11. Noise and Vibration

Introduction

11.1 This chapter assesses the effects of the Proposed Development on noise and vibration. In particular, it identifies and assesses the anticipated effects of change resulting from the Proposed Development on the potential effects of noise and vibration impacts associated with the construction and operational phases.

11.2 The chapter describes the methods used to assess the likely significant effects, the baseline conditions currently existing at the site and surroundings, the potential direct and indirect effects of the development arising from noise and vibration due to construction noise and vibration, construction road traffic noise and operational road traffic noise, the mitigation measures required to prevent, reduce, or offset the identified significant effects and the residual effects. It has been written by Dan Emery of Miller Goodall Limited.

11.3 This Chapter is supported by the following figures and appendices:

- Figure 11.1 Redline Boundary, Noise Sensitive Receptors and Measurement Positions
- Appendix 11.1 Legislation, Policy and Guidance
- Appendix 11.2 Calculation, Modelling and Assessment Techniques
- Appendix 11.3 Baseline Noise Monitoring
- Appendix 11.4 Site Suitability Study

Assessment Methodology and Significance Criteria

Legislative Framework, Policy and Guidance

11.4 The following legislation and policy have informed the assessment of effects within this Chapter and is detailed further in **Appendix 11.1**:

- The Welsh Assembly Government (1997), Planning Guidance (Wales) TAN 11– Noise,[i]

11.5 The following guidance has informed the assessment of effects within this Chapter and is detailed further in **Appendix 11.1**:

- Institute of Environmental Management and Assessment (IEMA) (2024), Guidelines for Environmental Noise Impact Assessment[ii];
- Highways England (2020), Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration, Revision 2[iii];
- Department of Transport, Welsh Office (1998), Calculation of Road Traffic Noise[iv];

- British Standards Institute (2014), BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise[v]; and,
- British Standards Institute (2003), BS 7445-1: 2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures[vi];

Identification of the Study Area

11.6 The extent of the study area in relation to noise and vibration impacts associated with the construction and operational phases of the Proposed Development has been informed by the likely influence of noise and vibration associated with each phase of the Proposed Development and the location of identified noise sensitive receptors (NSRs) around the Site.

11.7 The location of the NSRs bounding the study area is indicated on **Figure 11.1. Table 11.2** sets out the NSRs that have been identified for inclusion within the assessment.

Site Preparation and Construction

11.8 This section provides details of the approach to the assessment to determine the effects during the site preparation and construction phase.

11.9 No demolition activities are anticipated so no significant effects will arise from demolition. Construction activities have the potential to result in nuisance and/or adverse health effects for existing residential properties to the west and north of the Proposed Development by virtue of noise and vibration associated with construction activities.

Vibration

11.10 Potential temporary significant effects from vibration during the construction stage can occur due to piling.

11.11 No piling works are anticipated for the construction of the Proposed Development. Vibration from construction activities is therefore considered to be **Not Significant** and will not be considered further in the EIA or reported in the ES.

Construction Road Traffic Noise

11.12 For the assessment of noise associated with construction road traffic, prediction of noise levels at three NSRs has been completed following the methodology outlined in DMRB LA 111. A comparison of a summation of the baseline traffic and the predicted construction traffic flows, with the baseline traffic flows has been undertaken to estimate the likely decibel increase in the basic noise level associated with the road link due to additional construction traffic.

Construction Activity Noise

11.13 Detailed and specific information regarding construction activities and associated plant to be used to construct the Proposed Development is not available at this stage. Therefore, modelling of noise generated by construction activities has been undertaken based on an assumed list of plant and equipment based on conservative

estimates of construction rates and processes. The assumptions are detailed in **Appendix 11.2** along with details of the computer noise modelling undertaken. A summary of the assumed construction activity noises considered is shown in **Table 11.1.**

Table 11.1: Summary of assumed construction activity noise sources

Plant	Worst-Case Processes			
	Process 1		Process 2	
	Earthworks and Infrastructure		Foundations and Substructure	
	Number Active Plant per Work Area	Percentage On-time per Plant	Number Active Plant per Work Area	Percentage On-time per Plant
Tracked excavator	1	75%	1	75%
Cutting Tools	1	30%	1	30%
Hand-held tools	1	30%	1	30%
HGVs	1	25%	1	25%
Bulldozer	1	75%	n/a	n/a
Compaction plant	1	50%	1	50%
Dumper truck	1	25%	1	25%
Generator	n/a	n/a	1	100%
Water pump	n/a	n/a	1	100%
Concrete mixers and pumps	n/a	n/a	1	100%
Loader / fork lift truck	n/a	n/a	1	50%
Mortar mixing	1	100%	1	100%
Asphalt paving	1	75%	n/a	n/a

11.14 The predicted noise from construction equipment and plant has been assessed against criteria derived using the 'ABC Method', as described in Section E.3.2 of BS5228: 2009+A1:2014, and DMRB LA 111 as far as reasonably practicable.

Complete Development Assessment

Operational road traffic noise

11.15 Traffic data for road links within the study area and the wider vicinity of the site has been provided by the applicant's transport consultant.

11.16 The noise levels associated with operational road traffic associated with the Proposed Development at NSRs have been predicted based on traffic data, using the

proprietary computer noise modelling software CadnaA. Details of the computer noise modelling for the assessment of noise associated with road traffic during the operation of the Proposed Development are presented in **Appendix 11.2.**

11.17 The guidance in DMRB LA 111 Revision 2 has been used as the basis for the quantitative assessment of operational stage road traffic noise. LA111 provides a methodology for the assessment of road traffic noise during the operational stage of the Proposed Development.

11.18 The methodology adopted for this assessment is based on a comparison between the modelled noise level at receptors under a reference scenario without the Proposed Development, to a future scenario with the Proposed Development.

