



Former Whitley Library, 215 Northumberland Avenue and adjacent land to east, Reading, RG2 7PZ

20th March 2022

ISSUE 01





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1.0 INTRODUCTION

DAA Group has been appointed to carry out a Noise Impact Assessment at Former Whitley Library 215 Northumberland Avenue and adjacent land to east Reading RG2 7PZ. Page | 3

The purpose of the survey is to support Planning Application Ref: 210537 for the Change of use of former library to community centre (use Class F2 b) and formation of car park and new access on adjacent land to the east in accordance with:

- National Planning Policy Framework 2021 (NPPF)
- National Planning Practice Guidance (NPPG)
- BS8233:2014 Guidance on sound Insulation
- Reading Local Plan

The measured noise levels will be used to investigate and assess the noise impact from the operation of the proposed Community Centre to the nearest residential units and outlines any necessary mitigation measures.

The technical content of this assessment has been provided by a Tech member of the Institute of Acoustics.

The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration

2.0 NOISE CRITERIA

2.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The Department for Communities and Local Government introduced the National Planning Policy Framework (NPPF) in March 2012. The latest revision of the NPPF is dated July 2021.

The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework where local Councils can produce their own local and neighbourhood plans which reflect the needs of their communities.

In conserving and enhancing the natural environment, the planning system should prevent both new and existing development from contributing to, or being put at, unacceptable risk from environmental factors including noise.

Planning policies and decisions should aim to avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development. Conditions may be used to mitigate and reduce noise to a minimum so that adverse impacts on health and quality of life are minimised. It must be recognised 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. Reference is made within NPPF to the Noise Policy Statement for England (NPSE) as published by DEFRA in March 2021.

2.2 NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

The long-term vision of the NPSE is stated within the documents scope, to '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 policy aims are stated to:

- 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.

The application of NPSE should mean that noise is properly taken into account at the appropriate time (for example in planning applications or appeals) where it must be considered alongside other relevant issues. The guiding principles of Government policy on sustainable development should be used to assist in the implementation of the NPSE.

The NPSE should apply to all types of noise apart from occupational noise in the workplace. The types of noises defined in the NPSE includes:

- Environmental noise from transportation sources;
- Neighbourhood noise which includes noise arising from within the community; industrial premises, trade and business premises, construction sites and noise in the street

The Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- **NOEL – No Observed Effect Level**

- o 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**

- o This is the level above which adverse effects on health and quality of life can be detected.

- **SOAEL – Significant Observed Adverse Effect Level**

- o This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

2.3 ProPG: PLANNING AND NOISE

As outlined above, the National Planning Policy Framework encourages improved standards of design, although it provides no specific noise levels which should be achieved on site for varying standards of acoustic acceptability, or a prescriptive method for the assessment of noise.

ProPG: Planning and Noise was published in May 2017 in order to encourage better acoustic design for new residential schemes in order to protect future residents from the harmful effects of noise. This guidance can be seen as the missing link between the current NPPF and its predecessor, PPG24 (Planning Policy Guidance 24: Planning and Noise), which provided a prescriptive method for assessing sites for residential development, but without the nuance of 'good acoustic design' as outlined in ProPG.

ProPG allows the assessor to take a holistic approach to consider the site's suitability, taking into consideration numerous design factors which previously may not have been considered alongside the noise level measured on site, for example the orientation of the building in relation to the main source of noise incident upon it.

It should be noted this document is not an official government code of practice, and neither

replaces nor provides an authoritative interpretation of the law or government policy, and therefore should be seen as a good practice document only.

2.4 THE WORLD HEALTH ORGANISATION – GUIDELINES FOR COMMUNITY NOISE

The scope of WHO Guidelines for Community Noise was to consolidate scientific knowledge on the health impacts of community noise, to provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The health risk to human from exposure to environmental noise was evaluated and guidelines derived.

The WHO presents a measure to assess adverse health effects from steady-state ‘anonymous’ noises such as traffic. There are no specific health guidelines for the influence of noises with specific character (i.e. tonality or intermittency), or with respect to specific sources of noise; such as industrial or commercial sources.

Internal design levels within the WHO guidelines are recommended in line with those mentioned in BS8233:2014

‘The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference... To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB LAeq.’

