



Dewsbury Learning Quarter, Dewsbury

Noise Planning Report

Report for:



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1.0 INTRODUCTION

Hydrock have been appointed by Kirklees College to provide acoustic consultancy services relating to the development of the proposed Dewsbury Learning Quarter (DLQ) to be located on land adjacent to Commercial Road, Dewsbury.

Planning legislation and guidance documents have been consulted in order to plan a noise measurement survey of the proposed development site.

Prevailing noise levels have been established for use in the design development and Planning Application processes.

This report presents details of the noise assessment method, available guidance and computer modelling undertaken.

The report assesses the acoustic impact of the proposed development on the neighbouring areas and the impact of the existing noise environment on the proposed development.

2.0 OUTLINE DESCRIPTION OF DEVELOPMENT

The DLQ will be a new purpose built facility comprised of two buildings to be located on vacant land adjacent to Commercial Road, Dewsbury. The DLQ will contain learning areas, staff offices, meeting rooms, motor vehicle workshops, multi-skill construction learning areas and other ancillary spaces.

The proposed DLQ development site is bound by Commercial Road to the North, Bradford Road to the East, Halifax Road to the West and existing retail premises to the South.

Environmental noise levels in the area are dominated by road traffic noise from surrounding roads including Halifax Road, Bradford Road and Commercial Road and from rail traffic noise servicing local railway lines.

An indicative site plan of the proposed development site, outlined in red, is shown below in Figure 1:

Figure 1 – Proposed Site Location



3.0 PLANNING POLICY

The planning policies on which the proposed development will be scrutinised are outlined in the following sub-sections.

3.1 National Planning Policy Framework

The 'National Planning Policy Framework, March 2012, Department for Communities and Local Government' (NPPF) sets out the United Kingdom Government's planning policies for adoption in England and how they should be applied.

The main aims of the NPPF are set out in section 11, paragraph 123 as stated below.

'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 upon them because of changes in nearby land uses since they were established;*
- *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;'*

The NPPF makes reference to guidance contained in 'Noise Policy Statement for England (NPSE), March 2010, Department for Environmental, Food and Rural Affairs' (NPSE). The NPSE is intended to apply to all forms of noise, other than noise occurring in the workplace and includes environmental noise and neighbourhood noise of all forms.

The NPSE provides advice regarding the impact of noise which should be assessed on the basis of adverse and significant adverse effect. However, the NPSE does not provide any specific guidance on assessment methods or the noise levels at which different effects would be applicable. Moreover, the document advises that it is not possible to have *'a single objective noise-based measure...that is applicable to all sources of noise in all situations'*. It further advises that the sound level at which an adverse effect occurs is *'likely to be different for different noise sources, for different receptors and at different times'*.

3.1.1 Planning Practice Guidance

The Department for Communities and Local Government publishes guidance on the internet in the form of the *'Planning Practice Guidance'* (PPG). The guidance of PPG provides greater level of details in relation to the relevance of noise for planning following the introduction of the NPPF and NPSE.

It is stated under the heading *'How to Determine the Noise Impact'* that the following should be considered by local authorities:

- *'whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.'*

The assessed noise should include the overall effect of the development, inclusive of the construction stage and once completed.

The guidance process includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation as required by the NPSE.

The observed effects are defined in Table 1 which is taken from the section headed *'How to Recognise when Noise could be a concern?'*



Table 1 - PPG Noise Guidance

Perception	Examples of Outcome	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; closing windows for some of the time because of the noise. Potential for non-awakening 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	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. 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

Under the section heading ‘*What factors influence whether noise could be a Concern?*’ the subjective nature of noise is discussed. It is stated that there is no simple relationship between noise levels and the impact on those affected. It is all dependent on how various factors combine in particular situations, which include:

- *‘The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;*
- *For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;*
- *The spectral content of the noise (i.e. whether or not the noise contained particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.’*
- *‘Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies*



on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation can be found in the Building Regulations;

- *In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in noise may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.*
- *If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.'*

Similarly, to the NPSE, no specific noise parameters are defined in the guidance or target noise levels established for comparison.



4.0 GUIDANCE DOCUMENTS

In order to establish satisfactory noise parameters for design purposes and assessment, the following guidance has been considered:

4.1 Building Bulletin 93

To address noise control in and around education buildings, appropriate guidance and criteria can be taken from:

'BB93 Acoustic Design for Schools: Performance Standards' (BB93: February 2015).

BB93 provides advice and guidance regarding acceptable internal noise levels within various learning areas.

With regards to universities or colleges of further and higher education BB93 states that many of the acoustic specifications are desirable and not mandatory and should be used as outline guidance.

Table 2 below provides the BB93: February 2015 guidance criteria for indoor ambient noise levels in a variety of rooms associated with the proposed college development.

Table 2 – BB93 Internal Noise Limits

Type of room	Room classification for the purpose of airborne sound insulation		Upper limit for the indoor ambient noise level L _{Aeq} (30mins) dB	
	Activity noise (Source room)	Noise tolerance (Receiving room)	New building	Refurbishment
Lecture room	Average	Medium	35	40
Study Room	Low	Medium	40	45
Meeting Room	Low	Medium	40	45
Office, Staff Room	Low	Medium	40	45

BB93 states that the ventilation requirements, outlined in the above table, for normal teaching and learning activities may be relaxed by 5 dB with the use of natural or assisted ventilation methods.

