

Connah's Quay Low Carbon Power

Preliminary Environmental Information Report
Volume II, Chapter 9: Noise and Vibration

Uniper

The Planning Act 2008
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
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9. Noise and Vibration

9.1 Introduction

Overview

- 9.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents a preliminary assessment of the likely significant environmental effects of Connah's Quay Combined Cycle Gas Turbine (CCGT) with Carbon Capture Plant (CCP) (hereafter referred to as the Proposed Development) with respect to noise and vibration during the construction, operation (including maintenance), and decommissioning phases of the Proposed Development.
- 9.1.2 This chapter should be read in conjunction, and is supported by information presented within, the following Chapters (PEIR Volume II):
- **Chapter 10: Traffic and Transport;**
 - **Chapter 11 Terrestrial and Aquatic Ecology;**
 - **Chapter 17: Terrestrial Heritage;** and
 - **Chapter 21: Human Health.**
- 9.1.3 This chapter is supported by the following figures in PEIR Volume III:
- **Figure 9-1: Noise Sensitive Receptors and Sound Monitoring Locations;**
 - **Figure 9-2: Main Site and Construction Laydown Areas Noise Contours;** and
 - **Figure 9-3: Main Site Operational Sound Contours.**
- 9.1.4 This chapter is supported by the following appendices in PEIR Volume IV:
- **Appendix 2-B: Scoping Opinion Responses;**
 - **Appendix 7-A: Legislative, Policy and Guidance Framework for Technical Topics;**
 - **Appendix 9-A: Noise and Vibration Methodology;**
 - **Appendix 9-B: Baseline Sound Level Survey Information;**
 - **Appendix 9-C: Construction Noise Effects and Assumptions;** and
 - **Appendix 9-D: Operational Sound Information.**

Legislation, Policy and Guidance

- 9.1.5 Legislation, planning policy, and guidance relating to noise and vibration and pertinent to the Proposed Development are listed in **Table 9-1**. Further detail regarding these can be found in **Appendix 7-A: Legislative, Policy and Guidance Framework for Technical Topics (PEIR Volume IV)**.

Table 9-1: Legislation, Planning Policy, and Guidance Relating to Noise and Vibration

Type	Legislation, Policy and Guidance
Legislation	<ul style="list-style-type: none"> • Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (Ref 9-1). • Environmental Protection Act 1990 (Ref 9-2) • Control of Pollution Act 1974 (Ref 9-3) • Environmental Permitting (England and Wales) Regulations 2016 (as amended 2020) and Environmental Permitting Regulations 2023 (Ref 9-4)
National Planning Policy	<ul style="list-style-type: none"> • The Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 9-5); • The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (Ref 9-6); • The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref 9-7); • The NPS for Electricity Networks Infrastructure (EN-5) (Ref 9-8); • Noise and Soundscape Action Plan, 2018-2023 (Ref 9-9) • Planning Policy Wales (PPW) (Ref 9-10). • Technical Advice Note (TAN) 11: Noise (Ref 9-11)
Local Planning Policy	<ul style="list-style-type: none"> • Flintshire County Council (FCC) Local Development Plan (LDP) (2015-2030) (Ref 9-12).
National Guidance	<ul style="list-style-type: none"> • British Standard 7445-1:2003 and 7445-2:1991 (Ref 9-13) • British Standard 5228:2009-1+A1:2014 (Ref 9-14) • British Standard 5228:2009-2+A1:2014 (Ref 9-15) • British Standard 6472:2008 (Ref 9-17) • British Standard 7385:1993 (Ref 9-18) • British Standard 4142:2014+A1:2019 (Ref 9-19) • ISO 9613-2:1996: Attenuation of Sound during Propagation Outdoors (Ref 9-20) • Calculation of Road Traffic Noise (Ref 9-21) • Design Manual for Road and Bridges LA 111 (Revision 2) (Ref 9-22) • World Health Organization Guidelines (Ref 9-26) • The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (Ref 9-23)

9.2 Consultation and Scope of Assessment

Consultation

- 9.2.1 A request for an EIA Scoping Opinion was sought from the Secretary of State (SoS) through the Planning Inspectorate (PINS) in February 2024 as part of the EIA Scoping Process. The EIA Scoping Opinion was adopted on 20th March 2024 (**Appendix 1-B: Scoping Opinion PEIR Volume IV**).
- 9.2.2 Key issues raised in the Scoping Opinion are summarised and responded to in **Appendix 2-B: Matters Raised in the Scoping Opinion (PEIR Volume IV)**. All issues are being considered during the EIA process.
- 9.2.3 Engagement has been undertaken with a Pollution Control Officer at Flintshire County Council to agree that the location of monitoring proposed in the

scoping opinion was suitable. Details of this are provided in Section 9.4 and **Appendix 9-B: Baseline Sound Level Survey (PEIR Volume IV)**.

Scope of the Assessment

9.2.4 Following the scoping process that has been undertaken and the feedback received from the consultees, the scope of the assessment considered in this chapter of the PEIR is as follows:

- construction noise and vibration effects from the Proposed Development;
- operational sound effects from the Proposed Development; and
- decommissioning noise and vibration effects from the Proposed Development.

9.2.5 The following aspects have not been considered within the scope of the assessment in this chapter of the PEIR:

- Noise and vibration effects from the existing project elements - as presented in the scoping opinion (**Appendix 1-B: Connah's Quay Scoping Opinion (PEIR Volume IV)**) PINS is content that no works are required to the existing project elements and therefore there would be no construction impacts. PINS also state that noise and vibration emitted from the existing project elements should, however, form part of the baseline for the assessment; this approach has been adopted.
- Operational vibration from the proposed development – as presented in the scoping opinion (**Appendix 1-B: Connah's Quay Scoping Opinion (PEIR Volume IV)**) there are no significant vibration producing sources associated with the operation of the Proposed Development, as agreed by PINS.
- The Temporary Abnormal Indivisible Loads (AIL) Work Areas are excluded from the assessment for Noise and Vibration (refer to Section 5.5 of **Chapter 5: Construction Management and Programme**). The Temporary AIL Work Areas will be considered, as relevant, at the ES stage.

9.3 Assessment Methodology

Impact Assessment

9.3.1 **Chapter 2: Assessment Methodology and Consultation** sets out the overarching approach which has been used in developing the PEIR. This section describes the technical methods used to determine the baseline conditions, sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the preliminary noise and vibration assessment.

9.3.2 The methodologies used in this chapter to assess the magnitude of noise and vibration impacts are presented in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**. For ease of understanding how the effects of the Proposed Development have been identified the sensitivity of receptors and effect classifications have been outlined here.

Value/Sensitivity of Receptors

Effects are classified based on the magnitude of the impact (see **Appendix 9-A PEIR Volume IV**) for the various potential impacts during construction and

operation, and the sensitivity or value of the affected receptor. A scale of receptor sensitivity is presented in **Table 9-2**.

Table 9-2: Sensitivity / Value Criteria for Noise and Vibration Receptors

Sensitivity / Value	Description	Examples of receptor usage
Very High	Receptors where noise or vibration will significantly affect the function of a receptor.	<ul style="list-style-type: none"> • Auditoria/studios; • Specialist medical/teaching centres, or laboratories with highly sensitive equipment.
High	Receptors where people or operations are particularly susceptible to noise or vibration. Sensitive ecological receptors known to be vulnerable to the effects of noise or vibration.	<ul style="list-style-type: none"> • Residential; • Quiet outdoor areas used for recreation; • Conference facilities; • Schools/educational facilities in the daytime; • Hospitals/residential care homes; • Libraries.
Medium	Receptors moderately sensitive to noise or vibration where it may cause some distraction or disturbance	<ul style="list-style-type: none"> • Offices; • Restaurants/retail; • Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf).
Low	Receptors where distraction or disturbance of people from noise or vibration is minimal	<ul style="list-style-type: none"> • Residences and other buildings not occupied during working hours; • Factories and working environments with existing high noise levels; • Sports grounds when spectator or noise is a normal part of the event.

9.3.3 The following terminology has been used in this preliminary assessment to define noise and vibration effects; although the terminology is not applied to negligible effects:

- adverse – detrimental or negative effects to an environmental resource or receptor;
- neutral – effects to an environmental resource or receptor that are neither adverse nor beneficial; or
- beneficial – advantageous or positive effect to an environmental resource or receptor.

9.3.4 The effect resulting from each individual potential impact type above has been classified according to the magnitude of the impact and the sensitivity or value of the affected receptor using the matrix presented in **Table 9-3**, but where necessary also considering the context of the acoustic environment.

Table 9-3: Classification of Effects for Noise and Vibration

Sensitivity/ value of resource/ receptor	Magnitude of Impact			
	High	Medium	Low	Very Low
Very high	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

9.3.5 Where adverse or beneficial effects have been identified, these have been assessed against the following significance scale, derived using the matrix presented in **Table 9-3**:

- negligible – imperceptible effect of no significant consequence;
- minor – slight, very short or highly localised effect of no significant consequence;
- moderate – limited effect (by extent, duration or magnitude), which may be considered significant; or
- major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

9.3.6 For the purposes of this assessment, negligible and minor effects are considered to be not significant, whereas moderate and major effects are considered to be significant.

Rochdale Envelope

9.3.7 The setting of design parameters using the 'Rochdale Envelope' is described in **Chapter 2: Assessment Methodology and Consultation**. Table 4-1 of **Chapter 4: The Proposed Development** sets out the maximum parameters currently envisaged for the principal components of the Proposed Development. These parameters, together with assumptions regarding the future plans for the existing Connah's Quay Power Station set out in **Chapter 2: Assessment Methodology and Consultation** have been used to inform the representative worst-case scenario that has been assessed in this chapter, in order to provide a robust assessment of the impacts and likely significance of environmental effects of the Proposed Development at its current stage of design.