‘The capacity of a noise to induce annoyance depends upon its physical characteristics, including the sound pressure level, spectral characteristics and variations of these properties with time. During daytime, few people are highly annoyed at LAeq levels below 55 dB(A), and few are moderately annoyed at LAeq levels below 50 dB(A).’

2.5 BRITISH STANDARD BS 8233:2014

British Standard Code of Practice BS8233:2014 ‘Sound insulation and noise reduction for buildings’ provides recommended guideline value for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation Guidelines for Community Noise 1999 (WHO).

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16hour	
Dining	Dining room/area	40 dB LAeq, 16hour	
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq, 8hour

2.4.1 Indoor ambient noise levels for dwellings

The WHO guideline noise criteria set an internal sleep disturbance noise limit of 45dB LAmax,F which should not be exceeded on a regular basis.

2.6 IEMA GUIDELINES FOR ENVIRONMENTAL NOISE IMPACT ASSESSMENT

While BS 8233:2014 establishes the upper limit there is no specific formal methodology for undertaking an assessment of noise from voices potentially affecting nearby residential occupiers. A general principle that can be employed in situations of potential noise disturbance where there is no formal assessment methodology is to consider whether the new noise source will likely cause a significant increase over the current sound level or a change of character compared to the existing noise climate.

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This assessment method forms the basis of the Guidelines for Environmental Noise Impact Assessment, written by the Institute of Environmental Management and Assessment (IEMA).

Having established the likely change in sound levels due to the new activity, an initial indication of the significance of the change can be determined from the table below, taken from Table 7-12 of the Guidelines.

Effect Description	Definition
None / Not significant	Less than LAeq 2.9dB change in sound level and/or all receptors are of negligible sensitivity to noise.
Slight	A LAeq 3dB to 4.9dB change in sound level at a receptor of some sensitivity.
Moderate	A LAeq 3dB to 4.9dB change in sound level at a sensitive or highly sensitive receptor, or a greater than LAeq 5dB change in sound level at a receptor of some sensitivity.
Substantial	Greater than LAeq 5B change in sound level at a noise-sensitive receptor, or a LAeq 5dB to 9.9dB change in sound level at a receptor of high sensitivity to noise.
Severe	Greater than LAeq 10dB change in sound level at a receptor of high sensitivity to noise.

Table 2.6 - Effect descriptors for change in sound level taken from Table 7-12 of the Guidelines for Environmental Noise Impact Assessment

Note that defining the change of loudness to one decimal place is not a reflection of the accuracy of any assessment undertaken but rather to provide a clear threshold between adjacent effect descriptions.

Section 7 of the Guidelines advises that the change in sound level provides an initial estimate of the impact, which should then be examined considering the context of the development, the type of noise source, nature of the change, and other factors.

Paragraph 7.6 summarises that,

“In some situations, the conclusions about the degree of the impact will be clear and straightforward; but in others it is likely that, ultimately, a professional judgement will have to be made by the assessor. It must be remembered that the effects of noise are primarily subjective, and while it is desirable to include as much objectivity as possible into the assessment process in

order to obtain consistency, there should be no concern in allowing professional judgement to come into the final analysis. However, the basis for the judgement made must be clearly set out so that it is clear how the conclusion has been reached."

Once the initial estimate of the impact has been corrected to account for the context of the assessment, the magnitude of the impact and significance of the effects can be reviewed against Table 7-7 of the Guidelines, copied below.

Magnitude of Impact	Description of Effect
Negligible	No discernible effect on the receptor.
Slight	Receptor perception = Non-intrusive Noise impact can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.
Moderate	Receptor perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.
Substantial	Receptor perception = Disruptive Causes a material change in behaviour and/or attitude. Potential for sleep disturbance. Quality of life diminished due to change in character of the area.
Severe	Receptor perception = Physically harmful Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects.

Table 2.6.1 - Relationship between noise impact and noise effects

It is of benefit to notice the similarity between the effect descriptions in Table 2 with the examples of outcome in Figure 1, taken from the PPG-N. From this, achieving a magnitude of impact of "slight" corresponds to designing noise to below the LOAEL. ACA Acoustics therefore recommends that where an assessment indicates an impact of "negligible" or "slight" this is fully acceptable in accordance with the NPPF, NPSE, and PPG-N. Where an assessment indicates a "moderate" impact then this would potentially have an adverse impact on nearby residents and would only be acceptable where it can be adequately mitigated and minimised.

3.0 SITE SURVEYS

3.1 SITE DESCRIPTION

The site is located on a roundabout. The area is predominantly residential.

