

REPORT TITLE:

Site Noise Assessment, Yale College Campus Redevelopment, Wrexham, LL12 7AB

CLIENT DETAILS:

Wynne Construction

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PREPARED BY:

Cait Smith. BSc (Hons)

CHECKED/AUTHORISED BY:

Nick Swainston. PGDip IOA. MIOA

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1. Introduction

Pace Consult Limited has been commissioned by Wynne Construction to carry out a site noise assessment for the proposed redevelopment of Yale College Campus, Wrexham, LL12 7AB; in accordance with BB93: *'Acoustic Design of Schools' February 2015*.

The building layout has a variety of teaching spaces and specialist gym and fitness areas that are spread over three stories, the proposed floor plan for the redevelopment is shown in figures 1, 2 and 3.

The site is located to the West of Chester Street and to the North of Wrexham Library car park. The existing building that stands there will be demolished to make way for the new proposed building.

A noise survey was completed on the site over a seven day period to measure and record ambient noise levels during typical school hours (8:00-16:00). Measurements were also used to assess the potential for natural ventilation, to identify existing background noise levels and to gauge the possibility for adverse noise transmission from nearby noise sources.

This report gives details of the noise survey and provides outline advice on ventilation, indoor ambient noise levels and noise limits for fixed plant and machinery.



Figure 1. Proposed Ground Floor Plan



Figure 2. Proposed First Floor Plan



Figure 3. Proposed Second Floor Plan

2. Noise Survey

A noise survey was completed between Wednesday 14th till Wednesday 20th June 2018, during the hours of 8:00 and 16:00, using three manned and one remote unattended noise monitoring location (MP1, MP2, MP3 and MP4). MP1, MP2 and MP3 were logging 10-minute samples and MP4 logging 15-minute samples. These measurements were taken to record ambient and background noise levels across the site, the locations that were chosen is thought to be representative of the noise levels affecting the existing building. Figure 5 below shows the location of these measuring positions.

The noise measurement positions were in the following locations, MP1 was situated in the top left corner of the library carpark, MP2 was positioned to the left of the existing building, MP3 was placed to the top left hand side of the existing building and finally MP4 was located the bottom right hand corner of the existing building near Chester Street.

The noise levels recorded at the measurement positions MP1, MP2, MP3 and MP4 are considered representative of the existing noise across the site.

A summary of the recorded noise levels which are considered typical for the site is shown in Table 1 below and Figure 4.

Table 1. Noise Survey Results for MP1, MP2 & MP3

Date	Position	Duration (minutes)	dB L _{Aeq}	dB L _{A1}	dB L _{A90}	dB L _{Amax,F}
13/06/18	MP1	10:0.0	51	58	47	70
13/06/18	MP1	10:0.0	49	57	45	67
20/06/18	MP1	10:0.0	49	53	47	60
20/06/18	MP1	10:0.0	51	57	50	60
13/06/18	MP2	10:0.0	53	63	46	77
13/06/18	MP2	10:0.0	50	59	46	70
13/06/18	MP3	10:0.0	54	64	49	74

Date	Position	Duration (minutes)	dB L _{Aeq}	dB L _{A1}	dB L _{A90}	dB L _{Amax,F}
13/06/18	MP3	10:0.0	50	59	47	69
20/06/18	MP3	10:0.0	50	59	44	65
20/06/18	MP3	10:0.0	48	55	44	60
20/06/18	MP3	10:0.0	48	57	44	64

