

# **Residential development of land at The Northern Quarter, Glyndwr University, Wrexham:**

## **Noise Assessment**

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Edwards Homes Ltd

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| Echo Acoustics<br>18 January 2022 |
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## EXECUTIVE SUMMARY

This report is an update of the previous report submitted in December 2021, presenting the results of a noise measurement survey, and desk-based assessment, with respect to the proposed residential redevelopment of land at The Northern Quarter, Glyndwr University, Plas Coch Road, Wrexham LL11 2BZ.

The assessment shows that site is principally affected on its western boundary by elevated levels of traffic noise arising from the movements of vehicles on Plas Coch Road and, on its eastern boundary, by daytime, evening and weekend use of the University all-weather sports pitches.

Appropriate mitigation measures\* are recommended such that future residents of the development will be suitably protected from noise during the day and night time.

The assessment concludes that, with the provision of the noise mitigation measures recommended in the report, the site is suitable for residential redevelopment, that good residential amenity for future occupants of the development can be assured and that noise need not be a reason for refusal of planning permission.

\* The proposed mitigation measures have been updated to include a change in the height of the barrier, adjacent the sports pitches, to 2 metres and to provide barrier calculations for the rear gardens of Units 1 and 13 adjacent Plas Coch Road.

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# 1 INTRODUCTION AND SITE DESCRIPTION

- 1.1 Echo Acoustics has been instructed by Edwards Homes Ltd to prepare a noise assessment report to accompany a full planning application for the residential of land at The Northern Quarter, Glyndwr University, Plas Coch Road, Wrexham LL11 2BZ.
- 1.2 The site is located approximately 1km to the north-west of Wrexham town centre and comprises the redundant student accommodation buildings adjacent Plas Coch Road and land to the east which is currently grassed areas or car parking. The approximate site outline is presented in Figure 1.

**Figure 1: Approximate site area**



- 1.3 The site's western boundary is defined by Plas Coch Road beyond which is the Plas Coch Public House & Restaurant and a retail park. To the south are remaining University buildings, still occupied whilst the northern boundary adjoins the Wrexham tennis centre and the eastern boundary adjoins a mixture of private residential housing on Crispin Lane and University facilities including the Sports facility and its associated all-weather pitches.
- 1.4 The ambient noise affecting the site is dominated by general urban noise, local road traffic, particularly at the its western boundary, and noise from the all-weather pitch, which is available to hire by members of the public; the pitch is open until 9:00pm on weekdays and 6:00pm on the weekend.
- 1.5 The indicative site layout is presented in Figure 2.

Figure 2: Indicative site layout (drawing 10408.10c.ds)



- 1.6 This (updated<sup>1</sup>) report presents the results of a noise measurement survey at the site, a desk-based assessment of noise affecting the site and its significance with respect to the proposed residential use and, where appropriate, a discussion of suitable mitigation requirements for the future residential use, updated since the previous iteration of the report was issued in December 2021.
- 1.7 A glossary of acoustic terminology is presented at Appendix A.

<sup>1</sup> Updates to barrier height, to 2 metres, along boundary with sport pitches