This allowance of +5 dB does however not apply to teaching and learning spaces with an internal noise limit of 45 dB or more.

4.2 British Standard 8233:2014

BS 8233:2014 provides guidance on the sound insulation and noise reduction for buildings, the standard offers the following guidance with regards to acceptable design range limits for specific room types:

Table 3 – BS 8233:2014 Internal Noise Limits

Room Type	Design Range L _{Aeq T} dB
Staff Meeting Room / Training Room	35-45 dBA



4.3 British Standard 4142:2014

Guidance on measurement of prevailing background noise and rating methods of external building services noise can be taken from:

'British Standard 4142:2014 Methods for rating and assessing industrial and commercial sound'

The methods described in BS4142:2014 provide an objective method for assessing the likelihood of disturbance caused by industrial or commercial noise. It can be used to determine the following levels at external locations:

- a) rating levels for sources of sound of an industrial and/or commercial nature; and
- b) ambient, background and residual sound levels,

for the purposes of:

- 1) investigating complaints;
- 2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and
- 3) assessing sound at proposed new dwellings or premises used for residential purposes.

During the measurement period, weather conditions should be monitored and recorded. Caution is advised of rain influence and measurements in wind speeds greater than 5 m/s.

The specific sound (i.e. that generated by the source or sources of interest) should be measured or determined using a 1-hour period during the daytime (0700 hrs to 2300 hrs) and a 15-minute period at night (2300 hrs to 0700 hrs).

The monitoring duration should reflect the range of background noise for the period being assessed. In practice, there is no 'single' background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed.

The prevailing background sound level should be measured and representative of times when the specific sound source(s) is intended to be operated.

Certain acoustic features can increase the perceived of impact of a specific noise source.

Where such features are present at the assessment location, a character correction is added to the specific sound level to obtain the rating level.

The significance of noise impact is initially estimated for the specific sound by subtracting the measured background sound level from the rating level, and the following considered.

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Where the initial estimate of the impact needs to be modified due to the context, all pertinent factors should be taken into consideration.



4.4 Calculation of Road Traffic Noise

The 'Department of Transport: Calculation of Road Traffic Noise: 1988 Section 43-44.' shortened measurement procedure has been used to calculate the predicted noise emissions of road traffic noise emanating from Bradford Road, Halifax Road and Commercial Road on the DLQ.

The shortened measurement procedure outlined in section 43 provides the following guidance:

'Measurements of L_{10} are made over any three consecutive hours between 10:00-17:00 hours. Using L_{10} (3-hour) as the arithmetic mean of the three consecutive values of hourly L_{10} , the current value of L_{10} (18-hour) can be calculated from the relation:

$$L_{10} (18 - \text{hour}) = L_{10} (3 - \text{hour}) - 1 \text{ dB(A)}$$

The Transport Research Laboratory (TRL) document 'Converting the UK traffic noise index L_{A10} (18-Hour) to EU noise indices for noise mapping' PR/SE/451/02, outlines calculation methodology to calculate the L_{day} , L_{evening} , L_{night} and L_{den} using the L_{A10} (18-Hour) noise index.

Calculation Method 3 for non-motorway traffic is shown below:

$$L_{\text{day}} = 0.95 \times LA_{10} (18 - \text{Hour}) + 1.44 \text{ dB}$$

$$L_{\text{evening}} = 0.97 \times LA_{10} (18 - \text{Hour}) - 2.87 \text{ dB}$$

$$L_{\text{night}} = 0.90 \times LA_{10} (18 - \text{Hour}) - 3.77 \text{ dB}$$

$$L_{\text{den}} = 0.92 \times LA_{10} (18 - \text{Hour}) + 4.20 \text{ dB}$$

5.0 NOISE SURVEY

To enable an assessment of the impact on and from the proposed development, environmental noise measurements were undertaken on each site between Tuesday 10 May and Wednesday 11 May 2016.

During the site visit an assessment of the noise climate of the proposed development site and their surroundings was conducted.

It was noted during the inspection that the ambient noise level was dominated by road traffic noise from surrounding roads but predominately the Dewsbury Ring Road, Halifax Road and Bradford Road.

Railway traffic was in operation during the measurement process however it was noted that due to the close proximity of the roads in a majority of cases it was not determined to be audible above the noise of the road traffic.