The dominant source of Noise is road traffic noise from the surrounding roads. (See Figure 3.1)

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Figure 3.1 – Proposed Site

3.2 ENVIRONMENTAL SITE SURVEY PROCEDURE

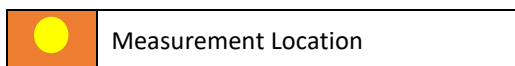
Measurements were carried out free field (See figure 3.2) and logged over a 5 hour period between on 8th March 2022. There was no secure location to leave the noise equipment un maned. The measurements were taken to establish the ambient sound level at the site, with respect to criteria of BS8233:2014.

The weather was suitable conditions to carry out the noise survey.



Measurement Location

Figure 3.2 – Measurement Location



3.3 EQUIPMENT

Instrument manufacturer	Cirrus Research Plc
Model	IEC 61672-3:2013
Serial Number	G302987
Microphone Type	MK:224
Serial Number	214457A
Cirrus CK: 675 Outdoor Kit	
Type 1 Acoustic Calibrator	

The calibration of the sound level meters was verified in-situ before any measurements were taken, using the hand held calibrator and reference tone of 114dB at 1kHz. Validation checks at the end of the survey indicated that all instruments had operated within permitted tolerances for drift and measured level.

Copies of Calibration certificates are available upon request.

4.0 NOISE SURVEY

The following free-field sound levels have been derived for assessment of environmental Noise. The LAeq: 15min, LAm_{ax}: 15min, LA10: 15min and LA90: 15min acoustic parameters were measured and are shown as a time history in Appendix A.

Minimum background (LA90) levels monitored for the duration of the survey are shown in Table 4.1.

Measurement Data		Free Field Sound Pressure Level dB	
Time	Average LAeq,T	Maximum LAMAX,(f)	Lowest L90,T
13:00 – 18:00	61dB	71dB	52dB

Table 4.1 - Measurement Levels

5.0 BREAKOUT NOISE CRITERIA

There is no written criterion for noise emissions in this instance. However, for commercial dwellings in the majority of Local Authorities, the following statement applies:

“No music, amplified sound or preaching/chanting is audible beyond the site boundary (Leq 15min shall be 10dB below at 1/3 octaves 40Hz to 20 KHz).”

We therefore propose to set the noise criteria to the worst case scenario as shown in Table 5.0 in order to comply with the above requirement.

Time Period	Noise Criterion 1m at Nearest Residential Receiver
13:00 – 18:00	42

Table 5.0 – Noise Criterion

6.0 PLANNING PROPOSAL

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This planning application seeks planning permission to utilise the site as a F2b use class, which involves the use of land adjacent to the library and 182 Cressingham Road to provide off street parking.

The new usage of the building would be to provide classrooms/ workshops for children and adult learning centre through organised seminars. The use of the building would be primarily learning based and would allow client (Al-Majid Welfare Trust) to deliver its objectives in delivering learning and engagement activities for children and adults, aimed at social development and community led organisation.

No amplified music or speech is to be played any time and no external plant equipment is to be installed as part of the proposal.

