12 CHAPTER 12 – NOISE AND VIBRATION

12.1 INTRODUCTION

This Chapter of the Environmental Statement (ES) assesses the potential effects of noise and vibration from the Proposed Development at existing nearby sensitive receptors. The assessment considers the potential noise and vibration impacts during the construction, operational and decommissioning stages. This assessment was undertaken by ACCON UK Limited ('ACCON').

This Chapter includes the following elements:

- Legislation, Policy and Guidance;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Development Design mitigation
- Assessment of Likely Effects;
- Mitigation Measures and Residual Effects;
- Cumulative Effect Assessment;
- Summary of Likely Effects; and
- Statement of Significance.

This Chapter of the EIA Report is supported by the following figures in Volume 3, ES Report Figures:

- Figure 12.1 – Noise Monitoring Positions
- Figure 12.2 – Noise Sensitive Receptors

Operational Noise contours are identified on the following figures:

- Figure 12.3 – Scenario 1
- Figure 12.4 – Scenario 2
- Figure 12.5 – Scenario 3
- Figure 12.6 – Scenario 4
- Figure 12.7 – Scenario 5
- Figure 12.8 – Scenario 6
- Figure 12.9 – Scenario 7
- Figure 12.10 – Scenario 8
- Figure 12.11 – Scenario 9
- Figure 12.12 – Scenario 10
- Figure 12.13 – Scenario 11

12.2 LEGISLATION, POLICY AND GUIDANCE

The following guidance, legislation and information sources have been considered in carrying out this assessment:

- Environmental Protection Act 1990;
- Control of Pollution Act 1974;
- National Planning Policy Framework 2021;
- Noise Policy Statement for England;
- Planning Practice Guidance;

- The Guidance on the Planning for Mineral Extraction: Ministry of Housing, Communities & Local Government, October 2014;
- British Standard 4142: 2014+A.1:2019 Methods for rating and assessing industrial and commercial sound;
- British Standard 5228: 2009 + A1: 2014 Code of practice for noise and vibration control on construction and open sites;
- Calculation of Road Traffic Noise 1988;
- Design Manual for Roads and Bridges, 2019 and
- Institute of Environmental Management and Assessment Guidelines for Environmental Noise Impact Assessment, 2014.

12.2.1 Legislation

Environmental Protection Act 1990

Local authorities are required to investigate any public complaints of noise and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they may serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either simply the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity. Contravention of a notice without reasonable excuse is an offence.

In determining if a noise complaint amounts to a statutory nuisance the local authority can take account of various guidance documents and existing case law; no statutory noise limits exist.

Demonstrating the use of 'Best Practicable Means' (BPM) to minimise noise levels is an accepted defence against a noise abatement notice.

Control of Pollution Act 1974

Sections 60 and 61 of the Control of Pollution Act 1974 (CoPA) provide the main legislation regarding demolition and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by the local authority with instructions to cease work until specific conditions to reduce noise have been adopted.

Section 61 of CoPA provides a means for applying for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served provided the agreed conditions are maintained on-site.

CoPA requires that BPM (as defined in Section 72 of CoPA) be adopted for construction noise on any given site. CoPA makes reference to British Standard (BS) 5228 (British Standards Institute (BSi) 2014a and 2014b) as BPM.

12.2.2 National Policy

National Planning Policy Framework, 2021

The revised National Planning Policy Framework ('NPPF' as amended in July 2021) supersedes the 2012, 2018 and 2019 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

One of the core planning principles is to contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser value, where consistent with other policies in the Framework. The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 185 of the NPPF states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));*

- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

National Policy Statement for England, 2010

The Noise Policy Statement for England ('NPSE') was developed by Defra and published in March 2010. The Noise Policy Vision of the NPSE is to:

- *"Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development….".*

This long term vision of the NPSE is supported by the following Noise Policy Aims:

- *"Through the effective management and control of environment, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life" .*

The Planning Practice Guidance 'PPG), published March 2014 and last updated in respect of noise in July 2019, provides advice on how to determine the noise impact on development:

- *"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:*
- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for

the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy."

The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:

- *"Significant observed adverse effect level: this is the level of noise exposure above which significant adverse effects on health and quality of life occur.*
- *Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.*
- *No observed effect level: this is the level of noise exposure below which no effect at all on health and quality of life can be detected."*

12.2.3 Guidance

Guidance on the Planning for Mineral Extraction: Ministry of Housing, Communities & Local Government, October 2014.

The advice provided in the guidance in respect of how minerals operators should seek to control noise emissions states that "*Those making mineral development proposals, including those for related similar processes such as aggregates recycling and disposal of construction waste, should carry out a noise impact assessment, which should identify all sources of noise and, for each source, take account of the noise emission, its characteristics, the proposed operating locations, procedures, schedules and duration of work for the life of the operation, and its likely impact on the surrounding neighbourhood.*

Proposals for the control or mitigation of noise emissions should:

- *consider the main characteristics of the production process and its environs, including the location of noise-sensitive properties and sensitive environmental sites;*
- *assess the existing acoustic environment around the site of the proposed operations, including background noise levels at nearby noise-sensitive properties;*
- *estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations;*
- *identify proposals to minimise, mitigate or remove noise emissions at source;*
- *monitor the resulting noise to check compliance with any proposed or imposed conditions.*

Mineral planning authorities should take account of the prevailing acoustic environment and in doing so consider whether or not noise from the proposed operations would:

- *give rise to a significant adverse effect;*
- *give rise to an adverse effect; and*
- *enable a good standard of amenity to be achieved."*

British Standard 4142: 2014 + A.1:2019 Methods for rating and assessing industrial and commercial sound

BS 4142 describes methods for rating and assessing sound of an industrial and / or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes, upon which sound is incident. The procedure contained in BS 4142 assesses the significance of sound, which depends upon the margin

by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs or will occur.

British Standard 5228: 2009 + A1: 2014 Code of practice for noise and vibration control on construction and open sites

BS 5228 Part 1: Noise; sets out methodologies for predicting noise levels from construction and related activities. Data on sound levels is provided for a wide variety of site activities and mobile equipment used on construction and open sites. BS 5228 provides two informative methods for assessing the significance of construction noise effects using noise change: 'The ABC Method' and 'The 5 dB(A) Change Method'.

Design Manual for Roads and Bridges, 2019

The Design Manual for Roads and Bridges (DMRB) provides methods for quantifying the noise and vibration impacts generated by changes in road traffic.

Institute of Environmental Management and Assessment Guidelines for Environmental Noise Impact Assessment, 2014

The IEMA Guidelines for Environmental Noise Impact Assessment address the key principles of noise impact assessment and are applicable where noise effects are likely to occur. The guidelines provide specific guidance for noise impact assessment as part of the EIA process.