11.19 Based on DMRB LA 111 guidance, the assessments for Phase 1 and Phase 2 are based on predicting the change in noise level for the following scenarios to determine the likely magnitude of impact:

- Opening Year 2026. DSOY1 vs. DMOY1. Phase 1 assessment.
- Assessment Year 2035. DSOY2 vs. DMOY2. Phase 2 assessment.

11.20 The DMRB LA 111 short-term criteria for magnitude of change have been used to assess the magnitude of impact for both the Opening year and the Assessment Year. This is a considered to be a more onerous assessment as the thresholds for DMRB LA 111 magnitude of change are lower for the short-term criteria assessment than for the long-term criteria. It is also considered that the Opening Year and the Assessment Year both represent short term impacts with respect to Phase 1 and Phase 2 of the development becoming fully operational, respectively.

Identifying Sensitive Receptors

11.21 When assessing noise impacts not all receptors in the vicinity of the Site are considered in the assessment as it is considered sufficient to assess either the closest or most exposed receptors as being indicative of the worst-case impacts. As such, all other noise sensitive receptors can be assumed to be either represented by those identified or be assumed likely to experience a lower magnitude of impact.

11.22 For the construction noise assessment, existing noise-sensitive receptors have been selected based on their proximity to the Site.

11.23 For the operational road traffic noise assessment, existing noise-sensitive receptors have been selected based on their proximity to the road link being assessed.

11.24 **Table 11.2** sets out the NSRs that have been identified for inclusion within the assessment. The location of these NSRs is indicated on **Figure 11.1.**

Table 11.2: Assessed Receptors

Applicable Development Phase	Effect	Receptor Reference	Description	Classification
Construction traffic	Road traffic noise	NSR1	Dwellings on Cefn Road	Residential

Applicable Development Phase	Effect	Receptor Reference	Description	Classification
		NSR3		
		NSR21		
Construction Activities	Noise generated by temporary on-site construction activities	NSR1	Dwellings on Cefn Road	Residential
		NSR2		
		NSR3		
		NSR4	Oakhurst	Residential
		NSR5	Thornleigh	Residential
		NSR6	Dwellings adjacent to Bryn Estyn Road	Residential
		NSR8		
		NSR9	Llwyn Knottia Farm	Residential
		NSR10	Morgan Llywd School	School
		NSR11	Erlas Gardd Furiog Fictoraidd	Outdoor Amenity
		NSR12	Clwb Rygbi Wrecsam	Sports Facility
Operational	Road traffic noise	NSR1	Dwellings on Cefn Road	Residential
		NSR2		
		NSR3		
		NSR21		
		NSR7	Dwelling adjacent to Bryn Estyn Road	Residential
		NSR10	Morgan Llywd School	School
		NSR13	Dwelling adjacent to Greyhound Roundabout	Residential
		NSR14	Dwellings on Hullah Lane	Residential
		NSR15		
		NSR16		Residential

Applicable Development Phase	Effect	Receptor Reference	Description	Classification
		NSR17	Dwellings on Stryt Holt	
		NSR19		
		NSR20		
		NSR18	Dwelling on Dean Road	Residential

Characterisation of Effect

11.25 Effects are characterised as being adverse, beneficial or negligible. An adverse effect is when the Proposed Development results in an increase in environmental noise at the assessed receptor; a beneficial effect is when the Proposed Development results in a decrease in environmental noise at the assessed receptor; and negligible effect is when the Proposed Development does not cause an appreciable change in environmental noise and at the assessed receptor.

11.26 Effects are also characterised by the associated magnitude of impact, the duration, the time at which they occur, and the reversibility with respect to the receptor which experiences the effect.

11.27 The duration of the effect in this assessment has been assessed as either 'short-term', 'medium-term' or 'long-term' as follows:

- Short-term is considered to be up to 1 year;
- Medium-term is considered to be between 1 and 10 years; and,
- Long-term is considered to be greater than 10 years.

11.28 The overall significance is determined by consideration of these factors in combination with the methodology outlined in the following sections.

Significance Criteria

11.29 This section describes the methodology that has been adopted to assess the significance of noise associated with the construction and operational stages of the Proposed Development, on the existing environmental noise climate within the study area.

11.30 The significance has been determined by considering the magnitude of impact and sensitivity of the selected receptors, to establish the level of effect. The assessment process is described in the following sections.

Magnitude Of Impact

Construction Activity Noise

11.31 Based on the environmental noise survey data presented in **Appendix 11.3** for measurement positions in and around the Site and Table E1 of BS 5228-1, the NSRs identified for the assessment of noise associated with temporary on-site construction activities are considered to have a fixed baseline of 55 dB $L_{Aeq,T}$ for the typical construction periods of 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays.

11.32 Based on the Category A values in Table E1 of BS 5228-1, this corresponds to threshold values of 65 dB $L_{Aeq,T}$ for potential significant effects. For the purpose of defining the magnitude of impact, this is considered to be the Significant Observed Adverse Effect Level (SOAEL). Based on this, the magnitude of the impacts for construction activity noise that have been used in the assessment are presented in **Table 11.3**.

Table 11.3: Magnitude of impact for construction activity noise

Magnitude of Impact	Construction activity noise level $L_{Aeq,T}$
	Weekdays 07.00 – 19.00 (T = 12 hr) Saturdays 07.00 – 13.00 (T = 6 hr)
Major Adverse	≥ $L_{Aeq,T}$ 70 dB
Moderate Adverse	≥ $L_{Aeq,T}$ 65 dB < $L_{Aeq,T}$ 70 dB
Minor Adverse	≥ $L_{Aeq,T}$ 55 dB < $L_{Aeq,T}$ 65 dB
Negligible	< 55 dB

11.33 Since the assessment of construction noise would not lead to a reduction in ambient environmental noise levels, beneficial effects would not occur, so are not included in **Table 11.3**

11.34 The assessment of significance for construction noise has followed the guidance in DMRB LA 111, which states, 'construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or
- a total number of days exceeding 40 in any 6 consecutive months.

