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# Environmental Noise Survey & Assessment

Prepared: 20<sup>th</sup> March 2016

|                  |                          |
|------------------|--------------------------|
| <b>Report No</b> | 16825-1                  |
| <b>Client</b>    | Redrow Homes South Wales |
| <b>Site</b>      | Land at<br>St. Nicholas  |



## 1. Executive Summary

1.1.1. An environmental noise assessment has been carried out for a proposed residential development at Land at St. Nicholas. This report considers any relevant criteria to assess the impact of existing noise sources on the development.

### 1.2. Measurement, assessment and evaluation

1.2.1. The survey was conducted to BS7445-1:2003<sup>1</sup> and BS7445-2:1991<sup>2</sup> which are covered under our UKAS Accreditation.

The interpretation of the data and the specification of suitable mitigation or treatment is outside the scope of our UKAS accreditation but is covered in our 17025 Quality Management System and reporting procedure.



<sup>1</sup> BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Description of quantities and procedures"

<sup>2</sup> BS7445-2:1991 "Guide to the acquisition of data pertinent to land use"

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- 2.1.3. The methodology adopted and the sources of information used by Noise in providing its services are outlined in this report. The work described in this report was undertaken between the 14th March 2016 and 20th March 2016 and is based on the conditions encountered and the information available up to the said date. The scope of this report and the services are accordingly factually limited by these circumstances.
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## 4. Scope

- 4.1.1. This report covers all aspects of the noise impact assessment, including:
- An objective sound pressure level survey of the existing site
  - Analysis of data
  - Prediction of the internal sound pressure levels
  - The design of any mitigation to meet the required internal noise criteria

## 5. Introduction

### 5.1. Proposed development

5.1.1. Redrow Homes South Wales is proposing a residential development at Land at St. Nicholas.

5.1.2. An image showing the proposed location and layout of the development is given in Figure 1.



Figure 1 - Plan showing the location and layout of the proposed development



**Noise Exposure Categories (NECs) for residential development**

6.3.2. Noise Exposure Categories (NECs) have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources. The NECs from appendix A of TAN11 have been reproduced in Table 1 below:

| NEC | Definition  |
|-----|---|
| A   | 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   | Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.   |
| C   | 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. |
| D   | Planning permission should normally be refused.   |

Table 1 – NECs reproduced from appendix A of TAN11

6.3.3. TAN11 recommends a range of noise levels for each of the NECs for dwellings exposed to noise from road, rail, air and mixed sources. Where there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3dB above the recommended levels. In other cases, a reduction of up to 3dB may be justified. The recommended noise levels for each NEC from TAN11 have been reproduced in Table 2.

| Noise source | Time period, T | Noise Exposure Category (NEC) sound pressure level, dB $L_{Aeq,T}$ |       |       |     |
|--------------|----------------|--|-------|-------|-----|
|              |                | A  | B     | C     | D   |
| Road         | 0700-2300      | <55  | 55-63 | 63-72 | >72 |
|              | 2300-0700      | <45  | 45-57 | 57-66 | >66 |
| Rail         | 0700-2300      | <55  | 55-66 | 66-74 | >74 |
|              | 2300-0700      | <45  | 45-59 | 59-66 | >66 |

Table 2 – Noise exposure categories for road and rail sources from TAN11

6.3.6. The sound pressure levels detailed in Table 2 are free-field; i.e. they refer to sound pressure levels measured on open sites with no nearby buildings or other acoustically reflective surfaces (apart from the ground).

### **Measures to mitigate the impact of noise**

6.3.7. TAN11 recommends several measures to limit exposure to noise, these include:

- Engineering:
  - reduction of noise at point of generation (e.g. using quiet machines and/or quiet methods of working);
  - containment of noise generated (e.g. insulating buildings which house machinery and/or providing purpose-built barriers around sites); protection of surrounding noise-sensitive buildings (e.g. improving sound insulation in these buildings and/or screening them by purpose-built barriers);
- Lay-out:
  - adequate distance between noise source and noise-sensitive building or area;
  - screening by natural barriers, other buildings, or non-critical rooms in a building;
- Administrative:
  - limiting operating time of noise source;
  - restricting activities allowed on the site;
  - specifying an acceptable noise limit.