9.3.8 Focused use of the Rochdale Envelope has been adopted for the following aspects regarding the construction of the Proposed Development:

- construction activities have been assumed to take place throughout the Main Site and within the Construction Laydown Areas;
- construction activities within the Main Site and Construction Laydown Areas are modelled as area sources;
- construction away from the Main Site has been assumed to take place at the nearest part of the working area to noise sensitive receptors (NSRs); and

- predictions made for construction noise in the evening and night-time period for residential NSRs assume the same intensity of operation as during the daytime, as an intended worst-case.
- 9.3.9 Focused use of the Rochdale Envelope has been adopted for the following aspects regarding the operation of the Proposed Development:

- there are two potential indicative layouts of the Proposed Development with either a single or twin absorber per train as shown in **Figure 4-1: Indicative Site Layout-Single Absorbers** and **Figure 4-2: Indicative Site Layout – Twin Absorbers (PEIR Volume III)**. The twin absorber indicative layout has been assessed to be the worst-case so has been used in this chapter; and
- The modelled layout included two trains operating at the same time.

Assessment Assumptions and Limitations

Baseline Surveys

- 9.3.10 The baseline sound monitoring locations as shown in **Table 9-4** and **Appendix 9-B: Baseline Sound Level Survey (PEIR Volume IV)** are the same as set out in Chapter 7 of the Scoping Report (**Appendix 1-A: Connah's Quay Scoping Report (PEIR Volume IV)**) apart from:
- ST3 – a short-term measurement in place of LT7, on the basis that a secure place to leave the sound monitoring equipment could not be found;
 - LT2 – a long-term measurement placed in the garden area of receptor R21 instead of R22, due to access availability; and
 - Ecology 1 to 4 – replacing LT10 to provide additional baseline data for ecological assessment.
- 9.3.11 The acoustic effects of wind direction have not been taken into account when determining the representative values in **Table 9-4**, which will likely represent a worst-case assessment for the PEIR. Further analysis of the influence of wind direction on background sound levels will be undertaken to inform the ES.

Construction

- 9.3.12 Information on the expected construction programme and methods of working are based on the current understanding at this stage in the design of the Proposed Development. A detailed construction programme is not currently available as this is determined by the Principal Contractor which has not yet been appointed. Where construction details cannot be confirmed, reasonable worst-case estimates have been made based on experience gained on similar developments and using professional judgement. Further details on the construction of the Proposed Development are set out in **Chapter 5: Construction Management and Programme**.
- 9.3.13 At present, construction noise effects related to the Connection Corridors for CO₂ (which include the Proposed and Repurposed Corridors), cooling water and electricity are predicted on the assumption that construction activities may occur at the closest point along the Connection Corridor to each NSR (as a worst-case). Further refinement of the Connection Corridors has the potential

to increase the distance from the works to some NSRs. This will likely reduce the impact and associated adverse effects.

- 9.3.14 It has been assumed as a worst-case that all construction activities could occur 24/7, although the exact nature of the works is uncertain at this stage and this is unlikely in practice. The same intensity of working as for the daytime is assumed as a worst-case.
- 9.3.15 Details of the construction plant associated sound power levels (L_{WA}) and assumed percentage on-time for each construction plant item (i.e. how much of the working day each construction plant item will be used/operational) are presented in **Appendix 9-C: Construction Noise Effects and Assumptions (PEIR Volume IV)**.

Operation

- 9.3.16 A list of assumptions made during the noise modelling and operational assessment of the Proposed Development are detailed in the Modelling Assumptions sub-section of **Appendix 9-D: Operational Sound Information (PEIR Volume IV)**.
- 9.3.17 The operational noise model has assumed that the Proposed Development will operate continuously at full load, 24 hours a day to present a worst-case assessment. However this does not represent the predicted operation pattern of the Proposed Development as described in **Chapter 4: The Proposed Development**.
- 9.3.18 It has been assumed that potential operational sound of a tonal, impulsive or intermittent nature will be designed out of the Proposed Development during the detailed design phase by the selection of appropriate plant, building cladding, louvres and silencers/ attenuators as necessary. However, a +3 dB character correction for other distinctive sound has been included at NSRs where this potential exists above the *background sound level*.

Decommissioning

- 9.3.19 Detailed information regarding the decommissioning works is not available at this stage. The preliminary assessment has been undertaken based on typical site clearance activities and demolition plant on the Main Site.

9.4 Baseline Conditions and Study Area

Study Area

- 9.4.1 The study area was defined to include the spatial extent of identified noise and vibration sensitive receptors with the potential to be significantly affected by direct or indirect impacts that might arise from the Proposed Development, termed the Zone of Influence (ZOI). The potential ZOI is considered to be:
- construction noise: the construction noise assessment study area is typically 300 m (based on BS 5228-1 guidance (Ref 9-14)) from the Indicative Site Boundary (excluding Temporary AIL Work Areas), however the construction noise study area has been extended up to 1 km of the Main Site and a further 300m from the CO₂ Connection Corridors and

Construction and Indicative Enhancement Area (C&IEA) that extend beyond the 1 km study area of the Main Site;

- construction vibration: NSRs within 100 m (based on BS 5228-2 guidance (Ref 9-15) from the closest construction activity with the potential to generate vibration;
- construction traffic: based on the spatial extent of traffic links in the transport model (as discussed in **Chapter 10: Traffic and Transport**); and
- operational noise: NSRs with 1 km of the Main Site. This distance is based on professional judgement and AECOM's previous experience of CCGT and CCP projects and seeks to consider all potential impacts.

9.4.2 The representative receptors assessed within the study area are named as R1 to R33 and described in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)** and shown on **Figure 9-1: Noise Sensitive Receptor and Sound Monitoring Locations (PEIR Volume III)**. R33 is an additional receptor added since the Scoping Assessment to represent the residential properties on Bank Road in Connah's Quay.

Existing Baseline

9.4.3 A review of aerial imagery and observations during the site survey indicates that the dominant sources of sound in the area are existing infrastructure at and near the existing Connah's Quay Power Station (including National Grid), rail traffic and traffic on the local road network including the A548, B5129 and Chester Road.

9.4.4 The location of potential NSRs in proximity to the Proposed Development has been considered when assessing the effects associated with noise and vibration levels from the construction, operational and decommissioning phases of the Proposed Development.

9.4.5 NSRs include but are not limited to residential properties, education facilities, places of worship, health buildings/ care homes and libraries. The sensitivity of receptors is shown in **Table 9-2**.

9.4.6 The processed results from each sound survey position are provided in **Table 9-4**. The sound level metrics are described in **Appendix 9-A: Noise and Vibration Methodology**. The L_{Aeq} values presented combine all measurements taken in each time period (day 07:00 to 23:00/night 23:00-07:00). The L_{A90} values presented are those deemed to be 'representative' of *Background Sound Levels*, for use in the BS 4142 (**Ref 9-19**) assessment. Representative *Background Sound Levels* have been selected through consideration of the outcome of different methods of analysing the measured 15-minute measurement data. The acoustic effects of the wind direction have not been taken into account when determining the representative values in **Table 9-4**. Further analysis of the influence of wind direction on background sound levels will be undertaken to inform the ES.

9.4.7 Further details of the sound survey including observations, dates and durations of measurement, full data sets, data analysis and equipment details are available in **Appendix 9-B: Baseline Sound Level Survey (PEIR Volume IV)**.

Table 9-4: Baseline Sound Survey Results

Monitoring Location*	Representative of NSRs	Time Period	$L_{Aeq,T}$ dB	Highest L_{Amax} dB	$L_{A90,T}$ dB
LT1	R26, R27, R28, R29	Daytime	53	104	44
		Night-time	47	74	37
LT2	R19, R20, R21, R22, R23, R24, R25	Daytime	54	96	45
		Night-time	52	84	37
LT3	R17, R18	Daytime	49	91	39
		Night-time	52	84	36
LT4	R6, R7, R8, R9	Daytime	52	89	46
		Night-time	48	73	38
LT5	Connah's Quay Properties	Daytime	52	92	36
		Night-time	46	73	30
LT6	R33	Daytime	55	105	39
		Night-time	52	81	36
LT8	R30, R31	Daytime	57	89	45
		Night-time	54	87	35
LT9	R10, R11, R12, R13, R14, R15	Daytime	55	103	43
		Night-time	57	96	34
LT11	R4, R5, R16	Daytime	50	93	38
		Night-time	42	74	36
ST1	R1	Daytime	44	73	33
ST2	R2, R3	Daytime	44	57	40
ST3	Connah's Quay Properties, R32	Daytime	61	86	47
		Night-time	49	75	30
Ecological 1	Ecological receptors	Daytime	49	90	45
		Night-time	47	78	39
Ecological 2	Ecological receptors	Daytime	51	87	47
		Night-time	48	84	40
Ecological 3	Ecological receptors	Daytime	56	90	49
		Night-time	56	92	48
Ecological 4	Ecological receptors	Daytime	49	82	46
		Night-time	47	73	41

LT= Long term, ST= Short Term

Ecological 1 to 4 are not used in this chapter but are used to inform ecological assessments in Chapter 11 Terrestrial Ecology and Chapter 12 Marine Ecology.

Future Baseline

- 9.4.8 In the absence of the Proposed Development, future baseline sound levels at NSRs will depend largely on traffic flows on surrounding road networks, and the future operations at the existing power station, as described in Section 2 of **Chapter 2: Assessment Methodology and Consultation** and other industrial and commercial premises in the area.

9.5 Development Design and Embedded Mitigation

- 9.5.1 The Proposed Development has been designed, as far as possible, to avoid or minimise impacts and effects of noise and vibration through the process of design development, and by embedding measures into the design of the Proposed Development.