Construction Road Traffic Noise

11.35 The guidance contained in DMRB LA 111 has been used as the basis for the assessment of construction road traffic noise. The guidance provides a method based on assessing the increase in the basic noise level (BNL) on the closest public road used for construction traffic.

11.36 **Table 11.4** presents the criteria adopted to determine the magnitude of the impact from the baseline conditions.

Table 11.4: Magnitude of impact for construction road traffic noise

DMRB LA 111 Magnitude of Impact	Increase in basic noise level (BNL) *dB*
Major Adverse	≥ 5
Moderate Adverse	≥ 3.0 and < 5.0
Minor Adverse	≥ 1.0 and < 3.0
Negligible	< 1.0

11.37 Since the assessment of construction road traffic noise would not lead to results indicating a reduction in road traffic noise levels, beneficial effects would not occur, so are not included in **Table 11.4**.

Operational Road Traffic Noise

11.38 The guidance contained in DMRB LA 111 has been used as the basis for the assessment of operational road traffic noise.

11.39 The DMRB LA 111 short-term criteria for the magnitude of change have been used to assess the magnitude of impact for both the Opening year and the Assessment Year of the Proposed Development. This is considered a conservative assessment as the thresholds for DMRB LA 111 magnitude of change are lower for the short-term impacts than for the long-term impacts. It is also considered that both the Opening Year and the Assessment Year represent short-term impacts with respect to Phase 1 and Phase 2 of the development becoming fully operational, respectively.

11.40 **Table 11.5** presents the short-term criteria that have been adopted to determine the magnitude of impact for this assessment.

Table 11.5: Magnitude of impact for short-term operational road traffic noise

Magnitude of Impact[*1.]	Change from Baseline *dB* $L_{A10,18hr}$
	Short-term
Major Adverse	≥ 5
Moderate Adverse	≥ 3 and < 5
Minor Adverse	≥ 1 and < 3
Negligible	< 1 and > -1
Minor Beneficial	≤ -1 and > -3
Moderate Beneficial	≤ -3 and > -5
Major Beneficial	≤ -5

[*1.] DMRB LA 111 Magnitude of Change

Sensitivity Of NSRs

11.41 The sensitivity of affected receptors has been considered on a scale of high, medium, low or negligible.

11.42 The classification of the sensitivity of receptors used within the assessments has been derived from the guidance provided within the Design Manual for Roads and Bridges and professional judgement and is outlined in **Table 11.6**

Table 11.6 Sensitivity of receptor criteria

Sensitivity	Receptor classification
High	Hospitals (e.g. operating theatres or high dependency units); residential accommodation; private gardens; hospital wards; schools; universities; care homes; care homes at night; research facilities
Medium	National parks, during the day; and temporary holiday accommodation at all times
Low	Offices; shops; outdoor amenity areas; long distance footpaths; doctors surgeries; sports facilities; places of worship
Negligible	Warehouses; light industry; car parks; agricultural land

Level Of Effect

11.43 The level of effect at each NSR has been assessed based on the magnitude of impact and the sensitivity of the affected receptor. The overall level of effect of the Proposed Development has been based on professional judgement.

11.44 The following terms have been used to define the level of the effects identified. It should be noted that for assessments where the magnitude of impact can be 'beneficial' or 'adverse', the corresponding level of effect can be 'beneficial' or 'adverse':

- **Major effect:** where the Proposed Development is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity;
- **Moderate effect**: where the Proposed Development is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability;
- **Minor effect:** where the Proposed Development is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Scheme is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change and / or can recover from the change; and
- **Negligible effect:** where the Proposed Development is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change.

11.45 **Table 11.7** presents the matrix used to determine the level of effect at each NSR. This is adapted from the guidance contained in IEMA Guidelines for Environmental Noise Impact Assessment. Whilst **Table 11.7** provides ranges, the level of effect is confirmed as a single level, based on professional judgement.

Table 11.7: Level of effect matrix

Magnitude of Impact	Sensitivity of Receptor: High	Medium	Low	Negligible
Major Adverse Impact	Major Adverse Effect	Moderate to Major Adverse Effect	Minor to Moderate Adverse Effect	Negligible Effect
Moderate adverse impact	Moderate to Major Adverse Effect	Moderate Adverse Effect	Minor Adverse Effect	Negligible Effect
Minor Adverse Impact	Minor to Moderate Adverse Effect	Minor Adverse Effect	Negligible to Minor Adverse Effect	Negligible Effect
Negligible Impact	Negligible Effect	Negligible Effect	Negligible Effect	Negligible Effect
Minor Beneficial Impact	Minor to Moderate Beneficial Effect	Minor Beneficial Effect	Negligible to Minor Beneficial Effect	Negligible Effect
Moderate Beneficial Impact	Moderate to Major Beneficial Effect	Moderate Beneficial Effect	Minor Beneficial Effect	Negligible Effect
Major Beneficial Impact	Major Beneficial Effect	Moderate to Major Beneficial Effect	Minor to Moderate Beneficial Effect	Negligible Effect

11.46 The final level of effect is based on the assessment of the initial effect combined with professional judgment. Professional judgement has been used to consider the difference in relation to the top and bottom of the minor (adverse or beneficial) and moderate (adverse or beneficial) banding boundary, absolute noise level in relation to the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) sound levels in DMRB LA 111 guidance and the character of the sound in relation to the existing acoustic context.

11.47 Where an effect has been changed based on professional judgement, justification has been reported along with any supporting evidence.

Determining Significance

11.48 For each effect, a statement has been made as to whether the level of effect is '**Significant**' or '**Not Significant'**.

11.49 Effects of the levels **Major, Moderate to Major, Moderate** and **Minor to Moderate** are considered **Significant**.

