

7. Noise & Vibration

7.1. Introduction

7.1.1. This chapter of the ES has been produced by Atkins. The assessment of noise and vibration considers both the Site's suitability for residential and mixed-use development taking into account the existing ambient noise levels on the Site, as well as the temporary construction and permanent operational impacts the proposed development may have on existing and proposed noise and vibration sensitive receptors. Where necessary, outline mitigation measures are presented to demonstrate that the proposed development can achieve the applicable noise and vibration criteria, subject to further detailed design at a later stage.

7.1.2. A glossary of acoustic terminology is provided in Appendix 7.1.

7.2. Assessment criteria & methodology

Previous Assessments

7.2.1. An outline planning permission for 4,000 new homes across the Site was granted in February 2008 (reference P2005/0393). A noise and vibration assessment was conducted in 2005 as part of the original Environmental Impact Assessment in support of that planning application.

Consultations

7.2.2. NPTC Environmental Health department was consulted for informal feedback on the noise monitoring methodology prior to commencing noise surveys and for formal comments on the EIA Scoping Report noise assessment methodology.

7.2.3. NPTC provided comments on the Scoping Report on 21st September 2021 which stated that they agreed with the proposed scope of the noise assessment presented in the Scoping Report and welcomed the reference to the Noise and Soundscape Action Plan.

7.2.4. Additionally, NPTC commented that they are likely to recommend a condition on the application restricting the hours of construction to 8am - 6pm Monday to Friday and 8am – 1pm Saturdays with no Sunday or Bank Holiday working.

Legislative Context

Environmental Noise (Wales) Regulations

7.2.5. The Environmental Noise (Wales) Regulations 2006 as amended by the Environmental Noise (Wales) (Amendment) Regulations 2009 (collectively referred to as the Environmental Noise Regulations) is the transposition of the European Environmental Noise Directive (END) 2002/49/EC into UK law, which relates to the assessment and management of environmental noise.

- 7.2.6. A further amendment to the Environment Noise Regulations was passed in 2019. The Environmental Noise (Wales) (Amendment) (EU Exit) Regulations 2019 ensure that the legislation in Wales concerning environmental noise continues to operate effectively following the withdrawal of the UK from the European Union.
- 7.2.7. Under the Environmental Noise Regulations, the Welsh Government has an obligation to produce and keep updated strategic noise maps for agglomerations, major roads and major railways. It also requires the identification of quiet areas, and production of noise action plans to manage environmental noise sources.
- 7.2.8. The current noise action plan (the Noise and Soundscape Action Plan 2018 to 2023, published by the Welsh Government) identifies Priority Areas and Proximity Areas for roads and railways based upon the strategic noise map results. The Priority Areas highlight “hotspot” locations where people’s homes are exposed to a L_{den} noise level exceeding 73 dB according to the noise maps, or where people live alongside concrete trunk roads. In accordance with the action plan, the priority areas provide a framework for further investigation.

The Control of Pollution Act 1974

- 7.2.9. The Control of Pollution Act 1974 sets out the framework for the legislative control of construction noise and vibration on any given site. It also sets out the principle of 'best practicable means' (as defined in Section 72 of the Act) and how this should be applied to construction activity noise. The Act refers to approved Codes of Practice, which include British Standard 5228, as being relevant for the purposes of determining the 'best practicable means'.
- 7.2.10. Section 61 of the Act states that construction works may apply for prior consent from the relevant local authorities prior to the construction works commencing. If this is sought, the relevant local authorities will need to be provided with information about the proposed construction works and how construction noise will be managed, including the use of 'best practicable means'.

National Planning Policy

Planning Policy Wales

- 7.2.11. Planning Policy Wales (PPW), Edition 11, dated February 2021 sets out the land use planning policies of the Welsh Government. It is supported by a series of Technical Advice Notes (TANs), Welsh Government Circulars and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. The primary objective of the PPW is to ensure the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental, and cultural well-being of Wales.
- 7.2.12. PPW promotes healthier places by reducing the exposure of populations to noise pollution. Additionally, PPW recognises that an appropriate soundscape can contribute to a positive experience of a place as well as being necessary for public health, amenity, and well-being. Conversely, PPW recognises that noise pollution can have a negative effect on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible.

- 7.2.13. PPW states that in proposing new development, planning authorities and developers must address any implication arising as a result of its association with, or location within noise action planning priority areas or areas where there are sensitive receptors. Any sensitive developments located close to existing transportation infrastructure should be designed to limit noise levels within and around the development, both now and in the future. This may include employing the principles of good acoustic design. Additionally, the potential impacts of noise pollution arising from existing development, be this commercial, industrial or transport related, must be fully considered to ensure the effects on new development can be controlled to safeguard amenity and necessary measures and controls should be incorporated as part of the proposed new development.

Technical Advice Note 11 - Noise

- 7.2.14. Planning Guidance (Wales) Technical Advice Note (Wales) 11 – Noise (TAN-11), dated October 1997, provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account when determining planning approvals for developments which will either generate noise or be exposed to existing noise sources.
- 7.2.15. TAN-11 provides Noise Exposure Categories (NECs) for residential development, derived to assist the local planning authorities in their consideration of planning applications for residential development near transport related noise sources. These are replicated in Table 7.1 below.

Table 7.1 – TAN-11 Noise Exposure Categories

Noise Exposure Category	Description
A	Noise need not be considered as a determining factor in granting planning permission, although the noise levels 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.

- 7.2.16. TAN-11 provides a recommended range of noise levels, replicated in Table 7.2 below, for each of the NECs for dwellings exposed to noise from road, rail, air and mixed sources. However, TAN-11 states that in some cases it may be appropriate for local planning authorities to determine the range of noise levels they wish to attribute to the various NECs.

Table 7.2 – TAN-11 Recommended noise exposure categories for new dwellings near existing noise sources

Noise Levels ⁽¹⁾ corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,t}$ dB					
Noise Source		Noise Exposure Category			
		A	B	C	D
Road Traffic	0700-2300	<55	55-63	63-72	>72
	2300-0700 ⁽²⁾	<45	45-57	57-66	>66
Rail Traffic	0700-2300	<55	55-66	66-74	>74
	2300-0700 ⁽²⁾	<45	45-59	59-66	>66
Air Traffic ⁽³⁾	0700-2300	<57	57-66	66-72	>72
	2300-0700 ⁽²⁾	<48	48-57	57-66	>66
Mixed Sources ⁽⁴⁾	0700-2300	<55	55-63	63-72	>72
	2300-0700 ⁽²⁾	<45	45-57	57-66	>66

Notes

- (1) Noise levels:** the noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representative of typical conditions.
- (2) Night-time noise levels (2300-0700):** sites where individual noise events regularly exceed 82 dB L_{Amax} (Slow time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D).
- (3) Aircraft noise:** daytime values accord with the contour values adopted by the Department of Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.
- (4) Mixed sources:** this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant. To check if any individual noise source is dominant (for the purposes of this assessment) the noise level from the individual sources should be determined and then combined by decibel addition (remembering first to subtract 2 dB(A) from any aircraft noise contour values). If the level of any one source then lies within 2 dB(A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source, rather than using the "mixed source" NECs. If the dominant source is industrial noise see paragraph B17 of Annex B [of TAN-11]. If the contribution of the individual noise sources to the overall noise level cannot be determined by measurement and/or calculation, then the overall measured level should be used and the site assessed against the NECs for "mixed sources".

7.2.17. TAN-11 states that the NEC principle cannot be applied sensibly to developments such as offices, hospitals and schools and it will be more appropriate to refer to specific guidance on internal noise standards in these instances.

- 7.2.18. TAN-11 is currently under review and a Welsh Government consultation was undertaken which ended on 4th May 2020 ('Air Quality and soundscape: review of TAN 11'). The responses of this consultation are currently being reviewed and no updates to TAN-11 have been issued at the time of preparing this Environmental Statement.