Construction

- 9.5.2 A Framework Construction Environmental Management Plan (CEMP) will be included as part of the DCO Application, which sets out the key measures to be employed during the construction of the Proposed Development, to control and minimise the impacts on the environment. The Framework CEMP will set out how impacts upon NSRs will be managed during construction. A Final CEMP(s) will be prepared by the construction Contractor(s) in accordance with the Framework CEMP prior to construction. The submission, approval, and implementation of the Final CEMP(s) will be secured by a Requirement of the DCO.
- 9.5.3 Construction activities will typically be undertaken during core construction working hours 07:00 to 19:00 Monday to Friday (except Bank Holidays) and 07:00 to 13:00 on Saturdays. However, it is likely that some construction activities may need to be undertaken outside of these core working hours. This is partly because certain construction activities cannot be stopped, such as concrete pouring, but also to manage the construction programme. Where on-site works are to be conducted outside the core hours, they would comply with any restrictions agreed with the local planning authority. This will be secured via a Requirement of the DCO.
- 9.5.4 Some works will need to take place outside of core working hours provided that they do not give rise to unacceptable noise impacts (this would be where they do not exceed construction noise thresholds) as described in **Appendix 9-C: Construction Noise Effects and Assumptions (PEIR Volume IV)**. Measures to mitigate noise and vibration will be implemented during the Proposed Development construction phase to minimise impacts at human and ecological receptors, particularly with respect to activities required outside of normal working hours. The construction noise models include 3 m acoustic barriers along the northern boundary of the Main Site and the C&IEA as shown on Figure 5.4. Mitigation (included in the Framework CEMP or Framework Construction Traffic Management Plan (CTMP) as relevant and henceforth in the final version of those documents) will include, but not be limited to:
- abiding by agreed construction noise thresholds at nearby NSRs;
 - avoidance of working in the more sensitive evening and night-times where practicable;

- making sure that processes are in place to minimise noise before works begin and that Best Practical Means (BPM) are being followed throughout the construction programme;
 - using modern plant, complying with the latest European noise emission requirements (Ref 9-24). Selection of inherently quiet plant where practicable;
 - hydraulic techniques for breaking to be used in preference to percussive techniques where practical;
 - use of rotary bored rather than driven piling techniques (if required), where possible;
 - off-site pre-fabrication where practical;
 - all plant and equipment being used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;
 - all contractors to be made familiar with current legislation and the guidance in BS 5228-1 and BS 5228-2 (Ref 9-14 and Ref 9-15);
 - loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials within the Proposed Development to be conducted in such a manner as to minimise noise generation;
 - where practicable, locating of the noisiest items of plant at the furthest distance from the nearby NSRs. Plant known to emit noise strongly in one direction will, where practicable, be orientated so that the noise is directed away from NSRs;
 - shutting down of machines such as cranes that may be in intermittent use between work periods or will be throttled down to a minimum. Machines will not be left running unnecessarily;
 - appropriate routing of construction traffic on public roads and along access tracks, to minimise construction traffic noise levels at NSRs, will be described in a CTMP (see **Chapter 10: Traffic and Transport**);
 - consultation with the local authority (FCC) and local NSRs to advise of potential noisy works that are due to take place; and
 - monitoring of noise complaints and reporting to the Principal Contractor for immediate investigation.
- 9.5.5 Method statements regarding construction management, traffic management and overall site management will be prepared prior to construction in accordance with best practice and relevant British Standards, to help minimise impacts of the construction works with reference to the measures outlined in the Final CEMP(s). One of the main aims of such method statements will be to minimise noise disruption to local NSRs during the construction phase.
- 9.5.6 Regular communication with the local community throughout the construction period will also serve to publicise the works schedule, giving notification to NSRs regarding periods when higher levels of noise may occur during specific operations, and providing lines of communication where complaints can be addressed. This will be included in the Final CEMP(s).

- 9.5.7 The appointed construction Contractor(s) would be encouraged to be a member of the 'Considerate Constructors Scheme' which is an initiative open to all contractors undertaking building work. This will be included in the Final CEMP(s).
- 9.5.8 To assist in the preparation of the Final CEMP(s), a further noise and vibration assessment will be undertaken as required, once the Principal Contractor is appointed, to identify specific mitigation measures for the Proposed Development (including construction traffic).

Operation

- 9.5.9 Details of the operational sound sources can be found in **Appendix 9-D: Operational Sound Information (PEIR Volume IV)**.
- 9.5.10 The control and monitoring of noise during operation will be controlled by the Environmental Permit.
- 9.5.11 The Proposed Development will require an Environmental Permit and will comply with this under the Environmental Permitting (England and Wales) Regulations 2016. This will require operational noise from the power station to be controlled using Best Available Techniques (BAT), which will be determined through the Environmental Permit application. The Applicant has also begun engagement with Natural Resources Wales and is preparing an application for an Environmental Permit.
- 9.5.12 The Proposed Development will be operated in line with appropriate standards, whilst the operator will implement and maintain an Environment Management System (EMS) which will be attested to International Standards Organisation (ISO) 14001 (Ref 9-16). The EMS will outline requirements and procedures required so that the Proposed Development is operating to the appropriate standard.
- 9.5.13 As part of ongoing discussions with the designers, a number of operational sound mitigation measures have been embedded within the design including increased sound insulation, enclosure of plant and acoustic lagging, although additional and/or alternative solutions may be identified as the design evolves.

Decommissioning

- 9.5.14 The decommissioning phase is effectively construction in reverse and therefore relevant embedded mitigation list under Construction will apply. This phase is anticipated to involve the removal of all above surface structures and ground remediation as required to facilitate future re-use.
- 9.5.15 Decommissioning activities would be conducted in accordance with the appropriate guidance and legislation for the closure of the Proposed Development. A Decommissioning Environmental Management Plan (DEMP) will be prepared at the time of decommissioning which would consider in detail all potential environmental risks on the Proposed Development and contain guidance on how risks can be removed or mitigated. This will include details of how noise and vibration should be managed on the Main Site during decommissioning and demolition.

9.6 Preliminary Assessment of Likely Impacts and Effects

- 9.6.1 Taking into account the embedded mitigation measures as detailed in Section 9.5 above, the potential impacts and effects of the Proposed Development have been assessed using the methodology as detailed in Section 9.3 of this chapter, **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)** and **Chapter 2: Assessment Methodology and Consultation (PEIR Volume II)**.

Construction Phase

Construction Noise Thresholds Definition

- 9.6.2 The construction noise assessment involves the calculation of noise emissions from the construction works based on the sound power levels associated with the plant or equipment to be used, and the propagation of noise from each noise source to the NSR locations. Sound power levels are taken from manufacturers data and/or archive data given in BS 5228-1 (Ref 9-14). The calculated levels are then compared to nominated criteria in BS 5228-1 (Ref 9-14) to determine whether an adverse impact is expected.
- 9.6.3 For residential NSRs, the 'ABC' method (detailed in BS 5228-1 Section E.3.2) sets construction noise thresholds for residential NSRs for different time periods (e.g. day, evening, night and weekends) based on the existing ambient noise levels. For the appropriate period (day, evening, night, weekend etc.), the existing ambient noise levels are determined (through noise measurements at NSRs). The measured noise levels are then rounded to the nearest 5 dB and used to derive the appropriate noise threshold value using the construction noise thresholds set out in Table 3 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**. The predicted construction noise levels are then compared with these construction noise threshold values to indicate whether a potentially significant effect is likely to occur at residential NSRs.
- 9.6.4 As stated in the BS 5228-1 ABC method and shown in Table 3 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**, there are different noise thresholds for weekday daytime and Saturday morning periods (classed as weekdays (07:00 to 19:00) and Saturday mornings (07:00 to 13:00)) than for evening and weekend periods (classed as 19:00 to 23:00 weekdays, Saturday afternoons (13:00– to 23:00) and Sundays (07:00 to 23:00)). BS 5228-1 Section 6.3(d) acknowledges this difference in receptor sensitivity at different times, stating "*Hours of work. For any NSP [noise sensitive premises], some periods of the day will be more sensitive than others. For example, levels of noise that would cause speech interference in an office during the day would cause no problem in the same office at night. For dwellings, times of site activity outside normal weekday and Saturday morning working hours will need special consideration.*" As such, the ABC method assigns evening and weekend periods a 10dB lower threshold than weekday daytime and Saturday morning periods.
- 9.6.5 The measured baseline ambient sound levels have been used to determine indicative BS 5228-1 'ABC' noise threshold categories as shown in **Table 9-5**

at each of the representative residential NSRs. Where baseline data is not available during the evening, weekend and night-time periods, limits have been assigned as category A.

Table 9-5: Measured Free-Field $L_{Aeq,T}$ Noise Levels and Associated 'ABC' Assessment Category - Residential Receptors

Measurement Location	NSR	Weekday daytime (07:00-19:00) and Saturday morning (07:00-13:00)		Weekday evening (19:00-23:00)		Weekend (Saturday 13:00-23:00 and Sunday 07:00-23:00)		Night (23:00-07:00)	
		L_{Aeq} dB	ABC	L_{Aeq} dB	ABC	L_{Aeq} dB	ABC	L_{Aeq} dB	ABC
LT1	R26, R27, R28, R29, R30	54	A	49	A	49	A	47	B
LT2	R19, R20, R21, R22, R23, R24, R25	56	A	51	A	52	A	52	C
LT3	R17, R18	50	A	46	A	49	A	52	C
LT4	R6, R7, R8, R9	53	A	52	A	51	A	48	C
LT5	Connah's Quay Properties	54	A	43	A	47	A	46	B
LT6	Connah's Quay Properties, R33	56	A	50	A	51	A	52	C
LT8	R30, R31	59	A	55	B	55	B	54	C
LT9	R10, R11, R12, R13, R14, R15	56	A	53	B	52	A	57	C
LT11	R4, R5, R16	50	A	42	A	51	A	42	A
ST1	R1	44	A	-	A	-	A	-	A
ST2	R2, R3	44	A	-	A	-	A	-	A
ST3	Connah's Quay Properties, R32	61	A	-	A	-	A	49	C

9.6.6 Construction noise thresholds have been derived for each NSR in **Table 9-6** based upon the assigned BS 5228-1 ABC category in **Table 9-5** (methodology described in **Appendix 9-A Noise and Vibration Methodology (PEIR Volume IV)**).

9.6.7 The non-residential NSRs (R27 and R32, both educational use) have been assigned construction thresholds for daytime and evening/weekend periods, as a worst-case scenario.

Table 9-6: Indicative Construction Noise Thresholds for Human Noise Sensitive Receptors

NSR	Weekday daytime 07:00 – 19:00, Saturday 07:00 – 13:00	Evenings 19:00 – 23:00	Night 23:00 – 07:00	Saturday 13:00 – 23:00 and Sunday 07:00- 23:00)
R26, R27*, R28, R29, R30	65	55	50	55
R19, R20, R21, R22, R23, R24, R25	65	55	55	55
R17, R18	65	55	55	55
R6, R7, R8, R9	65	55	55	55
R33	65	55	55	55
R30, R31	65	60	55	60
R10, R11, R12, R13, R14, R15	65	60	55	55
R4, R5, R16	65	55	45	55
R1	65	55	45	55
R2, R3	65	55	45	55
R32*	65	55	55	55

Construction Noise Impact Predictions

9.6.8 This section sets out the potential noise and vibration impacts on sensitive receptors arising during the construction of the Proposed Development. Construction noise impacts are assessed for:

- construction activities on the Main Site including the temporary Construction Laydown Areas;
- construction of the CO₂ Connection within the Proposed CO₂ Connection Corridor;
- construction of the CO₂ Connection within the Repurposed CO₂ Connection Corridor;
- construction of the Electrical Connection within the Proposed Electrical Connection Corridor; and
- construction of the Water Connection within the Proposed Water Connection Corridor.

9.6.9 Noise and vibration levels experienced by NSRs during such works depend upon several variables, the most significant of which are:

- the noise generated by plant or equipment used on site, generally expressed as sound power levels (Lw) or the vibration generated by the plant;
- the periods of use of the plant on site, known as its on-time;
- the distance between the noise/vibration source and the receptor;

- the noise attenuation due to ground absorption, air absorption and barrier effects; and
 - in some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings.
- 9.6.10 Construction activities may take place across the full area of the Proposed Development Site, including the Proposed and Repurposed Connections Corridors. Noise levels during construction have been predicted at a selection of representative NSRs located closest to the Proposed Development Site. Distances between the NSRs and the closest construction areas can be found in Table 1 of **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**.
- 9.6.11 The indicative construction programme and the construction working hours for the Proposed Development are set out in **Chapter 5: Construction Programme and Management**.
- 9.6.12 As exact construction activities are not confirmed at this stage, preliminary predicted noise levels for the construction programme and methods of working are based on the current understanding at this stage in the design of the Proposed Development. This gives an indication of where construction noise is at risk of leading to potentially significant effects. These levels will be reviewed and reassessed if required as information becomes available once the Principal Contractor has been appointed.
- 9.6.13 The construction noise predictions have been undertaken using noise data for plant and calculation methodologies from BS 5228-1 (Ref 9-14). The Main Site and C&IEA proposed single phase construction works follows the plant list provided in Table 1 and Table 2 in **Appendix 9-C Construction Noise Effects and Assumptions (PEIR Volume III)**, in combination with the areas shown in **Figure 5-4 (PEIR Volume III)**. The construction works have been subdivided into three activities: Site Enabling, Main Civils Works and Plant Installation. For the construction elements away from the Main Site it is assumed that all plant and activities take place at the closest point to each NSR along the Proposed and Repurposed CO₂, Water and Electrical Connection Corridors.
- 9.6.14 The predicted levels apply to normal weekday daytime (07:00 – 19:00) working, although they could equally apply to other time periods where working at the same rate and intensity is proposed. Details on the noise prediction methodology, including a full list of construction plant and associated sound power levels (L_w) for each construction activity, are presented in **Appendix 9-C Construction Noise Effects and Assumptions (PEIR Volume III)**.
- 9.6.15 A summary of preliminary noise predictions for construction works at the Main Site and the C&IEA is presented in **Table 9-7** and preliminary noise predictions at NSRs located along the Connection Corridors are presented in **Table 9-8**. Free-field noise levels have been predicted to allow subsequent comparison with the ABC categories derived from free-field baseline ambient noise levels at the residential NSRs.
- 9.6.16 As advised by BS 5228-1 (Ref 9-14), noise levels predicted at distances over 300 m (of which some NSRs for the Main Site are significantly greater than)

should be treated with caution due to the increasing importance of meteorological effects.

9.6.17 Indicative noise predictions have been based on the current proposed temporary construction laydown areas.

9.6.18 The daytime construction noise contours for Main Civils Works (presented in **Figure 9-2**) represent the predicted free-field construction noise levels at first floor level (4 m above ground) using a 10 m x 10 m colour grid. The contours are provided for illustrative purposes of the predominantly highest noise level construction activity assessed for the Main Site.

Table 9-7: Construction Noise Predictions for the Main Site and C&IEA

NSR **Predicted free-field noise level for daytime construction activity**

dB $L_{Aeq,12h}$

	Site Enabling	Main Civils Works	Plant Installation	
R5	N/A		46	N/A
R15	49		49	47
R19	60		61	59
R20	56		58	58
R21	60		63	63
R22	60		62	62
R23	62		65	65
R24	48		52	48
R31	62		61	59
R33	58		57	55

Note: NSRs beyond 300m of the construction works are only reported in this table if the predicted construction noise levels exceed the construction thresholds in Table 9-6. N/A is assigned where the NSR is beyond 300 m and the predicted construction noise level is below the construction threshold.

Table 9-8: Construction Noise Predictions for Connection Corridor Construction

NSR **Predicted free-field noise level for daytime construction activity**

dB $L_{Aeq,12h}$

	Proposed CO₂ Connection	Repurposed CO₂ Connection	Water Connection	Electrical Connection
R1	56	53	N/A	N/A
R2	68	59	N/A	N/A
R3	60	67	N/A	N/A

NSR Predicted free-field noise level for daytime construction activity

dB $L_{Aeq,12h}$

	Proposed CO ₂ Connection	Repurposed CO ₂ Connection	Water Connection	Electrical Connection
R4	51	74	N/A	N/A
R5	51	68	N/A	N/A
R6	N/A	64	N/A	N/A
R7	N/A	58	N/A	N/A
R8	N/A	56	N/A	N/A
R10	N/A	57	N/A	N/A
R11	N/A	61	N/A	N/A
R12	N/A	60	N/A	N/A
R13	N/A	61	N/A	N/A
R15	N/A	76	N/A	N/A
R16	47	59	N/A	N/A
R23	N/A	N/A	N/A	58
R24	N/A	N/A	N/A	60
R25	N/A	N/A	N/A	62
R26	N/A	N/A	N/A	60
R27	N/A	N/A	54	61
R28	N/A	N/A	55	62
R29	N/A	N/A	55	63
R30	N/A	N/A	54	62
R31	N/A	N/A	N/A	59
R32	N/A	N/A	N/A	58

Note: NSRs beyond 300m of the construction works are only reported in this table if the predicted construction noise levels exceed the construction thresholds in Table 9-6. N/A is assigned where the NSR is beyond 300 m and the predicted construction noise level is below the construction threshold.

Construction Noise Effects - Daytime

9.6.19 The effects of the predicted daytime construction noise levels for the Main Site and C&IEA (as presented in **Table 9-7**) and the Connection Corridors construction (as presented in **Table 9-8**) have been classified by considering the construction noise thresholds in **Table 9-6** and using the semantic scales

in **Table 9-3** and Table 4 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**. These effects are presented in Tables 4 and 5 in **Appendix 9-C: Construction Noise Effects and Assumptions (PEIR Volume IV)**.

- 9.6.20 For example, at Receptor R4, the predicted construction noise level in **Table 9-8** is 74 dB for the Repurposed CO₂ Connection corridor, which equals a high magnitude of impact (based upon Table 4 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**). This is due to a greater than 5 dB exceedance of the threshold in **Table 9-6**. A high magnitude of impact combined with a high sensitivity receptor (as shown in **Table 9-2**) equals a major adverse (**significant**) effect (based on the semantic scale in **Table 9-3**).
- 9.6.21 The preliminary construction noise effects are summarised in the following paragraphs. Construction noise effects at all receptors during construction works at the Main Site and C&IEA are predicted to be up to minor adverse (**not significant**) during the daytime period.
- 9.6.22 There is the potential for major adverse (**significant**) noise effects during daytime construction away from the Main Site at the following NSRs:
- at R4 and R15 for Repurposed CO₂ Connection construction.
- 9.6.23 There is the potential for moderate adverse (**significant**) noise effects during daytime away from the Main Site at the following NSRs:
- at R2 for construction of the Proposed CO₂ Connection; and
 - at R3 and R5 during Repurposed CO₂ Connection works.

Construction Noise Effects - Evenings and Weekends

- 9.6.24 It will be necessary for some construction activities to take place continuously, including evening and potentially weekend periods. It has been assumed as a worst-case that all activities could occur 24/7, although the exact nature of the works is uncertain at this stage and this is unlikely in practice. Construction noise thresholds for residential NSRs during evening and weekend periods have been defined in **Table 9-6**. The effects of the preliminary construction noise levels during evenings and weekends based on the activities occurring outside of core hours have been classified by considering the construction noise thresholds in **Table 9-6** and using the semantic scales in **Table 9-3** and Table 4 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**. These effects are presented in Tables 6 and 7 in **Appendix 9-C: Construction Noise Effects and Assumptions (PEIR Volume IV)**. The indicative construction noise effects are summarised in the following paragraphs.
- 9.6.25 There is the potential for major adverse (**significant**) noise effects during evening and weekend construction at the Main Site and C&IEA at the following NSRs:
- at R19, R21 R22 and R23 during Site Enabling works;
 - at R19, R21, R22 and R23 during Main Civils works; and
 - at R21, R22 and R23 during Plant Installation works.

9.6.26 There is the potential for moderate adverse (**significant**) noise effects during evening and weekend construction at the Main Site and C&IEA at the following NSRs:

- at R20, R31 and R33 during Site Enabling;
- at R20 R31 and R33 during Main Civils works; and
- at R19, R20 and R33 during Plant Installation works.

9.6.27 Otherwise, all construction effects of the Main Site and C&IEA are Negligible to Minor Adverse (Not Significant) during the evening and weekend periods.

9.6.28 There is the potential for major adverse (**significant**) noise effects during evening and weekend construction away from the Main Site at the following NSRs:

- at R2 and R3 during Proposed CO2 Connection works;
- at R3, R4, R5, R6, R11, R12, R13 and R15 during Repurposed CO₂ Connection works; and
- at R24, R25, R26, R27, R28, R29 and R30 during Electrical Connection works.

9.6.29 There is the potential for moderate adverse (**significant**) noise effects during evening and weekend construction away from the Main Site at the following NSRs:

- at R1 during Proposed CO2 Connection works;
- at R2, R7, R8, R10 and R16 during the Repurposed CO₂ Connection works; and
- at R23 and R32 for Electrical Connection construction.

9.6.30 Otherwise, all potential effects of construction away from the Main Site are negligible to minor adverse (**not significant**) during the evening and weekend.

Night-time

9.6.31 It will be necessary for some construction activities to take place continuously, including night-time period. For assessment purposes, the same intensity of working as for the daytime is assumed as a worst-case, although it is unlikely that piling would be required at night. Construction noise thresholds for residential NSRs during night-time periods have been defined in **Table 9-6**. The effects of the indicative construction noise levels during night-time period based on the activities occurring outside of core hours have been classified by considering the construction noise thresholds in Table 9-6 and using the semantic scales in **Table 9-3** and Table 4 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**. These effects are presented in Tables 8 and 9 in **Appendix 9-C: Construction Noise Effects and Assumptions (PEIR Volume IV)**. The preliminary construction noise effects are summarised in the following paragraphs. R27 and R32 are educational so not in use during the night and therefore not assessed.

9.6.32 There is the potential for major adverse (**significant**) noise effects during night-time Main Site and C&IEA construction at the following NSRs:

- at R19, R21, R22, R23 and R31 during Site Enabling;

- at R19, R21, R22, R23 and R31 during Main Civils works; and
 - at R21, R22, and R23 during Plant Installation works.
- 9.6.33 There is the potential for moderate adverse (**significant**) noise effects during night-time Main Site construction at the following NSRs:
- at R20 and R33 during Site Enabling works;
 - at R5, R20 and R33 during Main Civils works; and
 - at R19, R20, R31 and R33 during Plant Installation works.
- 9.6.34 Otherwise, all Main Site construction effects are negligible to minor adverse (**not significant**) during the night.
- 9.6.35 There is the potential for major adverse (**significant**) noise effects during night-time construction of the Connection Corridors at the following NSRs:
- at R1, R2, R3, R4 and R5 during the Proposed CO₂ Connection works;
 - at R1, R2, R3, R4, R5, R6, R11, R12, R13 R15 and R16 during the Repurposed CO₂ Connection works;
 - at R28 and R29 for Water Connection construction; and
 - at R24, R25, R26, R27, R28, R29 and R30 during Electrical Connection works.
- 9.6.36 There is the potential for moderate adverse (**significant**) noise effects during night-time construction of the Connection Corridors at the following NSRs:
- at R16 during the Proposed CO₂ Connection works;
 - at R7, R8 and R10 during the Repurposed CO₂ Connection works;
 - at R27 and R30 during Water Connection works; and
 - at R23, R31 and R32 during Electrical Connection works.
- 9.6.37 Otherwise, all effects of construction away from the Main Site are negligible to minor adverse (**not significant**) during the night.
- 9.6.38 Construction activities taking place outside normal working hours will need to be planned, managed and controlled appropriately so they do not exceed the limits for construction noise that have been defined in **Table 9-6**. Provided noise limits are not exceeded, construction activities outside of normal working can be considered as having a negligible to minor adverse effect (**not significant**) at NSRs. Potential embedded mitigation measures during the works have already been discussed in Section 9.5. Additional mitigation, not already included in the quantitative assessment, is discussed in in Section 9.7.

Construction Traffic Noise

- 9.6.39 The potential changes in road traffic noise as a result of the construction traffic due to the Proposed Development have been considered by calculating the Basic Noise Level (BNL) at 10 m from the road as per the methodology in Calculation of Road Traffic Noise (CRTN, Ref 9-21) for 'without Proposed Development construction flows' and 'with Proposed Development construction flows' for the peak construction year (2034) and comparing the change in BNL. The potential changes in road traffic noise as result of the

construction traffic from the Proposed Development is presented in **Table 9-9**.

Table 9-9: Changes in Road Traffic Noise due to the Construction of the Proposed Development

Link	'Without' Proposed Development construction flows 2034			'With' Proposed Development construction flows 2034			Change in BNL, dB	Magnitude of impact
	AAWT	% HGV	Speed (km/h)	AAWT	% HGV	Speed (km/h)		
Kelsterton Road	404	20	48	1,958	13	48	6.8*	High
A548 (West of Main Site Access)	15,789	8	86	16,266	8	86	0.1	Very low
A548 (East of Main Site Access)	14,877	7	112	15,347	8	112	0.1	Very low
B5129	10,546	13	39	11,152	12	39	0.2	Very low
Kelsterton Lane	1,466	11	56	1,938	8	56	1.7	Low
Allt Goch Lane	149	16	36	157	15	36	0.2	Very low
Golftyn Lane	7,894	9	32	7,894	9	32	0	Very low
Mold Road	8,523	8	41	8,523	8	41	0	Very low

*In the calculation of the BNL for this road link, the low flow correction has been excluded from both the 'with' and 'without' construction flows as it should not be used for flows <1000 AAWT and can significantly affect predicted noise levels. This better represents the change in noise levels due to the change in flows.

- 9.6.40 For the Kelsterton Road traffic link there is a high change in road traffic noise due to traffic flows along the construction traffic routes of the Proposed Development. This would be classified as a potential Major Adverse increase in road traffic noise level at source, although given the flows on Kelsterton Road are low, the change in road traffic noise levels at nearby NSRs (R21, R22 and R23) will be at least partially masked by noise from other road noise and industrial sound sources in the vicinity (including the adjacent A548 dual carriageway and existing power station). This masking would be expected to reduce the impact to moderate adverse at worst. The effects of changes in road traffic noise on these receptors will be assessed in more detail in the ES.
- 9.6.41 For all other traffic links the magnitude of change is low or less. This will result in up to minor adverse (**not significant**) effects.
- 9.6.42 In addition to the road traffic related to the Proposed Development construction, Abnormal Indivisible Loads (AIL), which arrive at the Port of Mostyn, Ellesmere Port or Connah's Quay North, would be offloaded using temporary mobile cranes and enter the Proposed Development via the AIL routes. A number of AIL routes are under consideration; exact details will be confirmed during detailed design, but the ES will include an indication of the anticipated number of AIL movements during the construction period and assess the impact of those movements on the relevant NSRs, but it is considered that road traffic noise from this potential source (individual infrequent, transient passbys), compared with baseline traffic flows and other existing area sound sources, will likely to be negligible (**not significant**).

Construction Vibration Impacts and Effects

- 9.6.43 The level of vibration impact magnitude at different receptors will be dependent upon a number of factors including the distance between the works and receptors, ground conditions, the nature and method of works required close to receptors and the specific activities being undertaken at any given time.
- 9.6.44 However, due to large distances (minimum of 150 m) between residential receptors and the plant that is likely to produce higher levels of vibration (e.g. piling rigs) on the Main Site, vibration effects on both humans and buildings are likely to be negligible (**not significant**).
- 9.6.45 R31 is the closest receptor to the construction plant likely to be associated with the construction laydown area in either the Phased or Single Construction Scenario, being approximately 30 m from laydown area boundary (refer to **Figure 5-4 (PEIR Volume III)**). There may be a need for vibratory rollers during site clearance or leveling of the site when establishing the construction laydown area. Therefore, the magnitude of vibration impacts and the resulting significance of effects are also assessed in **Table 9-10**.

Table 9-10: Assessment of Construction Vibration

NSR	Construction Location	Vibratory equipment	Distance (m)	Magnitude of Impact Peak particle velocity (V_{res}), mm/s	Classification of effect
R19	Laydown Area	Vibratory Roller*	50	0.8	Minor Adverse
R20	Laydown Area	Vibratory Roller*	95	0.4	Minor Adverse
R31	Laydown Area	Vibratory Roller*	33	1.4	Moderate Adverse

*Predictions based on use of a Bomag BW203 Vibratory Roller on high amplitude mode

- 9.6.46 It may not be necessary for vibratory rolling to occur at the closest distance of the laydown areas to receptors, however, these shortest distances have been assessed as a worst-case. On this worst-case basis, up to moderate adverse (**significant**) vibration effects are predicted at receptors R31 during the use of a vibratory rolling at the closest point of the construction laydown area. However, the guidance in BS 5228-2 (Ref 9-15) states for PPV levels between 1.0 and <10 mm/s 'it is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.'
- 9.6.47 The vibration levels predicted are considerably below the thresholds for damage to buildings as presented in Table 7 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**.
- 9.6.48 Additional mitigation to reduce vibration levels and likelihood of complaints from residents are discussed in Section 9.7.