The guidelines provide a generic relationship between noise impact and noise effect, including the evaluation of effect significance. the guidelines adopt a similar, although more detailed approach, to those identified in paragraph 005 of the ppg for noise.

World Health Organization Guidelines for Community Noise, 1999

The World Health Organization ('WHO') provides guidance on the potential health impacts associated with noise. Specifically, the document recommends internal and external noise levels that would provide an acoustic environment that is conducive to uninterrupted speech and sleep.

12.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

12.3.1 Scoping Responses and Consultations

Consultation has been undertaken with the organisations shown in **Table 12.1.**

Table 12.1: Scoping and Consultation Response

Consultee	Date	Summary of Consultation Response	Response to Consultee
Nottinghamshire County Council	04/11/2022	The Council broadly agreed with the ACCON scope of works and assessment methodology. However, the Council stated that they will require a construction noise assessment that considers the potential noise impacts from the main processing site and facility construction on nearby noise sensitive ecological and residential receptors. It was also requested that decommissioning phases of the Proposed Development are included in the noise assessment. The Council agreed that vibration effects could be scoped out of the assessment.	ACCON have included an assessment of the construction noise impacts. The assessment considers the construction and decommissioning phases of the Proposed Development. Vibration impacts have been scoped out of the assessment.

12.3.2 Scope of Assessment

This Chapter considers the potential impacts at the locations of nearby noise sensitive receptors (NSRs) during the following phases of the Proposed Development:

- Site establishment construction phases, which include
    - Access and haul road construction within the Site, and construction of Processing Site 1-3; and
    - Construction of the Main Processing Site.
- Phased Extraction operations;
    - Daytime extraction operations; and
    - 24/7 Drying operations located at the Main Processing Site.
- Phased Restoration of the Site;
- Construction and Operational traffic; and
- Decommissioning.

12.3.3 Study Area / Survey Area

The study area around the Site has been defined to include the nearest residential and ecological noise sensitive receptors. Properties that are located within the vicinity of haulage roads during both construction and operational phases have also been considered. This is in general accordance with the DMRB which relates to road traffic noise impacts and the BS 5228 methodology for construction noise. Existing noise sensitive receptors within the study area are considered in this chapter. Road traffic data was provided by Arcus.

12.3.4 Cumulative effects

Cumulative effects related to noise are assessed in the context of other developments within 5 km of the Site. The potential cumulative effects arising from operational phases of the Proposed Development are related to the increases in traffic flows on the local road network. There are no cumulative noise effects anticipated from extraction operations taking place within the project area and nearby developments.

12.3.5 Baseline Survey Methodology

ACCON has carried out noise measurements at a number of representative sensitive receptor locations in the vicinity of the Proposed Development. The noise measurement positions are identified on **Figure 12.1.** A combination of long-term and short-term noise measurements were undertaken in order to identify the prevailing ambient and background noise conditions at the location of noise sensitive receptors. The noise measurements were undertaken at nearby residential properties, and within the nearby Sutton and Lound Gravel Pits SSSI.

Noise measurements were carried out between 1700 hrs on the 3rd August 2022 and 1000 hrs on the 5th August 2022. Three long-term noise measurements were undertaken over a period of 24 hrs and supplemented with 14 short-term noise measurements.

12.3.6 Methodology for the Assessment of Effects

Noise Model

The measured noise levels have been utilised to calibrate a CadnaA noise prediction model for the Site. This noise model has been used to predict the impact of noise arising from the Proposed Development on existing noise sensitive receptors.

CadnaA is a three-dimensional noise model developed by DataKustik and has been extensively used by ACCON and others to develop noise models for a wide variety of situations and noise sources. CadnaA utilises the methodology in Calculation of Road Traffic Noise (CRTN) to predict the noise levels from road traffic and the methodology in BS 5228-1 to predict the noise levels from construction, operation and extraction activities.

Noise Sensitive Receptors

The noise sensitive receptors (NSR) considered in the noise assessment are those located within 500 m of construction and operational activities and within 50 m of haul roads or the local road network.

Table 12.2 identifies the representative NSRs which have been considered in the assessment and **Figure 12.2** identifies the locations of the NSRs.

Table 12.2: Noise Sensitive Receptors

Receptor Number	Receptor Name	Approximate Distance to the Site boundary (m)
1	Wetlands Fisheries	50
2	Sutton-cum-Lound	480
3	Low Farm/Sutton Grange Farm	50
4	Bellmoor Farm and adjacent propeties	90
5	Footpath SSSI (Ecological receptor)	260
6	Footpath Tiln (Ecological receptor)	480
7	River Idle Footpath (Ecological receptor)	100
8	River Idle Footpath (Ecological receptor)	820
9	45 Sutton Lane	280
10	Brooklyn House - North Road	250

The criteria used to determine the sensitivity of a receptor are provided in **Table 12.3** below.

Table 12.3: Scale of Receptor Sensitivity

Sensitivity of Receptor	Definition
Very High	Residential dwellings , Ecological receptors such as SSSI and SPA locations
High	hospitals, quiet recreation areas, places of worship
Low	Offices, cafes / bars with external areas
Negligible	Industrial, retail

Construction Noise Assessment – Site Establishment

The magnitude of construction noise impacts can be predicted by considering noise emission data for typical construction equipment based on the expected methods of construction for each phase of work on each worksite area. The prediction method follows that set out in BS 5228-1. BS 5228-1 and also includes two informative methods of guidance for assessing the significance of construction noise: 'The ABC Method' and 'The 5 dB(A) Change Method'. The ABC method is the preferred method as the threshold

values are easier to control during construction works than individual noise limits for each receptor, which would otherwise be set by the 5 dB(A) Change Method. It is noted that the ABC method is only applicable for residential receptors, and for all other sensitive receptors the 5 dB(A) Change method is utilised.

The ABC Method defines threshold noise levels and arranges these threshold levels into the categories shown in **Table 12.4**.

Table 12.4: Noise Categories for ABC Method

Assessment category and threshold value period	Threshold value $L_{Aeq,T}$ (dB)		
	Category A[A]	Category B[B]	Category C[C]
Night-time (23:00-07:00)	45	50	55
Evenings and weekends[D]	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75

Note 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2: If the ambient noise level exceeds the Category C threshold values given in the Table (i.e., the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total L_{Aeq} noise level for the period increases by more than 3 dB due to site noise.

Note 3: Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays.

The 5 dB(A) Change method suggests that noise from construction activities is significant if the total noise during construction (pre-construction ambient noise plus construction noise) is greater than the pre-construction ambient noise by 5 dB or more. This is subject to the following requirements:

- The construction noise alone must be greater than 65 dB $L_{Aeq,T}$ in the daytime, 55 dB $L_{Aeq,T}$ in the evening and 45 dB $L_{Aeq,T}$ in the night-time (minimum construction noise level).
- The duration of the construction activities would exceed a duration of one month unless works of a shorter duration are likely to result in a significant effect.

The 5 dB(A) Change method is suitable for assessing noise at noise sensitive buildings such as residential dwellings, hotels, buildings in religious use, buildings in educational use and buildings in health and/or community use.

The construction noise assessment set out in this Chapter utilises the noise data from BS 5228-1 within the CadnaA noise modelling software and is based on typical construction. For construction noise, where the BS 5228 ABC method significant effect threshold is exceeded for a residential receptor, the effect is deemed 'significant'. The magnitude of impact of significant effects is identified in **Table 12.5** below:

Table 12.5: Construction Noise Magnitude of Impact

Magnitude of Impact	$L_{Aeq,1hr}$ dB at receptor
High	Exceedance of the Threshold Value by > 5 dB
Medium	Exceedance of ABC Threshold Value by up to 5 dB
Low	Equal to or below the ABC Threshold Value by up to 5 dB
Negligible	Below the ABC Threshold Value by > 5 dB

Operational Noise Assessment – Phased Extraction

Operational noise impacts during the phased extraction stages have been assessed in accordance with the PPG guidance on the planning for mineral extraction. The guidance sets out noise level criteria to be achieved by mineral extraction operations and is as follows:

"MPAs should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10 dB during normal working hours (0700-1900). Where it will be difficult not to exceed the background level by more than 10 dB without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55 dB LAeq,1h (free field).

For operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10 dB and should not exceed 55 dB LAeq,1h (free field).

For any operations during the period 2200-0700 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42 dB LAeq,1h (free field) at a noise sensitive property.

Where the site noise has a significant tonal element, it may be appropriate to set specific limits to control this aspect. Peak or impulsive noise, which may include some reversing bleepers, may also require separate limits that are independent of background noise (e.g. Lmax in specific octave or third-octave frequency bands, and that should not be allowed to occur regularly at night).

Care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed.

Increased temporary daytime noise limits of up to 70 dB LAeq,1h (free field) for periods of up to eight weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds, where it is clear that this will bring longer term environmental benefits to the site or its environs.

Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB LAeq,1h (free field) limit referred to above should be regarded as the normal maximum."

The daytime criteria for typical site operations are based on the guidance set out in the PPG on mineral extraction. In this case a lower daytime noise limit has been identified as the background level plus 10 dB, with an upper noise limit of 55 dB $L_{Aeq,1h}$. An impact of low magnitude has been defined where the lower noise limit is predicted to be exceeded,

and an impact of medium magnitude where the upper limit is exceeded. An impact of high magnitude has been defined as where a level of 70 dB $L_{Aeq,1h}$ is exceeded.

During the evening hours the noise should not exceed the background sound level by plus 10 dB or 55 dB $L_{Aeq,1h}$, whichever is the lower. Therefore, an impact of medium magnitude has been defined where this limit is predicted to be exceeded. An impact of high magnitude has been defined as where a level of 55 dB $L_{Aeq,1h}$ is exceeded.

The PPG on mineral extraction advises that during the night, site noise levels should not exceed an absolute level of 42 dB $L_{Aeq,1h}$. The PPG on mineral extraction does not set out any limits for the night-time period relative to the background level, although BS 4142:2014 advises that a difference between background levels and operational noise levels of +5 dB is 'likely to be indication of an adverse impact'. Therefore, an impact of high magnitude has been defined where the background level plus 5 dB is predicted to be exceeded, and an impact of medium magnitude where the 42 dB $L_{Aeq,1h}$ limit is exceeded. An impact of high magnitude has been defined as where the WHO 'Guidelines for Community Noise' for external noise outside bedrooms of 45 dB L_{Aeq} is exceeded.

Table 12.6 below identifies the operational noise magnitude of impact for all noise sensitive receptors.

Table 12.6: Scale of Magnitude and Operational Noise Impact Criteria

Magnitude of Impact	Operational Noise Level (x) $L_{Aeq,T}$ (dB)		
	Daytime	Evening	Night-time
High	x >70	x > 55	x > 45
Medium	55 < x ≤ 70	L_{A90} + 10 < x ≤ 55	42 < x ≤ 45
Low	L_{A90} + 10 < x ≤ 55	x ≤ L_{A90} + 10 and ≤ 55	L_{A90} + 5 ≤ x ≤ 42
Negligible	x ≤ L_{A90} + 10 and ≤ 55	N/A	x < L_{A90} + 5 and < 42

Construction Traffic Noise – Site Establishment

Construction traffic noise (in respect of construction traffic on public roads) can be assessed by considering the short-term increase in traffic flows on public roads during construction works following the principles of CRTN and DMRB.

For construction traffic on public roads, the magnitude of the change in road traffic noise levels is considered using the criteria outlined in **Table 12.7** below. The relative levels are reproduced from the semantic scale for short-term changes in road traffic noise levels found in the DMRB guidance document.

Table 12.7: Scale of Magnitude Used in the Construction Traffic Noise Assessment

Magnitude of impact	Description
Large	Greater than 5 dB(A) change in sound level
Medium	3.0 dB(A) to 4.9 dB(A) change in sound level
Small	1.0 dB(A) to 2.9 dB(A) change in sound level
Negligible	0.9 dB(A) or less change in sound level

Operational Road Traffic Noise – Phased Extraction

The noise effects of the Proposed Development on the surrounding area have been assessed by considering the changes in traffic flow which are predicted to occur on the

existing road network due to the Proposed Development. Traffic flow data for the local road network, both with and without the Proposed Development, has been provided by the Project Transport Consultants, Arcus and is reported further in Chapter 14: Transport and Access **and Volume 3, Appendix 14.1**.

The predicted traffic flows have been utilised in CadnaA to predict the noise levels from road traffic at existing noise sensitive receptors. The overall effect of a change in road traffic noise is determined using assessment criteria that take into account the magnitude of the noise impact and the sensitivity of the receptors. An increase in noise level results in an adverse effect whilst a decrease in noise level results in a beneficial effect.

Operational road traffic noise levels are considered using the magnitude of change criteria outlined in **Table 12.8** The relative levels are reproduced from the semantic scale for long-term changes in road traffic noise levels found in the DMRB guidance document.

Table 12.8: Scale of Magnitude Used in the Operational Road Traffic Noise Assessment

Magnitude of impact	Description
Large	Greater than 5 dB(A) change in sound level
Medium	3.0 dB(A) to 4.9 dB(A) change in sound level
Small	1.0 dB(A) to 2.9 dB(A) change in sound level
Negligible	0.9 dB(A) or less change in sound level

12.3.7 Significance of Effects

For all phases of the Proposed Development the significance of effect is determined having regard to the magnitude of impact of the noise sources set against the sensitivity of the receptor (**Table 12.3**). **Tables 12.5 to 12.8** above present the criteria used within this Chapter for determining the magnitude of impact.

To determine the overall noise effect, the magnitude of impact and receptor sensitivity criteria are combined into the significance of effect matrix as shown in **Table 12.9**. The methodologies utilised reflect standard assessment criteria and good practice guidance for noise and vibration assessments.

Table 12.9: Framework for Assessment of the Significance of Effects

Magnitude of Effect	Sensitivity of Resource or Receptor				
	Very High	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

12.3.8 Assessment Limitations and assumptions

Data used to compile this report consists of primary noise information that has been measured and predicted by ACCON, and secondary information (e.g. traffic data, construction plant noise levels etc.) that has been derived from a variety of reputable and appropriate professional sources, and that information is assumed to be accurate. Where appropriate the Applicant has reviewed and approved assumptions contained within this Chapter.

12.4 BASELINE CONDITIONS

Noise Measurement Survey

A baseline noise monitoring survey has been carried out at various locations across the site. The baseline noise monitoring survey included three semi-permanent (24-hour) and 14 satellite (short-term) noise monitoring positions. Noise monitoring equipment was installed at the three semi-permanent locations on the 3rd August 2022 and the short-term noise monitoring was undertaken on the 4th August 2022.

Weather conditions during the survey were suitable for noise monitoring as wind speeds were < 6 m/s in a SW direction, and temperatures varied from 25°C during the daytime to 15°C during the night-time. There was approximately 5% cloud cover throughout the survey period. There was no precipitation during the noise survey.

The noise measurement locations and noise sensitive receptors have previously been identified in **Figure 12.1 and Figure 12.2** respectively. **Table 12.10** below provides a short description of each receptor.

Table 12.10: Noise Measurement Positions

Measurement Position	Description
MP1	Sutton Grange/ Low Farm – Sound level meter (SLM) was located in the garden of local residents. Typical noise sources observed were farm animals, farm machinery, bird song and distant road traffic.
MP2	Wetlands Fisheries – SLM was located in the garden of local residents in close proximity to the fishery. Typical noise sources observed were birdsong, distant farm machinery and distant road traffic.
MP3	Bellmoor Farm – SLM was located in the garden of the property. Typical noise sources observed were farm animals, distant farm machinery, bird song and distant road traffic.
MP4	SLM was located at the roadside of Sutton Lane. Sources of noise observed were continuous traffic and bird song.
MP5	SLM was located on a footpath within the SSSI. Sources of noise observed were trucks and various machinery and industrial noises from the existing Industrial Estate, trees rustling, distant road traffic and birdsong.
MP6	SLM was located on the pavement approximately 3 m from the kerbside of the A638. Sources of noise observed were jet washing activities from the nearby car wash, trains passing by and moderate traffic flows.
MP7	SLM was located on a footpath within the SSSI. Sources of noise observed were farm machinery, trees rustling in the wind, distant road traffic/train pass-bys and birdsong.
MP8A	SLM was located on a footpath within the SSSI. Sources of noise observed were nearby sheep bleating and tree leaves rustling in the wind.
MP8B	SLM was located on a footpath within the SSSI. Sources of noise observed were nearby sheep bleating and tree leaves rustling in the wind.
MP9	SLM was located on a footpath within the SSSI. Sources of noise observed were nearby sheep bleating and tree leaves rustling in the wind.

Measurement Position	Description
MP10	SLM was located on the pavement at Chainbridge Road. Sources of noise observed were a small plane overhead, very light traffic flows and birdsong.

The results of the long-term noise monitoring survey are provided in **Table 12.11**. The results of the short-term noise monitoring surveys are provided in **Table 12.12**. The short-term noise monitoring was undertaken during the daytime and the evening time. Positions where repeat measurements were undertaken have also been identified in **Table 12.12**.

Table 12.11: Summary of Long-term Noise Measurement Survey

Measurement Position	Measurement Period (hrs)	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)
MP1	0700 - 2300 (daytime)	49	88	40
	2300 - 0700 (night-time)	43	76	35
MP2	0700 - 2300 (daytime)	52	82	39
	2300 - 0700 (night-time)	45	84	31
MP3	0700 - 2300 (daytime)	48	91	39
	2300 - 0700 (night-time)	35	62	28

Table 12.12: Summary of Short-term Noise Measurement Survey

Measurement Position	Start Time	Duration	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)
MP4a	11:17	30 mins	71	81	48
MP4b - repeated in afternoon	14:09	30 mins	62	81	45
MP5	11:49	30 mins	47	63	41
MP6a	10:46	30 mins	73	86	57
MP6b - repeated in afternoon	13:32	30 mins	74	88	59
MP7	11:01	30 mins	48	64	45
MP8A	13:13	30 mins	51	70	44
MP8B	14:01	30 mins	42	68	37
MP9	14:55	30 mins	48	84	39
MP10a	12:17	30 mins	51	80	37
MP10b - repeated in afternoon	14:47	30 mins	46	64	37
MP4 - repeated in evening	17:48	20 mins	69	98	43
MP6 - repeated in evening	18:14	20 mins	74	89	56

Measurement Position	Start Time	Duration	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)
MP10 - repeated in evening	18:42	20 mins	43	65	35

12.5 DEVELOPMENT DESIGN MITIGATION

Measures to avoid or reduce potential operational noise effects at the nearest noise sensitive receptors have been incorporated into the design of the Proposed Development ('embedded mitigation'). This includes 'mitigation by design' whereby aspects of the Proposed Development have been re-designed to avoid or reduce effects. Embedded mitigation is taken into consideration when undertaking the assessment of significant effects. If significant effects are predicted, further mitigation is detailed.

12.5.1 Mitigation by Design

Construction Phases

An Outline Construction Environmental Management Plan (OCEMP) has been developed and is included in **Volume 3, Appendix 5.7**. This provides details of noise mitigation measures, which would be implemented to minimise any adverse effects on existing noise sensitive receptors during construction.

Extraction Phases

It is understood that the Site topography would change significantly as the extraction process continues throughout the project duration. Throughout all the main phases of extraction and before the restoration process, the majority of the Site would be bounded by approximately 6 m high sandstone embankments. As the PFA is extracted and the works go deeper, the embankments would provide noise mitigation as a result of the shielding between the site activities and the sensitive receptor locations. A detailed description of the extraction phases and how the Site evolves throughout its duration is provided in **Chapter 5, Project Description**.

Two options are considered in respect of screening for the haul road and the conveyor between lagoon 2 (HR P5) and lagoon 3 (HR P6):

- Option 1 - Haul Road and conveyor would be recessed by approximately 0.5 m and spoil from the excavation placed on top of the existing sandstone embankment. This would increase the height of the natural screening of the haul road and conveyor and reduce visibility from Bellmoor Farm.
- Option 2 - An environmental noise barrier of wooden construction with a height of 2 m would be constructed that runs parallel to the haul road and conveyor between lagoon 2 and lagoon 3.

As the precise details regarding the noise screening is yet to be decided, the screening has not been included in the noise modelling predictions which are therefore a worst-case scenario. It is expected that these details would be secured by a suitable planning condition in consultation with relevant parties. Note that the impacts on the properties at Bellmoor Farm from the haul road and conveyor in the absence of Option 1 and Option 2 have been assessed as not significant, however these additional measures are proposed to enhance noise and visual protection.

Main Processing Site – Night-time

The CHP plant and drying modules, which are required to be operational during the night-time, would have mitigation implemented in order to achieve the following:

- The CHP plant noise emissions would be mitigated using a standard noise enclosure in order to achieve <65 L_{Aeq} dB(A) at 10 m distance;
- The Drying plant would be contained within a standard acoustic enclosure. Noise levels are expected to achieve <65 dB(A) at 10 m distance; and
- The material storage building would be constructed with a cladding system with a 24 dB Rw sound reduction.

The material storage building would be constructed with a noise insulating cladding and any noise generating activities taking place within the material storage building at night-time would be required to not exceed a specific internal noise level of 80 dB(A).

12.6 ASSESSMENT OF LIKELY EFFECTS

12.6.1.1 Construction Effects

Construction Activities and Plant

Any major development has the potential to give rise to some noise disturbance for receptors within the vicinity of it during the construction phase. Disruption due to construction is generally a more localised phenomenon than the effects of the Proposed Development during extraction operations, and is temporary and short-term in nature.

The project phasing plan is presented in **Volume 3, Appendix 5.7**, which shows that the construction works would to an extent be completed in various stages as the phased extraction progresses, with, for example, sections of haul road and conveyors added in stages. However, the main/initial construction works are likely to take place over an approximate 6 month period at the start of the Proposed Development.

The construction activities plant list is provided in **Appendix 12.1.** Precise locations for all construction activities have not been identified at this stage of the Proposed Development, which is standard practice at the planning stage. However, ACCON have used professional judgement and previous experience from similar construction projects in order to identify a reasonable worst-case location for each activity in the various construction scenarios, i.e. where applicable, activities have been modelled as close to the Site redline boundary as possible. In practice, the noise modelling scenarios would only occur over a short duration. It is considered that this assessment provides a very worst-case assessment based on the assumed plant utilisation and positioning.

An assessment of the likely noise levels at the nearest noise sensitive receptors has been carried out.

There are 13 activities required in order to complete the construction phases. The activities are identified below:

- Road and hard surface construction
- Conveyor Sections and Plant
- CHP Plant
- Gas reception infrastructure
- Gas main infrastructure
- Drying Plant
- Silo construction
- Fence and gating construction
- Office and welfare facilities
- Spoil removal

- Storage building – Optimisation
- Storage Building – Main
- Contingency works

The construction of the drying plant and silos is expected to take place over a duration of 24 months. However, it is expected that the majority of construction activities would take place during the first 3 months, as a worst-case scenario. The exact start and end dates for each activity has not been finalised, but an indicative programme has been identified for assessment purposes. In order to configure the noise prediction model, the construction programme has been split into five scenarios. The specific scenario start and end month, and the activities taking place during each scenario are identified below:

- Scenario 1 (Month 1):
    - Road and hard surface construction
    - Conveyor Sections and Plant
    - CHP Plant
    - Gas reception infrastructure
    - Drying Plant
    - Silo construction
    - Fence and gating construction
    - Office and welfare facilities
    - Spoil removal
    - Storage building – Optimisation
    - Contingency works
- Scenario 2 (Month 2-3):
    - Road and hard surface construction
    - Conveyor Sections and Plant
    - Drying Plant
    - Silo construction
    - Fence and gating construction
    - Office and welfare facilities
    - Spoil removal
    - Contingency works
- Scenario 3 (Month 4-6):
    - Drying Plant
    - Silo construction
    - Office and welfare facilities
- Scenario 4 (Month 7-12):
    - Gas main infrastructure
    - Drying Plant

- Silo construction
- Office and welfare facilities
- Storage building – Main

- Scenario 5 (Month 13-24):
  - Drying Plant
  - Silo construction

Construction Noise Thresholds

The daytime ambient noise level in the vicinity of the identified noise sensitive receptors and the associated 'ABC' category, where appropriate, is detailed in **Table 12.13**. The daytime ambient noise levels (L_{Aeq}) have been obtained from the noise survey measurement data. **Table 12.13** below identifies the significant effect thresholds at each NSR considered in the construction noise assessment.

It should be noted that the significant threshold level for all ecological receptors has been defined as 55 dB(A). The 55 dB(A) limit was derived via consultation with the Nottinghamshire Wildlife Trust in January 2022. Further information is provided in **Chapter 8, Ecology and Ornithology**.

Table 12.13: Construction Noise Thresholds

NSR	Receptor Name	Daytime Ambient Noise Level (NML*)	Rounded Ambient Noise Level	ABC Category	Significant Effect Threshold $L_{Aeq,T}$ dB(A)
1	Wetlands Fisheries	52 (MP2)	55	A	65
2	Sutton-cum-lound	51 (MP10)	55	A	65
3	Low Farm/Sutton Grange Farm	49 (MP1)	50	A	65
4	Bellmoor Farm	48 (MP3)	50	A	65
5	Footpath SSSI (Ecological receptor)	48 (MP7)	50	n/a	55**
6	Footpath Tiln (Ecological receptor)	42 (MP8B)	40	n/a	55**
7	River Idle Footpath (Ecological receptor)	48 (MP9)	40	n/a	55**
8	River Idle Footpath (Ecological receptor)	51 (MP8A)	50	n/a	55**
9	45 Sutton Lane	73 (MP6)	75	C	75
10	Brooklyn House - North Road	73 (MP6)	75	C	75

*The NML considered representative of the ambient noise level at the NSR.

**Threshold derived from consultation with the project Ecology and Ornithology teams. This is the typical maximum noise level (L_{Amax}) where disturbance to local birds and wildlife is likely to occur.