11.50 Effects of the levels **Minor, Negligible to Minor** and **Negligible** are considered **Not Significant**.

Assumptions / Limitations

Construction Activity Noise Assessment

11.51 The construction assessment is indicative and, at the time of undertaking the assessment, there was no construction contractor appointed for the Scheme. However, the preliminary construction data and, where available, the programme have been used to develop an assumed list of plant and equipment based upon conservative assumptions as to the construction methods. Construction methods shall be set out in a Construction Environmental Management Plant (CEMP) together with any proposed mitigation measures considered necessary in consultation with the Planning Authority under CoPA 1974.

Road Traffic Noise Assessments

11.52 Likely additional traffic movements and access routes during construction are currently indicative until a construction contractor is appointed; therefore, this may require further consideration at later stages of the project.

Consultation with statutory and non-statutory consultees

11.53 Input to a scoping report was provided with regards to the Noise and Vibration aspects of the EIA. The Scoping Report and Scoping Opinion can be viewed at **Appendix 2.1** and **2.2** respectively.

Table 11.8: Consultation Table

Consultation	Date and Time	Comments	Actions
WCBC response to EIA Scoping Report	March 2024	The development has the potential to give rise to noise associated with traffic	This has been considered within the noise assessment
Email from Paul Campini of WCBC to Justin Paul of J10 Planning, dated 02 May 2024.	02 May 2024	Response to pre-planning consultation concerning the suitability of the site for residential development	This does not form part of the scope of this EIA chapter. A site suitability study is provided in Appendix 11.4

Baseline Conditions

Establishing the Baseline

11.54 **Table 11.9** summarises the environmental noise surveys and baseline computer noise modelling that has been undertaken to inform the assessments presented within this Chapter.

Table 11.9: Environmental noise surveys and baseline computer noise modelling

Study / survey / analysis / evaluation	Overview	Date of completion
Environmental noise survey	Baseline 'on-Site' daytime and night-time attended short term environmental noise monitoring	January 2022
Environmental noise survey	Baseline 'on-Site' 72-hour long-term environmental noise monitoring	January 2024
Noise modelling	Modelling of noise levels across the Site for the existing baseline scenario	February 2024
	Modelling of baseline road traffic noise levels	February 2023

11.55 The environmental noise survey procedure and the measured sound levels are presented in **Appendix 11.3**.

11.56 The computer noise modelling for noise associated with road traffic during operation, including the baseline scenarios and summary of modelled noise levels is presented in **Appendix 11.2**.

Local sound climate

11.57 In general, the environmental sound climate at and around the site is characterised by local and distant road traffic noise, typical of a suburban semi-rural location. The dominant sources of distant road traffic noise across the site are Wrexham Road (A534) and the Llan-y-Pwll Link Road (A5156). In the vicinity of local road links considered within this chapter, road traffic noise from the closest road link becomes the dominant source.

Noise Sensitive Receptors

11.58 The NSRs considered within the assessment have been tabulated in **Table 11.2**. The table classifies the receptors within the study are as residential, school, outdoor amenity or sports facility. This enables the sensitivity of the receptors to be determined.

Sensitivity of Receptors

11.59 Based on **Table 11.6**, the residential NSRs and Morgan Llwd School are considered to have high sensitivity. Erlas Gardd Furiog Fictoraidd and Clwb Rygi Wrecsam are considered to have low sensitivity.

Embedded Mitigation

Construction

11.60 Details of the proposed construction activities and associated plant are not available at this stage. As such no embedded mitigation has been proposed or developed at the time of undertaking this assessment.

The Completed and Operational Development

11.61 Active travel measures have been incorporated into the outline transport engineering design. Reductions in road traffic flows due to the inclusion of these methods would be reflected in the traffic data upon which the operational road traffic noise assessment has been based.

Assessment of Likely Significant Effects

Construction Road Traffic Noise

11.62 During the construction phase of the Scheme, access to the construction works is expected to be principally via Cefn Road, which is predicted to have annual average two-way 18-hour traffic flows (between 06:00 and 00:00) of approximately 11,132 in the 2026 opening year.

11.63 Table 3.17 of DMRB LA 111 provide guidance on the potential for significant effects as a result of increases in road traffic noise during construction. DMRB LA 111 states that magnitude of impacts of moderate or more in the short-term have the potential to result in significant effects.

11.64 To experience an increase in noise level of 3 dB or more (i.e. experience a moderate or greater impact), the road traffic flow on Cefn Road would need to approximately double. However, it is expected that road traffic from construction vehicles would increase overall traffic flows on Cefn Road by significantly less than this. Overall traffic flows are predicted to increase by 70 AAWT, which includes an increase in HGV flows of 40 AAWT. On this basis, a simple calculation was undertaken for three NSRs on Cefn Road, based on the associated road links, respectively. The results of the assessment calculation are presented in **Table 11.10**.

Table 11.10 Assessment of construction road traffic noise

Receptor				Preliminary Assessment					
Ref	Description	Type	Sensitivity	Baseline Traffic Flow No. Vehicles	Baseline + Construction Traffic Flow No. Vehicles	Estimated Increase in Basic Noise Level (BNL) dB	Magnitude of Impact	Level of Effect	Likely Significance
NSR1	Dwelling on Cefn Road	Residential accommodation	High	8354	8424	0.04	Negligible	Negligible	**Not Significant**
NSR3	Dwelling on Cefn Road	Residential accommodation	High	11132	11202	0.03	Negligible	Negligible	**Not Significant**
NSR21	Dwelling on Cefn Road	Residential accommodation	High	8354	8354	0.00	Negligible	Negligible	**Not Significant**

11.65 The estimated increase in basic noise level is predicted to be less than 1 dB for the three high sensitivity NSRs considered. Therefore, vehicles associated with construction works that are expected to use Cefn Road, required to construct the Proposed Development, are likely to have a negligible impact in terms of increasing noise levels at sensitive receptors along this road. As a consequence of this, no further assessment of construction traffic noise has been undertaken and the potential effect is considered to be **Not Significant**.