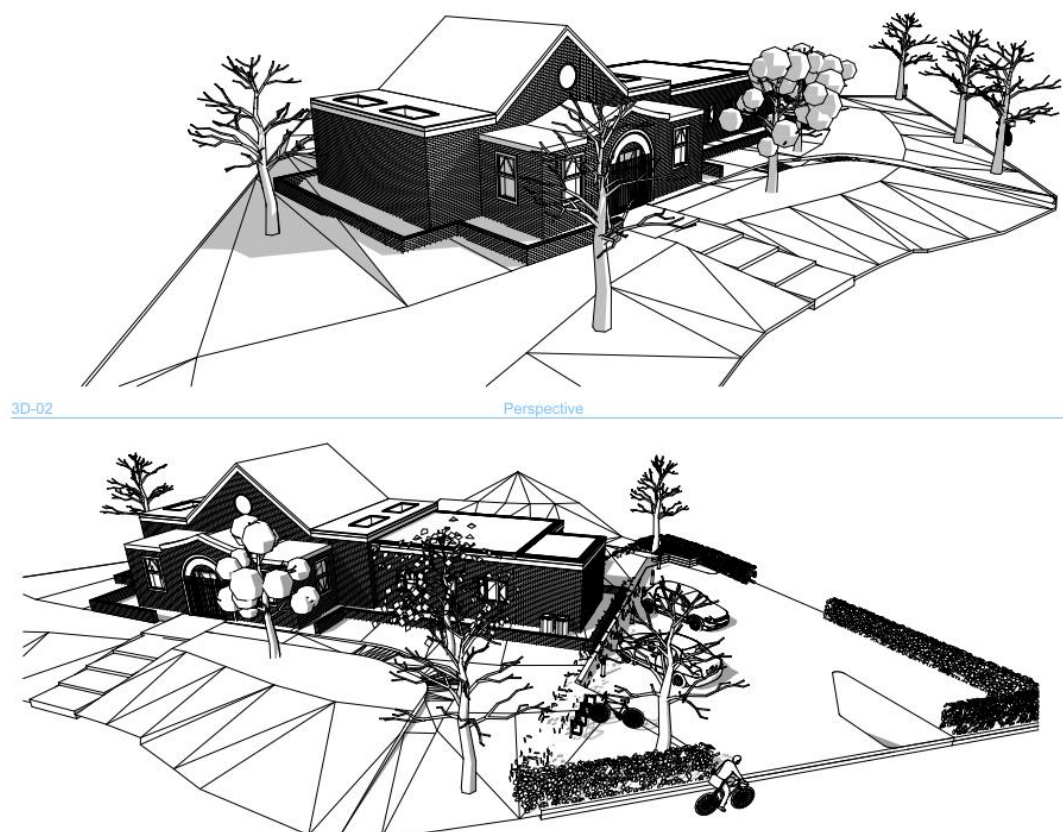


Figure 6.0 – Proposed Plans

6.1 SOURCE NOISE LEVELS

To be able to calculate noise emissions from the community centre it is necessary to establish what the typical sound level will be.

During activities within the proposal, the primary noise source is likely to be spoken voice from the attendees. Library data for spoken voice has been used to calculate a worst-case internal noise level for multiple attendees speaking simultaneously within the meeting room. The resultant noise levels are tabulated below:

Sound Pressure Level (dB) in each Frequency Band								
Source	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	dBA
Meeting Room/ Group Speech	33	49	62	72	71	67	61	75

Table 5.0.1 – Worse Case Internal Noise Levels

It is important to note that the noise levels given in table 1 are considered worst-case for nature of the activities et to take place within the proposal, noise levels for the majority of the time are likely to be lower.

6.2 EXTERNAL BUILDING FABRIC

Following an inspection of the site, the closest receivers to the proposed community centre have been identified as being a residential building located to the east elevation approximately 20 meters away. (See Figure 6.2).

The forementioned receivers would be potentially subjected to transmission through the breakout elements of noise from the proposed community centre and will therefore be used as the most representative noise-sensitive receiver.



	Proposed Community Centre
	Nearest Residential Noise Sensitive Window
	Measurement Location

Figure 6.2 – Nearest Noise Sensitive receptor

The non-glazed external building fabric elements of the proposed development is comprised of blockwork. This would contribute towards a significant reduction of ambient noise levels in combination with a good quality secondary-glazed window configuration, as shown in Section 6.2.

All non-glazed elements of the building facades have been assumed to provide a sound reduction performance of at least the figures shown in Table 5.1 when tested in accordance with BS EN ISO 140-3:1995.

Element	Octave Band Centre Frequency SRI, dB					
	125	250	500	1K	2K	4K
Non Glazed Element SRI	41	43	48	50	55	55

Table 6.2.1 Non-glazed elements assumed sound reduction performance

Glazing Configuration – 4mm/ (6-16mm) / 4mm							
Frequency, Hz/dB					Rw	Rw + C	Rw +Ctr
125	250	500	1K	2K	30	28	25
21	17	25	35	37			

Table 6.2.2 – Standard Double Glazing

The main front door should achieve minimum 30 dB Rw, including perimeter acoustic seals to ensure noise breakout is controlled.

Using the measured activity level of 75dB(A) and the measured Dw rating of the building façade, Table 6.2.3 shows the predicted sound pressure level at the identified nearest noise sensitive receivers due to noise breakout through the external building fabric, compared with the minimum measured background noise during proposed operating hours.