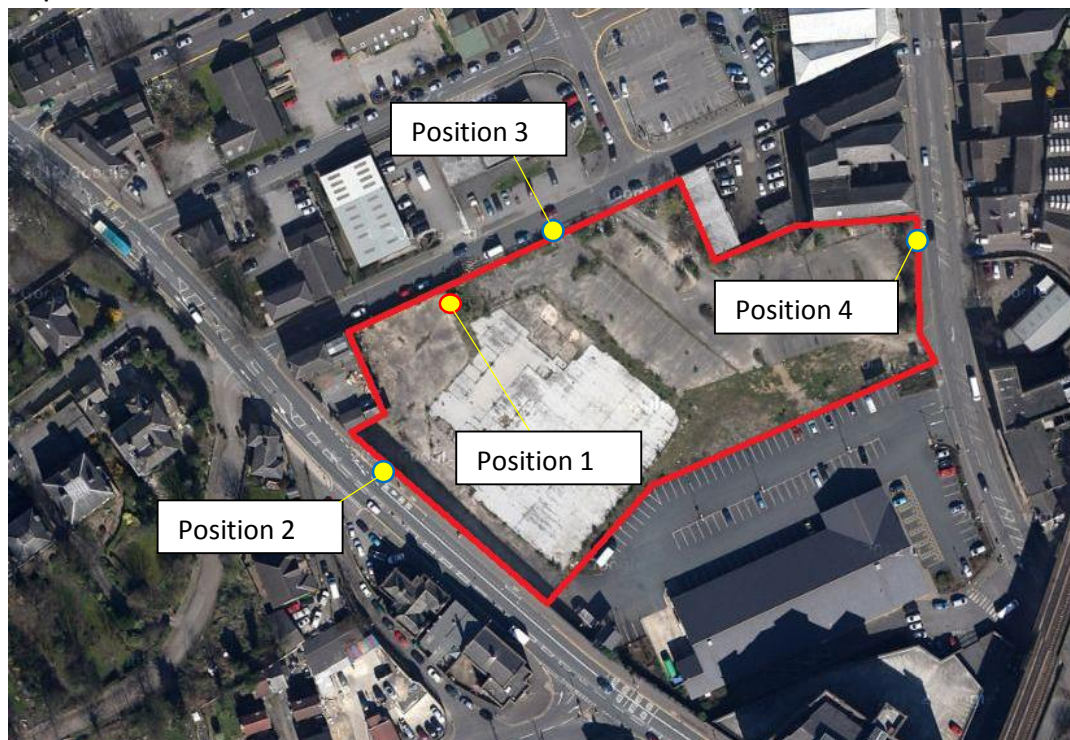
5.1 Methodology

The measurement locations were selected on and around the proposed development site in order to quantify the necessary noise levels for the Planning Application stage.

5.2 Dewsbury Learning Village

The figure below shows the locations used and the proposed development site.

Figure 2 – Proposed Site Location



5.2.1 Monitoring Position 1 – Environmental Noise Monitoring

Position 1 was chosen as a long term monitoring position due to its close proximity to the identified nearest noise sensitive receivers and in order to measure the prevailing background noise levels of the quietest façade.

An unattended environmental noise survey was conducted at Position 1 between 1215hrs on 10 May 2016 and 1430hrs on 11 May 2016.

The unattended sound level meter was positioned to acquire prevailing noise levels during both day and night time periods.

The sound level meter microphone was placed on the roof of a decommissioned electrical substation, at a height of approximately 4.5m above local ground height.



The monitoring procedure generally followed the guidance outlined in BS7445:2003 Part 1 Section 5.2.3.

A wind shield was fitted to the monitoring equipment at all times.

5.2.2 Monitoring Position 2 – CRTN – Halifax Road

Monitoring Position 2 was selected to acquire data in conformance with the *'shortened measurement procedure'* of the *'Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988'* (CRTN).

Measurements were undertaken using a class 1 sound level meter fitted to a tripod at a height of 1.5m. All measurements were undertaken at one position on the pavement overlooking Halifax Road.

As per guidance outlined in Section 41.1 and paragraph 26.1 of the CRTN document:

'There should be no sound-reflecting surfaces (other than the ground) within 15 metres of the microphone...the façade correction, (Para 26.1, +2.5dBA) should be subtracted from the measured level.'

As the measurements were not undertaken within a 'free field' environment the façade correction of 2.5dB was subtracted from the measured levels.

Measurements were undertaken between the hours of 1100-1320 hrs on Wednesday May 2016.

A wind shield was fitted to the monitoring equipment at all times.

5.2.3 Monitoring Position 3 – CRTN – Commercial Road

Monitoring Position 3 was selected to acquire data in conformance with the *'shortened measurement procedure'* of the *'Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988'* (CRTN).

Measurements were undertaken using a class 1 sound level meter fitted to a tripod at a height of 1.5m. All measurements were undertaken at one position on the pavement overlooking Commercial Road.

As per guidance outlined in Section 41.1 and paragraph 26.1 of the CRTN document:

'There should be no sound-reflecting surfaces (other than the ground) within 15 metres of the microphone...the façade correction, (Para 26.1, +2.5dBA) should be subtracted from the measured level.'

As the measurements were not undertaken within a 'free field' environment the façade correction of 2.5dB was subtracted from the measured levels.

Measurements were undertaken between the hours of 1120-1340 hrs on Wednesday May 2016.

A wind shield was fitted to the monitoring equipment at all times.

5.2.4 Monitoring Position 4 – CRTN – Bradford Road

Monitoring Position 4 was selected to acquire data in conformance with the *'shortened measurement procedure'* of the *'Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988'* (CRTN).

Measurements were undertaken using a class 1 sound level meter fitted to a tripod at a height of 1.5m. All measurements were undertaken at one position on the pavement overlooking Bradford Road.

As per guidance outlined in Section 41.1 and paragraph 26.1 of the CRTN document:

'There should be no sound-reflecting surfaces (other than the ground) within 15 metres of the microphone...the façade correction, (Para 26.1, +2.5dBA) should be subtracted from the measured level.'

As the measurements were not undertaken within a 'free field' environment the façade correction of 2.5dB was subtracted from the measured levels.