### **6.4. BS8233:2014 internal ambient noise criteria**

6.4.1. If noise mitigation measures are required on the proposed development, BS8233:2014 represents the most appropriate source of guidance to assess the effectiveness of the mitigation.

6.4.2. BS8233:2014 draws on the results of research and experience to provide information on the design of buildings that have internal acoustic environments appropriate to their function.

6.4.3. The standard provides guideline internal values for dwellings for steady external noise sources. These have been summarised in Table 3.

| Activity                   | Location    | 07:00 to 23:00               | 23:00 to 07:00              |
|----------------------------|-------------|------------------------------|-----------------------------|
| Resting                    | Living Room | 35dB L <sub>Aeq,16hour</sub> | -                           |
| Dining                     | Dining Room | 40dB L <sub>Aeq,16hour</sub> | -                           |
| Sleeping (daytime resting) | Bedroom     | 35dB L <sub>Aeq,16hour</sub> | 30dB L <sub>Aeq,8hour</sub> |

*Table 3 – BS8233:2014 guideline values for internal ambient noise levels from steady external noise sources*



6.4.4. The guideline values are issued by the World Health Organisation (WHO) and assume normal diurnal fluctuations in external noise. They are expected to be achieved based on normal annual data and not in all circumstances. For example, it is normal to exclude occasional events such as fireworks night or New Year's Eve.

6.4.5. If relying on closed windows to achieve the guideline values, there needs to be an appropriate alternative ventilation scheme that does not compromise the facade sound insulation or the resulting noise level.

**6.5. BS8233:2014 garden criteria**

6.5.1. For external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB  $L_{Aeq,T}$  with an upper guideline value of 55dB  $L_{Aeq,T}$  which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In such cases, the lowest practicable levels should be achieved in external amenity areas.

## 7. Survey

### 7.1. Noise climate

7.1.1. The existing noise climate was dominated by continuous road traffic noise from road traffic using the A48.

### 7.2. Measurement locations

7.2.1. Fixed position monitoring took place at a single position close to the A48 to account for the likely dominant noise sources.

7.2.2. The monitoring equipment was located 1.5m from the ground and at least 3m from the next nearest reflecting surface. The monitoring positions are shown in Figure 3.

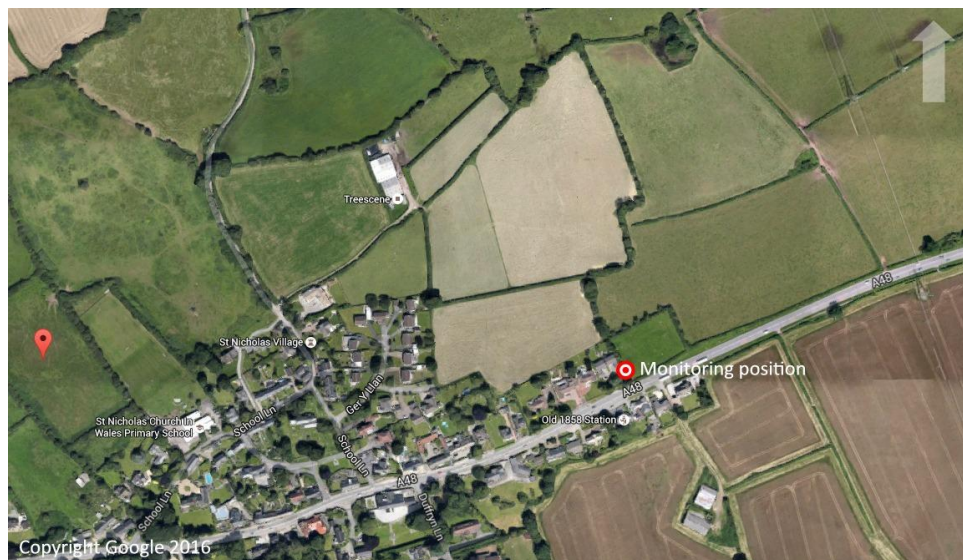


Figure 3 - Noise monitoring location on site

7.2.3. The measurement instrumentation used during the survey is detailed in the appendix (see Section 11.2).

7.2.4. The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003<sup>3</sup> before and after the surveys. The calibration details are also detailed in the appendix.

