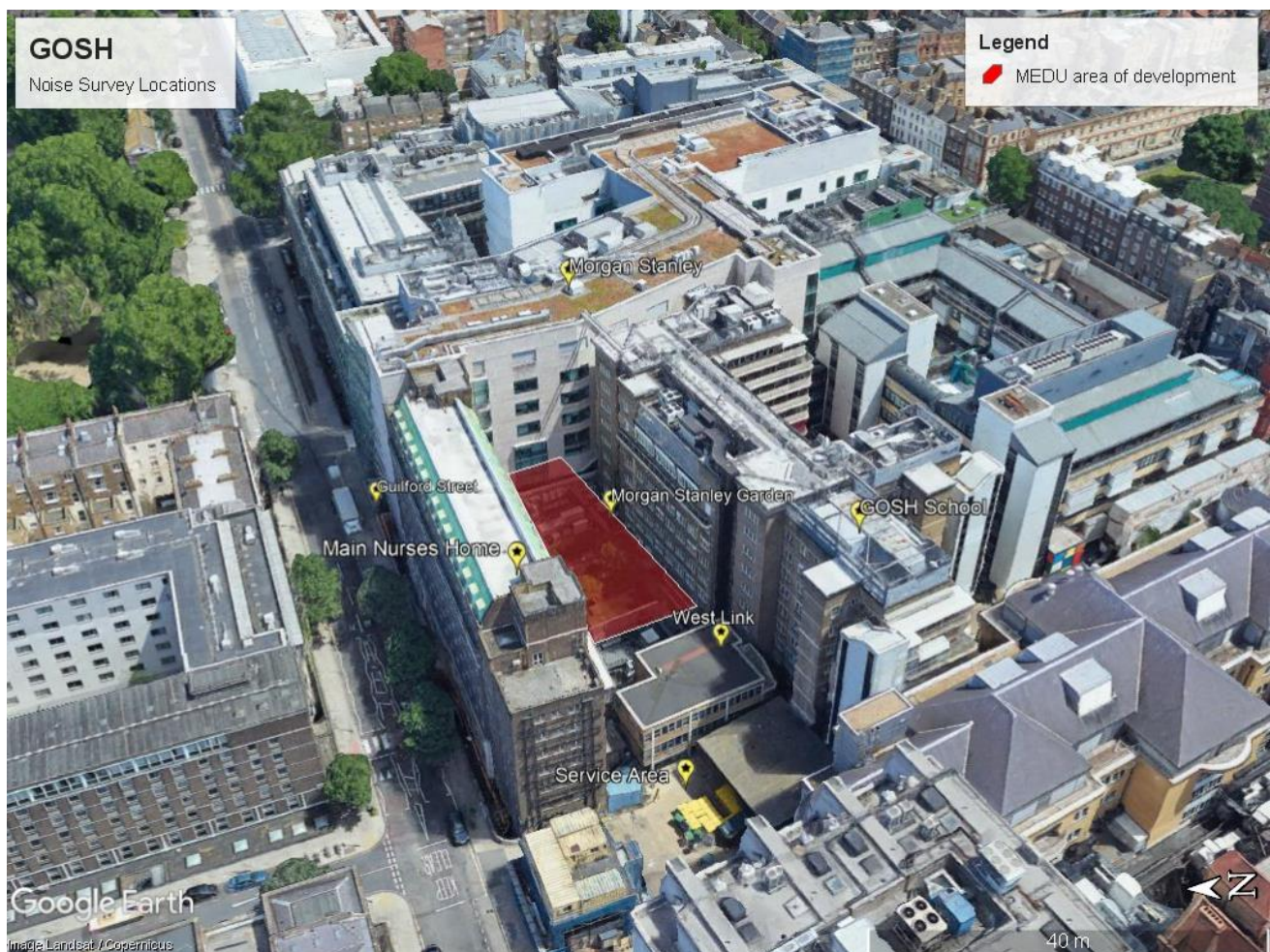


Figure 1: Site plan of proposed development, highlighting nearest noise sensitive receptors