Operational Phase

- 9.6.49 Operational sound modelling has been undertaken using available sound level data for the Proposed Development plant and information based on similar projects. The assessment presented below sets out the realistic worst-case potential magnitude of impacts and significance of effects associated with the operation of the Proposed Development.
- 9.6.50 The earliest year of operation for the Proposed Development is anticipated to be 2030, under a phased construction approach beginning in 2026 for a period of five years. If construction was to be undertaken in a single phased approach, the earliest year of operation is anticipated to be 2035. If a single phased construction approach was undertaken at the latest possible time, five years after DCO Consent, operation would be anticipated to occur in late 2036.
- 9.6.51 Details of the sound source sound power level (L_{wA}) data, the settings used in the noise modelling software and the list of assumptions made are presented in **Appendix 9-D Operational Sound Information (PEIR Volume IV)**.
- 9.6.52 The predicted free-field operational specific sound levels at the NSRs in the absence of any additional mitigation built into the Proposed Development design are presented in **Table 9-11**. The results presented are for the first floor of the representative receptors. Assuming continual 24-hr operation, the predicted sound levels could apply to both the 1-hour daytime and the 15-minute night-time BS 4142 assessment periods.

BS 4142 Assessment Results

- 9.6.53 The daytime BS 4142 assessments are presented in **Table 9-11** and the night-time BS 4142 assessments are presented in **Table 9-12**. The magnitude of impact and significance of effect classifications have been included in the tables, to provide context for the BS 4142 assessment outcomes, with reference to the semantic scales in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**.
- 9.6.54 The values presented are the differences between the representative *Background Sound Level* L_{A90} at each NSR and the predicted *Rating Level* (the *Specific Sound Level* $L_{Aeq,T}$ plus the character correction). Positive values in the table indicate an excess of the *Rating Level* over the *Background Sound Level*.
- 9.6.55 The Main Site Operational Sound Contours (in **Figure 9-3: Main Site Operational Sound Contours**) are provided for illustrative purposes to represent the free-field operational sound levels at first floor level (4 m above ground level) using a 10 m x 10 m colour grid.
- 9.6.56 The assessment has assumed that potential operational sound of a tonal, impulsive or intermittent nature will be designed out of the Proposed Development during the detailed design phase by the selection of appropriate plant, building cladding, louvres and silencers/ attenuators as necessary. However, inclusion of a +3 dB correction for other distinctive character has been included at this stage as a conservative approach. This has been applied for NSRs where the *Specific Sound Level* is equal to or greater than the

existing background sound level, as there is the potential to identify the new sound source in the existing acoustic environment.

Table 9-11: Daytime BS4142 Assessment

NSR	Specific sound level L_s ($L_{Aeq,Tr}$), dB	Acoustic feature correction, dB	Rating level ($L_{Ar,Tr}$), dB	Representative background sound level ($L_{A90,T}$), dB	Excess of rating level background sound level ($L_{Ar,Tr} - L_{A90,T}$), dB	BS 4142:2014 impact category	Magnitude of impact	Initial classification of effect
R4	33	+0	33	38	-5	Low impact	Very low	Negligible
R5	33	+0	33	38	-5	Low impact	Very low	Negligible
R6	33	+0	33	46	-13	Low impact	Very low	Negligible
R7	32	+0	32	46	-14	Low impact	Very low	Negligible
R8	33	+0	33	46	-13	Low impact	Very low	Negligible
R9	30	+0	30	46	-16	Low impact	Very low	Negligible
R10	32	+0	32	43	-11	Low impact	Very low	Negligible
R11	34	+0	34	43	-9	Low impact	Very low	Negligible
R12	34	+0	34	43	-9	Low impact	Very low	Negligible
R13	33	+0	33	43	-10	Low impact	Very low	Negligible
R14	31	+0	31	43	-12	Low impact	Very low	Negligible
R15	36	+0	36	43	-7	Low impact	Very low	Negligible
R16	34	+0	34	38	-4	Low impact	Very low	Negligible
R17	37	+0	37	39	-2	Low impact	Very low	Negligible
R18	44	+3	47	39	+8	Adverse/Significant Adverse impact depending on the context	Low/Medium	Minor/Moderate Adverse

NSR	Specific sound level $L_s (L_{Aeq,Tr})$, dB	Acoustic feature correction , dB	Rating level $(L_{Ar,Tr})$, dB	Representative background sound level ($L_{A90,T}$), dB	Excess of rating level over category BS 4142:2014 impact Magnitude of impact	Initial classification of effect
R19	47	+3	50	45	+5 Adverse impact depending on the context	Low Minor Adverse
R20	48	+3	51	45	+6 Adverse impact depending on the context	Low Minor Adverse
R21	55	+3	58	45	+13 Significant Adverse Impact depending on the context	Medium/High Moderate/Major Adverse
R22	53	+3	56	45	+11 Significant Adverse Impact depending on the context	Medium Moderate Adverse
R23	50	+3	53	45	+8 Adverse/Significant Adverse impact depending on the context	Low/Medium Minor/Moderate Adverse
R24	43	+0	43	45	-2 Low impact	Very low Negligible
R25	40	+0	40	45	-5 Low impact	Very low Negligible
R26	38	+0	38	44	-6 Low impact	Very low Negligible
R28	35	+0	35	44	-9 Low impact	Very low Negligible
R29	35	+0	35	44	-9 Low impact	Very low Negligible
R30	34	+0	34	44	-10 Low impact	Very low Negligible
R31	31	+0	31	45	-14 Low impact	Very low Negligible

Table 9-12: Night-time BS4142 Assessment

NSR	Specific sound level L_s (LAeq,Tr), dB	Acoustic feature correction, dB	Rating level $(L_{Ar,Tr})$, dB	Representative background sound level $(L_{A90,T})$, dB	Excess of rating level over background sound level $(L_{Ar,Tr} - L_{A90,T})$, dB	BS 4142:2014 effect category	Magnitude of impact	Initial classification of effect
R4	33	+0	33	36	-3	Low impact	Very low	Negligible
R5	33	+0	33	36	-3	Low impact	Very low	Negligible
R6	33	+0	33	38	-5	Low impact	Very low	Negligible
R7	32	+0	32	38	-6	Low impact	Very low	Negligible
R8	33	+0	33	38	-5	Low impact	Very low	Negligible
R9	30	+0	30	38	-8	Low impact	Very low	Negligible
R10	32	+0	32	34	-2	Low impact	Very low	Negligible
R11	34	+3	37	34	+3	Low/Adverse impact	Very low/Low	Negligible/Minor Adverse
R12	34	+3	37	34	+3	Low/Adverse impact	Very low/Low	Negligible/Minor Adverse
R13	33	+0	33	34	-1	Low impact	Very low	Negligible
R14	31	+0	31	34	-1	Low impact	Very low	Negligible
R15	36	+3	39	34	+5	Adverse impact	Low	Minor Adverse
R16	34	+0	34	36	-2	Low impact	Very low	Negligible
R17	37	+3	40	36	+4	Adverse impact	Low	Minor Adverse
R18	44	+3	47	36	+11	Significant Adverse Impact depending on the context	Medium	Moderate Adverse

NSR	Specific sound level L_s (LAeq,Tr), dB	Acoustic feature correction, dB	Rating level (LA _{r,Tr}), dB	Representative background sound level (LA90,T), dB	Excess of rating level over background sound level (LA _{r,Tr} - LA90,T), dB	BS 4142:2014 effect category	Magnitude of impact	Initial classification of effect
R19	47	+3	50	37	+13	Significant Adverse Impact depending on the context	Medium/High	Moderate/Major Adverse
R20	48	+3	51	37	+14	Significant Adverse Impact depending on the context	High	Major Adverse
R21	55	+3	58	37	+21	Significant Adverse Impact depending on the context	High	Major Adverse
R22	53	+3	56	37	+19	Significant Adverse Impact depending on the context	High	Major Adverse
R23	50	+3	53	37	+16	Significant Adverse Impact depending on the context	High	Major Adverse
R24	43	+3	46	37	+9	Significant Adverse Impact depending on the context	Medium	Moderate Adverse
R25	40	+3	43	37	+6	Adverse impact	Low	Minor Adverse
R26	38	+3	41	37	+4	Adverse impact	Low	Minor Adverse
R28	35	+0	35	37	-2	Low impact	Very low	Negligible
R29	35	+0	35	37	-2	Low impact	Very low	Negligible
R30	34	+0	34	35	-1	Low impact	Very low	Negligible
R31	31	+0	31	35	-4	Low impact	Very low	Negligible

- 9.6.57 The values presented in **Table 9-11** and **Table 9-12**, for the worst-case scenario produce a range of impact magnitudes from low to high at the NSRs. This would result in effects ranging between negligible (**not significant**) to major adverse (**significant**), subject to consideration of context.
- 9.6.58 The BS 4142 assessment applies to residential receptors only. There are two non-residential receptors in this assessment, both educational facilities (R27 and R32) as identified in Table 1 in **Appendix 9-A: Noise and Vibration Methodology (PEIR Volume IV)**. Design guides for good internal conditions in non-residential receptors are set indoor. Design criterion from Building Bulletin 93 (BB93) (Ref 25) specifies an internal noise level 35 dB $L_{Aeq,T}$ in classrooms. Assuming that education facilities may have doors or windows open at some points during the year, the maximum external noise level (assuming 15 dB attenuation for a partially open door or window as assumed by the WHO) before the design criterion would be exceeded would be 50 dB $L_{Aeq,T}$. The predicted external specific sound levels due to sound from the Proposed Development at R27 and R32 are 34 dB $L_{Aeq,T}$ and 30 dB $L_{Aeq,T}$ respectively, which are well below the 50 dB $L_{Aeq,T}$ external criterion.