Construction Noise Predictions

Noise predictions have been completed for all stages of the construction works utilising the CadnaA noise modelling software. The noise modelling has considered the noise sensitive receptors identified above in **Table 12.13**. **Table 12.14** provides the results of the construction noise modelling and compares the predicted noise level with the criteria identified in **Table 12.13.**

Table 12.14: Construction Noise Assessment

NSR	Ambient Noise Level	Predicted Activity Noise Level $L_{Aeq,1hr}$ dB	Significant Effect Threshold	Noise Level Below threshold of Significance?
Scenario 1				
1	52	38	65	✓
2	51	40	65	✓
3	49	33	65	✓
4	48	56	65	✓
5	47	61	55*	×
6	51	42	55*	✓
7	42	37	55*	✓
8	48	47	55*	✓
9	73	59	75	✓
10	73	63	75	✓
Scenario 2				
1	52	37	65	✓
2	51	39	65	✓
3	49	32	65	✓
4	48	56	65	✓
5	47	59	55*	×
6	51	41	55*	✓
7	42	35	55*	✓
8	48	45	55*	✓
9	73	57	75	✓
10	73	61	75	✓
Scenario 3				
1	52	30	65	✓
2	51	34	65	✓
3	49	27	65	✓
4	48	38	65	✓
5	47	56	55*	×
6	51	37	55*	✓
7	42	31	55*	✓
8	48	41	55*	✓
9	73	53	75	✓

10	73	57	75	✓
Scenario 4				
1	52	32	65	✓
2	51	36	65	✓
3	49	28	65	✓
4	48	40	65	✓
5	47	58	55*	×
6	51	38	55*	✓
7	42	33	55*	✓
8	48	42	55*	✓
9	73	56	75	✓
10	73	60	75	✓
Scenario 5				
1	52	18	65	✓
2	51	17	65	✓
3	49	17	65	✓
4	48	24	65	✓
5	47	52	55*	✓
6	51	35	55*	✓
7	42	30	55*	✓
8	48	23	55*	✓
9	73	52	75	✓
10	73	46	75	✓

An assessment of the sensitivity, magnitude and significance of construction noise effects for each receptor is set out in **Table 12.15**. All construction effects detailed below would comprise multiple short-term, temporary phases and be of significance at the local level. It should also be noted that people are generally more tolerant of higher noise levels if they know that they are only going to be of a short duration which would reduce the likelihood of complaint.

Table 12.15: Construction Noise – Significance of Effects

NSR	Receptor Name	Sensitivity	Magnitude of Effect	Significance of Effect
1	Wetlands Fisheries	Very High	Negligible	Minor
2	Sutton-cum-lound	Very High	Negligible	Minor
3	Low Farm/Sutton Grange Farm	Very High	Negligible	Minor
4	Bellmoor Farm	Very High	Negligible	Minor
5	Footpath SSSI (Ecological receptor)	Very High	**Medium**	**Major**
6	Footpath Tiln (Ecological receptor)	Very High	Negligible	Minor
7	River Idle Footpath (Ecological receptor)	Very High	Negligible	Minor
8	River Idle Footpath (Ecological receptor)	Very High	Negligible	Minor
9	45 Sutton Lane	Very High	Negligible	Minor
10	Brooklyn House - North Road	Very High	Negligible	Minor

The construction noise significance of effect is generally of **minor significance.** The construction noise effect at NSR 5 is considered to be of **major significance** in the absence of additional noise screening.

Construction Traffic

Information relating to construction traffic flows are provided in **Chapter 14, Tables 14.5 and 14.6.** Construction traffic is proposed to utilise the A638 in order to deliver the required construction material to the Site. A total of 50 vehicles per day are predicted during peak construction phases of the Proposed Development. The total number of HGVs is predicted to be 20 per day. The resultant increases in traffic noise at receptors in the vicinity of the A638 would be less than 1 dB(A).

Therefore, the potential effects upon surrounding noise sensitive receptors as a result of construction traffic would be negligible and not considered to be significant for the purposes of this environmental impact assessment. Potential construction traffic noise effects are considered to be of **minor significance**.

12.6.1.2 Operational Effects - Extraction and Restoration Phases

The operational effects assessment considers both the extraction and restoration phases together. This is due to the operational programme identifying that excavation and restoration activities will take place concurrently throughout the duration of the project.

The operational noise assessment has been split into two sections: the operational extraction phases which would take place during the daytime, and the PFA drying

operations which are understood to take place during both the daytime and the night-time within the main storage building located in the Main Processing Site.

Operational phases during both the daytime and night-time would be required to meet the absolute noise level criteria as identified in **Table 12.6**: Scale of Magnitude and Operational Noise Impact Criteria.

Operational Noise Levels

The predicted operational noise levels have been calculated in CadnaA noise modelling software and take into account the following:

- Location and types of plant such as mobile screens and excavators;
- Percentage on-times of operational plant;
- The number of each plant; and
- Phasing of extraction/restoration operations.

The plant list is provided in **Appendix 12.1**. In order to predict the likely operational noise levels at each of the NSRs the operational programme has been split into 11 scenarios. These scenarios take into account the phasing as described in Chapter 5, Project Description. The noise modelling scenarios are identified in **Table 12.16** below.

Table 12.16: Operational Noise Modelling Scenarios

Stage/Scenario	Phase	Activity
1	HR P1	Site Establishment
2	HR P1	Extraction
	LR P1	Soakaway Ponds Construction
	LR P2	Filter Ponds Construction
3	HR P1	Restoration
	HR P2	Excavation
4	HR P2	Restoration
	LR P3	Excavation
5	LR P3	Restoration
	LR P4	Excavation
6	LR P4	Restoration
	LR P5	Excavation
7	LR P5	Restoration
	HR P3	Excavation
8	HR P3	Restoration
	HR P4	Excavation
9	HR P4	Restoration
	HR P5	Excavation
10	HR P5	Restoration
	HR P6	Excavation
11	LR P1	Restoration
	LR P2	Restoration
	HR P6	Restoration

Predicted Operational Noise Levels - Daytime

The results of the operational noise predictions for each scenario are presented in **Table 12.17** and **Table 12.18**.

Table 12.17: Operational Noise levels – Daytime – Scenario 1 to 7

NSR	Operational Noise Level $L_{Aeq,1hr}$ dB						
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
1	28	41	41	42	41	40	59
2	29	38	38	38	38	37	43
3	25	36	36	38	40	42	48
4	38	46	46	45	45	45	46
5	42	43	43	43	43	43	43
6	28	43	42	40	40	40	41
7	25	33	33	33	34	33	36
8	32	47	48	45	45	45	46
9	40	43	43	43	43	43	43
10	43	44	44	44	44	44	44

Table 12.18: Operational Noise levels – Daytime – Scenario 8 to 11

NSR	Operational Noise Level $L_{Aeq,1hr}$ dB			
	Scenario 8	Scenario 9	Scenario 10	Scenario 11
1	64	40	37	32
2	46	38	39	31
3	45	35	33	28
4	46	47	62	45
5	43	43	44	43
6	40	38	39	33
7	34	32	33	27
8	50	50	50	41
9	43	43	44	43
10	44	44	45	44

Predicted Operational Noise Levels – Night-time

It is understood that the PFA drying process taking place within the Main Processing Site is proposed to be operational during the night-time. Noise predictions have been undertaken, and the resultant noise levels are identified in **Table 12.19**. The night-time noise predictions consider the following sources:

- CHP and Drying Modules; and
- PFA drying within the material storage building.