Measurements were undertaken between the hours of 1140-1400 hrs on Wednesday May 2016.

A wind shield was fitted to the monitoring equipment at all times.



5.3 Equipment

Details of the sound monitoring equipment used for the acquisition of the prevailing noise levels are provided in Table 4 below.

The sound level meters and acoustic calibrator units were calibrated to national standards.

The equipment used satisfies the requirements of BS 4142:2014 and BS 7445-1:2003 for measurement of prevailing background noise conditions.

The sound level meters were field calibrated using their relevant acoustic calibrator before and after the continuous set of measurements.

No significant deviation in levels were observed.

Table 4 – Survey Equipment

Monitoring Location	Manufacturer	Instrument	Type	Serial No. / Version	Calibration Certificate Number
Position 1	Rion	Sound Level Meter	NL-52	01254313	No.C11030502
Position 1	Rion	Pre-Amplifier	NH-25	54395	No.C11030502
Position 1	Rion	Microphone	UC-59	08771	No.C11030502
Position 1	Rion	Acoustic Calibrator	NC-74	35157401	No.C02040201
Position 2-4	Brüel & Kjær	Sound Level Meter	2250	3009207	CDK1600424
Position 2-4	Brüel & Kjær	Pre-Amplifier	ZC 0032	23772	CDK1600424
Position 2-4	Brüel & Kjær	Microphone	4189	3005149	CDK1600424
Position 2-4	Brüel & Kjær	Acoustic Calibrator	4231	3015450	CDK1600406

Copies of the equipment calibration certificates can be provided upon request.

5.4 Weather Conditions

A record of the weather conditions as published by www.timeanddate.com was kept during the measurement survey period of Tuesday 10 May 2016 to Wednesday 11 May 2016.

The outline details of which are presented in Table 5 below.

Table 5 – Weather Data

Period	Mean Temperature Degrees Celsius	Events	Wind Speed m/s	Prominent Wind Direction
Tuesday, 10 May 2016	12	Cloudy / Drizzle	4.8	ENE
Wednesday, 11 May 2016	17	Partly Sunny Broken Clouds	4.2	E



6.0 VIBRATION

Due to the proximity of railway lines servicing Dewsbury train station, a subjective evaluation of the vibration has been conducted under the guidance outlined in the relevant British Standard *6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings'*.

Vibration levels at each of the proposed site location is not predicted to exceed the threshold of perception.

As observed during the site visit, the surrounding area immediately adjacent to the proposed site contains several residential dwellings and business in close proximity to the observed railway lines.



7.0 RESULTS

7.1.1 Environmental Noise Survey – Position 1

An environmental noise survey was undertaken at Position 1 between 1300 hrs on 10 May 2016 and 1400hrs on 11 May 2016.

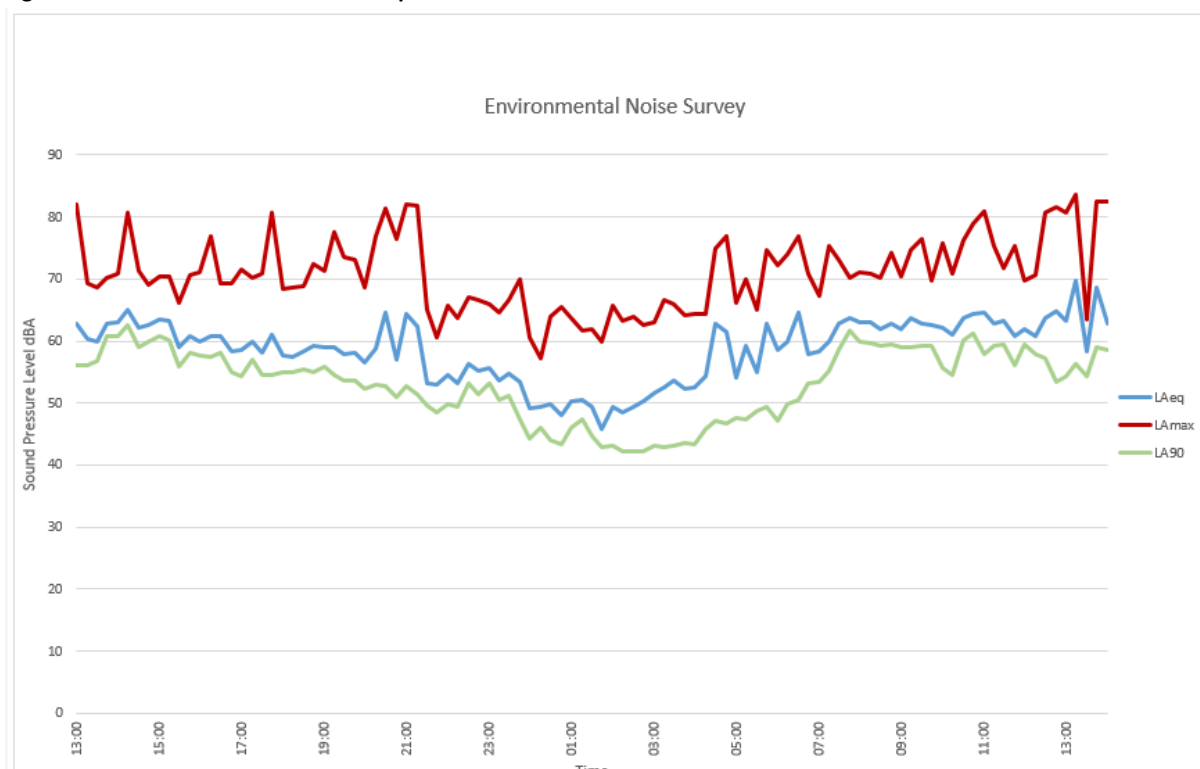
Three main acoustic parameters were measured using a time interval of 15 minutes as described below.