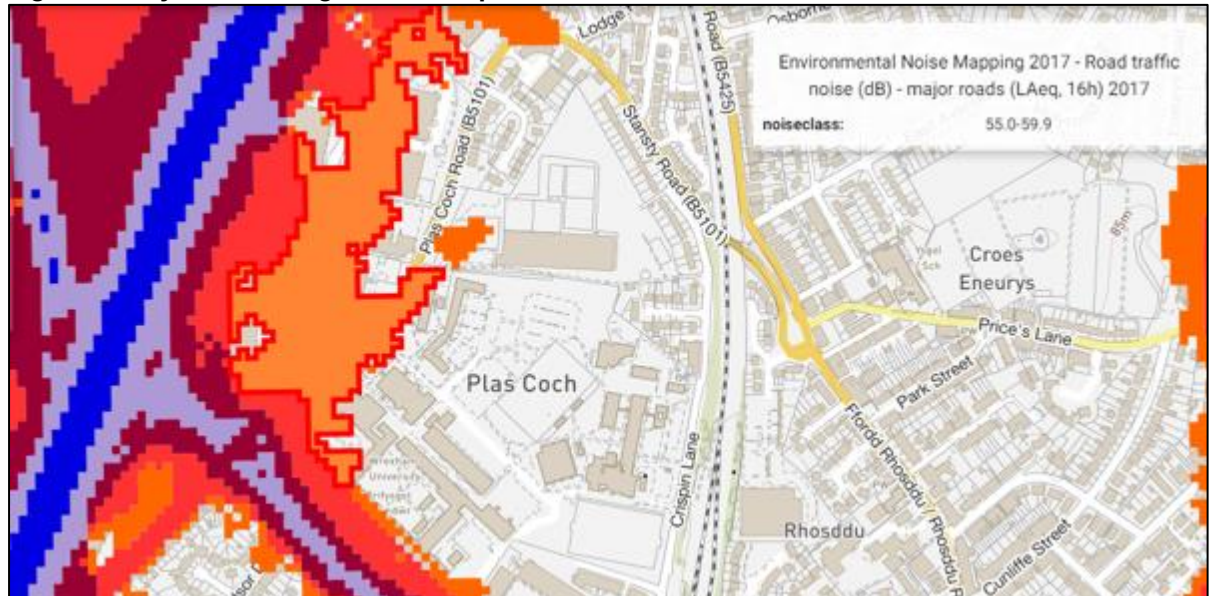
## 2 GUIDANCE

### Noise – national and local policy guidance

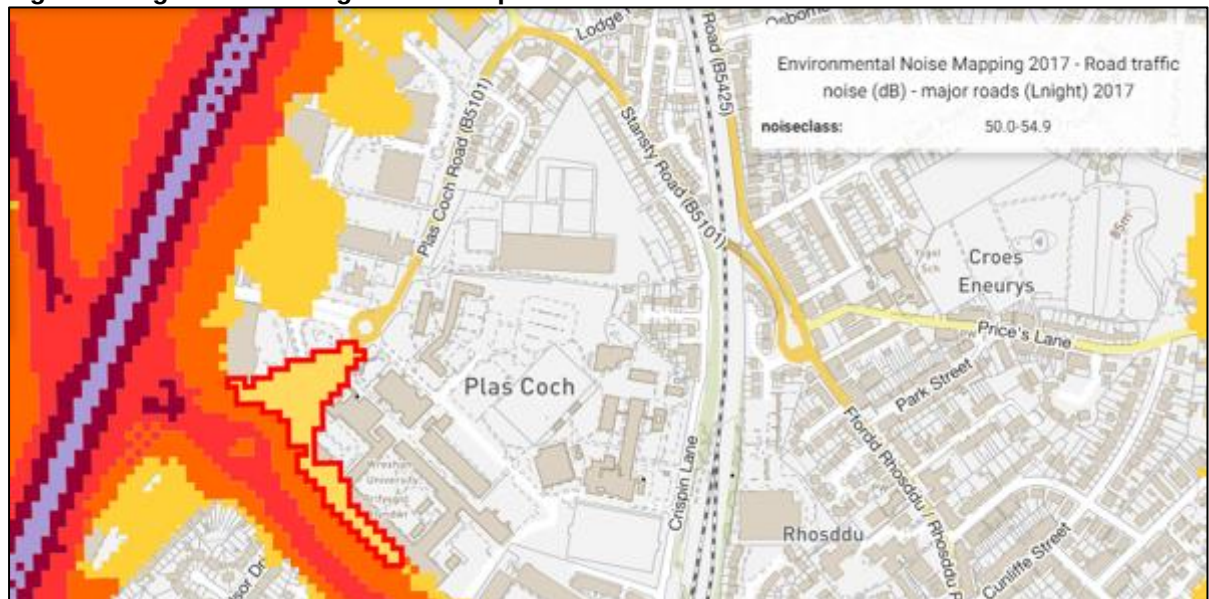
- 2.1 Planning policies in Wales are set at both a national and local level. With respect to national policy, assessment of the suitability of a site for residential development is guided by the document Planning Policy Wales (PPW), Edition 11 of which was published in February 2021. This document aims to promote the principles of sustainable development and wellbeing for the people of Wales.
- 2.2 With regard to noise, the PPW does not provide specific noise, defined noise limits; issues of noise within the planning process are referenced in Chapter 3 “*Strategic and Spatial Choices*”, Chapter 4 “*Active and Social Places*”, Chapter 5 “*Productive and Enterprising Places*” and Chapter 6 “*Distinctive and Natural Places*”; the latter addresses the environmental considerations of development in greatest detail with noise being addressed specifically at Section 6.7 “*Air quality and soundscape*”.
- 2.3 PPW proposes that plans for new development should be accompanied by a technical noise assessment with consideration of good design techniques and the provision of suitable mitigation to minimise adverse effects of noise on future residents. Specifically, it states: “*Planning authorities must consider current and future sources of air and noise pollution as part of developing their strategies for locating new development. The pattern of proposed development should be informed by the sensitivity of, and compatibility of, uses in relation to the sources of airborne pollution and the importance of ensuring appropriate soundscapes*”.
- 2.4 is intended to enable the planning system to support the Government’s aims and objectives with respect to sustainable development and provides a general framework within which planning applications for development must “*be determined in accordance with the [local] development plan*”.
- 2.5 The Consultation Draft of the “*Noise and soundscape action plan 2018-2023*” makes reference to the provisions of the Environmental Noise (Wales) (Amendment) Regulations 2009 which, in turn, enact the provisions of European Union Directive 2002/49/EC *relating to the assessment and management of environmental noise* (the END). This requires Member states to undertake *strategic* noise mapping to identify Noise Action Plan areas where noise is considered likely to give rise to adverse long-term health effects. The Draft action Plan notes that “*It is expected that the noise maps will inform a range of activities carried out by public bodies in Wales over the next five years, including but not limited to:*
- *prioritised noise mitigation works, such as noise barriers and resurfacing;*
  - *the planning process;*
  - *air quality, green infrastructure and transport plans and strategies;*
  - *the assessments of local well-being produced by public services boards (PSBs)<sup>6</sup> under the Well-being of Future Generations (Wales) Act 2015 (the WFG Act); and*
  - *the State of Natural Resources Report (SoNaRR) and area statements produced by Natural Resources Wales (NRW) under the Environment (Wales) Act 2016” .*

