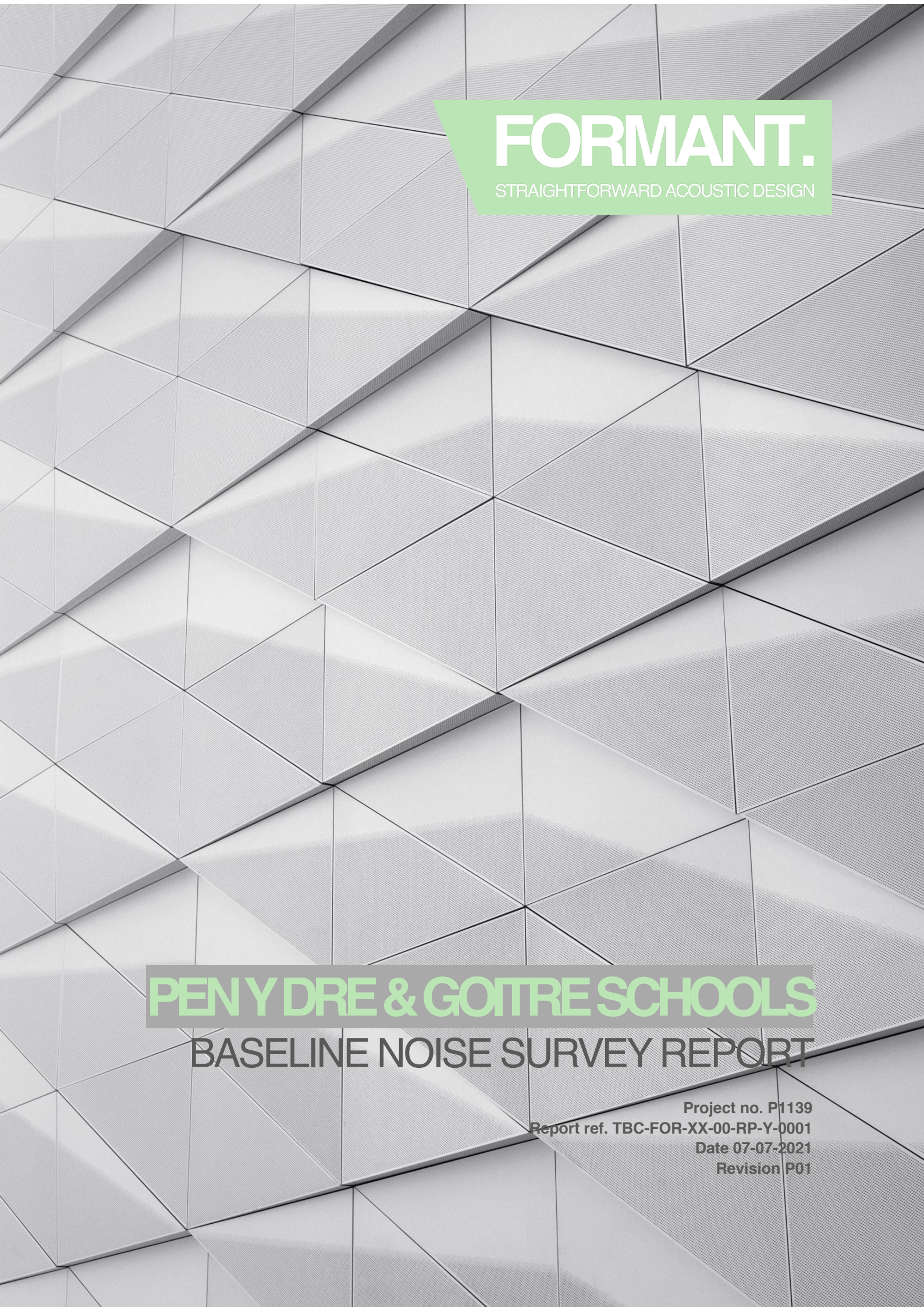




FORMANT.

STRAIGHTFORWARD ACOUSTIC DESIGN

PEN Y DRE & GOTTRE SCHOOLS
BASELINE NOISE SURVEY REPORT

Project no. P1139
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Revision P01



EXEC SUMMARY

Formant has been appointed by Morgan Sindall to review the noise climate at the site of the existing Pen-y-Dre High School with respect to a proposed project involving the refurbishment of the existing High School and construction of a new-build Primary School to the south of the site. This report summarises the results of a baseline noise survey at the site and an assessment of potential noise impacts arising from the proposed development.

