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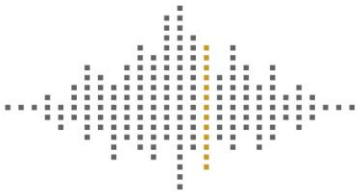
ACOUSTIC CONSULTANTS



Report

Kings Cross Methodist Church

Environmental Noise Assessment

Prepared by
Gary King MIOA

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Project No 1414196

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Sharps Redmore
The White House, London Road,
Copdock, Ipswich, IP8 3JH
T 01473 730073
E contact@sharpsredmore.co.uk
W www.sharpsredmore.co.uk

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1.0 Introduction

1.1 Sharps Redmore have been instructed to carry out a noise assessment for the redevelopment of Kings Cross Methodist Church located between Crestfield Street and Birkenhead Street in London's King Cross area.

1.2 The site is located just south of Kings Cross and St Pancras stations. Planning permission is being sought for demolition of the existing collection of buildings which make up the Methodist Church site, to provide new church facilities, community facilities for the ongoing charitable work, reprovision of the existing ancillary housing associated with the congregation (MCH) and residential apartments (C3 use).

1.3 The objective of this report is to measure the impact of existing noise sources on the proposed residential elements of the redevelopment and the impact of operational activity, including noise from congregations, charitable uses and any fixed plant on both existing and proposed residential properties.

1.4 The study considers the noise levels against current national and local guidelines and where appropriate recommendations are made on mitigation measures necessary to ensure an acceptable noise environment for future residents.

1.5 Prior to carrying out the assessment SR has contacted the Environmental Health Department at London Borough of Camden who confirmed that they have not had any complaints in relation to noise from the existing use of the church. Their comments in relation to the assessment have been included in Section 2.0 of the report which contains a discussion of the available methods of assessment and assessment criteria.

1.6 Section 3.0 of this report contains details of the environmental noise survey.

1.7 The reports results and assessment are shown in section 4.0 and section 5.0. The report conclusions are set out in section 6.0.

1.8 A glossary of acoustic terminology used within the report is included in Appendix A.

2.0 Assessment Methodology and Criteria

National Policy

2.1 The National Planning Policy Framework (NPPF), March 2012, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 123 of the NPPF state the following:

"Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

Table 2.1: Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	

Perception	Examples of Outcomes	Increasing Effect Level	Action
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on 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."*

2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

Local Policy

2.5 In terms of local policy regard is had to the Camden Development Policies DP 26 'Managing the impact of development on occupiers and neighbours' and DP 28 'Noise and Vibration' which states the following:

Policy DP26 –Managing the impact of development on occupiers and neighbours

"The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. The factors we will consider include:

…

e) noise and vibration levels…"

Policy DP28 – Noise and Vibration

"The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:

a) development likely to generate noise pollution; or

b) development sensitive to noise in locations with pollution unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.

The Council will only grant planning permission for plant and machinery if it can be operated without causing harm to amenity and does not exceed our noise thresholds.

The Council will seek to minimise the impact of local amenity from the demolition and construction phases of the development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise impact."

2.6 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

i) The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation "Guidelines for Community Noise" contain such guidelines.

ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.

iii) Another method is to compare the resultant noise level against the background noise level (L_{A90}) of the area. This is the method employed by BS 4142:2014 which describes a method for rating and assessing sound of an industrial and or/commercial nature, including sound from fixed installations of mechanical and electrical plant.

2.7 For the future residential properties regard is had to the noise and vibration thresholds as set out in Tables A and B of Camden's Planning Policy DP 28. These are based on the interpretation of the standards in the now revoked PPG 24. For sites adjoining roads the following criteria apply.

Table 1-London Borough of Camden – Noise Thresholds for residential development

Period	Time	Noise criteria	Comments/Reference
Day	0700 - 1900	72 dB $L_{Aeq12hr}$	Planning permission will not be granted/Table A
Evening	1900 – 2300	72 dB L_{Aeq4hr}	Planning permission will not be granted/Table A
Night	2300 - 0700	66 dB L_{Aeq8hr}	Planning permission will not be granted/Table A
Day	0700 - 1900	62 dB $L_{Aeq12hr}$	Noise attenuation measures will be required/Table B
Evening	1900 - 2300	57 dB L_{Aeq4hr}	Noise attenuation measures will be required/Table B
Night	2300 - 0700	52 dB L_{Aeq1hr}	Noise attenuation measures will be required/Table B
Individual noise events	2300 - 0700	>82 dB L_{Amax}	Noise attenuation measures will be required/Table B

2.8 The above thresholds are based on the Noise Exposure Categories (NEC's) contained within the now revoked PPG 24 – Planning and Noise. Although still relevant as local policy regard is also has to the current nationally recommended internal noise levels for dwellings are given in BS 8233:2014 'Guidance on Sound Insulation & Noise Reduction for Buildings'. BS 8233 recommends the following internal noise standards:

Table 2: BS 8233:2014 – Noise Criteria

BS 8233:2014 – Indoor ambient noise levels for dwellings			
Activity	Location	0700 to 2300	2300 to 0700
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 $L_{Aeq,8hour}$

2.9 There is no longer a L_{AMAX} standard for bedrooms In BS 8233. However, footnote 4 to Table 4 states that *"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 $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."* In this case, it is proposed that the previous BS 8233 internal standard (also referenced in World Health Organisation Guidelines for Community Noise) is applied. This is 45 dB L_{AMAX}, inside bedrooms.

2.10 The above levels are considered a robust but balanced view in the context of current national and local policy. If, for practical reasons, these internal noise limits are not achievable, some flexibility (up to 5 dB relaxation of L_{Aeq} criteria) may be available whilst maintaining internal standards.

2.11 In relation to operational noise the main impacts will be noise from any fixed plant or equipment, noise from the congregation and noise from charitable activities.

Noise from fixed plant

2.12 As discussed, this BS 4142:2014 described a method for rating and assessing sound of industrial and/or commercial nature according to the following summary process:

i) Determine the background sound levels, in terms of L_{A90}, at the receptor locations of interest.

ii) Determine the specific sound level of the source being assessed, in terms of L_{AeqT} level (T = 1 hour for day or 15 minutes at night), at the receptor locations.

iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent or other characteristic which attract attention.

iv) Compare the rating sound level against the background noise level; the greater the difference between the two, the higher the potential impact.

v) Differences (rating – background) of around +10 dB is likely to be an indication of significant adverse impact (SOAEL) depending on context; a difference of +5 dB is likely to be an indication of adverse impact, depending on context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

2.13 The general intent of the planning system is to ensure that a development does not result in 'significant adverse impacts on health and quality of life' (NPPF para 123). BS 4142:2014 considers that the threshold of 'significant adverse impact' is likely to be around 10 dB or more… depending on upon the context.

2.14 As can been seen above 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 exceeds the background sound level and the context in which it is placed.