- 2.6 Examination of the Noise Mapping database<sup>2</sup> shows that the proposed site is not within, or next to, any noise “Priority/Proximity Areas”. The strategic noise maps, last produced in 2017, indicate that Plas Coch Road is subject to noise levels in the region of 55.0 to 59.9 dB  $L_{Aeq, 16h}$  during the daytime (Figure 3) and 50.0 to 54.9 dB  $L_{night}$  (Figure 4).

**Figure 3: Day time strategic noise map**



**Figure 4: Night time strategic noise map**



- 2.7 None of the current local or national planning policies preclude residential development of the site.

### Noise – technical guidance

- 2.8 In May 2017, a working group a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute

<sup>2</sup><http://lle.gov.wales/map#m=-3.00302,53.05472,16&b=europa&l=973h;974h;975h;976h;977h;978h;979h;980h;981h;982h;983h;984h;985h;1564h;1577>; (accessed 15/6/2021)

of Environmental Health (CIEH) produced a Professional Practice Guidance (ProPG) document<sup>3</sup>. PPW notes that *“ProPG has been written principally to assist with the planning process in England, but the design principles put forward in Supplementary Document 2 may also be adopted in Wales”*.

- 2.9 The guidance was produced *“to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England”* and *“which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise”*. Its primary aim is *“to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise”*.
- 2.10 The guidance identifies that *“Good acoustic design is about more than the numbers. It is a holistic design process that creates places that are both comfortable and attractive to live in, where acoustics is considered integral to the living environment.*  
*Good acoustic design can involve, for example, careful site layouts and better orientation of rooms within dwellings. Good acoustic design does not mean “gold plating” or significantly increasing costs. This guidance seeks to encourage and promote design outcomes that are proportionate and reasonable in the particular circumstances of each development site”*.
- 2.11 It should be noted that the ProPG *“does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate”*.
- 2.12 The ProPG risk-assessment approach to ‘categorising’ sites and the production of an Acoustic Design Statement (ADS) are not required in Wales; Supplementary Document 2 of the ProPG sets out recommendations for *“good acoustic design”* in order to ensure suitable residential amenity for occupants of new development.
- 2.13 With respect to specific Welsh noise guidance, the quantitative assessment of traffic-related noise in Planning is determined using Technical Advice Note (TAN) 11<sup>4</sup>. This provides a number of Noise Exposure Categories (NECs) *“derived to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources”*.
- 2.14 The NECs are defined in Table 2 of TAN 11, replicated here as Figure 5.

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<sup>3</sup> ANC, IOA & CIEH (2017) *Pro PG: Planning & Noise Professional Practice Guidance on Planning & Noise: New Residential Development*

<sup>4</sup> Welsh Government *Planning Guidance (Wales), Technical Advice Note (Wales) 11, Noise* - October 1997 (accessed 29/6/2021)

**Figure 5: TAN 11 NECs**

Figure 2: Noise Levels

| Table 2: RECOMMENDED NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS NEAR EXISTING NOISE SOURCES                       |                          |                         |       |       |     |
|--------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------|-------|-------|-----|
| Noise Levels <sup>(1)</sup> corresponding to the Noise Exposure Categories for New Dwellings L <sub>Aeq,T</sub> dB |                          |                         |       |       |     |
| Noise Source                                                                                                       |                          | Noise Exposure Category |       |       |     |
|                                                                                                                    |                          | A                       | B     | C     | D   |
| road traffic                                                                                                       | 0700-2300                | <55                     | 55-63 | 63-72 | >72 |
|                                                                                                                    | 2300-0700 <sup>(2)</sup> | <45                     | 45-57 | 57-66 | >66 |
| rail traffic                                                                                                       | 0700-2300                | <55                     | 55-66 | 66-74 | >74 |
|                                                                                                                    | 2300-0700 <sup>(2)</sup> | <45                     | 45-59 | 59-66 | >66 |

- 2.15 The *significance* of the NECs, in respect of proposed residential development, is given in Table 1 of TAN 11, reproduced here as Figure 6.