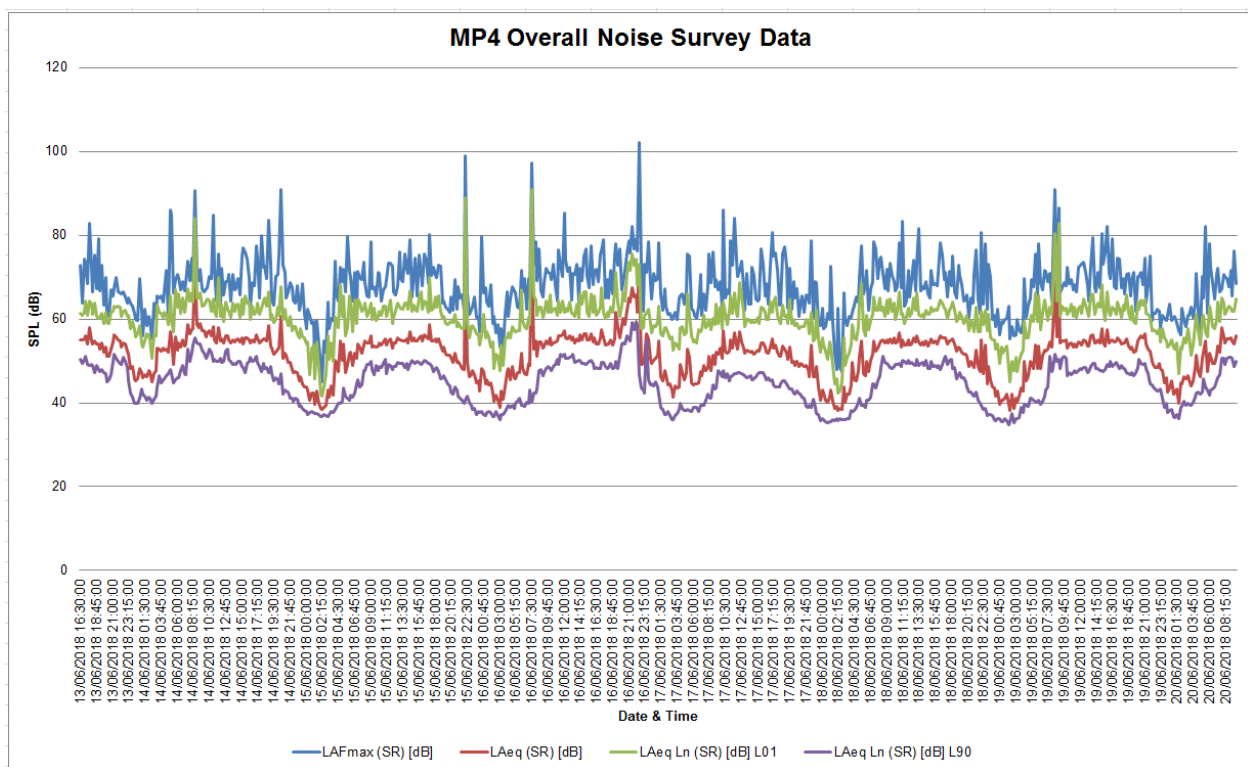


Figure 4. Noise Survey Data MP4

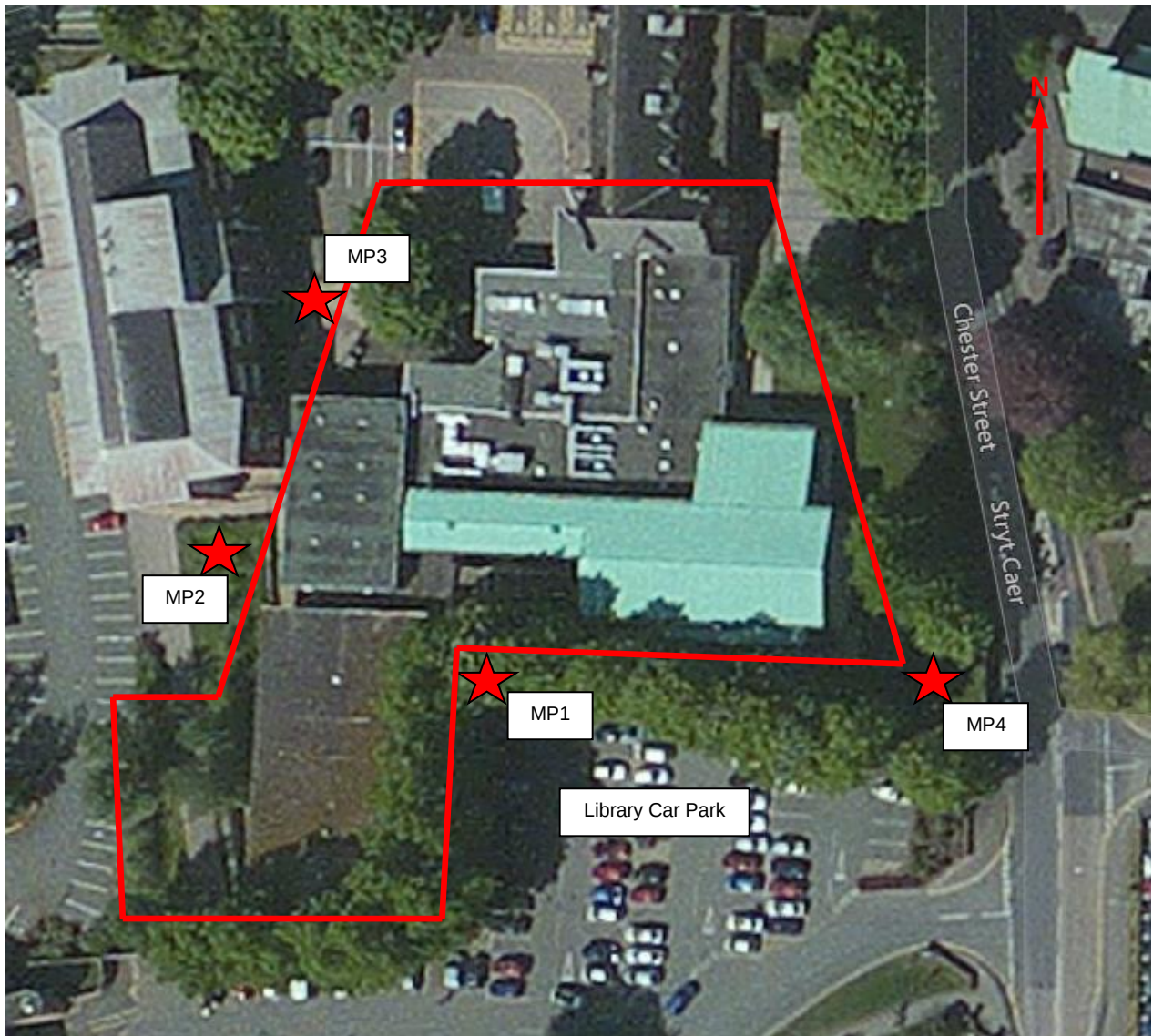


Figure 5. Noise Measurement Locations

3. Indoor Ambient Noise Levels

The information that is provided in this chapter is taken from the document titled *BB93 Acoustic Design of Schools: performance standards (February 2015)*. BB93 is a document that Secondary schools follow. As the redevelopment of Yale College is a further education building it does not necessarily need to follow the document, but the document does provide suitable criterion for colleges and further education environments that can be altered where necessary to meet the specific requirements of teaching rooms within the college.

BB93 Acoustic Design of Schools: performance standards (February 2015) Table 1 (reproduced below) gives criteria for indoor ambient noise levels (IANL's) in teaching and ancillary spaces and provides the following notes relating to indoor ambient noise levels:

The objective is to provide suitable indoor ambient noise levels (IANL) for

- (a) clear communication of speech between teacher and student*
- (b) clear communication between students*
- (c) learning and study activities*

The IANL includes noise contributions from:

- external sources outside the school premises (including, but not limited to, noise from road, rail and air traffic, industrial and commercial premises)*
- building services (e.g. ventilation system, plant, etc.). If a room is naturally ventilated, the IANL is calculated and measured with ventilators or windows open as required to provide ventilation as described in section 1.1.3. If a room is mechanically ventilated or cooled, the plant should be assumed to be running at its normal operating duty*
- actuator and damper noise*

The IANL excludes noise contributions from:

- teaching activities within the school premises, including noise from staff, students and equipment within the building or in the playground. (noise transmitted from adjacent spaces is addressed by the airborne and impact sound insulation requirements)*