Table 12.19: Operational Noise levels – Night-time

NSR	Operational Noise Level $L_{Aeq,T}$ dB
1	23
2	22
3	21
4	29
5	42
6	24
7	19
8	28
9	39
10	42

Operational Effects

An assessment of the sensitivity, magnitude and significance of operational noise effects during the daytime and night-time respectively for each receptor is set out in Error! Reference source not found. and Error! Reference source not found..

Table 12.20: Operational Noise levels – Magnitude of Impact – Scenario 1 to 7

NSR	Magnitude of Impact						
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	**Medium**
2	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
3	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
4	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
5	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
6	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
7	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

8	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
10	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Table 12.21: Operational Noise levels – Magnitude of Impact – Scenario 8 to 11

NSR	Magnitude of Impact			
	Scenario 8	Scenario 9	Scenario 10	Scenario 11
1	**Medium**	Negligible	Negligible	Negligible
2	Negligible	Negligible	Negligible	Negligible
3	Negligible	Negligible	Negligible	Negligible
4	Low	Low	**Medium**	Low
5	Negligible	Negligible	Negligible	Negligible
6	Negligible	Negligible	Negligible	Negligible
7	Negligible	Negligible	Negligible	Negligible
8	Negligible	Negligible	Negligible	Negligible
9	Negligible	Negligible	Negligible	Negligible
10	Negligible	Negligible	Negligible	Negligible

Table 12.22: Operational Noise levels – Magnitude of Impact – Night-time

NSR	Operational Noise Level $L_{Aeq,1hr}$ dB
1	Negligible
2	Negligible
3	Negligible
4	Negligible
5	Negligible
6	Negligible
7	Negligible
8	Negligible
9	Negligible
10	Low

The significance of effect at each receptor due to operational noise from the Proposed Development is identified in **Tables 12.23** to **Table 12.25**.

Table 12.23: Operational Noise levels – Significance of Effect – Scenario 1 to 7

NSR	Significance of Effect						
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
1	Minor	Minor	Minor	Minor	Minor	Minor	**Major**
2	Minor	Minor	Minor	Minor	Minor	Minor	Minor
3	Minor	Minor	Minor	Minor	Minor	Minor	Minor
4	Minor	Minor	Minor	Minor	Minor	Minor	Minor
5	Minor	Minor	Minor	Minor	Minor	Minor	Minor
6	Minor	Minor	Minor	Minor	Minor	Minor	Minor
7	Minor	Minor	Minor	Minor	Minor	Minor	Minor
8	Minor	Minor	Minor	Minor	Minor	Minor	Minor
9	Minor	Minor	Minor	Minor	Minor	Minor	Minor
10	Minor	Minor	Minor	Minor	Minor	Minor	Minor

Table 12.24: Operational Noise levels – Significance of Effect – Scenario 8 to 11

NSR	Significance of Effect			
	Scenario 8	Scenario 9	Scenario 10	Scenario 11
1	**Major**	Minor	Minor	Minor
2	Minor	Minor	Minor	Minor
3	Minor	Minor	Minor	Minor
4	**Moderate**	**Moderate**	**Major**	**Moderate**
5	Minor	Minor	Minor	Minor
6	Minor	Minor	Minor	Minor
7	Minor	Minor	Minor	Minor
8	Minor	Minor	Minor	Minor

9	Minor	Minor	Minor	Minor
10	Minor	Minor	Minor	Minor

The assessment has identified potential moderate to major significant effects at Bellmoor Farm and Wetlands Fisheries. This is due to the proposed restoration activities when they are closest to these properties, which occur over a short-term duration rather than the longer-term extraction of the PFA itself. The restoration activities leading to the potential impacts relate solely to the removal of the lagoon embankments closest to these NSRs in order to provide restoration fill, which brings activities up to the boundary of the Site and closer to the NSRs. The prior extraction of PFA does not contribute to this potential impact, largely due to containing extractive activities which are screened behind the lagoon embankments.

It follows that the impacts associated with the aforementioned 'restoration activities' would be short-term in that they are limited to the relatively short amount time required to remove the embankments following extraction of PFA behind them, which is likely to be only a few weeks. All other impacts as a result of the Proposed Development at these NSRs are not significant.

Table 12.25: Operational Noise levels – Significance of Effect – Night-time

NSR	Significance of Effect
1	Minor
2	Minor
3	Minor
4	Minor
5	Minor
6	Minor
7	Minor
8	Minor
9	Minor
10	**Moderate**

12.7 CUMULATIVE EFFECTS ASSESSMENT

ACCON have reviewed a number of developments, both proposed and consented within 5 km of the Site. These developments are set out in **Table 12.26**: Cumulative Sites.

Table 12.26: Cumulative Sites

Development Reference Number	Status	Approximate Distance and direction from the Site
17/01509/FUL	Approved - Mon 27 Apr 2020	1.09 km north of the Site
21/01666/RES	Approved - Tue 28 Jun 2022	5.28 km north west of the Site
20/01405/FUL	Approved - Fri 19 Feb 2021	1.2km East of the Site
21/00508/VOC	Approved - Mon 05 Jul 2021	1.2km East of the Site
19/00157/SCR	Not EIA - Mon 25 Feb 2019	3.04 km south east of the Site
17/00931/FUL	Granted 04 Apr 2018	0.1 km west of the Site

SITE HS7	Approved	0.38 km south west of the Site
SITE HS13	Approved	4.06 km south of the Site

Construction and Operational Traffic

Any cumulative effects are likely to occur due to construction and operational road traffic on the local network. The assessment of construction and operational traffic on the existing local road network has indicated that there would be a negligible increase in road traffic noise for existing noise sensitive receptors during all phases.

The additional traffic flows due to cumulative developments within 5 km of the sites are expected to be much greater than the additional traffic generated by the Proposed Development, and as such the resultant changes in noise levels alongside the local highway network will be dominated by those developments. Therefore, cumulative effects due to potential traffic increases are **negligible** and of **minor significance**.

Operational and Restoration Phases

Cumulative developments are located at a distance where cumulative noise effects during operational and restoration phases would be negligible. Operational and restoration noise emissions from the Proposed Development are localised to nearby receptors. Therefore, noise arising from all phases of the Proposed Development are unlikely to cause cumulative noise impacts in the vicinity of the surrounding proposed developments.