**Figure 6: TAN 11 NEC significance**

| TABLE 1: NOISE EXPOSURE CATEGORIES |                                                                                                                                                                                                                                                                             |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A</b>                           | Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.                                                                                         |
| <b>B</b>                           | Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.                                                                                                             |
| <b>C</b>                           | Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise. |
| <b>D</b>                           | Planning permission should normally be refused.                                                                                                                                                                                                                             |

- 2.16 Further detailed advice with respect to the protection of residential amenity is given in British Standard (BS) 8233: 2014 *Guidance on sound insulation and noise reduction for buildings*. This gives recommendations for external and internal noise levels for residential dwellings in order to protect residential amenity, based on health-based research, as follows:

- Living rooms during the day 35 dB L<sub>Aeq,16hour</sub>
- Dining rooms during the day 40 dB L<sub>Aeq,16hour</sub>
- Bedrooms during the day 35 dB L<sub>Aeq,16hour</sub>
- Bedrooms during the night 30 dB L<sub>Aeq,8hour</sub>

- 2.17 These values can be taken to be broadly equivalent with the LOAEL in the PPG. Note that these are not specific criteria or ‘target’ noise levels, merely indicative recommendations which will be context-dependant. However, most Local Authorities tend to apply the recommended noise levels as strict criteria.

- 2.18 In most standard modern properties, the walls and roof provide relatively high levels of sound insulation of greater than 40 dB; the weakest part of a building facade, with respect to noise, is generally the windows. Modern construction methods for new residential properties incorporate standard thermal double-glazing which, the standard suggests, will provide approximately 30 dB R<sub>w</sub> of sound attenuation when closed. The standard does not specifically give sound attenuation values for partially open windows, although the worked example (G.1)

at Annex G of the Standard indicates that a partially open window would provide 15 dB of sound attenuation.

- 2.19 Suitable day time noise levels for external areas (gardens and patios) are given in BS 8233 as being 50 to 55 dB  $L_{Aeq}$ .
- 2.20 With regard to maximum ( $L_{AFmax}$ ) noise levels, relevant to assessment of noise at night, BS 8233 (Note 4) states the following:  
*“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or  $L_{Amax,F}$ , depending on the character and number of events per night. Sporadic noise events could require separate values”.*
- 2.21 The World Health Organisation (WHO) 1999 *Guidelines for community noise*, upon which the BS 8233 guidance is based, provides guideline values for avoidance of particular negative health effects e.g. annoyance and sleep disturbance.
- 2.22 The guideline values applicable to residential developments are reproduced in Table 1.

**Table 1: WHO guideline values for community noise in specific environments**

| Specific environment | Critical health effect                                         | Time base (hours) | dB L <sub>Aeq</sub> | dB L <sub>AFmax</sub> |
|----------------------|----------------------------------------------------------------|-------------------|---------------------|-----------------------|
| Outdoor living area  | Serious annoyance, daytime and evening                         | 16                | 55                  | ---                   |
|                      | Moderate annoyance, daytime and evening                        | 16                | 50                  | ---                   |
| Dwelling, indoors    | Speech intelligibility & moderate annoyance, daytime & evening | 16                | 35                  | ---                   |
| Inside bedrooms      | Sleep disturbance, night time                                  | 8                 | 30                  | 45                    |
| Outside bedrooms     | Sleep disturbance, window open (outdoor values)                | 8                 | 45                  | 60                    |

- 2.23 With respect to maximum noise levels, the WHO guidance references a study undertaken by Vallet & Vernet (1991)<sup>5</sup> on aircraft noise which suggests that for good sleep, indoor sound pressure levels in bedrooms should not exceed approximately 45 dB L<sub>Amax</sub> more than 10-15 times per night, equivalent to an external level of 60 dB L<sub>Amax</sub> with windows open or 75 dB L<sub>Amax</sub> with windows closed. The findings of this research are conventionally accepted as being suitable for use in the assessment of noise from other forms of transportation.
- 2.24 With respect to noise from the sports pitches, Sport England produced a guidance document<sup>6</sup> specifically for this purpose. Whilst the document is intended principally to inform applications for the introduction of new sports pitches close to existing noise sensitive receptors, it can also be used to inform the reverse situation.
- 2.25 The guidance references the 1999 WHO guidance and states *“The most significant noise levels were found to be generally derived from the voices of players, with the exception of hockey where impact noises of balls hitting perimeter strike boards and goal back boards were more noticeable. Such impact noises can be mitigated by incorporating shock absorbing noise reduction measures. Assuming such mitigation measures, the most significant noise source from typical AGP sports sessions is therefore voice and as such, a typical noise level can be determined.*

*From the measurement data, a typical free-field noise level of 58 dB L<sub>Aeq(1 hour)</sub> 4 at a distance of 10 metres (m) from the sideline halfway marking has been determined as representative for noise from an AGP ... When a site is in an open location, noise levels of 50 dB L<sub>Aeq(1 hour)</sub> can be achieved at a distance of 40 m at 1.5 m above the ground but a distance of 70 m is required at a height of 30 m above the ground”.*

<sup>5</sup> Vallet M. & Vernet I. (1991) *Night noise index for aircraft noise and sleep disturbance*. Proceedings Internoise 1991, Sydney, Vol. 1 pp 207-210

