HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.7.6 ES Volume G - A5025 Off-line Highway Improvements G6 - Noise and vibration

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6 Noise and vibration

6.1 Introduction

6.1.1 This chapter describes the assessment of potential noise and vibration effects resulting from the construction of the A5025 Off-line Highway Improvements.

6.1.2 The chapter excludes noise and vibration effects associated with road traffic. These are considered in the assessment contained within chapter C5 (noise and vibration effects of traffic) (Application Reference Number: 6.3.5) which covers project-wide effects of traffic upon noise and vibration.

6.1.3 Please refer to chapter B6 (noise and vibration) (Application Reference Number: 6.2.6) and appendix G6-1 (construction noise model inputs and outputs) (Application Reference Number: 6.7.18) for the technical basis for the assessment including a summary of legislation, policy and guidance; key points arising in consultation that have guided the noise and vibration assessment; and assessment methodologies and criteria.

6.1.4 A full description of the A5025 Off-line Highway Improvements can be found in chapter G1 (proposed development) (Application Reference Number: 6.7.1).

6.2 Study area

6.2.1 This section describes the study areas relevant to the noise and vibration assessment for the A5025 Off-line Highway Improvements.

6.2.2 The study area has been developed to incorporate all nearby noise and vibration sensitive receptors that may be subject to potentially significant noise and vibration effects from the construction activities identified within this assessment.

6.2.3 The study area is split into nine sections as defined in chapter G1 (Application Reference Number: 6.7.1), which together cover a length of approximately 15km from Valley to Tregele (south to north). The sections are defined as follows:

- section 1 – Junction 3 of the A55 to Valley Junction A5/A5025;
- section 2 – Valley Junction A5/A5025 to north of Llanynghenedl;
- section 3 – north of Llanynghenedl to north of Llanfachraeth;
- section 4 – north of Llanfachraeth to south of Llanfaethlu;
- section 5 – south of Llanfaethlu to north of Llanfaethlu;
- section 6 – north of Llanfaethlu to north of Llanrhuddlad;
- section 7 – north of Llanrhuddlad to north of Cefn Coch; and
- section 8 – north of Cefn Coch to Wylfa Site Access.

6.2.4 Sections 1, 3, 5 and 7 have been identified to be sites where major highway improvements are required and included in these sections are proposed new stretches of road and improved junctions. Sections 2, 4, 6 and 8 represent

stretches of road where minor improvements, such as road markings and resurfacing, would be required.

6.2.5 In line with the above, only sections 1, 3, 5 and 7 of the A5025 Off-line Highway Improvements are considered in this chapter, along with the Power Station Access Road Junction. These sections are described in further detail below. The study area for each section of the scheme was determined by buffering the relevant site boundary to a distance of 600m. This study area was identified using the method for defining the noise and vibration study area detailed within the Design Manual for Roads and Bridges (DMRB) [RD1].

Section 1: Valley

6.2.6 The Valley section is the southernmost section of the study area. The junction between the A5, Holyhead Road, and the A5025 is included in this section, along with the first 800m stretch of the A5025. The junction of the A5 and the A5025 is currently a signalised junction on the eastern edge of Valley. Apart from the junction itself, this section of road is predominantly rural.

Section 3: Llanfachraeth

6.2.7 Section 3 is a 2.2km section of the A5025, which runs close to the village of Llanfachraeth. The area to both the north and south of the village is rural, with agricultural land. The village itself has a relatively high proportion of residential properties, along with a school and a number of small commercial properties.

Section 5: Llanfaethlu

6.2.8 The Llanfaethlu section stretches 1.5km through a predominantly rural area. A small section of the road runs along the southern edge of the village, past a chapel and a public house. To the north and south of this village lies rural land, with a small number of residential properties.

Section 7: Cefn Coch

6.2.9 This is a 1.3km section, which runs through a rural area surrounded by agricultural land. There are less than 40 residential properties in the area.

Power Station Access Road Junction

6.2.10 The Power Station Access Junction is to be located on a stretch of the A5025 approximately 750m south of Tregele. The surrounding land is agricultural, with a small number of residential properties.

Identified receptors

6.2.11 Receptors have been grouped according to the five sections outlined above.

6.2.12 The sensitivity scale set out in chapter B6 (Application Reference Number: 6.2.6) has been adopted to enable the categorisation of noise-sensitive receptors relevant to the A5025 Off-line Highway Improvements, and is presented in table G6-1. This is displayed visually in figures G6-1, G6-2 and G6-3 (Application Reference Number: 6.2.22).

Table 6-1 Human receptor sensitivities to noise effects

Sensitivity	Noise-sensitive receptor categories
High	Dwellings, hospitals, hotels and schools
Medium	Places of worship, open-air amenities used for recreation, community facilities and offices
Low	Commercial premises
Negligible	Industrial installations

6.3 Baseline environment

6.3.1 This section provides a summary of the baseline conditions for noise and vibration within the study area described in section 6.2.

6.3.2 Baseline noise monitoring results are presented in appendix B6-1 (baseline noise monitoring) (Application Reference Number: 6.2.20).

6.3.3 Surveys were undertaken during 2015 and monitoring locations are shown in figures G6-1 (Application Reference Number: 6.7.48), G6-2 (Application Reference Number: 6.7.48) and G6-3 (Application Reference Number: 6.7.48). Details of the monitoring locations and survey durations are summarised in table G6-2.

6.3.4 Noise measurements were undertaken on either a short-term or a long-term basis. The long-term measurements provide an adequate representation of noise levels that would occur during typical A5025 Off-line Highway Improvements working hours. Environmental noise levels are inherently variable, being influenced by a number of man-made and natural factors. The survey periods were selected to ensure that this variability was characterised. Road traffic from the A5025 was the dominant noise source across each of the study areas associated with the A5025 Off-line Highway Improvements. Other sources of noise observed during the baseline survey included wildlife and livestock as well as noise from dog kennels. Additionally, in some locations, wind contributed to the ambient noise levels. Full details of the equipment used and methodology employed during the surveys are presented in appendix B6-1 (Application Reference Number: 6.2.20).

Table 6-2 5025 Off-line Highway Improvements baseline monitoring locations

Section	Monitoring point reference	Location	Comments
Section 1: Valley	R1a	Glynn Villa	Long term – duration: 9 days
	R1b	Cemetery	Short term
Section 2: Llanynghenedl	R2a	Layby adjacent to Converted Chapel	Short term

Section	Monitoring point reference	Location	Comments
Section 3: Llanfachraeth	R3a	Erw Goch Bach	Long term – duration: 9 days
	R3b	Dolydd	Long term – duration: 9 days
	R3c	Field adjacent to Bryn Farm	Long term – duration: 9 days
	R3d	Field adjacent to Primary School	Long term – duration: 9 days
Section 4: Llanfaethlu	R4a	Rhos Ty Mawr	Long term – duration: 16 days
	R4b	Bryn Gwyn	Long term – duration: 2 days
	R4c	Layby north of Rhos Ty Mawr	Short term
Section 5: Llanfaethlu	R5a	Layby north of westerly turning for Cylch y Garn	Short term
Section 6: Cefn Coch	R6a	Tyn Felin	Long term – duration: 9 days
	R6b	Rhandir	Long term – duration: 8 days
Section 7: Cefn Coch	R7a	Taldwrst	Long term – duration: 8 days

Short-term measurements were undertaken during the night-time period (19:00 to 07:00 hours) only, whilst long-term measurements were undertaken during the daytime, evening and night-time. As no construction works are due to be undertaken at night, only the long-term measurements are used within this assessment.

Section 1: Valley

Noise

6.3.5 Table G6-3 presents the noise levels for the daytime and evening/weekend periods (based on the time periods described in the example 'ABC' methodology in BS5228-1:2009+A1:2014 [RD2]) obtained from the long-term measurement location at Glynn Villa (R1a). From analysis of the noise sources within the study area, this location is considered to be representative of the entire section 1 study area. The data presented here have been used in the construction noise assessments of the A5025 Off-line Highway

Improvement works in section 1, based on the guidance within BS5228-1 [RD2].