Receiver	Operating Noise Emissions Criterion	Noise Level at Receiver (due to proposed activity)
Nearest residential Receiver	42dB(A)	24dB(A)

Table 6.2.3 – Predicted Noise Level at Nearest Noise Sensitive receiver

6.3 REVERBERATION TIME – NEW COMMUNITY HALL

The current proposals for the surface finishes of the proposed New Community Hall is currently unknown.

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As an indicator for general target of reverberation, BS8233: 2014 – “Guidance on sound insulation and noise reduction for buildings” specifies recommended reverberation times at 500Hz for various volumes of rooms. This is shown in Table 6.2 below.

Room Volume m^3	Reverberation Time T (s)	
	Speech	Music
50	0.4	1.0
100	0.5	1.1
200	0.6	1.2
500	0.7	1.3
1000	0.9	1.5
2000	1.0	1.6

Table 6.2 BS8233:1999 Reverberation times at 500Hz

After reviewing the above guidance, we would recommend the reverberation time within the New Community Hall to be in the region of 0.6 – 0.7 seconds as an arithmetic average of the reverberation times in the 500Hz, 1kHz, and 2kHz octave bands.

Proposals

In order to achieve the target reverberation time of 0.6-0.7 second absorptive treatment would need to be installed to increase speech clarity and reduce the reverberation time.

To achieve a more controlled reverberation time as well as a higher level of clarity we would recommend the installation of one of the following absorptive panels at various points along the proposed walls:

- Akusto Wall C Texona 40 mm (Absorption Class A)
- VertiQ 40mm direct (Absorption Class A)
- Wallsorba 40mm direct (Absorption Class A)

In order to achieve the desired results, we would recommend approximately 30-40m² of one of these panels are installed through proposed walls. However, further calculations would need to be undertaken once the surface finishes are known.

6.4 BS8233:2014 ASSESSMENT

The highest value of 42dB(A) is to be considered externally at 1m from the receiving residential window. Windows may be closed or partially closed leading to further attenuation, as follows. Further calculations have been undertaken to assess whether the noise emissions from the plant unit installation would be expected to meet the recognized British Planning Compliance Review recommendations, in order to further ensure the amenity of nearby noise sensitive receivers. British Standard 8233:2014 'Sound insulation and noise reduction for buildings – Code of Practice' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:2014 recommends 35dB(A) for internal resting/sleeping conditions during daytime hours. With a calculated external level of 24dB(A), the residential window itself would not need to provide any additional attenuation in order for the recommended internal noise conditions to be achieved. According to BS8233:2014, even a partially open window offers 10dB attenuation, thus leading to a further reduced interior noise level.

Receiver	Design Range – for resting/ sleeping conditions in a bedroom during daytime in BS8233:2014	Internal Noise Level at Receiver With Open Window
Residential Window as in figure 5.2	35dB(A)	14dB(A)

7.0 PARKING

The impact of traffic noise on the surrounding environment will depend on several factors, including (but not limited to) the time of day, frequency of occurrence and type of vehicle used.

Consideration is given towards the proposed one or two meetings per week.

It is recognised that there are no approved guidelines or standards for the assessment of arrival / departure noise. The standard BS4142:2014 Methods for rating and assessing industrial and commercial sound is not appropriate when dealing with noise generated from vehicle movements outside of a site, as the scope of this document does not cover this noise source.

One method that can be used to estimate road traffic noise impacts is the Calculation of Road Traffic Noise (CRTN, 1988). This typically describes a method used to accompany Transport Assessments, when used to describe larger developments and associated impacts. Traffic flow information to be used CRTN calculation is the maximum expected between 06:00 hours and 24:00 hours on a normal working day within a period of 15 years after opening to traffic. The estimate is based upon the Annual Average Weekday Traffic (AAWT) obtained for the base year and growth forecast, considering local conditions and differences through development.

One limitation of the CRTN methodology, being based on the LA10, T parameter, is that there is a minimum traffic flow required to generate valid levels. For the 18-hour period, this threshold is 1,000 vehicles. Where predicted flows are below this level then no predictions have been made and it can be assumed that road traffic noise is not particularly significant.

The traffic generation caused by the development is significantly below CRTN lower limits.

The impact of an increase or reduction in noise level from road traffic is provided in a variety of documents including The Institute of Environmental Management and Assessment – Guidelines for Environmental Noise Impact Assessment (IEMA, 2014). The magnitude of the impact should be considered different in the short and long term. A change in road traffic noise of 1 dB LA10,18h in the short term is the smallest that is considered perceptible. In the long term, typically 15 years after the project opening, a 3 dB LA10,18h change is considered perceptible. The subjective response to changes in road traffic noise is largely restricted to daytime periods, as applicable in this case.