<sup>6</sup> Sport England (2015) *Artificial Grass Pitch (AGP) Acoustics - Planning Implications* (Revision 1) <https://www.sportengland.org/how-we-can-help/facilities-and-planning/planning-for-sport/artificial-grass-pitches-acoustics-planning-implications> (accessed 29/6/2021)

- 2.26 The guidance then states “*The determining noise criteria for AGPs proximity to residential properties, to avoid moderate annoyance in the daytime and evenings, as set by The World Health Organisation’s ‘Guidelines for Community Noise’: = 50 dB  $L_{Aeq}(1 \text{ hour})$  upper noise limit external to residential properties and within external living areas*”.

### 3 METHODOLOGY AND ASSUMPTIONS

- 3.1 The assessment comprised a noise measurement survey between 8:00pm on Thursday 10 June and 6:45pm on Sunday 14 June 2021. This comprised measurement between 8:00pm and 9:45pm on the Thursday at a position approximately 16 metres from the edge of the sports pitches (measurement location 1), and a period of continuous consecutive measurement, at a position 10.5 metres from the edge of Plas Coch Road, between 10:15pm on the Thursday 6:45pm on the Sunday.
- 3.2 At both locations, measurements comprised continuous consecutive (logging) measurement of 15-minute and 1-second (dB  $L_{Aeq}$  and  $L_{Amax}$  only) noise levels.
- 3.3 The measurement locations are presented in Figures 7 to 9.

**Figure 7 : Measurement locations**



**Figure 8: View of Location 1 close to sports pitches (in use)**



**Figure 9: View of Location 2 looking towards Plas Coch Road**



- 3.4 The sound level meter used was a Casella CEL 633 Class 1 integrating, averaging meter, which was placed in a locked, weather-proof case attached via extension cable to the microphone which was mounted on a tripod at a height of approximately 1.3 metres above the ground.
- 3.5 The meter was field-calibrated before and after the survey; no significant variation in calibration tone was observed.
- 3.6 The weather during the survey was dry and warm with generally low winds but with periods of elevated wind forecast during the Saturday evening: a short 15-minute sample measurement was recorded on the Monday during equipment demobilisation and comparison of this with the data recorded on the Friday showed good correlation. Examination of the 15-

minute data for the Saturday night time period indicated good correlation with the data for the other nights.

- 3.7 It is reasonable to conclude, therefore, that the marginally elevated wind on the Saturday night did not adversely affect the ambient noise data gathered adjacent to Plas Coch Road.

## 4 RESULTS AND ASSESSMENT

### Measurement data

- 4.1 The noise measurement data are summarised in Tables 2 and 3 and Figure 10; the full 15-minute and 1-second (tabulated) measurement data for location 2 are too numerous to present in this report but are available on request.

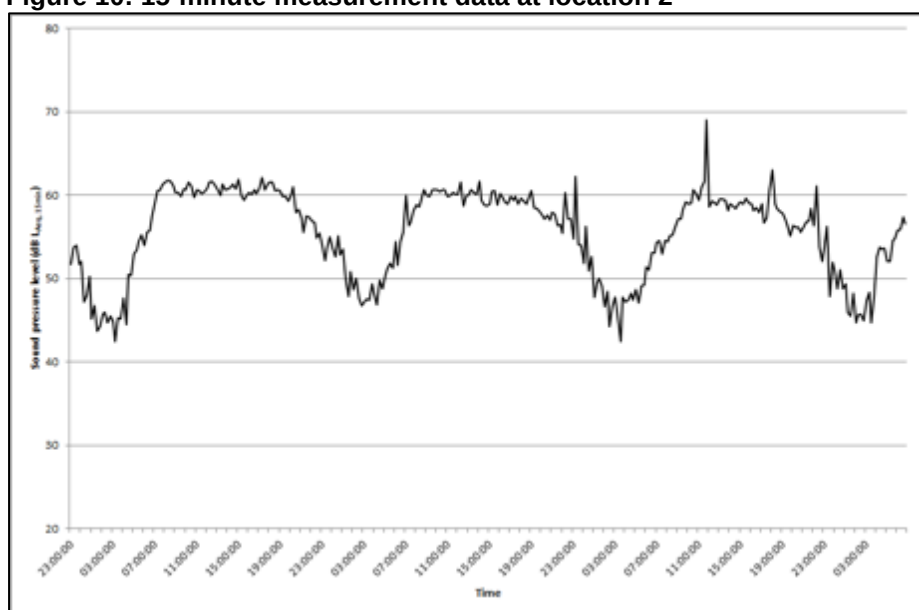
**Table 2: Measurement data at location 1**

| Time  | Duration (mins) | Measured noise (dB) |                    | Notes                                              |
|-------|-----------------|---------------------|--------------------|----------------------------------------------------|
|       |                 | L <sub>Aeq</sub>    | L <sub>AFmax</sub> |                                                    |
| 20:00 | 15              | 59.0                | 86.6               | Balls being kicked against fencing                 |
| 20:15 |                 | 52.8                | 76.5               | Lots of shouting and foul language                 |
| 20:30 |                 | 51.6                | 76.1               |                                                    |
| 20:45 |                 | 51.6                | 74.7               |                                                    |
| 21:00 |                 | 50.3                | 79.0               | Games end 21:03, departing players                 |
|       | <b>Average:</b> | <b>54.4</b>         |                    |                                                    |
| 21:15 | 15              | 44.8                | 53.3               | Pitches empty, general distant traffic/urban noise |
| 20:46 |                 | 45.1                | 60.7               |                                                    |
| 21:30 |                 | 45.3                | 54.1               |                                                    |
|       | <b>Average:</b> | <b>45.1</b>         |                    |                                                    |

**Table 3: Summarised measurement data at location 2**

| Day   | Period                | Measured noise (dB) |                   |
|-------|-----------------------|---------------------|-------------------|
|       |                       | L <sub>Aeq</sub>    | L <sub>Amax</sub> |
| Thurs | 8-hour night          | 51.4                | 68.9              |
| Fri   | 16-hour day           | 60.3                | -                 |
|       | 8-hour night          | 51.7                | 76.5              |
| Sat   | 16-hour day           | 59.4                | -                 |
|       | 8-hour night          | 52.1                | 87.8              |
| Sun   | 16-hour day           | 59.0                | -                 |
|       | 7-hour & 45 min night | 52.3                | 76.2              |
| Mon   | 15-min sample         | 60.7                | 66.3              |

**Figure 10: 15-minute measurement data at location 2**



- 4.2 At location 1, approximately 16 metres from the edge of the all-weather football pitches, the two northern-most pitches (out of three) were in use by groups of adult, mainly male, players;

the games included a significant amount of shouting, foul language and, on only a couple of occasions, the balls being kicked against the wire boundary fencing. The games continued until just after 9:00pm and the pitches and car park had cleared of participants by 9:10pm

- 4.3 At location 2, the ambient noise situation was dominated by road traffic noise from Plas Coch Road with a steady, underlying contribution of noise from the A483 dual-carriageway, approximately 300 metres to the west. Figure 10 shows that the traffic noise exhibits a 'typical' diurnal pattern.
- 4.4 The Plas Coch Public House was open until approximately 10:00pm with a few people sitting outside drinking. There was very little noise of any other description from the direction of the Retail Park.
- 4.5 In determining whether the current pandemic restrictions adversely affected the measured data, comparison of the measured data at location 2 (Table 3) with the strategic noise map data<sup>7</sup>, which indicated a noise level range of 55.0 to 59.9 dB  $L_{Aeq\ 16h}$  during the daytime (Figure 3) and 50.0 to 54.9 dB  $L_{night}$  (Figure 4), shows good correlation, the day time measured data being at the high end of the strategic noise map range. It can be concluded that the data represent the 'typical' noise situation in this location irrespective of the pandemic restrictions.
- 4.6 With respect to noise from the railway line, located to the east of the site, train movements were just audible but were not significant and had no effect on the observed measurement data; it can be concluded that the distant railway has no significant effect on the proposed development and is not considered further in this report.
- 4.7 The current site layout (Figure 11) indicates that the houses closest to the sports pitches and Plas Coch Road are approximately in the same location as the measurement positions; the data can, therefore, be taken to be representative of the noise affecting the future properties without additional adjustment.

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<sup>7</sup> Reference paragraph 2.6 of this report

Figure 11: Indicative layout (drawing 10408.10c.dsj)



## Assessment of sports pitch noise

### External amenity areas:

- 4.8 Examination of the data in Table 2 shows that, in the absence of activity on the sports pitches, the ambient noise situation is in the region of 45 dB  $L_{Aeq}$ . The playing of games on the pitches gives rise to a noise level of 54.4 dB  $L_{Aeq, 1h}$ ; this is 4.4 dB greater than the Sport England (1-hour) and BS 8233 (16-hour) guideline level of 50 dB  $L_{Aeq}$  for external amenity areas during the day.

### Internal noise:

- 4.9 This level would give rise to an internal noise level, assuming 15 dB of sound attenuation through an open window, of 41.4 dB  $L_{Aeq}$ , 6.4 dB greater than the BS 8233 guideline level for living rooms and bedrooms used during the day, and 1.4 dB greater than the guideline level for dining areas; the latter is not considered particularly significant.
- 4.10 **Mitigation will be required** to minimise the likelihood of adverse disturbance for future residents of the proposed development, both externally and internally, in the properties closest to the sports pitches.

## Assessment of traffic noise

- 4.11 The data in Table 3 indicate that the western area of the development, closest to Plas Coch Road, falls within TAN 11 NEC B during both the day and night time.
- 4.12 Table 1 of TAN 11 (Figure 7 of this report) states that, for development areas falling within NEC B, "Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection".