2.15 As discussed in paragraph 2.5 above, Camden Council's development policy DP28 contains thresholds for plant and machinery at which planning permission will not be granted. These thresholds are based on the requirements of the previous version of BS 4142:1997 which assessed the 'likelihood of complaint' rather than the significance of impact. The noise thresholds contained within Camden Council's development policy DP 28 are shown below:

Table 3: London Borough of Camden – Noise levels from plant and machinery

Table E: Noise Levels from plant and machinery at which planning permission will not be granted			
Noise description and location of measurement	Period	Time	Noise Level
Noise at 1m external to sensitive facade	Day, evening and night	0000 - 2400	5 dB(A) < $L_{A(90)}$
Noise that has a distinguishable discrete tone at 1m external from sensitive facade	Day, evening and night	0000 - 2400	10 dB(A)< L_{A90}
Noise that has distinct impulses at 1m external to a sensitive facade	Day, evening and night	0000 - 2400	10 dB(A)< L_{A90}
Noise at 1m external to sensitive façade where L_{A90} > 60 dB	Day, evening and night	0000 - 2400	55 dB L_{Aeq}

Noise from congregation

2.16 In terms of objective guidance there is no firm policy guidance or assessment methodology for noise emissions from amplified music.

2.17 The Institute of Acoustics (IOA) have produced a "Good Practice Guide on the Control of Noise from Pubs and Clubs" in March 2003. Whilst not directly applicable to music from church services, it is a useful guide and in relation to music states *"noise may be considered not audible or inaudible when it is at a low enough level such that it is not recognisable as emanating from the source in question and it does not alter the perception of ambient noise environment that would prevail in the absence of the source in question."*

2.18 The published IOA guide does not contain objective noise criteria. To address this, a working group produced a draft annex on criteria and measurement criteria which was published in the IOA Bulletin (Volume 28, No6, 2003). It proposed that, for premises where music might occur more than once a week, as is the case with the Church, the L_{Aeq} of the music noise should exceed the representative background noise level L_{A90} (without entertainment noise). This criterion is an internal criterion. The document advises that the zero exceedance guidance given in the criterion would equate to differences of approximately 5 dB outside a partially open window. In other words, to be considered 'inaudible' noise from music should not exceed the background noise level by more than 5 dB. This standard is in line with the threshold targets set out in Table D 'Noise levels from places of entertainment on adjoining residential sites for entertainment taking place up to 2300 hours.

Noise from Charitable activities

2.19 There is no objective guidance to assess noise from the charitable activities however regard will be had to the existing uses and details of any complaints received by the Council.

Demolition and Construction Noise

2.20 BS 5228 provides a method for predicting noise from construction activity or equipment. It is the accepted standard employed for the assessment of construction noise. The standard also provides a framework for good working practice and guidance on the mitigation of noise.

2.21 Reference will also be made to the 'Camdens minimum requirements for building/construction/demolition sites.

Summary

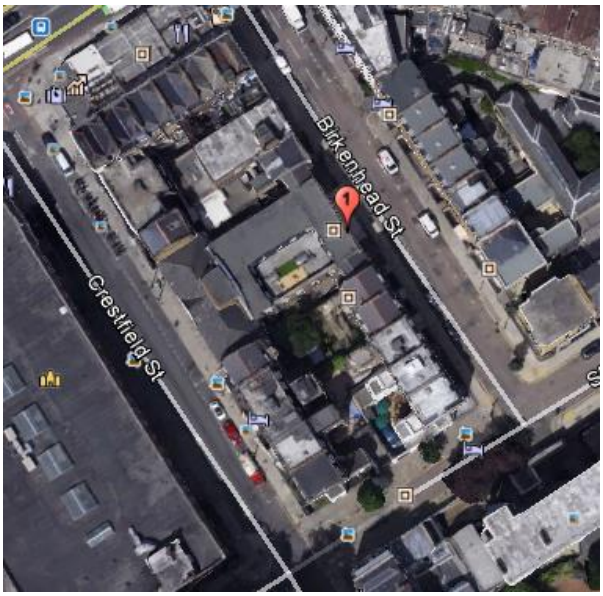
2.22 The main noise impacts from the proposed redevelopment of Kings Cross Methodist Church will be assessed as follows:

Receptor	Effects	Methodology
Existing Residential Properties	Noise from construction activity	BS 5228:2009 Part 1 – Code of Practice for Noise and Vibration control on construction and open sites Camden's minimum requirements for building/construction/demolition site
Existing Residential Properties	Noise from fixed mechanical plant – Operational Noise	BS 4142:2014 – Method for rating and assessing industrial and commercial sound Camden Development Policy – DP28 – Table E
Existing Residential Properties	Noise from operational church activities	Change in noise level, impact on existing noise levels Camden Development Policy – DP28-Table D
Future Residential Properties	Noise from existing traffic	BS 8233:2014 –Guidance on Sound Insulation and Noise reduction in Buildings. Camden Development Policy – DP 28 – Tables A & B

3.0 Survey Details

3.1 A noise survey was undertaken at the site between 6th and 10th November 2014 to obtain measurements of the existing noise climate. Measurements were taken at a location as shown in Fig 1 below. The monitoring location were chosen to represent the nearest existing residential properties to the existing church and also the facades of the proposed residential properties.

Fig 1: Monitoring Location



3.2 Noise measurements were taken using a Norsonic 118 Type 1 sound level meter which was calibrated at the start and end of the survey. No variation in level was noted. The sound level meter was set up to record measurements every 5 minutes in accordance with the advice contained in BS 4142:2014. The microphone was set up at 1 metre from the existing facades at the front and rear of the existing church.

3.3 The weather conditions during the survey were dry with a slight wind (>5 m/s) and were suitable for carrying out noise measurements. The equipment used, and the measurement procedures employed, complied with the requirements of BS 4124:2014.

3.4 A summary of the results is shown in Table 3.1, full details of the survey results can be found in Appendix B.

Table 3.1: Summary of noise survey results – Location 1

Date	Day (0700 – 2300 hours)		Night (2300 – 0700 hours)		
	$L_{Aeq16hr}$ (dB)	L_{A90}[1] (dB)	L_{Aeq8hr} (dB)	L_{A90}[1] (dB)	L_{Amax}[2] (dB)
Thurs 6th Nov	62	58	61	55	76
Fri 7th Nov	63	58	61	57	81
Sat 8th Nov	62	57	60	55	78
Sun 9th Nov	62	56	59	54	77

[1]Is the typical background noise level during the measurement period

[2]L_{Amax} excludes 10 % of highest peak levels recorded.

3.5 The existing noise climate is dominated during the day by existing road traffic on Euston Road and localised street activity in and around the area.

4.0 Noise Assessment- Proposed Residential Use

4.1 The residential proposal consists of 11 self-contained flats which will be located on the upper 3 floors of the development overlooking Birkenhead Street. Ancillary residential accommodation in connection with the church will be provided on the opposite side of the building overlooking Crestfield Street.

4.2 For the purposes of the assessment the noise levels measured on Friday 7th November 2014 have been used. These are the highest noise levels measured during the monitoring period.