Local Planning Policy

Neath Port Talbot County Borough Council Local Development Plan (2011-2026)

- 7.2.19. The Neath Port Talbot County Borough Council Local Development Plan (LDP) (2011-2026) was adopted in January 2016 and features Coed Darcy as a major development site identified in the strategy area, which will play a central role in shaping the future prosperity of the area.
- 7.2.20. The LDP recognizes the need to minimise adverse impacts from noise generating and polluting activities and to ensure the location of major housing developments considers the need to reduce people's exposure to noise. LDP Strategic Policy 16 (SP 16 'Environmental Protection') sets out the approaches to be taken to protect and improve the environment as far as possible and to ensure that developments do not increase the number of people exposed to significant levels of pollution.
- 7.2.21. LDP Policy EN8 'Pollution and Land Stability' states that potentially noisy proposals should not be located close to sensitive uses (such as hospitals, schools and housing) and new noise-sensitive developments should not be located near to existing noisy uses (including industry and existing or proposed transport infrastructure) unless it can be shown that adverse effects can be dealt with through mitigation measures incorporated into the design.
- 7.2.22. LDP Policy EN10 'Quiet Areas' identifies areas which are public open spaces located within the urban area that have local amenity value that warrants protection from noise intrusion and are relatively quiet by urban standards in actual and perceived terms. The policy states that development proposals that would have unacceptable impacts on the characteristics that led to the designation will be resisted.

Guidance/ Best Practice

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

- 7.2.23. TAN-11 refers to BS 4142:1990 for the assessment of the likelihood of complaints from industrial development. The current version of this standard is BS 4142:2014(+A1:2019).
- 7.2.24. BS 4142 provides a method for assessing the significance of sound from industrial or commercial premises. BS 4142 is used to assess the potential significance of effects by comparing the 'rating sound level' of an industrial source to the typically representative 'background sound level' at the location of nearby receptor. The greater the difference between the rating level and the background sound level; the greater the impact, depending on context.
- 7.2.25. Certain acoustic features can increase the potential for a sound to attract attention, and therefore increase its relative significance than that expected from a simple comparison between the specific sound level and the background sound level. In particular, BS 4142 identifies noise that contains audible tonality, impulsivity and/or intermittency and recommends that a correction be added to the specific

sound level. The specific sound level along with any applicable correction is referred to as the 'rating sound level'.

7.2.26. The significance of sound of an industrial and/or commercial nature depends on both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An initial estimate of the impact of the specific sound is determined by subtracting the background sound level from the rating level, and considering the following:

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

British Standard 8233 'guidance on sound insulation and noise reduction for buildings'

7.2.27. TAN-11 refers to BS 8233:1987 for general guidance for other non-residential developments such as offices, hospitals and schools. The current version of this standard is BS 8233:2014.

7.2.28. BS 8233 draws on the results of research and experience to provide information on the design of buildings that have internal acoustic environments appropriate to their functions. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics for non-critical situations. Included within this standard is a design range for internal noise levels in living rooms and bedrooms for resting/sleeping conditions. These recommendations are detailed in Table 7.3.

Table 7.3 – BS 8233 Recommended indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq,16hour	-
Dining	Dining room/area	40 dB LAeq,16hour	-
Sleeping (daytime resting)	Bedrooms	35 dB LAeq,16hour	30 dB LAeq,8hour

7.2.29. The main factors affecting whether the internal design noise levels can be achieved are the level of noise outside the building and the sound insulation of the building envelope (windows, roof, walls, doors and ventilation systems). In practice, the sound insulation of the building envelope is only as good as the weakest element; in most cases this is taken to be an open window when determining the suitability of a site for development. However, alternative appropriate ventilation can be considered where external noise levels are too high to meet internal design targets with windows open.

7.2.30. BS 8233 also includes design criteria for external noise. It states that for external areas that are used for amenity space (such as gardens or patios), it is desirable that the external noise level does not exceed 50 dB L_{Aeq} , with an upper guideline value of 55 dB L_{Aeq} which would be acceptable in noisier environments. However, it is recognised that these guidelines may not be achievable in all circumstances where development might be desirable.

7.2.31. It is noted that where development is necessary or desirable that despite external noise levels above the guidelines, the internal targets may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

British Standard 5228 'Code of practice for noise and vibration control on construction and open sites'

7.2.32. BS 5228 provides guidance on the prediction, assessment, and control of construction noise and vibration.

7.2.33. BS 5228 Part 1 – 'Noise' provides calculation procedures for predicting the likely noise levels from specific construction activities at a receptor location, considering distance, ground absorption, screening, reflections, and the percentage on-time for an activity. Annexes C and D provide generic noise data for various items of plant which can be used for undertaking predictions where no other specific information is available. Annex E provides a number of example assessment methodologies for determining potential significant effects due to construction noise. Predicted construction noise levels are typically compared against the thresholds, in combination with other factors such as the duration of an activity, to determine likely impacts and significance.

Table 7.4 – Example construction noise threshold levels

Assessment category and threshold value period	Threshold value ($L_{Aeq,T}$ dB)		
	Category A	Category B	Category C
Night-time (23:00 – 07:00)	45	50	55
Weekday evenings (19:00 – 23:00) and weekends (Saturdays 13:00 – 23:00, Sundays 07:00 – 23:00)	55	60	65
Weekday daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Notes: 1. A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. 2. If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise. 3. Applied to residential receptors only.			

Assessment category and threshold value period	Threshold value ($L_{Aeq,T}$ dB)		
	Category A	Category B	Category C
Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values. If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.			

7.2.34. The 'ABC' method provided in Annex E of BS 5228 has been used to assess the impacts of the construction activities. Using this method, the impact of an activity has potential to be significant if the noise levels from the construction activities are shown to exceed the relevant threshold value as shown in Table 7.4.

7.2.35. The consideration of significance then needs to take the duration of the activity into account along with the characteristics of the existing noise climate. In line with the advice in BS 5228 and common practice on similar major development construction schemes, a "significant time period" for the threshold levels shown in Table 7.4 to be exceeded for is:

- A period of 10 or more days of working in any 15 consecutive days during construction, or
- For a total of 40 days or more in any 6 consecutive months during construction.

7.2.36. BS 5228 Part 2 – 'Vibration' provides guidance on vibration levels that can be used to assess the likely impacts of construction vibration. Annex B of BS 5228 Part 2 provides guidance on the likely significance of PPV levels in mm/s due to construction works, which is reproduced in Table 7.5 below.

Table 7.5 – Guidance on the effects of PPV vibration levels perceptible to humans

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower levels, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

7.2.37. Table 7.5 suggests that vibration levels of 0.3 mm/s from construction activities could suitably represent the onset of adverse effects as this is when vibration becomes perceptible. Typically, there are no

significant sources of vibration in the general environment to influence people's perceptions and experiences. Therefore, as complaints become more likely, for example when vibration levels are 1 mm/s, this would be an appropriate threshold to use as a significant effect level for construction vibration.

- 7.2.38. Where high levels of vibration are predicted, the values in Table 7.6 are used to determine the potential for cosmetic damage to buildings.

Table 7.6 – Guidance on the effects of vibration levels perceptible to buildings

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
1. Reinforced or framed structures Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
2. Unreinforced or light framed structures Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Building Bulletin 93 'Acoustic design of schools – performance standards'

- 7.2.39. Building Bulletin 93 (BB93) was published by the Department for Education (DfE). It sets out the minimum performance standards for the acoustics of school buildings and describes the normal means of demonstrating compliance with the Building Regulations. It also provides guidance in support of the School Premises Regulations (2012) and the Independent School Standards (2013). Performance standards include an upper limit for the indoor ambient noise level for a variety of spaces including rooms for children with Special Educational Needs.

Design Manual for Roads and Bridges 'LA 111 - Noise & Vibration'

- 7.2.40. The Design Manual for Roads and Bridges (DMRB) 'LA 111 - Noise and Vibration' provides guidance on the assessment, reporting and management of environmental effects, specifically changes in noise and vibration emissions, from road schemes. DMRB provides guidance for the assessment of construction noise and vibration, and operational noise from road schemes.
- 7.2.41. The DMRB guidance incorporates the calculation and prediction methodology from the Department of Transport's Technical Memorandum "Calculation of Road Traffic Noise" (CRTN). For this assessment, core elements of the CRTN methodology have been used to determine the expected differences in road traffic noise levels generated by changes in traffic flows based on traffic data provided by Atkins Highways & Transportation.