The impact of changes is provided in the below classification of noise impacts, which has been equated to an approximate change in road traffic volume.

Short Term Noise Change dB LA10,18h	Long Term Noise Change dB LA10,18h	Magnitude of Impact dB LA10,18h	Approximate change in Road Traffic Volume
Negligible	Negligible	≥ 0 dB and < 1 dB	$< 26\%$
Minor		≥ 1 dB and < 3 dB	$\geq 26\%$ and $< 100\%$
Moderate	Minor	≥ 3 dB and < 5 dB	$\geq 100\%$ and $< 315\%$
Major	Moderate	≥ 5 dB and < 10 dB	$\geq 315\%$ and $< 1000\%$
	Major	≥ 10 dB	$\geq 1000\%$

Table 7.1– Classification of magnitude of noise impacts based on short- and long-term periods.

The Noise Change due to the parking activity will be negligible.

8.0 NOISE MANAGEMENT PLAN

In order to minimise the risk of any noise disturbance caused by attendees on site, it would be recommended that signage be installed outside the premises in to remind attendees to leave the site in a quiet and respectful manner.



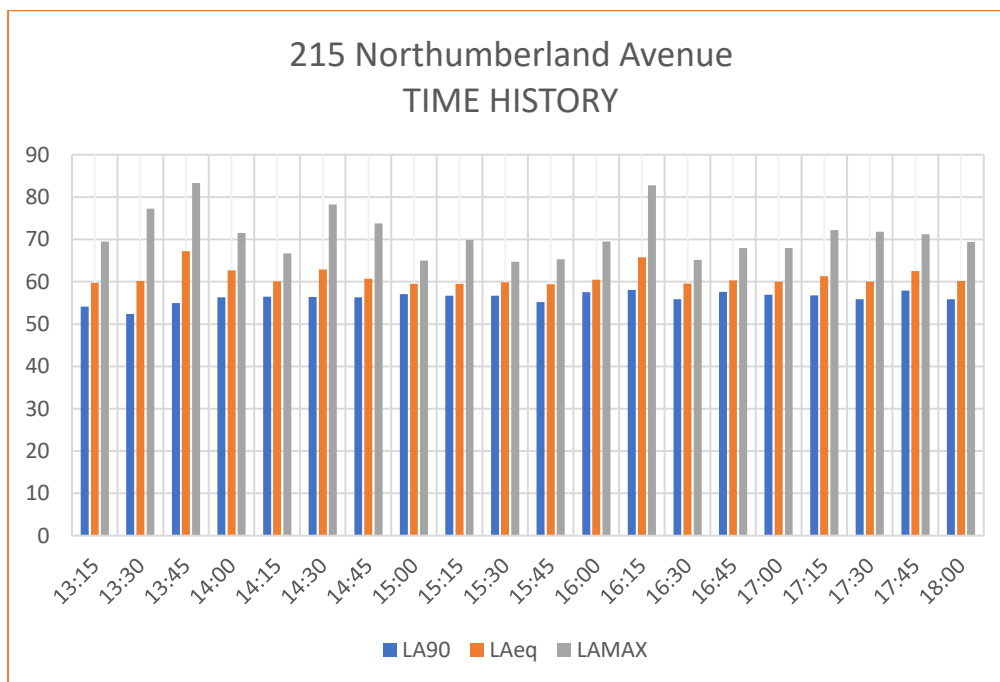
9.0 SUMMARY AND CONCLUSIONS

A baseline noise survey has been undertaken by DAA Group to establish the prevailing noise climate in the locality of Former Whitley Library 215 Northumberland Avenue and adjacent land to east Reading RG2 7PZ in support of an application for a Community Centre.

The measured levels have been assessed against the National Planning Policy Framework and currently available standards and guidance documents including World Health Organisation Guidelines for Community Noise (1999) and BS8233:2014 Guidance on sound Insulation.

Based on the calculations and assessments made within this report and with implementation of the mitigation measures, the proposed community Centre will not prejudice the amenities of the nearest residential receptors.