<sup>3</sup> B7445-1:2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures"

### 7.3. Measurement and timescale

7.3.1. Unattended noise monitoring took place over a typical 24-hour period during the working week between Monday 14<sup>th</sup> March 2016 and Tuesday 15<sup>th</sup> March 2016.

7.3.2. The following quantities were measured:

$$L_{Aeq,5min}$$

7.3.3. Sound pressure measurements were subsequently averaged into hourly, daytime and night-time periods.

7.3.4. The acoustic measurements and their interpretation have been in accordance with BS 7445: Parts 1, and 2<sup>4</sup>. All sound pressure levels are in dB (re 20 $\mu$ Pa).

### 7.4. Meteorology

7.4.1. During the survey the weather information was noted. This is summarised in Table 4.

|  | Position | Survey start | Survey end |
|--|----------|--------------|------------|
| Roads(Wet/Dry)                           | 1        | Dry          | Dry        |
| Wind Speed (ms <sup>-1</sup> )/Direction | 1        | 7m/s ENE     | 6m/s ENE   |

Table 4 - Meteorological data noted during the survey

<sup>4</sup> BS7445-2:1991 "Guide to the acquisition of data pertinent to land use"

## 8. Results

### 8.1. External results summary – $L_{Aeq-Day/Night}$

8.1.1. The fixed position external measurement results are summarised in Table 5. Hourly average levels and plots of the 5-minute data can be found in the appendix. The reported sound pressure levels are free-field.

| Measurement location | Quantity       | Inclusive hours | SPL, dB |
|----------------------|----------------|-----------------|---------|
| 1                    | $L_{Aeq,16hr}$ | 0700-2300       | 64.6    |
| 1                    | $L_{Aeq,8hr}$  | 2300-0700       | 58.1    |

Table 5 - Summary of the external sound pressure levels measured

### 8.2. 3D noise model

8.2.1. A 3D noise model has been produced using SoundPLAN™ to predict the sound pressure levels at the properties across the site. The objective measurements reported in Table 5 have been used to calibrate a road source, used to model the nearby A48. The model was implemented using the following conditions.

- Calculation procedure: CRTN<sup>5</sup>
- Evaluated results:
  - Maximum (regardless of height) sound pressure level ( $L_{Aeq}$ ) at worst affected facades during the day and night periods
  - Colour contour plot illustrating the propagation of sound across the site during the day and night periods
- New buildings:
  - Building locations have been based on outline plans provided by the client. These can be found in the appendix
  - Houses and garages have been assumed to be two and one storey respectively

8.2.2. Copies of the contour plots for the proposed conditions can be found in the appendix. The contour plots for the proposed development have been marked with the maximum facade levels in the appropriate locations and these have been summarised in Table 6. The figures in Table 6 include a -3dB correction to account for facade reflections.

<sup>5</sup> Calculation of Road Traffic Noise, 1988, HMSO

| Quantity       | Period     | Worst-case SPL |
|----------------|------------|----------------|
| $L_{Aeq,16hr}$ | Daytime    | 59.9           |
| $L_{Aeq,8hr}$  | Night-time | 54.0           |

Table 6 – Worst-case predicted external sound pressure levels

### 8.3. TAN11 and NEC assessment

- 8.3.1. Based on the sound pressure levels predicted to be incident on the worst affected property, the proposed development site has been classified as NEC B. TAN11 gives the following guidance regarding residential development on a site such as this:

*“Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.”*

- 8.3.2. The guidance contained in BS8233:2014 has been used to ensure that suitable mitigation is in place to ensure a commensurate level of protection against existing road noise sources affecting the proposed residential development.

## 9. Mitigation

### 9.1. Method

9.1.1. Based on the predicted free-field sound pressure levels at the worst affected facades, the simple calculation method from BS8233:2014 has been used to determine the necessary sound reduction to meet the criteria from BS8233:2014. Standard forms of construction are assumed such that the glazing is likely to be the lowest performing facade element.