Consideration of Context

- 9.6.59 The existing Connah's Quay Power Station has been an operating industrial source in the study area since the original power station began operations in 1954 with the current gas fired power station operating since 1996. Additionally, on the Main Site is a gas treatment plant which was an additional industrial sound source in the area until 2023. This is likely to mean that residents at all NSRs are already accustomed to an industrial source.
- 9.6.60 To assist with consideration of context, **Table 9-13** and **Table 9-14** present the existing ambient sound levels and future predicted specific sound levels during the operation of the Proposed Development at NSRs with reference to the IEMA impact guidance as set out in **Appendix 9-A: Noise and Vibration Methodology**.

Table 9-13: Comparison of Ambient Sound Levels during the Daytime

NSR	Existing Ambient Sound Level $L_{Aeq,T}$, dB	Predicted Specific Sound Level, L_s $L_{Aeq,T}$, dB	Logarithmic Sum of Existing Ambient Sound Level with Predicted Specific Sound Level, $L_{Aeq,T}$, dB	Predicted Increase in Ambient Sound Level due to the Proposed Development, $L_{Aeq,T}$, dB, dB	Magnitude of Impact of Noise Change Using IEMA Guidelines
R18	49	47	51.1	2.1	Low
R19	54	50	55.5	1.5	Low
R20	54	51	55.8	1.8	Low
R21	54	58	59.5	5.5	High
R22	54	56	58.1	4.1	Medium
R23	54	53	56.5	2.5	Low
R24	54	46	54.6	0.6	Low

Table 9-14: Comparison of Ambient Sound Levels during the Night-time

NSR	Existing Ambient Sound Level $L_{Aeq,T}$, dB	Predicted Specific Sound Level, L_s $L_{Aeq,T}$, dB	Logarithmic Sum of Existing Ambient Sound Level with Predicted Specific Sound Level, $L_{Aeq,T}$, dB	Predicted Increase in Ambient Sound Level due to the Proposed Development, $L_{Aeq,T}$, dB, dB	Magnitude of Impact of Noise Change Using IEMA Guidelines
R18	52	47	53.2	1.2	Low
R19	52	50	54.1	2.1	Low
R20	52	51	54.5	2.5	Low
R21	52	58	59	7	High
R22	52	56	57.5	5.5	High
R23	52	53	55.5	3.5	Medium
R24	52	46	53	1	Low

9.6.61 **Table 9-13** and **Table 9-14** show that the predicted change of ambient sound levels experienced at NSRs R18, R19, R20 and R24 would represent a low magnitude of impact during both the day and night. This will likely reduce the overall effects at these NSRs from the initial BS 4142 classification of effects. However, at R21, R22 and R23 there is predicted medium or high magnitude of impact due to the increase in the ambient sound levels with the addition of sound from the Proposed Development, therefore effects at these NSRs may remain moderate to major adverse (**significant**) in line with the outcomes in **Table 9-11** and **Table 9-12**.

9.6.62 As significant adverse effects are predicted, potential options to minimise sound levels at NSRs from the Proposed Development are discussed in Section 9.7.

Venting

9.6.63 Venting will be required as detailed in paragraphs 4.4.16 to 4.4.17 in **Chapter 4: The Proposed Development**. Potential noise associated with venting will be controlled by the Environmental Permit.

Operational Traffic Noise

9.6.64 The potential changes in road traffic noise levels due the operation of the Proposed Development have been considered by calculating the BNL at 10 m as per the methodology in CRTN (Ref 9-21) from each road link for both the 'without' Proposed Development flows' and 'with Proposed Development flows' for the operational year. The potential changes in road traffic noise as result of the operational traffic from the Proposed Development is presented in **Table 9-15**.

Table 9-15: Changes in Road Traffic Noise due to the Operation of the Proposed Development

Link	'Without' Proposed Development operational flows 2036			'With' Proposed Development operational flows 2036			Change in BNL, dB	Magnitude of impact	Classification of effect
	AAWT	% HGV	Speed (km/h)	AAWT	% HGV	Speed (km/h)			
Kelsterton Road	409	20	48	544	20	48	1.2	Low	Minor Adverse
A548 (West of Main Site Access)	15,987	8	86	16,025	8	86	0	Very low	Negligible
A548 (East of Main Site Access)	15,064	7	112	15,112	7	112	0	Very low	Negligible
B5129	10,677	13	39	10,725	13	39	0	Very low	Negligible
Kelsterton Lane	1,485	11	56	1,522	11	56	0.2	Very low	Negligible
Allt Goch Lane	151	16	36	151	16	36	0	Very low	Negligible
Golftyn Lane	7,991	9	32	7,991	9	32	0	Very low	Negligible
Mold Road	8,629	8	41	8,629	8	41	0	Very low	Negligible

- 9.6.65 For all road links there is a predicted low change in road traffic noise levels (at worst) at NSRs due to changes in traffic flows in the vicinity of the Proposed Development. This will result in up to minor adverse (**not significant**) effects.

Decommissioning Phase

- 9.6.66 The potential magnitude of impacts and significance of effects would require further consideration at the decommissioning stage of the Proposed Development, but potential mitigation measures are detailed in Section 9.5.
- 9.6.67 The effects of decommissioning noise associated with the Main Site are considered to be comparable to, or less than, those assessed for construction activities and are therefore considered to be Not Significant during the daytime. However, if the decommissioning works are undertaken during evening, night or weekend periods there is the potential for **significant** adverse effects.
- 9.6.68 The effects of decommissioning vibration are also potentially comparable to, or less than, those assessed for construction activities as set out in paragraphs 9.6.43 to 9.6.47.
- 9.6.69 Decommissioning would require submission of a DEMP to the relevant planning authority for its approval, which will be secured by a Requirement in the DCO. Appropriate best practice mitigation measures will be applied during any decommissioning works, as described in Section 9.5, and documented in a DEMP.

9.7 Additional Mitigation and Enhancement Measures

Construction

- 9.7.1 In addition to the noise control measures presented within Section 9.5 where significant construction effects are predicted, additional noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes and potentially further refinement of construction works programme will be considered and implemented where practicable. The use of temporary barriers or screens may also provide additional mitigation. In combination, these additional mitigation measures can provide up to 15 to 20 dB sound level reduction (based on Table B.1 in BS 5228-1).
- 9.7.2 Appropriate measures will be confirmed through further detailed assessment, as necessary, once construction plant and methods and construction traffic management, have been confirmed.
- 9.7.3 Potentially significant vibration effects have been identified where vibratory rollers are required for establishment of construction laydown areas. This is based on predictions of the use of rollers on high amplitude. Where vibratory rollers are to be used within 50 m of receptors these will be required to be used on low amplitude mode and no vibratory rollers to be used with 16 m of NSRs. Potentially significant vibration effects will be controlled by requirements set out in the Final CEMP, which is already part of embedded mitigation, to prevent significant adverse impacts at sensitive receptors.

Operation

- 9.7.4 Based on the current assessment, without the application of additional mitigation and enhancement measures, significant adverse effects are predicted during the daytime or night-time periods at up to three NSR locations, all of which represent multiple properties.
- 9.7.5 The assessment has assumed that potential sound of a tonal, impulsive or intermittent nature will be designed out of the Proposed Development during the detailed design phase by the selection of appropriate plant, building cladding, louvres and silencers/attenuators as necessary.
- 9.7.6 During the detailed design stage mitigation measures to minimise operational sound will be considered. These measures may include, but not limited to the following depending on the potential benefits achievable:
- enclosure of key sound sources;
 - use of quieter plant (including limits on sound emissions from plant and equipment at source);
 - orientation of plant within the site to provide screening of low-levels sound sources by other buildings, structures and dedicated barriers, or orientating fans and the air inlets away from sensitive receptors; and
 - use of additional acoustic barriers/screens or earth bunds to reduce transmission of sound from the Site to NSRs.
- 9.7.7 Provision of a package of sound insulation to nearby NSRs may also be considered, as a last resort, where other measures are unlikely to be adequate.
- 9.7.8 Further assessment of how these measures (or a combination thereof) can be applied to reduce the operational sound levels predicted at NSRs will be undertaken during the ES.
- 9.7.9 Furthermore, during detailed design, an operational noise control scheme (including noise limits as agreed with the local authority) will be prepared and secured by a Requirement of the DCO. The noise control scheme will set out the noise reduction measures to be incorporated into the Proposed Development and will demonstrate the use of Best Available Techniques (BAT) for the control of noise for the Environmental Permit.

Decommissioning

- 9.7.10 No additional mitigation for decommissioning of the Proposed Development beyond such best practice specified in BS 5228-1 and BS 5228-2 and Section 9.5 is considered necessary at this stage.

9.8 Summary of Likely Significant Residual Effects

- 9.8.1 **Table 9-16** and **Table 9-17** summarise the likely residual significant effects of the Proposed Development on noise and vibration sensitive receptors following implementation of mitigation. In summary, no likely significant residual effects have been identified following the implementation of appropriately designed mitigation, with the possible exception of temporary construction traffic noise impacts at NSRs along the access road to the Main

Site. This is on the basis that the construction noise and vibration thresholds and operational sound limits are met through additional mitigation measures.

- 9.8.2 An assessment of cumulative effects with other proposed developments that could interact with the effects of this Proposed Development will be carried out in the final ES, when the short-list of other developments has been finalised, as detailed in **Chapter 24: Cumulative and Combined Effects**. **Chapter 24: Cumulative and Combined Effects** will also assess the in-combination effects of multiple aspects on one receptor.