Construction Activity Noise

11.66 **Table 11.11** shows the predicted daytime construction activity noise levels at the selected NSRs without mitigation, along with the magnitude of impact derived in accordance with the methodology outlined above.

Table 11.11: Assessment of significant effects for construction activity noise

Receptor				Assessment Scenario			
Ref	Description	Type	Sensitivity	Construction activity noise level $L_{Aeq,T}$, dB Weekdays 07.00 – 19.00 (T = 12 hr) Saturdays 07.00 – 13.00 (T = 6 hr)	Magnitude of Impact	Level of Effect	Likely Significance
NSR1	Dwelling on Cefn Road	Residential accommodation	High	71	Major Adverse	Major Adverse	**Significant**
NSR2	Dwelling on Cefn Road	Residential accommodation	High	67	Moderate Adverse	Moderate Adverse	**Significant**
NSR3	Dwelling on Cefn Road	Residential accommodation	High	71	Major Adverse	Major Adverse	**Significant**
NSR4	Dwelling on Oakhurst	Residential accommodation	High	75	Major Adverse	Major Adverse	**Significant**
NSR5	Dwelling on Thornleigh	Residential accommodation	High	77	Major Adverse	Major Adverse	**Significant**
NSR6	Dwelling adjacent to Bryn Estyn Road	Residential accommodation	High	74	Major Adverse	Major Adverse	**Significant**
NSR8	Dwelling adjacent to Bryn Estyn Road	Residential accommodation	High	75	Major Adverse	Major Adverse	**Significant**
The NSR9	Dwelling at Llwyn Knottia Farm	Residential accommodation	High	51	Negligible	Negligible	**Not Significant**
NSR10	Morgan Llwd School	School	High	54	Negligible	Negligible	**Not Significant**

Receptor				Assessment Scenario			
Ref	Description	Type	Sensitivity	Construction activity noise level $L_{Aeq,T}$, dB Weekdays 07.00 – 19.00 (T = 12 hr) Saturdays 07.00 – 13.00 (T = 6 hr)	Magnitude of Impact	Level of Effect	Likely Significance
NSR11	Erlas Gardd Furiog Fictoraidd	Outdoor amenity	Low	50	Negligible	Negligible	**Not Significant**
NSR12	Clwb Rygi Wrecsam	Sports facilities	Low	59	Minor Adverse	Minor Adverse	**Not Significant**

11.67 The predicted noise levels presented in **Table 11.11** assume that the activity is occurring at the edge of the Proposed Development closest to each noise sensitive receptor, thereby representing a worst-case scenario. The majority of the construction activities undertaken will be transient in nature; therefore, noise levels would be reduced as these activities move further from the receptor.

11.68 A magnitude of impact of moderate or above is considered potentially significant for high sensitivity receptors, dependent upon the duration of the activity. Due to their proximity to the site boundary, NSR1 through NSR6 and NSR 8 may experience a major adverse magnitude of impact, when construction activity is undertaken at worst-case locations adjacent to the associated site boundaries, respectively.

11.69 Based on the worst-case assumptions detailed in **Appendix 11.2,** it is considered that the modelled worst-case construction scenario may occur for a duration of 2 weeks or more. Referring to DMRB LA 111 criteria, this would be classified as a significant impact as this corresponds with a duration exceeding 10 or more days in any consecutive 15 days.

11.70 Based on the assumptions on which the assessment is based, the primary contributors to the construction activity noise may be bulldozers, cutting tools, hand held tools and HGVs.

11.71 Mitigation will be required for noise sensitive receptors predicted to experience a significant effect from the construction of the Proposed Development and recommendations are provided below.

The Completed and Operational Development

Operational Road Traffic Noise for Phase 1, 2026 Opening Year

11.72 **Table 11.12** presents the predicted change in 18-hour (06:00 – 00:00) noise levels at NSR locations in the short-term with and without the Development for the 2026 Opening Year scenario, representing the opening of Phase 1 of the Proposed Development. The magnitude of impact, sensitivity of receptor, level of effect and proposed significance are presented. Predicted absolute noise levels associated with the assessed receptors for the 2026 Opening Year scenario with and without the development are presented in **Appendix 11.2**.

11.73 No NSR is predicted to experience more than a minor adverse level of effect. The effect of operational 18-hour road traffic noise levels for the opening of Phase 1 of the Proposed Development is, therefore, considered to be **Not Significant**.

Table 11.12: Assessment of likely significant effects for operational road traffic noise – Phase 1, 2026 Opening Year

Receptor				2026 Opening Year Scenario			
Ref	Description	Classification	Sensitivity	Change from Baseline dB $L_{A10,18hr}$ Short-term	Magnitude of Impact	Level of Effect	Proposed Significance
NSR1	Dwelling on Cefn Road	Residential accommodation	High	1.4	Minor Adverse	Minor Adverse	Not Significant
NSR2 (West)	Dwelling on Cefn Road	Residential accommodation	High	1.4	Minor Adverse	Minor Adverse	Not Significant
NSR3	Dwelling on Cefn Road	Residential accommodation	High	1.1	Minor Adverse	Minor Adverse	Not Significant
NSR7	Dwelling adjacent to Bryn Estyn Road	Residential accommodation	High	0	Negligible	Negligible	Not Significant
NSR10	Morgan Llwd School	School	High	1.2	Minor Adverse	Minor Adverse	Not Significant
NSR13	Dwelling adjacent to Greyhound Roundabout	Residential accommodation	High	0.6	Negligible	Negligible	Not Significant
NSR14	Dwelling on Hullah Lane	Residential accommodation	High	-0.6	Negligible	Negligible	Not Significant
NSR15	Dwelling on Hullah Lane	Residential accommodation	High	-0.1	Negligible	Negligible	Not Significant
NSR16	Dwelling on Stryt Holt	Residential accommodation	High	0.5	Negligible	Negligible	Not Significant
NSR17	Dwelling on Stryt Holt	Residential accommodation	High	0.5	Negligible	Negligible	Not Significant