4.3 Based on the survey data the existing noise level 1 metre from the façade of the building is as follows:

Table 4.1: Existing Noise levels

Facade	Daytime	Evening	Night Time	
	$L_{Aeq12hr}$	L_{Aeq4hr}	L_{Aeq8hr}	L_{Amax}
1m from Facade	63 dB	62 dB	61 dB	81 dB
DP28 – Table A Threshold Targets[1]	72 dB	72 dB	66 dB	n/a
DP28 – Table B Threshold Targets[2]	62 dB	57 dB	52 dB	82 dB

[1]Planning permission will not be granted

[2]Noise attenuation measures will be required

4.4 According to the advice contained in Camden Development Policy DP 28, noise levels will be below the threshold level at which planning permission will not be granted but will exceed the threshold targets in Table B. Therefore based on the above the site can be redeveloped for residential use subject to suitable mitigation measures. The recommended mitigation measures are discussed below:

Birkenhead Street

4.5 To ensure internal noise levels within living do not exceed the criteria established in paragraph 2.8 of this report, they should be fitted all windows should fitted with good standard of well-sealed thermal double glazing with different pane thicknesses (8-12-6 for example), to achieve a minimum sound reduction index of 30 dB R_W.

4.6 For bedrooms of primary concern will be peak noise levels from passing traffic and street activity during the night time period. To control these levels to those required by BS 8233:2014 will require acoustic double glazing. Examples include Saint Gobain Solar Glass (6-15-10). The glazing system should achieve a minimum weighted sound reduction index of 35 dB $R_W + C_{tr}$ or better.

4.7 At night to allow windows to remain closed, if desired, sufficient ventilation should be provided by acoustically treated trickle vents, acoustic air bricks or acoustic ventilators to each room area. The acoustic ventilator shall be selected so not degrade compliance with the internal noise limits when considered in combination with the overall façade.

Crestfield Street

4.8 Of primary concern to the living conditions of the ancillary accommodation will be the peak noise levels from passing traffic and street activity during the night time period. To control these levels to those specified in bedrooms as specified in BS 8233:2014, would require acoustic double glazing. The glazing system should achieve a minimum weighted sound reduction index of 35 dB $R_W + C_{tr}$ or better.

4.9 As above to allow windows to remain closed, if desired, sufficient ventilation should be provided by acoustically treated trickle vents, acoustic air bricks or acoustic ventilators to each room area. The acoustic ventilator shall be selected so not degrade compliance with the internal noise limits when considered in combination with the overall façade.

4.10 Taking into account the above it is concluded that the site can be developed for residential use subject to mitigation measures to ensure that internal noise levels meet those contained within BS 8233:2014.

5.0 Noise Assessment- Operational Activity

5.1 As outlined in section 2.0 of this report the main noise impact from operation activity will be as follows:

- Noise from fixed plant
- Noise from congregations
- Noise from charitable activities

Noise from fixed plant

5.2 The precise details of the mechanical services plant and refrigeration equipment (type and noise signature) are not known at this stage. The plant will be located in a 2 plant areas located on the roof of the building. Typical types of fixed plant include of condenser units, air handling units, extract fans and boilers

5.3 With regard to the assessment of industrial noise sources in commercial premises (i.e. fixed mechanical plant associated BS 4142:2014 enables the resultant noise from new equipment to be compared to the existing background noise level (L_{A90}) of an area to assess the significance of impact.

5.4 The closest noise sensitive properties to the mechanical services plant area are the adjacent residential properties in Birkenhead Street and Crestfield Street.

5.5 Camden Councils noise criteria requires noise from mechanical services plant to be at least 5 dB below background noise levels or where the plant has a distinct discrete isolated tone 10 dB below the background noise levels when measured at 1 meter from the nearest noise sensitive property.

5.6 BS 4142:2014 requires that a representative background noise level should be used for the period being assessed. It is assumed that the any plant will operate continuously and therefore using the background noise level measured the following noise criteria have been determined.

Table 5.1: Fixed Plant Noise Criteria

Existing Background Level (L_{A90T} dB)[1]		Plant Rating Level L_{AeqT} dB	
Day	Night	Day	Night
56	54	47	45

[1]Based on measurements recorded on Sunday 9th November 2014

5.7 Based on knowledge of mechanical services plant associated with similar commercial premises the noise levels required would be achievable. However, considering the close proximity of residential properties attenuation localised noise mitigation measures may be required such as acoustic screens may be required. The detail of any attenuation can be determined once the type of system to be installed finalised.

Noise from congregation

5.8 The proposed development will include two chapels located at the ground level. The main chapel will have a congregation size of 200 people, with a smaller chapel for 110 people. As with the existing premises the new chapels will share party walls and floors with both neighbouring residential properties and the proposed residential units above. Specifically, the noise may transmit from the following areas:

- Noise from the playing of amplified of music
- Noise from congregation

5.9 As the final design details of the development are not yet known, it is beyond the scope of this report to predict and define sound transmission across the many structures involved. Adequate sound insulation, above that required by Building Regulations, will likely to be required to ensure that the above activities do not cause disturbance to both neighbouring residential properties and the new residential units above. This can best be ensured by the imposition of a planning condition. A suggested planning condition is shown below:

"Before the development hereby permitted is commenced details of the proposed sound insulation works for protecting the first floor residential apartments from road traffic noise and from noise from internally transmitted sound from commercial operations, has been submitted and approved by the local planning authority; all works which form part of the proposed sound insulation scheme shall be completed before the residential units are occupied."

Noise from charitable activities

5.10 The existing church is used for many charitable functions including a winter night shelter, support and drop in centre for sex workers during the evenings as well as being used by other community groups and national organisation.

5.11 SR has contacted the Environmental Health Department at London Borough of Camden who has confirmed that there has been no complaints regarding the existing church and charitable activities that take place it is therefore unlikely that the continuation of these activities within a modern purpose built property will cause significant impact to local residents in accordance with the requirements of the NPPF.

6.0 Construction Noise

6.1 At this stage, it is not possible to be specific about construction activity since no contractor has been appointed. However, the construction work will most likely be carried out in the following phases:

- Demolition of existing building.
- Infrastructure construction
- Internal fit out

6.2 In general, noise from these activities may be best controlled by the following process:

i. determine the likely extent of construction works (where, when, duration)

ii. determine noise emission levels by reference to BS 5228

iii. agree noise amelioration measures with the local authority (amelioration and management controls) and/or noise limits

iv. prepare a construction works method study in agreement with the local authority.

6.3 The contractors will need to take note of, and act on, the advice in BS 5228 and carry out a noise assessment of construction work in accordance with Camden's Minimum Requirements for Building/Construction /Demolition sites.

6.4 With regard to the restriction of construction hours, these would likely be restricted to Camden Council's standard construction hours as follows:

- Monday to Friday: 0800 – 1800 hours
- Saturdays: 0800 – 1300 hours

6.5 All methods of work and noise control measures will be agreed with the Local Authority prior to the commencement of works on site, whether by informal undertaking or legislative processes.

7.0 Summary and Conclusions

7.1 Sharps Redmore has undertaken an environmental noise assessment for the redevelopment of the existing Kings Cross Methodist Church, Birkenhead Street, London. In terms of noise the following activities have been assessed.

- Impact of existing noise sources on proposed residential use
- Impact of operational activities on existing and proposed residential use
- Construction noise

7.2 Comprehensive surveys have been carried out at the nearest noise sensitive properties in to the proposed development and the facades of the proposed residential properties.

