HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.8.6 ES Volume H - Logistics Centre H6 - 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, operation and decommissioning of the Logistics Centre at Parc Cybi.

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) 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 This chapter makes reference to other volumes and chapters contained within the Wylfa Newydd Environmental Statement, namely:

- chapter B6 (Application Reference Number: 6.2.6);
- chapter C5 (Application Reference Number: 6.3.5); and
- chapter H11 (cultural heritage) (Application Reference Number: 6.8.11).

6.2 Study area

6.2.1 This section describes the study area(s) relevant to the noise and vibration assessment for the Logistics Centre. The study area adopted for the Logistics Centre comprises a zone measuring approximately 600m from the development site boundary. The topic study area has been identified using professional judgement and the *Design Manual for Roads and Bridges* [RD1] as there is no current authoritative guidance on how far a noise study area should extend from the construction activities or operational noise sources. During the assessment process, this 600m zone was refined to include additional receptors beyond 600m with the potential to experience significant noise effects. Further details on receptor identification are presented in chapter B6 (Application Reference Number: 6.2.6).

6.2.2 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 construction and operation of the Logistics Centre, and is presented in table H6-1.

Table H6-1 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

Identified receptors

6.2.3 The following groups of residential receptors near to the Logistics Centre site have been defined, and are shown in figure H6-1 (Application Reference Number: 6.8.29) along with the study area:

- residential properties at Penrhyn Geiriol, southwest of the Logistics Centre, the closest of which is approximately 500m from the site boundary;
- residential properties at Tyddyn-Uchaf, south of the Logistics Centre, the closest of which is approximately 400m from the site boundary; and
- residential properties at Kingsland Road, the closest of which is approximately 530m from the site boundary.

6.2.4 Other identified receptors are users of:

- commercial premises located at Penrhos Industrial Estate, north of the Logistics Centre, the closest of which is approximately 380m from the site boundary; and
- industrial premises located in between the A55 and London Road, northeast of the Logistics Centre, the closest of which is approximately 410m from the site boundary.

6.2.5 A planning application to build a new hotel to the north of the Logistics Centre was submitted in August 2017. Planning permission for this proposed hotel was granted late 2017. The proposed location for the proposed hotel is understood to be at approximately 450m from the Logistics Centre site boundary and will therefore fall within the Logistics Centre study area.

6.2.6 There are no high sensitivity, non-residential receptors (hospitals and schools), medium sensitivity receptors (places of worship, community facilities) or Public Rights of Way either within or in the vicinity of the 600m study area.

6.2.7 The key heritage receptors are described in chapter H11 (Application Reference Number: 6.8.11), and public access and recreational receptors in chapter H4 (public access and recreation) (Application Reference Number: 6.8.4).

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.

Noise

6.3.2 Noise monitoring was undertaken at five locations in the vicinity of the proposed Logistics Centre, during May 2017. This comprised long-term monitoring within the footprint of the proposed development and four additional short-term measurements, undertaken in the vicinity of nearby sensitive properties. Details of the noise-monitoring locations are described in table H6-2, whilst the noise-monitoring results are summarised in tables H6-3 and H6-4. The location of the noise monitoring locations is presented on figure H6-1 (Application Reference Number: 6.8.29). Full details of the noise monitoring including the noise survey results, details of the equipment used and methodology employed are presented in chapter B6 (Application Reference Number: 6.2.6).

Table H6-2 Logistics Centre baseline monitoring locations

Monitoring point reference	Location	Comments
PC1	Location of proposed Logistics Centre	Long term – duration one week
PC2	Adjacent to existing residential properties at Maes Y Delyn	Short term
PC3	Adjacent to existing residential properties at Kingsland Road	Short term
PC4	Adjacent to existing residential properties at Penrhyn Geiriol	Short term
PC5	Adjacent to Trearddur Bay caravan park	Short term

6.3.3 Table H6-3 presents the noise levels for the day-time, evening/weekend and night-time 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.