### 9.2. Required mitigation

9.2.1. The single figure glazing performance requirements in order to achieve the internal design criteria are summarised in Table 7. Calculations showing the predicted internal levels can be found in the appendix.

| Building area                  | Recommended glazing configuration |
|--------------------------------|-----------------------------------|
| <b>Facades overlooking A48</b> |                                   |
| Living Rooms                   | 25dB $R_w + C_{tr}$               |
| Dining Rooms                   | 20dB $R_w + C_{tr}$               |
| Bedrooms                       | 24dB $R_w + C_{tr}$               |

Table 7 - Required facade sound reduction

9.2.2. A full marked-up plan has been provided in the appendix showing where each of these reduction values must be achieved.

### 9.3. Glazing and ventilator specifications

9.3.1. The glazing and ventilator performance has been specified based on the performance data provided by Saint-Gobain and Greenwood Airvac. These are suggested configurations and any other glazing and vent combination can be used provided it achieves the minimum performance levels given in Table 7. The recommended glazing specification is given in Table 8.

| Building area                  | Recommended glazing configuration |
|--------------------------------|-----------------------------------|
| <b>Facades overlooking A48</b> |                                   |
| Living Rooms                   | Saint-Gobain 4(12)4               |
| Dining Rooms                   | Saint-Gobain 4(12)4               |
| Bedrooms                       | Saint-Gobain 4(12)4               |

Table 8 - Our recommended glazing configurations

- 9.3.2. Our recommended ventilator configurations, calculated to work in conjunction with the above glazing specifications, are summarised in Table 9. The specification provides an equivalent area of at least 5000mm<sup>2</sup>. It should be checked by a suitably qualified person that this ventilator specification meets the requirements of Approved Document F.<sup>6</sup>

| Building area                  | Recommended ventilator |
|--------------------------------|------------------------|
| <b>Facades overlooking A48</b> |                        |
| Living Rooms                   | Greenwood 5000EA       |
| Dining Rooms                   | Greenwood 5000EA       |
| Bedrooms                       | Greenwood 5000EA       |

*Table 9 - Our recommended ventilator configurations.*

- 9.3.3. Given the assumptions in this method the information in this section should be treated as general guidance only. The acoustic performance of third party products cannot be guaranteed by noise.co.uk.

#### 9.4. Gardens

- 9.4.1. The gardens of the properties closest to the A48 are predicted to experience sound pressure levels less than 55dB L<sub>Aeq</sub>. The garden areas have been designed to achieve the lowest practical sound pressure levels by using the associated dwelling as a screen.

<sup>6</sup> Approved Document F: Means of Ventilation (2010 Edition)

## 10. Conclusions

- 10.1.1. An environmental noise assessment has been carried out on a proposed residential development at Land at St. Nicholas to assess the potential noise impact of existing noise sources on a proposed residential development.
- 10.1.2. Table 7 in section 9 gives the required facade sound reduction of any glazing and ventilator combination to be compliant with the internal noise criteria from BS8233:2014. A site mark-up is provided in the appendix showing where these specifications should be adopted.
- 10.1.3. We strongly recommend that this report be passed to the LPA for approval before any works are carried out.

**Matt Torjussen** MSc, MIOA, CEng  
Noise & Vibration Consultant



## 11. Appendix

### 11.1. APPENDIX A - Summary information

| Required ISO Test Report Information<br>(cross referenced where required) |   |  |              |
|---|---|--|--------------|
|   |   | Measurements carried out to:   | Analysed to: |
| <b>A</b>  | Standards   | BS 7445-1: 2003<br>BS 7445-2: 1991   | BS 8233:2014 |
| <b>B</b>  | Organisation performed the measurements               | noise.co.uk Ltd, The Haybarn, Newnham Grounds, Kings Newnham Lane, Bretford, Coventry, CV23 0JU. |              |
| <b>C</b>  | Name of Client  | Redrow Homes South Wales   |              |
| <b>D</b>  | Full site address                                     | Land at St. Nicholas   |              |
| <b>E</b>  | Date of surveys                                       | Survey Start Date: 14 <sup>th</sup> March 2016<br>Survey End Date: 15 <sup>th</sup> March 2016   |              |
| <b>F</b>  | Description & identification of proposed development  | It is proposed to develop the site for residential use.  |              |
| <b>G</b>  | Brief Description of details of Procedure & equipment | See Section 5 of this report.  |              |