The development will be subject to the requirements of Building Bulletin 93 Acoustic Design of Schools, which requires an assessment of potential environmental noise impacts on the proposed school. Noise from mechanical services plant serving the proposed school also has the potential to affect nearby noise sensitive receptors (NSRs).

NOISE AFFECTING THE PROPOSED SCHOOL

The site is located on the edge of a residential area and is affected by one significant noise source: traffic from the roads to the north of the site (the A465 and the Gurnos Ring Rd). The noise climate at the north of the site is dominated by the traffic noise and this decreases to the south, as the distance from the road increases and where the existing high school buildings provide screening from the roads. The ambient noise level measurements results were up to 58 dBL_{Aeq} at the north of the site, dropping to around 44-50 dBL_{Aeq} in screened locations and at the location of the proposed new primary school.

The survey was undertaken while the A465 was in the early stages of a construction project which will significantly change the design of the road and affect the noise emissions from it. As such the measured levels are not necessarily representative of the future noise climate at the site. We have reviewed the publicly available data on predicted changes in noise levels as a result of the A465 works and have used this, along with the measured levels, to predict the future levels at the school facades.

The predictions confirm, with a reasonable degree of certainty, that the future ambient levels will fall below the BB93 thresholds for natural ventilation in all areas. However a small number of rooms on the north elevation will not be suitable for the size of window openings typically required for single-sided ventilation and an alternative ventilation strategy will be required. Façade acoustic upgrades are unlikely to be required, although this will be confirmed as the design progresses.

PLANT NOISE EMISSIONS

The nearest noise sensitive receptors to the site are houses to the west, south and east of the site. The lowest measured background sound levels at the site were 40 dBL_{A90}. Plant selections are not known at this stage, but noise emissions limits have been set based on BS 4142 and the BREEAM Pol 05 limit of '5 dB below background': i.e. **rating sound levels at nearby receptors should not exceed 35 dBL_{A,r}**. These limits are considered achievable with standard plant and attenuation measures, therefore **no significant impacts are predicted as a result of plant noise emissions.**



1 INTRODUCTION

Formant has been appointed by Morgan Sindall to assess the noise climate at the existing Pen-Y-Dre High School in Merthyr Tydfil with respect to a proposed refurbishment of the existing buildings and a build Primary School on land to the south of the existing school. The proposed development is currently at the early stages of design and the exact location of the proposed Primary School buildings and details of the proposed refurbishment are not yet finalised.

This report provides:

- 1) A summary of applicable legislation, policy and guidance,
- 2) A description of the proposed development and its potential impacts,
- 3) The results of a baseline noise survey undertaken at the site
- 4) The potential changes in site noise climate arising from the dualling of the A465 and
- 5) A summary of the assessment of potential noise impacts

2 PROPOSED DEVELOPMENT

2.1 EXISTING SITE

A plan of the existing site, showing the indicative location of the new school building and the location of the nearby noise sensitive receptors (NSRs) is provided in Figure 1. The site is bounded by Gurnos Ring Rd to the north, by Goitre Lane to the west and by agricultural fields to the south and east. The A456 runs in an east-west direction, beyond Gurnos Ring Rd to the north and this is the dominant noise source in the local area.

Nearby noise sensitive receptors comprise residential dwellings on the opposite side of Goitre Lane to the west and to the south as well as Firs Avenue, beyond the fields to the east of the site.

2.2 SITE NOISE CLIMATE

The noise climate at the site is dominated by traffic noise from the north, primary from vehicles on the A465 and, to a lesser extent, Gurnos Ring Rd to the north. The A465 is partially screened by a cutting to the northwest of the site, rising up to be slightly elevated (and unscreened) above the site at the northeast. Noise from the A465 is fairly constant with a high flow of vehicles and is audible across the entire school site. Gurnos Ring Rd is a single-carriageway local road with a significantly lower flow of traffic than the A465, however it is located closer to the school and is unscreened.