- equipment used in the space (e.g. machine tools, CadCam machines, dust and fume extract equipment, compressors, computers, projectors, fume cupboards) as these noise sources are considered as operational noise*

- *rain noise – however, Building Regulations submissions should demonstrate that lightweight roofs and roof glazing have been designed to provide suitable control of rain noise reverberant sound pressure level in a space (calculated using laboratory test data with ‘heavy’ rain noise excitation as defined in BS EN ISO 140-18. Levels during heavy rain should not be more than 25 dB above the appropriate indoor ambient noise level given in table 1 (for refurbishments, this applies only to new roofing elements and not to repairs to existing roofs)*

Type of room	Room classification for the purpose of airborne sound insulation in Tables 3a and 3b		Upper limit for the indoor ambient noise level $L_{Aeq,30mins}$ dB	
	Activity noise (Source room)	Noise tolerance (Receiving room)	New build	Refurbish- ment
Nursery school rooms <i>Primary school:</i> classroom, class base, general teaching area, small group room <i>Secondary school:</i> classroom, general teaching area, seminar room, tutorial room, language laboratory	Average	Medium	35	40
<i>Open plan:</i> (See also section 1.8) Teaching area Resource/breakout area	Average	Medium	40	45
Primary music room	High	Medium	35	40
Secondary music classroom [†] Small and large practice/group room [†] Performance/recital room [†]	Very high	Low	35	40
Ensemble room [†] Recording studio [†]	Very high	Low	30	35
Control room - for recording [†] Control room - not for recording	High Average	Low Medium	35	40
Lecture room	Average	Medium	35	40
Teaching space intended specifically for students with special hearing and communication needs ²	Average	Low	30	35
SEN calming room	High	Low	35	35