### 11.2. APPENDIX B - Technical appendix

11.2.1. Measurements were made using the following equipment:

| Monitoring Position | Sound Level Meter<br>(Serial Number) | Calibrator<br>(Serial Number) |
|---------------------|--------------------------------------|-------------------------------|
| 1                   | Norsonic 118 (31476)                 | Norsonic 1251 (31012)         |

11.2.2. The equipment has traceable calibration.

11.2.3. The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

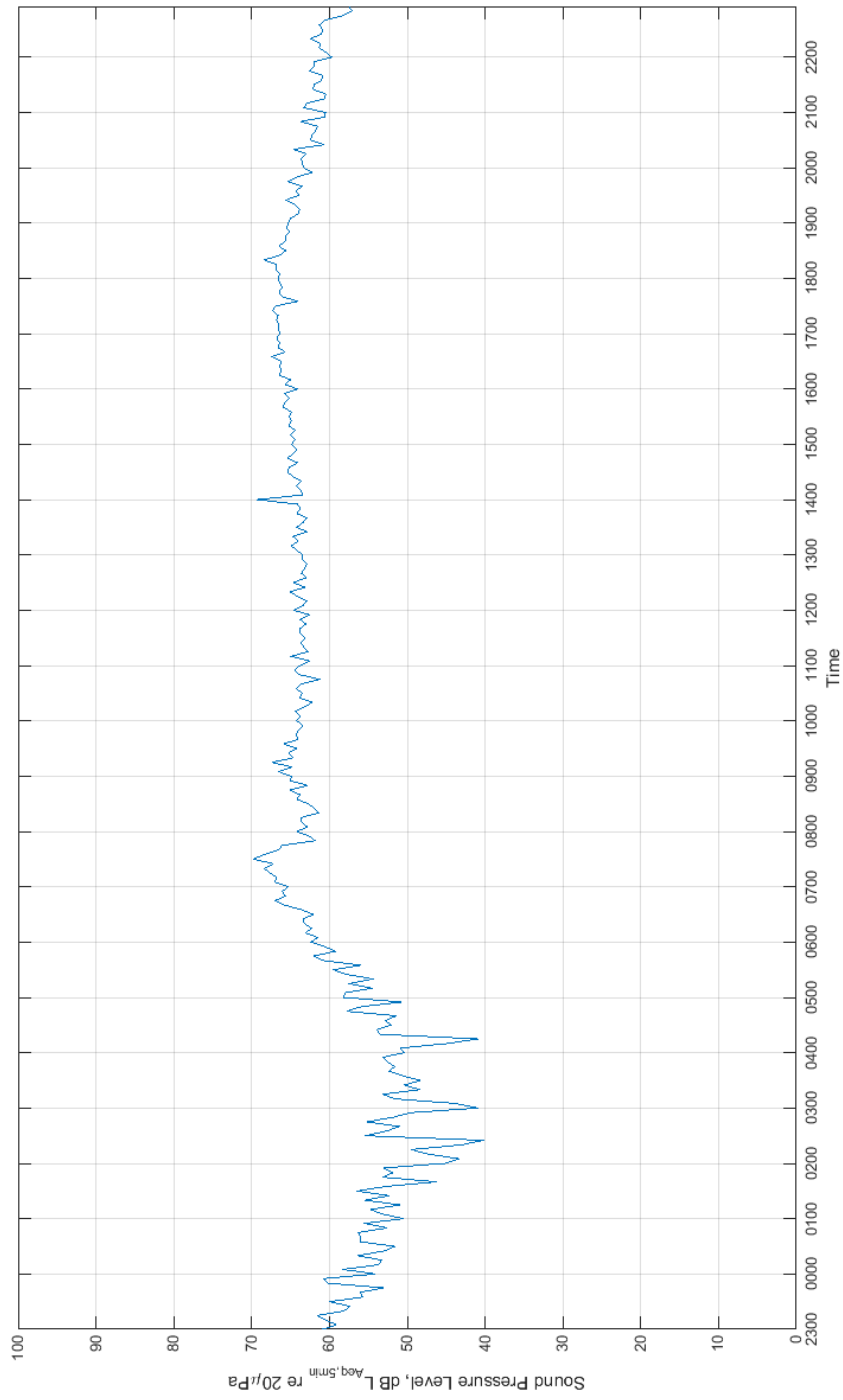
| Sound Level Meter    | Before   | After    |
|----------------------|----------|----------|
| Norsonic 118 (31476) | 114.0 dB | 114.0 dB |

11.2.4. There was no adverse deviation.

11.3. APPENDIX C - Average hourly  $L_{Aeq}$  levels

| Date     | Hour Starting | dB $L_{Aeq,1-hour}$ |
|----------|---------------|---------------------|
| 14/03/16 | 23:00:00      | 59.2                |
| 15/03/16 | 00:00:00      | 55.1                |
| 15/03/16 | 01:00:00      | 53.2                |
| 15/03/16 | 02:00:00      | 50.9                |
| 15/03/16 | 03:00:00      | 50.8                |
| 15/03/16 | 04:00:00      | 52.9                |
| 15/03/16 | 05:00:00      | 58.8                |
| 15/03/16 | 06:00:00      | 64.2                |
| 15/03/16 | 07:00:00      | 66.9                |
| 15/03/16 | 08:00:00      | 63.6                |
| 15/03/16 | 09:00:00      | 65.1                |
| 15/03/16 | 10:00:00      | 63.6                |
| 15/03/16 | 11:00:00      | 63.5                |
| 15/03/16 | 12:00:00      | 63.7                |
| 15/03/16 | 13:00:00      | 63.9                |
| 15/03/16 | 14:00:00      | 65.2                |
| 15/03/16 | 15:00:00      | 65.2                |
| 15/03/16 | 16:00:00      | 66.2                |
| 15/03/16 | 17:00:00      | 66.4                |
| 15/03/16 | 18:00:00      | 66.4                |
| 15/03/16 | 19:00:00      | 64.4                |
| 15/03/16 | 20:00:00      | 62.7                |
| 15/03/16 | 21:00:00      | 61.8                |
| 15/03/16 | 22:00:00      | 60.4                |

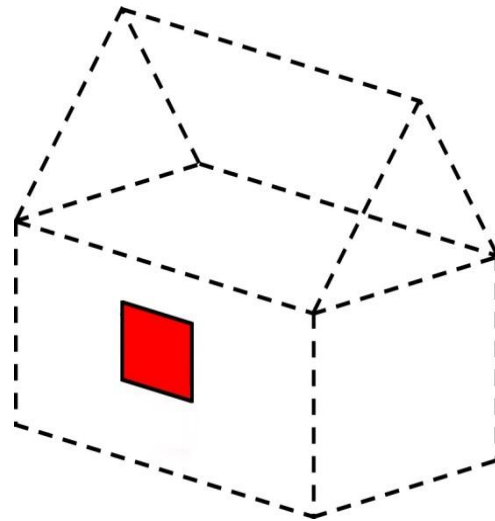
11.4. APPENDIX D - Raw data



**11.5. APPENDIX E - Glazing design – worst affected properties**

11.5.1. To reduce the noise exposure inside the dwelling the façade sound insulation should be considered. The windows and trickle ventilators will normally be the weakest part of a brick and block façade<sup>7</sup>.

11.5.2. The glazing specification has been based on the corrected sound reduction index  $R_w+C_{tr}$ ,  $R_w$ , or  $R_w+C$  depending on the dominant source of noise at the facade.



11.5.3. The following table details the information used in each Internal or external calculation for reference purposes.

| Building Area                          | Predicted Level at Facade | Specified Glazing   | Glazing Performance | Predicted Internal Level |
|--|---------------------------|---------------------|---------------------|--------------------------|
| <b>NSR 1 - Facades overlooking A48</b> |                           |                     |                     |                          |
| Living Rooms                           | 59.9dB $L_{Aeq,16hr}$     | Saint-Gobain 4(12)4 | 27dB $R_w + C_{tr}$ | 32.9dB $L_{Aeq}$         |
| Dining Rooms                           | 59.9dB $L_{Aeq,16hr}$     | Saint-Gobain 4(12)4 | 27dB $R_w + C_{tr}$ | 32.9dB $L_{Aeq}$         |
| Bedrooms                               | 54.0dB $L_{Aeq,8hr}$      | Saint-Gobain 4(12)4 | 27dB $R_w + C_{tr}$ | 27.0dB $L_{Aeq}$         |