The site slopes down from north to south and the noise levels decrease in the same direction as the distance from the A465 and Gurnos Ring Rd increases. At the southern end of the site (where the proposed primary school will be located) the noise levels were fairly low with very low numbers of vehicles moving at fairly low speeds on Goitre Lane.

2.3 PROPOSED DEVELOPMENT

The proposed development comprises the refurbishment of the existing High School buildings and a new-build primary school on the farm land to the south of the site. The A465 is currently undergoing major roadworks to dual the existing road and to create a new junction near the school. Further details of the proposed changes are discussed in Section 5.

3 LEGISLATION, POLICY AND GUIDANCE

3.1 LEGISLATION

Approved Document E of the Building Regulations states that new school buildings should comply with the requirements set out in Building Bulletin 93 (BB93). The development will be designed to comply fully with the requirements and they form the basis of the criteria used in this assessment.

3.2 LOCAL POLICY

Regarding noise, Merthyr Tydfil's Replacement Local Development Plan 2016-2023 states that "*New development proposals will be required to reduce, or at the very least minimise the impact identified to the lowest possible acceptable level*". We are not aware of any other specific local policy requirements which would affect this noise assessment.

3.3 GUIDANCE

BB93 ACOUSTIC DESIGN OF SCHOOLS

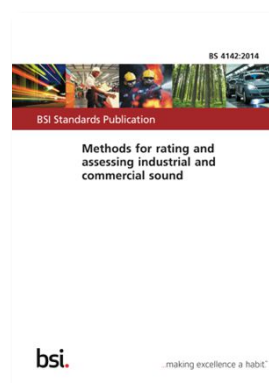
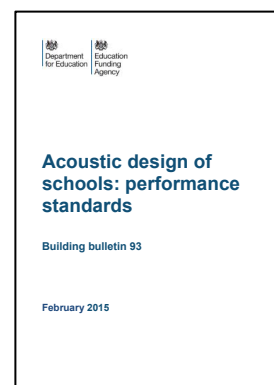
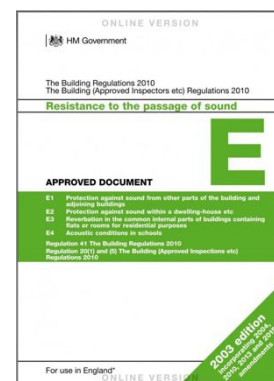
BB93 provides design criteria and an assessment methodology which has been adopted for assessing noise break-in into the school.

BS 4142:2014

BS4142 provides a method for rating industrial and commercial sound and a method for assessing resulting impacts upon people. The method is applicable to fixed plant installations and has been used as the basis for the assessment of plant noise emissions.

BREEAM 2018: NON-DOMESTIC BUILDINGS

BREEAM provides criteria and assessment methods applicable to schools, under the Hea5 and Pol5 credits. These criteria have been adopted for this assessment.





4 BASELINE NOISE SURVEY

4.1 MEASUREMENT METHODOLOGY

Environmental noise measurements were undertaken at positions MP1 to MP6 by Paul Driscoll between 13:30 and 15:30 hrs on 29 March 2021.

Noise measurements were undertaken approximately 1.4 metres above local ground level, at a distance of at least 2.5 metres from the façade of buildings and are considered representative of free field measurements. Measurements were made in line with BS 7445:2003 *Description of Environmental Noise*.

4.2 EQUIPMENT

The following measurement equipment was used to conduct the survey:

- 01dB Fusion Sound Level Meter SNo. 10919
- 01dB CAL21 Calibrator, SNo. 34323957

All measurement equipment owned or hired and operated by Formant has annual or bi-annual calibration checks carried out by external companies traceable to UKAS or national standards. Copies of all calibration records are kept and can be provided upon request.

4.3 WEATHER CONDITIONS

Weather conditions during the attended measurements were warm, generally sunny with intermittent cloud cover, with no precipitation and a slight breeze. The results of the survey were not significantly affected by the weather conditions and are considered to be suitable for use in the noise assessment.

4.4 NOISE PARAMETERS

A full range of noise data was captured during the survey including the following statistical measurements:

L_{Amax}	The sound pressure level of the single noisiest event during the measurement period.
L_{Aeq}	Time averaged sound pressure level. This is generally considered to be an acceptable representative descriptor of environmental noise.
L_{A90}	Sound pressure level exceeded for 90% of the measurement period, this is generally accepted to be indicative of the continuous background noise level.