- $L_{Aeq,T}$ dB, defined as the ‘A’ weighted equivalent continuous sound pressure level. Over a defined time period ‘T’, it is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. It is often referred to as the ‘ambient noise level’.
- $L_{Amax,F,T}$ dB, defined as the ‘A’ weighted maximum sound pressure level that occurred during the time period ‘T’ acquired using a ‘fast’ time weighting (i.e. a sample every 125ms). It is commonly used to describe the highest noise level that occurred during an event such as a vehicle pass-by.
- $L_{A90,T}$ dB, defined as the ‘A’ weighted sound pressure level exceeded for 90% of the measurement period ‘T’. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe the prevailing background noise level.

A noise level time history over the full measurement period is presented in Figure 3 below, which demonstrates the variability of noise on the proposed development site.

All noise levels have been corrected from ‘façade level’ measurements to ‘free field’ measurements as per the guidance of the relevant British Standards and best practice guidance documentation.

Figure 3 – DLQ Noise Measurement Graph



The full dataset of noise levels measured is not presented in tabular form as it is too large.

A summary of the 16 hour daytime (0700hrs to 2300hrs) and 8 hour night time (2300hrs to 0700hrs) $L_{Aeq,T}$ and L_{A90} parameters are presented in Table 6 below:



Table 6 – Summary Noise Levels

Measurement Parameter	Daytime 0700-2300hrs	Night-time 2300-0700hrs
Average Ambient Noise Level $L_{Aeq,T}$ dB	62	57
Minimum Measured Noise Level L_{A90} dB	49	42

7.1.2 Calculation of Road Traffic Noise - Position 2

Attended measurements were taken at one position, identified as Position 2, in order to provide base noise level data for use in noise mapping prediction software.

Data will also be used for setting criteria limits for the relevant guidance and British standards.

Calculations of the measured noise data were undertaken as per guidance outlined in Section 4.4

The key acoustic parameter measured was $L_{A10,T}$ as defined below.

- $L_{A10,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 10% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe road traffic noise levels.

The $L_{Aeq,T}$ and $L_{Amax,F,T}$ and $L_{A90,T}$ were also recorded for later design usage.

The measurement period was 30 minutes within each consecutive hour of the survey.

Table 7 below provides a summary of the measured levels at Position 2 and demonstrates the CRTN assessment and estimation of the L_{day} , $L_{evening}$ and L_{night} levels using calculation method 3 of the TRL methodology.

Table 7 – CRTN Assessment (Position 2)

Acoustic Parameter	Process	Sound Level dB(A)	Measured L_{Aeq} (30mins) dB	Measured $L_{Amax,F}$ (30mins) dB	Measured L_{A90} (30mins) dB
L_{A10} (30mins)	Sample 1	73	73	100	61
L_{A10} (30mins)	Sample 2	72	69	80	61
L_{A10} (30mins)	Sample 3	72	70	79	63
L_{A10} (3hour)	Avg. 1, 2 and 3	73	-	-	-
L_{A10} (18hour)	L_{A10} (3hour) - 1	72	-	-	-
L_{Day}	$0.95 * L_{A10}(18hour) + 1.44$	70	-	-	-
$L_{Evening}$	$0.97 * L_{A10}(18hour) - 2.87$	67	-	-	-
L_{Night}	$0.90 * L_{A10}(18hour) - 3.77$	61	-	-	-

7.1.3 Calculation of Road Traffic Noise - Position 3

Attended measurements were taken at one position, identified as Position 3, in order to provide base noise level data for use in noise mapping prediction software.

Data will also be used for setting criteria limits for the relevant guidance and British standards.

Calculations of the measured noise data were undertaken as per guidance outlined in Section 4.4

The key acoustic parameter measured was $L_{A10,T}$ as defined below.



- $L_{A10,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 10% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe road traffic noise levels.

The $L_{Aeq,T}$ and $L_{Amax,F,T}$ and $L_{A90,T}$ were also recorded for later design usage.

The measurement period was 30 minutes within each consecutive hour of the survey.

Table 8 below provides a summary of the measured levels at Position 3 and demonstrates the CRTN assessment and estimation of the L_{day} , $L_{evening}$ and L_{night} levels using calculation method 3 of the TRL methodology.

Table 8 – CRTN Assessment (Position 3)

Acoustic Parameter	Process	Sound Level dB(A)	Measured L_{Aeq} (30mins) dB	Measured $L_{Amax,F}$ (30mins) dB	Measured L_{A90} (30mins) dB
L_{A10} (30mins)	Sample 1	66	63	83	52
L_{A10} (30mins)	Sample 2	65	61	77	53
L_{A10} (30mins)	Sample 3	63	60	81	53
L_{A10} (3hour)	Avg. 1, 2 and 3	65	-	-	-
L_{A10} (18hour)	$L_{A10}(3hour) - 1$	64	-	-	-
L_{Day}	$0.95 * L_{A10}(18hour) + 1.44$	62	-	-	-
$L_{Evening}$	$0.97 * L_{A10}(18hour) - 2.87$	59	-	-	-
L_{Night}	$0.90 * L_{A10}(18hour) - 3.77$	53	-	-	-

7.1.4 Calculation of Road Traffic Noise - Position 4

Attended measurements were taken at one position, identified as Position 4, in order to provide base noise level data for use in noise mapping prediction software.

Data will also be used for setting criteria limits for the relevant guidance and British standards.

Calculations of the measured noise data were undertaken as per guidance outlined in Section 4.4

The key acoustic parameter measured was $L_{A10,T}$ as defined below.

- $L_{A10,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 10% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe road traffic noise levels.

The $L_{Aeq,T}$ and $L_{Amax,F,T}$ and $L_{A90,T}$ were also recorded for later design usage.

The measurement period was 30 minutes within each consecutive hour of the survey.

Table 9 below provides a summary of the measured levels at Position 4 and demonstrates the CRTN assessment and estimation of the L_{day} , $L_{evening}$ and L_{night} levels using calculation method 3 of the TRL methodology.

**Table 9 – CRTN Assessment (Position 4)**

Acoustic Parameter	Process	Sound Level dB(A)	Measured L_{Aeq} (30mins) dB	Measured $L_{Amax,F}$ (30mins) dB	Measured L_{A90} (30mins) dB
L_{A10} (30mins)	Sample 1	72	69	77	62
L_{A10} (30mins)	Sample 2	76	74	103	64
L_{A10} (30mins)	Sample 3	74	71	82	61
L_{A10} (3hour)	Avg. 1, 2 and 3	74	-	-	-
L_{A10} (18hour)	L_{A10} (3hour) - 1	73	-	-	-
L_{Day}	$0.95 * L_{A10}(18hour) + 1.44$	71	-	-	-
$L_{Evening}$	$0.97 * L_{A10}(18hour) - 2.87$	68	-	-	-
L_{Night}	$0.90 * L_{A10}(18hour) - 3.77$	62	-	-	-

8.0 OUTLINE DESIGN GUIDANCE – INTERNAL NOISE

In order to protect the amenity of future occupants, it will be necessary to assess the noise intrusion due to external sources against the appropriate guidance.

BB93 is detailed in Section 4.1 of this report and provides appropriate guidance on these levels.

8.1 Noise Mapping

In order to predict the external noise levels present at each façade of the proposed development due to all measured on-site noise emissions, a noise map has been created using CadnaA environmental noise prediction and mapping software.

The noise map will be used in part to determine a suitable ventilation and glazing strategy.

A baseline noise map has been generated of the proposed site using measurements logged at all positions and calculated using the method outlined in Section 6 to predict the L_{day} , $L_{evening}$ and L_{night} levels.

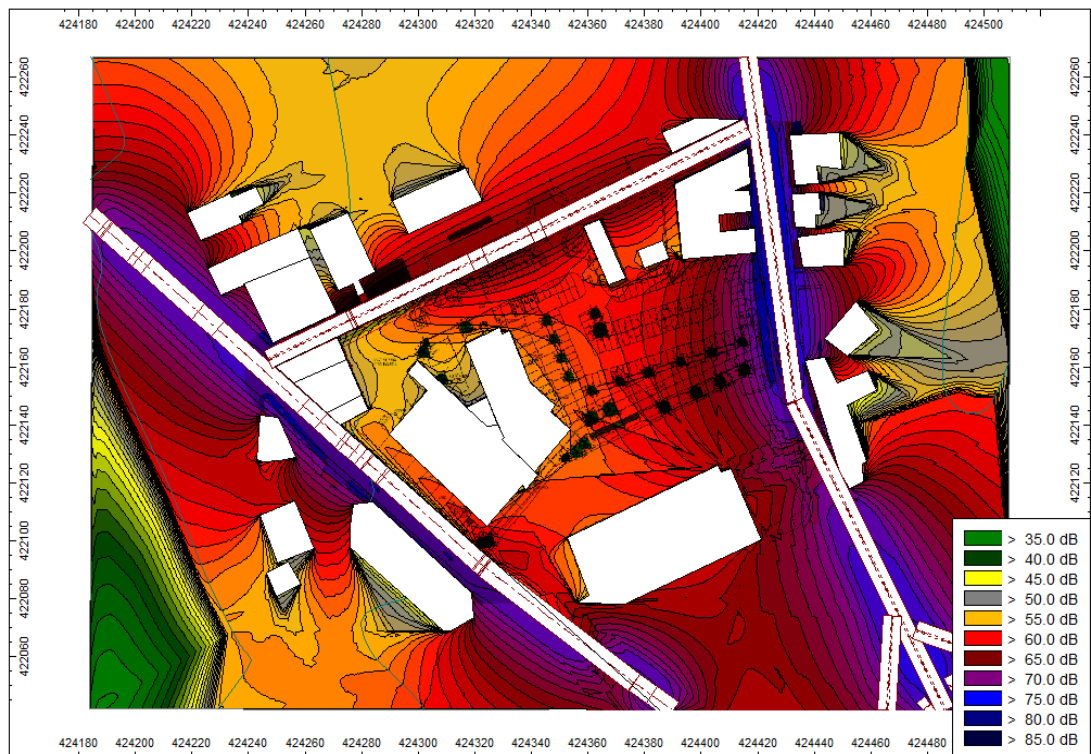
The model was calibrated for daytime equivalent noise levels ($L_{Aeq,16hr}$), and night time equivalent levels ($L_{Aeq,8hr}$).

A noise map of the site has been generated with the proposed development in-situ.

Figure 4 displays the noise level map of the proposed campus buildings at the DLQ.

Some 3D images of the proposed façades are shown attached in Appendix A.

Figure 4 – Dewsbury Learning Village Noise Map



As can be seen, some of the façade areas are subject to high noise levels.



8.2 Outline Guidance for Building Envelope and Ventilation Strategy

The sound insulation properties of the building envelope depend upon the external noise levels present at each facade.

We would therefore advise that the development be designed to ensure internal noise levels in accordance with BB93.

Table 10 below assumes compliance with BB 93's internal noise criterion and shows the level differences for varying spaces within the proposed development.

The assessment has taken into account measured noise levels from all identified sources outlined in Sections 5 and 6.

The examples shown represent the highest level differences required for each façade as identified in Figure 5, based on the predicted data from the noise map, environmental noise survey and manual noise measurements.

Table 10 – Façade Noise Assessment for Dewsbury Learning Quarter

Façade	Room Use	Predicted External (‘free-field’ corrected)	Proposed Internal (Maximum)	Minimum Level Difference (D)
			New building	
High Noise Exposure	Lecture room	60 +	35	25+
	Study Room	65 +	40	25+
	Meeting Room	65 +	40	25+
Medium Noise Exposure	Lecture room	50-60	35	15-25
	Study Room	45-55	40	15-25
	Meeting Room	45-55	40	15-25
Low Noise Exposure	Lecture room	35-50	35	0-15
	Study Room	30-45	40	0-15
	Meeting Room	30-45	40	0-15

As per the guidance of BS 8233:2014, simple natural ventilation through the use of opening windows will provide a level difference (D) in the order of 10-15 dB.

As shown in Figure 5 below, facades have been colour coded to demonstrate the level of noise exposure and their required ventilation strategy.

The defining exposure level and relevant ventilation strategies can be defined as follows:

‘Low Noise Exposure’ – Suitable for natural ventilation, e.g. openable windows

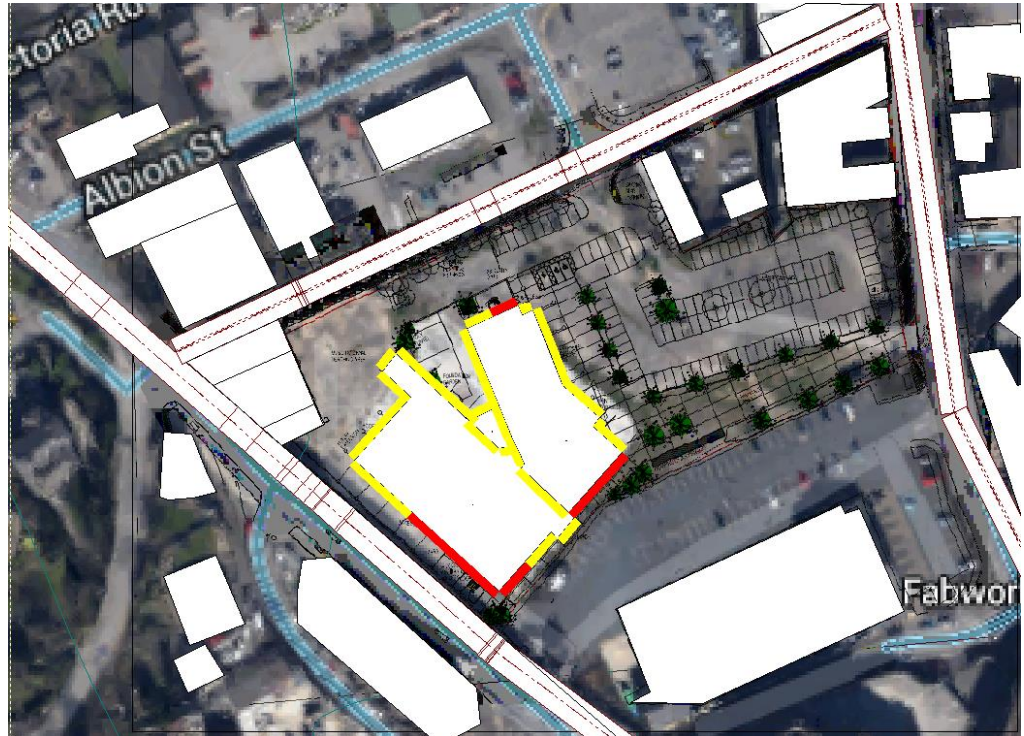
‘Medium Noise Exposure’ – Suitable ventilation strategies may include; passive acoustic ventilation where possible, whole house ventilation (MHVR) or acoustically treated ventilation with constantly running extract fans.

‘High Noise Exposure’ - Suitable ventilation strategies are likely to be restricted to whole house ventilation (MVHR) or acoustically treated ventilation with constantly running extract fans.