<sup>7</sup> BS8233:2014 “Sound insulation and noise reduction for buildings – Code of practice”, P15

11.6. APPENDIX F - Glazing mark-up



Minimum facade sound insulation

| Receiver | Bedrooms            | Dining Room         | Living Rooms        |
|----------|---------------------|---------------------|---------------------|
| NSR 1    | 24dB $R_w + C_{tr}$ | 20dB $R_w + C_{tr}$ | 25dB $R_w + C_{tr}$ |

Recommended glazing specification

| Receiver    | Bedrooms                | Dining Room         | Living Rooms        |
|-------------|-------------------------|---------------------|---------------------|
| NSR 1       | Saint-Gobain 4(12)4     | Saint-Gobain 4(12)4 | Saint-Gobain 4(12)6 |
| Other areas | No specific requirement |                     |                     |

Recommended ventilator specification

| Receiver    | Bedrooms                | Dining Room      | Living Rooms     |
|-------------|-------------------------|------------------|------------------|
| NSR 1       | Greenwood 5000EA        | Greenwood 5000EA | Greenwood 5000EA |
| Other areas | No specific requirement |                  |                  |

11.7. APPENDIX G - Client drawings



## 11.8. APPENDIX H – LPA Guidance

## MEMORANDUM / COFNOD

The Vale of Glamorgan Council  
 Public Protection Services  
 Legal, Public Protection and Housing Services Directorate  
 Civic Offices, Holton Road  
 BARRY, CF63 4RU

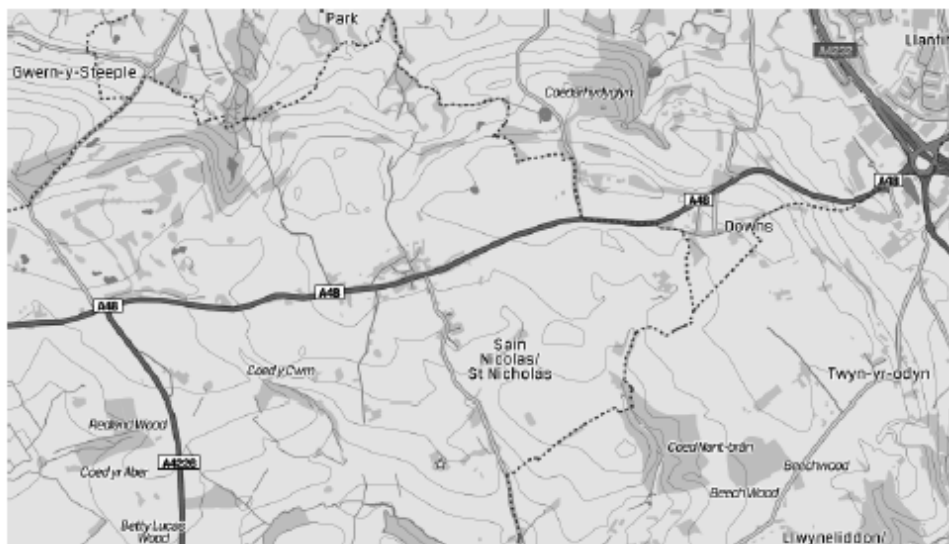


|               |   |             |                   |
|---------------|---|-------------|-------------------|
| To:           | Mr Steven Rennie                            | From /      | Sue Brown         |
| Dept / Adran: |   | Oddi Wrth:  | Pollution Section |
| Date/Dyddiad  | 2 March 2016                                | My Ref/Cyf  | SFB/295401        |
| :             |   | Tel / Ffôn: | 01446 709872      |
| Your Ref /    | Docks Office, Subway                        | Fax /       | 01446 709449      |
| Eich Cyf:     | Road, Barry, Vale of<br>Glamorgan, CF63 4RT | Ffacs:      |                   |