7.3 Taking into account the above and having assessed the main noise impacts from the development against national and local standards, and taking into account the existing noise climate and it is concluded that the site can be redeveloped as proposed without causing significant impact or disturbance to local residents as advised by the National Planning Policy Framework.

7.4 If granted the proposed development will not compromise the Governments' noise policy vision, as stated in the Noise Policy Statement for England.

APPENDIX A

ACOUSTIC TERMINOLOGY

Acoustic Terminology

A1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible

3 dB increase - just noticeable

10 dB increase - perceived as twice as loud

A2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

A3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

A4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p. Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p.

A5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

A6 The main noise indices in use in the UK are:

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

L_{Aeq}: The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

L_{A10}: The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.

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

A7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB}.$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

A8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \text{ Log } {}^{160}/_{10} = 60 - 24 = 36 \text{ dB}.$$

APPENDIX B

NOISE SURVEY RESULTS

Table 1: Noise Survey Results – Location 1

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
00:00				65.7	85.5	57.3	59.1	64.4	56.7	60	72.9	57	61.8	80.3	54.2
00:05				60.5	68.5	56	60.3	76.1	57.1	60.4	66.4	57.5	58.3	64.2	54.2
00:10				60.1	69	57	60.4	73	56.9	60	65.9	57.6	59	67.4	55.1
00:15				61.4	78.1	56	65.5	83.7	57	60.7	71.9	57.1	59.3	69.2	55.3
00:20				68.1	89.1	57.8	60.5	73.3	56.8	59.6	65.8	56.4	59.3	74.6	53.9
00:25				59.3	66.5	55	63.1	82.9	56.4	60.4	71.1	57.7	58.7	69.4	54.2
00:30				59.7	65.5	55	59.8	71.1	56.8	60	74.5	56.9	58.1	68.3	52.9
00:35				59.4	70.3	55.4	59.7	69.5	56.8	61.1	75.6	56.3	58.8	80.3	52.9
00:40				60.3	74.1	55.6	60.4	72.1	57.6	60.9	75.4	55.1	58.7	68.9	53.9
00:45				59.5	67.7	55.9	63	79.8	56.9	59.9	76.1	56	58.8	72.5	53.5
00:50				59.8	74.3	55.4	61.1	78	56.8	59.4	70.7	56	58.1	67.9	53.7
00:55				59.4	68.9	55.5	62.2	73.9	57.5	59.3	69.4	56.4	57.6	68.8	52.8
01:00				59.2	69.3	55.9	63	79.6	56.9	59.8	69.1	56.3	57.5	67.1	52.1
01:05				59.1	66	55.4	65.9	80.3	57.6	63.3	82	55.6	58.5	73.5	51.6
01:10				59.4	66.1	55.8	65	80.8	57.7	59	66.2	55.6	57.5	72	51.1
01:15				60	65.9	56.2	58.8	65	54.9	58.8	64.5	55.9	57	66.5	51.6
01:20				60.2	69.1	55.1	58.7	74.9	54.8	59.3	67.2	55.9	58.3	73	51.6
01:25				60	68.7	56	59	70.4	56.3	60.3	72.7	55.2	57	68.5	50.2
01:30				59.3	68.7	55.9	60.2	68.5	55.7	59.9	66.2	56.5	57.8	69.6	53.3
01:35				59.3	65.8	54.8	58.9	70.4	55.1	59.9	67.3	56.5	59.2	79.6	53.4
01:40				59.8	67.7	56.1	59.2	67.5	55.9	59.1	66.3	56.4	56.9	71.6	50.9
01:45				59.8	71.6	54.9	60.6	69.3	57.6	59.7	73.2	55.1	56.7	73.8	49.9
01:50				59.1	65.7	54.8	61.7	74.1	56.8	59.5	65	56.2	57.5	69.3	51.7
01:55				59.7	66.2	55.9	59.7	76.9	54.9	60	68.2	57	56.8	66.5	51.4

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
02:00				59.5	69.8	55.7	60.6	72.2	57.2	59.8	69.2	56.6	55.7	64.3	51.2
02:05				58.8	70.2	54.8	59.6	65.9	56	65.5	82.5	56.9	59.5	78.5	51.3
02:10				59	71	53.6	60.6	73.6	57.7	59.4	69.1	54.5	56.6	64.6	52.7
02:15				58.2	67.9	53.8	59.8	67.2	57.4	63	78.6	56.5	56.9	65.1	52.4
02:20				59.7	75.9	54.3	60.3	70.6	58	61.9	78.4	57.2	56.2	63.5	51.4
02:25				57.5	67.1	53.1	60.2	71.1	57.7	58.8	65.2	54.6	55.9	67.8	52
02:30				58.3	73.6	53.3	63.6	82.9	56.8	62	75.8	55.2	55	65.5	49.8
02:35				58.3	65.5	52.7	66.3	83.9	57.2	60.3	69.3	56.9	56.6	69.1	50.5
02:40				57.8	65.8	52.6	60	67.3	57.1	60	65.2	56	57.8	67.3	51
02:45				58.3	65.1	53.1	59	68.8	55.1	63.7	82.8	55.6	55.1	65.3	49.3
02:50				58.7	65.4	54.9	58.2	65.3	54.7	59.6	74.1	55.8	66.1	86.8	48.9
02:55				59	66.2	55.4	58.7	65.9	55.1	59.4	67.7	55.2	58.1	73.6	49.7
03:00				59.9	67.3	56.2	60	72.8	55.2	60	72.5	54.8	57	66.1	50.5
03:05				59.5	66.2	55.7	58.1	65.5	55	64.4	85.7	54.5	56	65.8	48.1
03:10				58.8	72.6	55.2	58.4	64.2	55.5	63.5	83.7	54.5	56.4	65.5	48.3
03:15				59.2	69.8	56	61.2	78.2	56.3	59.3	69.5	55.1	55.4	65	49.9
03:20				59.1	68.7	56.3	59.7	74.2	55	59.2	70.1	54.2	56.1	66.1	49.9
03:25				57.7	66	53.1	58.3	65.9	54.9	59.4	68.4	54.8	55.4	65.7	48.4
03:30				57.1	66.5	51.3	61	74.3	56.3	58.7	68	54.1	57.7	64.9	53.4
03:35				58.1	70.3	51.9	59.8	71.8	55.9	58.8	71.1	54.3	57.7	66	55
03:40				58.4	68.9	51.2	60	72.7	55.8	59	68.3	54.7	58.2	67.8	54.1
03:45				57.3	71.6	52.7	58.9	65	55.3	59.6	71.3	54.8	58	68.4	54.2
03:50				58.6	66.1	54.2	60.7	70.4	56.9	59.3	69.4	54.8	57.5	66.3	54.3
03:55				58	65.2	52.5	59.2	64.7	56.3	58.3	69	54.3	58.3	67.9	54.9
04:00				58.4	66.2	53.8	60	70.9	56.9	64.4	86.7	55.1	58	66.3	54.3
04:05				58.1	67.4	52.8	62.2	73.7	56.7	58.6	72	53.3	57.4	64.9	54.2