Receptor				2026 Opening Year Scenario			
Ref	Description	Classification	Sensitivity	Change from Baseline dB $L_{A10,18hr}$ Short-term	Magnitude of Impact	Level of Effect	Proposed Significance
NSR18	Dwelling on Dean Road	Residential accommodation	High	0.4	Negligible	Negligible	Not Significant
NSR19	Dwelling on Stryt Holt	Residential accommodation	High	0.7	Negligible	Negligible	Not Significant
NSR20	Dwelling on Stryt Holt	Residential accommodation	High	0.7	Negligible	Negligible	Not Significant
NSR21	Dwelling on Cefn Road	Residential accommodation	High	0.3	Negligible	Negligible	Not Significant

Operational Road Traffic Noise for Phase 2, 2035 Assessment Year

11.74 **Table 11.13** presents the predicted change in 18-hour (06:00 – 00:00) noise levels at NSR locations in the short-term with and without the Development for the 2035 Assessment Year scenario, representing the opening of Phase 2 of the Proposed Development. The magnitude of impact, sensitivity of receptor, level of effect and proposed significance are presented. Predicted absolute noise levels associated with the assessed receptors for the 2035 Assessment Year scenario with and without the Development are presented in **Appendix 11.2**.

11.75 There are some decreases in road traffic noise arising out of the Proposed Development, notably on Cefn Road and Stryt Holt due to the redistribution of road traffic following construction of the link road through the Proposed Development.

11.76 Overall, the effect of operational road traffic noise levels for the opening of Phase 2 of the Development is considered to be **Not Significant**.

Table 11.13: Assessment of likely significant effects for operational road traffic noise – Phase 2, 2035 Assessment Year

Receptor				2035 Assessment Year Scenario			
Ref	Description	Classification	Sensitivity	Change from Baseline dB $L_{A10,18hr}$ Short-term	Magnitude of Impact	Level of Effect	Likely Significance
NSR1	Dwelling on Cefn Road	Residential accommodation	High	0.1	Negligible	Negligible	**Not Significant**
NSR2 (West)	Dwelling on Cefn Road	Residential accommodation	High	-0.2	Negligible	Negligible	**Not Significant**
NSR3	Dwelling on Cefn Road	Residential accommodation	High	-0.1	Negligible	Negligible	**Not Significant**
NSR7	Dwelling adjacent to Bryn Estyn Road	Residential accommodation	High	-0.1	Negligible	Negligible	**Not Significant**
NSR10	Morgan Llwd School	School	High	-0.2	Negligible	Negligible	**Not Significant**
NSR13	Dwelling adjacent to Greyhound Roundabout	Residential accommodation	High	0.2	Negligible	Negligible	**Not Significant**
NSR14	Dwelling on Hullah Lane	Residential accommodation	High	1.3	Minor Adverse	Minor Adverse	**Not Significant**
NSR15	Dwelling on Hullah Lane	Residential accommodation	High	0.5	Negligible	Negligible	**Not Significant**
NSR16	Dwelling on Stryt Holt	Residential accommodation	High	0.6	Negligible	Negligible	**Not Significant**
NSR17	Dwelling on Stryt Holt	Residential accommodation	High	0.8	Negligible	Negligible	**Not Significant**

Receptor				2035 Assessment Year Scenario			
Ref	Description	Classification	Sensitivity	Change from Baseline dB $L_{A10,18hr}$ Short-term	Magnitude of Impact	Level of Effect	Likely Significance
NSR18	Dwelling on Dean Road	Residential accommodation	High	1.3	Minor Adverse	Minor Adverse	**Not Significant**
NSR19	Dwelling on Stryt Holt	Residential accommodation	High	-0.5	Negligible	Negligible	**Not Significant**
NSR20	Dwelling on Stryt Holt	Residential accommodation	High	-0.6	Negligible	Negligible	**Not Significant**
NSR21	Dwelling on Cefn Road	Residential accommodation	High	1.4	Minor Adverse	Minor Adverse	**Not Significant**

Additional Mitigation / Enhancement Measures

11.77 Whilst construction activities are of a temporary, short-term nature and the assessment presented provides a conservative approach, the potential for significant adverse effects has been identified. Therefore, specific mitigation measures are proposed to moderate the effects of noise from construction activities.

Construction

11.78 The following mitigation measures are proposed;

- The use of a 2.4 m solid barrier hoarding at perimeters close to sensitive receptors.
- The appointed contractor is expected to undertake construction works between 07:30 to 18:00 on Mondays to Fridays and 08:30 to 13:00 on Saturdays.
- All construction work to be undertaken in accordance with the best practice measures set out in BS 5228-1 and BS 5228-2 (British Standards Institution). In particular the following mitigation measures would be employed on site to ensure that noise and vibration levels are adequately controlled (all of which are considered to be examples of BPM, and which would be set out within a Construction Environmental Management Plan:
    - Appropriate selection of plant and equipment, construction methods and programming. Only plant conforming with, or better than, relevant national or international standards, directives or recommendations on noise or vibration emissions would be used.
    - Maintenance of construction plant to ensure that it is in good condition;
    - Training of site personnel to raise awareness of noise and nearby noise sensitive receptors;
    - Ensuring good stakeholder engagement with local residents and other stakeholders, including provision of information to the public on expected construction noise and vibration, including duration, especially to those likely to be exposed to moderate and major magnitude effects.
    - A manned complaints phone number should also be provided to residents in advance of works commencing;
    - All vehicles, plant and equipment would be switched off when not in use;
    - Where practicable, gates (to compounds and construction areas) would not be located close to noise sensitive receptors;

- Vehicle and mechanical plant/equipment used for the purpose of the works would be fitted with exhaust silencers;
- The positioning of construction plant and activities to minimise noise at sensitive locations;
- Mufflers shall be used on pneumatic tools;
- Minimise the potential for higher vibration levels from vibratory rollers, by taking into account the guidance within TRL Report 429 Groundborne vibration

The Completed and Operational Development

11.79 No additional mitigation has been included for noise associated with road traffic during operation of the Proposed Development.