- 7.2.42. DMRB sets out criteria for assessing the impact of traffic noise changes. Two sets of criteria are presented, for the short term and for the longer term, to take into account the difference in the human perception of short and long term environmental noise changes. In the short term a change in road traffic noise of 1 dB $L_{A10,18\text{hour}}$ is the smallest that is considered perceptible whilst in the longer term a 3 dB $L_{A10,18\text{hour}}$ change is considered just perceptible.
- 7.2.43. Table 7.7 below reproduces the impact magnitude levels from DMRB and will be used to assess the significance of traffic noise changes in the shorter and longer terms. For simplicity this scale has been applied to all noise sensitive receptors.

Table 7.7 – Criteria for impact significance of road traffic noise changes

Significance	Noise change $L_{A10,18h}$ Short Term	Noise change $L_{A10,18h}$ Long Term
Major	≥ 5.0	≥ 10.0
Moderate	3.0 – 4.9	5.0 – 9.9
Minor	1.0 – 2.9	3.0 – 4.9
Negligible/ Neutral	0.1 – 0.9	0.1 – 2.9

Professional Planning Practice Guidance on Planning and Noise

- 7.2.44. Professional Planning Guidance on Planning and Noise – New Residential Development (ProPG) was produced by the Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health. The guide has been written principally to assist with the planning process in England, however, the principles of good acoustic design put forward in Supplementary Document 2 may also be adopted in Wales and are referenced within PPW.

7.3. Baseline environment

Sensitive Receptors

- 7.3.1. The nearest existing noise sensitive residential receptors to the Site are the homes on Coed Darcy Phase 1 and Heritage Gate immediately to the south east of the Site. Other existing residential receptors are located further afield to the south of the Site on Prettyman Drive and The Greenway, to the east of the Site, on the opposite side of the M4 Motorway, on Pen-y-Heol, Bay View Gardens and Cefn-Parc, and to the north of the site on Heol Crymlyn. All residential receptors are considered to be high sensitivity.
- 7.3.2. There are some non-residential receptors, including offices, that may be considered noise sensitive to a lesser degree on Heritage Gate, the Llandarcy Business Park to the east of the Site and the Contractor's Yard on Tank Farm Road to the south of the Site.

- 7.3.3. The nearest LDP designated 'Quiet Area' is Skewen Park, Neath (ID EN10/3) some 300m to the north east of the Site, east of the M4 Motorway.

Baseline Noise Survey

- 7.3.4. A baseline noise survey was undertaken from 22nd – 27th July 2021 to determine the baseline noise levels on the Site and identify possible noise sources and sensitive receptors not readily identifiable from a desk-based study alone. Unattended continuous monitoring was undertaken at four positions over a period of five days. This was supplemented with attended measurements and observations at three positions undertaken during two daytime periods. Measurement locations are shown in **Error! Reference source not found.** below.

Figure 7-1 Baseline noise survey measurement locations



- 7.3.5. Weather conditions were observed throughout the survey period. Temperatures were generally in the order of 22 degrees Celsius during the daytime and 15 degrees Celsius during the night-time. Wind speeds were generally in the order of 3m/s with occasional gusts of around 3-8m/s. There were short

periods of precipitation and higher winds noted on 23rd and 24th July, however, the data was not deemed to be adversely affected by weather; therefore, all measured data is considered in the analysis.

- 7.3.6. Sound level meters used in the baseline survey conformed to precision Class 1 of BS EN 61672. Sound level meters were field calibrated before and after each round of measurements with no significant drift in calibration observed. All sound level meters were laboratory calibrated within the previous 24 months and field calibrators within the previous 12 months. A list of the equipment is provided in Table 7-8 below.

Table 7.8 – Baseline noise survey equipment

Type	Manufacturer	Model	Serial No.	Last Calibration Date
Sound Level Meter	01dB	FUSION	12811	24/11/2020
Calibrator	01dB	CAL31	93745	24/11/2020
Sound Level Meter	01dB	FUSION	11200	02/11/2020
Calibrator	Brüel & Kjær	4231	2385276	29/10/2020
Sound Level Meter	01dB	FUSION	11199	15/04/2021
Calibrator	01dB	CAL21	34565046	14/04/2021
Sound Level Meter	Rion	NL-52	620856	30/10/2020
Calibrator	Rion	NC-74	35125801	30/10/2020

- 7.3.7. A summary of measured noise levels is provided in Table 7.9 and Table 7.10 below. Full long-term measurement data, including photos, is available in Appendix 7.1.

Table 7.9 – Summary of measured baseline noise levels, daytime

Location	Date	Period	dB, L _{Aeq,T}	dB, L _{A90,T}	dB, L _{A10,T}	dB, L _{Amax}
L1	22/07/2021	13:00-23:00	63	59	65	89
	23/07/2021	07:00-23:00	65	62	66	81
	24/07/2021	07:00-23:00	66	62	67	91
	25/07/2021	07:00-23:00	63	59	65	82
	26/07/2021	07:00-23:00	63	59	64	86

Location	Date	Period	dB, $L_{Aeq,T}$	dB, $L_{A90,T}$	dB, $L_{A10,T}$	dB, L_{Amax}
	27/07/2021	07:00-08:00	67	64	69	76
L2	22/07/2021	13:00-23:00	46	37	42	80
	23/07/2021	07:00-23:00	52	45	49	85
	24/07/2021	07:00-23:00	50	45	49	85
	25/07/2021	07:00-23:00	49	37	42	83
	26/07/2021	07:00-23:00	51	35	40	82
	27/07/2021	07:00-12:00	52	37	43	82
L3	22/07/2021	15:00-23:00	58	47	60	89
	23/07/2021	07:00-23:00	60	54	62	91
	24/07/2021	07:00-23:00	59	54	61	90
	25/07/2021	07:00-23:00	56	46	58	89
	26/07/2021	07:00-23:00	61	45	60	102
	27/07/2021	07:00-12:00	60	51	63	82
L4	22/07/2021	18:00-23:00	39	33	38	63
	23/07/2021	07:00–09:00, 13:00–23:00	46	39	46	83
	24/07/2021	07:00-23:00	41	37	42	68
	25/07/2021	07:00-23:00	40	31	39	76
	26/07/2021	07:00-23:00	46	34	44	78
	27/07/2021	07:00-11:00	48	39	50	73
S1	22/07/2021	15:54–16:09	49	47	51	62
	23/07/2021	11:03–11:18	54	52	56	67
S2	22/07/2021	15:07–15:22	39	35	41	53
	23/07/2021	10:02–10:17	42	39	44	54

Location	Date	Period	dB, L _{Aeq,T}	dB, L _{A90,T}	dB, L _{A10,T}	dB, L _{Amax}
S3	22/07/2021	14:27–14:42	46	43	48	58
	23/07/2021	09:29–09:44	51	49	53	68

Table 7.10 – Summary of measured baseline noise levels, night-time

Location	Date	Period	dB, L _{Aeq,T}	dB, L _{A90,T}	dB, L _{A10,T}	dB, L _{Amax}
L1	22-23/07/2021	23:00–07:00	60	46	62	80
	23-24/07/2021	23:00–07:00	62	47	63	92
	24-25/07/2021	23:00–07:00	57	39	61	80
	25-26/07/2021	23:00–07:00	61	45	63	74
	26-27/07/2021	23:00–07:00	61	43	62	76
L2	22-23/07/2021	23:00–07:00	52	40	47	83
	23-24/07/2021	23:00–07:00	50	39	46	80
	24-25/07/2021	23:00–07:00	39	32	40	71
	25-26/07/2021	23:00–07:00	49	36	43	79
	26-27/07/2021	23:00–07:00	49	32	41	81
L3	22-23/07/2021	23:00–07:00	54	45	54	79
	23-24/07/2021	23:00–07:00	53	45	54	82
	24-25/07/2021	23:00–07:00	49	38	51	77
	25-26/07/2021	23:00–07:00	53	41	52	87
	26-27/07/2021	23:00–07:00	52	36	49	84
L4	22-23/07/2021	23:00–07:00	42	36	42	64
	23-24/07/2021	23:00–07:00	41	35	42	80
	24-25/07/2021	23:00–07:00	35	27	35	66
	25-26/07/2021	23:00–07:00	40	30	36	69