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
04:10				58.4	66.6	52.3	59.5	65.5	56.6	59.3	66	54.5	57.1	71.7	53.5
04:15				58.7	66.2	52.6	59.7	71.1	57.3	58.8	66.9	54.3	58.2	70.7	53.9
04:20				58	66.8	51.8	59.7	74	55.5	58.5	65.5	54.2	58	70.2	53.2
04:25				59.7	75.1	53.2	62	81.6	56.7	58.6	66.7	54.5	57	63.2	52.5
04:30				58.1	65.2	51.2	59.9	67	57.3	58.6	65.6	54.2	58	69.4	52.7
04:35				59.2	66.4	54.5	59.2	66.9	56.7	59.6	69.4	54.9	57.9	66.5	52.8
04:40				59.4	65.6	52.9	63.5	86.1	56.6	58.7	66	54.1	59.9	71.4	54.1
04:45				58.9	69.3	51.6	60	68.6	56.6	58.4	67	53.8	58.7	72	50.7
04:50				59.2	65.7	53.8	60.1	74.3	56.2	57.9	65.7	53.3	58	72.9	51.6
04:55				60	67.9	54.3	60.3	76.8	56.2	58.3	67.7	54.1	57.9	69.1	52.5
05:00				60.2	67.2	54.4	59.4	74	55.8	58.8	68	54.4	57.9	65.2	51.9
05:05				61.7	73.9	56.5	59.7	71.5	55.1	58.8	71.3	54.7	58	69.3	53.1
05:10				61	68.7	56.8	58.9	69.3	54.6	58.3	64.9	53.9	58.9	70	53
05:15				62.3	79.9	57.1	59.7	68.6	55.4	62.8	78.1	54.9	59.9	69	55.3
05:20				61.3	74.7	56.3	59.3	68	55.4	58.2	69.8	52.1	57.9	67.1	53.2
05:25				61.6	71	55.4	58.2	66.6	54.5	58.3	67.4	53.6	58.8	65.7	55.3
05:30				60.4	72.8	53.2	62.5	76.9	55.6	58.9	66.4	54.5	58	65.8	53
05:35				60.5	70.4	55	60.1	73.5	55.5	58.3	68.5	53.9	59.3	70	53.8
05:40				62	70.5	56.4	59.6	74.1	55.2	58.5	65.3	52.7	59	70.1	52.1
05:45				61.2	67.6	57	59.7	66.3	55.7	57.1	64.3	52.1	62.6	72.3	54.3
05:50				61.9	73.5	57.7	61	76.7	55.7	59.2	69.4	52.5	61.4	68.9	55.5
05:55				64.5	77.5	59.7	59.1	65.8	54.6	58.8	64.6	54.7	60.1	70.8	54.9
06:00				62.8	68.8	58.8	60.7	73.5	54.9	58.5	67	52.7	59	68.7	54.1
06:05				61.5	67.8	57.5	59.1	67.6	54.7	59.2	66.8	52.9			
06:10				60.7	69.8	56.6	59.8	70.7	56	59	70.1	53.3			
06:15				61.8	73	56.2	59.3	66.4	54.8	60	71.2	52.9			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
06:20				61.3	69.5	57.5	60.8	76.7	56.5	61.1	78.4	54.8			
06:25				61.8	69.1	57.9	60.3	78.2	54.6	58.9	66.1	53.3			
06:30				60.1	66.9	55.6	67.8	84.4	57.1	59.6	68.4	55.7			
06:35				61.3	76.1	57.2	60.5	68.8	56.2	59.1	68.8	54.7			
06:40				61.2	70.3	55.8	60.2	68.8	54.7	59.5	72.7	55.1			
06:45				61.2	70.8	57	59.4	66.9	54.8	59.3	67.1	55			
06:50				61.7	72.3	58	60.1	71.5	56.7	59.7	66	56.1			
06:55				61.7	75.8	57.3	60.8	72.4	56.4	59.1	69.3	53.3			
07:00				62.3	75.5	58.6	60.1	66.8	55.8	61.8	67.4	56.3			
07:05				61.1	70.4	57.6	59.6	78.5	55.6	59.7	64.7	54.8			
07:10				62.4	72.7	58.2	60.4	77.1	55.7	60.4	77.3	54			
07:15				63.5	72.7	58.7	61.4	74.5	55.8	60.5	73.6	55.7			
07:20				61	72.9	57.2	60.9	69.6	56.9	58.9	67.4	53.7			
07:25				61	70.1	56.6	63.7	77	58.5	60.7	74.2	55.2			
07:30				60.4	68.9	56.9	61.9	76.1	56.3	60.2	67.8	56.2			
07:35				61.9	70	57.9	62.6	73.9	59.2	59.8	72.6	55.1			
07:40				65.1	85.2	58.8	61.6	70.1	57	60.8	74.3	55.5			
07:45				64.5	76.7	59.3	60.3	69.7	56.1	59.9	69.5	54.7			
07:50				65.9	75.6	64.1	61	69.5	56.8	61	76.3	55.6			
07:55				66.2	73.7	64.4	60.7	70.7	56.7	64	79.4	56.4			
08:00				66.8	76.3	64.7	60.3	75	56.9	62.6	72.3	55.9			
08:05				66	77.9	61.7	59.8	69	56.6	60.4	68.1	56.4			
08:10				65.3	85	57.9	61.5	74.4	57.2	59.3	69.2	53.9			
08:15				63.4	74.5	58.6	61.9	80.7	57.2	59.2	66.8	54.8			
08:20				63.9	84.5	59.1	61.5	71.8	56.6	59.7	74.9	54.5			
08:25				63.5	79.5	57.3	60.8	72.7	56.6	59.9	72.3	54.5			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
08:30				65.3	84.4	58	60.9	75.3	57.5	59.6	67.6	55.4			
08:35				62.3	73.3	58.2	60.7	71.2	57.1	59.6	65.8	55.6			
08:40				61.4	74.3	57.5	61.3	69.6	56.8	60.1	68.9	55.1			
08:45				62.8	77.8	57.5	60.9	72.2	56.6	59.9	67.5	55.6			
08:50				60.6	71.1	57.8	65	84.6	57.6	60.8	67	56.6			
08:55				61.6	72.7	58.3	61	71.8	57.4	61.5	68.9	58.8			
09:00				62.8	73.5	58.6	64	76.6	60	60.1	72.8	56.3			
09:05				62.7	80.8	57.7	61.1	71.9	58.1	60.5	70	55.2			
09:10				61	68.3	56.4	62.2	70.9	58.6	61.8	76.3	56.3			
09:15				61.5	80.3	58.4	61.2	69.7	58	59.5	66.2	55.5			
09:20				62.7	77.8	57.9	60.6	81.8	57	60.6	78.8	55.7			
09:25				60.2	67.4	58.4	62	77.5	57.4	60.5	77	56.1			