Outline specifications for the building fabric, glazing and ventilation scheme minimum sound attenuation requirements are outlined in Section 8.2.1 and 8.2.2.



Figure 5 – Worst Case Façade Assessment for Dewsbury Learning Quarter



8.2.1 Building Fabric and Glazing Sound Insulation Requirements

Preliminary calculations have been undertaken to provide guidance on the sound insulation requirements of the building envelope.

A suggested minimum sound insulation performance of the non-glazed elements of the building façades are outlined in Table 14.

Table 14 – Non-glazed Façade Element

Product Description	Sound Insulation Values per Octave Band Frequency (Hz) dB							R _w + C _{tr}
	63	125	250	500	1000	2000	4000	
Non-Glazed Element	30	39	50	60	65	65	65	55

A proposed minimum sound insulation performance for the glazed elements of the building façade are as follows in Tables 15 and 16.

Table 16 – Glazed Façade Element for Dewsbury Learning Village

Façade	Minimum Required R _w + C _{tr}	
	Class Room / Lecture Room Workshop building	Class Room / Lecture Room College building
High Noise	26	25
Medium Noise	24	24
Low Noise	-	-

As the development design progresses, qualified comment should be sought on acoustic suitability and evidence of lab performance values should be made available by manufacturers.

If glazing areas / sizes change, then the assessment should be repeated.



8.2.2 Ventilation Requirements

Facades deemed to fall within the 'High Noise Exposure' and 'Medium Noise Exposure' criteria will require a specialised acoustic ventilation strategy in order to meet the requirements of the relevant British standards and best practice guidelines.

In order to protect the amenity of future occupiers as best as reasonably practicable, we would recommend the inclusion of a full MVHR ventilation strategy be adopted.

If this would not be feasible, facades within the 'Medium Noise Exposure' criteria may substitute a full mechanical ventilation strategy for an assisted natural ventilation scheme.

This will require the use of a mechanical fan system in conjunction with a robust acoustic trickle ventilation system and glazing scheme to provide sufficient attenuation to external noise levels to meet the required internal ambient noise conditions.

The acoustic trickle vents should be selected to provide the attenuation level outlined in Table 13 with the vent in the open position:

Table 13 – Minimum Required Attenuation – Acoustic Trickle Ventilation

Trickle Ventilation	$D_{n,e,w}$
Minimum Required Attenuation	30



9.0 OUTLINE DESIGN GUIDANCE – EXTERNAL PLANT

The proposed development may incorporate building services plant which can potentially vent to external locations or have externally located plant items. These are capable of producing audible noise and will, during the design development process, require consideration of noise control (and potentially vibration control dependent on location).

The nearest noise sensitive properties have been identified as:

- Existing apartments located on the North West corner of the proposed Dewsbury Learning Quarter development site, at 2 Commercial Road.

The prevailing background noise levels have been determined (see Sections 6.4.1 above) and will be used to establish a satisfactory noise limit for external building service plant noise emissions.

- $L_{A90(15mins)}$ 49 dB daytime (0700hrs to 2300hrs)
- $L_{A90(15mins)}$ 42 dB night time (2300hrs to 0700hrs)

To provide a satisfactory noise impact in accordance with the procedures of BS 4142:2014, a proposed noise limit of prevailing background noise (as above) minus 5 dB(A) is advised for design purposes.

The numerical noise limit levels are stated below.

- $L_{Aeq(1hour)}$ 44 dB daytime (0700hrs to 2300hrs)
- $L_{Aeq(15mins)}$ 37 dB night time (2300hrs to 0700hrs)

The noise limits above are 'free-field' measured / calculated levels at any height above ground and 1.0m from the nearest noise sensitive property façade. It applies to the overall combined operation of building services plant without any specific tone or character.

If the plant noise will contain specific tones or intermittent character, then the contribution from that item of plant is to be at least 6 dB(A) lower than the overall noise limit.

Comparison to BS 4142:2014 demonstrates a rating level of -5 dB which is not significant and is unlikely to create an adverse impact to existing noise sensitive properties.

It should be noted that if any more onerous limits arise during the Planning process, those will take precedence.



10.0 SUMMARY AND CONCLUSIONS

Hydrock have been appointed by Kirklees College to provide acoustic consultancy services relating to the development of their proposed Dewsbury Learning Quarter (DLQ) to be located on land adjacent to Commercial Road, Dewsbury.

Guidance standards have been referenced to establish satisfactory indoor noise levels, external noise levels and methods for determining prevailing background noise levels, in the absence of any specific guidance contained in the National or Local Planning Policy.

A noise assessment has been conducted on and around the proposed development site to establish source noise levels for a computer modelling exercise and prevailing background noise levels representative of the nearest noise sensitive receivers.

External acoustic modelling has been conducted for the purposes of providing preliminary design advice relating to the sound insulation and ventilation design of the façades.

Due to the measured noise levels relating to road traffic noise and other localised noise sources, some areas of the proposed development will require a robust glazing and ventilation scheme.

Guidance has been given based on compliance with internal BB93 noise limits.

Noise limits at the identified nearest noise sensitive receivers have been proposed, based on a BS 4142:2014 rating level of -5 dB so the impact is not significant for the operation of building services plant. A full assessment report may be undertaken once full details of any proposed mechanical plant installations are known.



11.0 APPENDIX A: 3D VIEWS