Residual Effects

Temporary on-site construction activities

11.80 It is not possible to model the effect of the BPM measures outlined in the Additional Mitigation / Enhancement Measures above. However, **Table 11.14** indicates the effect of the inclusion of a 2.4 m hoarding within the noise model.

Table 11.14: Assessment of residual effects for construction activity noise

Receptor				Mitigated Scenario			
Ref	Description	Type	Sensitivity	Construction activity noise level $L_{Aeq,T}$, dB Weekdays 07.00 – 19.00 (T = 12 hr) Saturdays 07.00 – 13.00 (T = 6 hr)	Magnitude of Impact	Residual level of Effect	Residual Significance
NSR1	Dwelling on Cefn Road	Residential accommodation	High	64	Minor Adverse	Moderate Adverse	**Significant**
NSR2	Dwelling on Cefn Road	Residential accommodation	High	59	Minor Adverse	Minor Adverse	**Not Significant**
NSR3	Dwelling on Cefn Road	Residential accommodation	High	64	Minor Adverse	Moderate Adverse	**Significant**
NSR4	Dwelling on Oakhurst	Residential accommodation	High	68	Moderate Adverse	Moderate Adverse	**Significant**
NSR5	Dwelling on Thornleigh	Residential accommodation	High	67	Moderate Adverse	Moderate Adverse	**Significant**
NSR6	Dwelling adjacent to Bryn Estyn Road	Residential accommodation	High	67	Moderate Adverse	Moderate Adverse	**Significant**
NSR8	Dwelling adjacent to Bryn Estyn Road	Residential accommodation	High	66	Moderate Adverse	Moderate Adverse	**Significant**
NSR9	Dwelling at Llwyn Knottia Farm	Residential accommodation	High	48	Negligible	Negligible	**Not Significant**

Receptor				Mitigated Scenario			
Ref	Description	Type	Sensitivity	Construction activity noise level $L_{Aeq,T}$, dB Weekdays 07.00 – 19.00 (T = 12 hr) Saturdays 07.00 – 13.00 (T = 6 hr)	Magnitude of Impact	Residual level of Effect	Residual Significance
NSR10	Morgan Llwd School	School	High	53	Negligible	Negligible	**Not Significant**
NSR11	Erlas Gardd Furiog Fictoraidd	Outdoor amenity	Low	46	Negligible	Negligible	**Not Significant**
NSR12	Clwb Rygi Wrecsam	Sports facilities	Low	51	Negligible	Negligible	**Not Significant**

11.81 The application of site hoarding to site boundaries is likely to reduce the magnitude of impact from major to moderate at the most affected NSRs. Whilst the application of BPM for controlling construction noise would provide a reasonable level of mitigation, it cannot be guaranteed that all adverse impacts would be reduced to a level resulting in no significant effects at the nearest noise sensitive receptors.

11.82 As such, it is likely, even with the inclusion of noise mitigation measures, that some significant adverse effects would remain. These effects, however, would be temporary and transient in nature, such that they would occur for a limited duration whilst construction activities were undertaken at a local area of the site, and during that temporary period, only when noisy plant is operating in close proximity to NSRs.

Table 11.15: Residual Effects Summary

Description of Effect	Embedded Mitigation	Potential Effect (inc. Significance)	Further Mitigation	Residual Effect (inc. Significance)
Construction				
Construction road traffic noise	None	Disturbance due to increase in road traffic noise. **Not Significant**.	N/A	Disturbance due to increase in road traffic noise. **Not Significant**.
Construction activity noise	None	Temporary disturbance at residential NSRS adjacent to the Site due to noise associated with on-site construction activities. **Significant.**	Noise barrier. Application of BPM and limiting duration of exposure. Contractor to conduct updated noise and vibration assessment and create noise and vibration management plan as part of the CEMP.	Temporary disturbance at residential NSRs adjacent to the Site due to noise associated with on-site construction activities. **Significant.**
Operation				
Road traffic noise – 2026 Opening Year, representative of opening of Phase 1	Active travel	Disturbance due to increase in road traffic noise. **Not Significant.**	N/A	Disturbance due to increase in road traffic noise. **Not Significant.**
Road traffic noise – 2035 Assessment Year, representative of opening of Phase 2	Active travel	Disturbance due to increase in road traffic noise. **Not Significant.**	N/A	Disturbance due to increase in road traffic noise. **Not Significant.**

11.83 In summary, the assessment has found that residual significant effects due to disturbance associated with construction activity noise are likely to occur at the following representative receptors:

- NSR1. Moderate Adverse Effect.
- NSR 3. Moderate Adverse Effect.
- NSR4. Moderate Adverse Effect.
- NSR 5. Moderate Adverse Effect.
- NSR 6. Moderate Adverse Effect.
- NSR 8. Moderate Adverse Effect.

Conclusions

11.84 An assessment of construction activity noise associated with the construction stage of the proposed development has been undertaken. The assessment indicates that the effects of construction activity noise at the closest residential receptors to the site will be **Significant**. However, these effects would be temporary, such that they would occur for a limited duration whilst intensive construction activities were undertaken in close proximity to the receptor.

11.85 An assessment of construction road traffic noise and operational road traffic noise associated with the construction and operational phases of the Proposed Development respectively, has been undertaken. The assessment indicates that the effects of construction road traffic noise and operational road traffic noise associated with the Proposed Development, on assessed receptors, will be **Not Significant**.