Cumulative operational and restoration effects are considered to be **negligible** and of **minor significance.**

12.8 MITIGATION AND RESIDUAL EFFECTS

Outlined below are the potential effects, and proposed mitigation measures that would be implemented to reduce noise impacts, and subsequent residual effects. A further consideration of specific noise sources and effects is also considered, particularly for night-time working.

Construction Phases

The following mitigation measures would be implemented:

- All vehicles and mechanical plant would be fitted with effective exhaust silencers and would be maintained in good efficient order;
- Machines in intermittent use would be shut down in the intervening periods between use or throttled down to a minimum;
- All ancillary plant such as generators and pumps would be positioned so as to cause minimum noise disturbance, and where necessary, acoustic enclosures would be provided;
- Where practicable, the use of noisy plant would be limited to core daytime periods;
- Channels of communication would be established between the contractor / developer, Local Planning Authority and residents; and
- A Site representative would be appointed who would be responsible for matters relating to noise.

The noise sensitive receptors that could be affected by the construction activities are ecological in nature, and the following should be taken into consideration when discussing the residual impacts.

The construction noise impact assessment has assumed a very worst-case in each construction scenario with regards to the location of noisy activities and their source noise

level. In practice the magnitude of the construction noise levels throughout the duration of the construction programme would likely be less than predicted.

The construction activities which contribute to the impacts identified previously in this chapter would take place over a short-term duration of less than six months. The highest noise levels are expected during the first month of the construction programme and the total noise level at noise sensitive receptors would decrease in the subsequent three months of the construction activities. The main potentially noisy construction activities are expected to take place in the first year of the Proposed Development.

It should be noted that during the noise survey and site visit there were various noise sources of an industrial nature in the area, including from the Bellmoor Industrial Estate. Therefore, the introduction of short-term construction noise is not considered to be out of character for the area and existing wildlife within the SSSI are likely already habituated to short-term industrial noises.

The residual effects, when the above is taken into consideration and after implementation of the proposed mitigation are considered to be of **negligible** to **minor significance**.

Extraction and Restoration Phases

The assessment has identified potential short-term moderate to major significant effects at Bellmoor Farm and Wetlands Fisheries, due to limited restoration activities. Importantly, this is due to restoration activities only rather than the longer-term extraction of PFA. The restoration activities leading to the impacts relate solely to the removal of the lagoon embankments closest to these NSRs in order to provide restoration fill, which brings activities up to the boundary of the Site and closer to the NSRs for a limited time. The prior extraction of PFA does not contribute to this impact, largely due to containing extractive activities behind the significant lagoon embankments, using them as a noise screen.

It follows that the impacts associated with the aforementioned 'restoration activities' would be short-term in that they are limited to the time required to remove the embankments following extraction of PFA behind them, which is likely to be only a few weeks. All other impacts as a result of the Proposed Development at these NSRs are assessed as not significant. Mitigation options in this instance are limited due to the nature of the restoration works, i.e. the continual movement of sandstone spoil and the use of heavy machinery.

Therefore, the following recommendations for noise mitigation would be applied:

- Occupants at Bellmoor Farm and Wetlands Fisheries would be kept informed of the likely duration of the restoration activities;
- Care would be taken to ensure dozer engines are switched off when not in use;
- Restoration operations would retain as much of the existing sandstone embankment throughout the works as possible, in order to provide some level of screening for the NSRs;
- Restoration works being undertaken within line of sight of any NSR would be completed as efficiently and as quickly as possible; and
- Acoustic blankets attached to Heras fencing to provide local mitigation at the Site boundary where line-of-sight to affected NSRs is identified.

The residual effects after the above is taken into consideration and the implementation of mitigation, are considered to be of **negligible** to **minor significance**.

Night-Time Works

The following context is provided and should be taken into consideration. The closest NSR to the night-time working activities is NSR 10 located at Brooklyn House. In this instance is it appropriate to consider that the night-time ambient noise levels would be significantly affected by road traffic noise on the A638, and road traffic noise is expected to be the dominant source of noise in this location. Furthermore, when residents are located inside their dwellings the predicted noise levels are low enough so as to not cause noise disturbance at night-time or interrupt sleep. In circumstances where residents open their windows for ventilation during the warmer summer months, the internal noise levels are not expected to exceed internal noise level thresholds as identified in BS 8233.

The residual effects after the above is taken into consideration are considered to be of **negligible** to **minor significance.**

12.9 SUMMARY OF EFFECTS

Table 12.27 provides a summary of effects detailed within this Chapter.

Table 12.27: Summary of Effects

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
1	Noise from construction activities	Minor	None proposed	Minor
2		Minor	None proposed	Minor
3		Minor	None proposed	Minor
4		Minor	None proposed	Minor
5		**Major**	CEMP controlled mitigation	Minor
6		Minor	None proposed	Minor
7		Minor	None proposed	Minor
8		Minor	None proposed	Minor
9		Minor	None proposed	Minor
10		Minor	None proposed	Minor
Operational and Restoration Phases				
1	Noise from extraction and restoration phases	**Major***	**See Section 12.8***	Minor
2		Minor	None proposed	Minor
3		Minor	None proposed	Minor
4		**Major***	**See Section 12.8***	Minor
5		Minor	None proposed	Minor
6		Minor	None proposed	Minor
7		Minor	None proposed	Minor
8		Minor	None proposed	Minor
9		Minor	None proposed	Minor
10		Minor	None proposed	Minor

*The major significance of effect at NSRs 1 and 4 are due to noise from restoration stages when the existing sandstone embankments are removed and levelled. The significance of effects can be reduced by implementation of the mitigation options as set out in **Section 12.8**

12.10 SUMMARY STATEMENT OF SIGNIFICANCE

The Chapter has identified potential significant effects at the closest noise sensitive receptors. These significant effects can be reduced through the implementation of those mitigation measures and through the consideration of the additional information (see Section 12.8) as set out in this Chapter.

The main noise impacts predicted within this Chapter are due primarily to the short-term temporary construction and restoration activities. The construction noise impacts are likely to affect the nearest NSRs for a maximum of six months, with some additional shorter-term periods of construction, and the restoration activities are likely to affect the nearest NSRs for a period of weeks. Mitigation options have been identified and discussed in this chapter.

Additionally, the noise impact assessments contained within this chapter have considered the worst-case scenarios where the predicted noise levels are continuous, including for night-time working. In practice the absolute noise levels and the magnitude of significance are likely to be lower when further context is taken into consideration as discussed above in **Section 12.8.**

Therefore, in conclusion, the significance of effects due to the Proposed Development are as follows:

- The significance of effect due to construction activities is considered to be of **minor significance**.
- The significance of effect due to operational phases (night-time working only) is considered to be of **minor significance**.
- The significance of effect due to restoration phases is considered to be of **minor significance**.