4.5 MEASUREMENT LOCATIONS

The location of the measurement positions and key results are shown in Figure 1.



Figure 1: Measurement positions and key results

4.6 MEASUREMENT RESULTS

A summary of the noise survey results is provided in the table below:

Position and description	Parameter	Result	Photo
MP1 West side of proposed primary school site. Noise sources included traffic on Goitre Rd, distant traffic from the A465, birdsong and distant aircraft	Time	13:18 hrs	
	Duration	10 mins	
	L _{Aeq}	44 dB	
	L _{Amax}	57 dB	
	L _{A90}	40 dB	
MP2 South side of proposed primary school site. Noise climate as per MP1.	Time	13:30 hrs	
	Duration	10 mins	
	L _{Aeq}	47 dB	
	L _{Amax}	64 dB	
	L _{A90}	42 dB	
MP3 East side of proposed primary school site. Noise climate as per MP1.	Time	13:43 hrs	
	Duration	10 mins	
	L _{Aeq}	44 dB	
	L _{Amax}	57 dB	
	L _{A90}	40 dB	
MP4 Front of existing school. Noise climate dominated by traffic noise from the A465 plus very occasional contributions from vehicles/staff on the school site.	Time	14:09 hrs	
	Duration	10 mins	
	L _{Aeq}	46 dB	
	L _{Amax}	72 dB	
	L _{A90}	41 dB	

Position and description	Parameter	Result	Photo
MP5 Northeast corner of existing school. Noise climate dominated by traffic noise from the A465 (constant flow) and vehicles on Gurnos Ring Rd immediately outside the school site boundary.	Time	14:22 hrs	
	Duration	10 mins	
	L _{Aeq}	58 dB	
	L _{Amax}	69 dB	
	L _{A90}	54 dB	
MP6 North of existing school site. Noise climate as per MP5	Time	14:36 hrs	
	Duration	10 mins	
	L _{Aeq}	57 dB	
	L _{Amax}	71 dB	
	L _{A90}	52 dB	
MP7 West of existing school site. Noise climate as per MP6 but significantly less traffic noise from A465. Some noise from staff and vehicles leaving the staff car park.	Time	14:47 hrs	
	Duration	10 mins	
	L _{Aeq}	51 dB	
	L _{Amax}	66 dB	
	L _{A90}	43 dB	

Table 1: Noise survey results summary

5 FUTURE CHANGES IN SITE NOISE LEVELS

The A465 to the north of the site currently comprises a three-lane trunk road with a 50 mph speed limit, however at the time of the noise survey, construction works were taking place with a temporary 40 mph speed limit and lane restrictions. This may have affected the noise levels from the road during the survey.

The roadworks currently taking place are part of a major project to dual this section of the A465. The section of road to the north of the site will be redesigned to provide two lanes of traffic in both directions with the speed limit increased to 70 mph and a new junction with Gurnos Ring Rd. The road topography will be changed significantly, with the new road being lowered into an 8.5m deep cutting and the new junction built at grade. This will change the amount of screening provided to the school site and the traffic numbers will also change.

In order to estimate the potential change in noise levels we have the Environmental Statement (ES) prepared by Jacobs on behalf of the Welsh Government. The ES states that *“The Prince Charles Hospital junction design was heavily influenced by the need to screen views of the junction, and potential noise impacts, from Pen-y-Dre High School.”* The proposed changes to the junction are shown on the extract from the ES below:

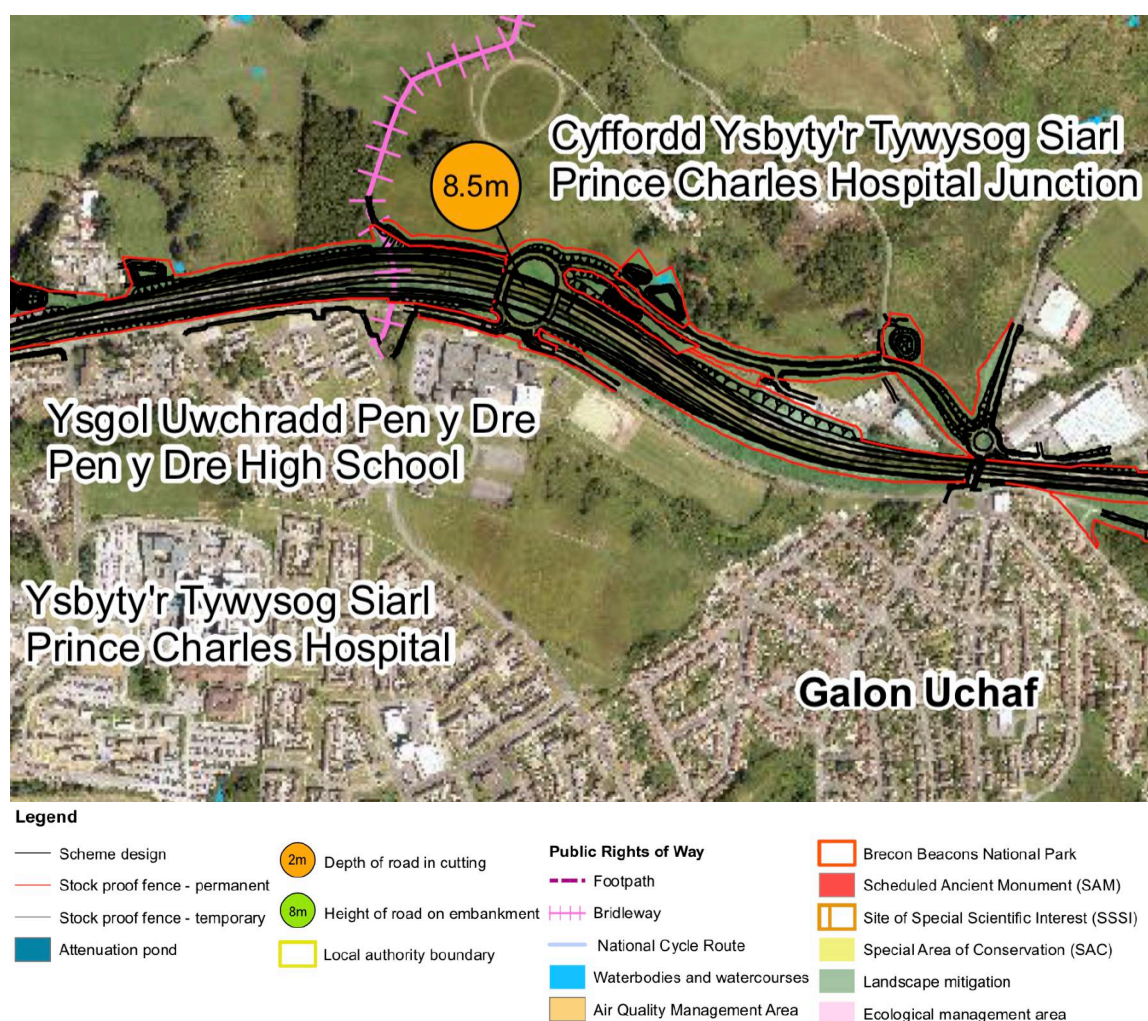


Figure 2: Proposed changes to A465 near the site (taken from A465 Environmental Statement prepared by Jacobs, sourced from <https://gov.wales/docs/beta/a465-section-5-6-environmental-statement-vol-3-figures.pdf>)

The ES includes predicted future noise levels at the school buildings as follows (DM = 'Do minimum' and DS = 'Do something'):