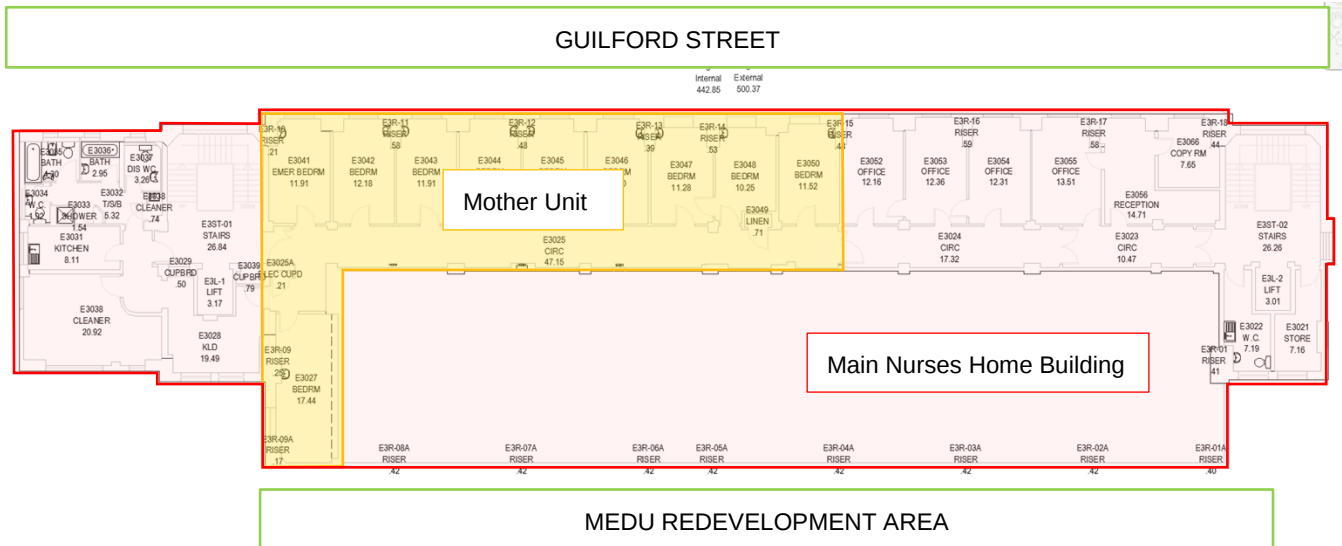


Figure 2 Drawing showing Main Nurses Home configuration

Environmental Noise Survey

An attended and unattended baseline noise surveys were undertaken on site from 14th to 15th February 2019 to establish the existing noise climate around the new development. The noise monitoring equipment was installed on the rooftop of the West Link Building on the south-east corner, in sight of the Main Nurses Home. The position was judged to be representative of the noise climate at the façade of the nearest noise sensitive receptors. A summary of the survey and its findings are presented in the following sections.

The ambient noise climate around the site generally comprised of plant noise, predominantly originating from the Morgan Stanley Garden but also from Morgan Stanley Building rooftop. Birdsong, noise from the service yard, construction noise originating from the south of the site, and helicopters flyovers were also observed.

The above description of the noise sources is accurate for the time at which the attended noise survey was carried out. Other noise sources that may have been present during the unattended survey period cannot be confirmed as a result of the survey being unmanned.

Unattended Continuous Noise Measurements

Positioned on the West Link Building rooftop, the unattended continuous noise survey was carried out between 11:15 hrs 14th February and 11:30 hrs 15th February 2019. Measurements were made over continuous 5 minute intervals.

The microphone was extended to a height of approximately 1.4m, and is considered to be a free-field measurement more than 3.5m from any façade. For the purposes of addressing local authority requirements, Table 1 presents the most occurring measured background noise levels from the survey during defined day time (07:00 – 23:00) and night time (23:00 to 07:00) periods.

Date	Time Period	A-weighted sound pressure level (dB re. 2 x 10 ⁻⁵ Pa)
		Most Occurring Measured L _{A90,5mins} dB
Thursday 14/02/2019 to Friday 15/02/2019	Daytime 07:00 – 23:00	57
	Night time 23:00 – 07:00	55

Table 2: Summary of background noise levels obtained from the unattended continuous noise survey

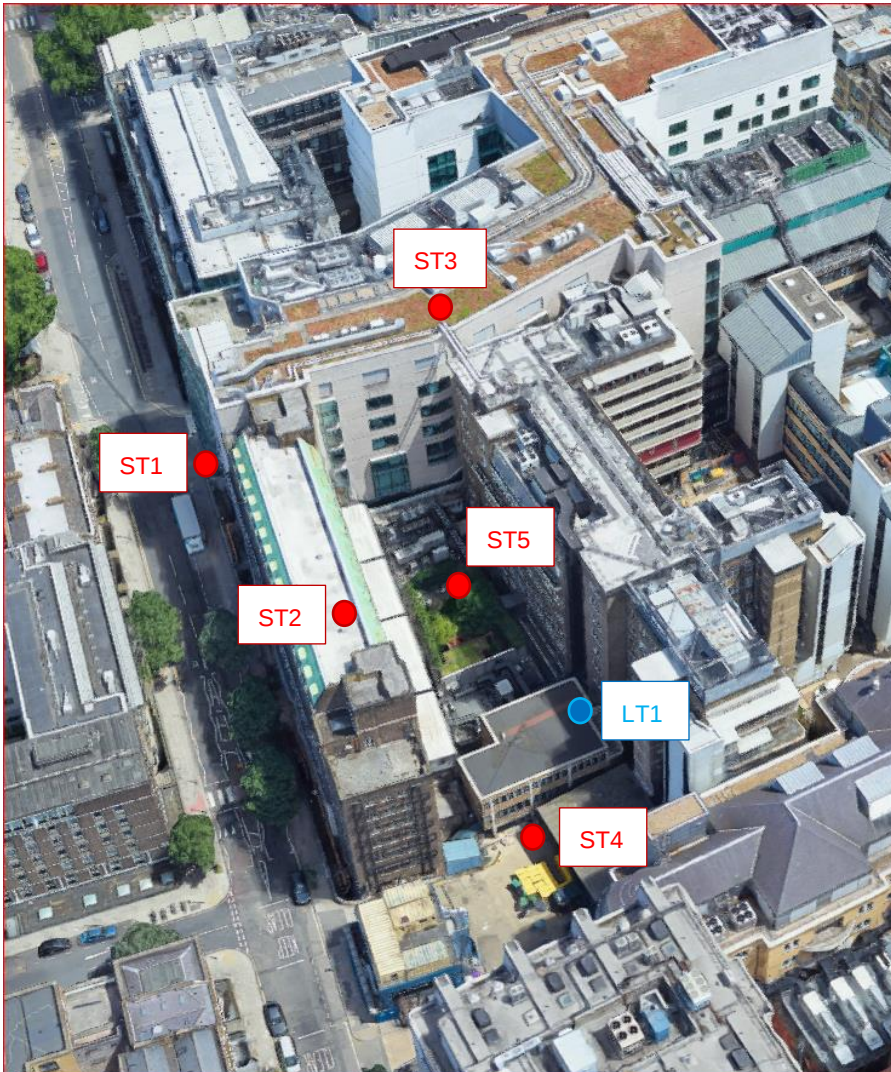


Figure 3: Site plan of measurement locations

Attended Noise Measurements Results

Attended continuous noise measurements were carried out at five locations around the MEDU area on the 14th and 15th February 2019. Measurements at each position were undertaken for a total duration of 15 minutes, comprising three 5 minute measurements.

The microphone was fixed on a tripod to a height of approximately 1.4m, and is considered to be a free-field measurement more than 3.5m from any façade. The location and local noise sources present at the time of the measurements is summarised in Table 3. Table 4 presents the measured levels over the 5 minute intervals at each position.

Measurement Location	Description of Local Noise Sources
Short-term measurement 1 (ST1) - Guilford St	Road traffic along Guildford Road approximately 5m from measurement position. Foot traffic from passing pedestrians and runners.
Short-term measurement 2 (ST2) - Rooftop of GOSH Main Nurses Home (MNH)	Continuous noise from plant on Morgan Stanley rooftop could be heard at this location. The edge protection around the perimeter of the roof was screening the microphone from the noise of the current plant located in the MEDU development area.
Short-term measurement 3 (ST3) – Rooftop of Morgan Stanley building	Continuous noise from plant, which was in direct line of sight of the microphone. The edge protection around the perimeter of the roof was screening the microphone from the noise of the current plant located in the MEDU development area.
Short-term measurement 4 (ST4) – Service Yard	Main source was activity noise originating from the service yard. Noise comprised of the loading and unloading of goods, pushing trolleys, movement of delivery trucks and chains dropping.
Short-term measurement 5 (ST5) - Morgan Stanley Garden	Continuous noise from existing plant was recorded at this location. A helicopter flying over was also observed.

Table 3: Description of Local Noise Sources per location

Date	Location	Time Period	A-weighted sound pressure level (dB re. 2 x 10 ⁻⁵ Pa)		
			L _{Aeq,5mins} dB	L _{Amax,5mins} dB	L _{A90,5mins} dB
Thursday 14/02/2019	ST1 - Guilford St	10:21	63.9	76.4	57.1
		10:26	68.0	90.4	57.2
		10:31	62.6	76.1	54.3
Thursday 14/02/2019	ST2 - Main Nurses Home (MNH)	11:32	55.1	66.3	53.5
		11:37	53.9	64.7	53.2
		11:42	54.0	63.0	52.6
Thursday 14/02/2019	ST3 – Rooftop of Morgan Stanley building	11:59	54.3	61.7	53.7
		12:04	54.6	60.8	53.9
		12:09	54.2	60.9	53.7
Thursday 14/02/2019	ST4 – Service Yard	12:28	63.9	82.2	56.7
		12:33	67.5	92.3	57.3
		12:38	69.7	89.6	57.5
Friday 15/02/2019	ST5 - Morgan Stanley Garden	11:49	57.7	62.8	56.9
		11:55	61.6	78.2	56.1
		12:00	57.9	63.3	56.9

Table 4: Measured levels over 5 minute intervals

Noise emissions from new development

Data obtained from the unattended noise survey has been used in setting out fixed plant noise emissions limits at noise sensitive receptors for new building services, fixed plant and industry noise sources that would be associated with the new MEDU development for the purposes of planning.