09:30				69.3	83.6	60.6	60.4	76.2	57.6	69.5	91.1	63.7			
09:35				60.8	75.6	57.5	66	82.6	57	68.9	83.8	64			
09:40				62.3	73.5	57.7	60.8	70.3	56.9	63.8	77.9	58			
09:45				63	78.5	58.5	59.9	69	56.7	67.9	85.9	59.8			
09:50				61.4	72.1	57.9	61.6	75.9	58.1	67.9	86.2	62			
09:55				61.1	71.1	58.2	62.7	73.1	57.8	64.1	78.3	61			
10:00				61.1	69.1	58.1	63.5	80.2	57.7	65	75.4	59.7			
10:05				65.9	85.3	59.9	62.2	79.6	55.8	59.7	68.1	55.8			
10:10				60.8	70.3	57.7	62.3	74.1	58.1	60.7	73.6	56.8			
10:15				61.2	68.4	58.9	61.5	72.1	57.6	60.8	71.3	56.6			
10:20				60.2	77.5	58	60.8	82.5	56.4	60.8	74.9	57.2			
10:25				61.5	74.6	58.1	60.5	72.6	56.9	61.7	77.4	57.5			
10:30				61.4	70.8	58.3	60.6	70.8	56.9	61	70	57.3			
10:35	63.6	81.8	58.4	60.1	68.1	57.4	61.1	71.5	57.4	67.6	87.3	57.2			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
10:40	60.9	69.9	58.2	61.4	76.7	58	60.1	71.6	56.5	64.3	76.5	57.1			
10:45	64.2	86.3	57.8	62.7	78.1	59.7	60.1	69.1	56.9	72.7	93.6	64			
10:50	61.5	78	58.2	61.2	70.5	58.3	60.8	71.3	57.3	65.9	84.3	63.9			
10:55	65.5	83.3	57.8	63.3	82.2	58.1	60.3	68.9	56.9	76.2	99.7	59.5			
11:00	61.1	69.4	58.6	61.3	68.4	58.6	60.5	69.2	56.7	57.8	69.3	54.8			
11:05	63.4	85.3	58.5	61.8	74	58.7	60.5	69.2	56.4	59.4	68.8	56.3			
11:10	63.8	86.5	58.6	74.3	99.1	59.2	62.8	77.2	57.4	60	70.6	56.4			
11:15	61.6	71.2	58.7	61.4	69.2	58	60.2	68.7	56.7	59.7	73.1	55.8			
11:20	64.3	81.2	58.8	62.9	77.3	58.8	60.7	73.5	57.8	60.8	73	56.8			
11:25	63	80.8	58	60.6	73.4	57.6	60.4	67.7	57.4	59.6	68.8	56.2			
11:30	66.7	85.7	59	61	75.3	57.8	61	69.6	57.8	60	70	57.1			
11:35	61.9	71.3	59.2	60.4	68.1	58.3	60.3	72.2	57.1	59.5	68.9	55.8			
11:40	62.7	74.7	58.9	70.4	87.2	58.3	63.8	78.6	58	64.3	79.7	56.9			
11:45	60.9	73.1	56.3	60.7	68.7	57.8	60.8	68.2	58	60.4	73.8	56.4			
11:50	61.1	75.3	57.1	61.4	73	58.5	61	71.4	58	59.3	67.5	55.8			
11:55	60.9	74	58	60.8	71.5	58.3	61.6	76.5	57.5	59.2	66.5	56.1			
12:00	62.1	74.9	57.8	62.3	80.4	57.4	60.1	68.9	57.3	59.5	67.8	56.1			
12:05	61.3	69.3	58.5	61	70.7	58	60.8	76.2	57.5	62.2	79	55.7			
12:10	62.8	75.8	58.3	61.5	70.5	58.3	62.1	84.7	57.6	59.3	71.5	55.6			
12:15	61.2	78.8	58	60.4	68.5	57.6	62.6	78.3	57.5	60.1	66.9	57.3			
12:20	60.4	75.5	56.6	62.7	73.7	58.8	60.8	80.8	57	61.9	70.5	57.6			
12:25	61.3	71.7	57	60.5	70.2	58	66.4	85.7	59	64.1	87.2	57.3			
12:30	59.6	70.6	57.3	61.5	73.5	58.1	66.1	89.4	57.5	66	79.3	56.4			
12:35	60.2	68.3	57.6	60.8	69.8	57.8	60.9	74.5	57.3	61.2	73.7	56.1			
12:40	61.7	79.3	57.3	60.6	68.4	58	64.3	80.2	57.8	59.3	70.3	56.3			
12:45	60.2	70.4	57.8	60.1	73.3	57.4	61.3	69.6	58.7	60.5	74.8	55.8			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
12:50	61.3	76	58.1	63.8	84.9	57.7	60.6	68	57.1	59.3	68.2	56			
12:55	59.7	71.3	57.1	61.4	73.4	58	61.1	75.5	57.4	59.4	78.8	56.1			
13:00	60	74.1	56.8	59.8	71.2	57.5	61.5	81	57.7	59.8	76.6	55.6			
13:05	60.9	71.4	57.7	61.6	80.3	57.8	60.7	79.7	57.7	59.8	71.6	56.1			
13:10	61.3	75.4	57.3	60.9	74.4	58.5	61.2	78.3	57.6	59.5	69.2	56.2			
13:15	65	84.1	58.7	63.5	91	57.3	60.1	69.8	57.4	60.2	71.3	56.8			
13:20	61.4	72.9	58.2	61	76.9	58.3	60.1	73.2	56.7	60.4	74.4	56.2			
13:25	60.5	71.6	57.5	61.8	76.9	58.9	60.8	76.8	56.6	60.1	69.6	56.7			
13:30	64.9	83.3	57.9	61.2	73.4	58.5	60	69.9	57.4	59.3	65.9	55.6			
13:35	61.6	78.3	57.4	61.1	73.8	58	61.2	74.6	57.3	59.4	68.1	56.2			
13:40	60.7	71.8	57.4	61	75.7	58.3	61	68.7	57.8	61.9	84.6	56			
13:45	62.1	76.3	59.1	61.7	77.3	58.8	62	79.2	58.5	67.2	87.2	55.9			
13:50	62.4	72.4	59.2	61	70.7	58	60.5	70.7	57.8	60.3	75	57.1			
13:55	60.6	71.6	58.1	60.3	73.4	57.9	60.6	70.7	57.2	62.8	85.7	56.3			
14:00	66.4	84.4	58.5	60.3	80	57.5	59.9	68.1	56.7	63.3	80	57.1			
14:05	61.2	75.4	58.5	60.7	72.5	58.2	61.5	74.8	58.2	59.5	76.2	56.3			
14:10	61.9	83.5	58	62	85	58.2	63.8	76.1	57.1	63.4	80.7	57.2			
14:15	61.7	71.3	58.7	61.1	80.3	57.3	61.2	70.8	57.6	61.9	76.1	57.9			
14:20	61	78.2	57.3	63.7	87.4	58.6	61.1	69	57.9	58.8	66	56.1			
14:25	63.1	73.4	58.7	62.1	77.7	58.5	64.2	77.4	56.9	60.2	68.4	56.7			
14:30	62	72.5	58.8	68	92	58.7	59.9	70.6	56.7	60.7	73.3	57			
14:35	66.8	88.4	59.7	66.7	87.2	58.6	59.7	71.6	57.5	61.2	75.1	57			
14:40	61.9	71.8	58.1	70.4	93.2	58.8	69.1	89.3	60	59.5	67.1	57			
14:45	62.1	71.6	58.7	64.4	84.5	58.6	60.1	68.1	57	60.3	70.1	56.8			
14:50	60.9	76.6	57.8	63.5	80.2	59.4	60.3	70.1	57.3	60.4	76.5	56.7			
14:55	62.6	81	58.3	63	78.1	59.2	63.8	78.6	57.4	59.6	70.3	56.4			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
15:00	66	83.5	58.5	62.2	73.9	58	60.5	67.7	57.8	61.4	73.3	56.7			
15:05	62.6	72	59.7	59.7	72.9	56.7	60.3	70.4	57.2	61	76.9	57.3			
15:10	60.8	70.9	58.1	65.3	81.5	58.5	61.1	78.4	57.4	59.7	71.7	57.3			
15:15	61.4	75.7	58.8	62.5	77.8	58.1	59.2	65.9	56.2	59.9	68	57			
15:20	65.8	80.4	59.1	59.8	66.9	57.7	60.2	71.5	56.9	59.4	67	56.9			
15:25	65.4	78.8	59.3	60.5	68.5	57.9	60.2	69.1	55.9	59.9	69.7	56.9			
15:30	65.6	81.5	58.9	60.6	77.8	57.7	64.9	81.7	57.3	60.9	72.3	57.6			
15:35	65.1	80.7	58.7	60.4	68.9	57.9	60.7	73	56.8	61.1	73.8	58			
15:40	60.4	73.9	58	60.8	72.3	57.7	61.8	76.4	57.5	62.7	79.7	57.6			
15:45	61.5	72.2	58.8	64.3	82.7	58.4	60.1	69.3	57.2	60	69.3	57.8			
15:50	59.9	74.6	57.5	60.8	75.2	58	60.3	74.6	57.7	59.6	77.3	56.1			
15:55	61.3	76.3	57.4	61.4	77.8	58.3	60.8	69.7	57.8	59.4	73	56.1			
16:00	60.5	70.1	57.6	60.7	70.1	58.1	60.7	67.6	57.1	60.5	75.4	56.5			
16:05	61.2	74.4	57.8	60.5	72.1	57.8	60.3	73	55.7	60.5	67.7	57.6			
16:10	66.4	84.5	58.6	60.6	68.7	57.9	60	74.6	56.7	62.4	72	58.8			
16:15	65.4	80.9	61	60.3	69.6	57.6	60.6	73.2	57.1	61.3	78.8	57.6			
16:20	61.4	72.5	59.3	63.3	77.4	57.8	60.2	75.6	57.1	59	68.1	56.6			
16:25	60.5	73.4	58.1	61.1	72.7	56.9	60	67.6	57.4	60.7	69.7	57.1			
16:30	65.1	77.6	58.4	59.9	74.9	57.5	63.4	82.5	58.9	62.4	77.3	57.7			
16:35	61.6	74.1	58.4	60	72.3	57.2	60.3	72.4	57.2	60.1	72	56.7			
16:40	62.7	79.9	58	61.1	71.1	57.1	60.9	73.7	57.6	58.8	68.8	56.3			
16:45	59.9	67.2	57.7	63	75.9	58	60.5	70.5	57.5	60	70	57.4			
16:50	62.1	75.7	58.6	59.8	69.5	57.7	60.3	72.9	57.2	59	72.7	55.9			
16:55	61.1	72.2	57.5	60.4	73	56.9	60.6	75.3	58	61.1	73.1	56.7			
17:00	68.5	87.5	58.2	59.8	70.7	57.5	63.3	75.3	60.4	58.6	73.7	56			
17:05	61.6	82.5	57.6	62.2	72.3	57.9	63.1	76.1	59.4	58.2	65.2	55.8			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
17:10	68	80.5	60	59.7	71.3	57.3	62.2	73.7	58.2	59.6	72.3	56.5			
17:15	60.9	73.8	57.8	62	77.9	57.6	65.3	80.5	59.3	60.8	81.7	56			
17:20	61.1	81.1	57	61.9	72.5	58.5	68.2	84.9	60.1	58.6	66	56.1			
17:25	61.4	82.5	57.9	62.9	77.7	58	70.6	91.5	60.1	61.1	80.2	57			
17:30	60	68.9	57.4	64.8	81.5	58.9	62.6	75	59.1	59.7	70.8	56.6			
17:35	61.3	72.2	57.9	60.1	69.1	57.5	60.8	66.6	57.8	58.8	69.3	56.6			
17:40	60.4	72.2	57.2	60.2	69.4	57.6	60.8	67.3	57.7	60.3	76.1	56.9			
17:45	60.1	77.7	57.3	64.5	79.8	58.7	61	68.7	58	58.8	72.3	56.2			
17:50	59.9	68.2	57.5	62	76.8	57.8	62.1	72.1	58.8	58.9	66.6	56.3			
17:55	60	69.6	57.7	63.9	83.1	57.6	62	71	58.7	61.3	76.5	55.6			
18:00	60.2	73.5	57.9	60.3	70.1	57.8	64.5	80.2	58.7	59.2	71.9	55.5			
18:05	60.7	74.2	58.1	60	71.8	57.3	61.2	74.2	57.9	58.1	67	55.5			
18:10	60.9	74.9	57.6	60.9	72.7	58.3	60.2	72.4	58	60.3	75.1	56			
18:15	60.8	77.7	57.3	61.4	76.7	58.2	62.1	77.2	59.2	61	74.6	57.5			
18:20	64.4	82.9	56.8	65.8	84.3	58.6	61.5	78.5	58.8	62.7	87.3	56.5			
18:25	59.7	67.9	57.1	61.5	74.9	58.2	61.7	75.7	57.5	61.4	78.2	57.7			
18:30	60.7	78.9	57.8	60	70.8	57.5	61.5	75.5	58.2	59.7	67.9	57.7			
18:35	64	79.6	57.5	60.7	74.7	57.3	62.9	79	58.2	61	85.8	56.6			
18:40	59.4	72.9	57.5	60.4	71.1	57.5	62.2	73.1	58.9	59.4	68.5	56.8			
18:45	61.4	76.3	57.7	63.8	77.7	57.9	60.5	66.6	58.3	60.6	71.7	57.2			
18:50	64.2	86.1	57.8	62.8	84.9	57.7	60.8	73.5	57.7	59	69.1	57.1			
18:55	60.3	70.2	58.2	60.9	74.8	57.3	61.7	75.2	56.8	62.9	82.5	56.8			
19:00	62	80.9	58.2	60.4	74.6	57.2	61.8	71	58.2	59.6	67.6	56.6			
19:05	60.7	75.6	58.1	60.6	71.3	57.4	61.4	72.5	56.4	60	70.3	55.8			
19:10	60.2	69.6	57	60.5	73.9	58.1	60.7	68.5	57.3	61.2	69.3	58			
19:15	60.7	72.5	55.6	61.2	73.1	57.7	62.5	76.2	58.7	59.2	69.3	57.1			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