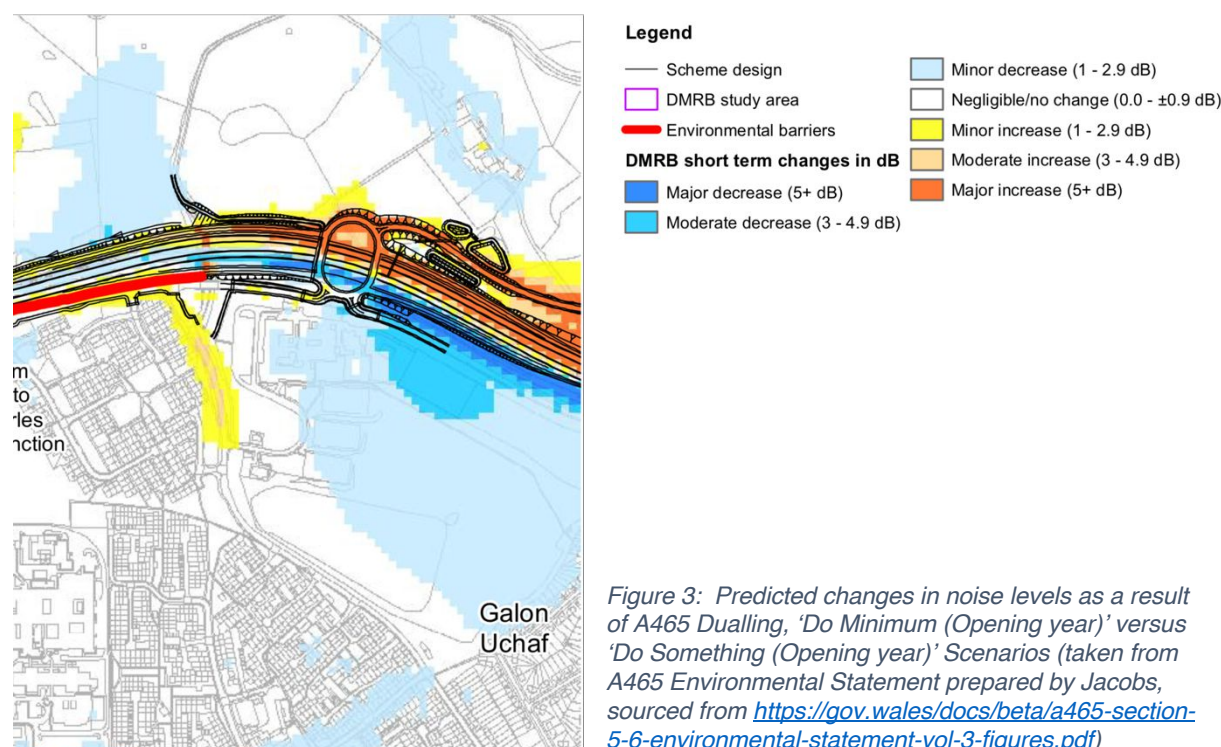
Address	Daytime Noise Level				Night-time Noise Level			
	L _{A10,18 hour}				L _{Aeq, 8 hour}			
	DM 2022	DM 2037	DS 2022	DS 2037	DM 2022	DM 2037	DS 2022	DS 2037
Pen Y Dre High School Building No. 3 Goitre Lane	58.0	57.1	58.8	59.6	46.1	45.4	46.9	47.6
Pen Y Dre High School Goitre Lane	58.0	57.1	58.8	59.6	46.1	45.4	46.9	47.6

Table 2: Predicted noise levels at the school buildings.

The data indicates a +0.8 dB increase in daytime traffic noise (or +2.5 dB if the 2037 scenario is considered), but unfortunately we cannot ascertain from the information in the ES the exact location of the receptors nor the reason for the predicted increases.

The DM 2022 daytime noise levels are reasonably close to those measured at the north facades of the school (MP5 and MP6 were L_{A10,10mins} 60 dB, compared with predicted 58 dBL_{A10,18hr}) during our baseline survey, so it would appear likely that the receptor position is somewhere along the northern façade of the school.

The ES also includes a figure showing the predicted change in noise levels at the school site, as reproduced below:



This figure appear to show a reduction in noise levels across the site, which is at odds with the predicted increase in the tabulated results.

We have tried to contact the Acoustic Consultant at Jacobs who undertook the study for an explanation of this issue, but we have not been able to get a response at this stage. We will continue to try and seek an explanation and will update this report if our assumptions are not correct.



5.1 MODELLED DATA UNCERTAINTY

The predicted noise levels in the ES are generated using a noise prediction model which is based on a standardised set of assumptions about road traffic noise, published by the Department for Transport and the Welsh Office in 1988. The noise of road vehicles in 2021 is not necessarily the same as it was in 1988, and the modelling methodology is also considered less accurate at lower speeds, where traffic is not free-flowing.

The model should therefore be considered to include a significant degree of uncertainty for this location (near the proposed new junction) and the predictions from the model should be used with caution.