Location	Date	Period	dB, L _{Aeq,T}	dB, L _{A90,T}	dB, L _{A10,T}	dB, L _{Amax}
	26-27/07/2021	23:00–07:00	42	27	35	76

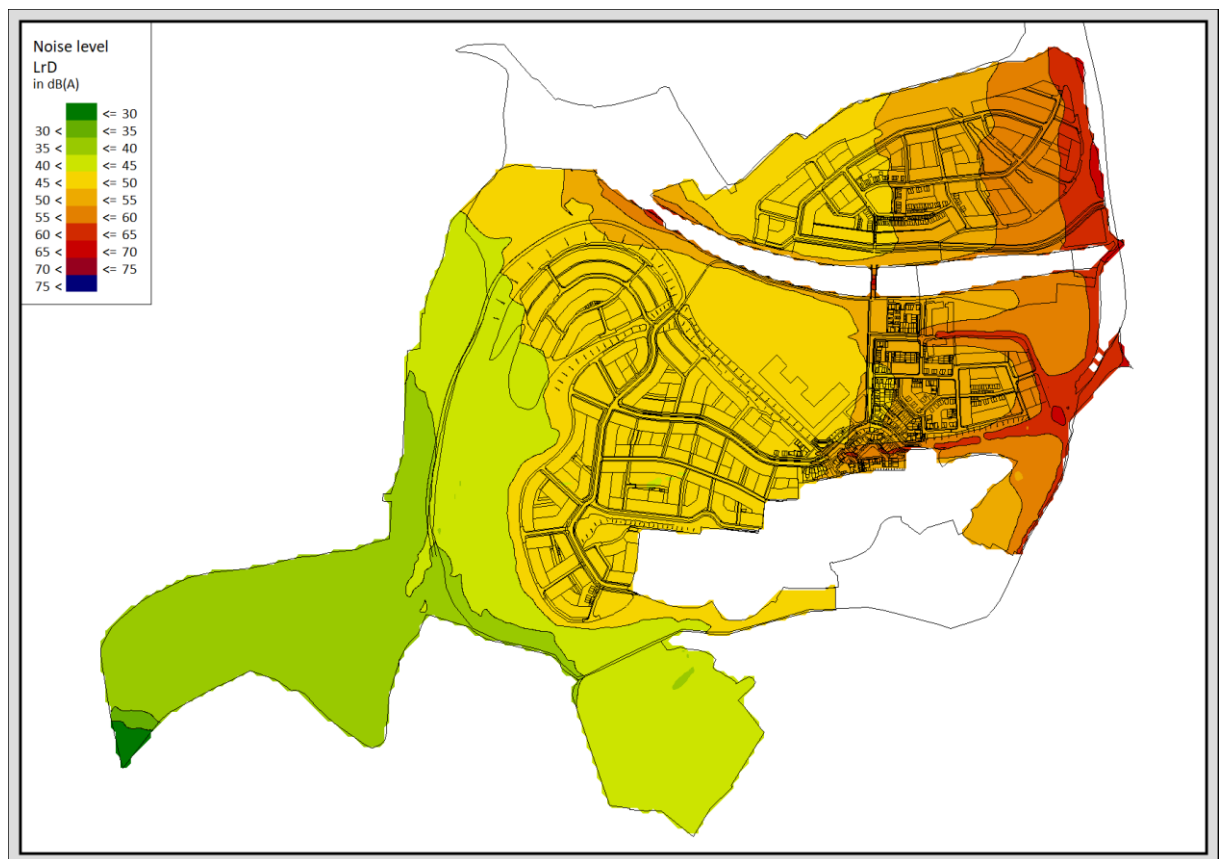
- 7.3.8. Measurement position L1 was positioned approximately 25m from the M4 Motorway carriageway edge with an unobstructed line-of-sight to the road. The noise climate at measurement position L1 was dominated by continuous road traffic noise from the M4.
- 7.3.9. Measurement position L2 was positioned approximately 20m from the railway edge and located at the top of the cutting adjacent the main overbridge road in the centre of the Site. The noise climate at measurement position L2 was dominated by road traffic noise from the M4 but at a much quieter level compared to L1. Birdsong was identified as a secondary noise source. One train pass-by was noted at 10:55 on 27th July 2021 during the collection of the survey equipment. Daily noise contributions from the railway are relatively minor as the railway is situated within a deep cutting and the line only carries around three passenger train services and a small number of freight services per day.
- 7.3.10. Measurement position L3 was positioned approximately 7m from the Llandarcy Business Park access road junction from the B4290. The noise climate at measurement position L3 was dominated by road traffic at the nearby traffic lights and road junction of the B4290 and the Llandarcy Business Park. Road traffic associated with a nearby motorcycle training school and ambulance depot were noted. Road traffic noise from the M4 was audible but less dominant than the local road traffic noise at this Site boundary.
- 7.3.11. Measurement position L4 was located approximately 40m from the Contractor's Yard Site boundary. The noise climate at measurement position L4 was subjectively quiet and some low-level commercial noise emissions associated with the nearby Contractor's Yard just distinguishable above the background (including metallic impact noise, forklift movements and occasional indiscernible fixed plant noise). Occasional commercial vehicles (mostly flat-bed vehicles and vans) using Tank Farm Road were noted. Observations were also made when positioned at the closest proposed residential development plot location to the Contractor's Yard (some 130m from the Contractor's Yard Site boundary); here some commercial activity noise (metallic impact noise and door alarm) was occasionally barely distinguishable above the background noise, however, it was not at a level that was measurable nor the source of noise readily identifiable. Generally, the Soundscape was noted as positive in this area, with low ambient noise levels and natural features.
- 7.3.12. Measurement position S1 was located on the access road adjacent the existing bowls club. The noise climate at measurement position S1 was dominated by road traffic noise from the M4. Birdsong was identified as a secondary noise source. Noise associated with the nearby Balancing Services Plant (peak power generators) north of Llandarcy Business Park was inaudible; however, it is noted that the generators may have not been operational during the time of the measurements.
- 7.3.13. Measurement position S2 was located in the centre of the Site. The noise climate at measurement position S2 was subjectively quiet. Distant continuous road traffic noise from the M4 was noted but was at a very low level. Secondary noise sources were noted as birdsong and crickets. The Soundscape in this area was noted to be very positive, with low ambient noise levels and natural features.

- 7.3.14. Measurement position S3 was located on the Site boundary just to the south of the Llandarcy Business park. The noise climate at measurement position S3 was dominated by road traffic noise from the M4. Some noise events associated with the nearby commercial units were noted which included vehicles accessing the car parks.

Noise Modelling

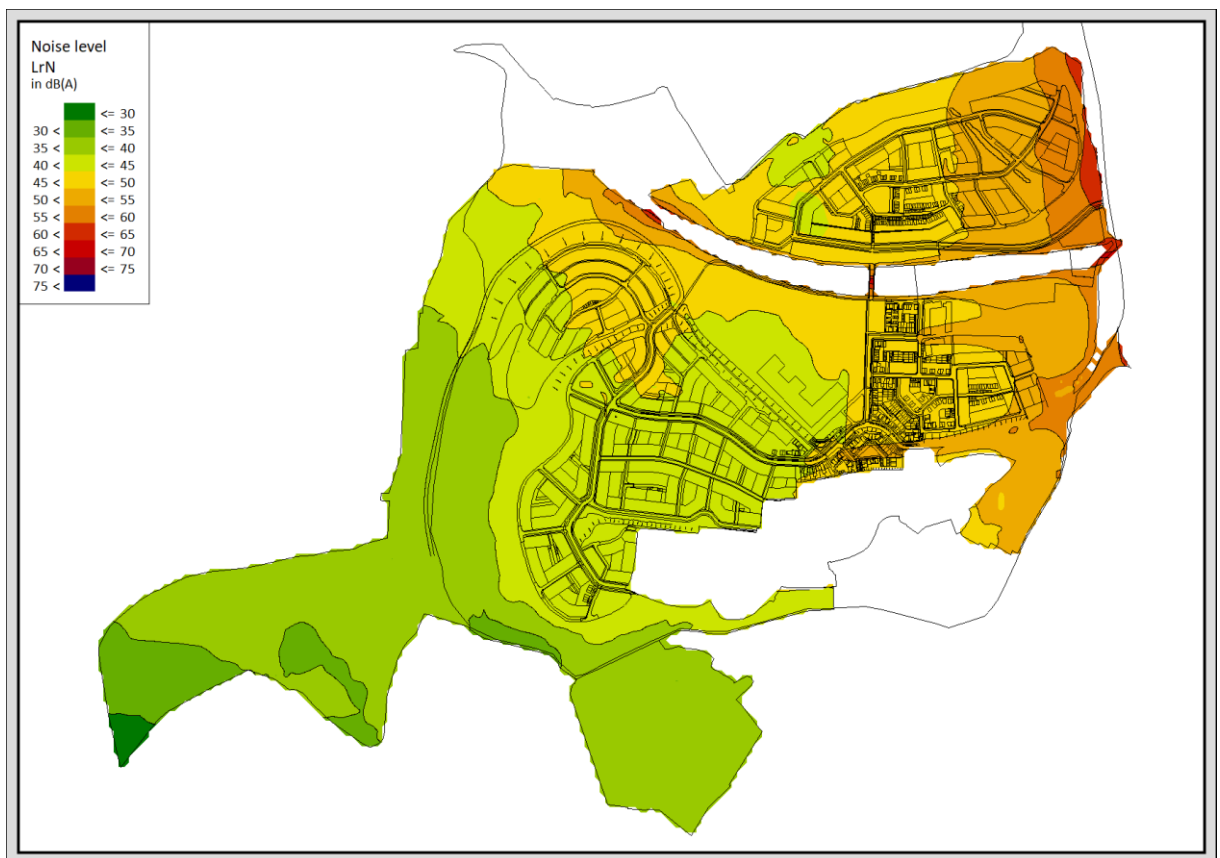
- 7.3.15. A 3D digital noise model of the proposed development on the Site has been created in SoundPLAN v8.2 software to predict transportation noise levels across the entire Site calibrated to the measured baseline noise levels. As the noise climate on the Site is dominated by transportation noise no measurable contribution from other sources (including aircraft or industrial noise) the noise model provides representative baseline noise levels across the Site.
- 7.3.16. The SoundPLAN noise model implements Calculation of Road Traffic Noise (CRTN), and ISO 9613 'Acoustics - Attenuation of sound during propagation outdoors' calculation methodologies and takes into account the 3D site topography and any screening from existing buildings or landscaping features. The baseline noise contours (taking into account the current undeveloped topography of the Site) is shown below for daytime and night-time in Figure 7.1 and Figure 7.2 respectively.

Figure 7.1 – Baseline noise contours (daytime $L_{Aeq,16h}$ at 1.5m)



7.3.17. Figure 7.1 above demonstrates that the majority of the Site would fall within TAN-11 NEC A indicating that existing daytime noise levels on the Site in these areas are considered suitable for residential development and noise would not normally be considered as a determining factor in granting planning permission. The majority of the site therefore has a positive Soundscape, with relatively low ambient noise levels which feature natural sources. However, nearer to the M4 Motorway daytime noise levels increase and some areas of the Site are expected to fall within NEC B at the closest residential plots to the M4 Motorway. This indicates that noise in these areas should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection. The Site's suitability for residential development is further addressed in the subsequent assessments and inherent mitigation is proposed to reduce the road traffic noise levels as described in Section 7.4.1.

Figure 7.2 – Baseline noise contours (night-time $L_{Aeq,8h}$ at 1.5m)



7.3.18. Similarly to daytime, during the night-time a large proportion of the Site would fall within TAN-11 NEC A with some areas of the Site expected to fall within NEC B at the closest residential plots to the roads. This indicates that noise in these areas should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection. The Site's suitability for residential development is further addressed in the subsequent assessments and inherent mitigation is proposed to reduce the road traffic noise levels as described in Section 7.4.1.

Uncertainties and Limitations

- 7.3.19. Whilst every effort has been taken to reduce the uncertainty in the noise measurements and predictions, the baseline noise levels across the Site are dominated by road traffic noise and therefore the outcome of the assessment is dependent on traffic levels being representative of typical conditions. Road traffic levels during the summer of 2021 may have been affected to some extent by the Coronavirus Pandemic, however, the baseline noise survey was undertaken during a period where no national travel restrictions were in place to minimise the uncertainty. The baseline noise survey was also undertaken at the start of the Welsh school summer holiday period and therefore traffic levels may also be affected by holiday traffic to some extent. However, given that the dominant noise source of the Site is the M4 Motorway with relatively high traffic flows, it is considered that seasonal holiday traffic would have a minimal impact on the overall traffic flows and therefore the resultant noise levels experienced on the Site.
- 7.3.20. It is considered that the baseline conditions presented in this ES are representative of current conditions and are therefore suitable to base assessments at the outline planning stage. It is recommended that site noise levels are verified during detailed design to ensure that any noise mitigation is designed factoring in representative baseline noise levels.

7.4. Inherent design mitigation

- 7.4.1. The Land Use Parameter plan incorporates a landscaped noise bund along the M4 Motorway in the northern land parcel due to the measured road traffic noise levels in this area shown above in Figures 7.2 and 7.3. There will be a combination of landscaped noise bund and/or noise barriers along this boundary to provide an effective noise screen 3m in height.
- 7.4.2. Inclusion of this inherent mitigation is an example of Good Acoustic Design (as referenced by ProPG through the Noise and Soundscape Action Plan) which ensures that the road traffic noise levels affecting this area of the site are made as low as reasonably practicable, to both minimise the burden on property developers needing to include high performance noise mitigation and to improve the Soundscape in this area of the site for future occupants.
- 7.4.3. The following assessments take this inherent screening into account; however, the precise extents of this noise mitigation measure will need to be fully confirmed during the detailed design stage when a detailed scheme of noise mitigation is determined taking into account the plot and property layouts.

7.5. Potential environmental impacts & effects

Construction Impacts and Effects

- 7.5.1. Noise levels for various construction activities have been predicted in accordance with BS 5228:2009+A1:2014 at a range of distances to determine where potential effects from construction noise are likely to occur. A detailed construction programme, phasing plan and plant schedule are not available at this stage of the project and therefore a generalised list of likely plant and activities has been assumed based on similar project experience and is provided in Table 7-11 below.

Table 7.11 – Construction activities and source noise levels

Activity	Plant	BS 5228 Table	BS 5228 Reference	Noise Level (dB L _{Aeq}) at 10m	On-time (%)
Earthworks	Tracked excavator	C.2	19	77	50
	Dozer	C.2	12	81	50
	Wheeled excavator	C.4	12	77	50
	Articulated dump truck	C.5	16	87	25
	Dozer	C.2	12	81	50
	Tracked excavator	C.6	6	81	50
	Articulated dump truck	C.10	19	89	25
Road Formation and surfacing	Dozer	C.8	7	75	50
	Road roller	C.5	19	80	50
	Articulated dump truck	C.9	22	89	25
	Asphalt paver (+ tipper lorry)	C.5	30	75	50
	Vibratory roller	C.5	27	67	50
	Articulated dump truck	C.9	22	89	25
Landscaping	Tractor (towing equipment)	C.4	74	80	50
	Tractor (towing equipment)	C.4	74	80	50
	Tractor (towing equipment)	C.4	74	80	50
	Articulated dump truck	C.9	22	89	25
Signage	Road sweeper	C.4	90	76	50
	Lifting platform	C.4	57	67	50
	Road sweeper	C.4	90	76	50
	Mini tracked excavator	C.4	68	65	50
	Road sweeper	C.4	90	76	50

Activity	Plant	BS 5228 Table	BS 5228 Reference	Noise Level (dB LAeq) at 10m	On-time (%)
	Mini tracked excavator	C.4	68	65	50
	Dumper	C.4	7	78	50
	Road sweeper	C.4	90	76	50
	Large rotary bored piling rig	C.3	14	83	50
General	Road sweeper	C.4	90	76	50
	Diesel generator	C.4	84	74	50
	Concrete mixer truck (discharging) & concrete pump (pumping)	C.4	28	75	25
	Mobile telescopic crane	C.4	39	77	25

- 7.5.2. The nearest existing noise sensitive receivers are located on Coed Darcy Phase 1 in the centre of the Site, including dwellings on Lon Y Grug, Ridgeway Lane, Heathland Way and Lle Crymlyn. Properties on these streets could be within 50m to construction works near the Site boundary, although in reality, a vast amount of construction activity will occur across the site at greater distances from these properties. The construction of the proposed development will be phased, which will bring new occupied dwellings on the Site near to on-going construction activities.
- 7.5.3. Other noise sensitive receptors are located at greater distances from the Site and are well screened from construction by intervening buildings. These include properties at Heritage Gate some 300m to the south east, properties at Llandarcy Village some 500m to the south and properties at Skewen some 100m to the north east on the opposite side of the M4 Motorway.
- 7.5.4. Predicted noise levels are presented in Table 7.12 below. The predictions should be considered a reasonable worst-case as all equipment is unscreened and operating simultaneously in the same location.

Table 7.12 – Predicted construction noise levels at various distances from the works

Activity	Noise Level dB L _{Aeq} by Distance				
	50m	75m	100m	200m	400m
Earthworks	71	67	64	56	49
Road Formation and surfacing	71	67	64	56	49
Landscaping	70	66	62	55	47
Signage	68	63	60	53	45
General	62	57	54	47	39

- 7.5.5. According to the BS 5228 ABC method, the threshold for significant effects during the daytime period is likely to be 65 dB across the majority of the Site due to the daytime ambient noise levels measured across the Site being generally below the category A value of 65 dB.
- 7.5.6. Individual items of plant would generally not cause any potential significant adverse effects at distances greater than 75m from existing noise sensitive receivers.
- 7.5.7. At distances of approximately 100m or greater from noise sensitive receivers, noise levels from all construction activities should not be significant. The noisiest activities are predicted to be associated with plant used during earthworks and road formation/surfacing.
- 7.5.8. It is expected that construction noise will be controlled using tried and tested methods and the contractors will utilise Best Practicable Means (BPM) to avoid adverse significant effects. These are likely to include the following:
- Limiting construction activities to weekday daytime periods and Saturday mornings where practicable;
 - Switching off plant, equipment and vehicles when they are not in use;
 - Selection of quietest plant when available (including the use of broadband “white noise”/directional reversing alarms rather than conventional audible reversing alarms and the consideration of electric innovation in site machinery);
 - Ensuring that all staff and operatives are briefed on the requirement to minimise noise nuisance from site activities;
 - Use of temporary noise screens or partial enclosures around particularly noisy activities, for example during earthworks; and
 - Ensuring that the plant to be used has been regularly maintained.

7.5.9. When a contractor is appointed, the creation of a Construction Environmental Management Plan (CEMP) or application for prior consent for work on construction sites (in accordance with the Control of Pollution Act 1974, Section 61) may be considered applicable. Such documents would include:

- Details of the works and methods by which they are to be carried out; and
- The steps proposed to be taken to minimise noise impacts from the works.

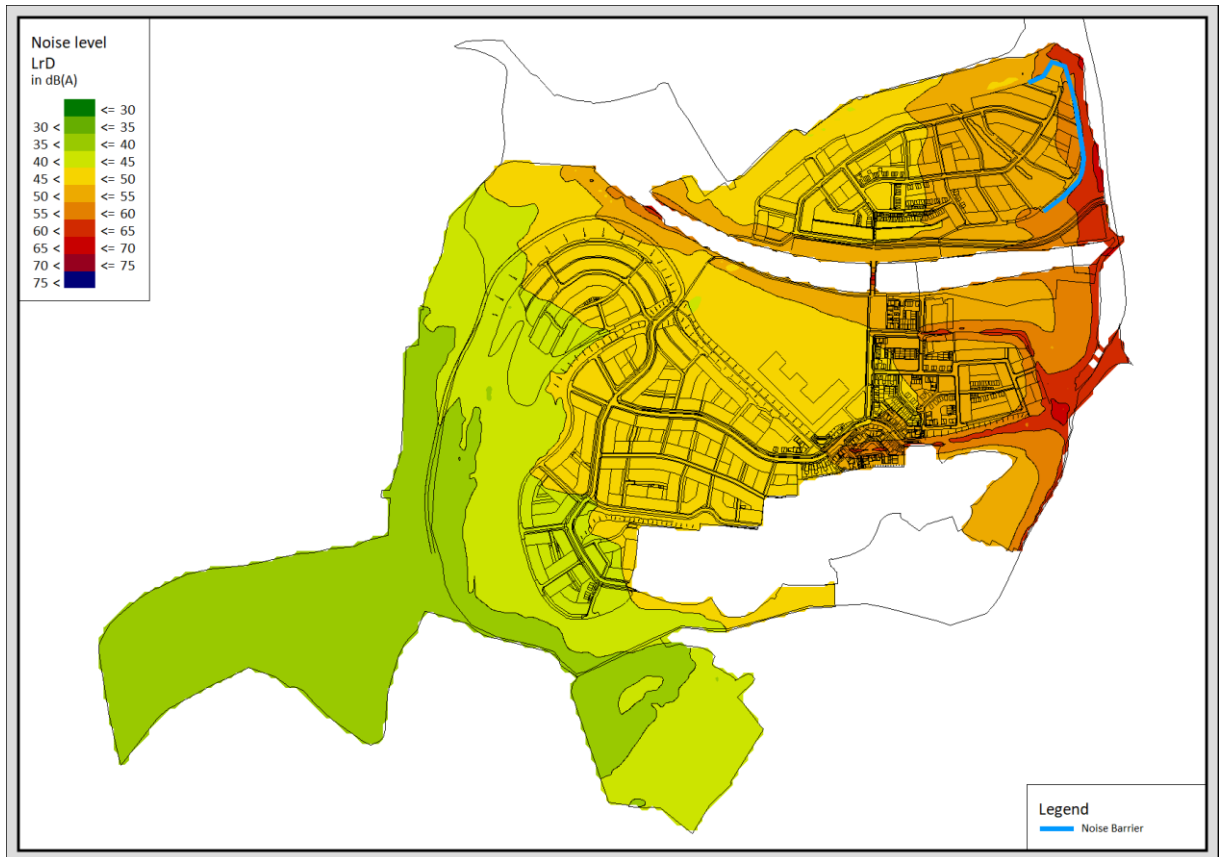
7.5.10. Vibration levels from ground compaction are generally imperceptible at distances greater than around 20 m from the source and therefore **no significant adverse effects** from construction vibration are expected. At this stage it is not expected that any hammer driven piling will be required.

Operational Impacts and Effects

Site Suitability for Residential Development

7.5.11. To assess the site suitability for residential development, the baseline noise model described in Section 7.3.15 has been updated to incorporate the proposed site topography, including the 3m high noise screening within the northern land parcel as described in Section 7.4.1. Noise contours for daytime and night-time are provided below in Figure 7.3 and Figure 7.4 respectively.

Figure 7.3 – Development noise contours with inherent design mitigation (daytime $L_{Aeq,16h}$ at 1.5m)



7.5.12. Figure 7.3 above demonstrates that noise levels in the majority of residential plots are below 55dB $L_{Aeq,16h}$ and therefore below the upper guideline design criteria for outdoor garden/amenity areas as recommended by BS 8223. Additionally, a significant proportion of residential development areas are below 50 dB $L_{Aeq,16h}$ and therefore below the more stringent desirable guideline design criteria as recommended by BS 8223. These areas of the site have a positive Soundscape with low ambient noise levels and feature natural sources of noise. The inherent mitigation adjacent the M4 will benefit the Soundscape across the site, with more areas experiencing lower road traffic noise levels.

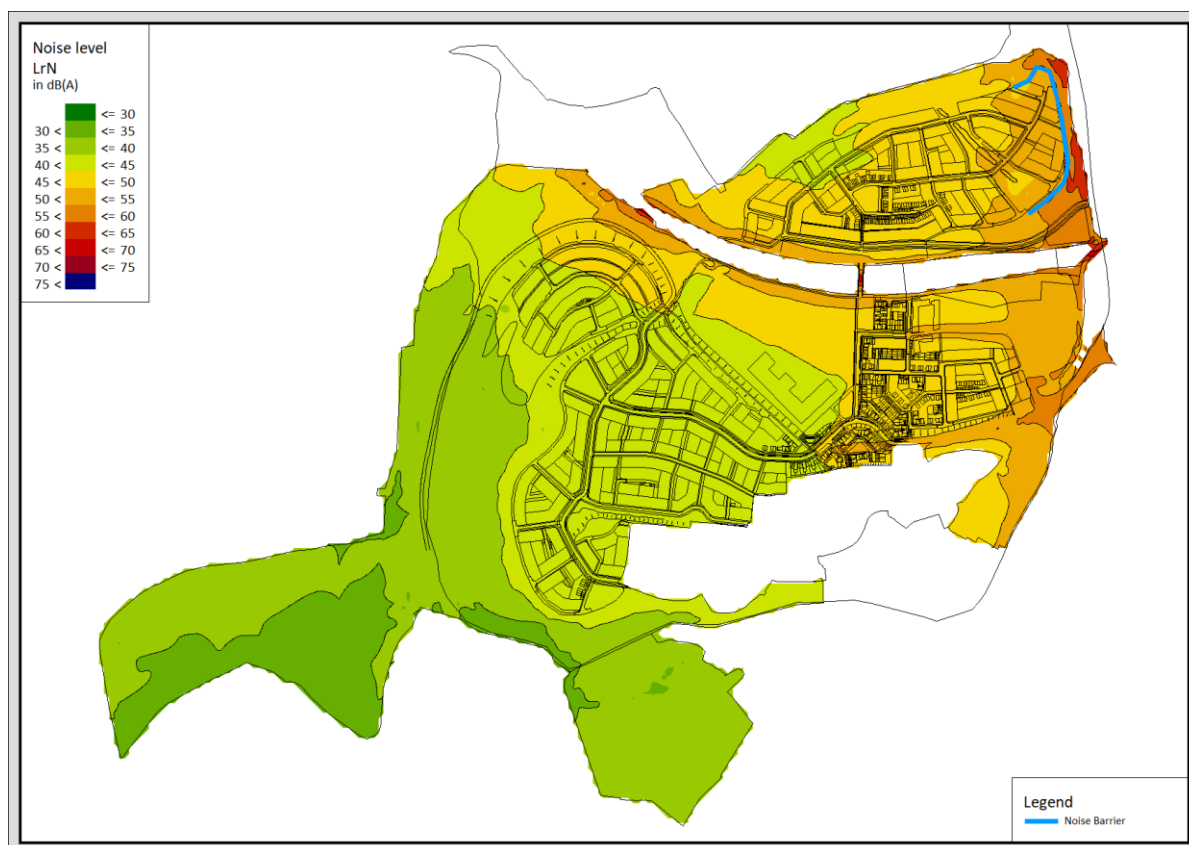
7.5.13. There are a small number of plots with outdoor noise levels above the BS 8223 design criteria of 55 dB $L_{Aeq,16h}$ (with noise levels in the order of 57 dB $L_{Aeq,16h}$). Once the new buildings are built across the Site (thereby introducing additional noise screening), the areas in excess of 55 dB $L_{Aeq,16h}$ are likely to be limited to only the front row of properties adjacent the main roads. Noise levels in these areas may be further minimised through consideration of building/garden orientation to provide additional screening to outdoor spaces i.e. locating gardens on property facades facing away from the roads. BS 8233 also recognizes that the guideline values are not achievable in all circumstances where development is desirable, and marginally higher external noise levels in these instances could be considered acceptable where the development is designed to achieve the lowest practicable noise levels in these external amenity areas. Additionally, in accordance with guidance in ProPG, any impacts may be partially offset

if the residents are provided with access to relatively quieter areas of public outdoor amenity space. There would be many public areas of the Site with lower noise levels and a positive Soundscape available to future occupants.

- 7.5.14. Where external daytime noise levels are predicted to be below 50 dB $L_{Aeq,16h}$ internal noise levels are expected to achieve the BS 8233 criteria of 35 dB inside bedrooms (for daytime resting) with partially open windows (assuming a typical 15 dB noise reduction from outside to inside).
- 7.5.15. Where external daytime noise levels exceed 50 dB $L_{Aeq,16h}$ a glazing specification will need to be provided to give an adequate level of noise attenuation in conjunction with an appropriate alternative means of ventilation to enable windows to remain closed. A standard thermal double-glazed window with a standard trickle vent can be expected to achieve an external to internal sound level reduction of 25 dB¹ and therefore would be a suitable specification for attenuating external daytime noise levels up to around 60 dB $L_{Aeq,16h}$.
- 7.5.16. Figure 7.4 below demonstrates that noise levels in the majority of residential plots, particularly in the southern land parcel, are below 45 dB $L_{Aeq,8h}$ during the night-time. In these areas internal noise levels are expected to achieve the BS 8233 criteria of 30 dB inside bedrooms at night with partially open windows.
- 7.5.17. Where external night-time noise levels exceed 45 dB $L_{Aeq,8h}$ a glazing specification will need to be provided to give an adequate level of noise attenuation in conjunction with an appropriate alternative means of ventilation to enable windows to remain closed. A standard thermal double-glazed window with a standard trickle vent providing a sound level reduction of 25 dB would therefore be a suitable specification for attenuating external night-time noise levels up to around 55 dB $L_{Aeq,8h}$.
- 7.5.18. The outline glazing specifications above enable both daytime and night-time internal noise level guidelines provided in BS 8233 to be met across the Site demonstrating that suitable internal noise levels can be achieved.
- 7.5.19. The actual level of attenuation required will be dependent on the building location within the plot (taking into account any additional screening from other buildings), the layout and dimension of rooms within the property and the window/door dimensions. For this reason, a detailed schedule of noise mitigation should be determined at the detailed design stage of the development.

¹ Based on assumptions for room size and reverberation time. Sound insulation data from Building Research Establishment (BRE).

Figure 7.4 – Development noise contours with inherent design mitigation (night-time $L_{Aeq,8h}$ at 1.5m)



Operational Traffic Noise

- 7.5.20. Changes in road traffic noise levels have been assessed based on traffic data supplied by Atkins. Traffic data has been provided both with and without the additional operational traffic due to the development in an opening year scenario (assumed to be 2026) and a future year scenario (assumed to be 2036).
- 7.5.21. Basic Noise Levels (BNLs) have been predicted for each road link following the procedure in CRTN. The BNL is the noise level 10m from the carriageway edge, calculated considering the traffic flow, percentage of Heavy Goods Vehicles and speed. Predicted BNLs, the change in BNL and the magnitude of the impact in the future year are presented below in Table 7.13.