Table 9-16: Summary of Likely Significant Residual Effects (Construction and Decommissioning)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
R4, R15	High	Up to high magnitude of noise impact during daytime construction (and potentially decommissioning) of Repurposed CO ₂ Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R2	High	Up to medium magnitude of noise impact during daytime construction (and potentially decommissioning) of Proposed CO ₂ Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
R3, R5	High	Up to medium magnitude of noise impact during daytime construction (and potentially decommissioning) of Repurposed CO ₂ Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R19, R21, R22, R23,	High	Up to high magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Main Site and C&IEA.	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
R20, R31, R33	High	Up to medium magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Main Site and C&IEA.	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R2, R3	High	Up to high magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Proposed CO ₂ Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				outside of daytime working hours.		
R3, R4, R5, R6 R11, R12, R13, R15	High	Up to high magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Repurposed CO ₂ Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R24, R25, R26, R27, R28, R29, R30	High	Up to high magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Electrical Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.		
R1	High	Up to medium magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Proposed CO ₂ Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, careful programming of works. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R2, R7, R8, R10, R13, R16	High	Up to medium magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Repurposed CO ₂ Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				and screens, careful programming of works. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.		
R16, R32	High	Up to medium magnitude of noise impact during evening/weekend construction (and potentially decommissioning) of Electrical Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R19, R21, R22, R23, R31	High	Up to high magnitude of noise impact during night-time construction (and potentially decommissioning) of Main Site and C&IEA	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on	Low magnitude of impact or less on the basis that BS 5228-1 ABC	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	noise limits are met.	
R5, R20, R33	High	Up to medium magnitude of noise impact during night-time construction (and potentially decommissioning) of Main Site and C&IEA	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R1, R2, R3, R4, R5	High	Up to high magnitude of noise impact during night-time construction (and	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as	Low magnitude of impact or	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
		potentially decommissioning) of Proposed CO ₂ Connection		jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	less on the basis that BS 5228-1 ABC noise limits are met.	
R1, R2, R3, R4, R5, R6, R11, R12, R13, R15, R16	High	Up to high magnitude of noise impact during night-time construction (and potentially decommissioning) of Repurposed CO ₂ Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
R28, R29	High	Up to high magnitude of noise impact during night-time construction (and potentially decommissioning) of Water Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R24, R25, R26, R27, R28, R29, R30	High	Up to high magnitude of noise impact during night-time construction (and potentially decommissioning) of Electrical Connection	Up to Major Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				outside of daytime working hours.		
R16	High	Up to medium magnitude of noise impact during night-time construction (and potentially decommissioning) of Proposed CO ₂ Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R7, R8, R10	High	Up to medium magnitude of noise impact during night-time construction (and potentially decommissioning) of Repurposed CO ₂ Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.		
R27, R30	High	Up to medium magnitude of noise impact during night-time construction (and potentially decommissioning) of Water Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)
R23, R31, R32	High	Up to medium magnitude of noise impact during night-time construction (and potentially decommissioning) of Electrical Connection	Up to Moderate Adverse	Additional specific measures where possible (use of noise-control equipment such as jackets on pneumatic drills, acoustic covers on compressors, shrouds on piling rigs and cranes), temporary acoustic barriers	Low magnitude of impact or less on the basis that BS 5228-1 ABC noise limits are met.	Minor Adverse or less (Not Significant)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				and screens, further refinement of construction works programme. Further detailed assessment, if necessary, to confirm mitigation requirements particularly regarding working outside of daytime working hours.		
R31	High	Up to medium magnitude of vibration impact during construction (and potentially decommissioning) of Main Site and C&IEA	Up to Moderate Adverse	Use of vibratory rollers on low amplitude mode when within 50 m of residential receptors and no vibratory rollers to be used with 16 m of NSRs.	Low magnitude of impact or less	Minor Adverse or less (Not Significant)
R21, R22, R23	High	High magnitude of change in construction (and potentially decommissioning) road traffic noise level at source on Kelsterton Road (access road to Main Site) due to construction traffic, although masking will likely offset noise change at local NSRs to Medium magnitude or less	Up to Moderate Adverse	Further detailed assessment of construction road traffic noise. Construction traffic management.	Medium magnitude of impact or less	Potentially Moderate Adverse (Significant) on access road to Main Site. Elsewhere Minor or Negligible Adverse (Not Significant)

Table 9-17: Summary of Significant Residual Effects (Operation)

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
R21, R22, R23	High	Up to medium/high magnitude of noise impact during daytime operation.	Moderate / Major Adverse	Limits on noise emissions from plant and equipment at source. Acoustic barriers / screens or earth bunds to reduce transmission of noise from the Site to NSRs. Recommendation for provision of a package of sound insulation to nearby NSRs, as a last resort, where other applied measures are considered to be insufficient. Further assessment of mitigation as the design evolves, in conjunction with design engineers, to further reduce adverse effects. During detailed design, an operational noise control scheme (including noise limits agreed with the local authority) will be prepared, secured by a Requirement of the DCO, demonstrating the use of Best Available Techniques (BAT) for the control of noise for the Environmental Permit.	Low impact magnitude or less during daytime operation on the basis that the operational noise limits are met.	Up to Minor Adverse
R21, R22, R23,	High	Up to high magnitude of noise impact during night-time operation.	Moderate / Major Adverse	Limits on noise emissions from plant and equipment at source. Acoustic barriers / screens or earth bunds to reduce transmission of noise from the Site to NSRs. Recommendation for provision of a package of sound insulation to nearby NSRs, as a last resort, where other applied measures are considered to be insufficient.	Low impact magnitude or less during night-time operation on the basis that the operational	Up to Minor Adverse

Receptor	Sensitivity (value)	Description of Impact	Classification of Effect (prior to Additional Mitigation)	Additional Mitigation / Enhancement Measure	Magnitude of Impact after Additional Mitigation	Residual Effect after Additional Mitigation
				<p>Further assessment of mitigation as the design evolves, in conjunction with design engineers, to further reduce adverse effects.</p> <p>During detailed design, an operational noise control scheme (including noise limits agreed with the local authority) will be prepared, secured by a Requirement of the DCO, demonstrating the use of Best Available Techniques (BAT) for the control of noise for the Environmental Permit.</p>	noise limits are met.	

References

- Ref 9-1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/572). London: HMSO. Available at: [The Infrastructure Planning \(Environmental Impact Assessment\) Regulations 2017 \(legislation.gov.uk\)](https://www.legislation.gov.uk/uksi/2017/572/contents/made) (Accessed 26/02/24)
- Ref 9-2 HM Government (1990). The Environmental Protection Act 1990 (c. 43).
- Ref 9-3 HM Government (1973). Control of Pollution Act 1974 (c. 40).
- Ref 9-4 Environmental Permitting Regulations 2016 (as amended 2020) and Environmental Permitting Regulations 2023
- Ref 9-5 DESNZ, 2023; Overarching National Policy Statement for Energy (EN-1) [online]. Available at: <https://assets.publishing.service.gov.uk/media/65a7864e96a5ec0013731a93/overarching-nps-for-energy-en1.pdf> (Accessed 26/02/24)
- Ref 9-6 DESNZ, 2023; National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2) [online]. Available at: <https://assets.publishing.service.gov.uk/media/655dc15a544aea000dfb3239/nps-natural-gas-electricitygenerating-infrastructure-en2.pdf> (Accessed 26/02/24)
- Ref 9-7 DESNZ, 2023; National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) [online]. Available at: <https://assets.publishing.service.gov.uk/media/655dc2d4046ed4000d8b9dd9/nps-natural-gas-supply-infrastructurepipelines-en4.pdf> (Accessed 26/02/24)
- Ref 9-8 DESNZ, 2023; National Policy Statement for Electricity Networks Infrastructure (EN-5) [online]. Available at: <https://assets.publishing.service.gov.uk/media/655dc25e046ed400148b9dca/nps-electricity-networks-infrastructure-en5.pdf> (Accessed 26/02/24)
- Ref 9-9 Welsh Government, 2018, Noise and Soundscape Action Plan, 2018-2023. Available here: [noise-and-soundscape-action-plan.pdf \(gov.wales\)](https://gov.wales/noise-and-soundscape-action-plan.pdf) (Accessed 26/02/24)
- Ref 9-10 Welsh Government, 2021; Planning Policy Wales: Edition 1 [online]. Available at: Planning Policy Wales - Edition 12 (gov.wales) (Accessed 22/04/24)
- Ref 9-11 Welsh Government, 1997, Technical Advice Note (TAN) 11: Noise
- Ref 9-12 FCC, 2023; Flintshire Local Development Plan 2015 – 2030. Adopted Plan 24th January 2023. [Online] Available at: <https://flintshire.gov.uk/en/PDFFiles/Planning/Examination-Library-Documents/FINAL-LDP-Written-Statement-English.pdf> (Accessed 26/02/24)
- Ref 9-13 British Standards Institute (BSI). (2003). BS 7445-1 – Description and measurement of environmental noise. Guide to quantities and procedures
- Ref 9-14 British Standards Institute (BSI) (2014). BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1: Noise.
- Ref 9-15 British Standards Institute (BSI) (2014). BS 5228-2:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration.
- Ref 9-16 International Organization for Standardization (2015). ISO 14001:2015 Environmental Management Systems. Geneva: International Organisation for Standardisation.
- Ref 9-17 British Standards Institute (BSI) (2008). BS 6472-1 – Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting

- Ref 9-18 British Standards Institute (1993) BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration'
- Ref 9-19 British Standards Institute (BSI). (2019). BS 4142:2014+A1:2019: 'Methods for rating and assessing industrial and commercial sound'
- Ref 9-20 International Standards Organization (Part 1: 1993, Part 2: 1996) ISO 9613 – Acoustics – Attenuation of sound during propagation outdoors, ISO
- Ref 9-21 Department of Transport (DfT)/ Welsh Office. (1988). Calculation of Road Traffic Noise
- Ref 9-22 Highways England. (2020). Design Manual for Roads and Bridges LA111 Noise and vibration – Version 2
- Ref 9-23 Institute of Environmental Management and Assessment (IEMA). (2014). Guidelines for Environmental Noise Impact Assessment
- Ref 9-24 HM Government (2001). Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001
- Ref 9-25 Department for Education (2015) Acoustic design of schools: performance standards. Building Bulletin 93.
- Ref 9-26 World Health Organisation (1999). Guidelines for Community Noise.