6 NOISE AFFECTING THE SCHOOL BUILDINGS

6.1 CORRECTIONS TO MEASURED LEVELS

There is a significant amount of uncertainty associated with using the measured noise levels to assess the future noise levels at the site, for the various reasons outlined above. The table below summarises the effect of the uncertainty and the corrections we propose to adopt to account for this:

Issue	Correction to measured levels in order to predict future levels	
	North of the site	South of the site (inc. Primary School site)
Measured noise levels were affected by road works temporary speed limit and Covid pandemic traffic flows	+1 dB	No change
Changes to A465 junction (dualling, speed increase, new cutting, new junction, changed traffic flows), change figures taken from ES.	-1 dB overall and ± 2 dB modelling uncertainty	No change overall and ± 1 dB modelling uncertainty
All issues cumulatively	±2 dB	±1 dB

Table 3: Proposed corrections to measured levels in order to account for future site conditions

6.2 FUTURE AMBIENT NOISE LEVELS

Predicted future daytime ambient noise level ($L_{Aeq,30mins}$) at the locations of the proposed building facades are as follows:

HIGH SCHOOL SITE

The mark-up below shows the predicted future external ambient sound levels at each teaching space façade:



Figure 4: Estimated future façade noise levels (teaching spaces with openable windows)

PRIMARY SCHOOL SITE

The predicted future daytime ambient noise levels at the location of the proposed primary school site range from **43 to 49 dBL_{Aeq}**.

6.3 ASSESSMENT CRITERIA

BB93 provides internal ambient noise level (IANL) criteria for each different type of space within a school. In general, most teaching spaces in a new-build school have an IANL criterion of 35 dB, with a +5 dB relaxation permitted for naturally ventilated spaces. BB93 states that the IANL criteria can normally be achieved with:

- Single-sided ventilation where external noise levels exceed the IANL criteria by up to 16 dB
- Cross-ventilation where external noise levels exceed the IANL by up to 20 dB.



In short this means that:

- 1) **New-build classrooms** can typically be naturally ventilated where external noise levels do not exceed:
 - a. $L_{Aeq,30min}$ **51 dB for single-sided ventilation or**
 - b. $L_{Aeq,30min}$ **55 dB for cross-ventilation.**
- 2) For **refurbished classrooms**, a further 5 dB relaxation on the above figures is permitted, i.e. external noise levels do not exceed
 - a. $L_{Aeq,30min}$ **56 dB for single-sided ventilation or**
 - b. $L_{Aeq,30min}$ **60 dB for cross-ventilation.**

6.4 VENTILATION STRATEGY AND BUILDING ENVELOPE

The results of the survey indicate that the noise levels at **the primary school site is suitable for natural ventilation by single-sided or cross-ventilation.**

The majority of the high school buildings are also suitable for natural ventilation by single-side or cross-ventilation, however a small number of rooms on the north elevation are only suitable for cross-ventilation or another means which does not require large areas of open windows.

The internal noise levels may be close to the upper limit in these rooms, depending on the outcome of the changes arising with traffic on the redesigned A465 and the assessment already takes a 5 dB relaxation of the IANL criteria due to it being a refurbishment. For these reasons we would not recommend any further derogation from the BB93 criteria.

Standard thermal double glazing and most standard façade cladding/drylining build-ups are expected to provide sufficient sound insulation across both sites without any additional upgrades.

7 PLANT NOISE EMISSIONS FROM THE SCHOOL

7.1 BACKGROUND NOISE LEVELS

In order to set appropriate noise emissions limits for noise from the proposed development, it is necessary to determine a representative value for the daytime background noise (L_{A90}). The lowest measured background noise level (**L_{A90} 40 dB**) **has been adopted as the representative background noise levels at the nearest NSRs.**

7.2 ASSESSMENT CRITERIA

In line with BREEAM Pol 5 and BS 4142, we propose Rating sound limits 5 dB lower than the background noise level at nearby residential receptors. The **rating sound limits are $L_{A,r}$ 35 dB.**

7.3 PROPOSED PLANT

Plant selections have not been made at this stage of the design, however it is considered that the above limits can be met with provision of standard attenuation and screening measures. Therefore no significant noise impacts are predicted.