The limits should be met in the presence of all new fixed plant expected to operate simultaneously during the daytime and night-time periods, and are based on the typical measured background noise levels L_{A90} presented in Table 5. Table 5 presents the limits for noise generation inclusive and exclusive of any acoustic feature, such as tonality (e.g. a 'whine', 'hiss' or 'hum'), impulsivity (e.g. switching noise, 'bang' or 'clank'), or intermittency. Where acoustic features are expected, the limit has been set to be at least 15dB below the typical background noise level as per the requirements of the local plan.

Noise sensitive receptors	Time Period	Typical Background Noise Level, $L_{A90,15\text{ min}}$	Proposed Noise Emissions Limit $L_{A9,Tr}$	Proposed Noise Emissions Limit, with acoustic feature correction $L_{A9,Tr}$
GOSH estate	Daytime (07:00-23:00)	57 dB	≤47 dB	≤42 dB
GOSH estate	Night-time (23:00-07:00)	55 dB	≤45 dB	≤40 dB

Table 5: External plant noise emission limits at 1m from any window of the GOSH estate

Noise Mitigation Measures

The above proposed limits are to be used for the design and selection of the plant and noise mitigation measures to ensure the cumulative noise level limits of all plant operating simultaneously are achieved at the noise sensitive receptors.

At the time of this report being prepared, plant requirements and selections were being defined. As plant selections become available and are confirmed following tender, assessments should be made of the plant noise emissions and plant mitigation should be applied appropriately. Notwithstanding, in order to ensure the proposed limits are met, the following mitigation measures shall be considered as part of the design:

- Management of plant use, potentially through the use of 'on-demand' building management systems;
- Purchasing of low-noise plant equipment incorporating low noise switch gear;
- Acoustic attenuation applied to inlets and outlets of plant as appropriate;
- Acoustic shrouds where appropriate and feasible.

In selecting appropriate mitigation measures, consideration shall also be given to the temporal nature of existing environmental noise, and the variability of duty on the proposed operational plant, which may include some or all of the following:

- The time of plant operation;
- The duration of plant operations;
- The duty placed upon plant during different times of the day and night;
- The reasons for operating plant, which in some cases may be limited to maintenance testing of emergency plant only.

Conclusions

BDP has been commissioned by the Great Ormond Street Children's Hospital of London to provide a report in support of the planning application for the proposed MEDU redevelopment, which is to refurbish the existing facility and introduce new building elements, including noise generating mechanical plant to the hospital site.

With respect to noise emissions from new mechanical plant, the assessment criteria for the noise emissions limits has been based on requirements set out within the Camden Council Local Plan. In order to comply with the requirements, the following limits are to be achieved when measured 1m externally from the façade of the nearest noise sensitive receptors considered to be the surrounding GOSH estate:

Noise sensitive receptors	Time Period	Typical Background Noise Level, $L_{A90,15\text{ min}}$	Proposed Noise Emissions Limit $L_{Ar,Tr}$	Proposed Noise Emissions Limit, with acoustic feature correction $L_{Ar,Tr}$
GOSH estate	Daytime (07:00-23:00)	57 dB	≤ 47 dB	≤ 42 dB
GOSH estate	Night-time (23:00-07:00)	55 dB	≤ 45 dB	≤ 40 dB

These limits are to be used for the selection of new plant associated with the MEDU development.

Appendix I - Glossary of Acoustic Terms

A-Weighting

Normal hearing covers the frequency range from about 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The 'A-Weighting' is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA.

Decibel, dB

This is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10 dB corresponds to a doubling in the perceived loudness of sound.

Equivalent Continuous Sound Level L_{eq} or L_{Aeq}

The continuous equivalent sound level, L_{Aeq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. The A-weighted L_{eq} is widely used to measure any environmental noise which varies considerably with time and is denoted as the L_{Aeq} .

Background Noise Level, $LA_{90,T}$

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels

Reference Time Interval, T_r

Specified interval over which the specific sound level is determined. NOTE This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.

Specific Sound Level, $L_s = L_{Aeq,T_r}$

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r

LAF_{max}

A-weighted, fast, maximum, root mean squared (RMS) sound level.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands, and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500Hz octave band are 1kHz and 250Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

Noise Sensitive Receptor

Any receptor that may be adversely affected by the noise or vibration in question. In most cases this would refer to residential dwellings, schools, hospitals etc. but may also refer to sites which may be adversely affected for other reasons (for example containing equipment sensitive to noise or vibration).