



KRONOSPAN, CHIRK

**NORTH ACCESS ROAD INTO THE KRONOSPAN FACILITY,
LORRY PARK, WEIGHBRIDGES AND WEIGHBRIDGE
BUILDING, WEIGHBRIDGE CAR PARK AND FACILITIES
BLOCK, ROUNDWOOD STORAGE AREAS, 132KV
SUBSTATION, AND ANCILLARY WORKS**

ENVIRONMENTAL STATEMENT CHAPTER 8.0 – NOISE AND VIBRATION

REV A - JULY 2023



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8.0 NOISE AND VIBRATION

8.1 Introduction

Introduction

8.1.1 This chapter assesses the impact of the Proposed Development with regard to noise and vibration. It describes the methods used to assess the impacts, the baseline conditions that currently exist at the site, the potentially affected noise sensitive receptors, the possible direct and indirect impacts arising from the Proposed Development, and the mitigation measures that would be implemented to reduce noise impact from the Proposed Development.

8.1.2 The assessment includes the consideration of:

- description of the existing sound environment;
- outline of the likely evolution of the future baseline sound levels;
- identification of those aspects of the Proposed Development that may cause noise effects;
- information and predictions on the noise impact from the construction phase upon the nearest Noise Sensitive Receptors (NSRs);
- predictions of noise levels during the operation phase upon the NSRs;
- details of potential cumulative effects where noise from other potential developments may also affect the same NSRs; and
- likely residual significant effects taking account of proposed mitigation.

8.1.3 Potential noise effects are considered in the context of the predicted background sound levels at NSRs, which at this location are likely to be influenced by road traffic and other existing industrial activities.

8.1.4 **Appendix 8.1** provides details of technical terms used within the chapter. There is also a chart showing typical everyday noise levels to assist in understanding the subjective level of noise in terms of decibels (dB).

Proposed Development

8.1.5 A full description of the Proposed Development is provided in **ES Chapter 4.0 (Description of the Proposed Development)**. The location of the Proposed Development (the Site) is shown on **Figure 1.1**.

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- 8.1.6 It has been assumed that site operations and vehicle movements would occur 24 hours per day and 7 days a week.
- 8.1.7 The Proposed Development would comprise the principal components set out below. The location of each of these is illustrated on **Figure 4.1**.
- North access road.
 - Lorry park.
 - Weighbridges.
 - Weighbridge building.
 - Weighbridge car park.
 - Facilities block.
 - Roundwood storage areas.
 - 132kV substation.
 - Site drainage scheme.
 - Site landscape scheme.
- 8.1.8 A sound survey has been carried out in the vicinity of the Proposed Development to determine existing representative background and residual sound levels. The aim of the sound survey was to:
- identify the existing baseline sound levels for use as a reference for background and residual sound levels in the assessment of impacts related to the operation of the Proposed Development;
 - enable the assessment baseline to be established and understand the effects of existing developments on the future baseline; and
 - characterise the nearest NSRs or noise sensitive sites;
- 8.1.9 The methodology and approach to the sound survey and assessment included the following:
- establishing the nearest NSRs;
 - evaluation of present and assessment background and ambient sound levels;
 - evaluation of noise sources from the Proposed Development in terms of typical operating levels;
 - assessment of specific noise sources in relation to appropriate guidance and standards (e.g. BS4142:2014+A1:2019, BS8233:2014, BS5228:2009+A1:2014); and

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- identification of any noise control necessary where noise generated from the Proposed Development has been identified as exceeding noise limits.

Competence

- 8.1.10 The author of this assessment has over 35 years' experience in the field of industrial and environmental acoustics with a Masters' Degree in Acoustics and is a Member of the Institute of Acoustics, Member of the Association of Noise Consultants, Member of the Academy of Experts and an Incorporated Engineer.

8.2 Assessment Methodology

Consultation

Pre-Application 1

- 8.2.1 A request for pre-application advice (dated 14 February 2020) was submitted by the Applicant to Wrexham County Borough Council (WCBC) for the development of a new private road leading from Holyhead Road to the existing Kronospan facility.
- 8.2.2 The first pre-application response from WCBC (reference ENQ/2020/0044, dated 07 January 2022) made no reference to specific matters or application requirements in relation to noise and vibration.

Pre-Application 2

- 8.2.3 A subsequent request for pre-application advice (dated 02 November 2021) was submitted by the Applicant to Wrexham County Borough Council for several development proposals to develop and improve the existing industrial facility at Kronospan Limited, Holyhead Road, Chirk. The development proposals subject to the pre-application advice request included the Proposed Development plus other development proposals that have either had planning applications submitted or granted. Further details of the other development proposals (aside from the Proposed Development) are provided in the Planning Statement and **ES Chapter 1.0 (Introduction)**.
- 8.2.4 With respect to noise and vibration the second pre-application response from WCBC (reference ENQ/2021/0315, dated 07 January 2022) states that the application should be accompanied by a noise impact assessment and, where they are identified

as necessary, measures to ensure the amenity afforded to residential properties is not adversely affected.

Statutory Pre-Application Consultation

- 8.2.5 The Town and Country Planning (Development Management Procedure) (Wales) Amendment Order 2016 (DMPO 2016) requires the Applicant to consult the public and statutory consultees prior to submitting a planning application for major development. The consultation period was between 14 October 2022 and 11 November 2022 with an extended period until 18 November 2022 agreed with Natural Resources Wales (NRW).
- 8.2.6 A series of responses from consultees including the Canal and Rivers Trust (CRT) and Chirk Town Council (CTC), the National Trust (NT) received in November 2022 identified issues relating to noise and vibration matters, as set out in **Table 8.1** below. Full consultee responses (and how each has been addressed) is provided in the Pre-Application Consultation (PAC) Report.

Table 8.1: Summary of Statutory Pre-Application Consultation Responses

Consultee	Summary of Response	How Response has been addressed in the ES (or elsewhere in the planning submission)
CRT	The noise assessment ought to have considered and assessed boaters as a receptor to noise especially during construction and operation, as the site will be operational 24/7.	A new receptor location (R7) is now included for live aboard boaters at Chirk Marina and along the canal. Although R7 is further away from the Proposed Development than receptor R3 (Afon Bradley Farm) and therefore noise and vibration impacts experienced at R7 would be lower than at R3, baseline noise levels are assumed to be similar due to distance from Holyhead Road and location.
Chirk Town Council	The Council's major concern is around noise levels as this is currently a quiet country area. The noise from the arriving and departing HGV's and the disconnecting and forklift trucks will be 24/7 and residents in Lodgevale Park will be directly affected.	Receptor R1 (receptors off Wern and Offa) has been re-labelled to include reference to Lodgevale Park which is a suitable representative receptor position in this location given their close proximity to each other. The assessment shows that there would be no significant impacts at all NSRs during the construction or operation of the Proposed Development following the implementation of appropriate mitigation.
Chirk Town Council	Roundwood storage areas and associated structures - the current log stacks make a lot of noise and concern that these have been	This chapter demonstrates that no significant noise and vibration impacts would be experienced at receptors closest to the proposed roundwood storage areas. Operational mitigation built into the proposed design includes a restriction stating that the log loader would not be used at the proposed

Consultee	Summary of Response	How Response has been addressed in the ES (or elsewhere in the planning submission)
	located closest to the residential area.	lorry park and roundwood storage areas during night-time periods (only between the hours of 07.00 and 19.00).

Post-Submission Statutory Consultation Responses

Overview

- 8.2.7 During the statutory post-submission consultation stage undertaken by WCBC, several consultation responses have been received by WCBC and subsequently issued to the Applicant for further consideration and comment.
- 8.2.8 All consultation responses have been collated together and submitted via separate cover to WCBC – they detail how account has been taken of each response (including points of further clarification, where the Proposed Development design was amended, or further information provided in the planning application documents).

Alternatives

- 8.2.9 Some of the consultation responses received were with respect to further consideration of alternatives to minimise impact on the surrounding landscape and historic environment; the most notable of which were provided by Cadw.
- 8.2.10 The Applicant and Cadw held a meeting on 20 April 2023 to discuss alternatives in greater detail. The discussion included further clarification of the key design parameters considered (of the various components) during the development of the Proposed Development and the desire to achieve, on balance, a proposal that has the least environmental impact, with particular regard given to consideration of the historic environment, the landscape and visual impacts, local amenity (noise, vibration and air quality), and impacts on the local highway network. A summary of the key discussion parameters discussed with Cadw is provided in **ES Chapter 3.0 (Alternatives)**.
- 8.2.11 The discussion continued to understand the extent to which it would be possible to amend the design of the Proposed Development to reduce impacts on the historic environment (without creating additional environmental impacts elsewhere e.g. noise and vibration, landscape), with a particular focus on reducing/removing the extent of new development located towards the northern extent of the red line boundary. An

outline sketch of an alternative Proposed Development layout was produced to address this objective which Cadw later agreed would likely assist with reducing the impact of the proposed Development on the historic environment. This sketch was subsequently looked at in greater detail by the Applicant to develop a workable alternative layout for subsequent formal submission to WCBC. The key changes implemented during the development of the alternative layout are discussed in more detail at **ES Chapter 3.0** (Alternatives) but are summarised below.

- Weighbridges, weighbridge building, and weighbridge car park moved approximately 20m to the south.
- Lorry park footprint reduced by approximately 50% (previously 91 HGV spaces, now 45 HGV spaces) and moved further south.
- Area at the northern extent of the Proposed Development Site now vacated by the reduced lorry park is proposed as further wildflower grassland.
- Roundwood storage areas reduced in size (around 21% collectively) to accommodate the above.
- Additional land on the western boundary of the western roundwood storage proposed for new woodland planting.
- The bund along the eastern boundary of the Site amended to a height of approximately 4m adjacent to the proposed lorry park, and to a height of approximately 7m north of the proposed lorry park (when measured from the adjacent internal platform/road level of the Proposed Development) to provide appropriate noise mitigation for the residential receptors at Offa/Wern. This would provide similar noise effects to the original (and now superseded) Proposed Development layout.
- The 5m high acoustic screen along the eastern boundary of the lorry park extended further south to also run adjacent the weighbridge car park area

Formal Submission of Amended Planning Drawings and EIA Regulation 24

- 8.2.12 The finalisation of the alternative Proposed Development layout represents a clear change to the original planning application made to WCBC. Therefore, several of the original planning documents have been revised and formally submitted to WCBC for further consideration (and formal consultation). This includes an updated ES in accordance with Regulation 24 of the EIA Regulations, including this chapter.

Planning Policy, Guidance and Standards

General

- 8.2.13 Within the introduction of Technical Advice Note (Wales) 11: 1997 'Noise' it states
- "This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business."*
- 8.2.14 Technical Advice Note 11 (TAN 11) provides the following information:
- indicates how noise issues should be handled in development plans and development control;
 - outlines ways of mitigating the adverse impact of noise;
 - provides specific guidance on noisy and noise-sensitive development;
 - introduces the use of noise exposure categories; and
 - gives guidance on the use of planning conditions relating to noise.
- 8.2.15 The guidance introduces the concept of Noise Exposure Categories (NEC), which have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport-related noise sources. The NEC procedure is only applicable for the introduction of a new residential development into an area with an existing noise source. At Annex 1, guidance is given for various types of noise sources, which includes road traffic, aircraft and railways.
- 8.2.16 For reference, the recommended noise exposure categories for new dwellings near existing sources are shown below in **Table 8.2**. Note that these noise categories are based upon measurements taken in an open site (i.e. without any noise attenuating features in place).
- 8.2.17 The level at the boundary of NEC A and NEC B is based on guidance provided by the World Health Organisation (WHO) health criteria from 1980, which states that *"general daytime outdoor noise levels of less than 55dB(A) Leq are desirable to prevent any significant community annoyance"*.
- 8.2.18 The night-time noise level at the boundary of NEC A and NEC B is also based upon the WHO health criteria, stating *"based on limited data available, a level of less than 35dB(A) is recommended to preserve the restorative process of sleep"*.

8.2.19 **Table 8.2** below provides an interpretation of the NEC categories in terms of granting planning permission.

Table 8.2: NEC Categories

NEC Category	Description	Noise Range $L_{Aeq,T}$ dB
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.	<55dB(A) daytime (16hr) <45dB(A) night-time (8hr) Road, rail and mixed sources
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.	55-63dB(A) daytime (16hr) 45-57dB(A) night-time (8hr) Road and mixed sources
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.	63-72dB(A) daytime (16hr) 57-66dB(A) night-time (8hr) Road and mixed sources

8.2.20 In applying these noise exposure categories, it states:

“Different indices have been used to describe noise from different sources, and limits have been set over different time periods. This has caused confusion, and this advice follows the move towards consistency advocated in BS 7445: 1991 by expressing all noises of $L_{Aeq,T}$. The recommended time periods are 0700-2300 and 2300-0700.”

8.2.21 For noisy industrial development, the guidance refers to BS 4142 - ‘Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas’ (updated in 2019).

8.2.22 To establish the impact of the Proposed Development in respect of noise on existing or proposed residential receptors it is necessary to consider the relevant noise guidance, standards and policy for an industrial development. The following section examines the guidance and establishes the methodology to be adopted for assessing noise impacts.

8.2.23 Information used in this assessment has been obtained from the following sources:

- Ordnance Survey maps of the local area;
- general layout of the Proposed Development;
- Technical Advice Note (Wales) 11: 1997 ‘Noise’

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- BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound';
 - BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings';
 - BS5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites';
 - World Health Organisation: 'Guidelines for Community Noise' - April 1999;
 - Department of Transport 'Calculation of Road Traffic Noise': 1988;
 - Design Manual for Roads and Bridges, LA 111 'Noise and Vibration' May 2020;
 - Calculation of Road Traffic Noise (CRTN): Department of Transport 1988;
 - ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors;
 - Environment Agency – Guidance: Noise and vibration management: environmental permits (July 2021); and
 - The author of this assessment's library data of on-site noise sources.

BS4142: 2014+A1:2019 'Methods for Rating and Assessing industrial and Commercial Sound'

8.2.24 BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' is based on the measurement of background sound using L_{A90} noise measurements, compared to source noise levels measured in L_{Aeq} units. Once any corrections have been applied for source noise tonality, distinct impulses etc., the difference between these two measurements (i.e. known as the 'rating' level) determines the impact magnitude.

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

8.2.25 To establish the rating level, corrections for the noise character need to be taken into consideration.

8.2.26 To establish the rating level, corrections for the noise character need to be taken into consideration. The standard states that when considering the perceptibility:

“Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.”

8.2.27 The subjective method adopted includes the following character corrections:

Table 8.3: BS4142 Character Corrections

Level of perceptibility	Correction for tonal character dB	Correction for impulsivity dB	Correction for intermittency dB	Correction for 'other character' dB
Not perceptible	0	0	0	0
Just perceptible	+2	+3	0	0
Clearly perceptible	+4	+6	+3*	+3*
Highly perceptible	+6	+9	+3*	+3*

*Standard defines this should be readily distinctive against the residual acoustic environment, it is interpreted therefore to be either clearly or highly perceptible as a character.

BS8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

8.2.28 The British Standard BS8233 provides additional guidance on noise levels within buildings. These are based on the WHO recommendations and the criteria given in BS8233 for unoccupied spaces within residential properties.

8.2.29 The guidance provided in Section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings.

Table 8.4 provides detail of the levels given in the standard.

Table 8.4: BS8233: 2014 Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35dB LAeq	30dB LAeq
Dining	Dining room/area	40dB LAeq	
Sleeping (daytime resting)	Bedroom	35dB LAeq	
Study and work requiring concentration	Staff/Meeting Room	35-45dB LAeq	
	Training Room/	35-45dB LAeq	
	Executive Office		

8.2.30 This standard would be appropriate to apply to existing or proposed residential development. The Site noise contribution should be within the proposed internal noise levels, which would include the following noise limits:

- Living room areas: $\leq 35\text{dB } L_{Aeq,16\text{hours}}$ (0700-2300 hours) [equivalent to an external level of approximately $65\text{dB } L_{Aeq,16\text{hours}}$ based on typical standard double-glazed units in the closed position and approximately $50\text{dB } L_{Aeq,16\text{hours}}$ in the open position].
- Bedrooms: $\leq 30\text{dB } L_{Aeq,8\text{hours}}$ (2300-0700 hours) [equivalent to an external level of approximately $60\text{dB } L_{Aeq,8\text{hours}}$ based on typical standard double-glazed units in the closed position and approximately $45\text{dB } L_{Aeq,8\text{hours}}$ in the open position]
- Offices: $35\text{dB to } 45\text{dB } L_{Aeq,8\text{hours}}$ [equivalent to an external level of approximately $65\text{dB to } 75\text{dB } L_{Aeq,8\text{hours}}$ based on typical standard double-glazed units in the closed position].

8.2.31 The above internal bedroom limits would comply with sleep disturbance criteria defined by World Health Organisation guidelines (WHO). The WHO night noise guidelines for Europe refers to sleep disturbance limit of $42\text{dB}-45\text{dB } L_{Amax}$ for regular peak events within bedrooms [which is approximately $57\text{dB}-60\text{dB } L_{Amax}$ external to the bedroom window in the open position].

World Health Organisation (WHO) Guidelines for Community Noise: April 1999

8.2.32 This document provides further updated information on noise and its effects on the community. Within the document for noise '*In Dwellings*' it states that

'To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed $35\text{dB } L_{Aeq}$. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed $55\text{dB } L_{Aeq}$ on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during

the daytime, the outdoor sound level should not exceed 50dB L_{Aeq} . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.”

World Health Organisation (2009) – Night Noise Guidelines for Europe

- 8.2.33 The WHO regional office for Europe set up a working group of experts to provide scientific advice to the Member States for the development of future legislation and policy action in the area of assessment and control of night noise exposure. Considering the scientific evidence on the thresholds of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive (2002/49/EC), an $L_{night,outside}$ of 40dB should be the target of the night noise guidance (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. $L_{night,outside}$ value of 55dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach

World Health Organisation ‘Environmental Noise Guidelines for the European Region’:2018

- 8.2.34 The objective of the ‘Environmental Noise Guidelines for the European Region’ is stated in the Executive Summary of the report:

‘The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. Leisure noise in this context refers to all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices. The guidelines focus on the WHO European Region and provide policy guidance to Member States that is compatible with the noise indicators used on the European Union’s END.’

8.2.35 As stated in the guidance “*Environmental permits have conditions that require operators to control pollution – this includes controlling noise and vibration. This guidance covers:*

- *How the environment agencies will assess noise from certain industrial processes*
- *What the law says you must do to manage noise and vibration*
- *Advice on how to manage noise – in particular, how to carry out a noise impact assessment and what operators should include in a noise management plan”*

8.2.36 Operators (or permit applicants) must consider the potential noise impact of their site. They may need to carry out noise impact assessments:

- at the permit application stage;
- when applying to vary a permit; and
- to comply with specific permit conditions.

8.2.37 The guidance advises on 4 steps that are required when carrying out a noise impact assessment, these are:

- Desktop risk assessment – identification of any audible noise plant or operations, identification of NSRs, description and ranking of noise sources in terms of potential off-site impact, description of land between site and NSRs.
- Off-site monitoring survey – for new development this would relate to a study of the existing baseline sound conditions.
- Source assessment – noise modelling of plant or operations and if industrial source using BS4142 and ISO 9613 for prediction.
- Best Available Techniques (BAT) or appropriate measures justification – measures to be adopted to avoid unacceptable noise pollution and demonstrate that BAT or appropriate measures would be introduced to prevent, or where that is not practicable, to minimise noise impact.

BS5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

- 8.2.38 In the forward of this standard, it states: *‘This British Standard refers to the need for the protection against noise and vibration of persons living and working in the vicinity of, and those working on, construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations, and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners.’*
- 8.2.39 Under the heading ‘Use of this document’ it states *‘As a code of practice, this part of BS5228 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure claims of compliance are not misleading.’*
- 8.2.40 This scope of the standard is clarified as follows:
- ‘This part of BS5228 gives recommendations for basic methods of noise control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites where work activities/operations generate significant noise levels, including industry-specific guidance.’*
- 8.2.41 The guidance gives specific advice in relation to noise control from mineral extraction workings.
- 8.2.42 In summary, advice provided within the document to minimise noise from these types of site is set out under the following headings:
- a) Site location and layout
 - b) Choice of equipment
 - c) Maintenance of plant
 - d) Site operations
 - e) Sequencing of activities
 - f) Acoustic screening

Road Traffic Noise

- 8.2.43 The proposed north access road and lorry park would provide a new access into the Kronospan Facility from the B5070 Holyhead Road. The new access point would be

to the north of Chirk and would allow heavy goods vehicles (HGV) traffic to access and egress the Kronospan Facility without having to enter the town itself.

- 8.2.44 Access from the public highway would be via a new roundabout on the B5070. The location of this is shown on **Figure 4.1**. The roundabout would replace the existing junction between the B5070 with the minor road that runs eastwards toward the service area off the A5. The roundabout would also replace the existing junction between the B5070 and the private means of access leading to Afon Bradley Farm.
- 8.2.45 To assess the likely impact on NSRs from the changes to the traffic movement as a result of the Proposed Development on the local road network, noise calculations have been undertaken using 'Calculation of Road Traffic Noise' ("CRTN") methodology and traffic flow information for the Proposed Development.
- 8.2.46 The Design Manual for Roads and Bridges (DMRB) LA 111 provides guidance on the magnitude of change in terms of road traffic noise. The procedure for assessing noise impacts advises the use of a LA₁₀ measurement index based on a daytime 16-hour time period (i.e. 0700 to 2300 hours) and night-time period (i.e. 2300-0700 hours).
- 8.2.47 DMRB LA 111 defines the short term and long-term scenarios which are considered to represent the situation when a new road opens (short term) and 15 years after a road opens (long term). The magnitude of change criteria is set out in **Table 8.5** for the short term and **Table 8.6** for the long term.

Table 8.5: Magnitude of Change – Road Traffic Noise- Short Term

Short Term Magnitude	Short Term Noise Change (dB LA _{10,18hr} or L _{night})
Negligible	Less than 1.0
Minor (Slight)	1.0 to 2.9
Moderate	3.0 to 4.9
Major (Substantial/Severe)	Greater than or equal to 5.0
Negligible	Less than 1.0

Table 8.6: Magnitude of Change – Road Traffic Noise- Long Term

Long Term Magnitude	Long Term Noise Change (dB L _{A10,18hr} or L _{night})
Negligible	Less than 3.0
Minor (Slight)	3.0 to 4.9
Moderate	5.0 to 9.9
Major (Substantial/Severe)	Greater than or equal to 10.0
Negligible	Less than 3.0

8.2.48 The impact magnitude categories can then be correlated with the receptor sensitivity categories in **Table 8.16** to establish a level of effect as defined in **Table 8.17**.

8.2.49 For the assessment of on-site traffic, ISO9613-2 calculation methodology has been applied using a 'line source' to represent moving vehicles with appropriate speed and empirical sound power levels obtained from the Site.

BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

8.2.50 BS5228 refers to: *“the need for the protection against noise and vibration of persons living and working in the vicinity of, and those working on, construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners.”*

8.2.51 Part 1 deals with noise in terms of background legislation and gives recommendations for basic methods of noise control relating to construction and open sites where significant noise levels may be generated. The guidance is aimed at giving advice on achieving 'best practice' in controlling noise and vibration from construction and open sites. There is an example of noise limits given in Annex E, which sets out cut-off limits between 65dB(A) and 75dB(A) or 5dB(A) above the ambient noise, whichever is the greater. Part 2 of BS 5228 deals specifically with vibration control and provide the legislative background to the control of vibration and recommendations for controlling vibration at source and management controls (e.g. liaison with communities, supervision, preparation and choice of plant etc.).

Level and Significance of Effect

- 8.2.52 The level of an effect is a function of the sensitivity or importance of the receiver, or receptor, and the scale or magnitude of the effect. In the case of this assessment, the level of the effect has been determined by reference to existing guidance and standards that are explained below.
- 8.2.53 Three types of effects at receptors have been identified:
- Residents of existing houses adjacent to the Site who could experience Site operational noise during the daytime.
 - Residents of existing houses who could experience additional vehicle noise from the Proposed Development.
 - Residents of existing houses adjacent to the Site who could experience Site construction noise during the daytime.

Construction Noise

- 8.2.54 For residents of houses that could be exposed to construction noise, BS5228-1:2009+A1:2014 is considered to be the appropriate standard. This standard does not prescribe limits but requires 'best practicable means' ("BPM") to be employed to control noise generation. The criterion therefore is that BPM should be employed, and conditions implemented for example to restrict construction noise to non-sensitive hours.
- 8.2.55 The construction impact semantic scale, set out in **Table 8.7** below, is based on the ABC method of assessment described in Annex E.3.2 of BS5228, which sets out threshold values depending upon the ambient noise at receptors, which have been determined from the baseline sound survey.
- 8.2.56 According to the guidance found within the DMRB LA 111, the lowest observable adverse effect level (LOAEL) and significant observable adverse effect level (SOAEL) for noise sensitive receptors during construction are shown in **Table 8.7**.

Table 8.7: Construction Time Period – LOAEL and SOAEL

Time Period	LOAEL	SOAEL	Threshold Level L _{Aeq1hr} dB
Day (0700-1900 hours Weekday and 0700-1200 Saturdays)	Baseline noise levels L _{Aeq,T}	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	65-75
Night (2300-0700 hours)	Baseline noise levels L _{Aeq,T}	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	45-55
Evening and weekends (time periods not covered above)	Baseline noise levels L _{Aeq,T}	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	55-65

8.2.57 The magnitude of impact for construction noise is outlined in **Table 8.8** (as defined in DMRB LA 111).

Table 8.8: Magnitude of Impact for Construction Noise

Magnitude of Impact	Construction Noise Level
Negligible	Below LOAEL
Minor (Slight)	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below SOAEL +5dB
Major (Substantial/Severe)	Above or equal to SOAEL +5dB

Construction Road Traffic Noise

8.2.58 According to the LA 111 guidelines, the magnitude of impact at noise sensitive receptors from construction traffic is set out in **Table 8.9**.

Table 8.9: Magnitude of Impact for Construction Road Traffic Noise

Magnitude of Impact	Increase in Basic Noise Level of Closest Public Road used for Construction Traffic (dB)
Negligible	Less than 1.0
Minor (Slight)	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major (Substantial/Severe)	Greater than or equal to 5.0

Note: 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:

- 1) 10 or more days or nights in any 15 consecutive days or nights;
- 2) a total number of days exceeding 40 in any 6 consecutive months.

Construction Vibration

- 8.2.59 For construction phase vibration the LOAEL and SOAEL is set out in DMRB LA 111 and provided in **Table 8.10**.

Table 8.10: Construction Vibration LOAELs and SOAELs

Time Period	LOAEL	SOAEL
All time periods	0.3mm/sec PPV	1.0mm PPV

- 8.2.60 The magnitude of impact for construction vibration, shall be determined in accordance with **Table 8.11** (as defined in DMRB LA 111).

Table 8.11: Magnitude of Impact at Receptors

Magnitude of Impact	Vibration Level
Negligible	Below LOAEL
Minor (Slight)	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below 10mm/s PPV
Major	Above or equal to 10mm/s PPV

Note: Construction vibration shall constitute a likely significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 1) 10 or more days or nights in any 15 consecutive days or nights; or
- 2) a total number of days exceeding 40 in any 6 consecutive months.

Operational Noise

- 8.2.61 **Table 8.12** below shows the proposed impact magnitude methodology considering the guidance contained within BS4142: 2014+A1:2019 for fixed and vehicle noise.

Table 8.12: Impact Magnitude Scale – Future Noise against Existing in accordance with BS4142: 2014 (Operational Phase)

Rating Level above Background Noise dB(A) as BS4142: 2014	Description of Effect	Impact Magnitude
-10 to 0	No discernible effect on the receptor	Negligible
+0.1 to +4.4	Non-intrusive – Noise impact can be heard but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Slight
+4.5 to +9.4	Intrusive – Noise impact can be heard and causes small changes in behaviour and/or attitude.	Moderate

Rating Level above Background Noise dB(A) as BS4142: 2014	Description of Effect	Impact Magnitude
	Affects the character of the area such that there is a perceived change in the quality of life. Potential for non-awakening sleep disturbance.	
+9.5 to +14.4	Disruptive – Causes a material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep. Quality of life diminished due to change in character of the area.	Substantial
+14.5 and above	Physically Harmful – Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm	Severe

Note: The 'rating' level is the difference between the noise contribution from site and the existing background sound level allowing for any adjustments required for noise characteristics (i.e. tonal, impulsive or intermittent noise character). The standard advises that rounding of numbers to one decimal place should relate to levels of 0.5Db or above, which is reflected in the table limits. The impact magnitude scales in Tables 8.10 to 8.11 are used in the assessment of operational noise impacts.

8.2.62 The Institute of Environmental Management and Assessment (IEMA) has provided 'Guidelines for Environmental Noise Impact Assessment'. The guidelines set out an example of how changes in noise level may be assessed in terms of residual LAeq. This assists in determining the impact of Site operational noise relative to the context of the noise climate, which is detailed in **Table 8.13**.

Table 8.13: Impact Magnitude Scale – General Site Noise

Change in sound levels LAeq dB	Description of Effect	Impact Magnitude
< +2.9	No discernible effect on the receptor	Negligible
+3.0 to +4.9 (some receptor sensitivity)	Non-intrusive – Noise impact can be heard but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Slight
+3.0 to +4.9 (high receptor sensitivity) +5 to +9.9 (some receptor sensitivity)	Intrusive – Noise impact can be heard and causes small changes in behaviour and/or attitude. Affects the character of the area such that there is a perceived change in the quality of life. Potential for non-awakening sleep disturbance.	Moderate
+5 to +9.9 (high receptor sensitivity)	Disruptive – Causes a material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep. Quality of life diminished due to change in character of the area.	Substantial
+10 and above (high receptor sensitivity)	Physically Harmful – Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological	Severe

Change in sound levels LAeq dB	Description of Effect	Impact Magnitude
	effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm.	

Operational Road Traffic Noise

- 8.2.63 DMRB LA 111 defines the short term and long-term scenarios are considered to represent the situation when a new road opens (short term) and 15 years after a road opens (long term). The magnitude of change criteria is set out in **Table 8.14** for the short term and **Table 8.15** for the long term.

Table 8.14: Magnitude of Change – Road Traffic Noise - Short Term

Short Term Magnitude	Short Term Noise Change (dB LA10,18hr or Lnight)
Negligible	Less than 1.0
Minor (Slight)	1.0 to 2.9
Moderate	3.0 to 4.9
Major (Substantial/Severe)	Greater than or equal to 5.0

Table 8.15: Magnitude of Change – Road Traffic Noise - Long Term

Long Term Magnitude	Long Term Noise Change (dB LA10,18hr or Lnight)
Negligible	Less than 3.0
Minor (Slight)	3.0 to 4.9
Moderate	5.0 to 9.9
Major (Substantial/Severe)	Greater than or equal to 10.0

- 8.2.64 To determine the significance of an impact, the magnitude of this impact and the sensitivity of the receptors likely to experience the impact must be determined. For this assessment, the categories presented in **Table 8.16** have been adopted.

Table 8.16: Receptor Sensitivity

Receptor Sensitivity	Type of Receptor
High	Dwellings/residential properties including houses, flats, old people's homes, hospitals, schools, churches, caravans and open spaces/conservation areas.
Moderate	Commercial premises including retails and offices etc.
Low	Industrial premises including warehouses and distribution etc.

- 8.2.65 Based upon the assessment of impact magnitude and the sensitivity of individual receptors, the matrix shown in **Table 8.17** has been developed to provide an indication of the possible level of effect for each predicted noise impact. Given that

there are many factors which may affect the level of the effect of an impact, not least, the character of the noise and timescales over which the noise operates, the overall level of effect must be assessed on an individual basis using professional judgement and experience. Therefore, whilst the matrix provides a useful indication of the likely significance, it cannot be applied in all situations.

Table 8.17: Level of Effect Matrix

Impact Magnitude	Receptor Sensitivity		
	High	Moderate	Low
Severe	Major	Major/Moderate	Moderate/Minor
Substantial	Major/Moderate	Moderate	Minor
Moderate	Moderate	Moderate/Minor	Minor/Neutral
Slight	Minor	Minor/Neutral	Neutral
No significant impact (negligible)	Neutral	Neutral	Neutral

- 8.2.66 Where a level of effect is defined as Major or Major/Moderate then the effect is likely to be considered significant i.e. an impact that is likely to be a key material factor in the decision-making process.

Assessment Limitations

- 8.2.67 No specific limitations were encountered in the preparation of this assessment chapter.

8.3 Baseline Environment

Overview

- 8.3.1 A baseline background sound survey in accordance with the advice given in BS4142: 2014+A1:2019 was undertaken between the 27th July and 3rd August 2021 (inclusive) at 9 receptor positions. An additional survey was carried out between Friday 1st April and Tuesday 5th April 2022 at two further receptor positions which are closer to the Proposed Development.
- 8.3.2 The surveys involved a total of 11 fixed monitoring positions to establish baseline noise levels as indicated in **Figure 8.1** and were chosen to be representative of the NSRs around the Proposed Development and provide broadband data of the existing sound climate at these receptors. Details of the instrumentation used for the survey are detailed in **Appendix 8.2**.
- 8.3.3 The local sound environment is therefore generally formed by noise from local road traffic, birdsong and industrial noise sources.

8.3.4 The monitoring positions are indicated in **Table 8.18**.

Table 8.18: Baseline Monitoring Positions and NSRs

NSR Position	Approximate Distance from Site Boundary (m)	Grid Reference	Description of Position
P1: No.2 Linden Avenue	260	329196 339250	This dwelling has a garden facing the direction of Kronospan off Linden Avenue a location area previously used for distant receptor to the northeast. Meter placed in centre of garden away from reflective walls.
P2: No. 3 Wern	40	328935 339034	This dwelling has a front garden facing Kronospan site off Wern. This is a location previously used for receptor to the northeast close to the B5070 Holyhead Road. Meter placed in centre of front garden at least 3.5m away from dwelling.
P3a: No. 23 George Street	110	328896 338882	This dwelling was closest and most accessible and safe property relative to West View with a garden open to noise from direction of Kronospan closer to the site to the northeast and away from traffic noise off Holyhead Road. This is further back than previous survey positions off West View and therefore more likely to produce lower ambient and background sound levels. Meter placed towards rear of garden away from reflective walls.
P4: Chirk Court	650	329059 338217	This position was most open location and accessible relative to Maes-y-waun and at similar distance from Holyhead Road and should therefore provide similar ambient and background sound levels to those previously measured. Green space used was in view of Kronospan and location west to southwest of site. Meter placed to the side of bicycle park on lawned area away from reflective walls and main building.
P5: No.2 Hadley Close	1100	329346 337929	This dwelling position was the most accessible and open location relative to previous Shepherds Lane monitoring position. Front garden was in directional view of Kronospan site. Meter placed towards centre of front lawn away from reflective surfaces.
P6: Tall Trees, Station Avenue	1120	328572 337837	This dwelling was the closest to the Mondelez entrance off Station Avenue and the rear garden faces the direction of Mondelez and Kronospan being south of the sites. Meter and weather station placed in rear garden away from reflective walls of dwelling.
P7: Canalwood Industrial Estate	1060	328403 337898	This position was most appropriate for measuring ambient noise and in a position facing the Kronospan site away from reflective walls and buildings. Meter placed on green space on raised grassed bund just to the west of the railway station complex.
P8: Manatton, Llwyn-y-cil Road	1280	328080 337787	This dwelling position was the most accessible position to the southwest of Kronospan site in a position with side lawned area facing an unimpeded direction towards the Kronospan plant. Meter placed in the side private garden just north of the dwelling away from dwelling walls.
P9: New Hall Farm, Castle Gates	1140	327611 338873	This position was most accessible and appropriate position to the northwest of the Kronospan site and in view of the plant on an elevated land position just east of the farm entrance. Meter was placed in the

NSR Position	Approximate Distance from Site Boundary (m)	Grid Reference	Description of Position
			field opposite the farm site entrance away from reflective walls and buildings.
P10. Afon Bradley Farm	40	328691 339433	This property is in the ownership of the Applicant and is located to the northwest of the lorry park. The meter was placed at the front lower garden of the property away from reflective walls and facing the direction of the Proposed Development.
P11. Opposite Lodge Farm Cottage	50	328953 339526	This property is located opposite the proposed new roundabout junction and therefore northeast of the lorry park. The meter was placed in the field opposite the Property at a similar distance from the local road network.

Existing Background Sound Survey Results

8.3.5 The results of the noise monitoring surveys are provided below in **Table 8.19** (daytime) and **Table 8.20** (night-time). Please refer to **Appendix 8.2** and **Appendix 8.3** for further details.

Table 8.19: Daytime Baseline Noise Measurements (0700-2300 hours)

Location	Survey Dates	LAeq dB	Representative LA90 dB	LAmx dB
P1. Linden Avenue	July 2021	46	36-37	47-86
P2. Wern	July 2021	57	45-48	63-91
P3a. George Street	July 2021	40	33-35	43-80
P4. Maes-y-Waun	July 2021	59	49	68-92
P5. Hadley Close	July 2021	47	41-42	47-86
P6. Station Avenue	July 2021	49	45-46	48-84
P7. Canalwood Industrial	July 2021	54	51-54	44-92
P8. Lylwn-y-cil Road	July 2021	46	39-40	42-75
P9. Opposite Castle back	July 2021	48	38	40-99
P10. Afon Bradley Farm	April 2022	51	43	51-83
P11. Opposite Lodge Farm Cottage	April 2022	61	51	69-92

Table 8.20: Night-time Baseline Noise Measurements (2300-0700 hours)

Location	Survey Dates	LAeq dB	Representative LA90 dB	LAmx dB
P1. Linden Avenue	July 2021	41	34	40-81
P2. Wern	July 2021	52	38-41	54-80
P3a. George Street	July 2021	37	30-31	34-62
P4. Maes-y-Waun	July 2021	53	46-47	49-93
P5. Hadley Close	July 2021	47	39-40	41-82
P6. Station Avenue	July 2021	47	45	47-67
P7. Canalwood Industrial	July 2021	54	49-51	54-80
P8. Lylwn-y-cil Road	July 2021	45	38-39	39-75

Location	Survey Dates	LAeq dB	Representative LA90 dB	LAmx dB
P9. Opposite Castle back	July 2021	47	34-36	54-80
P10. Afon Bradley Farm	April 2022	49	43	52-92
P11. Opposite Lodge Farm Cottage	April 2022	55	42	52-92

Historical Baseline Levels

- 8.3.6 Historical baseline data for Bryn Hyfryd, which is owned by the Applicant, was used as a fixed monitoring position for the original baseline survey in 2011. The background and residual levels established were found to be similar to those at Maes-y-Waun at a background level of 48dB LA90 daytime and 46dB LA90 night-time and 58dB and 53dB LAeq respectively. We have therefore used the original established baseline data from 2011 as being relevant for this position.

Representative Background Level

- 8.3.7 Section 8 of BS4142:2014+A1:2019 sets out the parameters for establishing the representative background level. The standard provides an example of statistical analysis that might provide a suitable method using the most commonly occurring value.
- 8.3.8 The data obtained during the July 2021 and April 2022 surveys has been statistically analysed and the results provided in **Appendix 8.3**.
- 8.3.9 Although ambient noise levels can vary depending on weather conditions, the purpose of the baseline survey is to monitor sound levels under suitable weather conditions. This then provides a typical and representative indication of ambient conditions.
- 8.3.10 For the purpose of this assessment, it is assumed that operational noise from the Proposed Development would be under appropriate weather conditions and therefore any significant positive or negative vector from wind direction is not representative. The effect of wind speed and direction can also increase background noise levels thereby masking any potential increase in site-specific noise levels. For this reason, it is assumed that typical weather conditions apply and no increase or decrease for the wind vector is required.

Identification of Noise Sensitive Receptors

Existing or Proposed Residential Receptors

- 8.3.11 For the purpose of the assessment (the identification of the likely level of effect), the following NSRs (summarised below and shown at **Figure 8.1**) have been identified.
- 8.3.12 Residential properties (off Wern, Offa, and Crogen) (Receptor R1) which form part of Lodgevale Park are east of the Site boundary are approximately 50m from the proposed lorry park.
- 8.3.13 Residential properties off Old Black Park Road (Lodge Farm Cottage and Parkgate Cottage) (Receptor R2) northeast of the Site are approximately 50m from the proposed access roundabout junction and approximately 250m from the proposed lorry park. There are other properties in this locality but are at a greater distance and therefore the impact would be lower.
- 8.3.14 The residential property at Afon Bradley Farm (Receptor R3) is owned by the Applicant and is currently occupied by a tenant and employee of the Applicant. The property is approximately 40m northeast of the Site boundary and approximately 200m from the proposed lorry park.
- 8.3.15 The Applicant owns a residential property immediately southeast of the Site boundary known as Bryn Hyfryd (Receptor R4). This property is occupied and a tenant of the Applicant.
- 8.3.16 Residential properties approximately 100m to 120m southeast of the Site boundary are off West View and George Street (Receptors R5).
- 8.3.17 A residential property at New Hall Farm (Receptor R6) is approximately 1.1km west of the Site boundary.
- 8.3.18 The Chirk Marina and the canal has live-aboard boaters (Receptor R7) which are approximately 170m from the Site Boundary at the nearest point.
- 8.3.19 There are no known future receptors proposed that would be of greater sensitivity than those considered in this assessment.

Ecological Sensitive Receptors

- 8.3.20 The potential effects of noise and vibration on biodiversity receptors is described at **ES Chapter 7.0 (Biodiversity and Nature Conservation)**.

Future Baseline

- 8.3.21 In the absence of the Proposed Development, it is assumed that the Site would remain in its present agricultural use.
- 8.3.22 Additionally, it seems reasonable to assume that, irrespective of the presence/absence of the Proposed Development, that there would be some degree of change within the Kronospan Facility as buildings are upgraded or replaced to accommodate new industrial processes, or are otherwise refurbished, and new items of plant are introduced to the Site, reflecting changes in technology or working practices.
- 8.3.23 In the absence of the Proposed Development, the HGVs would continue to be routed along Holyhead Road, which passes through part of Chirk village to enter through the existing entrance. The future baseline would therefore be subject to existing levels of noise from road traffic with the natural increase in local road traffic noise and from the effects of other cumulative projects from approved development occurring over time. The future baseline levels for receptors along a large section of Holyhead Road would therefore be higher from road traffic noise if the Proposed Development was not consented.

8.4 Development Design and Impact Avoidance Measures

Introduction

- 8.4.1 The predicted noise levels from the Proposed Development have been calculated using the noise levels provided within **Appendix 8.5**. The noise levels are based on data provided by Technology Providers of fixed plant (i.e., 132kV substation transformers).
- 8.4.2 The following sets out aspects of the Proposed Development that have been designed at the outset or through the earlier development/design stages to avoid or minimise the potential for significant effects. Further mitigation identified to address the initial environmental effects of the Proposed Development is described at **Section 8.7** of this chapter.

Construction

- 8.4.3 In accordance with BS5228, BPM would be employed to control the noise generation during construction. In addition, further mitigation would be implemented as part of

any Construction Environmental Management Plan (CEMP). Embedded mitigation measures that would be implemented during construction are as follows:

- Restriction of construction hours to non-sensitive times of day would normally form part of the planning consent conditions. The construction delivery hours proposed would be generally limited to 07.30 to 18.00hrs Monday to Friday and 08.00 to 14.00hrs Saturday. No work on Sundays or Bank Holidays, however there may be occasions when construction would need to be undertaken outside of the core hours, for example, during major concrete pours or the transfer of abnormal loads.
- Avoid un-necessary plant operation and revving of plant or vehicles.
- Sensible routing of the construction plant to avoid the nearest residential properties (where practicable).
- Where necessary, monitoring of site noise levels at NSR.
- Where practicable locate plant away from nearest sensitive receptors or in locations which provide good screening in the direction of sensitive receptors.
- Use of broadband noise reverse alarms (where practicable) on mobile plant.
- Regular maintenance of plant and equipment.
- Inform local residents of the works being undertaken and provide a complaints procedure for local residents to enable them to contact the Site should any issues arise in terms of noise.
- Use of local screening where plant is in proximity to sensitive receptor boundaries (e.g. within 50m of a sensitive boundary) using temporary hoarding. This is likely to be required, where practicable, along the eastern boundary parallel with Holyhead Road (north of Bryn Hyfryd) and to the north and western boundaries of Receptor R4 (Bryn Hyfryd). The temporary screening to the eastern boundary and the permanent screening proposed around Receptor R4 (see below) for operational noise would be introduced prior to the start of the construction work. Where this is not practicable, e.g. temporary construction of earth mounds to form screening at eastern boundary or construction of new roundabout access junction, the application of BPM would be introduced to minimise noise impact. Indicative location of acoustic screens are shown at **Figure 8.2**.
- Contact local residents prior to construction works commencing advising of anticipated duration and a contact number to advise of any issues/concerns.

Operation

- One-way system for HGVs to avoid the need for any reverse parking alarms.
- Any mobile plant used during the daytime at the roundwood storage areas would be fitted with non-tonal reversing alarms.
- Vehicle engines switched off when stationary, unless for short engine warm up.
- No use of vehicle horns or vehicle reversing alarms unless in emergency.
- Log Loader would not be used at the proposed lorry park and the roundwood storage areas during night-time periods.
- Earth embankment screening to the eastern boundary and northeastern corner of the Site to a minimum height of 3m. Acoustic screening around Receptor R4 (Bryn Hyfryd) via a solid screen to a height of 3m (e.g. close-boarded fencing (cbf) to a minimum mass of 10kg/m² or other solid screen such as brickwork, earth mounding with cbf on top). Refer to **Figure 8.2** for the location of the proposed acoustic screen.

8.5 Assessment of Potential Effects

Construction Phase Noise Effects – Plant Noise

- 8.5.1 Construction works would involve the movement of soils and the construction of new facilities and infrastructure. Excavators, haulage lorries, cranes, dumpers, concrete plant, diggers and road surfacing plant would all, at some time during the construction programme, be operating at the Site. In addition, ancillary equipment such as small generators, pumps and compressors may also be operating on occasion.
- 8.5.2 The above noise sources and their associated activities would vary from day to day and may be in use at different stages of the construction period for relatively short durations. The noisiest activities are expected to be generated during soil movement and infrastructure work during the initial stages of construction when excavators, dozers, road construction and surfacing plant or similar may be in use.
- 8.5.3 The actual noise level produced by construction work would vary at the nearest property boundary at any time depending upon several factors including the plant location, duration of operation, hours of operation, intervening topography and type of plant being used. Refer to **Appendix 8.4** for construction plant inventory that has been considered in the assessment.

8.5.4 The construction works would typically take place during normal daytime operating hours. The daytime activities and associated noise levels are provided below in **Table 8.21**, which is based on the ABC method within BS5228: 2009 (Annex E.3.2.).

Table 8.21: Noise Predictions for Highest Likely Construction Noise for existing NSRs (daytime activities) with Embedded Mitigation Measures

Position	Approximate Distance to Receptor (m)	Activity	Predicted Noise Level, LAeq dB _{1hr}	Typical Residual Noise LAeq dB	BS5228 Threshold Value LAeq dB (daytime)	Level Difference LAeq dB
R1. Receptors off Wern & Offa (east at Lodgevale Park)	40-320	Site Preparation	44-63 ²	57	65	-17 to -2
	60-280	General activities	47-62 ²	57	65	-18 to -3
	55-280	Infrastructure	47-64 ²	57	65	-18 to -1
	50-140	Plant & Facilities	57-62 ²	57	65	-8 to -3
R2. Receptors off Old Black Park Road (northeast)	50-450	Site Preparation	41-65	61	65	-20 to 0
	80-350	General activities	46-62	61	65	-19 to -3
	50-450	Infrastructure	43-64 ²	61	65	-22 to -1
	380-510	Plant & Facilities	44-47	61	65	-21 to -18
R3. Afon Bradley Farm (northwest)	50-500	Site Preparation	42-65	51	65	-18 to 0
	130-340	General activities	47-57	51	65	-18 to -8
	130-340	Infrastructure	46-60	51	65	-19 to -5
	330-400	Plant & Facilities	46-48	51	65	-19 to -17
R4. Bryn Hyfryd (south)	15-500	Site Preparation	42-64 ³	57 ¹	65	-21 to -1
	80-400	General activities	45-57 ³	57 ¹	65	-20 to -8
	60-460	Infrastructure	43-64 ³	57 ¹	65	-22 to -1
	100-160	Plant & Facilities	46-56 ³	57 ¹	65	-19 to -9
R5. West View & George Street (southeast)	35-350	Site Preparation	45-64 ³	40-57	65	-20 to -1
	80-300	General activities	48-57 ³	40-57	65	-17 to -8
	60-320	Infrastructure	46-64 ³	40-57	65	-19 to -1
	80-200	Plant & Facilities	53-58 ³	40-57	65	-12 to -7
R6. New Hall Farm (west)	1100-1400	Site Preparation	38-40	48	65	-27 to -25
	1150-1250	General activities	35-36	48	65	-30 to -29
	1200-1380	Infrastructure	33-39	48	65	-32 to -26
	1140-1260	Plant & Facilities	36-37	48	65	-29 to -28
R7. Canal users & Marina live aboard boaters	170-230	Site Preparation	50-55	51 ⁴	65	-15 to -10
	220-280	General activities	48-51	51 ⁴	65	-17 to -14
	170-280	Infrastructure	47-57	51 ⁴	65	-18 to -8
	170-280	Plant & Facilities	50-55	51 ⁴	65	-15 to -10

¹ Assumed to be similar to baseline measurement at R1 due to distance from Holyhead Road.

² Screen in place along eastern boundary either from temporary hoarding or proposed permanent earth mound screen.

³ Screen in place around property to north and western boundary of Bryn Hyfryd.

⁴ Baseline measurement at R7 taken to be similar to R3 due to distance from Holyhead Road and location.

8.5.5 On the basis of the above, the resultant temporary noise level, as a result of construction works is likely to result in an impact magnitude classification of

negligible to slight resulting in a **neutral to minor** level of effect. This is a temporary noise source and **not significant** in EIA terms.

- 8.5.6 The application of BPM will assist in minimising impact from construction noise.

Construction Phase Noise Effects – Road Traffic

- 8.5.7 Chapter 5 of the Transport Assessment (**Planning Statement Appendix F**) outlines the potential construction phase activities and the level of staff and HGV traffic that could arise during peak stages of the construction period. These estimates indicate that construction traffic could reach a peak with 20 cars and 100 one-way HGV movements per day. The construction delivery hours would be generally limited to 07.30 to 18.00hrs Monday to Friday and 08.00 to 14.00hrs Saturday. No work on Sundays or Bank Holidays, however there may be occasions when construction would need to be undertaken outside of the core hours, for example, during major concrete pours or the transfer of abnormal loads.

- 8.5.8 **Table 8.22** and **Table 8.23** provide details of predicted highest likely impacts due to the increased traffic flow along the local road network during peak hours movements. The dwelling positions in the vicinity of the B5070 Holyhead Road are likely to be the most sensitive receptors to any direct traffic flow increase from construction traffic movement.

Table 8.22: Predicted Change in Road Traffic Noise on Local Road Network due to Construction Works (AM Period)

Road	Baseline Year	2026 'Do Nothing' LA10 _{1hour} (dB)	'Do Something' LA10 _{1hour} (dB)	Change (with development) LA10 _{1 hour} (dB)
B5070 Holyhead Road (south of A5 roundabout)	2026	69.4	69.9	+0.5
A5 west of roundabout	2026	67.7	67.7	0
A5 east of roundabout	2026	70.3	70.7	+0.4

* The predicted noise levels are based on a notional 10m distance from the kerbside

Table 8.23: Predicted Change in Road Traffic Noise on Local Road Network due to Construction Works (PM Period)

Road	Baseline Year	2026 'Do Nothing' LA10 _{1hour} (dB)	'Do Something' LA10 _{1hour} (dB)	Change (with development) LA10 _{1 hour} (dB)
B5070 Holyhead Road (south of A5 roundabout)	2026	68.3	68.9	+0.6
A5 west of roundabout	2026	65.8	65.8	0
A5 east of roundabout	2026	68.7	69.2	+0.5

* The predicted noise levels are based on a notional 10m distance from the kerbside

- 8.5.9 Based on the traffic data and traffic routing assumptions set out in the Transport Assessment (**Planning Statement Appendix F**), the above results show no significant increase along the local road network where residential receptors exist. According to DMRB LA 111 impact methodology, the change in road traffic noise would be **negligible** and the level of effect **neutral** and therefore **not significant**.

Construction Phase Vibration Effects

Typical Vibration Levels

- 8.5.10 The highest levels of vibration generated by construction plant is likely to include the following:
- vibratory rollers and compactors;
 - material offloading onto hard surfaces; and
 - large bulldozer.
- 8.5.11 Typical field measurements taken at sites in the UK where vibratory rollers have been used (as indicated in the example of a vibratory compaction in **Appendix 8.8** indicates a vibration level of 0.4mm/sec to 1.5mm/sec at 10m distance. (ref. BS5228-2: 2009 Table C1-3 C1-4).

BS5228:2009 Part 2: Vibration

- 8.5.12 Part 2 of the standard deals with vibration from construction and open sites and provides information on the effects of the levels of vibration, human and structural response, response limits of structures and practical measures to reduce vibration.
- 8.5.13 The distance from the nearest residential receptors to any likely use of vibratory compaction (i.e. during road construction) is likely to be a minimum distance of between 50m and 130m.

Table 8.24: Highest Likely Construction Vibration for Existing NSRs (Daytime Activities)

Position	Approximate Distance to Receptor (m)	Receptor Sensitivity	Range of Highest Likely Vibration (mm/sec)
R1. Receptors off Wern & Offa (east at Lodgevale Park)	55	High	0.08 to 0.15
R2. Receptors off Old Black Park Road (northeast)	80	High	0.05 to 0.1
R3. Afon Bradley Farm (northwest)	130	High	0 to 0.03

Position	Approximate Distance to Receptor (m)	Receptor Sensitivity	Range of Highest Likely Vibration (mm/sec)
R4. Bryn Hyfryd (south)	20	High	0.3 to 0.5
R5. West View & George Street (southeast)	60	High	0.06 to 0.1
R7. Canal & Marina (west)	170	High	0

Note: receptor R6 is at much greater distance and therefore not included.

Conclusion

- 8.5.14 Based upon the above information, at the closest approach to existing residential properties, the highest likely levels of ground-borne vibration would generally be well below perceptible levels of vibration (i.e. 0.3mm/s). At the closest residential receptor (i.e. R4 Bryn Hyfryd) the highest level of vibration (i.e. from vibratory compaction) levels may just be above perceptible levels but not significant. Please refer to **Appendix 8.8** for further information.
- 8.5.15 It should be noted that the type of equipment, ground conditions and structural form could all affect the resultant level of vibration. At this stage, it has been assumed that the highest likely vibration level scenario occurs (i.e. a conservative estimate of potential effects).
- 8.5.16 The levels of vibration, as a result of construction, are likely to result in an impact magnitude classification of **negligible to slight** and a level of effect of **neutral to minor** during peak vibration. This is **not significant** in EIA terms.

Operational Phase Plant Noise

Noise Characteristics

- 8.5.17 In terms of the potential noise characteristics of the Proposed Development the following provides the details of the appropriate noise criteria applied in the assessment in accordance with BS4142: 2014+A1:2019:

Tonality

- 8.5.18 In terms of tonality, HGVs fitted with 'beeper' type reversing alarms do produce tonal noise; however, the Site is designed to avoid the need to reverse by the one-way system and layout of the proposed lorry park enabling parking access and egress in the same direction. Without some additional screening of the lorry park there may be some just perceptible tonality from lorry engines during night-time. Transformers also produce tonal noise at the driving frequency of the power supply however the noise

levels are low (provided by the Technology Provider) and the separation distance reduces the noise level sufficiently so that it would be negligible at NSRs. Any mobile plant used on Site to the roundwood storage areas would be fitted with broadband type noise that does not produce any tonality.

- 8.5.19 In terms of impulsivity (e.g. noise impacts) this type of noise character is not expected in relation to the type of development. For the proposed design, an impulse noise character penalty is considered not to be required.

Intermittency

- 8.5.20 The only intermittent activity is likely to be noise from HGV movements on and off-site. However, as the movement of vehicles forms a part of the existing noise climate during daytime and night-time, these are unlikely to be distinctive at NSRs.
- 8.5.21 In conclusion, with the proposed embedded noise mitigation strategy and controls of specific plant selection and design, we have allowed a +2dB allowance for vehicle engine noise during night-time operations. For the scenario where additional mitigation measures are included, a noise penalty is not deemed to be required due to residual noise masking effects and absolute level being so low.
- 8.5.22 **Table 8.25** and **Table 8.26** below show the highest noise prediction relating to fixed plant and vehicular noise sources on Site operating during daytime and night-time periods. Calculations include the inherent noise control measures outlined at paragraph 8.4.3.

Daytime Operations

- 8.5.23 **Table 8.25** below provides information on the predicted noise levels during daytime operations (i.e. in accordance with BS4142: 2014+A1:2019 07.00 to 23.00 hours). This includes the proposed substation plant and associated vehicle movements around the proposed lorry park, access roads, and mobile plant in the roundwood storage areas.

Table 8.25: Predicted Noise Contribution from Proposed Development during Daytime

Receptor Position (Refer to Figure 8.1)	Time Period (0700-2300 hours)	Predicted Rating ¹ Noise Level from Site LAeq _{1hr} dB	Assessment ² Baseline Sound Level LA90 _{1hr} dB [LAeq]	Rating ¹ compared to Baseline Sound LAeq _{1hr} dB	Noise Change ³ LAeq dB
R1. Receptors off Wern & Offa (east at Lodgevale Park)	Daytime	41-43	45-48 [57]	-7 to -2	+0.1 to +0.2
R2. Receptors off Old Black Park Road (northeast)	Daytime	42	51 [61]	-9	+0.1
R3. Afon Bradley Farm (northwest)	Daytime	45	43 [51]	+2	+1.0
R4. Bryn Hyfryd (south)	Daytime	43	48 [58]	-5	+0.1
R5. West View (southeast)	Daytime	30-40	45-48 ⁴ [57]	-18 to -5	0 to +0.1
R5. George Street (southeast)	Daytime	36	33-35 ⁴ [40]	+1 to +3	+1.5
R6. New Hall Farm (west)	Daytime	27	38 [48]	-11	0
R7. Canal & Marina (west)	Daytime	35-40	43 ⁵ [51]	-8 to -3	+0.1 to +0.3

Note 1: Noise characteristics at receptor locations do not include a penalty due to masking from residual sound levels.

Note 2: Based on a week or 5-day period of baseline sound monitoring including a weekend at NSRs.

Note 3: Column 6 is calculated by the logarithmic addition of columns 3 and column 4 **Leq** level in [] and subtraction of the background **Leq** noise level (i.e. column 4 in []).

Note 4: West View is at a similar distance to Wern monitoring position, George Street monitoring position was set back from Holyhead Road and therefore screened by housing closer to the main road producing lower baseline levels.

Note 5: Similar baseline assumed (for R7) as established at R3 due to distance from Holyhead Road and location.

8.5.24 The fifth column in **Table 8.25** shows the difference between the predicted rating noise level and the baseline sound level at the receptor positions. The rating level in column 5 is therefore in accordance with the methodology found within BS 4142: 2014+A1:2019, which is the most relevant applicable noise assessment guidance.

8.5.25 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate **negligible to slight** impact magnitude at receptors, where the impact significance would be **neutral to minor** level of effect. This is **not significant**.

8.5.26 In relation to the IEMA guidelines (which considers the increase in existing residual noise and therefore the context of the impact, reference **Table 8.13**), the magnitude of the impact during daytime periods (final column of table) shows that there is a change of up to +1.5dB in noise level, which indicates a **negligible impact**. The predicted level of effect that would be experienced by residential receptors would therefore be a **neutral** level of effect in relation to this guidance.

Night-time Operations

8.5.27 **Table 8.26** below provides information on the predicted noise levels during night-time (i.e. 23.00 to 07.00 hours according to BS4142: 2014+A1:2019).

Table 8.26: Predicted Noise Contribution from the Proposed Development during Night-time

Receptor Position (Refer to Figure 8.1)	Time Period (2300-0700) hours)	Predicted Rating ¹ Noise Level from Site LAeq _{15mins} dB	Assessment ² Baseline Sound Level LA90 dB [LAeq]	Rating ¹ Compared to Background Sound LAeq _{15mins} dB	Noise Change ³ LAeq dB
R1. Receptors off Wern & Offa (east at Lodgevale Park)	Night-time	44-47 ¹	40 [52]	+4 to +7	+0.3 to +0.6
R2. Receptors off Old Black ¹ Park Road (northeast)	Night-time	46 ¹	42 [55]	+4	+0.3
R3. Afon Bradley Farm (northwest)	Night-time	48 ¹	43 [49]	+5	+1.5
R4. Bryn Hyfryd (south)	Night-time	48 ¹	46 [53]	+2	+0.6
R5. West View (southeast)	Night-time	31-42 ¹	38-41 ⁴ [52]	-7 to +1	0 to +0.2
R5. George Street (southeast)	Night-time	35	30-31 [37]	+4 to +5	+2.1
R6. New Hall Farm (west)	Night-time	27	34-36 [47]	-9 to -7	0
R7. Canal & Marina (west)	Night-time	36-39	43 [49]	-7 to -4	+0.2 to +0.4

Note 1: Without further mitigation we have included a +2dB correction for engine noise at R1 to R5.

Note 2: Based on a week or 5-day period of baseline sound monitoring including a weekend at NSRs.

Note 3: Column 6 is calculated by the logarithmic addition of columns 3 and column 4 **Leq** level in [] and subtraction of the background **Leq** noise level (i.e. column 4 in []).

8.5.28 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise indicates in general a **negligible to moderate** impact magnitude. The operational noise impacts from the Proposed Development are therefore considered to represent a **neutral to moderate** level of effect. Further noise mitigation measures are required, which is detailed in **Section 8.7** of this chapter.

8.5.29 In relation to the IEMA guidelines and with reference to **Table 8.13**, the magnitude of the impact during night-time periods (final column of table) shows that the change in noise level ranges between +0.2dB and +2.1dB LAeq which indicates a **negligible impact**. The predicted level of effect would therefore be **neutral** NSRs in relation to this guidance. Further mitigation measures are proposed in **Section 8.7** of this chapter.

Operational Road Traffic Noise

8.5.30 The Transport Assessment (**Planning Statement Appendix F**) considers the assessment year (2026) for the traffic demand from the Proposed Development for these periods compared to a 'Do-nothing' scenario. **Table 8.27** and **Table 8.28** below provide details of the noise impact due to the increased traffic flow along the local road network based on a 16-hour daytime average and an 8-hour night-time demand using the traffic data provided within the Transport Assessment.

Table 8.27: Predicted Change in Road Traffic Noise on local road network based on 2026 Daytime 16-hour (0700-2300 hours) & Night-time (2300-0700 hours) Site Vehicle Demand

Road	Assessment Year	'Do Nothing' LA10 _{16hours} (dB)	'Do Something' LA10 _{16hours} (dB)	Change (with development) LA10 _{16 hours} (dB)
South of existing Site Entrance (e.g. Maes-y-Waun)	2026 (day)	66.5	66.4	-0.1
	2026 (night)	61.2	59.5	-1.7
North of existing Site Entrance (e.g. West View)	2026 (day)	68.1	66.3	-1.8
	2026 (night)	65.8	59.3	-6.5
North of Crogen (e.g. Wern, Offfa, Crogen – Lodgevale Park)	2026 (day)	67 to 70.2	65.3 to 68.4	-1.7 to -1.8
	2026 (night)	64.7 to 67.8	58.1 to 61.2	-6.5 to -6.6
North of proposed Site access roundabout (e.g. Old Black Park Rd)	2026 (day)	66.7	65.4	-1.7
	2026 (night)	64.3	61.6	-2.7

* The predicted noise levels are based on sample property positions in the vicinity of Holyhead Road

8.5.31 Based on a maximum HGV demand using a 16-hour time period in 2026, the impact show a daytime **negligible to slight positive impact** magnitude and **neutral to minor positive level of effect** in respect of traffic movements relative to the nearest local road network and at nearest residential properties. For night-time the impact is shown to produce a **negligible to moderate positive impact** magnitude and **neutral to moderate positive level of effect**. In terms of a reduction in noise level of circa 3dB this would be perceptible change in practice and 5-6dB considered to be a good improvement in practice and noticeable change.

Table 8.28: Predicted Change in Road Traffic Noise on local road network based on 2031 Daytime 16-hour (0700-2300 hours) & Night-time 8-hour (2300-0700 hours) Site Vehicle Demand

Road	Future Year	'Do Nothing' LA10 _{1hour} (dB)	'Do Something' LA10 _{1hour} (dB)	Change (with development) LA10 _{1hour} (dB)
South of existing Site Entrance (e.g. Maes-y-Waun)	2031 (day)	66.7	66.7	-0.1
	2031 (night)	60.9	59.7	-1.2
North of existing Site Entrance (e.g. West View)	2031 (day)	68.3	66.6	-1.7
	2031 (night)	65.9	59.6	-6.3
North of Crogen (e.g. Wern, Offfa, Crogen – Lodgevale Park)	2031 (day)	67.2 to 70.4	65.5 to 68.6	-1.7 to -1.8
	2031 (night)	64.8 to 67.9	58.4 to 61.6	-6.2 to -6.4
North of proposed Site access roundabout (e.g. Old Black Park Rd)	2031 (day)	66.8	65.5	-1.3
	2031 (night)	64.4	62.0	-2.4

- 8.5.32 Based on a maximum HGV demand using a 16-hour time period in 2031, the impact show a daytime **negligible to slight positive impact** magnitude and **neutral to minor positive level of effect** in respect of traffic movements relative to the nearest local road network and at nearest residential properties. For the night-time period. The impact is shown to produce a **negligible to moderate positive impact** magnitude and **neutral to moderate positive level of effect**.

Operational Vibration

- 8.5.33 In terms of HGV movement on access roads passing receptors, several noise and vibration studies of the movement of HGVs along local roads adjacent to residential properties in the UK, have been undertaken by the author of this assessment. This has included a study where monitoring has taken place within 1m of the kerbside. The results show at positions close to the pavement edge this only just triggers the seismograph and at levels below or just around perceptibility. The vibration levels from vehicle movements are well below cosmetic damage levels and highly unlikely to generate vibration that would constitute a nuisance according to BS6472: 2008. Refer to **Appendix 8.8** for further details.
- 8.5.34 The vibration survey results would indicate that vibration levels from HGVs using the Site would be imperceptible and therefore a **negligible impact** and a **neutral** level of effect and **not significant**. In terms of BS6472 this would conclude that vibration levels would be well below a 'low probability of adverse comment' and therefore nuisance conditions are highly unlikely to occur.

8.6 Inter-Relationship of Potential Effects

- 8.6.1 Noise and vibration effects (and any works undertaken to mitigate those effects) have the potential to lead to effects on environmental factors considered in other ES technical chapters including ecology and nature conservation, the historic environment and landscape and visual effects. Potential effects (and mitigation works) for those other environmental topics (see above) may also affect noise and vibration and have been considered, together with the traffic data set out in the Transport Assessment (**Planning Statement Appendix F**) as an inherent part of this assessment. Therefore, the inter-relationship of effects (with respect to noise and vibration) is not considered any further.

8.7 Further Mitigation, Monitoring and Enhancement

Construction Noise

- 8.7.1 No additional mitigation measures above those described in **Section 8.4** of this chapter would be required.

Construction Vibration

- 8.7.2 In accordance with BS5228, BPM would be employed to control vibration generation.

Operational Noise

- 8.7.3 Further noise mitigation would be required to help reduce noise impacts during the operational phase. This would include the following additional measures which can be viewed at **Figure 8.2**:

- a) Solid acoustic screen east of the lorry park to a height of 5m (e.g. cbf or brick wall and fence on top to a minimum mass of 15kg/m²).
- b) Solid acoustic screen west of the lorry park to a height of 3m (e.g. cbf or brick wall and fence on top to a minimum mass of 10kg/m²).
- c) The embankment east of the lorry park extended to a minimum height of 4m; the proposed finished height of the embankment is shown using spot heights on **Figure 4.1** and **Figure 4.3a**.
- d) Engines would be turned off when parked.

8.8 Summary of Potential Residual Effects

- 8.8.1 For the construction phase, the residual level of effects from plant noise, road traffic noise and vibration would be the same as those described in **Section 8.5** of this chapter. For the operational phase, the residual level of effects from road traffic noise (daytime and night-time) and vibration (daytime and night-time) would be the same as described in **Section 8.5** of this chapter.
- 8.8.2 The following analysis considers the residual effect of the additional mitigation measures on the predicted operational plant noise levels. **Table 8.29** and **Table 8.30** provides information on the predicted noise levels. Please refer to **Appendix 8.6** for noise mapping results.

Table 8.29: Predicted Noise Contribution from Proposed Development during Daytime (with Additional Noise Mitigation Measures)

Receptor Position (Refer to Figure 8.1)	Time Period (0700-2300 hours)	Predicted Rating ¹ Noise Level from Site LAeq _{1hr} dB	Assessment ² Baseline Sound Level LA90 _{1hr} dB [LAeq]	Rating ¹ compared to Baseline Sound LAeq _{1hr} dB	Noise Change ³ LAeq dB
R1. Receptors off Wern & Offa (east – Lodgevale Park)	Daytime	40-41	45-48 [57]	-8 to -5	+0.1
R2. Receptors off Old Black Park Road (northeast)	Daytime	42	51 [61]	-9	+0.1
R3. Afon Bradley Farm (northwest)	Daytime	45	43 [51]	+2	+1.0
R4. Bryn Hyfryd (south)	Daytime	42-43	48 [58]	-6 to -5	+0.1
R5. West View (southeast)	Daytime	27-40	45-48 ⁴ [57]	-18 to -8	0 to +0.1
R5. George Street (southeast)	Daytime	35	33-35 ⁴ [40]	0 to +2	+1.2
R6. New Hall Farm (west)	Daytime	26	38 [48]	-12	+0.3
R7. Canal & Marina (west)	Daytime	34-39	43 [51]	-8 to -4	+0.1 to +0.3

Note 1: Noise characteristics at receptor locations do not include a penalty due to masking from residual sound levels.

Note 2: Based on a period of a week or 5-days of baseline sound monitoring including a weekend at NSRs.

Note 3: Column 6 is calculated by the logarithmic addition of columns 3 and column 4 **Leq** level in [] and subtraction of the background **Leq** noise level (i.e. column 4 in []).

Note 4: West View is at a similar distance to Wern monitoring position, George Street monitoring position was set back from Holyhead Road and therefore screened by housing closer to the main road producing lower baseline levels.

- 8.8.3 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate **negligible to slight** impact magnitude at receptors,

where the impact significance would be **neutral to minor** level of effect. Whilst this is as those described in **Section 8.5** of this chapter and the effects would be **not significant**, the noise levels are lower.

- 8.8.4 In relation to the IEMA guidelines (which considers the increase in existing residual noise and therefore the context of the impact, reference **Table 8.13**) the magnitude of impact, level of effect (**neutral** level of effect) and increase would be the same as those described in **Section 8.5** of this chapter.

Table 8.30: Predicted Noise Contribution from the Proposed Development during Night-time (with Additional Noise Mitigation Measures)

Receptor Position (Refer to Figure 8.1)	Time Period (2300-0700) hours)	Predicted Rating ¹ Noise Level from Site LAeq _{15mins} dB	Assessment ² Baseline Sound Level LA90 dB [LAeq]	Rating ¹ Compared to Background Sound LAeq _{15mins} dB	Noise Change ³ LAeq dB
R1. Receptors off Wern & Offa (east – Lodgevale Park)	Night-time	41-42	40 [52]	+1 to +2	+0.3 to +0.4
R2. Receptors off Old Black Park Road (northeast)	Night-time	44	42 [55]	+2	+0.3
R3. Afon Bradley Farm (northwest)	Night-time	45	43 [49]	+2	+1.5
R4. Bryn Hyfryd (south)	Night-time	45	46 [53]	-1	+0.6
R5. West View (southeast)	Night-time	28-39	38-41 ⁴ [52]	-13 to +1	0 to +0.2
R5. George Street (southeast) ⁴	Night-time	34	30-31 [37]	+3 to +4	+1.8
R6. New Hall Farm (west)	Night-time	26	34-36 [47]	-10 to -8	0
R7. Canal & Marina (west)	Night-time	34-39	43 [49]	-9 to -4	+0.1 to +0.4

Note 1: With additional mitigation no character correction for engine noise at R1 to R5.

Note 2: Based on a week or 5-day period of baseline sound monitoring including a weekend at NSRs.

Note 3: Column 6 is calculated by the logarithmic addition of columns 3 and column 4 **Leq** level in [] and subtraction of the background **Leq** noise level (i.e. column 4 in []).

- 8.8.5 According to BS4142: 2014+A1:2019, the rating level relative to the assessment baseline noise would indicate **negligible to slight** impact magnitude at all receptors. The operational noise impacts from the facility are therefore considered to represent a **neutral to minor** level of effect, and **not significant**. The introduction of additional mitigation shows a reduction in noise levels and a reduction in the magnitude and level of effect.

- 8.8.6 In relation to the IEMA guidelines (which considers the increase in existing residual noise and therefore the context of the impact, reference **Table 8.13**), the magnitude

of impact, level of effect (**neutral** level of effect) and increase would be the same as those described in **Section 8.5** of this chapter.

8.9 Cumulative Effects

Introduction

- 8.9.1 There is the potential for the effects of the Proposed Development to interact with the effects of other projects or activities in the surrounding area. These are ‘inter-project’ cumulative effects and includes projects that have been submitted for consent but have not yet been approved, or that already have planning permission or consent but are not yet operational. Such projects are required to be within a geographical scope where environmental impacts could act together to create a more significant overall effect on a receptor and where sufficient environmental information is available.
- 8.9.2 The method for identifying other projects and activities is provided at **ES Chapter 2.0 (EIA Methodology)**; this includes a list of the specific projects and activities identified, which also takes into consideration the other Kronospan development proposals that are being progressed separately by the Applicant.
- 8.9.3 The developments in the cumulative assessment include:
- a) P/2021/0725 – Kronospan North-East Warehouse
 - b) P/2017/0699 – Kronospan – Log Delivery System and Chipping and Flaking System
 - c) APP/H6955/A/18/3193142 – Kronospan Raw Board Storage
 - d) APP/H6955/A/19/3227571 – Kronospan – Oriented Strand Board (OSB) Facility
 - e) P/2022/0336 – Kronospan – Covered Loading Yard
 - f) P/2022/0615 – Kronospan – Engineering Stores
 - g) P/2022/0765 - Kronospan – Silos and Extension to Chip Preparation Building
 - h) Indicative cable route between proposed 132kV substation and existing Legacy/Oswestry overhead line.

Cumulative Effects - Operational Noise

- 8.9.4 Based on previous noise assessments undertaken by the author of this assessment, the noise contribution from the operation of cumulative developments a) to g) is provided in **Table 8.31 and Table 8.32**.

Table 8.31: Predicted Noise Contribution from the Other Cumulative Projects

Receptor Position (Refer to Figure 8.1)	Time Period	Cumulative Noise Level from other Cumulative Projects Plant $L_{Aeq,T}$ dB	Predicted Noise Contribution from Proposed Development (with Additional Mitigation) $L_{Aeq,T}$ dB	Total Noise ¹ Level (Cumulative Projects & Proposed Development) $L_{Aeq,T}$ dB	Increase In Noise Level $L_{Aeq,T}$ dB
R1. Receptors off Wern & Offa (east – Lodgevale Park)	Daytime	35	40-41	41.2 to 42	+1.2
	Night-time	35	41-42	42 to 42.8	+1.0
R2. Receptors off Old Black Park Road (northeast)	Daytime	31	42	42.3	+0.3
	Night-time	31	44	44.2	+0.2
R3. Afon Bradley Farm (northwest)	Daytime	32	45	45.2	+0.2
	Night-time	32	45	45.2	+0.2
R4. Bryn Hyfryd (south)	Daytime	35	42-43	42.8 to 43.6	+0.8
	Night-time	35	45	45.4	+0.4
R5. West View (southeast)	Daytime	36	27-40	36.5 to 41.5	+1.5
	Night-time	36	28-39	36.6 to 40.8	+1.8
R5. George Street (southeast)	Daytime	34	35	37.5	+2.5
	Night-time	34	34	37	+3.0
R6. New Hall Farm (west)	Daytime	37	26	37.3	+0.3
	Night-time	37	26	37.3	+0.3
R7. Canal & Marina (west)	Daytime	33-38	34-39	36.5 to 41.5	+2.5
	Night-time	33-38	34-39	36.5 to 41.5	+2.5

Note 1: Column 5 is calculated by the logarithmic addition of columns 3 and column 4.

8.9.5 The above table shows no significant change in residual noise levels due to the operation of other projects or activities.

8.9.6 The effect of the operation of other projects or activities is assessed against the baseline levels in **Table 8.32**.

Table 8.32: Predicted Noise Contribution from Proposed Development & Cumulative Development (with Additional Noise Mitigation Measures)

Receptor Position (Refer to Figure 8.1)	Time Period	Predicted Rating Total Site Noise Level from $L_{Aeq,1hr}$ dB	Assessment Baseline Sound Level $LA_{90,1hr}$ dB [LAeq]	Rating compared to Baseline Sound $L_{Aeq,1hr}$ dB	Noise Change ¹ L_{Aeq} dB
R1. Receptors off Wern & Offa (east – Lodgevale Park)	Daytime	42	45-48 [57]	-6 to -3	+0.1
	Night-time	43	40 [52]	+3	+0.5
R2. Receptors off Old Black Park Road (northeast)	Daytime	42	51 [61]	-9	+0.1
	Night-time	44	42 [55]	+2	+0.3
R3. Afon Bradley Farm (northwest)	Daytime	45	43 [51]	+2	+1.0
	Night-time	45	43 [49]	+2	+1.5
R4. Bryn Hyfryd (south)	Daytime	43	48 [58]	-5	+0.1
	Night-time	45	46 [53]	-1	+0.6

Receptor Position (Refer to Figure 8.1)	Time Period	Predicted Rating Total Site Noise Level from LAeq _{1hr} dB	Assessment Baseline Sound Level LA90 _{1hr} dB [LAeq]	Rating compared to Baseline Sound LAeq _{1hr} dB	Noise Change ¹ LAeq dB
R5. West View (southeast)	Daytime	40	45-48 ⁴ [57]	-8 to -5	+0.1
	Night-time	39	38-41 ⁴ [52]	-2 to +1	+0.2
R5. George Street (southeast)	Daytime	35	33-35 ⁴ [40]	0 to +2	+1.2
	Night-time	34	30-31 [37]	+3 to +4	+1.8
R6. New Hall Farm (west)	Daytime	26	38 [48]	-12	0
	Night-time	26	34-36 [47]	-10 to -8	0
R7. Canal & Marina (west)	Daytime	39	43 [51]	-4	+0.3
	Night-time	39	43 [49]	-4	+0.4

Note 1: Column 6 is calculated by the logarithmic addition of columns 3 and column 4 **Leq** level in [] and subtraction of the background **Leq** noise level (i.e. column 4 in []).

- 8.9.7 The overall assessment including the cumulative effect of the Proposed Development and the cumulative projects shows a **negligible to slight** impact magnitude and **neutral to minor** effect at all receptors.

Cumulative Effects - Construction Noise

- 8.9.8 The underground cable route from the proposed 132kV substation to the existing Legacy/Oswestry overhead line would be a temporary construction activity which would involve the use of an excavator, cable laying, tarmacadam and ground compaction plant to create trenches for the cables and back fill and repair roads. This would be a short-term local impact as the cable laying moves along the route. BPM would be applied during the construction works in accordance with BS5228:2009+A1:2014 and impacts would be not significant. In terms of cumulative effects with the Proposed Development construction works, this would not be significant due to the temporary and short-term nature of the work.
- 8.9.9 There is unlikely to be any construction cumulative effects from other projects or activities during the construction phase of the Proposed Development as these should have been completed.
- 8.9.10 There are no known additional developments proposed in the area that are considered likely to result in any material cumulative effects in combination with the Proposed Development.

Cumulative Effects - Road Traffic Noise

- 8.9.11 The cumulative effect of other projects and activities on the local road network has been taken into account within the Transport Assessment (**Planning Statement Appendix F**) and the effect assessed in **Section 8.5.30 to 8.5.32** of this chapter.

8.9.12 In summary, no significant noise effects have been identified by the noise assessment in relation to construction or operation of the Proposed Development . **Table 8.33** below summarises the predicted effects of the construction, and operational of the development.

Table 8.33: Residual Impact at Nearest Receptor after Mitigation Measures

Source	Nature of Effect	Time Period	Impact Magnitude	Level of Significance
Construction noise	Temporary	Daytime	Negligible to Slight	Neutral to Minor Adverse
Road traffic noise (construction)	Temporary	Daytime	Negligible	Neutral
Construction Vibration	Temporary	Daytime	Negligible to Slight Adverse	Neutral to Minor
Road traffic noise (operation)	Permanent	Daytime	Negligible to Slight Improvement	Neutral to Minor Positive effect
		Night-time	Negligible to Moderate Improvement	Neutral to Moderate Positive effect
Industrial noise (Site operation)	Permanent	Daytime	Negligible to Slight Adverse	Neutral to Minor
		Night-time	Negligible to Slight Adverse	Neutral to Minor
Operational Vibration	Permanent	Daytime Night-time	Negligible Negligible	Neutral Neutral
Road traffic vibration	Permanent	Daytime Night-time	Negligible Negligible	Neutral Neutral
Cumulative Effects	Permanent	Daytime	Negligible to Slight Adverse	Neutral to Minor Adverse
		Night-time	Negligible to Slight Adverse	Neutral to Minor Adverse

8.10 Conclusions

8.10.1 Noise and vibration levels have been considered and assessed during the construction and operational phases of the Proposed Development. Relevant and appropriate noise and vibration guidance and standards have been used to determine the impact. The assessment has been undertaken to inform and guide the design of the Proposed Development, such that any likely noise and vibration impact on existing and potential sensitive receptors is minimised.

8.10.2 To establish any likely impact from noise a robust assessment of baseline sound levels has been considered by undertaking fixed position noise monitoring at 11 noise sensitive receptor areas around the Site, over a period of a week or a 5-day period including a weekend.

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- 8.10.3 In accordance with appropriate standards, BPM would be employed to control the noise generation during the construction period. Measures would include restriction on operating hours, screening measures, sensible routing of equipment to site and appropriate site management and liaison with residents to minimise and control noise. Such measures would be defined within the CEMP.
- 8.10.4 In relation to the operational phase, several mitigation measures (including permanent screening at the proposed lorry park area and permanent screening close to the property of Bryn Hyfryd) have been proposed to ensure that the resultant operational noise levels are within appropriate guidance and standards. The measures would be based on the employment of BAT to mitigate any potential peak noise sources.
- 8.10.5 The assessment shows that there would be no significant impacts at all NSRs during the construction or operation of the Proposed Development following the implementation of appropriate mitigation.
- 8.10.6 The introduction of the lorry park results in HGVs being able to avoid the need to travel through part of Chirk town centre and the assessment shows that road traffic noise levels would be perceptibly reduced for those NSRs nearest to the existing entrance and north of the entrance off Holyhead Road. The Proposed Development therefore provides a positive benefit in respect of noise.

8.11 References

BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'

Guidelines for Community Noise – World Health Organisation: April 1999

World Health Organisation 'Night Noise Guidelines for Europe' – 2009;

BS7445: 2003 - Description and measurement of environmental noise.

BS5228-1:2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites'.

BS5228-2: 2009 'Code of Practice for noise and vibration control on construction and open sites – Vibration'.

ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors.

Design Manual for Roads and Bridges, LA 111 Noise & Vibration (Rev 2)– May 2020

Technical Advice Note (Wales) 11: 1997 'Noise'

BS6472: 2008 'Guide to the evaluation of human exposure to vibration in buildings'

New Zealand Transport Agency research paper entitled 'Ground Vibration from Road Construction' in May 2012