Table 6-3 Summary of measured $L_{Aeq,T}$ noise levels within section 1 for use in construction noise assessment

Monitoring point reference	$L_{Aeq,T}$ dB	
	Daytime	Evening and weekends
R1a	56	52

Vibration

6.3.6 No significant sources of vibration were identified during the baseline noise survey, and consequently no baseline vibration measurements have been undertaken. Road traffic can potentially be a measurable source of vibration, and in the absence of any significant sources of vibration within the area, the baseline vibration environment is dominated by passing traffic on the A5025.

Section 3: Llanfachraeth

Noise

6.3.7 Table G6-4 presents the noise levels for the daytime and evening/weekend periods obtained from the four long-term measurement locations within section 3. The data presented here have been used in the construction noise assessments of the A5025 Off-line Highway Improvement works for this section, based on the guidance within BS5228-1 [RD2].

Table 6-4 Summary of measured $L_{Aeq,T}$ noise levels within section 3 for use in construction noise assessment

Monitoring point reference	$L_{Aeq,T}$ dB	
	Daytime	Evening and weekends
R3a	62	59
R3b	53	51
R3c	53	50
R3d	55	50

Vibration

6.3.8 No significant sources of vibration were identified during the baseline noise survey, and consequently no baseline vibration measurements have been undertaken. Road traffic can potentially be a source of vibration, and in the absence of any significant sources of vibration within the area, the baseline vibration environment is dominated by passing traffic on the A5025.

Section 5: Llanfaethlu

Noise

6.3.9 Table G6-5 presents the noise levels for the daytime and evening/weekend periods obtained from the long-term measurement location at Rhos Ty Mawr (R4a). From analysis of the noise sources within the study area, this location is considered to be representative of the entire section 5 study area. This is due to the dominance of the A5025 traffic ambient noise environment in the measurement position and the study area. The data presented here have been used in the construction noise assessments of the A5025 Off-line Highway Improvement works in section 5, based on the guidance within BS5228-1 [RD2].

Table 6-5 Summary of measured $L_{Aeq,T}$ noise levels within section 5 for use in construction noise assessment

Monitoring point reference	$L_{Aeq,T}$ dB	
	Daytime	Evening and weekends
R4a	49	44

Vibration

6.3.10 No significant sources of vibration were identified during the baseline noise survey, and consequently no baseline vibration measurements have been undertaken. Road traffic can potentially be a source of vibration, and in the absence of any significant sources of vibration within the area, the baseline vibration environment is dominated by passing traffic on the A5025.

Section 7: Cefn Coch

Noise

6.3.11 Table G6-6 presents the noise levels for the daytime and evening/weekend periods obtained from the long-term measurement location at Tyn Felin (R6a). From analysis of the noise sources within the study area, this location is considered to be representative of the entire section 7 study area. The data presented here have been used in the construction noise assessments of the A5025 Off-line Highway Improvement works in section 7, based on the guidance within BS5228-1 [RD2].

Table 6-6 Summary of measured $L_{Aeq,T}$ noise levels within section 7 for use in construction noise assessment

Monitoring point reference	$L_{Aeq,T}$ dB	
	Daytime	Evening and weekends
R6a	54	51

Vibration

6.3.12 No significant sources of vibration were identified during the baseline noise survey, and consequently no baseline vibration measurements have been undertaken. Road traffic can potentially be a source of vibration, and in the absence of significant sources of vibration within the area, the baseline vibration environment is dominated by passing traffic on the A5025.

Power Station Access Road Junction

Noise

6.3.13 Table G6-7 presents the noise levels for the daytime and evening/weekend periods obtained from the long-term measurement location at Taldwrst (R7a). From analysis of the noise sources within the study area, this location is considered to be representative of the entire access road study area. The data presented here have been used in the construction noise assessments of the A5025 Off-line Highway Improvement works within the Power Station Access Road Junction area, based on the guidance within BS5228-1 [RD2].

Table 6-7 Summary of measured $L_{Aeq,T}$ noise levels within the Power Station Access Road Junction for use in construction noise assessment

Monitoring point reference	$L_{Aeq,T}$ dB	
	Daytime	Evening and weekends
R7a	52	50

Vibration

6.3.14 No significant sources of vibration were identified during the baseline noise survey, and consequently no baseline vibration measurements have been undertaken. In the absence of significant sources of vibration within the area, the baseline environment is dominated by passing traffic on the A5025.

Evolution of the baseline

6.3.15 Between the baseline noise surveys and the commencement of works associated with the A5025 off-line Highway Improvements, baseline noise levels (i.e. those that would occur in the absence of the Wylfa Newydd Project) may have changed, or may be likely to change, due to a number of non-project-related factors.

6.3.16 Road traffic is likely to increase slightly over time, in common with most areas of the UK. According to DMRB, an increase of 25% in traffic flow in the short-term (i.e. on scheme opening) would generally be required before an increase in the traffic noise level is likely to be perceptible. Based upon professional judgement, an increase of this level is considered unlikely to occur between the 2015 baseline survey and completion of the highway improvements.

6.4 Design basis and activities

6.4.1 This section sets out the design basis for this assessment of effects. It sets out where any assumptions have been made to enable the assessment to be

carried out at this stage in the evolution of the design. This section also identifies the embedded and good practice mitigation that will be adopted to reduce adverse effects as inherent design features or by implementation of standard industry good working practice.

6.4.2 As described in chapter G1 (Application Reference Number: 6.7.1), the application for development consent for the A5025 Off-line Highway Improvements is based on the designs shown in detailed drawings for sections 1, 3, 5 and 7 (Application Reference Numbers: 2.7, 2.8, 2.9 and 2.10 respectively). This chapter has assessed a worst case scenario from a noise and vibration perspective, taking into account the flexibility afforded by the Works Plans (Application Reference Number: 2.3) and limits of deviation described in chapter G1 (Application Reference Number: 6.7.1).

Construction

6.4.3 There is a potential for noise and vibration effects at existing receptors near the A5025 Off-line Highway Improvements, due to the various proposed construction activities. These include earthworks, piling, bridge construction and road surfacing.

Basis of assessment and assumptions

6.4.4 Noise levels have been calculated for the construction phase of the A5025 Off-line Highway improvements using CadnaA noise modelling software. Full details of the noise modelling techniques and methodology employed are presented in chapter B6 (Application Reference Number: 6.2.6).

6.4.5 The following activities have been modelled at the height specified due to the height of the dominant noise source:

- earthworks at 1.5m;
- road surfacing at 1.5m;
- breakup of existing road surface at 1m; and
- boundary fence at 1.5m.

6.4.6 Earthworks, road surfacing and boundary fence activities have been modelled at 1.5m in order to represent the exhaust height of the dominant item of plant for each activity. The breakup of existing road surface activity has been modelled at 1m to account for the dominant noise source being at low level.

6.4.7 All other activities have been modelled at a height of 3m above ground, which is considered to represent a worst case scenario, as the majority of effective source positions for the noise emissions are likely to be closer to the ground and therefore potentially benefit from greater ground attenuation or attenuation from screening. The construction activities modelled at heights of 3m are as follows:

- bored piling;
- erecting bridge beams; and
- haul routes.

Embedded mitigation

6.4.8 The embedded mitigation that has already been committed to as part of the A5025 Off-line Highway Improvements is described below.

6.4.9 Normal working hours for the construction works at the A5025 Off-line Highway Improvements construction sites are set out in the A5025 Off-line Highway Improvements sub-Code of Construction Practice (CoCP) (Application Reference Number: 8.12) and as follows:

- Monday to Friday: 07.00 - 18.00; and
- Saturday: 07.00 to 13.00.
- No works are proposed during the sensitive evening and/or night time periods, Saturday afternoons, Sundays or Bank Holidays.
- If construction work is required at these sites outside of these hours, this would be identified by Horizon and justified in the Section 61 Control of Pollution Act 1974 application which would be made to the Isle of Anglesey County Council (IACC) in advance of the works.

6.4.10 Plant and equipment would comply with the noise limits outlined in the relevant European Commission Directive 2000/14/EC which is enacted in the Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001 (SI) 2001/1701. All plant and equipment would be maintained on a regular basis to ensure good working order and compliance with these limits, as per the Wylfa Newydd CoCP (Application Reference Number: 8.6).