Type of room	Room classification for the purpose of airborne sound insulation in Tables 3a and 3b		Upper limit for the indoor ambient noise level $L_{Aeq,30mins}$ dB	
	Activity noise (Source room)	Noise tolerance (Receiving room)	New build	Refurbishment
Study room (individual study, withdrawal, remedial work, teacher preparation)	Low	Medium	40	45
<i>Libraries:</i>				
Quiet study area	Low	Medium	40	45
Resource area	Average	Medium	40	45
Science laboratory	Average	Medium	40	45
<i>Design and technology:</i>				
Resistant materials, CAD/CAM area	High	High	40	45
Electronics/control, textiles, food, graphics, design/resource area, ICT room, art	Average	Medium	40	45
Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music)	High	Low	35	40
Atrium, circulation space not intended for teaching and learning	Average	Medium	45	50
Sports hall				
Dance studio	High	Medium	40	45
Gymnasium/Activity studio				
Swimming pool	High	High	50	55
Meeting room, Interviewing/counselling room, video conference room	Low	Medium	40	45
Dining room	High	High	45	50

Type of room	Room classification for the purpose of airborne sound insulation in Tables 3a and 3b		Upper limit for the indoor ambient noise level $L_{Aeq,30mins}$ dB	
	Activity noise (Source room)	Noise tolerance (Receiving room)	New build	Refurbishment
<i>Administration and ancillary spaces:</i>				
Kitchen	High	High	50	55
Office, medical room, staff room	Low	Medium	40	45
Corridor, stairwell, coats and locker area	Average	High	45	55
Changing area	High	High	50	55
Toilet	Average	High	50	55

4. Predicted Indoor Ambient Noise Levels

Using the noise survey data, an estimate of the internal noise levels within the new school has been made based on a sound reduction value for partially open windows of -16 dB for single sided ventilated spaces taken from BB93 Acoustic Design of Schools: performance standards (February 2015) Section 1.1.3.

Table 2. Predicted Internal Ambient Noise Levels with Open Windows

Measurement Position	Free Field External Noise Level, dB L _{Aeq(T)}	Sound Insulation of Partially Open Window, dB(A)	Estimated Internal Noise Level, dB(A)
MP1	50 dB(A)	-16 dB	34 dB L _{Aeq,30-minutes}
MP2	52 dB(A)	-16 dB	36 dB L _{Aeq,30-minutes}
MP3	51 dB(A)	-16 dB	35 dB L _{Aeq,30-minutes}
MP4	56 dB(A)	-16 dB	40 dB L _{Aeq,30-minutes}

In BB93 a provision is made for schools which are naturally ventilated by relaxing the indoor ambient noise criterion by 5 dB, provided the pre-corrected IANL is less than 45dB.

For Classrooms, and teaching areas guidance in BB93 indicates indoor ambient noise level (IANL) of 35 dB L_{Aeq,30mins}. When relaxed by +5 dB for rooms with natural ventilation the IANLs become 40 dB L_{Aeq,30mins}.

General Teaching spaces located around the perimeter can therefore be ventilated using a scheme that where necessary includes partially open windows. Window openings will be limited to achieve the necessary sound insulation.

The Main Hall, Lecture Theatres and all drama spaces will use a mechanical ventilation system to provide suitable internal conditions for these spaces.

The decision on ventilation will depend upon the final layout of the building.

5. External Noise Limits for Plant and Machinery

It is expected that fixed plant will include air handling and kitchen extract fans that will operate during normal daytime hours, and noise emission from ventilation extract fans and boilers and pumps in the plant room that may run on a 24-hour basis.

With a minimum daytime background noise level of 45 dB L_{A90} noise from fixed plant and machinery located on the Southern façade of the building (Library Carpark) should be limited to no higher than 40 dB L_{Aeq} at the nearest sensitive locations during the daytime.

Minimum daytime background noise levels on the Eastern façade (Chester Road) were measured as 52 dB L_{A90} therefore noise from fixed plant and machinery located at this facade should be limited to no higher than 47 dB L_{Aeq} at the nearest sensitive locations during the daytime. This is subject to approval by the Local Planning Authority.

6. Conclusions

The results of the noise assessment at the site of the proposed redevelopment of Yale College Campus, Wrexham show that natural ventilation using restricted window openings will be possible for general teaching areas. Mechanical or attenuated natural ventilation will be required to the Main Hall, Lecture Theatres and Drama spaces to follow the typical internal ambient noise guidance indicated within the BB93.

Recommended noise limits for fixed plant and machinery are included in this report but will be subject to any Local Authority planning conditions.