#### External amenity areas:

- 4.13 The western portion of the development site is the area principally affected by traffic noise. The current layout indicates that the majority of properties closest to Plas Coch Road will have their front facades towards the road with their rear gardens set behind and, therefore, suitably protected from traffic noise.
- 4.14 However, Units 1 and 13 have rear gardens side-on to the road and the data in Table 3 indicate that daytime traffic noise levels will be up to approximately 10 dB greater than the lower BS 8233 guideline level for external amenity areas.
- 4.15 These properties will be provided with a 2 metre-high solid brick garden wall which, it was calculated, will provide 9.6 dB (Unit 13) and 9.5 dB (Unit 1) of sound attenuation.
- 4.16 Based on the data in Table 3 of the report, the greatest measured 16-hour sound pressure level was 60.3 dB  $L_{Aeq, 16h}$ , at 10.5m from roadside edge (14m from effective source of noise from moving traffic, 0.5m above road level). It was determined that the distance between the 'source' of the traffic noise (the line of moving traffic) and the closest part of boundary walls will be 18.5m (Unit 13) and 21.5m (unit 1).
- 4.17 From this, the noise level was calculated for a garden receptor position 2m beyond the garden wall, and at a height of 1.5m above ground i.e person standing 2m from the boundary wall. The calculation included attenuation of noise due to distance between the 'source' and 'receptor'.
- 4.18 It was calculated that:
- Without a barrier, the noise level at the receptor position in the gardens would be 59.1 dB  $L_{Aeq, 16h}$  at Unit 13 and 58.4 dB  $L_{Aeq, 16h}$  at Unit 1.
  - With a 2 metre-high barrier, the receptor noise level was calculated to be 49.5 dB  $L_{Aeq, 16h}$  at Unit 13 and 48.9 dB  $L_{Aeq, 16h}$  at Unit 1

These levels are below the BS 8233 lower guideline value of 50 dB  $L_{Aeq, 16h}$  for external areas used during the day.

#### Internal noise:

- 4.19 With respect to assessment of internal noise levels in habitable rooms in properties closest and facing Plas Coch Road, using the more detailed guidance provided in BS 8233, Table 4 presents the calculated internal noise levels for properties closest to, and facing, Plas Coch Road, assuming 15 dB and 30 dB  $R_w$  of sound attenuation through an open and closed window, respectively.

**Table 4: Calculated internal noise levels**

| Table 4: Calculated internal noise levels |        |                       |                   |
|-------------------------------------------|--------|-----------------------|-------------------|
| Day                                       | Period | Calculated noise (dB) |                   |
|                                           |        | L <sub>Aeq</sub>      | L <sub>Amax</sub> |
| Windows closed                            |        |                       |                   |
| Thurs                                     | Night  | 21.4                  | 38.9              |
| Fri                                       | Day    | 30.3                  | -                 |
|                                           | Night  | 21.7                  | 46.5              |
| Sat                                       | Day    | 29.4                  | -                 |
|                                           | Night  | 22.1                  | 57.8              |
| Sun                                       | Day    | 29.0                  | -                 |
|                                           | Night  | 22.3                  | 46.2              |
| Windows open                              |        |                       |                   |
| Thurs                                     | Night  | 36.4                  | 53.9              |
| Fri                                       | Day    | 45.3                  | -                 |
|                                           | Night  | 36.7                  | 61.5              |
| Sat                                       | Day    | 44.4                  | -                 |
|                                           | Night  | 37.1                  | 72.8              |
| Sun                                       | Day    | 44.0                  | -                 |
|                                           | Night  | 37.3                  | 61.2              |

- 4.20 The data in Table 4 indicate that, with windows closed, internal ambient (L<sub>Aeq</sub>) noise levels are suitable for the preservation of residential amenity.
- 4.21 The maximum night time (L<sub>Amax</sub>) noise levels marginally appear to exceed the 45 dB L<sub>Amax, 8h</sub> guideline value for bedrooms at night. However, detailed examination of the 15-minute noise measurement data show that the 45 dB L<sub>Amax</sub> level was exceeded only once on the Friday and Sunday nights and only twice on the Saturday.
- 4.22 It can be concluded, therefore, that **with windows closed, internal noise levels suitable for the preservation of residential will be achieved.**
- 4.23 However, the data in Table 4 indicate that, with windows open, the BS 8233 and WHO guideline noise levels will be exceeded in all habitable rooms during the day and night time.
- 4.24 Consequently, windows of habitable rooms in facades closest and facing, Plas Coch Road, would need to remain closed to achieve the guideline levels and alternative means of providing 'background' ventilation, as a minimum, will be required. Background ventilation, typically achieved through the use of 'trickle ventilators', is the minimum air exchange required to maintain fresh air within dwellings.