Programme

6.4.11 The programme is based upon month-by-month increments with no further dissection. This is assumed to be representative for the majority of the works programme. However, this method has meant that both the breakup of the existing road surface and the surfacing of the roads are calculated as happening at the same time, on the same stretch of road. In order to remove the calculated overlap of the two activities that would not be expected to occur on the same stretch of road at the same time, the activity with the lowest noise level of the two (road surfacing) has been removed from the calculation programme. This has only been undertaken for the single month where the two activities occur at the same time, A5025 Off-Line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

Good practice mitigation

6.4.12 The construction of the A5025 Off-line Highway Improvements would meet the requirements as set out in the noise and vibration management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and A5025 Off-Line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

6.4.13 Good practice mitigation includes adopting Best Practicable Means (BPM) (as defined in section 72 of the Control of Pollution Act 1974). Where practicable, the control measures set out in BS5228-1, section 8 [RD2] and BS5228-2 [RD3] should be implemented. Generic noise and vibration control measures

are set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and include:

- choice of methodology/technique for construction operations (including site layout) will be considered in order to eliminate or reduce emissions at sensitive locations;
- fixed items of construction plant would be electrically powered in preference to diesel or petrol driven;
- where reasonably practicable, plant and/or methods of work causing significant levels of vibration at sensitive premises (such as vibratory rollers) should be replaced by other less intrusive plant and/or methods of working;
- where reasonably practicable, stationary plant (e.g. generators, pumps, compressors) should be positioned away from connected structures to sensitive premises or isolated using resilient mountings;
- wherever practicable, fabrication would be undertaken off-site;
- noisy plant and plant producing high levels of vibration would be kept as far away as possible from sensitive areas;
- equipment would be well-maintained;
- equipment would be shut down when not in use or throttled down to a minimum during waiting period;
- vehicles and mechanical plant employed for any activity associated with the construction works would be fitted with effective exhaust silencers/suppression equipment;
- plant employed for any activity associated with the construction works would be operated in a manner such that noise and vibration emissions are controlled and limited as far as reasonably practicable; and
- vehicles would not wait or queue on the public highway with engines running (unless the engine was required to power the operation of the vehicle e.g. concrete wagon).

6.4.14 Construction noise and vibration monitoring requirements for the A5025 Off-line Highway Improvements, including the locations and proposed programme for monitoring will be set out in the Section 61 application, which will be submitted to the IACC for approval prior to commencing construction. Spot checks and BPM audits will be undertaken during construction to ensure noise levels remain within the permitted levels under the Section 61 approval, as per the A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12). Actions to be undertaken in the event that monitoring identifies a breach of a threshold are set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

Operation

Basis of assessment and assumptions

6.4.15 The assessment and assumptions of the operation of the A5025 Off-line Highway Improvements are detailed within chapter C5 (Application Reference Number: 6.3.5).

Embedded mitigation

6.4.16 Embedded mitigation for operational traffic is set out in the Design and Access Statement, volume 3 (Associated Developments and Off-Site Power Station Facilities) (Application Reference Number: 8.2.3) and includes road barriers, design layout and road surface types. These are discussed in detail within chapter C5 (Application Reference Number: 6.3.5).

Good practice mitigation

6.4.17 Good practice mitigation measures for the noise and vibration effects of traffic are detailed in chapter C5 (Application Reference Number: 6.3.5). Operational traffic using the completed highways improvements would be controlled in accordance with the management strategies set out in the Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference Number: 8.13).

6.5 Assessment of effects

6.5.1 This section presents the findings of the assessment of effects associated with the construction and operation of the A5025 Off-line Highway Improvements.

Effects of noise at residential receptors

6.5.2 Residential receptors are considered to have high sensitivity. Free field noise levels have been calculated for each elevation and for each floor of each residential building within the study area, and for each month of the indicative programme. To provide a façade noise level, a +3dB correction has been applied to the model results. This has enabled the magnitude of change to be established at all residential receptors potentially affected by the A5025 Off-line Highway Improvement works, and an indication of a worst case duration in months that the effects could occur for.

6.5.3 Table G6-8 presents the effect magnitudes and criteria values that have been adopted to assess the magnitude of change from construction noise. Further information on the basis of these magnitude scales is provided in appendix B6-2 (Noise and Vibration Modelling and Assessment Methodology Report) (Application Reference Number: 6.2.21).

Table 6-8 Adopted magnitude scale for construction noise

Magnitude of change	Façade construction noise level, dB $L_{Aeq,T}$ 07:00–19:00, Mon to Fri 07:00–13:00, Sat	Comments
Large	≥75.0	75dB(A) is presented in BS5228-1 [RD2] as an example threshold for the determination of noise insulation eligibility.
Medium	70.0 – 74.9	-
Small	65.0 – 69.9	-
Negligible	<65.0*	65dB(A) is a threshold of significance defined by examples in BS5228-1 [RD2] for low ambient noise areas.
* or less than a 3.0dB increase in the pre-existing ambient noise level		

6.5.4 The highest predicted free-field noise level on any floor and on any side of a building in any month across the entire construction programme has been used for the determination of the likely effects.

6.5.5 The above approach ensures that a worst case assessment is carried out and reported.

6.5.6 Outside of the requirement (under the Environmental Impact Assessment Regulations 2009) to identify the likely significant effects, a further series of noise levels have been calculated as part of a sensitivity testing exercise. These further noise predictions provide an indication of the higher noise levels, which might be possible during certain transient phases of the works within any calendar month. These noise levels correspond to scenarios that assume that activities taking place over large areas are concentrated at the closest practicable locations to the most sensitive receptors simultaneously. In combination with a worst case and cautious assumptions already applied to the assessment (and described in chapter B6 (Application Reference Number: 6.2.6) and in section 6.4 above), these circumstances are therefore considered to be highly unlikely and, in any case, would only occur for very short periods of time. These values are therefore reported for information only.

Effects of vibration at residential receptors

6.5.7 The main sources of vibration during the A5025 Off-line Highway Improvements are likely to include rotary bored piling and surface compaction through the use of vibratory rollers. Vibratory compaction, through the use of vibratory rollers, is likely to be undertaken during the laying of road surfaces.

6.5.8 Table G6-9 presents both the effect magnitudes and criteria values that have been adopted to assess the magnitude of change from construction vibration. These values have been adopted to represent the onset of effects for human vibration response and building damage. The significance of these effects are

considered based on the methodology set out in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1).

Table 6-9 Adopted magnitude scale for construction vibration

Magnitude of change	Vibration level threshold (peak particle velocity mm/s)
Large	≥10.0
Medium	5.0-9.9
Small	1.0-4.9
Negligible	<1.0

6.5.9 A vibration level of 1mm/s has been selected to represent the onset of *small* magnitude of change, which according to BS5228-2 [RD3] represents a level that can be tolerated if warning and explanation has been given to residents.

6.5.10 A vibration level of 10mm/s has been adopted to represent the onset of a 'large' magnitude of change and is a point at which vibration is likely to be intolerable to humans for anything more than a very brief period of exposure inside buildings.

6.5.11 Whilst not directly promulgated in the relevant guidance, a further value of 5mm/s has been applied to provide a suitable threshold for the onset of a 'medium' magnitude of change in vibration.

6.5.12 The adopted magnitude of change criteria for vibration from plant and machinery, presented in table G6-9, jointly caters for potential effects on building occupants and also potential effects on buildings in terms of the risk of cosmetic building damage.

Vibratory compaction from road surfacing

The results of predictions of steady state vibration arising from the use of vibratory rollers during the road surfacing works are presented under each of the study area subsections, below. The radial distance from the roller, where free-field vibration levels are likely to be equal to the guideline vibration levels, has been determined using the calculation methodology in BS5228-2 [RD3]. These radial distances, of a 12t vibratory roller, are displayed below in table G6-10. Vibration magnitude thresholds are explained within chapter B6 (Application Reference Number: 6.2.6).

Table 6-10 Assessment of vibratory rollers during steady state operation

Magnitude of change	Vibration level threshold (peak particle velocity, mm/s)	Distance from source during steady state operation (m)
Large	10.0	12
Medium	5.0	20
Small	1.0	62
Negligible	<1.0	>62

Rotary bored piling

6.5.13 Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database [RD4] and figures G6-1 to G6-3 (Application Reference Number: 6.7.48) indicates that the closest residential property to the areas requiring bored piling is more than 50m from the source location. BS5228-2 [RD3] presents a summary of historical case history on vibration levels measured during rotary bored piling, presenting a peak particle velocity value of 0.54mm/s at a distance of 5m during auguring mode. As such, vibration effects from rotary bored piling activities associated with the A5025 Off-line Highway Improvements have not been considered further within this chapter (Application Reference Number: 6.7.6) and no magnitude scale is required.