Table H6-3 Baseline noise levels – Summary of $L_{Aeq,T}$ noise levels for use in construction noise assessment

Monitoring point reference	$L_{Aeq,T}$ dB		
	Day-time	Evening and weekends	Night-time
PC1	50	48	49

Monitoring point reference	$L_{Aeq,T}$ dB		
	Day-time	Evening and weekends	Night-time
PC2	52	-	33
PC3	69	-	50
PC4	54	-	37

6.3.4 Table H6-4 presents the $L_{A90,T}$ noise levels for use in the operational assessment. The mode values presented in table H6-4 are the values that occur the most in the PC1 (long term) measured dataset. The derived values presented for PC2 – PC4 (short term) are based on analysis of the noise level differences between PC1 and short-term locations (PC2, PC3, PC4). From these differences, correction factors have been established and applied to the PC1 mode values to derive day-time and night-time background L_{A90} values for PC2 – PC4. Full details on the derivation of background noise levels, including the correction factors are presented in appendix B6-1 (baseline noise monitoring) (Application Reference Number: 6.2.20).

Table H6-4 Baseline noise levels – Summary of $L_{A90,T}$ noise levels for use in operational assessment (BS 4142)

Monitoring point reference	Mode		Derived	
	Day-time $L_{A90,16h}$ dB	Night-time $L_{A90,8h}$ dB	Day-time $L_{A90,16h}$ dB	Night-time $L_{A90,8h}$ dB
PC1	43	40	-	-
PC2	-	-	42	32
PC3	-	-	48	35
PC4	-	-	37	33

Vibration

6.3.5 No significant sources of vibration sources were identified in the immediate vicinity of the identified sensitive receptors at the Logistics Centre site, 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 within the area, the baseline vibration environment is dominated by passing traffic on the A55.

Evolution of the baseline

6.3.6 Between the baseline noise surveys and the construction of the Logistics Centre, 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.

6.3.7 The overall Parc Cybi site extends to approximately 56 hectares (ha). The proposed Logistics Centre footprint is just over 3ha. Parc Cybi has outline planning permission for the proposed development of distribution and warehousing space and to support transport operators at the Port of Holyhead.

6.3.8 Road traffic is likely to increase gradually over time, in common with most areas of the UK and there is likely to be a change in the annual average daily traffic flow due to the committed development of Parc Cybi. However, an increase of 25% in traffic flow in the short term would generally be required before an increase in traffic noise level is likely to be perceptible. A traffic flow increase of this level is considered to be unlikely to occur and so baseline levels have not been adapted to account for this increase.

6.3.9 To ensure a worst case assessment, baseline levels collected in May 2017 and as presented in tables H6-3 and H6-4 have been used.

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 H1 (proposed development) (Application Reference Number: 6.8.1), the application for development consent is based on a parameter approach. The assessment described within this chapter has taken into consideration the flexibility afforded by the parameters. A worst case scenario has therefore been assessed from a noise and vibration perspective within the parameters described in chapter H1 (Application Reference Number: 6.8.1).

Construction

6.4.3 There is a potential for noise and vibration effects at existing receptors in the vicinity of the Logistics Centre, due to the various, proposed construction activities. These include site clearance and groundworks, building construction (piling), hardstanding and road surface construction (including ground compaction) and landscaping.

Basis of assessment and assumptions

6.4.4 Noise levels have been calculated for the construction phase of the Logistics Centre using the 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).

- Site clearance and groundworks would involve the removal of trees, and earthworks excavation, to prepare and level the site for construction works. Noise modelling of this activity has considered the use of tracked excavators, dozers and dumper trucks.