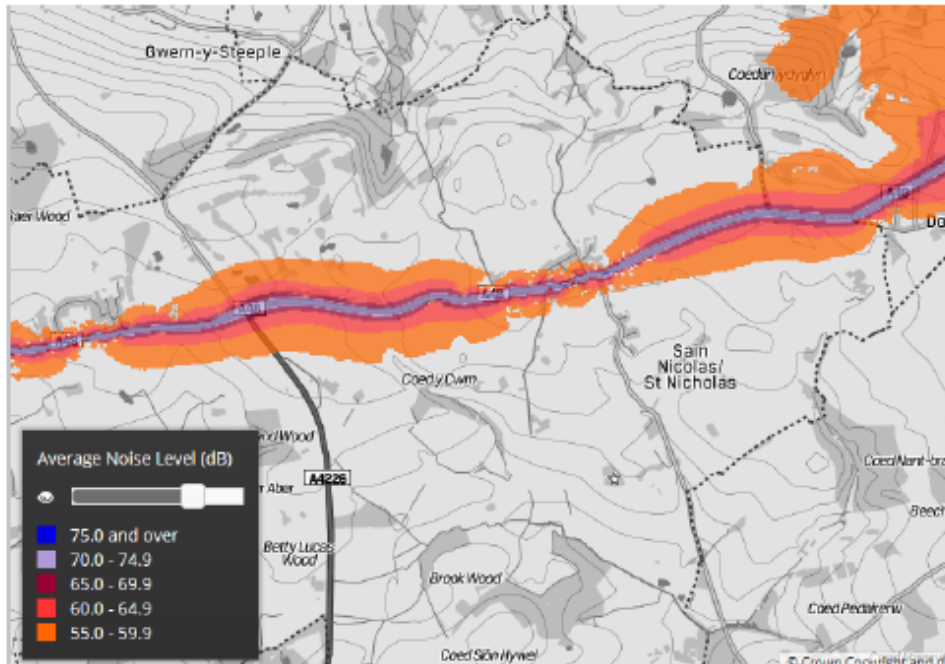
Subject / **Re: Planning Application No - 2015/00249/FUL**  
 Testyn: **Planning Application, Land to the east of St Nicholas, Vale of Glamorgan .**

Further to our telephone conversation on the 1 March 2016, please note that the application site is within a Noise Priority Area (NPA), (as shown below);

Without NPA shown;



With NAP



<http://data.wales.gov.uk/apps/noise/#lat=51.4648&lon=-3.3180&zoom=14&time=den&theme=road>

Welsh Government Policy is that;

*Priority areas on local authority roads should be taken into account by local authorities when planning and carrying out their related duties such as air quality action planning, road maintenance, road safety programmes, land use and transport planning, and tree planting and maintenance*

Advice has therefore been sought with regard to specific development within priority areas identified and designated under the Environmental Noise Directive (END). The following clarification was provided;

*'Any priority areas enlarged or created through planning decisions will be inherited by those who are called upon to implement future noise action plans, who may have higher expectations placed upon them than LAs currently have in the current noise action plan to carry out mitigation works and reduce levels. But if it is noted that appropriate noise mitigation has been included in any new development, then that would be a reason not to expand existing or create new priority areas to encompass the new housing developments.'*



Further;

*'All official Welsh Government planning policy on noise is contained in Planning Policy Wales and TAN11, and is summarised in Chapter 2 of the noise action plan (attached). I'd draw attention to paragraph 13.15.1 of PPW which states:*

*13.15.1 Noise can be a material planning consideration, for example in proposals to use or develop land near an existing source of noise or where a proposed new development is likely to generate noise. Local planning authorities should make a careful assessment of likely noise levels and have regard to any relevant noise action plan before determining such planning applications and in some circumstances it will be necessary for a technical noise assessment to be provided by the developer.*

*I would suggest that having regard to any relevant noise action plan would include having regard to the location of designated priority areas and the risk of increasing them in size or creating new priority areas by permitting new housing development that fails to sufficiently protect future residents from noise in the way in which it is designed and constructed'*

#### **Conclusion**

I would advise that not only does the Local Planning Authority (LPA) have an obligation, as detailed above, the developer also has an obligation to consider Noise Priority Areas and design and construct dwellings so to protect future residents from noise should permission be granted.

Therefore not only should the developer consider Technical Advice Note 11 but also the NPA designation whilst carrying out of a Acoustic Survey.

**Sue Brown**  
Environmental Health Officer

11.9. APPENDIX I – Noise contour plots