19:20	60.7	74.7	57.1	61.6	83.5	57.8	66.4	89.5	57	60.2	73.1	55.7			
19:25	61.4	75.2	57.4	63.5	80.9	58	60.5	68.5	56.2	67.1	85.3	56.2			
19:30	59.7	69.7	56.6	61.7	75	57.8	60.6	70.8	57.6	60.7	76	56.5			
19:35	60.4	77.4	56.4	63.6	79.6	58	65.3	85.7	56.7	61.2	72.2	56.9			
19:40	60.2	77.9	56.8	62.1	77.7	57.6	60.6	72.2	56.1	59.5	66.1	57.7			
19:45	61.4	70	58.2	60.6	71.9	57.3	60.4	65	57.6	60.1	68.5	57.1			
19:50	65.7	86.8	57.4	60	70.4	57.5	62.7	73.3	58.5	59.8	79.2	57.2			
19:55	67.3	86.8	59.7	60.3	77.5	56.8	60.2	66.8	57.1	59.1	68.2	56.9			
20:00	64.8	80	57.8	64.1	79.5	57.8	60.1	65.2	56.6	59	70.7	56.5			
20:05	60.1	70.5	56.9	62	84.4	57.1	60	69.5	56.6	58.8	67.4	55.1			
20:10	61.7	76.3	57.3	61.5	72.4	58.1	60.9	70.1	57.3	59	66.5	56.4			
20:15	60	70.9	56.6	62.1	80.7	58.5	61.2	74.9	57.4	61.2	77.4	55.5			
20:20	59.8	72.3	56.6	62.1	75.7	58.8	60.8	71.9	57	59.4	70.4	56.3			
20:25	60.7	82.3	56.7	60.5	72.1	57.8	63.1	75.8	57.7	61.6	83.6	56.5			
20:30	60.3	78.6	56	59.8	69.4	57.6	61.7	75.8	56.9	59.2	76.2	54.2			
20:35	58.9	73.5	56.2	59.8	69.1	57.4	61.1	77.5	56.8	60.2	76.3	56.7			
20:40	59.7	73.1	56.6	60.2	67	57.5	61.2	71.6	58	64.9	77.4	57.5			
20:45	60.4	71.8	56.7	61	74.3	57.8	62.7	78.1	56.4	59.3	71.3	56.4			
20:50	62.1	73.4	57.1	61	70.3	57.9	61.5	74.9	56.9	62.6	80.5	56.1			
20:55	59.6	68	56.5	61.4	73.3	58.6	63.3	80.9	57	60.2	74.1	56.8			
21:00	64.5	87.3	57.2	65.9	86.2	57.7	59.6	68.7	55.3	59.7	66.2	56.8			
21:05	60.6	74.7	56.9	60.7	73.8	57.3	60.5	67.8	56.6	59.4	73.8	56.5			
21:10	59.4	72.2	56.8	61.7	74.8	56.7	60.1	66.5	57.2	60	67.9	56.1			
21:15	59.8	73.5	57	61.2	74.2	57.1	62.2	79.8	57.8	58.8	66.4	54.5			
21:20	65.3	79.4	56.7	66.5	81.9	58.1	63.9	79.4	57	58.7	65.3	55.7			
21:25	61.1	74.3	57.7	59.7	74.7	56.3	65	83.6	57.7	60.5	75.5	56.8			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
21:30	59.5	73.5	56.6	62.9	80.5	57.5	60.9	68.5	57.8	62.6	80.3	56.5			
21:35	60.2	72.6	56.5	59.7	71.4	57	63.3	81.2	56.8	61.2	84	56			
21:40	60.4	70.7	57.6	59.1	67.9	56.8	61.2	72.7	58.3	59.9	66.4	55			
21:45	59.6	70.4	56.4	59.2	68.3	56	61.5	80.5	57.7	61.3	76.8	55.7			
21:50	59.8	70.7	56.6	61.1	75.5	56.7	61.4	72.5	58.7	60	77.1	55.5			
21:55	63	76.4	56.7	65.1	77.5	58.3	60.5	69.2	57.2	59.1	65.7	55.7			
22:00	58.8	69.8	55.8	65.4	77.2	58.5	60.2	67	57.2	59.2	66.6	53.9			
22:05	58.7	69.4	55.8	63.1	74.8	58	62.4	77.6	57.7	58.8	68	54.4			
22:10	59.8	76.4	55.8	65.3	76.2	58.7	61.4	72	57.3	58.5	65.8	54			
22:15	59.2	67.1	55.5	64.5	79.5	57.1	60.6	79.4	57.1	60.1	75	55.5			
22:20	61.7	77	56.1	63.5	83.1	57.3	59.4	70.7	56.3	59	68.7	55.6			
22:25	59.9	72.3	55.9	60.4	68.3	57.2	59.4	66.4	56.7	61.4	78.9	55.7			
22:30	63.3	80.1	56.2	61.2	76.5	56.5	66.2	85.1	57.4	60.2	75.7	55.2			
22:35	59.5	67.3	55.7	60.3	75.7	57.4	61.5	78.3	56	59.1	68.5	55.3			
22:40	62.4	75.6	57.1	59.9	69.1	57.1	59.9	69.6	56	58.9	67.3	55.4			
22:45	59.5	69.7	56.2	59.3	68.2	56.6	64.5	86.5	56	59.9	73.9	55			
22:50	60.3	74.1	57	60.3	76.4	55.8	65.8	81.2	57.7	59.7	67	56.4			
22:55	60.5	78.7	56.7	60.2	68.9	56.5	59.9	67.4	56.8	58.4	68.3	54.7			
23:00	66.6	90.9	56.4	63.5	82.1	58	60.9	71.2	57.3	63.7	80	55.7			
23:05	60.3	70.1	57.9	61.3	74.2	57.9	59.5	76	55.7	58.9	68.9	55.1			
23:10	60.6	81.7	57.3	59.7	73.9	57	59.5	67.6	56.1	62.4	79.9	56.7			
23:15	59.7	73.7	57	60.9	84.2	56.4	60.4	77.1	56.8	61	75.4	57.7			
23:20	60.2	66	56.4	63.1	81.7	57.4	61.5	73.8	58.1	61.1	73	57.7			
23:25	60.2	71.1	57.2	60.8	69	57.4	60.2	71.5	56.4	62.6	82.2	56.6			
23:30	60.4	75.3	56.4	60.5	80.1	56.1	60.2	74.7	55.9	58.7	68.5	55.8			
23:35	60.3	77.3	57.1	61.3	82.3	57.5	60	72.6	55.7	60.3	76.7	54.9			

	6.11.14			7.11.14			8.11.14			9.11.14			10.11.14		
	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}	L_{Aeq}	L_{Amax}	L_{A90}
23:40	63.4	83.8	56.6	59.8	67.3	56.9	62.4	79.7	55.8	59.1	76.3	55.2			
23:45	59.5	70.5	56.8	63.7	79.2	57.4	62.5	82.7	56.5	60.3	73.1	56			
23:50	63.8	75	58.6	59.8	65.8	56.4	60	71	56	62.1	78.6	55.6			
23:55	60.3	68.5	57.5	65.7	81.6	56.9	59	66.7	56.3	60.1	72.7	56.4			