## 5 MITIGATION MEASURES

### Mitigation of noise from all-weather sports pitches

- 5.1 For external amenity areas in the properties closest to and facing the sports pitches, the assessment has shown that elevated levels of noise associated with use of the sports pitches, up to 4.4 dB above guideline levels, are likely to affect garden areas closest to the pitches during the day time, evening and at weekends. This applies to Units 40 to 50, 53 to 55 and 72 to 82.
- 5.2 It is recommended that a 2 metre-high solid blockwork wall or acoustic fence be constructed along the boundary with the sports pitches; such a barrier would be expected to provide between 8 and 12 dB of sound attenuation, thereby achieving suitable noise levels in external amenity areas.
- 5.3 With respect to internal noise, the assessment has shown that internal noise levels in the properties closest to the sports pitches, on facades facing the pitches, will be up to 6.4 dB greater than the BS 8233 guideline level for living rooms and bedrooms used during the day.
- 5.4 The provision of screening as described in paragraph 5.2, would be expected to provide between 8 and 12 dB of sound attenuation, thereby reducing internal noise levels in ground floor habitable rooms to below the BS 8233/WHO guideline values.
- 5.5 However, first floor habitable rooms will not benefit from this protection and would need to remain closed in order to achieve the guideline levels.
- 5.6 Consequently, **alternative means of providing suitable levels of background ventilation**, as a minimum, will be required, utilising through-window trickle ventilation units providing **35 dB  $D_{n,e,w}$  of sound attenuation when open**.

### Mitigation of noise from Plas Coch Road

- 5.7 The assessment has shown that, for habitable rooms in facades closest and facing, Plas Coch Road, windows would need to remain closed to achieve the guideline levels in order to achieve suitable internal 'ambient' ( $L_{Aeq}$ ) noise levels during both the day and night time, in accordance with the guidance provided by BS 82333 and the WHO Guidelines.
- 5.8 Consequently, **alternative means of providing suitable levels of background ventilation**, as a minimum, will be required, utilising through-window trickle ventilation units providing **35 dB  $D_{n,e,w} + C_{tr}$  of sound attenuation when open**:  $C_{tr}$  is a 'correction' to account for the presence of low frequency noise associate with diesel-engined vehicle noise i.e. it provides a greater degree of protection against low frequency noise ingress.

With the recommended mitigation measures in place, suitable levels of internal noise, commensurate with the preservation of residential amenity for future occupants of the development, will be achieved.

## 6 SUMMARY & CONCLUSION

- 6.1 The assessment has shown that the western area of the site is affected principally by elevated levels of traffic noise from Plas Coch Road whilst the eastern area is affected by elevated noise from the use of the adjacent all-weather pitches.
- 6.2 Mitigation measures necessary to provide suitable internal noise levels for the preservation of residential amenity comprise:
- A 2 metre-high solid blockwork wall fence along the site boundary with the all-weather pitches.  
a 2 metre-high solid brick wall for Units 1 and 13 along the rear garden boundaries closest to and facing Plas Coch Road.
  - The provision of background ventilation for 1<sup>st</sup> floor habitable rooms on the facades closest to and facing the all-weather pitches, using through-window trickle ventilation units providing a minimum of **35 dB  $D_{n,e,w}$**  of sound attenuation *when open*.
  - The provision of background ventilation for habitable rooms on the facades closest to and facing Plas Coch Road, using through-window trickle ventilation units providing a minimum of **35 dB  $D_{n,e,w} + C_{tr}$**  of sound attenuation *when open*.
- 6.3 With these measures in place, the assessment concludes that the site is suitable for residential development, that good residential amenity for future occupants of the development can be assured, and that noise need not be a reason for refusal of planning permission.

## 7 APPENDICES

### Appendix A: Glossary of acoustic terms

*Ambient noise*: the noise from all sources, both near and far, at any given time. Conventionally defined using the A-weighted equivalent continuous noise level ( $L_{Aeq}$ ) [see below].

*Background noise level (dB  $L_{A90}$ )*: In the UK, the 90<sup>th</sup> percentile noise level ( $L_{A90}$ ) is generally used to define 'background' noise. This is a statistical parameter describing the noise level that is exceeded for 90% of the measurement or assessment time. Its value lies in the fact that it is a statistical value, towards the lower end of a measured range of data, and which is relatively 'stable' i.e. not adversely affected by occasional high-energy noise events.

*Decibel (dB)*: a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals ( $\mu\text{Pa}$ ), the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

*dB(A) / A-weighting*: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change (in steady noise) of 3 dB(A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to halving or doubling the *loudness* of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

*$L_{Aeq,T}$* : the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T).  $L_{Aeq}$  is used to describe many types of noise and can be measured directly with an integrating sound level meter.

*$L_{Amax}$* : the maximum single-event noise level attained during a measurement period.

*Noise*: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

*Sound / sound pressure*: a fluctuation in air pressure over the static ambient pressure.

*Sound pressure level*: the sound pressure relative to a standard reference pressure of 20  $\mu\text{Pa}$  ( $20 \times 10^{-6}$ ) on the decibel scale.