APPENDIX A – MEASUREMENTS



B.1 WEIGHTED DECIBEL, dB(A)

The unit generally used for measuring environmental, traffic or industrial noise is the A-weighted sound pressure level in decibels, denoted dB(A). The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. An increase or decrease of approximately 10 dB corresponds to a subjective doubling or halving of the loudness of a noise, and a change of 2 to 3 dB is subjectively barely perceptible.

B.2 EQUIVALENT CONTINUOUS SOUND LEVEL, L_{Aeq}

Another index for assessment for overall noise exposure is the equivalent continuous sound level, L_{Aeq} . This is a notional steady level which would, over a given period, deliver the same sound energy as the actual time-varying sound over the same period.

B.3 MAXIMUM NOISE LEVEL, L_{max}

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125 ms in duration.

B.4 NOISE RATING, NR

Noise ratings are used as a single figure criterion for specifying services noise in buildings. Each noise rating value has an associated spectrum of defined values in each third or octave frequency band. To determine the noise rating of a room the measured spectrum is compared to a set of noise rating curves. The highest NR curve that crosses any single frequency band of the measurement determines the noise rating for the room.

The single figure noise rating is read at the 1 kHz band.

B.5 SOUND LEVEL DIFFERENCE (D)

The sound insulation required between two spaces may be determined by the sound level difference needed between them. A single figure descriptor which characterises a range of frequencies, the weighted sound level difference, D , is sometimes used (BS EN ISO 717-1). This parameter is not adjusted to reference conditions.

The standardized level difference, D_n , T is a measure of the difference in sound level between two rooms, in each frequency band, where the reverberation time in the receiving room has been normalised to 0.5 s. This parameter measures all transmission paths, including flanking paths.

The weighted standardized level difference, D_{nTw} , is a measure of the difference in sound level between two rooms, which characterises a range of frequencies and is normalised to a reference reverberation time

B.6 SOUND REDUCTION INDEX (R)

The sound reduction index (or transmission loss) of a building element is a measure of the loss of sound through the material, i.e. its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room.

The weighted sound reduction index, R_w , is a single figure description of sound reduction index characterising



a range of frequencies, which is defined in BS EN ISO 717-1: 1997. The R_w is calculated from measurements in an acoustic laboratory

B.7 STATISTICAL NOISE LEVELS (L_{A90} , (T) L_{A1} , (T) L_{A10} , (T) etc.)

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{A10} is the level exceeded for ten per cent of the time under consideration, has historically been adopted in the UK for the assessment of road traffic noise. The L_{A90} is the level exceeded for ninety per cent of the time, has been adopted to represent the background noise level. The L_{A1} the level exceeded for one per cent of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted L_{A10} , dB L_{A90} , dB. etc. The reference time (T) is normally included, e.g. L_{A10} , (5min), & L_{A90} , (8hr).

B.8 TYPICAL NOISE LEVELS

Typical noise levels are given in the following table.

Noise Level dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-offs at 100 m
110	Chain saw at 1 m
100	Inside disco
90	Heavy lorries at 5 m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heaters at 1m
40	Living room
30	Ventilation Noise in Theatre
20	Remote countryside on still night
10	Sound insulated test chamber
0	Threshold of hearing.

APPENDIX C – CALCULATIONS

NOISE EMISSION CALCULATION														
ITEM	PARAMETER				HZ	63	125	250	500	1K	2K	4K	8K	dBA
1														
2														
3	Typical Group Speech	1	Spl	dB	+	33	49	62	72	71	67	61	57	75
4	Composite sound reduction index of existing masonry and standard double glazing		Spl	dB	-									50
5	(windows Closed)													
6														
7														
8														
9														
10														
11	Revised SPL:		Spl	dB										25
12														
13														
14														
15	Distance to nearest receptor Metres:	r	20		dB	-								18
16	$SPL = L_{120} \log(r_1/r_2)$	r	Q	2										
17														
18														
19														
20	Spl at receptor				dB									7
21														
22														
23	Non reverberant correction				dB	-								-6
24	Façade Correction				dB	-								3
25														
26														
27	Specific noise level at receptor				dB	+								4
28	(1m outside noise sensitive window)													
29	Lowest Background Noise Levels: (L_{A90})													
30	Daytime (13:00-18:00) Windows Closed				dB	+								52
31	Difference: (Daytime Assessment level)				dB	-								-48
32														
33	Daytime (13:00-18:00) Windows Open				dB	+								52
34	Difference: (Daytime Assessment level)				dB	-								-25
35														
36														
	E&OE													