Operation

6.5.14 The operation assessment for the A5025 Off-line Highway Improvements is presented in chapter C5 (Application Reference Number: 6.3.5).

Section 1: Valley

Construction

Noise at residential receptors

6.5.15 Table G6-11 below provides a summary of the total numbers of residential receptors within the section 1 (Valley) study area falling into each effect magnitude category, and an indication of the maximum duration of the likely effects. These figures are based upon consideration of the highest noise level calculated over the entire programme for each receptor, and the longest duration observed from any receptor falling into the effect magnitude category. This ensures that a worst case assessment of the predicted noise levels is reported.

Table 6-11 Summary of noise effects at section 1 residential receptors (high sensitivity)

Magnitude of change (effect)	Noise level from construction activities, dB $L_{Aeq,T}$	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day-time (07:00–19:00)	Maximum number of months that effect occurs
Large	≥75.0	Major significance	0	0
Medium	70.0 – 74.9	Major significance	0	0
Small	65.0 – 69.9	Moderate significance	0	0
Negligible	<65.0*	Minor (not significant)	552	18
* or less than a 3.0dB increase in the pre-existing ambient noise level				

6.5.16 Of the 552 residential receptors that fall within the section 1 study area, all receptors are predicted to receive minor (not significant) adverse effects and the assessment of these receptors is not therefore considered any further in this chapter.

6.5.17 Appendix G6-1 (Application Reference Number: 6.7.18) provides an indication of the total number of residential receptors in the study area which fall into the various effect magnitude categories over each month of the indicative programme.

6.5.18 Figure G6-4 (Application Reference Number: 6.7.48) presents predicted free-field construction noise contours for the associated construction scenario that corresponds to the highest predicted monthly average noise levels over the entire programme. For the A5025 Off-line Highway Improvements in section 1, the worst noise levels occur in months three to five. The contours have been calculated at a height of 4m above ground to represent the worst affected floor of any receptor. This is in line with comparisons of model results at ground and first floor height.

6.5.19 The noise contours for this section show that the worst affected residential property falls within the 50-55 dB $L_{Aeq,T}$ noise band. Only a single residential receptor, near the junction of the A5025 and the A5, is predicted to fall within this band.

6.5.20 Table G6-11 presents the likely significant effects at residential receptors based upon the approach of determining and assessing the calculated noise levels typical (and likely) of those occurring during each month.

6.5.21 Table G6-12 presents a summary of the highest predicted monthly averaged noise level within the section 1 residential area, along with indicative maximum noise levels possible for transient activities taking place close to the significantly affected areas for periods less than a month. The table also indicates the difference between the typical and worst case noise levels in parentheses.

Table 6-12 Indicative highest noise levels during transient activities close to significantly affected residential receptors

Residential area likely to experience significant effects	Highest monthly façade noise level dB $L_{Aeq,T}$	Highest façade noise level during transient activities close to significantly affected receptors dB $L_{Aeq,T}$
Residential properties within Section 1 (Valley) study area	59.2	59.5 (<1)

6.5.22 The values presented in table G6-12 show that the worst case noise levels during short-lived transient activities would be less than 1dB higher than the highest monthly noise level. These levels would still be a negligible magnitude of change.

Noise at non-residential receptors

6.5.23 Appendix G6-1 (Application Reference Number: 6.7.18) presents a summary of the predicted noise levels at non-residential receptors situated within the section 1 study area.

6.5.24 Noise levels at non-residential receptors, including offices and places of worship within this area are expected to be below 65dB $L_{Aeq,T}$, because there are no high sensitivity non-residential receptors within this study area, these are classified as negligible effects and are not significant.

6.5.25 The sensitivity of Public Rights of Ways (PRoWs) is considered to be lower than that of residential properties, as users are mobile and would experience the noise effects for a matter of minutes rather than several hours or days. Taking into account the Institute of Environmental Management and Assessment (IEMA) Guidelines [RD5] where nationally recognised footpaths are identified as potential noise-sensitive receptors, a sensitivity of medium has been assigned.

6.5.26 There are a number of PRoWs surrounding section 1 study area, particularly to the north of the main working areas. Users of these would typically be subject to noise levels below 39dB $L_{Aeq,T}$. This would be assessed as negligible and are therefore not significant.

Vibration

Vibration effects at residential receptors

Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database indicates that there are no residential properties within 62m of the boundary of the areas where vibratory rollers would be used. Therefore, all dwellings are expected to experience vibration levels of less than 1.0mm/s, which would be a magnitude of negligible and therefore assessed as being of minor adverse significance.

Vibration effects at non-residential receptors

6.5.27 All non-residential receptors within the Section 1 (Valley) study area lie beyond 62m from the boundary of the areas where vibratory rollers would be used. These properties would therefore experience vibration levels of less than 1.0mm/s, which would be an effect magnitude of negligible and would not be significant.

6.5.28 PRoWs (of medium sensitivity) located within the section 1 study area and their associated assessment of magnitudes of effects are shown in table G6-13. PRoWs within the section 1 study area are displayed on figure G6-1 (Application Reference Number: 6.7.48).

Table 6-13 Summary of vibration effects at section 1 residential PRoWs (medium sensitivity)

PRoW receptor ID	Section	Approximate distance to works (m)	Magnitude of change
49/009/1	Section 1	>200m	Negligible
49/016/2	Section 1	10	Moderate adverse

Effects on building structures

6.5.29 A roller would not be used within 12m of any building within the Section 1 (Valley) study area; therefore, vibration levels are likely to be below 10mm/s (i.e. of medium magnitude or less), and the effects on buildings (low sensitivity receptors) are considered likely to be minor adverse as a worst case and are therefore assessed as not significant. This conclusion is supported by guidance in BS5228-2 [RD3], which states, "*the probability of damage (to buildings) tends towards zero at 12.5mm/s peak component particle velocity*".

Section 3: Llanfachraeth

Construction

Noise

6.5.30 Table G6-14 below provides a summary of the total numbers of residential receptors within the section 3 (Llanfachraeth) study area falling into each effect magnitude category, and an indication of the maximum duration of the likely effects. These figures are based upon consideration of the highest noise level calculated over the entire programme for each receptor, and the longest duration observed from any receptor falling into the effect magnitude category. This ensures that a worst case assessment of the predicted noise levels is reported.

Table 6-14 Summary of noise effects at section 3 residential receptors (high sensitivity)

Magnitude of change (effect)	Noise level from construction activities dB $L_{Aeq,T}$	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during daytime (07:00–19:00)	Maximum number of months that effect occurs
Large	≥75.0	Major significance	2	6
Medium	70.0 – 74.9	Major significance	1	12
Small	65.0 – 69.9	Moderate significance	13	14

Magnitude of change (effect)	Noise level from construction activities dB $L_{Aeq,T}$	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during daytime (07:00–19:00)	Maximum number of months that effect occurs
Negligible	<65.0*	Minor (not significant)	218	18
* or less than a 3dB increase in the pre-existing ambient noise level				

6.5.31 Of the 234 residential receptors that fall within the section 3 study area, 16 (or 7%) are expected to experience significant effects (either moderate or major adverse) based on the embedded mitigation assumptions set out above. The calculated magnitudes of effects at all other receptors comprise minor (not significant) adverse effects and are not therefore considered any further in this chapter.

6.5.32 Significant adverse noise effects (moderate or major) at residential properties in Llanfachraeth are located at properties within 50m of the works area and occur throughout the duration of the programme. The greatest number of major significance effects are expected between months nine and ten.

6.5.33 Appendix G6-1 (Application Reference Number: 6.7.18) provides an indication of the total number of residential receptors in the study area which fall into the various effect magnitude categories over each month of the indicative programme.

6.5.34 Figure G6-5 (Application Reference Number: 6.7.48) presents predicted free-field construction noise contours for the associated construction scenario that corresponds to the highest predicted monthly average noise levels over the entire programme. For the A5025 Off-line Highway Improvements in section 3, the worst noise levels occur in months nine and ten of its construction works programme. The contours have been calculated at a height of 4m above ground to represent the worst affected floor of any receptor. This is in line with comparisons of model results at ground and first floor height.

6.5.35 The noise contours for this section show that the worst affected residential property falls within the 70-75dB $L_{Aeq,T}$ noise band. Only a single residential receptor, an outlying property to the north of Llanfachraeth, is predicted to fall within this band. A further two properties, within the residential Parc Llynnon area, fall within the 65-70dB $L_{Aeq,T}$ noise band.

6.5.36 Table G6-14 presents the likely significant effects at residential receptors based upon the approach of determining and assessing the calculated noise levels typical (and likely) of those occurring during each month.

6.5.37 Table G6-15 presents a summary of the highest predicted monthly averaged noise level within the section 3 residential areas, along with indicative highest noise levels possible for transient activities taking place close to the significantly affected areas for periods less than a month. The table also

indicates the difference between the typical and worst case noise levels in parentheses.

Table 6-15 Indicative highest noise levels during transient activities close to significantly affected residential receptors

Residential area likely to experience significant effects	Highest monthly façade noise level dB $L_{Aeq,T}$	Highest façade noise level during transient activities close to significantly affected receptors dB $L_{Aeq,T}$
Residential properties in Llanfachraeth study area	78.8	79.7 (<1)

6.5.38 The values presented in table G6-15 show that, in the areas where significant effects have been identified from likely noise levels during each month, it is possible that the worst case noise levels during short-lived transient activities would be less than 1dB higher than the highest predicted typical monthly noise level.

Noise at non-residential receptors

6.5.39 Appendix G6-1 (Application Reference Number: 6.7.18) presents a summary of the predicted noise levels at non-residential receptors situated within the section 3 study area.

6.5.40 Noise levels at all non-residential receptors within this area, such as places of worship and the village hall, are expected to be below 65dB $L_{Aeq,T}$, and because there are no high sensitivity non-residential receptors within this study area, these are classified as negligible effects and are not significant.

6.5.41 There are a number of PRoWs surrounding section 3, predominantly running east and west from the A5025. Users of these would typically be subject to noise levels below 65dB $L_{Aeq,T}$. This would be assessed as negligible and are therefore not significant.

Vibration

Vibration effects at residential receptors

6.5.42 Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database indicates that there are eight residential properties within 62m of the boundary of the areas where vibratory rollers would be used. Of these, three dwellings are located between 12m and 20m of the works. These three dwellings are expected to experience vibration levels of between 5mm/s and 10mm/s, which would be a magnitude of medium and therefore assessed as being of major adverse significance. The further five dwellings are located between 20m and 62m from the works and would be a magnitude of small and therefore the effect is assessed as being of moderate adverse significance.

6.5.43 Of the 234 residential receptors that fall within the section 3 study area, eight (or 3%) are expected to experience adverse significant effects from vibration (either moderate or major) based on the embedded mitigation assumptions

set out above. The calculated magnitudes of effects at all other receptors comprise minor (not significant) adverse effects and are not therefore considered any further in this chapter.

Vibration effects at non-residential receptors

6.5.44 All non-residential receptors within the section 3 area lie beyond 62m from the boundary of the areas where vibratory rollers would be used. These properties would therefore experience vibration levels of less than 1.0mm/s, which would be an effect magnitude of negligible and would not be significant.

6.5.45 PRoWs (of medium sensitivity) located within the section 3 study area and their associated assessment of magnitudes of effects are shown in table G6-16. PRoWs within the section 3 study area are displayed on figure G6-1 (Application Reference Number: 6.7.48).

Table 6-16 Summary of vibration effects at section 3 residential PRoWs (medium sensitivity)

PRoW receptor ID	Section	Approximate distance to works (m)	Magnitude of change
27/012/1	Section 3	10	Moderate adverse
27/018/1	Section 3	10	Moderate adverse
27/018/1	Section 3	10	Moderate adverse
27/019/1	Section 3	100	Negligible
27/020/1	Section 3	10	Moderate adverse
49/011/1	Section 3	>200	Negligible
49/014/2	Section 3	10	Moderate adverse

Effects on building structures

6.5.46 A roller would not be used within 12m of any building within the Llanfachraeth area; therefore, vibration levels are likely to be below 10mm/s (i.e. of medium magnitude). Three buildings within the study area are expected to be subject to vibration levels of between 5mm/s and 10mm/s. At these buildings (medium sensitivity receptors), the effects are considered likely to be of moderate significance. The calculated magnitudes of effects at all other buildings comprise minor (not significant) effects and are not therefore considered any further in this chapter. This conclusion is supported by guidance in BS5228-2 [RD3], which states, "*the probability of damage (to buildings) tends towards zero at 12.5mm/s peak component particle velocity*".

Section 5: Llanfaethlu

Construction

Noise

6.5.47 Table G6-17 below provides a summary of the total numbers of residential receptors within the section 5 (Llanfaethlu) study area falling into each effect

magnitude category, and an indication of the maximum duration of the likely effects. These figures are based upon consideration of the highest noise level calculated over the entire programme for each receptor, and the longest duration observed from any receptor falling into the effect magnitude category. This ensures that a worst case assessment of the predicted noise levels is reported.

Table 6-17 Summary of noise effects at section 5 residential receptors (high sensitivity)

Magnitude of change (effect)	Noise level from construction activities dB $L_{Aeq,T}$	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day-time (07:00–19:00)	Maximum number of months that effect occurs
Large	≥75.0	Major significance	3	7
Medium	70.0 – 74.9	Major significance	3	9
Small	65.0 – 69.9	Moderate significance	4	8
Negligible	<65.0*	Minor (not significant)	146	18
* or less than a 3.0dB increase in the pre-existing ambient noise level				

6.5.48 Of the 156 residential receptors that fall within the section 5 study area, ten (or 6%) are expected to experience adverse significant effects (either moderate or major) based on the embedded mitigation assumptions set out above. The calculated magnitudes of effects at all other receptors are expected to receive minor (not significant) adverse effects and the assessment of these receptors is not therefore considered any further in this chapter.

6.5.49 Significant adverse noise effects at residential properties in Llanfaethlu are located at properties within 50m of the works area and occur across the first 11 months of the programme, but with the highest levels of significance predicted during month ten. Month ten coincides with the breakup and removal of the existing road surface.

6.5.50 Appendix G6-1 (Application Reference Number: 6.7.18) provides an indication of the total number of residential receptors in the study area, which fall into the various effect magnitude categories over each month of the indicative programme.

6.5.51 Figure G6-4 (Application Reference Number: 6.7.48) presents predicted free-field construction noise contours for the associated construction scenario that corresponds to the highest predicted monthly average noise levels over the entire programme. For the A5025 Off-line Highway Improvements in section 5, the worst noise levels occur in months three to five of the construction works programme. The contours have been calculated at a height of 4m above

ground to represent the worst affected floor of any receptor. This is in line with comparisons of model results at ground and first floor height.

6.5.52 The noise contours for this section show that the worst affected residential properties fall within the 70-75dB $L_{Aeq,T}$ noise band. Two residential receptors, outlying properties to the north east of Llanfaethlu, are predicted to fall within this band. A further two properties, outlying properties to the south east of Llanfaethlu, fall within the 65-70dB $L_{Aeq,T}$ noise band.

6.5.53 Table G6-17 presents the likely significant effects at residential receptors based upon the approach of determining and assessing the calculated noise levels typical (and likely) of those occurring during each month.

6.5.54 Table G6-18 presents a summary of the highest predicted monthly averaged noise level within the section 5 residential areas, along with indicative maximum noise levels possible for transient activities taking place close to the significantly affected areas for periods less than a month. The table also indicates the difference between the typical and worst case noise levels in parentheses.

Table 6-18 Indicative highest noise levels during transient activities close to significantly affected residential receptors

Residential area likely to experience significant effects	Highest monthly façade noise level dB $L_{Aeq,T}$	Highest façade noise level during transient activities close to significantly affected receptors dB $L_{Aeq,T}$
Residential properties in Llanfaethlu study area	77.8	82.1 (4.3)

The values presented in table G6-18 show that, in the areas where significant effects have been identified from likely noise levels during each month, it is possible that the worst case noise levels during short-lived transient activities could be up to 4.3dB higher than the highest predicted typical monthly noise level.

Noise at non-residential receptors

6.5.55 Appendix G6-1 (Application Reference Number: 6.7.18) presents a summary of the predicted noise levels at non-residential receptors situated within the section 5 study area.

6.5.56 Noise levels at all non-residential receptors within this area are expected to be below 65dB $L_{Aeq,T}$, which is classified as a negligible magnitude of change at all non-residential receptors within this study area, apart from at Ysgol Rhyd Y Llan Llanfaethlu (school).

6.5.57 All schools are considered as having a high sensitivity; as such, a negligible magnitude of change at Ysgol Rhyd y Llan, Llanfaethlu is considered to be of minor adverse significance (not significant).

6.5.58 There are a number of PRoWs surrounding the section 5 study area, particularly to the north and west of the working area. Users of these would

typically be subject to noise levels below 63dB $L_{Aeq,T}$. This would be assessed as negligible and are therefore not significant.

Vibration

Vibration effects at residential receptors

6.5.59 Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database indicates that there are nine residential properties within 62m of the boundary of the areas where vibratory rollers would be used. Of these, five dwellings are located 12m or less from the works. These five dwellings are expected to experience vibration levels greater than 10mm/s, which would be assigned a magnitude of major and therefore assessed as being of major adverse significance. Four dwellings are located between 12m and 20m from the works and these would be expected to receive a vibration magnitude of medium, therefore the effect is also assessed as being of major adverse significance. Three further properties are located between 20m and 62m from the works, which would experience an effect of small magnitude and are therefore assessed as experiencing an effect of moderate adverse significance.

6.5.60 Of the 156 residential receptors that fall within the section 5 study area, nine (or 6%) are expected to experience significant effects from vibration (either moderate or major) based on the embedded mitigation assumptions set out above. The calculated magnitudes of effects at all other receptors comprise minor (not significant) effects and are therefore not considered any further in this chapter.

Vibration effects at non-residential receptors

6.5.61 Three non-residential receptors within the section 5 area lie between 20m and 62m from the boundary of the areas where vibratory rollers would be used. These receptors are all commercial, with a low sensitivity. Therefore, a minor adverse impact is expected due to the use of the vibratory rollers. All other non-residential properties in this study area, including the new school (section 5 study area), lie beyond 62m from the boundary of the areas where vibratory rollers would be used. These properties would therefore experience vibration levels of less than 1.0mm/s, which would be an effect magnitude of negligible and would not be significant.

6.5.62 PRoWs (of medium sensitivity) located within section 5 study area and their associated assessment of magnitudes of effects are shown in table G6-19. PRoWs within the section 5 study area are displayed on figure G6-2 (Application Reference Number: 6.7.48).

Table 6-19 Summary of vibration effects at section 5 residential PRoWs (medium sensitivity)

PRoW receptor ID	Section	Approximate distance to works (m)	Magnitude of change
29/007/2	Section 5	>200	Negligible
29/008/1	Section 5	50	Minor adverse
29/011/4	Section 5	>200	Negligible
29/013/01	Section 5	10	Moderate adverse
29/029/1	Section 5	160	Negligible

Effects on building structures

6.5.63 A roller would be used within 12m of five buildings within the Llanfaethlu area; therefore, vibration levels at these properties could exceed 10mm/s (i.e. be of large magnitude). At these buildings (medium sensitivity receptors), the effects are considered likely to be of a major adverse significance. A further four buildings are located between 12m and 20m of the planned road surfacing activity. At these buildings (medium sensitivity receptors), the magnitude is expected to be between 5mm/s and 10mm/s, which would be a medium magnitude. These effects are considered to be of a moderate adverse significance. The calculated magnitudes of effects at all other buildings comprise minor (not significant) adverse effects and are not therefore considered any further in this chapter. This conclusion is supported by guidance in BS5228-2 [RD3], which states, "*the probability of damage (to buildings) tends towards zero at 12.5mm/s peak component particle velocity*".

Section 7: Cefn Coch

Construction

Noise

6.5.64 Table G6-20 below provides a summary of the total numbers of residential receptors within the section 7 (Cefn Coch) study area falling into each effect magnitude category, and an indication of the maximum duration of the likely effects. These figures are based upon consideration of the highest noise level calculated over the entire programme for each receptor, and the longest duration observed from any receptor falling into the effect magnitude category. This ensures that a worst case assessment of the predicted noise levels is reported.

Table 6-20 Summary of noise effects at residential receptors (high sensitivity)

Magnitude of change (effect)	Noise level from construction activities dB $L_{Aeq,T}$	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day-time (07:00–19:00)	Maximum number of months that effect occurs
Large	≥75.0	Major significance	0	0
Medium	70.0 – 74.9	Major significance	2	6
Small	65.0 – 69.9	Moderate significance	10	11
Negligible	<65.0*	Minor (not significant)	19	18
* or less than a 3.0dB increase in the pre-existing ambient noise level				

6.5.65 Of the 31 residential receptors that fall within the section 7 study area, 12 (or 39%) are expected to experience significant adverse effects (either moderate or major) based on the embedded mitigation assumptions set out above. The calculated magnitudes of effects at all other receptors comprise minor (not significant) adverse effects and are not therefore considered any further in this chapter.

6.5.66 Significant noise effects at residential properties in Cefn Coch are located at properties within 50m of the works area and occur across the length of the programme, but with the highest levels of significance predicted during month ten of the programme.

6.5.67 Appendix G6-1 (Application Reference Number: 6.7.18) provides an indication of the total number of residential receptors in the study area which fall into the various effect magnitude categories over each month of the indicative programme.

6.5.68 Figure G6-6 (Application Reference Number: 6.7.48) presents predicted free-field construction noise contours for the associated construction scenario that corresponds to the highest predicted monthly average noise levels over the entire programme. For the A5025 Off-line Highway Improvements in section 7, the worst noise levels occur in months three to five of the construction works programme. The contours have been calculated at a height of 4m above ground to represent the worst affected floor of any receptor. This is in line with comparisons of model results at ground and first floor height.

6.5.69 The noise contours for this section show that the worst affected residential properties fall within the 65-70dB $L_{Aeq,T}$ noise band. Five residential receptors, rural properties adjacent to the A5025, are predicted to fall within this band.

6.5.70 Table G6-20 presents the likely significant effects at residential receptors based upon the approach of determining and assessing the calculated noise levels typical (and likely) of those occurring during each month.

6.5.71 Table G6-21 presents a summary of the highest predicted monthly averaged noise level within the section 7 residential area, along with indicative maximum noise levels possible for transient activities taking place close to the significantly affected areas for periods less than a month. The table also indicates the difference between the typical and worst case noise levels in parentheses.

Table 6-21 Indicative highest noise levels during transient activities close to significantly affected residential receptors

Residential area likely to experience significant effects	Highest monthly façade noise level dB $L_{Aeq,T}$	Highest façade noise level during transient activities close to significantly affected receptors dB $L_{Aeq,T}$
Residential properties in Cefn Coch study area	72.9	77.0 (4.1)

6.5.72 The values presented in table G6-21 show that, in the areas where significant effects have been identified from likely noise levels during each month, it is possible that the worst case noise levels during short-lived transient activities could be up to 4.1dB higher.

Noise at non-residential receptors

6.5.73 There are no non-residential sensitive receptor buildings within the Cefn Coch study area.

6.5.74 There are a number of PRoWs surrounding the section 7 study area, particularly to the north of the main working area. Users of these would typically be subject to noise levels below 63dB $L_{Aeq,T}$. This would be assessed as negligible and therefore not significant.

Vibration

Vibration effects at residential receptors

6.5.75 Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database indicates that there are four residential properties within 62m of the boundary of the areas where vibratory rollers would be used. Of these, a single dwelling is located between 12m and 20m from the works, which would be expected to receive a vibration magnitude of medium and therefore also assessed as being of major adverse significance. Three further properties are located between 20m and 62m from the works and would be expected to receive a vibration magnitude of small and therefore assessed as a moderate adverse significance.

6.5.76 Of the 31 residential receptors that fall within the section 7 study area, four (or 13%) are expected to experience significant effects from vibration (either moderate or major) based on the embedded mitigation assumptions set out above. The calculated magnitudes of effects at all other receptors comprise minor (not significant) adverse effects and are not therefore considered any further in this chapter.

Vibration effects at non-residential receptors

6.5.77 There are no non-residential sensitive receptors in section 7 that lie within 62m of the boundary of the areas where vibratory rollers would be used. These properties would therefore experience vibration levels of less than 1.0mm/s, which would be an effect magnitude of negligible and would not be significant.

6.5.78 PRoWs (of medium sensitivity) located within section 7 study area and their associated assessment of magnitudes of effects are shown in table G6-22. PRoWs within the section 7 study area are displayed on figure G6-2 (Application Reference Number: 6.7.48).

Table 6-22 Summary of vibration effects at section 7 residential PRoWs (medium sensitivity)

PRoW receptor ID	Section	Approximate distance to works (m)	Magnitude of change
18/067/01	Section 7	60	Minor adverse
18/017/1	Section 7	190	Negligible
33/033A/1	Section 7	180	Negligible
38/029/1	Section 7	>200	Negligible
38/0300B/1	Section 7	10	Moderate adverse

Effects on building structures

6.5.79 A roller would not be used within 12m of any building within the Cefn Coch area; therefore, vibration levels are not expected to exceed 10mm/s. There is a single building located between 12m and 20m from the road surfacing works. At this building (medium sensitivity receptor), the effects are considered likely to be of a moderate significance. The calculated magnitudes of effects at all other buildings comprise minor (not significant) or negligible effects and are not therefore considered any further in this chapter. This conclusion is supported by guidance in BS5228-2 [RD3], which states, "*the probability of damage (to buildings) tends towards zero at 12.5mm/s peak component particle velocity*".

Power Station Access Road Junction

Construction

Noise

6.5.80 Table G6-23 below provides a summary of the total numbers of residential receptors within the Power Station Access Road Junction study area falling into each effect magnitude category, and an indication of the maximum duration of the likely effects. These figures are based upon consideration of the highest noise level calculated over the entire programme for each receptor, and the longest duration observed from any receptor falling into the effect magnitude category. This ensures that a worst case assessment of the predicted noise levels is reported.

Table 6-23 Summary of noise effects at residential receptors (high sensitivity)

Magnitude of change (effect)	Noise level from construction activities dB $L_{Aeq,T}$	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day-time (07:00–19:00)	Maximum number of months that effect occurs
Large	≥75.0	Major significance	0	0
Medium	70.0 – 74.9	Major significance	0	0
Small	65.0 – 69.9	Moderate significance	0	0
Negligible	<65.0*	Minor (not significant)	31	18
* or less than a 3dB increase in the pre-existing ambient noise level				

6.5.81 Of the 31 residential receptors that fall within the Power Station Access Road Junction area, all receptors are predicted to receive minor (not significant) adverse effects and the assessment of these receptors is not therefore considered any further in this chapter.

6.5.82 Appendix G6-1 (Application Reference Number: 6.7.18) provides an indication of the total number of residential receptors in the study area which fall into the various effect magnitude categories over each month of the indicative programme.

6.5.83 Figure G6-6 (Application Reference Number: 6.7.48) presents predicted free-field construction noise contours for the associated construction scenario that corresponds to the highest predicted monthly average noise levels over the entire programme. For the A5025 Off-line Highway Improvements within the Power Station Access Road study area, the worst noise levels occur in months three to five of the construction works programme. The contours have been calculated at a height of 4m above ground to represent the worst affected floor of any receptor. This is in line with comparisons of model results at ground and first floor height.

6.5.84 The noise contours for this section show that the worst affected residential properties fall within the 55-60dB $L_{Aeq,T}$ noise band. Two residential receptors, immediately to the south of the junction, are predicted to fall within this band.

6.5.85 Table G6-23 presents the likely significant effects at residential receptors based upon the approach of determining and assessing the calculated noise levels typical (and likely) of those occurring during each month.

6.5.86 Table G6-24 presents a summary of the highest predicted monthly averaged noise level within the residential areas close to the Power Station Access Road Junction, along with indicative maximum noise levels possible for transient activities taking place close to the significantly affected areas for

periods less than a month. The table also indicates the difference between the typical and worst case noise levels in parentheses.

Table 6-24 Indicative highest noise levels during transient activities close to significantly affected residential receptors

Residential area likely to experience significant effects	Highest monthly façade noise level dB $L_{Aeq,T}$	Highest façade noise level during transient activities close to significantly affected receptors dB $L_{Aeq,T}$
Residential properties in the Power Station Access Road Junction study area	63.9	68.0 (4.1)

6.5.87 The values presented in table G6-24 show that, in the areas where significant effects have been identified from likely noise levels during each month, it is possible that the worst case noise levels during short-lived transient activities could be up to 4.1dB higher.

Noise at non-residential receptors

6.5.88 Appendix G6-1 (Application Reference Number: 6.7.18) presents a summary of the predicted noise levels at non-residential receptors situated within the Power Station Access Road Junction study area.

6.5.89 Noise levels at non-residential receptors within this area, such as the Tregele Service Station, are expected to be below 65dB $L_{Aeq,T}$, which is classified as a negligible magnitude of change as there are no high sensitivity non-residential receptors within this study area.

6.5.90 There are a number of PRoWs surrounding the Power Station Access Road Junction to the south. Users of these would typically be subject to noise levels below 60dB $L_{Aeq,T}$. This would be assessed as negligible and are therefore not significant.

Vibration

Vibration effects at residential receptors

6.5.91 Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database [indicates that there are no residential properties within 62m of the boundary of the areas where vibratory rollers would be used. Therefore, all dwellings in this area are expected to experience vibration levels of less than 1.0mm/s, which would be a magnitude of negligible and therefore assessed as being of minor adverse significance.

Vibration effects at non-residential receptors

6.5.92 All non-residential receptors within the Power Station Access Road Junction study area lie beyond 62m from the boundary of the areas where vibratory rollers would be used. These properties would therefore experience vibration

levels of less than 1.0mm/s, which would be an effect magnitude of negligible and would not be significant.

6.5.93 PRoWs (of medium sensitivity) located within the study area and their associated assessment of magnitudes of effects are shown in table G6-25. PRoWs within this study area are displayed on figure G6-2 (Application Reference Number: 6.7.48).

Table 6-25 Summary of vibration effects at residential PRoWs (medium sensitivity) within the Power Station Access Road study area

PRoW receptor ID	Section	Approximate distance to works (m)	Magnitude of change
38/013/2	Power Station Access Road	45	Minor adverse
38/013/3	Power Station Access Road	70	Negligible

Effects on building structures

6.5.94 A roller would not be used within 12m of any building within the Power Station Access Road Junction study area; therefore, vibration levels are likely to be below 10mm/s (i.e. of medium magnitude or less), and the effects on buildings (low sensitivity receptors) are considered likely to be minor adverse as a worst case and therefore assessed as not significant. This conclusion is supported by guidance in BS5228-2 [RD3], which states, "*the probability of damage (to buildings) tends towards zero at 12.5mm/s peak component particle velocity*".

6.6 Additional mitigation

6.6.1 In accordance with chapter B1 (Application Reference Number: 6.2.1), embedded and good practice mitigation measures relevant to noise and vibration were taken into account when determining the 'pre-mitigation' significance of effects. These are detailed in the design basis and activities section of this chapter.

6.6.2 Additional mitigation measures would be implemented to address potential significant effects identified in the assessment of effects section. These additional mitigation measures are summarised in table G6-26.

6.6.3 Additional mitigation measures are also explained below.

Construction

6.6.4 The impact assessment process has identified that there is the potential for a limited number of both moderate and major significant noise and vibration effects. Consideration has therefore been given to additional mitigation measures, which may reduce the effects experienced by receptors. These mitigation measures are summarised in table G6-26.

Hydraulic breaker

6.6.5 The use of a hydraulic breaker would be required for the construction of the A5025 Off-line Highway Improvements. Horizon would implement mitigation requirements to ensure that quiet plant and techniques are used in order reduce noise emissions. Mitigation measures would be implemented to ensure that noise emissions experienced at the nearest existing noise sensitive receptor, from the use of the hydraulic breaker, are reduced by 10dB(A) from those assumed in the initial noise modelling (as detailed in appendix G6-1 (Application Reference Number: 6.7.18). This could be achieved by use of a temporary mobile barrier, selection of quieter plant or alteration of working methods. The application for prior consent under section 61 of the Control of Pollution Act 1974, to be submitted to the IACC will include a noise assessment, and demonstrate that Best Practical Means have been employed, as per the A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

Vibration risk assessment

6.6.6 Horizon would undertake a vibration risk assessment as part of the Section 61 application for any construction activity involving vibratory or impact equipment (such as vibratory rollers) to be used at the A5025 Off-line Highway Improvements. Horizon would undertake a vibration risk assessment as part of the Section 61 application for any construction activity involving vibratory or impact equipment to be used within the Wylfa Newydd Development Area. This assessment would establish safe working distances for receptors in relation to construction vibration. This would ensure that any equipment that is identified as having potentially adverse vibration effects can be located sufficiently away from any sensitive receptors, so that any effects on such receptors could be reduced to negligible. Where works are required within the safe working distances, alternative equipment or working methods would be investigated and vibration levels would be reduced to the greatest extent practicable. The Section 61 application would also describe appropriate vibration monitoring which would be carried out at the closest receptors to determine the success of these requirements. Where adopted alternative equipment and working methods still result in significant effects on sensitive receptors, respite periods would be considered, as per the A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

Community liaison

6.6.7 A Community Liaison Group would be established and construction issues would be regularly discussed between Horizon and representatives from the local community, as per the community liaison strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

6.6.8 The overall commitments to additional noise and vibration mitigation measures are summarised in table G6-26.

Table 6-26 Additional mitigation measures – construction

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques.	Reduce the level of noise from this item of plant.	Reduces the magnitude of change at receptors closest to the breakup of existing road surface.
Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Reduce significant impacts of building damage from use of vibratory roller.	Reduces the magnitude of change by reducing the vibration level of the source.
Community liaison – agree mutually convenient times with local residents or arrange respite periods.	Reduce community effects.	Community liaison protocol to be compliant with Wylfa Newydd CoCP (Application Reference Number: 8.6).

Operation

6.6.9 Horizon is committed to a voluntary Local Noise Mitigation Strategy which offers secondary glazing to properties within the Local Noise Mitigation Strategy boundary area for the main site and along the A5025. Horizon are also committed to ongoing monitoring of noise effects and considering potentially additional eligibility of affected properties during construction as part of the Section 61 process in due course, as per the Wylfa Newydd CoCP (Application Reference Number: 8.6).

6.7 Residual effects

6.7.1 This section describes the residual effects for noise and vibration having taken into account the embedded, good practice and additional mitigation described above. Table G6-27 below provides a summary of significant residual effects identified either prior to or post application of additional mitigation for the construction phase.

6.7.2 All effects of minor significance or greater identified in the assessment of effects section are summarised in appendix I3-1 (master residual effects table, Application Reference Number: 6.9.8).

Table 6-27 Summary of residual effects

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Construction								
PRoW within Valley area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: Effects anticipated to occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of two residential properties close to the works within the Llanfachraeth area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over periods of between one month and six months. Noise predominantly from Boundary Fence and Break up and removal of existing road surface activities. Effects from dominant noise sources would potentially be intermittent during works schedule.	Large	Major adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Large at one property, medium at the other	Major adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of a single residential property close to the works within the Llanfachraeth area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over two month periods. Noise predominantly from boundary fence and break up and removal of existing road surface activities. Effects from dominant noise sources would potentially be intermittent due activity sequencing.	Medium	Major adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Small	Moderate adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of 13 residential properties within the Llanfachraeth area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over periods of between one month and six months. Noise predominantly from bulk earthworks formation works, break up, removal of existing road surface activities and road surfacing. Effects from dominant noise sources would potentially be intermittent due to nature of the works required.	Small	Moderate adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Small at six properties, negligible at seven	Moderate adverse at six properties, minor adverse at seven

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of three residential properties within the Llanfachraeth area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and six months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Major adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor Adverse
Occupants of five residential properties within the Llanfachraeth area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and six months however, vibratory roller use effects likely to be intermittent during works schedule.	Small	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor Adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
PRoW within Llanfachraeth area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and six months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible
Three building structures within Llanfachraeth area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and six months however, vibratory roller use effects likely to be intermittent during works schedule)	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of three residential properties within the Llanfaethlu area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated occur over periods of between one month and seven months. Noise predominantly from bulk earthworks cut and fill and bulk earthworks formation works. Noise effects primarily from the use of motor grader. Potential for intermittent use of plant during programmed works schedule.	Large	Major adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Large at one property, medium at two	Major adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of three residential properties within the Llanfaethlu area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over periods of between one month and four months. Noise predominantly from bulk earthworks cut and fill. Noise effects primarily from the use of motor grader. Potential for intermittent use of plant during programmed works schedule.	Medium	Major adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Medium	Major adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of four residential properties within the Llanfaethlu area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over periods of between three months and eight months. Noise predominantly from bulk earthworks cut and fill, earthworks formation works and road surfacing. Noise effects primarily from the use of motor grader and road planer. Potential for intermittent use of plant during programmed works schedule.	Small	Moderate adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Small	Moderate adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of five residential properties close to the works within the Llanfaethlu area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to last occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Large	Major adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor Adverse
Occupants of a single residential property within the Llanfaethlu area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Major adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor Adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of three residential properties within the Llanfaethlu area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and four months, however, vibratory roller use effects likely to be intermittent during works schedule.	Small	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor Adverse
PRoW within Llanfaethlu area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Five building structures within Llanfaethlu area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Large	Major adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible
Four building structures within Llanfaethlu area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of two residential properties within the Cefn Coch area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over periods of between two months and six months. Noise predominantly from bulk earthworks cut and fill, and road surfacing. Noise effects primarily from the use of motor grader and road planer. Potential for intermittent use of plant during programmed works schedule.	Medium	Major adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Medium at one property, small at one	Major adverse at one property, moderate adverse at one

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of ten residential properties within the Cefn Coch area affected by noise	High	Construction noise	Exposed to elevated levels of noise: effects anticipated to occur over periods of between two months and 11 months. Noise predominantly from bulk earthworks cut and fill, bulk earthworks formation works and road surfacing. Noise effects primarily from the use of motor grader and road planer. Potential for intermittent use of plant during programmed works schedule.	Small	Moderate adverse	Acoustic screening around hydraulic breaker/s, selection of quieter plant and/or alteration of working techniques; and schedule works at mutually convenient times	Small at nine properties, negligible at one	Moderate adverse at nine properties, minor adverse at one

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Occupants of a single residential property within the Cefn Coch area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and five months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Major adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor adverse
Occupants of three residential properties within the Cefn Coch area affected by vibration	High	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and five months however, vibratory roller use effects likely to be intermittent during works schedule.	Small	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Minor adverse

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
PRoW within Cefn Coch area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and five months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible
A single building structure within Cefn Coch area affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and five months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
PRoW close to the Power Station Access Road Junction affected by vibration	Medium	Construction vibration	Exposed to elevated levels of vibration: effects anticipated to occur over periods of between one month and four months however, vibratory roller use effects likely to be intermittent during works schedule.	Medium	Moderate adverse	Vibration risk assessment to be undertaken to establish if safe working distances are available, otherwise alternative methods will be adopted.	Negligible	Negligible

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6.8 References

Table 6-28 Schedule of references

ID	Reference
RD1	Highways Agency. 2011. *Design Manual for Roads and Bridges* Vol 11 Environmental Assessment Section 3 Part 7 Noise and Vibration (HD213/11 – Revision 1). [Online]. [Accessed October 2017]. Available from: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/hd21311.pdf
RD2	British Standards Institution. 2014. *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1 Noise.* London: British Standards Institution.
RD3	British Standards Institution. 2014. *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 2 Vibration.* London: British Standards Institution.
RD4	Ordnance Survey. 2017. *OS MasterMap Address Layer 2*. Southampton: Ordnance Survey.
RD5	Institute of Environmental Management and Assessment. 2014. *Guidelines for Environmental Noise Impact Assessment*. Lincoln: Institute of Environmental Management and Assessment.

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