Table 7.13– Predicted Basic Noise Levels (Future Year)

Road Link	Opening year BNL (without development) dB L _{A10,18h}	Future Year BNL (with development) dB L _{A10,18h}	Future Year BNL Change dB L _{A10,18h}	DMRB Magnitude of Impact
A465	80.7	81.1	0.4	Negligible
B4290 link south of B4290/ Ffordd Coed Darcy Junction	67.1	67.8	0.7	Negligible
Ffordd Coed Darcy	60.9	65.4	4.5	Minor
B4290 Pen-Y-Heol between B4290/ Darcy Business Park Junction and Proposed Bowling Green Access Junction	65.8	67.1	1.3	Negligible
B4290 Pen-Y-Heol north of proposed Bowling Green Access Junction	66.2	66.8	0.6	Negligible
M4 between M4 J42 western spur and M4 J43	83.4	83.8	0.4	Negligible
M4 between M4 J43 and M4 J44	82.7	84.0	1.3	Negligible

7.5.22. Table 7.1 above demonstrates that the development traffic results in a negligible change in traffic noise levels on the majority of road links surrounding the Site. One road link, namely Ffordd Coed Darcy, shows a minor increase in noise, however, this is the access road to the Coed Darcy development and therefore an increase in traffic noise levels would be expected on this road link once the development is complete. The traffic entering the development via Ffordd Coed Darcy will be dissipated throughout the development and therefore the minor noise changes are likely to be limited to the eastern end of Ffordd Coed Darcy acting as an entrance to the Site, nearest the M4 Junction. As there are no residential receptors near Ffordd Coed Darcy in this area and the noise levels from traffic using Ffordd Coed Darcy will be masked to an extent by road traffic noise from the M4 in this area, it is expected that there would be **no permanent adverse significant effects** from operational traffic noise.

Commercial and Industrial Noise

- 7.5.23. Potential sources of commercial and industrial noise which could have the potential to adversely impact the new development were identified during the scoping opinion assessment and baseline noise survey site visit. Sources identified included commercial and industrial premises at the Contractor's Yard, commercial premises at the Llandarcy Business Park and the Balancing Services Plant (peak power generators) located north of the Llandarcy Business Park.
- 7.5.24. During the site visit it was confirmed that no commercial or industrial noise from Contractor's Yard was measurable above ambient levels at the nearest proposed residential plot location (notably this was at a similar distance as the now occupied residential receptors on Coed Darcy Phase 1 from the Contractor's Yard). Additionally, other than road traffic noise from vehicles accessing Llandarcy Business Park, no specific commercial noise was measurable at the nearest proposed residential plots to the Llandarcy Business Park. For this reason, no assessment of existing industrial or commercial noise affecting the proposed development has been undertaken and it is expected that existing industrial or commercial noise is not a constraint on the development.
- 7.5.25. The Balancing Services Plant (comprising ten x 2MW generating units) was not operational during the site visit as it is understood to only be required during periods of peak electricity demand. The noise assessment submitted in support of the planning application for the Balancing Services Plant (planning reference P2012/1061) included an assessment of noise impacts on the Coed Darcy site (AECOM report reference 60580051). The assessment concluded that the impact of the Balancing Services Plant when assessed in accordance with BS 4142, including BPM mitigation, would be low/medium during the night-time period for future receptors at the Coed Darcy site (depending on the context). However, the noise assessment also stated that as receptors in this area of the site would require closed windows to mitigate road traffic noise at night, the BS 8233 internal noise criteria would be achieved when the plant is operational, which aligns with the recommendations within this ES.
- 7.5.26. At this stage, detailed information is not available on any proposed noise generating commercial or industrial business uses or fixed building services plant associated with commercial and educational premises. Any new commercial or industrial sources, including any fixed building services plant, should be designed to comply with BS 4142 rating noise limits during the detailed design stage.

Acoustic assessment of the proposed school

- 7.5.27. It is understood that the proposed development will include a school within the southern land parcel to the west of the Site. Ambient noise levels in this area of the Site are generally below 50 dB $L_{Aeq,16h}$ and therefore noise from external sources is unlikely to be a constraint to the school development. The acoustic design of the school will need to be considered at the detailed design stage in accordance with Building Bulletin 93 (BB93) to meet the necessary performance standards.

7.6. Additional mitigation, compensation & enhancement measures

- 7.6.1. Any potential significant adverse effects from construction noise are expected to be controlled using tried and tested methods and the contractors will utilise BPM to minimise and avoid significant adverse effects. The appointed contractor should undertake a detailed assessment of construction noise impacts

once details of the works and methods by which they are to be carried out are known. This would include any steps proposed to be taken to minimise noise impacts from the works.

7.6.2. The assessments presented in Section 7.5.12 demonstrate that BS 8233 external noise guidelines will be achieved across the majority of the Site, however, some additional consideration to building/garden layouts would be desirable adjacent the M4 Motorway to provide some additional noise mitigation to outdoor amenity spaces. The assessments also indicated that the BS 8233 internal noise guidelines will be achieved with either partially open windows across the majority of the Site or with closed windows in higher noise areas assuming provision of standard thermal double glazing and standard trickle vents as a means of alternative ventilation to open windows. The assessments account for a 3m high noise attenuation bund/barrier around the perimeter of residential plots in the northern land parcel adjacent the M4 Motorway.

7.6.3. These measures would need to be refined during detailed design and implemented through reserved matters or planning conditions to include;

- a scheme of mitigation for dwellings prior to occupation comprising the full acoustic specification of glazing, ventilation and any required noise screening to achieve the criteria presented in BS 8233 for indoor and outdoor spaces as far as practicable, and,
- details to evidence that any noise associated with new commercial or industrial uses, including any fixed mechanical plant, will achieve the criteria presented in BS 4142 at the nearest noise sensitive receptors.

7.7. Residual environment impacts & effects

7.7.1. With the incorporation of additional mitigation outlined in Section 7.6.2 there would be **no residual temporary or permanent adverse significant effects** associated with the proposed development.

7.8. Cumulative effects

7.8.1. It is understood that the only committed development in the vicinity of the site is Heritage Gate Phase II. Heritage Gate Phase II has already been included in the traffic flow predictions which have been used for the operational traffic noise assessment and therefore there would be **no permanent cumulative adverse significant effects** due to this development. On the expectation that the Heritage Gate Phase II development will be required to control construction noise levels to below BS 5228 limits, there would also be **no temporary cumulative adverse significant effects** expected due to the relative size of the Coed Darcy and Heritage Gate Phase II sites and the distances between construction sites and noise sensitive receptors.

7.9. Assessment summary

7.9.1. Appropriate noise assessments have been undertaken in accordance with Government guidance and current best practice to assess the suitability of the proposed development on the Site for a mixed-use development.

- 7.9.2. Existing ambient noise levels predicted on a large proportion of the Site could achieve the daytime and night-time BS 8233 internal design criteria with windows open. Areas of higher ambient noise (such as nearer the M4 Motorway) would still be able to achieve the daytime and night-time internal design criteria with windows closed (using standard thermal double glazing and a standard trickle vent).
- 7.9.3. The BS 8233 design criteria for external noise is likely to be achieved across the majority of the Site. A small area is expected to exceed the BS 8233 upper design criteria for external noise, however, further noise mitigation is possible when considering the layout of buildings within the plot which should ensure the design criteria is achieved.
- 7.9.4. No existing sources of industrial or commercial sound were observed to be adversely affecting the Site. Any new commercial or industrial sources, including any fixed building services plant, should be designed to comply with BS 4142 rating noise limits during the detailed design stage.
- 7.9.5. Noise levels from construction activities are expected to result in **no significant adverse effects** at distances greater than approximately 100m from existing noise sensitive receptors and it is expected that noise and vibration as a result of construction should be adequately controlled using best practicable means to minimise residual significant adverse effects.
- 7.9.6. Noise levels from operational traffic caused by the development on existing roads are expected to result in **no significant adverse effects**.

Table 7.14 – Summary of effects

Topic	Mitigation measures	Designed into the Proposed Development	Delivery via condition (outline/RM)	Delivery via legal obligation	Paragraph reference in the ES	Proposed Monitoring Arrangement
Construction Noise	BPM and control measures	N/A	Yes	N/A	7.5.8	Noise monitoring as a control measure may be undertaken subject to requirements in the CEMP
Existing noise affecting the development	Noise bund/barrier screening for plots adjacent the M4 Motorway	Yes	Yes	N/A	7.4.3	N/A
Existing noise affecting the development	Acoustic glazing and	No	Yes	N/A	7.6.2	N/A

Environmental Statement

Coed Darcy



Topic	Mitigation measures	Designed into the Proposed Development	Delivery via condition (outline/RM)	Delivery via legal obligation	Paragraph reference in the ES	Proposed Monitoring Arrangement
new development	ventilation specification for new dwellings					
Operational road traffic noise	N/A	N/A	N/A	N/A	7.5.22	N/A