Assessment of Cumulative Effects

Approach

11.86 Table 11.16 provides details of the only development considered within the cumulative sites assessment.

Table 11.16 Cumulative Sites

Site Ref.	Application No.	Distance and Direction	Proposal	Scoped-in / Scoped-out	Justification
1.	P/2021/0436 (original application reference) currently subject to a pending appeal (P/2021/0436)	Approx 250m north	Land South of Holt Road, Wrexham (KSS2 North) 'Outline application for construction of up to 600 dwellings, with social landscaping, public open space and on-site establishment, with all matters retained except for north site access'	Scoped in and considered in the main assessment.	

Likely Residual Cumulative Effects and their Significance

Construction Road Traffic Noise

11.87 Due to the negligible impact of construction road traffic noise as indicated by the assessment summarised in **Table 11.10**, there are no likely cumulative effects associated with the cumulative site during the construction phase.

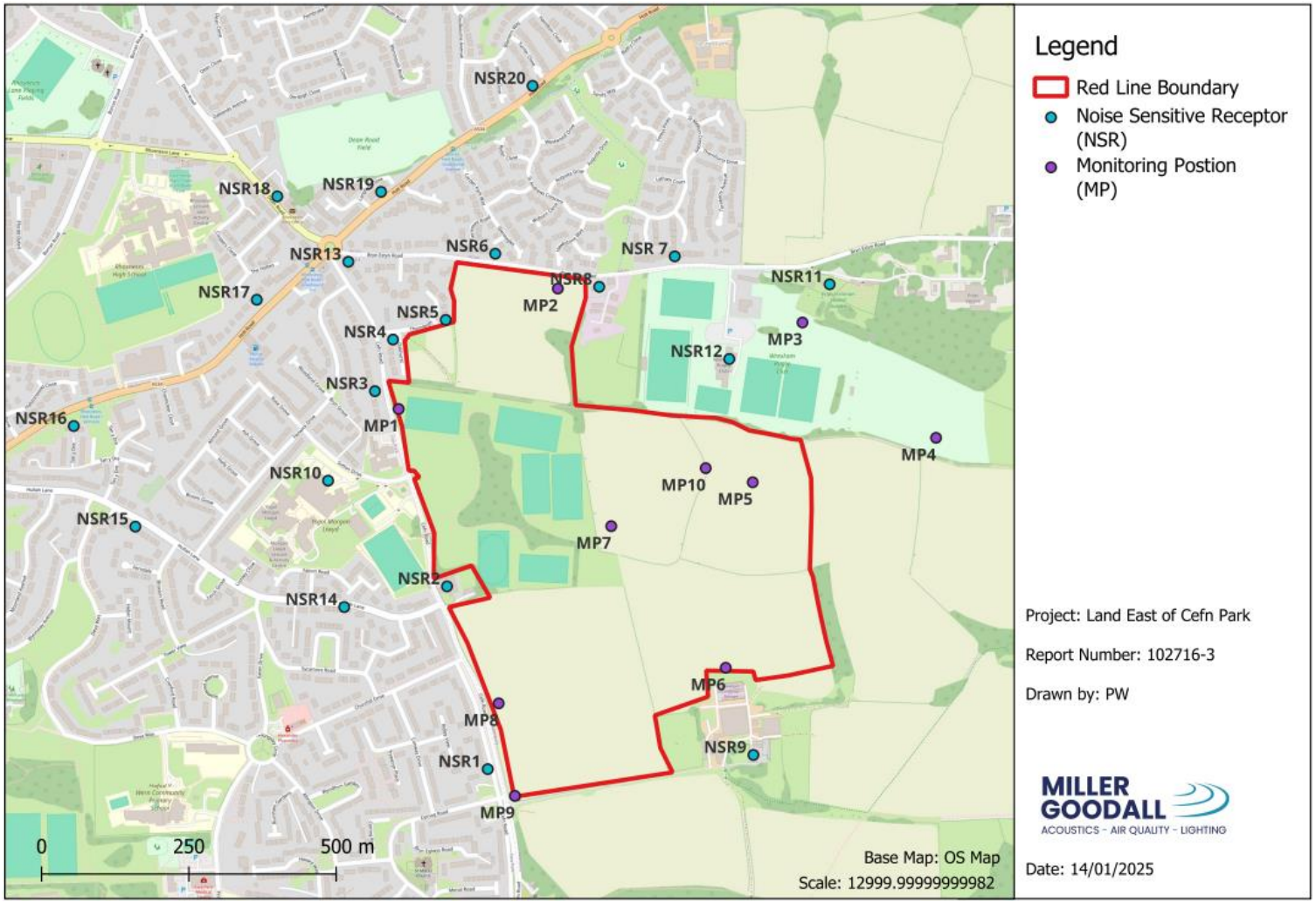
Construction Activity Noise

11.88 There are no likely cumulative effects of construction activity noise associated the with cumulative site during the construction phase.

Operational Road Traffic Noise

11.89 The road traffic data used in the assessments of operational road traffic noise above includes road traffic associated with application P/2021/0436. Therefore, the outcome of the cumulative assessment is the same as the standard assessment, the results for which are included in **Table 11.12** and **Table 11.13**.

Figure 11.1: Location of Site, Noise Sensitive Receptors and Measurement Positions



References

[i] The Welsh Assembly Government (1997), Planning Guidance (Wales) TAN 11– Noise
[ii] Institute of Environmental Management and Assessment (IEMA) (2024), Guidelines for Environmental Noise Impact Assessment
[iii] Highways England (2020), Design Manual for Roads and Bridges, LA 111 Noise and vibration, Revision 2
[iv] Department of Transport, Welsh Office (1988) , Calculation of Road Traffic Noise
[v] British Standards Institute (2014), BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
[vi] British Standards Institute (2003), BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures