



CAS-03463-R2W9C2 - Kronospan Low Carbon CHP Facility

Environmental Statement

Vol2: Chapter 5.0 – Noise and Vibration

Prepared for



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5.0 NOISE AND VIBRATION

5.1 Introduction

Introduction

- 5.1.1 This chapter of the Environmental Statement (ES), along with the accompanying Figures and Appendices, addresses the potential effects of noise and vibration during the construction, operation, and decommissioning of the Proposed Development. A description of the Proposed Development is provided in **ES Chapter 4.0 (Description of the Proposed Development)**.

Competence

- 5.1.2 This chapter has been prepared by D R Kettlewell of Noise & Vibration Consultants Ltd ('NVC') who has over 40 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.

5.2 Planning Policy, Legislation and Guidance

National Planning Policy

- 5.2.1 The following national planning policies are relevant to the assessment:
- i) Overarching National Policy Statement for Energy (EN-1)¹ (EN-1) January 2024 (section 4.8 and 5.12).
 - ii) National Policy Statement for Renewable Energy Infrastructure² (EN-3) January 2024 (section 2.7.13, 2.7.98 to 2.7.100).

¹ Department of Energy & Climate Change: Overarching National Policy Statement for Energy (EN-1) (January 2024).

² Department for Energy Security and Net Zero: National Policy Statement for Renewable Energy Infrastructure (EN-3).



Local Planning Policy

Overview

- 5.2.2 The adopted local development plan for Wrexham County Borough Council (WCBC) comprises the Wrexham Unitary Development Plan 1996-2011 (the UDP) which was adopted in February 2005. However, the local development plan has been through significant upheaval in recent years. WCBC adopted the Local Development Plan 2013-2028 (the LDP) on 20 December 2023, however, the decision to adopt the LDP has subsequently been quashed by a High Court Order issued on 12 June 2025. The LDP has therefore been returned to unadopted status and the UDP has been returned to being the adopted development plan. Further information regarding the status of the UDP and LDP is provided in the Planning Statement (**DNS4-001**).
- 5.2.3 In the above context, relevant policies from the UDP and LDP are set out below.
- UDP Policy GDP1 – (Development Objectives) states “*All new development should:*
 - *f) Ensure the safety and amenity of the public and safeguard the environment from the adverse effects of pollution of water, land or air, hazards from industry and quarrying, and associated noise, odour or vibration arising from development.*”
 - LDP Policy DM1 (Development Management Considerations) states “*Development proposals, where relevant must:*
 - *ii. Not have an unacceptable effect on the amenity of the occupiers of nearby properties/land; and provide a satisfactory standard of amenity for the occupiers/users of the development itself;*
 - *iii. Safeguard the environment from the adverse effects of pollution of water, land, noise, light or air, or land instability, arising from development.*”

Legislation and Guidance

5.2.4 The following key pieces of legislation and guidance are considered relevant to this assessment:

- Technical Advice Note (TAN) 11: Noise³
- BS4142: 2014+A1:2019⁴ 'Methods for rating and assessing industrial and commercial sound'
- BS8233: 2014⁵ 'Guidance on sound insulation and noise reduction for buildings'
- BS5228: 2009+A1:2014⁶ 'Code of practice for noise and vibration control on construction and open sites'
- BS 7445: 2003⁷ Description and measurement of environmental noise
- World Health Organisation (WHO) Guidelines for Community Noise: April 1999⁸
- Night Noise Guidelines for Europe: 2009⁹ – World Health Organisation
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)¹⁰
- The Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Noise Impact Assessment' 2014¹¹
- ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors¹²
- Natural Resources Wales – H3 Guidance: Noise and Vibration Management: Environmental Permits (January 2022)¹³
- Spectrum Acoustic Consultants (Spectrum) report 'Baseline environmental noise measurements during partial shutdowns in 2024' (report ref. CJA4897/23241/Rev 0 dated 18 February 2025)¹⁴ (**Appendix 5C**)

³ Technical Advice Note (TAN) 11: 1997 'Noise'

⁴ BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

⁵ BS 8233: 2014 'Guidance on sound insulation and noise reduction in buildings'.

⁶ BS 5228-2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites' – Part 1: Noise & Part 2: Vibration

⁷ BS 7445: 2003⁷ Description and measurement of environmental noise

⁸ World Health Organisation (WHO) Guidelines for Community Noise: April 1999

⁹ Night Noise Guidelines for Europe: 2009⁹ – World Health Organisation

¹⁰ Design Manual for Roads and Bridges, LA 111 Noise and Vibration (formerly HD 213/11)

¹¹ The Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Noise Impact Assessment' 2014

¹² ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors

¹³ Natural Resources Wales - Horizontal Guidance (H3): Noise and vibration management: environmental permits (January 2022)

¹⁴ Spectrum report 'Baseline environmental noise measurements during partial shutdowns in 2024' (report ref. CJA4897/23241/Rev 0 dated 15 March 2025)

- Spectrum report 'Noise Impact Assessment' (report ref. CJA4831/23241/Rev2) dated 13 April 2025¹⁵ (**Appendix 5D**)
- Spectrum report 'Noise Model Predictions in Support of an Environmental Permit Variation Application' (report ref. CJA4941/23241) dated 24 September 2025¹⁶ (**Appendix 5E**)
- Spectrum report 'Baseline noise measurements in Woodland to inform Noise Impact Assessments' (report ref. CJA4909/23241/Rev 1 dated 13 April 2025)¹⁷ (**Appendix 5F**)
- Natural England 'A review of the effects of noise on Birds' Version 1: 2018¹⁸

5.3 Consultation

EIA Scoping Direction

- 5.3.1 In accordance with Regulation 14 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (The EIA Regulations), a formal request for a Scoping Direction was submitted to PEDW on 30 May 2024 and was accompanied by a Scoping Report (**Appendix 1C**) which set out the proposed EIA scope of the Proposed Development.
- 5.3.2 A formal Scoping Direction (**Appendix 1D**) was issued by PEDW on 31 July 2024 which confirmed that the Proposed Development would fall under Schedule 1, Part 10 of the EIA Regulations (and would therefore require EIA) and provided PEDW's opinion regarding the proposed EIA scope of the Proposed Development.
- 5.3.3 A response to the Scoping Direction setting out how each matter is addressed in the ES and details of where areas of disagreement are clarified and/or resolved is provided at **Appendix 1G**.

¹⁵ Spectrum report 'Baseline noise measurements in Woodland to inform Noise Impact Assessments' (report ref. CJA4909/23241/Rev 0 dated 15 March 2025)

¹⁶ Spectrum report 'Noise Model Predictions in Support of an Environmental Permit Variation Application' (report ref. CJA4941/23241 dated 24 September 2025)

¹⁷ Spectrum report 'Baseline noise measurements in Woodland to inform Noise Impact Assessments' (report ref. CJA4909/23241/Rev 0 dated 15 March 2025)

¹⁸ Natural England 'A review of the effects of noise on Birds' Version 1: 2018 (Allan Drewitt, Emma Hawthorne, Richard Saunders & Sarah Anthony).



5.3.4 A summary of the Scoping Direction responses (and the Applicant's response) relevant to noise and vibration is provided at **Table 5.1** below.

Table 5.1 – Summary of (Noise and Vibration) Scoping Direction Responses

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES
WCBC	It would be appropriate for the Applicant to submit sufficient information via an appropriate technical report outside of the scope of the Environmental Statement to demonstrate that the proposed development would not give rise to levels of vibration that would harm the living conditions of the nearest noise sensitive properties to the site.	Appendix 5K provides test results from a similar site operating the type of plant proposed and also results from a study undertaken by the author of the assessment in respect of vibration from the movement of HGVs. The results are taken at close range positions and show no significant levels.
PEDW	The Scoping Report proposes to scope out vibration from the Scoping Report, however inadequate information has been provided to support this approach. PEDW therefore directs that vibration should be scoped into the ES in a proportionate manner. The ES should be supported by a technical report to demonstrate the level of vibration and likely impact on nearby sensitive receptors.	Appendix 5K shows no significant vibration levels from this type of development.
Glandŵr Cymru	We welcome that canal users and the users of Chirk Marina will be considered as part of this chapter in terms of noise disturbance as set out at paragraph 6.5.1. The report sets out that these receptors would experience temporary construction noise during daytime and operational noise during daytime and nighttime. As set out within the document, the outcome of noise modelling will determine the mitigation required.	This ES chapter assesses the impact of construction and operational noise at the Chirk Marina and canal users, Table 5.23 (R12) shows slight impact and minor level of effect during construction. Table 5.29 (daytime operational plant noise) and Table 5.30 (night-time operational plant noise) provide details of impact with further mitigation for the Proposed Development, which concludes a negligible impact (neutral level of effect) at the marina and

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES
		negligible to slight impact (neutral to minor level of effect) along the canal.
Glandŵr Cymru	The document sets out that the development is sufficiently distant from sensitive receptors and as such that significant vibration effects are not anticipated. If vibrations are considered to be significant and scoped into the assessment, then the impact on the canal infrastructure should be considered. The canal is within a cutting adjacent to the site, is over 200 years old infrastructure and not built to modern engineering standards and as such would likely be susceptible to vibrations.	<p>Vibration from the construction and operation of the Proposed Development is considered at Section 5.7 and Section 5.10.</p> <p>Appendix 5I and Appendix 5K provide further analysis.</p> <p>The assessment shows that at closest approach the worst-case vibration would be below perceptible levels and therefore no impacts would occur at the canal.</p>
PEDW	PEDW note that the receptors identified do not include any relating to ecology. The Applicant should consider the whether the development would result in an impact on noise sensitive species, with this consideration set out in the ES. PEDW therefore directs that biodiversity is scoped into the ES but not necessarily as a standalone chapter. Any impacts from noise on biodiversity can be addressed in the relevant topic chapters if that approach proves to be adequate.	<p>This ES chapter includes assessment of noise and vibration impacts at ecological sensitive receptors.</p> <p>A baseline sound survey (Appendix 5F) was carried out during March 2025 to determine typical sound levels within the Canal Wood Local Wildlife Site (LWS) and described further in Section 5.5.</p> <p>The assessment of effects (on Canal Wood LWS) is provided at Section 5.7 and Section 5.10.</p>
Welsh Government Highways	The development site is next to an area highlighted in the strategic noise maps of Wales, for details see web page: http://extrium.co.uk/walesnoiseviewer.html . Due to the proximity of the development site	Road traffic noise impacts during the construction and operational phases are described in Section 5.7 and Section 5.10 .

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES
	to Welsh Government maintained road network, the applicant may need to carry out relevant noise assessment and detail appropriate mitigation measures within the design to suppress existing traffic noise levels. It is also advisable to ensure mitigation measures are sufficient to provide protection in future years. All mitigation measures must be designed into buildings and/or be within land owned or in the applicant's control. Proposals for any mitigation on public highway is prohibited. Public highway vegetation and trees should be excluded from any assessments as these are not within the applicant's control and could be altered at any time. The exact requirements should be agreed in writing with the LPA prior to execution, with any proposed mitigation being to the written approval of the LPA.	The analysis shows a negligible impact and neutral level of effect from the Proposed Development.
PEDW	The applicant's attention is drawn to comments from Transport Directorate who highlight that the site is located near to the A5 which is highlighted in the strategic noise map of Wales. The applicant should consider the cumulative impact and include this in the noise assessment.	<p>The effect of any traffic movement from the Proposed Development and the A5 would be negligible due to the very low development flow compared with the high baseline flow on the A5 road.</p> <p>Refer to Table 5.28 which shows the impact on Holyhead Road, which has a much lower baseline where any impact would be higher than on the A5; the results show a negligible impact and neutral level of effect.</p>
Natural Resources Wales (NRW)	When submitting an application for an Environmental Permit, recently published guidance: Noise and vibration management: environmental permits - GOV.UK (www.gov.uk) should be followed. This states "When you apply for a variation, do not include noise from the existing site	Baseline sound surveys and analysis have been undertaken by NVC and further surveys and analysis undertaken by

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES
	(before changes) as part of the background or the residual sound levels. Your noise impact assessment must consider all the noise resulting from the proposed variation – the existing site and the variation together. Show both components clearly and then add them together to give a new total for site noise at the receptors. The impact assessment will be based on this new value, known as the ‘specific level’ in BS 4142.”	<p>Spectrum in 2024 and 2025.</p> <p>Refer to Section 5.5 for analysis relating to the contextual and estimated baseline excluding Kronospan.</p> <p>Cumulative effects (contextual and estimated baseline excluding Kronospan together with consideration of other (proposed or consented projects) is provided in Section 5.11.</p> <p>The Spectrum reports are provided at Appendices 5C – 5F.</p>
PEDW	<p>PEDW acknowledge that recent baseline noise assessments have been undertaken in 2021 and 2022. Whilst relatively recent survey data is available, PEDW recommend that an updated baseline survey is undertaken given the recent developments within the Kronospan site. The applicant should also refer to NRW’s comments at appendix 1 regarding the noise assessment required for the variation to the environmental permit variation. This advice also sets out that an updated baseline assessment will be required to amend the environmental permit. The applicant is also advised that background sound levels may vary significantly at different times, and locations around the site, particularly given the site operates on a 24-hour basis. Therefore, the noise assessment may need a series of background sound level monitoring surveys, and more than one noise impact assessment calculation, to reflect the variations in background sound levels.</p>	

EIA Scoping Direction - Addendum

- 5.3.5 Following receipt of the Scoping Direction (**Appendix 1D**), formal pre-application advice from PEDW (received 19 June 2024), further informal discussions with PEDW and informal pre-application discussions with WCBC, the Applicant issued (on 15 October 2024) a document to PEDW entitled ‘EIA Scoping Direction Clarification and Update to the Proposed Development Design’ (**Appendix 1E**). This document

provided details of the proposed changes to the Proposed Development which arose since the initial pre-application advice was sought, as well as setting out broad areas of agreement and disagreement/clarification with the EIA Scoping Direction referred to above. A summary of the main Proposed Development design changes made at this point is provided below:

- The status of the existing K7 Biomass Plant would change from ‘remaining in operation’ to ‘remain in situ but be used as a back-up biomass plant only’ – as a result, the existing K7 Biomass Plant feedstock would be re-directed for use in the proposed Low Carbon CHP Facility.
- A detailed review of CHP Facility feedstock generated on-site was undertaken to understand the maximum wood residue feedstock that would be generated from existing and planned manufacturing operations.
- The proposed use of Refuse Derived Fuel (RDF) was removed.

5.3.6 The proposed change to the Proposed Development design also confirmed that the proposed electrical generating capacity of the proposed Low Carbon CHP Facility would increase from 30 megawatts (MW) to 40MW.

5.3.7 An EIA Scoping Direction Addendum (see **Appendix 1F**) was issued by PEDW on 14 January 2025 and provides PEDW’s updated opinion regarding the proposed EIA scope of the Proposed Development.

5.3.8 A response to the Scoping Direction Addendum setting out how each matter is addressed in the ES and details of resolution of areas of disagreement is provided at **Appendix 1G**. The Scoping Direction Addendum provided no additional comments in relation to noise and vibration.

Other Engagement with Stakeholders

5.3.9 No further engagement with stakeholders with regards noise and vibration has been carried out.

Statutory Pre-Application Consultation

5.3.10 Sections 7, 8, 9, and 11 of the Developments of National Significance (Procedure) (Wales) Order 2016 (as amended) (‘the DNSPWO) and Section 61Z of the Town and Country Planning Act 1990 require the Applicant to undertake statutory consultation



prior to submitting a Development of National Significance (DNS) application. The statutory pre-application consultation period was between (insert date) and (insert date). THIS PARAGRAPH IS A PLACEHOLDER AND WILL BE FINALISED UPON COMPLETION OF PRE-APPLICATION CONSULTATION – THE PAC REPORT IS NOT YET AVAILABLE.

- 5.3.11 A series of responses from consultees received in month 2025 identified issues relating to noise and vibration matters, as set out in **Table 5.2** below. Full consultee responses (and how each has been addressed) is provided in the Pre-Application Consultation (PAC) Report (**DNS4-009**). THIS PARAGRAPH IS A PLACEHOLDER AND WILL BE FINALISED UPON COMPLETION OF PRE-APPLICATION CONSULTATION – THE PAC REPORT IS NOT YET AVAILABLE.

Table 5.2 – Summary of (Noise and Vibration) Pre-Application Consultation Responses

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES

5.4 Assessment Methodology

Overview

- 5.4.1 Detailed baseline noise monitoring surveys have been undertaken during 2021 and 2022 at, or close to, the nearest sensitive receptor ('NSR') to identify the representative background noise levels around the Site. Some additional baseline survey work has been undertaken during 2024 due to a request by Natural Resources Wales (NRW) as part of wider Environmental Permit discussions to provide updates at key locations during some partial plant shut-down periods.

- 5.4.2 Baseline surveys have been measured in accordance with guidance found within BS4142: 2014+A1:2019 and include fixed sound monitoring at appropriate accessible secure positions over weekday and weekend periods, as previously carried out during suitable weather conditions.
- 5.4.3 A further baseline survey was undertaken in 2025 at the Canal Wood Local Wildlife Sire (LWS) to the west of the Proposed Development for the purpose of assessing noise impacts on ecological receptors.

Modelling

- 5.4.4 Information on the proposed site layout, proposed plant buildings, detail of the likely noise generating plant and any available information from equipment suppliers on plant noise levels or empirical library noise level data as obtained from similar plant operating in the UK, has been reviewed.
- 5.4.5 Following the review of the proposed layout and data available on plant noise levels, noise prediction calculations have been undertaken of the effect of the plant in operation. This involved the production of a noise model using computer- based noise modelling software (CadnaA) for the operation of the facility, which applies ISO9613-2 calculation methodology. This includes the cumulative effect of the operation of all CHP plant on the Site. The predicted noise levels assist in establishing the likely impact at the NSR positions by applying BS4142: 2014+A1:2019.
- 5.4.6 Noise is assessed for the construction phase of the Proposed Development. Information on noise sources likely to be used at Site is derived from the construction phase description and library data. An assessment of the highest likely noise levels is provided based on the ABC methodology within BS BS5228-1:2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites'.
- 5.4.7 The results of the baseline noise monitoring are assessed against the modelled noise impacts. The main noise sources from the Proposed Development are assessed in terms of their contribution to noise radiating from the Site at NSR and results compared with relevant impact criteria.
- 5.4.8 Where appropriate, noise control measures are considered to ensure that noise levels are within relevant noise criteria guidance. Recommendations for appropriate noise control take Best Available Techniques (BAT) into consideration.



- 5.4.9 Noise arising from road traffic is determined from the traffic figures provided in the Transport Statement (TS) (**DNS4-005**) in accordance with the methodologies provided within 'Calculation of Road Traffic Noise' and the Design Manual for Roads and Bridges (DMRB LA 111 noise and vibration).

Guidance

Overview

- 5.4.10 Within the introduction of Technical Advice Note (Wales) 11: 1997 'Noise' (Tan 11) 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."

- 5.4.11 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.

- 5.4.12 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.

- 5.4.13 For reference, the recommended noise exposure categories for new dwellings near existing sources are shown below in **Table 5.3**. Note that these noise categories are based upon measurements taken in an open site (i.e. without any noise attenuating features in place).



- 5.4.14 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”*.
- 5.4.15 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”*.
- 5.4.16 **Table 5.3** below provides an interpretation of the NEC categories in terms of granting planning permission.

Table 5.3 – 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

- 5.4.17 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.”

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

5.4.19 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.

BS4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound

5.4.20 BS4142: 2014 'Methods for Rating and Assessing Industrial and Commercial Sound' is based on the measurement of background sound using LA90 noise measurements, compared to source noise levels measured in LAeq 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 between the site 'rating' level (i.e. the noise source contribution with any noise character penalties) and the representative background sound level, 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).

5.4.21 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.”

5.4.22 The subjective method adopted includes the following character corrections:

Table 5.4: BS4142: 2014 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. If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics*

BS8233: 2014 Guidance on Sound Insulation and Noise Reduction for Building

5.4.23 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.

5.4.24 The guidance provided in Section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings. **Table 5.5** provides detail of the levels given in BS8233.

Table 5.5: 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 Training Room/ Executive Office	35-45dB LAeq 35-45dB LAeq	

5.4.25 BS8233 is appropriate to apply to existing or proposed residential development. and offices. The Site noise contribution should be within the proposed internal noise levels, which include the following noise limits:

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

5.4.26 The above internal bedroom limits 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 42dB - $45\text{dB } L_{\text{Amax}}$ for regular peak events within bedrooms [which is approximately 57dB - $60\text{dB } L_{\text{Amax}}$ external to the bedroom window in the open position].

5.4.27 BS8233:2014 also advises that external noise in amenity space should aim to work within a range of 50dB - $55\text{dB } L_{\text{Aeq,T}}$ ¹⁹. This would be applicable to recreational receptors, where practicable.

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

5.4.28 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 $35\text{dB } L_{\text{Aeq}}$. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed $55\text{dB } L_{\text{Aeq}}$ 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 $50\text{dB } L_{\text{Aeq}}$. Where it is practical and*

¹⁹ paragraph 7.7.3.2

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

- 5.4.29 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 $L_{\text{night, outside}}$ as defined in the Environmental Noise Directive (2002/49/EC), an $L_{\text{night, outside}}$ 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. $L_{\text{night, outside}}$ 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.

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

- 5.4.30 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.”*
- 5.4.31 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 provides 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.).



Natural Resources Wales – H3 Guidance: Noise and Vibration Management: Environmental Permits (January 2022)

5.4.32 As stated within the above guidance, “*Environmental permits have conditions that require operators to control pollution – this includes controlling noise and vibration*”.

5.4.33 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.”

5.4.34 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.

5.4.35 The guidance advises on four steps that are required when carrying out a noise impact assessment, these include:

- Desktop risk assessment – identification of any audible noise plant or operations, identification of NSR, description and ranking of noise sources in terms of potential off-site impact, description of land between site and NSR.
- 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 ISO9613 for prediction.
- 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, minimise noise impact.



Level and Significance of Effect

Overview

- 5.4.36 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 impact. In the case of this assessment, the level of the effect has been determined by reference to existing guidance and standards that are explained in this section (**Section 5.4**).
- 5.4.37 Four types of effects at receptors have been identified:
- Residents of existing houses adjacent to the Site who could experience temporary construction plant noise and additional temporary vehicle noise during the daytime.
 - Residents of existing houses who could experience additional vehicle noise from the Proposed Development during the operation phase from the Scheme.
 - Residents of existing houses adjacent to the Site who could experience Site operational noise during the daytime and night-time.
 - Ecological receptors to the west of the Proposed Development at Canal Wood LWS who could experience temporary construction noise during the daytime and operational noise during daytime and night-time.
 - Recreational receptors in respect of canal users and the marina to the west and northwest of the Proposed Development who could experience temporary construction noise during the daytime and operational noise during daytime and night-time.

Construction Noise

- 5.4.38 The assessment of construction noise uses the methodology presented in the Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration guidance. This document sets out the requirements for assessing, reporting and management of environmental effects, specifically from the changes in noise and vibration from construction, operation and maintenance projects.
- 5.4.39 The DMRB LA 111 guidance provides a means of determining the magnitude of the impact, the observed effect level and the resultant significance of construction noise.
- 5.4.40 For the prediction of construction noise, the DMRB LA 111 guidance refers to BS5228-1. For residents of houses that could be exposed to construction noise,



BS5228-1:2009+A1:2014 is therefore considered to be the appropriate standard. This standard requires 'best practicable means' ("BPM") to be employed to control noise generation.

- 5.4.41 At this stage it is not possible to identify precise detail of what plant would be required and where it would be sited and for how long. As a consequence, an indicative range of levels of noise and vibration from specific types of task at the closest and most distant approach to the site have been used to calculate the range of highest likely noise and vibration conditions relative to the NSR.
- 5.4.42 The construction impact semantic scale is set out in DMRB LA 111 and provided in **Table 5.6** (i.e. ref. Table 3.12 of LA 111). We have added in column 4 to show the range of threshold levels for ease of reference, which is referred to in column 3 of **Table 5.6** and taken from BS5228-1:2009+A1:2014 Annex E.3.2. The threshold level is determined by measuring typical ambient noise at the NSR and comparing this with three threshold limits between the stated range (e.g. daytime weekday would be 65dB, 70dB or 75dB L_{Aeq}). The specific limit for the Proposed Development is determined by establishing whether the baseline noise level (rounded to the nearest 5dB) at NSR is either lower, equal to or higher than the three limits.
- 5.4.43 To relate the threshold level in terms of an effect level and an impact magnitude, the guidance compares the calculated noise level at the NSR with the measured baseline and the determined threshold limit. For example, if the calculated level is lower than the baseline level, it is considered to be a negligible impact (i.e. below the Lowest Observable Adverse Effect Level LOAEL). If the level is equal to or greater than +5dB above the threshold limit, it is considered to be a major impact (i.e. 5dB or greater than the Significant Observable Adverse Effect Level SOAEL). **Table 5.6** provides the relative impact magnitude and how this is defined relative to the construction noise level.



Table 5.6: Construction Time Period – LOAEL and SOAEL

Time Period	LOAEL	SOAEL	Threshold Level $L_{Aeq,1hr}$ 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

5.4.44 The magnitude of impact for construction noise is outlined in **Table 5.7** (as defined in DMRB LA 111).

Table 5.7: 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

5.4.45 According to the DMRB LA 111 guidelines, the magnitude of impact at noise sensitive receptors from construction traffic is set out in **Table 5.8**. The magnitude of impact is determined by establishing how much the existing baseline levels would increase by because of the temporary activity.

Table 5.8: 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

5.4.46 As this is a temporary activity, to establish whether a significant effect would occur at the NSR, the activity would have to be equal to or greater than an increase in 3dB and occur for a relatively long period of time.

5.4.47 According to DMRB LA 111 (ref. paragraph 3.19 of the guidance) the period of time that this would occur is defined below:

“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

5.4.48 To establish whether vibration generated by vibratory plant used during the construction phase would be significant, it is necessary to predict the likely vibration level at the NSR.

5.4.49 The DMRB LA 111 guidance provides a means of determining the magnitude of the impact, the observed effect level and the resultant significance of construction vibration.

5.4.50 To relate the threshold level in terms of an effect level and an impact magnitude, the guidance compares the calculated noise level at the NSR with two threshold limits. The first threshold (i.e. 0.3mm/sec Peak Particle Velocity (PPV)) is the level at which vibration is said to be just perceptible and the threshold of LOAEL. At a vibration level below 0.3mm/sec would represent a negligible impact, and the second threshold (i.e. 1mm/sec PPV) was set as the level at which construction vibration can be tolerated with prior warning and the threshold of SOAEL. Below this level would be a minor impact. At levels above 1mm/sec and below 10mm/sec, PPV would relate to a moderate impact and above 10mm/sec, PPV a major impact.

5.4.51 For construction phase vibration, the LOAEL and SOAEL is set out in DMRB LA 111 and provided in **Table 5.9**.

Table 5.9: Construction Vibration LOAELs and SOAELs

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

- 5.4.52 The magnitude of impact for construction vibration, shall be determined in accordance with **Table 5.10** (as defined in DMRB LA 111).

Table 5.10: 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

- 5.4.53 As this is a temporary activity, to establish whether a significant effect would occur at the NSR, the activity would have to be equal to or greater than 1mm/sec and occur for a relatively long period of time.
- 5.4.54 According to DMRB LA 111 (ref. paragraph 3.34) the period of time that this would occur is defined below:

“Construction vibration 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.”*

Operational Noise

- 5.4.55 The assessment considers all noise emitting plant associated with the Proposed Development. **Table 5.11** below shows the proposed impact magnitude methodology considering the guidance contained within BS4142: 2014+A1:2019 for Site generated noise.

Table 5.11: Impact Magnitude Scale – Future Noise against Existing in accordance with BS4142: 2014+A1:2019 (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. 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
+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 Table 5.11 and Table 5.12 are used in the assessment of operational noise impacts. *The intrusiveness depends on the context of the residual environment and therefore may fall into SOAEL if background and residual levels are similar. **Difficult to define physical harmful effect as this depends on numerous site-specific factors which may include type and character of noise source, location, human sensitivities, duration and receptor experiences etc.*

- 5.4.56 To provide some context of the predicted noise levels from the Proposed Development (provided in terms of the L_{Aeq} assessment index) relative to the existing residual L_{Aeq} at NSR (i.e. ambient level without the Site in operation), the semantic table taken from the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment' is provided.
- 5.4.57 The guidelines set out an example of how changes in noise level may be assessed in terms of residual L_{Aeq} . This assists in determining the impact of Site operational noise relative to the context of the noise climate, which is detailed in **Table 5.12**.

Table 5.12: 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 effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm	Severe

Operational Road Traffic Noise

- 5.4.58 To assess the likely impact on NSR from the changes to the traffic movement because 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.
- 5.4.59 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).
- 5.4.60 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 5.13** for the short term and **Table 5.14** for the long term.

Table 5.13: Magnitude of Change – Road Traffic Noise- Short Term

Short Term Magnitude	Short Term Noise Change (dB $L_{A10,18hr}$ 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 5.14: 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

- 5.4.61 The impact magnitude categories can then be correlated with the receptor sensitivity categories in **Table 5.15** to establish a level of effect as defined in **Table 5.16**.
- 5.4.62 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.
- 5.4.63 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 5.15** have been adopted.

Table 5.15: 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.

- 5.4.64 Based upon the assessment of impact magnitude and the sensitivity of individual receptors, the matrix shown in **Table 5.16** 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. However, the matrix provides a useful indication of the likely significance.

Table 5.16: 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

- 5.4.65 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

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

5.5 Baseline Environment

Overview

- 5.5.1 A baseline background sound survey in accordance with the advice given in BS4142: 2014+A1:2019 was undertaken by NVC (between 27 July and 03 August 2021 (inclusive)) at nine receptor positions. An additional survey was carried out between Friday 01 April and Tuesday 05 April 2022 at two further receptor positions which are further to the north relative to the existing Kronospan Facility.
- 5.5.2 The surveys in 2021 to 2022 therefore involved a total of 11 fixed monitoring positions to establish baseline noise levels as indicated in **Figure 5.1** and were chosen to be representative of the NSR around the Proposed Development and provide broadband data of the existing sound climate at these receptors. For context, the sound climate during this survey period would have included any normal Kronospan plant operations as the Site operates 24 hours a day and 365 days a year. Details of the instrumentation used for the survey are detailed in **Appendix 5B**.

- 5.5.3 During 2024, one survey was undertaken in January 2024 with the Kronospan Site in operations and two further baseline sound surveys were carried out during May 2024 and November to December 2024 **during Kronospan partial shut-down periods**. These were undertaken by Spectrum as part of the Environmental Permit application submission following consultation with NRW in conjunction with Kronospan and Spectrum. These two surveys included four key positions relative to the Proposed Development (i.e. at closest NSR in different directions from the CHP plant location at P2, P4, P8 and P9). During the survey in May 2024 and November to December 2024, the Kronospan Site was in partial shut-down, which enabled some further assessment of background sound levels without the influence of the existing Kronospan Facility to be determined at four NSR locations in different directions from the Site. Detail of the noise surveys undertaken during 2024 are provided in **Appendix 5D**.
- 5.5.4 During March 2025 an additional contextual baseline sound survey was undertaken by Spectrum to determine typical noise levels within the Canal Wood Local LWS, which is adjacent to the western boundary of the Canal Wood Industrial Estate and the existing Kronospan Facility. This was necessary to assist in informing the Biodiversity Assessment Report (BAR) (**DNS4-007**), due to a request by WCBC to assess the noise impact on protected and priority species, which would include breeding birds and bats. Detail of the noise surveys undertaken at the Canal Wood LWS are provided in **Appendix 5F**.
- 5.5.5 The local sound environment is therefore generally formed by noise from local road traffic, birdsong and industrial noise sources.
- 5.5.6 The monitoring positions from 2021 and 2022 together with the location description are provided in **Table 5.17** and for 2024 in **Table 5.18**.

Table 5.17: Contextual Baseline Monitoring Positions and NSR (2021 and 2122 Surveys)

NSR Position	Approximate Distance from CHP Site Boundary (m)	Grid Reference	Description of Position
P1: No.2 Linden Avenue	850	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	530	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.
P3: West View / Holyhead Road	380	329015 338636	This position was chosen for the early baseline studies in 2011 and 2016 which reflects the nearest receptors off West View. Data recorded in 2016 is referenced for this receptor. Meter placed on green space in front of dwellings off West View at circa 20m from Holyhead Road.
P4: Chirk Court (Maes-Y-Waun)	570	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	930	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	570	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: Canal Wood Industrial Estate	360	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	560	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.

NSR Position	Approximate Distance from CHP Site Boundary (m)	Grid Reference	Description of Position
P9: New Hall Farm, Castle Gates	960	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 field opposite the farm site entrance away from reflective walls and buildings.
P10. Afon Bradley Farm	950	328691 339433	This property is in the ownership of the Applicant and is located to the north of the CHP Site. 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	1120	328953 339526	This property is located opposite the proposed new roundabout junction and therefore northeast of the Proposed Development. The meter was placed in the field opposite the Property at a similar distance from the local road network.

Note: Receptor 3a George Street has been removed from the data set following a review of the location at ground level within the garden area, which benefited from significant self-screening from buildings on intervening land between the garden and Kronospan Site. In our expert opinion this would not provide a representative background level particularly for the night-time noise assessment at 4m above ground level for receptors at George Street or West View.

Table 5.18: Baseline Monitoring Positions and NSR (2024 Survey) – Extract taken from Appendix 5C

NSR Position	Approximate Distance from CHP Site Boundary (m)	Grid Reference	Description of Position
P2: No. 3 Wern (NSR1 in Appendix 5C)	530	328934 339036	Residential location approximately 800m NE of the main external plant area across flat urban terrain
P4: Maes-Y-Waun (NSR2 in Appendix 5C)	570	329065 338220	Maes-Y-Waun (assisted living residence) approximately 600m SE of the centre of the main external plant area across flat urban terrain.
P8: Llwyn-y-cil Road (NSR3 in Appendix 5C)	560	328091 337894	Llwyn-y-cil Road at residential property approximately 600m SW of the main external plant area up gently rising farmland.
P9: New Hall Farm (NSR4 in Appendix 5C)	960	327619 338875	New Hall Farm approximately 1km NW of the main external plant area up gently rising farmland.

Existing Background Sound Survey Results

5.5.7 The results of the three baseline noise monitoring surveys within the period between 2021, 2022 and 2024 are provided below in **Table 5.19** (daytime) and **Table 5.20**

(night-time). Refer to **Appendix 5B**, **Appendix 5D**, and **Appendix 5E** for further details.

- 5.5.8 The survey period during January 2024 was a contextual baseline survey (i.e. with Kronospan Site in operation) and the two surveys in May and November-December 2024 (undertaken by Spectrum) were carried out during partial shut-down periods at the existing Kronospan Facility and analysis of the data to establish the likely representative background sound level without the existing Kronospan Facility in operation were determined.

Table 5.19: Contextual 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	Surveys during 2024²	60	52	72 (av.)
P3. West View	September 2016 ¹	61	53	69-70
P4. Maes-y-Waun	Surveys during 2024²	56	49	70
P5. Hadley Close	July 2021	47	41-42	47-86
P6. Station Avenue	July 2021	49	45-46	48-84
P7. Canal Wood Industrial Estate	July 2021	54	51-54	44-92
P8. Llwyn-y-cil Road	Surveys during 2024²	53	46	73
P9. New Hall Farm	Surveys during 2024²	49	43	66
P10. Afon Bradley Farm	April 2022	51	43	51-83
P11. Lodge Farm Cottage	April 2022	61	51	69-92

Note: The contextual representative levels at NSR are based on mode or mean, whichever is the lower.

¹ Historic data from 2016 at this location (with Kronospan site in operation).

² Contextual sound levels from Spectrum survey with Kronospan operating typically (Appendix 5D, Section 5.2).

Table 5.20: Contextual 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	Surveys during 2024²	53	46	69
P3. West View	September 2016 ¹	46	45	50-52
P4. Maes-y-Waun	Surveys during 2024²	50	45	69
P5. Hadley Close	July 2021	47	39-40	41-82
P6. Station Avenue	July 2021	47	45	47-67
P7. Canal Wood Industrial Estate	July 2021	54	49-51	54-80
P8. Llwyn-y-cil Road	Surveys during 2024²	47	45	56
P9. New Hall Farm	Surveys during 2024²	46	43	58
P10. Afon Bradley Farm	April 2022	49	43	52-92
P11. Lodge Farm Cottage	April 2022	55	42	52-92

Note: The contextual representative levels at NSR are based on mode or mean, whichever is the lower.

¹ Historic data from 2016 at this location (with Kronospan site in operation).

² Contextual sound levels from Spectrum survey with Kronospan operating typically (Appendix 5D, Section 5.2).

Historical Baseline Levels

- 5.5.9 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 49dB LA90 daytime and 45dB LA90 night-time and 56dB and 50dB LAeq respectively from the Spectrum contextual baseline data from survey work in 2024. For the estimated background sound level without Kronospan is also taken from the relevant Spectrum report (refer to **Table 5.21**) and for other NSR (not included in the 2024 survey) the NVC and Spectrum Acoustic Consultants have agreed on the likely background sound levels.

Representative Background Level

- 5.5.10 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.

5.5.11 Two scenarios have been considered in respect of the assessment of impact:

- The use of contextual representative background sound levels, which takes into account the long-standing and relatively constant operations of the Kronospan Site that have added to the sound climate for over 50 years, which has been the basis of assumption of background level and impact assessment for many years.
- The use of estimated background sound level based on a scenario where the Kronospan site has shut down. Whilst this is highly unlikely to occur, it provides an indication of the impact of the Proposed Development out of context with the influence of the long-standing sound contribution from Kronospan operational activities.

5.5.12 The baseline data obtained at receptors not included in the latest Spectrum sound surveys have been reference to the NVC July 2021 and April 2022 contextual surveys. The results are provided in **Appendix 5B**.

5.5.13 The data obtained during 2024 contextual baseline surveys is provided in the Spectrum Noise Impact Assessment (NIA) report provided in **Appendix 5D** and **Appendix 5E**. The baseline survey work during 2024 during Kronospan partial shut-down periods is detailed in the Spectrum NIA report provided in **Appendix 5D**.

5.5.14 The results of the 2024 baseline surveys (with partial shut-down) have provided data to estimate the likely baseline levels without the Kronospan site in operation as part of the ongoing Environmental Permit work with NRW to update the previous noise assessments for existing Kronospan operational plant. The analysis has been able to establish an estimate of the likely contextual background (with the Kronospan Site) and background (without the Kronospan Site) LA90 levels at 4 key locations [i.e. northeast (P2), southeast (P4), southwest (P8) and northwest (P9)] relative to the Proposed Development and the overall Kronospan Site.

5.5.15 **Appendix 5D** provides an explanation regarding the context of the Kronospan Site in respect of BS4142 and the UK Environmental Permit Regulators. An extract from **Appendix 5D** is provided below for ease of reference:



“9.2 CONTEXT

Regarding context, BS4142 advises the following:

“Where the initial estimate of the impacts needs to be modified due to the context, take all pertinent factors into account...”

Spectrum are of the opinion that the overriding pertinent factors to be taken in to account when considering context would be as follows:

- 1. The Kronospan plant has been operational since 1970, and as such has been part of the ambient soundscape for over 50 years. Guidance from the UK Environmental Regulators (Ref:1) lists ‘long standing industry’ as an element ‘likely to make a situation less sensitive’.*
- 2. Permitting via NRW ensures that new developments within the site will be designed to avoid significant impact at noise sensitive receptors.*
- 3. As ageing plant is replaced with new plant, noise levels from the site are likely to reduce over time.*
- 4. The Kronospan site forms part of the Chirk community as a large employer.*

With regard to how the assessment should be modified to take context into account, guidance from the UK Regulators (Ref:1) advises the following:

‘There are no strict rules on what elements could make a context more or less sensitive. However, if you are modifying your assessment outcomes you must fully justify this otherwise we will reject your noise impact assessment.’

In view of the above. Spectrum are of the opinion that whilst the initial assessment of the Rating sound level should be made against the background sound levels without Kronospan site operating (as per Table 9.1 above), the context of the Chirk site is that the perceived background sound level in the area does include steady noise from the Kronospan site (due to its long standing presence), and this is reflected in the steady $L_{A90,T}$ levels measured at NSR1-4.

If this is accepted as a reasonable argument, then the BS4142 assessment could reasonably be adjusted for context by assessing measured $L_{Aeq,T}$ levels during operation against measured $L_{A90,T}$ values (modal night-time values from section 5) as shown below.”



5.5.16 The results of analysis undertaken by Spectrum is provided in **Table 5.21**, which shows the contextual background levels and the estimated background sound level without the Kronospan Site at the receptor locations.

5.5.17 For the assessment of **estimated** background sound levels at other NSR locations, NVC and Spectrum Consultants have considered the historical baseline data measured, Consultants observations during survey work and specific locations relative to those measured during partial shut-down periods. These are included in **Table 5.21** below.

Table 5.21: Contextual Baseline and Background Sound Levels without Kronospan in Operation (as advised by Spectrum reports (Appendix 5C and Appendix 5D) & NVC review of baseline information and observations)

NSR Position	Contextual Background Daytime Level $L_{A90,T}$ dB	Contextual Background Night-time Level $L_{A90,T}$ dB	Estimated Daytime Background Noise Level Without Kronospan Plant Operating $L_{A90,T}$ dB	Estimated Night-time Background Noise Level Without Kronospan Plant Operating $L_{A90,T}$ dB
P1. Linden Avenue	36	34	36	34
P2: No. 3 Wern (NSR1 in Appendix 5C and Appendix 5D)	52 ¹	46 ¹	49 ²	36 ²
P3. West View	53	45	49	37
P4: Maes-Y-Waun (NSR2 in Appendix 5C and Appendix 5D)	49 ¹	45 ¹	52 ²	37 ²
P5. Hadley Close	41	39	41	39
P6. Station Avenue	45	45	45	45
P7. Canal Wood Industrial Estate	51	49	51	49
P8: Llwyn-y-cil Road (NSR3 in Appendix 5C and Appendix 5D)	45 ¹	44 ¹	40 ²	37 ²
P9: New Hall Farm (NSR4 in Appendix 5C and Appendix 5D)	41 ¹	41 ¹	38 ²	36 ²
P10. Afon Bradley Farm	43	43	43	37
P11. Lodge Farm Cottage	51	42	49	36

¹ Contextual noise levels during the daytime are taken from the Spectrum survey undertaken in 2024 (Appendix 5D, Section 5.2) and estimated daytime and night-time background sound levels from Appendix 5C or agreed levels between NVC and Spectrum.

Ecological Receptor Background Sound Levels

- 5.5.18 To establish typical background sound levels at the Canal Wood LSW at the closest approach to the Proposed Development, a sound survey was undertaken over approximately 48 hours at two fixed locations during March 2025 by Spectrum.
- 5.5.19 The data obtained during the March 2025 survey at the Canal Wood LWS is provided at **Appendix 5F**.
- 5.5.20 The results of the survey are summarised in **Table 5.22**.

Table 5.22: Baseline Sound Levels at Canal Wood LWS (as detailed in Appendix 5F)

NSR Position	Grid Reference X Y	Average Ambient Sound Level Daytime (range) Level LAeq,T dB	Average Ambient Sound Level Night-time (range) Level LAeq,T dB	Average Daytime Ambient LAmax dB (range)	Average Night-time Ambient LAmax dB (range)
P12. LWS (Woodland West)	328353 338597	57 (53-59)	57 (55-59)	75 (58-77)	76 (74-79)
P13. LWS (Woodland East)	328365 338484	65 (64-68)	65 (64-67)	74 (69-86)	72 (70-82)

Note: Further information on the frequency spectra analysis is provided in Appendix 5F for the assessment of high frequency noise associated for bats.

- 5.5.21 The above data will enable what impact the Proposed Development could have on any associated ecological sensitive receptors and for comparison with NE guidance on birds.

General Comment on Weather Conditions

- 5.5.22 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.
- 5.5.23 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

- 5.5.24 For the purpose of the assessment (the identification of the likely level of effect), the following NSR (summarised below and shown at **Figure 5.1**) have been identified.
- 5.5.25 Residential properties off Linden Avenue (Receptor R1) are located circa 900m north-east of the Proposed Development.
- 5.5.26 Residential properties (off Wern, Offa, and Crogen) (Receptor R2) which form part of Lodgevale Park are northeast of the Site boundary are approximately 550m to 900m from the Proposed Development.
- 5.5.27 The Applicant owns a residential property immediately northeast of the Proposed Development known as Bryn Hyfryd (Receptor R2) and at a distance of circa 450m. This property is occupied and a tenant of the Applicant.
- 5.5.28 Residential properties approximately 400m northeast of the Site boundary are off West View (Receptors R3).
- 5.5.29 The nearest receptor in a southeastern direction from the Proposed Development is Maes-y-Waun (Receptor R4) at a distance of circa 560m. Additionally properties off Maes-y-Waun are further back from the B5070 road and screened from the Site by dwellings built on the intervening ground at circa 650m to 750m.
- 5.5.30 Residential properties off Shepherds Lane and Hadley Close (Receptor R5) are southeast of the Site at a distance of approximately 900m.
- 5.5.31 Residential properties off Station Avenue (Receptor R6) south of the Mondelez factory are approximately 550m south of the Proposed Development.
- 5.5.32 Canal Wood Industrial Estate (Receptor R7) is southwest of the Proposed Development at a distance of approximately 180m to 390m.
- 5.5.33 The closest receptors in a south-western direction from the Proposed Development are off Lylwn-y-cil-Road (Receptor R8) at a distance of circa 550m.

- 5.5.34 The closest receptors in a northwestern direction from the Proposed Development are at New Hall Farm (Receptor R9) at a distance of circa 940m.
- 5.5.35 The residential property at Afon Bradley Farm (Receptor R10) is owned by the Applicant and is currently occupied by a tenant and employee of the Applicant. The property is approximately 830m north of the Proposed Development.
- 5.5.36 Residential properties off Old Black Park Road (Lodge Farm Cottage and Parkgate Cottage) (Receptor R11) are approximately 1km northeast of the Proposed Development. There are other properties in this locality but are at a greater distance and therefore the impact would be lower.
- 5.5.37 The Chirk Marina and the canal which have live aboard boaters which use the canal and can also reside at the marina for periods (Receptor R12). The distance to the canal is approximately 100m from the Proposed Development.
- 5.5.38 There are no known future receptors proposed that would be of greater sensitivity than those considered in this assessment.

Ecological Sensitive Receptors

- 5.5.39 The potential effects of noise on biodiversity receptors are as described in the BAR (**DNS4-007**).
- 5.5.40 In respect of sensitive ecological receptors, Canal Wood LWS is the closest to the Site and is adjacent to the western boundary of the existing Kronospan Facility, which runs parallel with the railway line and Shropshire Union Canal. The woodland is not specifically designated for birds, but the ecological assessment considers impacts in terms of breeding birds and bats.
- 5.5.41 The Proposed Development is approximately 70m - 150m from the closest noise generating source to the Canal Wood LWS. The sound climate in the woodland is generally formed by industrial noise emanating from the existing Kronospan Facility, Canal Wood Industrial Estate (which includes a number of extract fan systems observed at high level and western side of the buildings facing the woodland) and Mondelez factory west of the southern end of the woodland.

Effects of Noise on Birds

- 5.5.42 The Natural England document 'A review of the effects of noise on Birds' Version 1 was published in 2018 by NE (Allan Drewitt, Emma Hawthorne, Richard Saunders & Sarah Anthony). As it states in the introduction:

"This guidance note describes the nature of noise and explains how it is heard and measured. Variable and unpredictable noises often result in the greatest disturbance effects on birds and methods to make representative measurements of variable noise level are presented and discussed. Noise also has other more subtle and less easily measured effects on birds, including masking important acoustic signals and potentially harmful physiological changes caused by increased stress. The available literature for a wide range of effects of different noise sources on birds has been reviewed and summarised, and a list of references for further reading is provided."

- 5.5.43 At section 4.3 the NE guidance state:

"What are the effects of industrial and construction noise?"

A number of assessments of noise effects on waterbirds have been undertaken on the Humber Estuary, including the effects of hydraulic hammer or percussive piling, steam venting and other construction activities (Cutts et al. 2009, IECS 2004, 2008, Wright et al. 2010). General conclusions from these studies are that that the potential for bird disturbance increases as the difference between the highest discontinuous noise levels and simultaneous continuous noise levels increases, and that birds are more likely to be disturbed by sudden noises than a wide range of more steady, and predictable, noise levels."

- 5.5.44 In conclusion, the NE guidance state:

"Caution should be exercised when attempting to define a threshold based on noise levels alone. As described above, other factors such as noise 'peakiness, including rise time of a noise signal, and the frequency content of the noise source, should also be expected to affect bird behaviour."

As with other forms of disturbance, bird response varies with other factors such as degree of habituation to ambient noise levels, flock size and availability of resources such as foraging and roosting habitats. Additionally, Halfwerk et al. (2010) argue that knowledge of the spatial, temporal and spectral overlap between noise and species-

specific acoustic behaviour are important for effective noise management. For example, road noise in the same range of frequencies as those of a bird's vocalizations (generally 2-4 kHz) has a much greater masking effect on the detection of acoustic signals than noises outside this range (Dooling & Popper 2007).

For all these reasons it seems clear that generic noise threshold levels are unlikely to offer a suitable approach for assessing the potential effects of noise on birds. A potentially more suitable approach might be the application of a threshold increase in noise levels, either continuous noise or sporadic noise. In the case of sporadic noise, a greater than 3 dBA increase in peak noise might be a useful and sufficiently precautionary rule-of-thumb when considering the likelihood of a significant effect (as described above, a difference of 3 dBA in similar types of noise is just distinguishable to people). Thus, as a general rule, if the noise source is no more than 3dB higher than existing noise levels it is unlikely to be significant, but noting that a 3dB increase in the average noise level could mask a significant increase in impulsive noise. Similarly, if considering the potential effect of chronic noise on breeding birds, the absence of a 3dB increase in the maximum level should not be used to exclude an impact linked to an increase in average baseline levels.”

5.5.45 In summary, the guidance would indicate the following noise level thresholds to be appropriate:

- Where L_{Amax} levels are likely to exceed 70dB then mitigation measures should be considered.
- Where L_{Aeq} or L_{Amax} levels are likely to exceed the existing baseline levels by 3dB then mitigation measures should be considered.

Effects of Noise on Bats

5.5.46 It is understood that effects on the type of bats that may occur in the vicinity of the Site (i.e. in/on the edge of Canal Wood LWS) could occur where a new noise source is being introduced that produces significant ultrasound frequencies (i.e. circa 20kHz and higher). Information on existing background sound levels at 20kHz frequency is provided in **Appendix 5F**.

Future Baseline

- 5.5.47 In the absence of the Proposed Development, it is assumed that the Site would remain with its existing power generation.
- 5.5.48 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.
- 5.5.49 In the absence of the Proposed Development, the heavy goods vehicles (HGVs) would continue to be routed along Holyhead Road, which passes through part of Chirk village to enter through the existing entrance until such time as the (to be constructed) North Access Road is operational. 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 subject to higher/lower/similar vehicles movements and road traffic noise if the Proposed Development was not consented.

5.6 Initial Development Design and Impact Avoidance/Reduction Measures

Overview

- 5.6.1 General design measures to avoid or minimise the potential for significant effects are described in **ES Chapter 4.0 (Description of the Proposed Development)**.
- 5.6.2 The predicted noise levels from the Proposed Development have been calculated using the noise levels provided within **Appendix 5G**. The noise levels are based on data provided by Technology Providers on other projects operating in the UK having similar types of fixed plant.
- 5.6.3 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.

Construction and Decommissioning

- 5.6.4 In accordance with BS5228, BPM would be employed to control the noise and vibration generation during construction. Noise and vibration mitigation is set out in the Framework Construction Environmental Management Plan (CEMP) (**DNS4-003**) provided with this DNS application.
- 5.6.5 The Framework CEMP (**DNS4-003**) presents the approach to and the application of environmental management and mitigation for the construction of the Proposed Development. A series of phase specific CEMP documents (as required) which define specific measures to be adopted during the construction of the various components of the Proposed Development would be produced (post-consent) by the Principal Contractor (PC).
- 5.6.6 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. The above construction hour restrictions have been implemented on previous Kronospan projects and will be implemented during the construction of the forthcoming North Access Road works.
 - Avoid unnecessary plant operation and revving of plant or vehicles.
 - Sensible routing of the construction plant to avoid the nearest residential properties (where practicable).
 - Use of non-percussive piling (e.g. CFA or hydraulic piling) 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.

- Contact local residents prior to construction works commencing advising of anticipated duration and a contact number to advise of any issues/concerns.

Operation

5.6.7 Design measures to avoid or minimise the potential for significant noise effects are summarised below:

- Buildings containing CHP plant [i.e. Boiler Room, Turbine Hall, Pre-Crushers, ID Fan, Bag Filter, NOx, Storage and Service Room) constructed from single skin cladding (Weighted Sound Reduction Index (R_w) = 22dB)).
- Air cooled condenser fans operating to a sound power level of 102dB(A) (i.e. 6 fans at 94dB(A) sound power level).
- Turbine Air Cooler Fans – overall sound power level with all fans operating designed to a level of 90dB(A) (i.e. circa <80dB L_{Aeq} at 1m).
- Fan stack designed to a sound power level of 90dB(A) at stack exit point (i.e. circa <80dB L_{Aeq} at 1m/90deg to stack outlet).
- Smaller external plant (i.e. pumps) designed to a sound power level of 90dB(A) (i.e. circa <80dB L_{Aeq} at 1m).
- Boiler roof vents designed to a sound power level of 80dB(A).
- ID Fan acoustically enclosed to achieve a design noise level of 65dB(A) @ 1m.
- Pre-crusher plant fitted inside an enclosure fitted with acoustic cladding to R_w 32dB and insulated roller shutter doors fitted to openings.
- Sound power levels of plant as detailed in **Appendix 5G**.
- Design to include control of noise character (i.e. tonality and impulsivity) in accordance with BS4142:2014+A1:2019.
- Mobile plant to be fitted with non-tonal reversing alarms (i.e. broad band noise type noise alarms).

5.6.8 The proposed Low Carbon CHP Facility would operate on a 24-hour basis. The feedstock would be brought to Site primarily between 0700 and 1900 hours, seven days a week, including Bank Holidays but excluding Christmas Day, Boxing Day and New Years Day. Deliveries outside of those hours would be infrequent.

5.7 Assessment of Potential Effects

Introduction

- 5.7.1 The following section sets out the assessment of effects taking into consideration the initial development design and impact avoidance/reduction measures detailed in **Section 5.6** above.

Construction Phase Noise Effects

Residential Receptors

- 5.7.2 Construction works would involve the movement of soils, piling, and the construction of new buildings, infrastructure and plant installation. Excavators, haulage lorries, piling rigs, cranes, telehandlers, dumpers, concrete plant, diggers, power tools 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 at times.
- 5.7.3 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, piling and infrastructure work during the initial stages of construction when excavators, piling rigs, dozers, road construction and surfacing plant or similar may be in use.
- 5.7.4 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 5H** for construction plant inventory that has been considered in the assessment.
- 5.7.5 The construction works would typically take place during normal daytime operating hours. The daytime activities and associated noise levels are provided below in **Table 5.23**, which is based on the ABC method within BS5228: 2009 (Annex E.3.2.).



Table 5.23: Noise Predictions for Highest Likely Construction Noise for existing NSR (daytime activities) with Initial Impact Avoidance/Reduction 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 (column 4 with 6) LAeq dB
R1. Linden Avenue (NE of Site)	860-1100	Site Preparation	37-41	57	65	-28 to -24
	860-1100	Piling	38-41	57	65	-27 to -24
	860-1100	General activities	37-39	57	65	-28 to -26
	860-1100	Infrastructure	36-44	57	65	-29 to -21
	860-1100	Building/Plant fit	33-44	57	65	-32 to -21
R2. Wern / Offa & Bryn Hyfryd (NE of Site)	450-700	Site Preparation	41-47	61	65	-24 to -18
	450-700	Piling	42-48	61	65	-23 to -17
	450-700	General activities	41-45	61	65	-24 to -20
	450-700	Infrastructure	40-50	61	65	-25 to -15
	450-700	Building/Plant fit	42-46	61	65	-23 to -19
P3: West View / Holyhead Road (E of Site)	420-600	Site Preparation	42-47	51	65	-23 to -18
	420-600	Piling	43-49	51	65	-22 to -16
	420-600	General activities	42-45	51	65	-23 to -20
	420-600	Infrastructure	41-50	51	65	-24 to -15
	420-600	Building/Plant	43-47	51	65	-22 to -18
R4. Maes-y-Waun (SE of Site)	600-700	Site Preparation	41-44	57 ¹	65	-24 to -21
	600-700	Piling	42-45	57 ¹	65	-23 to -20
	600-700	General activities	41-42	57 ¹	65	-24 to -23
	600-700	Infrastructure	40-47	57 ¹	65	-25 to -18
	600-700	Building/Plant fit	42-43	57 ¹	65	-23 to -22
R5. Shepherds Lane / Hadley Close (SE of Site)	900-1050	Site Preparation	37-41	48	65	-28 to -24
	900-1050	Piling	38-40	48	65	-27 to -25
	900-1050	General activities	37-38	48	65	-28 to -27
	900-1050	Infrastructure	36-44	48	65	-29 to -21
	900-1050	Building/Plant fit	39-40	48	65	-26 to -25
R6. Station Avenue (S of Site)	550-700	Site Preparation	41-45	49	65	-24 to -20
	550-700	Piling	42-46	49	65	-23 to -19
	550-700	General activities	41-43	49	65	-24 to -22
	550-700	Infrastructure	40-48	49	65	-25 to -17
	550-700	Building/Plant fit	42-44	49	65	-23 to -21
R8. Llwyn-y-cil Road (SSW of Site)	580-680	Site Preparation	41-45	53	65	-24 to -20
	580-680	Piling	42-45	53	65	-23 to -20
	580-680	General activities	41-43	53	65	-24 to -22
	580-680	Infrastructure	40-48	53	65	-25 to -17
	580-680	Building/Plant fit	42-44	53	65	-23 to -21
R9. New Hall Farm (NW of Site)	920-1000	Site Preparation	38-41	44	65	-27 to -24
	920-1000	Piling	39-40	44	65	-26 to -25
	920-1000	General activities	37-38	44	65	-28 to -27
	920-1000	Infrastructure	37-44	44	65	-28 to -21
	920-1000	Building/Plant fit	39-40	44	65	-26 to -25
R10. Afon Bradley Farm (N of Site)	820-1020	Site Preparation	38-42	49	65	-27 to -23
	820-1020	Piling	39-41	49	65	-26 to -24
	820-1020	General activities	37-39	49	65	-28 to -26
	820-1020	Infrastructure	37-45	49	65	-28 to -20
	820-1020	Building/Plant fit	39-41	49	65	-26 to -24

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 (column 4 with 6) LAeq dB
R11. Lodge	1000-1100	Site Preparation	37-40	55	65	-28 to -25
Farm	1000-1100	Piling	38-39	55	65	-27 to -26
Cottage off	1000-1100	General activities	37-38	55	65	-28 to -27
Old Black	1000-1100	Infrastructure	36-43	55	65	-29 to -22
Park Road (NE of Site)	1000-1100	Building/Plant fit	39-40	55	65	-26 to -25
R12: Chirk	100-870	Site Preparation	39-60	49-56	65	-26 to -5
Marina &	100-870	Piling	40-64	49-56	65	-25 to -1
Canal	100-870	General activities	39-58	49-56	65	-26 to -7
Towpath	100-870	Infrastructure	38-63	49-56	65	-27 to -2
	100-870	Building/Plant fit	40-59	49-56	65	-25 to -6

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

²Baseline levels taken from readings at Afon Bradley Farm and Appendix 5F

- 5.7.6 On the basis of the above, the resultant temporary noise level because of construction works is likely to result in an impact magnitude classification of **negligible** at all NSR except R12 where the impact would be **slight** resulting in a **neutral** to **minor** level of effect. This is a temporary noise source and **not significant** in EIA terms.

Ecological Receptors

- 5.7.7 **Section 5.5.39 to 5.5.41** provides detail of appropriate guidance for bird nesting at the LWS adjacent to the Site's western boundary. The predicted noise levels from the construction phase are provided in **Table 5.24**.

Table 5.24: Noise Predictions for Highest Likely Construction Noise at Ecological Sensitive NSR (daytime) with Initial Impact Avoidance/Reduction Measures

NSR Ecological Location	Activity	Predicted Noise Level Range LAeq [LAmax] dB	Typical Ambient Noise Levels Av. LAeq & LA _{Fmax} (Range 15min LAeq & LA _{Fmax}) dB	Exceedance of NE Guidance of LAeq +3dB	Exceedance of NE Guidance of 70dB LA _{Fmax} dB
NSR13. LWS (W of Site)	Site Preparation	55-58 [60-66]	57 LAeq (53-59)	None	None
	Piling	55-59 [56-66]		None	None
	General activities	50-52 [55-60]	75 LA _{Fmax} (58-77)	None	None
	Infrastructure	53-60 [58-68]		None	None
	Building/Plant Fit	56-59 [61-69]		None	None
NSR14. LWS (E of Site)	Site Preparation	55-63 [60-71]	65 LAeq (64-68)	None	None
	Piling	54-62 [55-69]		None	None
	General activities	52-56 [57-64]	74 LA _{Fmax} (69-86)	None	None
	Infrastructure	53-65 [58-73]		None	None
	Building/Plant Fit	56-64 [61-74]		None	None

- 5.7.8 The above results are an indication of the highest likely construction noise activities (i.e. closest approach areas and noisiest activities) with the application of BPM mitigation measures. The results show that the highest noise levels are likely to be during site preparation, infrastructure works (e.g. concreting) and during the building construction/plant installation.
- 5.7.9 The results show no exceedance of NE guidance thresholds relative to L_{Aeq} and L_{AFmax} for the Canal Wood LWS during peak noise activities.

Construction Phase Noise Effects – Road Traffic

- 5.7.10 The TS (**DNS4-005**) outlines the potential construction phase activities and the level of staff and HGV traffic that could arise during the operational stages of the Proposed Development.
- 5.7.11 During this period, there will be journeys associated with the arrival and departure of site staff and the delivery of equipment and construction materials via HGVs.
- 5.7.12 According to the TS (**DNS4-005**) for the operational phase of the Proposed Development there is expected to be on peak hourly traffic demand there would be a total of seven HGVs per operational day (i.e. 14 two-way HGVs per operational day) and this level of movement would **not be exceeded** during the construction phase.
- 5.7.13 Based on the assessment of operational road traffic noise (refer to **Table 5.28**) at the Proposed Development, this level of additional movement on the local road network would result in a **negligible** impact and **neutral** effect according to DMRB guidance (refer to **Table 5.13** and **Table 5.16**).

Construction Phase Vibration Effects

- 5.7.14 The highest levels of vibration generated by construction plant is likely to include the following:
- piling;
 - vibratory rollers and compactors;
 - material offloading onto hard surfaces; and
 - large bulldozer.

- 5.7.15 Typical field measurements taken at sites in the UK where piling or vibratory compaction might occur have been used (as indicated in the example empirical data of vibratory sources in **Appendix 5I**).
- 5.7.16 The distance from the nearest residential receptors to any likely use of piling or vibratory compaction is likely to be a minimum distance of between 400m relative to residential receptors, 100m to 400m from the canal and 70m to 150m from the LWS woodland. According to **Table 5.9** and **Table 5.10**, the vibration levels would be below 0.1mm/sec (i.e. perceptible levels of vibration) resulting in a **negligible impact** and **neutral** level of effect and **not significant**.

Decommissioning Effects

- 5.7.17 When decommissioning occurs, it is reasonable to assume that similar construction techniques and mitigation measures would be applied, and that the outcome of the construction phase assessment remains a reasonable worst-case proxy for the assessment of decommissioning phase effects. Refer to **Section 5.7** for construction phase impacts and effects, which conclude that the impact magnitude would be **negligible to slight** resulting in a **neutral to minor** level of effect. This is a temporary noise source and **not significant** in EIA terms.
- 5.7.18 Once the decommissioning is complete, the effects would be as described for the future baseline conditions as described in **Section 5.5**.

Operational Phase Noise Effects - Plant

Noise Characteristics

- 5.7.19 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

- 5.7.20 In terms of tonality, in view of the separation distance from the Proposed Development to NSR, proposed initial mitigation measures, predicted noise levels and the masking nature of the residual sound levels (i.e. ambient L_{Aeq} sound levels without the Site in operation) any tonal noise could be 'just perceptible' at the NSR. For this scenario, a noise character penalty of +2dB is included. For the scenario with additional mitigation measures, the control strategy includes the application of

BAT to reduce noise which includes eliminating, as far as practicable, any generated tonal noise character. It is therefore concluded that a tonal noise character penalty for this scenario is not required.

Impulsivity

- 5.7.21 In terms of impulsivity, the impulsive activities (such as feedstock offloading, loading, crushing and any reverse jet filters on bagging plant) would be enclosed in buildings or enclosures or would be silenced as proposed in the initial mitigation scenario (**Section 5.6**). The mitigation strategy would therefore be designed to contain this type of noise character and is therefore highly unlikely to be perceptible at NSR and any noise character penalty is not deemed to be applicable.

Intermittency

- 5.7.22 In terms of intermittency, the Proposed Development plant would work continuously and by its nature it does not normally operate with any intermittency. Noise from HGV movements is not an unusual noise source in the general noise climate at NSR and therefore would not be distinctive in terms of intermittency.
- 5.7.23 In conclusion, with the proposed initial noise mitigation strategy and controls of specific plant selection and design, a +2dB allowance for tonal noise during night-time operations is allowed for. For the scenario where further mitigation measures are included (see **Section 5.9**), a noise penalty is not deemed to be required due to residual noise masking effects and the absolute level being low.
- 5.7.24 **Table 5.25** and **Table 5.26** below show the highest noise prediction relating to fixed plant and vehicular noise sources on Site operating during daytime and fixed noise sources during night-time periods.

Residential Receptors

Daytime Operations

- 5.7.25 **Table 5.25** 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 associated vehicle movements to and from the fuel stores.

Table 5.25: Predicted Noise Contribution from Proposed Development during Daytime (0700 to 2300 hours) with Initial Impact Avoidance/Reduction Measures

Receptor Position (Refer to Figure 5.1)	Time Period (0700-2300 hours)	Predicted Rating ¹ Noise Level from Site LAeq _{1hr} dB (1.5m height & 4m height above ground)	Assessment Contextual Baseline Sound Level LA90 _{1hr} dB [Estimated Baseline with no Kronospan]	Rating ¹ compared to Contextual Baseline Sound LAeq _{1hr} dB	Rating ¹ compared to Baseline Sound with no Kronospan LAeq _{1hr} dB
R1. Linden Avenue (NE of Site)	Daytime	37 ¹ (1.5m) 39 ¹ (4m)	36 ² [36 ²]	+1 +3	+1 +3
R2. Wern / Offa & Bryn Hyfryd (NE of Site)	Daytime	37-41 ¹ 39-43 ¹	52 ³ [49 ³]	-15 to -11 -13 to -9	-13 to -9 -10 to -6
R3. West View / Holyhead Road (E of Site)	Daytime	42 ¹ 44 ¹	53 ⁴ [49 ³]	-11 -9	-7 -5
R4. Maes-y-Waun (SE of Site)	Daytime	40 ¹ 44 ¹	49 ³ [52 ³]	-9 -5	-12 -8
R5. Shepherds Lane / Hadley Close (SE of Site)	Daytime	34 ¹ 36 ¹	41 ² [41 ²]	-7 -5	-7 -5
R6. Station Avenue (S of Site)	Daytime	37 ¹ 39 ¹	45 ² [45 ²]	-8 -6	-8 -6
R8. Llwyn-y-cil Road (SSW of Site)	Daytime	36-40 ¹ 37-41 ¹	45 ³ [40 ³]	-9 to -5 -8 to -4	-4 to 0 -3 to +1
R9. New Hall Farm (NW of Site)	Daytime	34 ¹ 36 ¹	41 ³ [38 ³]	-7 -5	-4 -2
R10. Afon Bradley Farm (N of Site)	Daytime	38 ¹ 40 ¹	43 ⁵ [43 ⁵]	-5 -3	-5 -3
R11. Lodge Farm Cottage off Old Black Park Road (NE of Site)	Daytime	36 ¹ 38 ¹	51 ⁵ [49 ³]	-15 -13	-13 -11
R12: Chirk Marina (Canal Towpath)	Daytime Daytime	41 ¹ 45-49 ¹	43 ⁶ [43 ⁶]	-2 +2 to +6	-2 +2 to +6

Note 1: Noise characteristics at receptor locations include a penalty of +2dB for tonality.

Note 2: Based on baseline survey undertaken by NVC in July 2021.

Note 3: Based on baseline surveys undertaken by Spectrum during 2024.

Note 4: Based on baseline survey undertaken by NVC in 2016.

Note 5: Based on baseline survey undertaken by NVC in 2022.

Note 6: Based on baseline survey results at Afon Bradley Farm undertaken by NVC in 2022.

Column 5 is calculated by the subtraction of column 4 from column 3.

Column 6 is calculated by the subtraction of column 4 [] from column 3.

5.7.26 The fifth and sixth column in **Table 5.25** shows the difference between the predicted rating noise level and the contextual background sound level and the estimated background sound level at the receptor positions. The rating level is therefore in accordance with the methodology found within BS 4142: 2014+A1:2019, which is the most relevant applicable noise assessment guidance.

- 5.7.27 According to BS4142: 2014+A1:2019, the rating level relative to the assessment contextual background sound level or estimated background without the existing Kronospan site noise would indicate **negligible to slight** impact magnitude at receptors, which would be **neutral to minor** level of effect. This is **not significant**.
- 5.7.28 The impact on the marina and canal towpath approach to the marina is shown to be **negligible** and a **neutral** level of effect and **not significant**. Further mitigation is detailed in **Section 5.9** of this chapter.

Night-time Operations

- 5.7.29 **Table 5.26** 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 5.26: Predicted Noise Contribution from the Proposed Development during Night-time (2300 to 0700 hours) with Initial Impact Avoidance/Reduction Measures

Receptor Position (Refer to Figure 5.1)	Time Period (2300-0700 hours)	Predicted Rating ¹ Noise Level from Site L _{Aeq1hr} dB	Assessment Contextual Baseline Sound Level L _{A901hr} dB [Estimated Baseline with no Kronospan]	Rating ¹ compared to Contextual Baseline Sound L _{Aeq1hr} dB	Rating ¹ compared to Baseline Sound with no Kronospan L _{Aeq1hr} dB
R1. Linden Avenue (NE of Site)	Night-time	39 ¹	34 ² [34 ²]	+5	+5
R2. Wern / Offa & Bryn Hyfryd (NE of Site)	Night-time	39-43 ¹	46 ³ [36 ³]	-7 to -3	+3 to +7
P3. West View / Holyhead Road (E of Site)	Night-time	44 ¹	45 ⁴ [37 ³]	-1	+7
P4. Maes-y-Waun (SE of Site)	Night-time	44 ¹	45 ³ [37 ³]	-1	+7
P5. Shepherds Lane / Hadley Close (SE of Site)	Night-time	37 ¹	39 ² [39 ²]	-2	-2
P6. Station Avenue (S of Site)	Night-time	39 ¹	45 ² [45 ²]	-6	-6
P8. Llwyn-y-cil Road (SSW of Site)	Night-time	39-41 ¹	44 ³ [37 ³]	-5 to -3	+2 to +4
P9. New Hall Farm (NW of Site)	Night-time	36 ¹	41 ³ [36 ³]	-5	0
P10. Afon Bradley Farm (N of Site)	Night-time	40 ¹	43 ⁵ [37 ³]	-3	+3
P11. Lodge Farm Cottage off Old Black Park Road (NE of Site)	Night-time	38 ¹	42 ⁵ [36 ³]	-4	+2
R12: Chirk Marina (Canal Towpath)	Night-time	41 ¹ 45-49 ¹	43 ⁶ [43 ⁶]	-2 +2 to +6	-2 +2 to +6

Note 1: Noise characteristics at receptor locations include a penalty of +2dB for tonality.

Note 2: Based on baseline survey undertaken by NVC in July 2021.

Note 3: Based on baseline surveys undertaken by Spectrum during 2024.

Note 4: Based on baseline survey undertaken by NVC in 2016.

Note 5: Based on baseline survey undertaken by NVC in 2022.

Note 6: Based on baseline survey results at Afon Bradley Farm undertaken by NVC in 2022.

Column 5 is calculated by the subtraction of column 4 from column 3.

Column 6 is calculated by the subtraction of column 4[] from column 3.

- 5.7.30 According to BS4142: 2014+A1:2019, the rating level relative to the assessment contextual background sound level or estimated background without the Kronospan site noise would indicate **negligible to moderate** impact magnitude at receptors, which would be **neutral to moderate** level of effect. Whilst this is **not significant**, further mitigation measures would be required to achieve BAT requirements in accordance with NRW guidance (H3 Guidance: Noise and Vibration Management: Environmental Permits (January 2022))¹⁸. Further mitigation is detailed in **Section 5.9** of this chapter.

Ecological Receptors

- 5.7.31 **Section 5.5.39 to 5.5.41** provides detail of appropriate guidance for bird nesting at the LWS adjacent to the Site western boundary. The predicted noise levels from the operational phase of the Proposed Development with embedded mitigation measures are provided in **Table 5.27**.

Table 5.27: Noise Predictions for Highest Likely Operational Noise at Ecological Sensitive NSR (daytime and night-time) with Initial Impact Avoidance/Reduction Measures

NSR Ecological Location	Operating Period	Predicted Noise Level Range L _{Aeq} [L _{Amax}] dB	Typical Ambient Noise Levels Av. L _{Aeq} & L _{AF,max} (Range ^{15min} L _{Aeq} & L _{AF,max}) dB	Exceedance of NE Guidance of L _{Aeq} +3dB	Exceedance of NE Guidance of 70dB L _{AF,max} dB
NSR13. LWS (W of Site)	Daytime	36-47 [37-55]	57 L _{Aeq} (53-59) 75 L _{AF,max} (58-77)	None	None
	Night-time	38-48 [39-56]	57 (55-59) 76 (74-79)	None	None
NSR14. LWS (E of Site)	Daytime	39-52 [40-60]	65 L _{Aeq} (64-68) 74 L _{AF,max} (69-86)	None	None
	Night-time	40-53 [41-61]	65 (64-67) 72 (70-82)	None	None

- 5.7.32 The above results at the LWS woodland area show no exceedance of the NE guidance thresholds and therefore the impact would be **negligible** and a **neutral** level of effect on ecological receptors at this NSR location.

Operational Phase Noise Effects - Road Traffic

Site Access Arrangements

- 5.7.33 Once constructed, the North Access Road (WCBC planning reference P/2022/1080) would be used as the main access to the existing Kronospan Facility and the operation phase of the Proposed Development. Once the North Access Road is constructed, the current access would no longer be used for the access and egress by HGVs except in exceptional circumstances. During the construction phase of the Proposed Development, the existing T-junction access off Holyhead Road (B5070) would be used.
- 5.7.34 It should be noted that for the purpose of robustness, the traffic assessments within the TS (**DNS4-005**) assume that no Proposed Development traffic would utilise the North Access Road.
- 5.7.35 Whilst the North Access Road would be used as the main access to the existing Kronospan Facility and to the Proposed Development Site, for robustness it is assumed that all traffic would route via the existing Kronospan Facility access – i.e. the T-junction with Holyhead Road (B5070) – to account for potential effects along the sections of the B5070 immediately north of the existing Kronospan Facility access.

Assessment

- 5.7.36 **Table 5.28** provide details of predicted highest likely impacts due to the increased traffic flow along the local road network during daytime and night-time operational 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 traffic movement.

Table 5.28: Predicted Change in Road Traffic Noise on Local Road Network due to Operational Phase

Road	Operating Period	'Do nothing' LA10 _{1hour} (dB)	'Do something' LA10 _{1hour} (dB)	Change (with development) LA10 _{1 hour} (dB)
Operating Period (Daytime 0700 – 23.00)				
B5070 Holyhead Road (N of Existing Site Access)	Weekday	66.7	66.7	0
	Saturday	65.6	65.7	+0.1
B5070 Holyhead Road (N of Old Black Park Road)	Weekday	66.5	66.6	+0.1
	Saturday	65.4	65.5	+0.1
Operating Period (Night-time 23.00 – 07.00)				
B5070 Holyhead Road (N of Existing Site Access)	Weekday	58.5	58.7	+0.2
	Saturday	56.8	57.1	+0.3
B5070 Holyhead Road (N of Old Black Park Road)	Weekday	58.5	58.7	+0.2
	Saturday	56.1	56.4	+0.3

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

- 5.7.37 Based on the traffic data and traffic routing assumptions set out in the TS (**DNS4-005**), the above results show an increase of +0.1dB LA₁₀ during daytime and up to +0.3dB LA₁₀ during night-time. According to the DMRB LA 111 impact methodology, the change in road traffic noise would be **negligible** and the level of effect **neutral** and therefore **not significant** (refer to **Table 5.13**).

Construction and Operational Phase Vibration Effects – Road Traffic

- 5.7.38 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 above 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 5K** for further information.
- 5.7.39 The vibration survey results would indicate that vibration levels from HGVs using the Site would be imperceptible at a distance of circa 3m from kerbside which would be a **negligible impact**, a **neutral** level of effect, and **not significant**. Any dwellings that are within 3m distance from kerbside HGVs may result in vibration levels just above perceptibility thresholds but below 1mm/sec and therefore a worst-case impact of **slight**, a **minor** 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 highly unlikely to occur.

Operational Phase Vibration Effects - Plant

- 5.7.40 In terms of plant operational vibration (refer to **Appendix 5K**) the results of ground-borne vibration measurements at similar plant operating in the UK show vibration levels at close range (i.e. within 5m distance) would produce between 0.04mm/sec to 0.1mm/sec which is below perceptible vibration levels. The impact according to the results of empirical vibration results (as shown in **Appendix 5K**) would be **negligible** and a **neutral** level of effect and **not significant**.

5.8 Inter-Relationship of Potential Effects

- 5.8.1 The impacts on ecologically sensitive locations (i.e. LWS Canal Wood (R13 and R14)) are provided in **Sections 5.7.7 - 5.7.9, 5.7.30 - 5.7.31** and **Table 5.24** and **Table 5.27**. Impacts on recreational receptors [i.e. Canal and Marina (R12)] are also provided in **Section 5.7** above and **Tables 5.23, 5.25 and 5.26**. The results show **no significant effects**.
- 5.8.2 The impact of noise on the historic environment is considered in **ES Chapter 8.0 (Historic Environment)**.

5.9 Further Mitigation and Monitoring

- 5.9.1 The initial mitigation measures described in **Section 5.6** adequately address the needs to avoid, reduce and compensate for any significant effects of the Proposed Development. However, to comply with the relevant standards and guidance for noise, further operational noise mitigation would be required and are detailed below.
- Boiler Room, Turbine Hall, Bagging Plant, Pre-crushers buildings and ID Fan acoustic enclosure constructed from double skin acoustic cladding (Rw = 32dB). Note that **Section 5.6** (initial mitigation) previously set the acoustic cladding to Rw 22dB.
 - NOx, Storage and Service Room constructed from double skin acoustic cladding (Rw = 28dB). Note that **Section 5.6** (initial mitigation) previously set the acoustic cladding to Rw 22dB.

- Pre-crusher plant fitted inside an enclosure fitted with acoustic cladding to Rw 35dB and insulated roller shutter doors fitted to openings. Note that **Section 5.6** (initial mitigation) previously set the acoustic cladding to Rw 32dB.
- Ducting from ACC to Turbine, Turbine ducting and NOx ducting (external to buildings or enclosures) to be acoustically clad with insulation and solid outer skin.
- Sound power levels of plant as detailed in **Appendix 5G**.

5.9.2 There are several different ways in which the criteria can be achieved, for example, the use of noise control at source and/or the selection of different plant equipment, which may be quieter, can be investigated. The selected method(s) of mitigation should be appropriate to meet the noise criteria and the application of BAT. The aforementioned measures are just one combination that would be effective in achieving the requisite noise levels during the daytime and night-time periods.

5.10 Summary of Potential Residual Effects

Construction Phase Noise Effects

5.10.1 During the construction period there would be a variety of noise sources in use at different stages, and their associated activities would vary from day to day. The results show that the highest noise levels are likely to be during site preparation, infrastructure works (e.g. concreting) and during the building construction/plant installation. The peak noise activities do not normally occur over long periods of time and BPM would be employed to control the noise being generated. It is concluded that the increase in ambient noise levels due to construction noise with the implementation of mitigation measures (using BPM), is likely to result in an impact magnitude classification of **negligible to slight** at residential NSR and a **neutral to minor** level of effect. At recreational and ecological NSR, the application of BPM would result in an impact magnitude of **negligible to slight** and a **neutral to minor** level of effect, which is **not significant**.

Construction and Operational Phase Noise Effects – Road Traffic

5.10.2 The assessment of impact on existing residential areas from any increase in road traffic noise during the daytime construction or (daytime and night-time) operational

stage of the Proposed Development shows no significant change in noise levels. The impact during the construction or operational phase would be **negligible** and a **neutral** level of effect. This is **not significant**.

Construction and Operational Phase Vibration Effects - Plant

- 5.10.3 In terms of vibration during the construction or operational period, there would be a **negligible** impact and **neutral** significance at the nearest residential receptor and well within guidance limits for nuisance and cosmetic damage. At ecological and recreational NSR the highest impact would also be **negligible** and a **neutral** effect with proposed mitigation, and **not significant**.

Construction and Operational Phase Vibration Effects – Road Traffic

- 5.10.4 In respect of HGV vibration along the local road network, there is no mitigation available as, in general, this forms an inherent characteristic of the movement of HGV vehicles and is dependent on the condition of the local road surface, which is the responsibility of local authorities, councils and National Highways. Based on vehicles travelling relatively close to residential receptors and a 'worst case' road condition scenario, the impact would be a **slight** resulting in a **minor** level of effect and **not significant**.

Operational Phase Noise Effects - Plant

- 5.10.5 The following analysis considers the residual effect of the further mitigation measures on the predicted operational (plant) noise levels. **Table 5.29** below provides information on the predicted noise levels during daytime operations (07.00 to 23.00).

Daytime Operations

- 5.10.6 **Table 5.29** below provides information on the predicted noise levels during daytime operations with further mitigation measures (in accordance with BS4142: 2014+A1:2019 07.00 to 23.00 hours).



Table 5.29: Predicted Noise Contribution from Proposed Development during Daytime (0700 to 2300 hours) with Further Mitigation Measures

Receptor Position (Refer to Figure 5.1)	Time Period (0700-2300 hours)	Predicted Rating ¹ Noise Level from Site LAeq _{1hr} dB (1.5m height & 4m height above ground)	Assessment Contextual Baseline Sound Level LA90 _{1hr} dB [Estimated Baseline with no Kronospan]	Rating ¹ compared to Contextual Baseline Sound LAeq _{1hr} dB	Rating ¹ compared to Baseline Sound excluding Kronospan LAeq _{1hr} dB
R1. Linden Avenue (NE of Site)	Daytime	28 ¹ (1.5m) 30 ¹ (4m)	36 ² [36 ²]	-8 -6	-8 -6
R2. Wern / Offa & Bryn Hyfryd (NE of Site)	Daytime	28-33 ¹ 31-36 ¹	52 ³ [49 ³]	-19 -16	-16 -13
P3. West View / Holyhead Road (E of Site)	Daytime	33 ¹ 37 ¹	53 ⁴ [49 ³]	-20 -16	-16 -12
P4. Maes-y-Waun (SE of Site)	Daytime	32 ¹ 36 ¹	49 ³ [52 ³]	-17 -20	-20 -16
P5. Shepherds Lane / Hadley Close (SE of Site)	Daytime	25 ¹ 28 ¹	41 ² [41 ²]	-16 -13	-16 -13
P6. Station Avenue (S of Site)	Daytime	29 ¹ 31 ¹	45 ² [45 ²]	-16 -14	-16 -14
P8. Llwyn-y-cil Road (SSW of Site)	Daytime	27-32 ¹ 29-34 ¹	45 ³ [40 ³]	-13 -11	-8 -6
P9. New Hall Farm (NW of Site)	Daytime	26 ¹ 29 ¹	41 ³ [38 ³]	-15 -12	-12 -9
P10. Afon Bradley Farm (N of Site)	Daytime	29 ¹ 31 ¹	43 ⁵ [43 ⁵]	-14 -12	-14 -12
P11. Lodge Farm Cottage off Old Black Park Road (NE of Site)	Daytime	27 ¹ 30 ¹	51 ⁵ [49 ³]	-24 -21	-22 -19
R12: Chirk Marina (Canal Towpath)	Daytime	31 ¹ (35-39)	43 ⁶ [43 ⁶]	-12 -8 to -4	-12 -8 to -4

Note 1: Noise characteristics at receptor locations do not include a penalty due to the application of further mitigation measures.

Note 2: Based on baseline survey undertaken by NVC in July 2021.

Note 3: Based on baseline surveys undertaken by Spectrum during 2024.

Note 4: Based on baseline survey undertaken by NVC in 2016.

Note 5: Based on baseline survey undertaken by NVC in 2022.

Note 6: Based on baseline survey results at Afon Bradley Farm undertaken by NVC in 2022.

Column 5 is calculated by the subtraction of column 4 from column 3.

Column 6 is calculated by the subtraction of column 4[] from column 3.

5.10.7 The fifth and sixth column in **Table 5.29** shows the difference between the predicted rating noise level and the contextual background sound level and the estimated background sound level at the receptor positions. The rating level is therefore in accordance with the methodology found within BS 4142: 2014+A1:2019, which is the most relevant applicable noise assessment guidance.

- 5.10.8 According to BS4142: 2014+A1:2019, the rating level relative to the assessment contextual background sound level or estimated background without the Kronospan site noise would indicate **negligible** impact magnitude at residential receptors, which would be **neutral** level of effect. At the marina and towpath near the marina, the impact would be **negligible** (**neutral** level of effect). This is **not significant**.

Night-time Operations

- 5.10.9 **Table 5.30** below provides information on the predicted noise levels with further mitigation measures during night-time (i.e. 23.00 to 07.00 hours according to BS4142: 2014+A1:2019).

Table 5.30: Predicted Noise Contribution from the Proposed Development during Night-time (2300 to 0700 hours) with Further Mitigation Measures

Receptor Position (Refer to Figure 5.1)	Time Period (2300-0700 hours)	Predicted Rating ¹ Noise Level from Site L _{Aeq1hr} dB	Assessment Contextual Baseline Sound Level L _{A901hr} dB [Estimated Baseline with no Kronospan]	Rating ¹ compared to Contextual Baseline Sound L _{Aeq1hr} dB	Rating ¹ compared to Baseline Sound with no Kronospan L _{Aeq1hr} dB
R1. Linden Avenue (NE of Site)	Night-time	30 ¹	34 ² [34 ²]	-3	-3
R2. Wern / Offa & Bryn Hyfryd (NE of Site)	Night-time	31-35 ¹ 36 ¹	46 ³ [36 ³]	-15 to -11 -10	-5 to -1 0
P3. West View / Holyhead Road (E of Site)	Night-time	37 ¹	45 ⁴ [37 ³]	-8	0
P4. Maes-y-Waun (SE of Site)	Night-time	36 ¹	45 ³ [37 ³]	-9	-1
P5. Shepherds Lane / Hadley Close (SE of Site)	Night-time	28 ¹	39 ² [39 ²]	-11	-11
P6. Station Avenue (S of Site)	Night-time	31 ¹	45 ² [45 ²]	-14	-14
P8. Llwyn-y-cil Road (SSW of Site)	Night-time	29-34 ¹	44 ³ [37 ³]	-15 to -10	-7 to -2
P9. New Hall Farm (NW of Site)	Night-time	29 ¹	41 ³ [36 ³]	-12	-7
P10. Afon Bradley Farm (N of Site)	Night-time	31 ¹	43 ⁵ [37 ³]	-12	-6
P11. Lodge Farm Cottage off Old Black Park Road (NE of Site)	Night-time	30 ¹	42 ⁵ [36 ³]	-12	-6
R12: Chirk Marina (Canal Towpath)	Night-time	31 ¹ 35-39 ¹	43 ⁶ [37 ⁶]	-12 -8 to -4	-6 -2 to +2

Note 1: Noise characteristics at receptor locations do not include a character penalty due to application of further mitigation measures.

Note 2: Based on baseline survey undertaken by NVC in July 2021.

Note 3: Based on baseline surveys undertaken by Spectrum during 2024.

Note 4: Based on baseline survey undertaken by NVC in 2016.

Note 5: Based on baseline survey undertaken by NVC in 2022.

Note 6: Based on baseline survey results at Afon Bradley Farm undertaken by NVC in 2022.

Column 5 is calculated by the subtraction of column 4 from column 3.

Column 6 is calculated by the subtraction of column 4[] from column 3.

5.10.10 According to BS4142: 2014+A1:2019, the rating level relative to the assessment contextual background sound level or estimated background without the Kronospan site noise would indicate **negligible** impact magnitude at receptors, which would be **neutral** level of effect. Whilst this is **not significant**, further mitigation measures are designed to achieve BAT requirements in accordance with NRW guidance (H3 Guidance: Noise and Vibration Management: Environmental Permits (January 2022))¹⁸.

5.10.11 The impact at the canal towpath local to the marina indicates +2dB above representative background which is a **slight impact** and **minor** effect and **not significant**.

Calculation Methodology

5.10.12 The calculations provided for the operational site noise are based on ISO9613-2:1996 version of the standard as this has been used historically with all previous noise impact assessments and proven to be accurate and representative of the noise levels from the existing Kronospan Facility over the years. The author of this ES chapter is aware of the standard being updated in 2024, which should produce similar results, but for consistency the previous methodology has been referred to.

Ecological Receptors

5.10.13 In terms of the LWS adjacent to the Site's western boundary, the predicted noise levels from the operational phase of the Proposed Development with further mitigation measures are provided in **Table 5.31**.

Table 5.31: Noise Predictions for Highest Likely Operational Noise at Ecological Sensitive NSR (daytime and night-time) with Further Mitigation Measures

NSR Ecological Location	Operating Period	Predicted Noise Level Range L _{Aeq} [L _{Amax}] dB	Typical Ambient Noise Levels Av. L _{Aeq} & L _{AF,max} (Range 15min L _{Aeq} & L _{AF,max}) dB	Exceedance of NE Guidance of L _{Aeq} +3dB	Exceedance of NE Guidance of 70dB L _{AF,max} dB
R13. LWS (W of Site)	Daytime	37-41 [38-49]	57 L _{Aeq} (53-59) 75 L _{AF,max} (58-77)	None	None
	Night-time	38-43 [39-51]	57 (55-59) 76 (74-79)	None	None
R14. LWS (E of Site)	Daytime	36-45 [37-53]	65 L _{Aeq} (64-68) 74 L _{AF,max} (69-86)	None	None
	Night-time	36-48 [37-56]	65 (64-67) 72 (70-82)	None	None

5.10.14 The above results at the LWS woodland area show no exceedance of the NE guidance thresholds and therefore the impact would be **negligible** and a **neutral** level of effect and **not significant** relative to ecological receptors at these NSR locations.

5.11 Cumulative Effects

Overview

5.11.1 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 are under construction, projects that are approved but awaiting implementation, and projects awaiting determination within the planning process with design information in the public domain. 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.

5.11.2 The method for identifying other projects and activities is provided within **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. The cumulative effects Study Area and the locations of the other projects and activities are illustrated on **Figure 2.1** and **Figure 2.2** respectively.

5.11.3 An assessment of noise contribution from the existing operational noise at Kronospan at NSR has been assessed by Spectrum for the Environmental Permit.

Appendix 5E provides the results of predicted noise levels, which is detailed in **Table 5.32** below together with the Proposed Development noise contribution to show the cumulative impact relative to noise from the existing Kronospan Facility.

Table 5.32: Cumulative Effect of Existing Kronospan Site Noise and Proposed Development Noise at NSR with Further Mitigation Measures

Position	Predicted CHP Noise Level, $L_{Aeq,T}$ dB 1.5m & 4mH (daytime)	Predicted Existing Kronospan Noise Level $L_{Aeq,T}$ dB	Cumulative Noise Level $L_{Aeq,T}$ dB	Increase in Noise Level $L_{Aeq,T}$ dB
R1. Linden Avenue (NE of Site)	28-30 (day) 30 (night)	39-41 ¹ 41 ¹	39.5-41.3 41.3	+0.5 +0.3
R2. Wern / Offa & Bryn Hyfryd (NE of Site)	28-36 (day) 31-36 (night)	47-48 ¹ 48 ¹	47.1-48.1 49.3	+0.1 +0.3
P3: West View / Holyhead Road (E of Site)	33-37 (day) 37 (night)	53-54 ¹ 54 ¹	54.0 54.1	+0.1 +0.1
R4. Maes-y-Waun (SE of Site)	32-36 36	50-52 ¹ 52 ¹	51.1 52.1	+0.2 +0.1
R5. Shepherds Lane / Hadley Close (SE of Site)	25-28 28	41-44 ¹ 44 ¹	41.2 44.1	+0.2 +0.1
R6. Station Avenue (S of Site)	29-31 31	49-51 ¹ 50 ¹	49.1 50.1	+0.1 +0.1
R8. Llwyn-y-cil Road (SSW of Site)	27-32 29-34	47-49 ¹ 49 ¹	47.2 49.2	+0.1 +0.1
R9. New Hall Farm (NW of Site)	26-29 29	48-50 ¹ 50 ¹	48.1 50.1	+0.1 0
R10. Afon Bradley Farm (N of Site)	29-31 31	47-49 ¹ 49 ¹	47.1 49.1	+0.2 +0.1
R11. Lodge Farm Cottage off Old Black Park Road (NE of Site)	27-30 30	43-46 ¹ 46 ¹	43.2 46.1	+0.2 +0.1
R12: Chirk Marina R12: Canal Towpath	31 35-39	45 ¹ 45 ¹	45.3 47.5	+0.2 +1.0

¹ Predicted levels taken from Appendix 5D.

5.11.4 In relation to the IEMA guidelines and with reference to **Table 5.12**, the magnitude of the impact during daytime and night-time periods (final column of table) shows that the change in noise level ranges between +0.1dB and +0.5dB L_{Aeq} which indicates **negligible impact**. The predicted level of effect would therefore be **neutral** at NSR and **not significant** in relation to this guidance. The noise levels along the canal towpath are shown to be up to +1dB L_{Aeq} which is also **not significant**.

Cumulative Effect (Operational Noise) of Proposed Development and Other Kronospan Development

- 5.11.5 The other developments in the cumulative assessment (see **Table 2.4** of **ES Chapter 2.0 (EIA Methodology)**) include:
- ID Ref 1.1 - P/2017/0699 – Kronospan Log Delivery System and Chipping and Flaking System.
 - ID Ref 1.2 - APP/H6955/A/19/3227571 – Kronospan Oriented Strand Board (OSB) Facility.
 - ID Ref 1.3 - P/2022/0336 – Kronospan Covered Loading Yard.
 - ID Ref 1.4 - P/2022/0615 – Kronospan Engineering Stores.
 - ID Ref 1.5 - P/2022/0765 - Kronospan Silos and Extension to Chip Preparation Building.
 - ID Ref 1.6 - P/2022/1080 – Kronospan North Access Road and Lorry Park.
 - ID Ref 1.9 – Kronospan indicative cable route between proposed 132kV substation and existing Legacy/Oswestry overhead line.
- 5.11.6 Development projects ID Ref. 1.7, 1.8, 2.1, 2.2 and 2.3 are not included as they are at greater distance than the receptor locations chosen for the assessment and would therefore be subject to a lower impact.
- 5.11.7 In terms of cumulative impacts in respect of noise, ID Ref.1.7 and ID Ref 1.8 relate to housing development and therefore do not specifically generate noise other than traffic on the local road network. ID Ref 2.1 and ID Ref 2.3 are also residential development at circa 1.7km to 1.9km distance from the Proposed Development and ID Ref. 2.2 is a solar farm at circa 1.3km from the Proposed Development; they would produce noise levels which would be negligible. Any impacts from road traffic would only add to the baseline flows on to local roads therefore reducing any impact from the Proposed Development. Therefore, cumulative effect from these sites (ID Ref 1.7, 1.8, 2.1, 2.2, and 2.3) would be **negligible** and a **neutral** level of effect and **not significant**.
- 5.11.8 Based on previous noise assessments undertaken by the author of this assessment, the noise contribution from the operation of the other Kronospan developments detailed above (excluding ID Ref 1.9) is provided in **Table 5.33** and **Table 5.34**.

Table 5.33: Predicted Noise Contribution from Other Kronospan Developments

Receptor Position (Refer to Figure 5.1)	Time Period	Predicted Noise Contribution from Proposed Development (with further mitigation) $L_{Aeq,T}$ dB	Cumulative noise level from all consented, appealed or awaiting decision Plant $L_{Aeq,T}$ dB	Total Noise ¹ Level (cumulative projects & Proposed Development) $L_{Aeq,T}$ dB	Increase In Noise Level ² $L_{Aeq,T}$ dB
R1: Linden Avenue (NE of Site)	Daytime Night-time	28-30 (day) 30 (night)	36 36	37 37	+1 +1
R2: Wern / Offa & Bryn Hyfryd (NE of Site)	Daytime Night-time	28-36 (day) 31-36 (night)	38-44 36-42	45 43	+1 +1
R3: West View / Holyhead Road (E of Site)	Daytime Night-time	33-37 (day) 37 (night)	36-43 37-40	44 42	+1 +2
R4: Maes-y-Waun (SE of Site)	Daytime Night-time	32-36 36	36-37 37	37-39 39	+2 +2
R5: Shepherds Lane / Hadley Close (SE of Site)	Daytime Night-time	25-28 28	31-32 31	33 33	+1 +2
R6: Station Avenue (S of Site)	Daytime Night-time	29-31 31	29-31 30	32-34 34	+3 +3
R8: Llwyn-y-cil Road (SSW of Site)	Daytime Night-time	27-34 29-34	37-40 37-39	37-41 38-40	+1 +1
R9: New Hall Farm (NW of Site)	Daytime Night-time	26-29 29	34-35 34	35-36 35	+1 +1
R10: Afon Bradley Farm (N of Site)	Daytime Night-time	29-31 31	43-44 44	43-44 44	0 0
R11: Lodge Farm off Old Black Park Road (NE of Site)	Daytime Night-time	27-30 30	41-43 42	41-43 42	0 0
R12: Chirk Marina (Canal Towpath)	Daytime Night-time	31 (35-39) 31 (35-39)	38 (39-51) 36 (40-48)	39 37	+1 +1
R13: LWS (W of Site)	Daytime Night-time	37-41 38-43	49-50 49	49-51 50	+1 +1
R14: LWS (E of Site)	Daytime Night-time	36-45 36-48	52-54 51-53	52-55 51-54	+1 +1

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

Note 2: Column 6 calculated by subtracting column 4 from column 5.

5.11.9 **Table 5.33** shows that at the residential NSR, the cumulative increase in L_{Aeq} predicted levels because of the Proposed Development and other Kronospan developments vary between 0dB and +3dB. This would result in a **negligible to**

slight impact and **neutral to minor** level of effect and **not significant** as indicated in **Table 5.12**. The increase at the ecological NSR at the Canal Wood LWS shows a maximum cumulative increase of +1dB which is **not significant**.

5.11.10 The effect of the operation of other projects or activities is assessed against the baseline levels in **Table 5.34**.

Table 5.34: Predicted Noise Contribution from Proposed Development and Cumulative Development (with further mitigation measures)

Receptor Position (Refer to Figure 5.1)	Time Period	Predicted Rating Total Site Noise Level from LAeq _{1hr} dB	Assessment Contextual Baseline Sound Level LA90,T dB [Estimated Baseline LA90,T excluding Kronospan]	Rating compared to Baseline Sound LAeq _{1hr} dB	Noise Change ¹ LAeq dB
R1: Linden Avenue (NE of Site)	Daytime	37	36 [36]	+1 [+1]	+0.5
	Night-time	37	34 [34]	+3 [+3]	+1.5
R2: Wern / Offa & Bryn Hyfryd (NE of Site)	Daytime	45	52 [49]	-7 [-4]	+0.1
	Night-time	43	46 [36]	-3 [+7]	+0.4
R3: West View / Holyhead Road (E of Site)	Daytime	44	53 [49]	-9 [-5]	+0.1
	Night-time	42	45 [37]	-3 [+5]	+1.5
R4: Maes-y-Waun (SE of Site)	Daytime	37-39	49 [52]	-10 [-13]	+0.1
	Night-time	39	45 [37]	-6 [+2]	+0.3
R5: Shepherds Lane / Hadley Close (SE of Site)	Daytime	33	41 [41]	-8 [-8]	+0.2
	Night-time	33	39 [39]	-6 [-6]	+0.2
R6: Station Avenue (S of Site)	Daytime	32-34	45 [45]	-13 [-11]	+0.1
	Night-time	34	45 [45]	-11 [-11]	+0.2
R8: Llwyn-y-cil Road (SSW of Site)	Daytime	37-41	45 [40]	-8 [+1]	+0.3
	Night-time	38-40	44 [37]	-6 [+3]	+0.8
R9: New Hall Farm (NW of Site)	Daytime	35-36	41 [38]	-5 [-2]	+0.2
	Night-time	36	41 [36]	-5 [0]	+0.4
R10: Afon Bradley Farm (N of Site)	Daytime	43-44	43 [43]	+1 [+1]	+0.8
	Night-time	44	43 [37]	+1 [+7]	+1.2
R11: Lodge Farm off Old Black Park Road (NE of Site)	Daytime	41-43	51 [49]	-8 [-6]	+0.1
	Night-time	42	42 [36]	0 [+6]	+0.2
R12: Chirk Marina	Daytime	39	43 [43]	-4	+0.2
	Night-time	37	43 [43]	-6	+0.2
R13: LWS (W of Site)	Daytime	49-51	57	-8 to -6	+0.6 to +1
	Night-time	50	57	-7	+0.8
R14: LWS (E of Site)	Daytime	52-55	65	-13 to -10	+0.2 to +0.4
	Night-time	51-54	65	-14 to -11	+0.2 to +0.3

¹ Increase based on LAeq levels from Tables 5.19 and 5.20 logarithmically added to column 3 minus the LAeq levels from Tables 5.19 and 5.20 to establish the effect. ² LA90 levels from Spectrum woodland survey Appendix 5F) on western side.

- 5.11.11 The overall assessment including the cumulative effect of the Proposed Development and the other Kronospan developments shows a **negligible to slight** impact magnitude and **neutral to minor** effect at all receptors based on a contextual background sound level assessment.
- 5.11.12 Based on an estimated baseline L_{A90} level without the influence of the Kronospan Site, the cumulative impact magnitude varies between **negligible to moderate** and **neutral to moderate** level of effect in respect of site noise contribution relative to representative background (as indicated in **Table 5.11**) and in terms of increase in ambient L_{Aeq} baseline levels the analysis shows a **negligible to slight impact** (as indicated in **Table 5.12**) and a **neutral to minor** level of effect.
- 5.11.13 After taking into consideration the fact that the Proposed Development would be no higher than the contextual or estimated background sound level (i.e. with or without the Kronospan Site in operation as shown in **Table 5.29** and **Table 5.30**) and a BAT approach has been taken to the mitigation measures, the overall cumulative impact would be **negligible** and a **neutral effect** and **not significant**.

5.12 Enhancement Measures

- 5.12.1 No enhancement measures are necessary.

5.13 Conclusions

- 5.13.1 In summary, no significant noise effects have been identified by the noise assessment in relation to construction or operation of the Proposed Development noise or plant vibration. **Table 5.35** below summarises the predicted effects of the construction, and operational phases of the Proposed Development.

Table 5.35: Residual Effects after Further Mitigation Measures

Source	Nature of Effect	Time Period	Impact Magnitude	Level of Significance
Construction noise	Temporary	Daytime	Negligible to Slight	Neutral to Minor
Road traffic noise (construction)	Temporary	Daytime	Negligible	Neutral
Road traffic noise (operation)	Permanent	Daytime Night-time	Negligible Negligible	Neutral Neutral
Industrial noise (Site operation)	Permanent	Daytime Night-time	Negligible Negligible to Slight ¹	Neutral Neutral to Minor ¹
Construction vibration (plant)	Temporary	Daytime	Negligible	Neutral

Source	Nature of Effect	Time Period	Impact Magnitude	Level of Significance
Operational vibration (plant)	Permanent	Daytime Night-time	Negligible Negligible	Neutral Neutral
Construction vibration (road traffic)	Temporary	Daytime	Slight	Minor
Operational vibration (road traffic)	Permanent	Daytime Night-time	Slight Slight	Minor Minor
Cumulative Operational Noise ²	Permanent	Daytime Night-time	Negligible to Slight Negligible to Slight	Neutral to Minor Neutral to Minor

¹ Slight impact and Minor effect **only relate to the canal towpath areas** all other receptors are negligible impact and neutral effect.

² Impact and Effect based on contextual background sound levels

- 5.13.2 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.
- 5.13.3 To establish any likely impact from noise, an assessment of baseline sound levels has been considered by undertaking fixed position noise monitoring at NSR areas around the Site, over a weekday and weekend periods. The monitoring has enabled contextual background and ambient sound levels to be determined (i.e. which includes existing noise from the Kronospan Site) and to enable an estimate of background sound levels without the Kronospan Site in operation.
- 5.13.4 The noise assessment has benefited from pre-application discussions with WCBC and PEDW and responses provided in the EIA Scoping Direction (and Addendum) to enable agreement to be made on the approach to assessment methodology and noise criteria.
- 5.13.5 In accordance with appropriate standards, BPM would be employed to control the noise generation during the construction period. Measures may include restriction on operating hours, avoid un-necessary plant operation and revving of plant or vehicles and careful choice of piling rigs to minimise noise. Such measures are defined within the Framework CEMP (**DSN4-003**).

- 5.13.6 In relation to the operational phase, several further mitigation measures 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.
- 5.13.7 The assessment shows that there would be **no significant effects** during the construction or operational phases of the Proposed Development following the implementation of appropriate mitigation.

Appendix 5A – Basic Acoustic Terminology



Response	Percentage
Yes	85%

**Appendix 5C – Spectrum Partial
Shutdowns (2024) Baseline Noise
Measurements**



Appendix 5D – Spectrum Noise Impact Assessment Report



Appendix 5E – Spectrum Noise Impact Assessment Report Addendum



Appendix 5F – Spectrum Woodland Baseline Survey Report



Appendix 5G – Operational Noise Levels



Appendix 5H – Construction Plant Inventory



Appendix 5I – Typical Construction Vibration Levels



Appendix 5K – Vibration Levels for HGVs and Operational Plant