- Building construction would involve the installation of temporary site cabins, the pouring of concrete building foundations and the erection of proposed buildings, including welfare, security buildings, gatehouse and scanning facilities. Noise modelling of this activity has considered the use of mobile crane, dumper trucks, vibratory roller, forklift, tipper trucks, piling rig and concrete pump.
- Hardstanding and road-surface construction and landscaping would involve the preparation of sub surfaces, laying of tarmac road surfaces and landscaping of the site. Noise modelling of this activity has considered the use of a road planer, vibratory rollers, dumper trucks, tipper trucks, a wheel wash, backhoe loaders and circular saws.

6.4.5 The detailed information used for the construction noise and vibration assessments undertaken for the Logistics Centre is presented in appendix H6-1 (noise model inputs and outputs) (Application Reference Number: 6.8.14). This appendix includes details of the construction noise and vibration sources, assumed quantities, as well as emission data and periods of operation. Other model and calculation inputs are also detailed.

Embedded mitigation

6.4.6 Embedded mitigation measures included to reduce potential noise and vibration effects during construction are presented below.

- The proposed Logistics Centre would be positioned in a location which is of relatively low sensitivity to noise and vibration).
- The site boundary of the proposed Logistics Centre would be approximately 400m away from residential communities.
- Heavy goods vehicle (HGV) traffic flow and direction within the site will be strictly controlled (reducing the need for HGVs to reverse), as per the Logistics Centre sub-Code of Construction Practice (CoCP) (Application Reference Number: 8.11).

Good practice mitigation

6.4.7 The construction of the Logistics Centre 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 Logistics Centre sub-CoCP (Application Reference Number: 8.11).

6.4.8 All construction work will be undertaken in accordance with the following measures which are consistent with the guidance in BS 5228-1:2009+A1:2014 [RD2], and BS 5228-2:2009+A1:2014 [RD3], as per the Wylfa Newydd CoCP (Application Reference Number: 8.6).

- Prior to the commencement of construction activities, the preferred construction methodology and equipment will be reviewed by Horizon to identify any reasonable opportunities to reduce construction noise and vibration and potential impacts on sensitive receptors. Where reasonable opportunities are identified, Horizon will adopt these as part

of its construction methodology. Preference would be given to the selection of electrically powered equipment rather than diesel or petrol-powered.

- Preference would be given to fabrication off-site or within purpose-built buildings on site, rather than in the open at work areas.
- Heavy plant and equipment will 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.
- Heavy plant, equipment and vehicles in intermittent use would be shut down or throttled down to a minimum during waiting periods as far as practicable.
- All heavy plant and equipment which are fitted with noise abatement covers, will not be operated with noise abatement covers open or removed, to ensure that the acoustic insulation they are fitted with remains effective. The effectiveness of acoustic insulation and silencers fitted to plant would be monitored and assessed on a monthly basis. Any plant or equipment identified to have defective or underperforming insulation or silencers would be immediately investigated and repaired.
- Plant employed for any activity associated with the construction works would be operated in a manner such that noise and vibration emissions would be controlled and limited as far as reasonably practicable.
- 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).
- All materials will be handled in a manner that would reduce noise.

6.4.9 It should be noted that all works would be made under a prior consent agreement under Section 61 of the Control of Pollution Act 1974. Monitoring at locations representative of noise-sensitive receptors during construction would be undertaken to ensure noise levels remain within the permitted levels under the Section 61 agreement. The Section 61 application would set out the thresholds and details of the monitoring programme including monitoring equipment, locations and personnel. The proposed monitoring programme would be developed once the detail of the construction working methods and programme are finalised, but it would involve a combination of short-term spot check measurements and some longer-term monitoring. All monitoring results would be made available to the Isle of Anglesey County Council. Review of these initial results would be undertaken to determine if ongoing monitoring is required, as per the Logistics Centre sub-CoCP (Application Reference Number: 8.11). 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

6.4.10 The Logistics Centre would operate 24/7 with the operation of building services and HGVs activities occurring throughout the day-time and night-time period. As such, there would be potential for noise effects during the operation of the Logistics Centre.

6.4.11 The closest commercial premises and residential properties are approximately 380m and 400m respectively from the site boundary. It is therefore considered that vibration levels resulting from operation of surface plant of this development will not be significant at any identified receptors in the study area.

Basis of assessment and assumptions

6.4.12 Noise levels have been calculated for the operational phase of the Logistics Centre using the 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).

6.4.13 Potential operational noise effects may arise from the following noise sources, shown in figure H6-4 (Application Reference Number: 6.8.29):

- building services which includes the use of up to three heat/cooling pumps.
- on-site vehicular movements include HGV noise for queue and scan, and haul routes and parking. Noise modelling of vehicular noise includes engine idling, closing of HGV doors and HGV movements.

6.4.14 The detailed input information used for the operational noise assessments undertaken for the Logistics Centre is presented in appendix H6-1 (Application Reference Number: 6.8.14). This appendix includes details of the operational noise sources, assumed quantities, as well as emission data and periods of operation. Other model and calculation inputs are also detailed.

Embedded mitigation

6.4.15 The following embedded mitigation has been identified for the operation of the Logistics Centre:

- The Logistics Centre would be positioned in a location which is of relatively low sensitivity to noise and vibration.
- The site boundary of the proposed Logistics Centre would be approximately 400m away from residential communities.
- The Logistics Centre would be a temporary facility from which deliveries to the Power Station Site would be managed to reduce traffic impacts on the local road network.
- HGV parking bays would be arranged in rows. Allocation of vehicles to rows would be controlled to ensure vehicles can be accessed at their

allotted times (reducing need for HGVs to reverse). Vehicles would be dispatched in a controlled fashion to the Wylfa Newydd Development Area, as per the design principles in volume 3 of the Design and Access Statement (Associated Developments and Off-Site Power Station Facilities) (Application Reference Number: 8.2.3) and the Logistics Centre sub-CoCP (Application Reference Number: 8.11).

Good practice mitigation

6.4.16 The operation of the Logistics Centre would meet the requirements as set out in the Logistics Centre sub-CoCP (Application Reference Number: 8.11).

6.4.17 Good practice mitigation measures during the operation of the Logistics Centre would include the following as per the Logistics Centre sub-CoCP (Application Reference Number: 8.11):

- where practicable, HGV engines would be switched off, or whilst queuing to use the scanner facility;
- HGVs would not wait or queue on the public highway with engines running (unless the engine is required to power the operation of the vehicle e.g. concrete wagon); and
- the use of horns (i.e. to signal the attention of Logistics Centre staff upon arrival) would not be permitted.

6.4.18 The programme for monitoring operational noise at the Logistics Centre would be established and agreed with the Isle of Anglesey County Council prior to commencement of operation. Monitoring would be undertaken initially on a quarterly basis as a minimum. Review of these initial results would be undertaken to determine if ongoing monitoring is required. 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). Monitoring would include off-site spot check noise surveys at receptors, and some onsite monitoring near particular noise sources at long-term intervals, as per the Logistics Centre sub-CoCP (Application Reference Number: 8.11).

Decommissioning

6.4.19 There is the potential for noise and vibration effects at receptors in the vicinity of the Logistics Centre due to the proposed decommissioning activity. At the end of use, decommissioning of the Logistics Centre would involve the removal of buildings, structures, security kiosks and scanners. Hardstanding would remain.

Good practice mitigation

6.4.20 The good practice measures for the decommissioning phase would be the same as those good practice measures employed for the construction phase.

6.5 Assessment of effects

6.5.1 This section presents the findings of the assessment of effects associated with the construction, operation and decommissioning of the Logistics Centre.

Construction

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. In order to provide a façade noise level, a +3dB correction has been applied to the model results.

6.5.3 This has enabled the magnitude of effect to be established at all residential receptors potentially affected by the Logistics Centre, and an indication to be made of the worst case duration in months that the effects could occur for.

6.5.4 Table H6-5 presents the criteria that have been adopted to assess the magnitude of effect from the Logistics Centre construction works. Further information is provided in chapter B6 (Application Reference Number: 6.2.6).

Table H6-5 Adopted magnitude scale for construction noise

Magnitude of effect	Façade construction noise level $L_{Aeq,T}$ 07:00 – 19:00 hours Mon to Fri 07:00 – 13:00 hours Sat	Comments
Large	≥75.0	75dB(A) is presented in BS5228-1 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 for low ambient noise areas.
* or less than a 3.0dB increase in the pre-existing ambient noise level		

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

6.5.6 The above approaches ensure that a precautionary assessment is carried out and reported.

6.5.7 Appendix H6-1 (Application Reference Number: 6.8.14) 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.

6.5.8 The results show that in general the numbers of residential receptors experiencing significant effects are expected to be spread over the duration of the 15-month construction programme.

6.5.9 Table H6-6 below provides a summary of the total numbers of residential receptors within the 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, again, ensures that a worst case assessment of the predicted noise levels is reported.

Table H6-6 Summary of noise effects at residential receptors (high sensitivity)

Magnitude of change (effect)	Noise level from plant and machinery L_{AeqT}	Significance of effect at residential receptor (high sensitivity)	Approximate number of residential properties affected during day (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)	17	15
* or less than a 3.0dB increase in the pre-existing ambient noise level				

6.5.10 Table H6-6 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, considered to be a likely worst case. Figure H6-2 (Application Reference Number: 6.8.29) presents predicted noise contours for the associated construction scenarios that correspond to the highest predicted noise levels over the entire programme. For the Logistics Centre the worst case noise levels occur in month 12 of its construction works programme. Proposed construction works during month 12 include the construction of hardstanding, road surface construction and landscaping. The contours have been calculated at a height of 4m above ground to represent the worst affected floor of any receptor.

6.5.11 All 17 residential receptors that fall within the 600m study area of the application site are expected to experience minor (not significant) effects, based on the inclusion of the embedded mitigation assumptions.

6.5.12 Outside of the requirement (under the EIA Regulations 2009) to identify the likely significant effects, a further series of noise levels has been calculated as part of a sensitivity testing exercise to 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 the activities taking place over large areas are situated and concentrated at the closest practicable locations to the most sensitive receptors simultaneously. In combination with the other worst case and precautionary assumptions already applied to the assessment (and described in chapter B6 (Application Reference Number: 6.2.6)) 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.

6.5.13 Table H6-7 presents a summary of the highest predicted monthly noise level at the residential groups considered in this assessment along with indicative maximum noise levels possible for transient activities taking indicative highest noise levels during transient activities close to significantly affected residential receptors.

Table H6-7 Indicative highest noise levels during transient activities close to significantly affected residential receptors

Residential area likely to experience effects	Highest monthly noise level dB $L_{Aeq,T}$	Highest noise level during transient activities
Properties at Penrhyn Geiriol	55.4	56.9 (1.5)
Properties at Tyddyn-Uchaf	54.1	55.6 (1.5)
Properties at Kingsland Road	55.1	56.2 (1)

6.5.14 The values presented in table H6-7 show that in the areas where 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 2dB higher and as such, would not change the magnitude of effect.

Effects of noise at non-residential receptors

6.5.15 Appendix H6-1 (Application Reference Number: 6.8.14) presents the predicted noise levels at the specific non-residential receptors identified in paragraph 6.2.4 of this chapter.

6.5.16 Table H6-8 below provides a summary of the total number of non-residential receptors within the study area falling into each effect magnitude category and the highest predicted façade noise level from the construction phase.

Table H6-8 Summary of noise effects at non-residential receptors

Name	Receptor type	Sensitivity	Highest predicted façade noise level from construction, dB $L_{Aeq,T}$	Magnitude of effect	Significance of effect at non-residential receptor
Commercial premises located at Penrhos industrial estate	Commercial	Low	56.9	Negligible	Negligible (not significant)
Industrial premises located at Penrhos	Industrial	Negligible	60.3	Negligible	Negligible (not significant)
Industrial premises located in between A55, and London Road	Industrial	Negligible	58.0	Negligible	Negligible (not significant)

6.5.17 The assessed commercial and industrial receptors within 600m study area are predicted to experience effects of negligible magnitudes, and are therefore assessed as not significant.

6.5.18 It is noted the magnitude of effect from construction at the closest identified sensitive receptor (Tyddyn-Uchaf) is likely to be negligible. Tyddyn-Uchaf is closer than the proposed hotel at a distance of approximately 400m from the site boundary. The magnitude of effect at the proposed hotel is therefore also likely to be negligible, resulting in a minor (not significant) effect.

Effects of vibration at residential receptors

6.5.19 The potential sources of vibration during the construction of the Logistics Centre include piling works and surface compaction through the use of a vibratory roller. Vibratory compaction is likely to be undertaken during the laying of road surfaces.

6.5.20 Table H6-9 presents both the effect magnitudes and criteria values that have been adopted to assess the magnitude of effect from construction vibration. These values have been adopted to represent to 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 H6-9 Adopted magnitude scale for construction vibration

Magnitude of effect	Vibration level threshold (peak particle velocity mm/s)
Large	10.0
Medium	5.0
Small	1.0
Negligible	<1.0mm/s

6.5.21 The modelling and assessment of construction vibration effects is discussed in broad terms within chapter B6 (Application Reference Number: 6.2.6), with further details pertaining to the methods adopted for construction compaction and piling presented below.

Piling at building

6.5.22 Continuous flight auger (rotary bored) piling would be adopted for the piling of Logistics Centre building. Analysis of the Ordnance Survey MasterMap® Address Layer 2 product database indicates that the closest residential property to the Logistics Centre development site is approximately 400m. BS5228-2 [RD3] presents a summary of historic case history on vibration levels measured during rotary bored piling, presenting a Peak Particle Velocity (PPV) value of 0.54mm/s at a distance of 5m during augering mode. As such, vibration effects associated with continuous flight auger piling activities at the Logistics Centre at distance of 5m and beyond would be expected to be negligible and have not been considered further within this chapter.

Vibratory compaction from road and HGV park surfacing

6.5.23 The results of predictions of steady state vibration arising from the use of vibratory rollers during the Logistics Centre construction works are presented in table H6-10. 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 BS 5228-2 [RD3].

Table H6-10 Assessment of vibratory rollers during steady state operation

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

6.5.24 The closest residential property to the proposed Logistics Centre development site is approximately 400m away. As such, these properties

would therefore experience vibration levels considerably lower than 1.0mm/s, which would be an effect magnitude of negligible and therefore would not be significant.

Effects of vibration at non-residential receptors

Effects on humans

6.5.25 There are no high or medium sensitivity non-residential receptors, or Public Rights of Way users within the 600m study area.

6.5.26 Non-residential receptors with sensitivity (commercial units located at Penrhos Industrial Estate) are approximately 400m from the works. As such, these properties would therefore experience vibration levels of less than 1.0mm/s, which would be an effect magnitude of negligible and therefore would not be significant.

Effects on building structures

6.5.27 Trefignath Burial Chambers is located at a distance approximately 70m south of the proposed Logistics Centre site. Assessment of the effects on this heritage asset is contained within chapter H11 (Application Reference Number: 6.8.11).

Operation

Effects of noise at residential receptors

6.5.28 There is potential for noise effects at existing receptors in the vicinity of the proposed Logistics Centre during operation.

6.5.29 The activities that are considered in this assessment include noise generated by:

- one heat pump located on the southeast façade of the main Logistics Centre building;
- two heat pumps located on the southwest façade of the main Logistics Centre building;
- the closing of HGV doors;
- HGV movements; and
- HGV engines idling.

6.5.30 Operational activities associated with the Logistics Centre have been assessed using an assessment methodology based upon the method described in BS 4142 [RD4]. For further background on operational assessment methodology and derivation of the criteria, please refer to chapter B6 (Application Reference Number: 6.2.6).

6.5.31 The following tables set out the criteria used for the assessment.

Table H6-11 Operational noise – magnitude of change at residential receptors

Magnitude of change	BS4142 difference between rating and background noise levels (dB)	Description of impact from BS 4142
Large	≥15	A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
Medium	10–14	
Small	5–9	A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
Negligible	0-4	No description in BS4142, but described as between low and adverse impact for the purpose of this assessment.
	<0	Where the rating level marginally exceeds the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

6.5.32 To ensure consistency with the assessment methodology described in BS 4142 [RD4], the criteria presented in table H6-11 are used to determine an 'initial estimate' of the noise effect. Further evaluation of this 'initial estimate' is carried out by placing the noise into 'context' enabling the overall significance of the effect to be determined. Further details on this approach are provided in appendix B6-2 (Noise and Vibration Modelling and Assessment Methodology Report) (Application Reference Number: 6.2.21).

6.5.33 When placing the effects at residential properties in context, reference has been made to the following additional guideline values from the *Guidelines for Community Noise* [RD5] and the *Night Noise Guidelines* [RD6].

Table H6-12 Guideline values used to inform the context of operational noise levels at residential receptors

Free-field noise level	Description of effect
<50dB $L_{Aeq,16h}$ (07:00–23:00)	Moderate annoyance for community noise in outdoor living areas, from *Guidelines for Community Noise* [RD5]
<45dB $L_{Aeq,8h}$ (23:00–07:00)	Sleep disturbance with a window open, when measured outside, from *Guidelines for Community Noise* [RD5]
Annual average of 40dB L_{night}	Lowest observed adverse effect level for night noise. A health-based limit value for protection of the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise. From *Night Noise Guidelines* [RD6].

6.5.34 The effect thresholds developed for operational noise sources at non-residential receptors are summarised in table H6-13 below, and used to determine the onset of a potential significant effect.

Table H6-13 Operational noise effects criteria for non-residential receptors

Receptor type	External free-field noise level that relates to an onset of a potential significant effect, dB $L_{Aeq,T}$	Relevant guidance	Description of guideline level
Educational	45	*Building Bulletin 93* [RD7]	Level below which no special measures likely to be necessary to protect buildings or playing fields from external noise.
Places of worship	47	BS 8233 [RD8]	Internal acoustic design criterion for new places of worship of 35dB(A).
Commercial	52	BS 8233 [RD8]	Internal acoustic design criterion for offices in new buildings of 40dB(A).
Industrial	52	BS 8233 [RD8]	Internal acoustic design criterion for offices in new buildings of 40dB(A).

6.5.35 For details on the derivation of description of guideline level as presented in table H6-13 above, refer to chapter B6 (Application Reference Number: 6.2.6).

6.5.36 Both day and night-time noise assessments have been undertaken following the principles of BS 4142 [RD4] and the assessment results are presented in appendix H6-1 (Application Reference Number: 6.8.14).

6.5.37 Figure H6-3 (Application Reference Number: 6.8.29) presents the predicted noise contours for the associated operational scenario. The contours have been calculated at a height of 4m above ground to represent the worst affected floor of any receptor.

6.5.38 The initial estimates of magnitude of effect conducted in accordance with BS 4142 [RD4] would indicate that moderate effects are likely as a result of the operational activities at the Logistics Centre. These effects are likely at properties at Penrhyn Geiriol, Tyddyn-Uchaf and Kingsland Road.

6.5.39 However, existing background and rating sound levels are low and BS 4142 [RD4] advises to consider further the context of both the existing and new sound sources. The standard suggests that absolute (or benchmark) noise levels may be as, if not more, important in such circumstances, and as such absolute noise criteria have been considered further. This is provided for in the criteria set out in table H6-11 above.

6.5.40 At residential receptor groups located at Penrhyn Geiriol, Tyddyn-Uchaf and Kingsland Road, the highest total noise level at the affected receptors, from operational activity at the Logistics Centre, is calculated to be up to 40dB $L_{Aeq,T}$ during the day-time and night-time. These calculated levels are below the absolute criteria given in table H6-13, and meets the lowest observed adverse effect level for night noise for protection of the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise.

6.5.41 As such, and taking into consideration the high sensitivity of residential dwellings, the negligible magnitude of effect at all residential receptor groups considered would be of minor significance and therefore not significant.

Table H6-14 Summary of noise effects at residential receptors

Significance of effect at residential receptor (high sensitivity)	Number of properties affected	
	07:00 – 23:00	23:00 – 07:00
Major significance	0	0
Major significance	0	0
Moderate significance	0	0
Minor (not significant)	17	17

6.5.42 It is noted the magnitude of effect from daytime and night-time operations at the closest identified sensitive receptor (Tyddyn-Uchaf) is likely to be negligible. Tyddyn-Uchaf is closer than the proposed hotel at a distance of approximately 400m from the site boundary. The magnitude of effect at the proposed hotel is therefore also likely to be negligible, resulting in a minor (not significant) effect.

Effects of vibration at residential receptors

6.5.43 The Transport and Road Research Laboratory Report No RR53 [RD9] provides a summary of measurement taken by Transport and Road Research Laboratory, which indicates the relative effects of various construction related sources. The report indicates that, for a heavy lorry on a poor road surface at 8m a PPV of 0.1mm/s is expected.

6.5.44 As such, due to the relatively high distances between the site and the nearest residential dwellings, vibration effects during operational activities of vehicle movements at the Logistics Centre have not been considered further within this chapter.

Decommissioning

6.5.45 Noise and vibration levels arising from the decommissioning activities are not calculated to be worse than those calculated for the construction phase of the Logistics Centre. As such, there would be no likely significant effects at all residential receptors during the decommissioning of the Logistics Centre.

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.

Construction

6.6.2 No additional mitigation is required for the construction phase of the Logistics Centre.

Operation

6.6.3 No additional mitigation is required for the operational phase of the Logistics Centre.

Decommissioning

6.6.4 No additional mitigation is required for the decommissioning phase of the Logistics Centre.

6.7 Residual effects

6.7.1 No significant adverse effects were identified for noise and vibration.

6.7.2 Minor effects identified in the assessment of effects section are summarised in appendix I3-1 (master residual effects table) (Application Reference Number: 6.9.8).

6.7.3 With the application of the mitigation measures discussed, no adverse noise and vibration effects of greater than minor significance are anticipated during the construction or operation of the Logistics Centre.

6.8 References

Table H6-15 Schedule of references

ID	Reference
RD1	Highways Agency. 2011. *Design Manual for Roads and Bridges*. Volume 11: Environmental Assessment, Section 3, Part 7: Noise and Vibration (HD213/11 – Revision 1). London: The Stationery Office.
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	British Standards Institution. 2014. *BS 4142:2014 Methods for rating and assessing industrial and commercial sound*. London: British Standards Institution.
RD5	Berglund, B., Lindvall, T., Schwela, D.H. (eds.) 1999. *Guidelines for Community Noise*. Geneva: World Health Organization.
RD6	Hurtley, C. (ed.) 2009. *Night Noise Guidelines for Europe*. Copenhagen: World Health Organization for Europe.
RD7	Department for Education and Education Funding Agency. 2015. *Building Bulletin 93*. [Online]. [Accessed: 18 January 2018]. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/400784/BB93_February_2015.pdf
RD8	British Standards Institution. 2014. *BS 8233 Guidance on Sound Insulation and Noise Reduction for Buildings*. London: British Standards Institution.
RD9	Transport and Road Research Laboratory. 1986. *Ground vibration caused by civil engineering works RR53*.

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