The Drax Power (Generating Stations) Order

Land at, and in the vicinity of, Drax Power Station, near Selby, North Yorkshire

Environmental Statement
7 – Noise and Vibration

The Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

Drax Power Limited

Drax Repower Project

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7 NOISE AND VIBRATION

7.1 Introduction

7.1.1. This Chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Scheme regarding noise and vibration. The Chapter considers the potential noise and vibration effects as a result of the construction phase, the operational phase and the decommissioning phase for the Proposed Scheme.

7.1.2. The Chapter describes the assessment methodology, the baseline conditions at the Site and in the surrounding area, any primary and tertiary mitigation adopted for the purposes of the assessment, a summary of the likely significant effects taking into account national legislation, the further (secondary) mitigation measures required to prevent, reduce or offset any significant negative effects, and the likely residual effects after these measures have been employed.

7.1.3. This Chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to the Chapter 9 (Biodiversity**)** for potential noise effects at sensitive ecological receptor locations.

7.2 Policy, Legislation and Guidance

Policy

7.2.1. The applicable policy framework is summarised as follows:

- National Policy Statement EN-1 (Ref. 7.1).
- National Policy Statement EN-2 (Ref. 7.2).
- The National Planning Policy Framework (NPPF, DCLG 2012) (Ref. 7.3).
- The Noise Policy Statement for England 2010 (NPSE) (Ref. 7.4).

National Policy Statement

7.2.2. The NPS EN-1 (Overarching National Policy Statement for Energy) (Ref. 7.1); sets out the assessment principles to which the SoS will have regard to in the examination of an energy Nationally Significant Infrastructure Project (NSIP), and explains the generic noise and vibration impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2).

7.2.3. NPS EN-1 sets out the requirements for a noise assessment of an energy NSIP and also outlines the approach that the SoS should adopt when considering noise assessments. Paragraph 5.11.9 requires the SoS to be satisfied that the proposals will:

- Avoid significant adverse impacts on health and quality of life from noise.
- Mitigate and minimise other adverse impacts on health and quality of life from noise.
- Where possible, contribute to improvements to health and quality of life through the effective management and control of noise.

7.2.4. NPS EN-2 (Ref. 7.2); sets out assessment principles in respect of fossil fuel energy generation NSIPs. It states that the SoS must be satisfied that the principles set out at paragraph 5.11.9 of NPS EN-1 have been satisfied, and notes that mitigation for noise for such proposals is likely to be primarily through good design (i.e. enclosures, exhaust attenuation to turbines) and refers to the use of requirements attached to the DCO to secure relevant mitigation. The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Pipeline, and Electrical Connection Compound and Electrical Connection respectively.

Other National Policy

7.2.5. Whilst the Planning Act 2008 is clear as to the primacy of the relevant NPSs, other national and local planning policy can be considered important and relevant by the SoS in the determination of an energy NSIP.

7.2.6. The National Planning Policy Framework (NPPF, DCLG 2012) (Ref. 7.3); states that planning policies and decisions should aim to:

- Avoid noise that gives rise to significant adverse impacts on health and quality of life as a result of new development.
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions.
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

7.2.7. In order to deliver sustainable development, the NPPF states "to help economic growth, local planning authorities should plan proactively to meet the development needs of business and support an economy fit for the 21st century" (paragraph 20, page 6). Planning Practice Guidance (PPG) has been published alongside the NPPF, and is regularly updated, to provide guidance on the implementation of the planning policies.

7.2.8. It is noted that at the time of writing this ES a revision to the NPPF is under preparation and is currently at the draft stage. The draft NPPF currently states the following aims relating to noise and planning:

- 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 and living conditions, 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:

a) 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 quality of life;
b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

7.2.9. The PPG on noise provides guidance on the effects of noise exposure. The PPG sets out that sensitivity to noise is proportional to the level of noise receptors are exposed to. The PPG sets out the concepts of 'no observed effect level' (NOEL), and as exposure increases, 'lowest observed adverse effect level' (LOAEL) and 'significant observed adverse effect level' (SOAEL).

National Policy Statement for England

7.2.10. The Noise Policy Statement for England 2010 (NPSE) (Ref. 7.4); sets out the Government's guiding principles and noise policy aims, the first of which is:

7.2.11. *"Through the effective management and control of environmental, 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.*
- *Where possible, contribute to the improvement of health and quality of life."*

7.2.12. The NPSE uses two established concepts from toxicology currently applied to noise impacts, which are as follows:

- NOEL - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL - the level above which adverse effects on health and quality of life can be detected.

7.2.13. The NPSE extends these to the concept of a SOAEL:

- SOAEL - The level above which significant adverse effects on health and quality of life occur.

7.2.14. The driving aim of the NPSE is to mitigate and minimise adverse impacts on health and quality of life, it refers to the situation where such impacts lie somewhere between LOAEL and SOAEL:

7.2.15. *"…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into account the guiding principles of sustainable development…."*

7.2.16. The Government's noise policy notes that it is not appropriate to implement a single noise threshold that defines SOAEL that is applicable to all situations. The application of the SOAEL threshold should be specific to the noise source being

considered, taking account of different sources of exposure, receptor sensitivity and context.

7.2.17. This is consistent with consideration of Best Available Techniques (BAT) or appropriate measures under Environmental Permitting regulations. Importantly, this would mean that any time noise levels could be above LOAEL, there would be a requirement to demonstrate the noise mitigation that has been considered, and a cost/benefit demonstration as to why other measures are not being implemented.

7.2.18. The noise and vibration significance criteria framework used for this study has been based around these concepts. These concepts and how they are used in this study are discussed further in Section 7.7.

Legislation

7.2.19. The applicable legislative framework is summarised as follows:

- The Control of Pollution Act (CoPA) 1974 (Sections 60 to 61) (Ref. 7.5).
- The Environmental Permitting (England and Wales) Regulations (EPR) 2016 (Ref. 7.6)

Further Details on Legislation

- The Control of Pollution Act (CoPA) 1974 (Sections 60 to 61) (Ref. 7.5); Requirements for a Section 61 consent are defined in the CoPA as follows: *'At the planning stages of the construction programme and the setting up of the site, the contractor needs to demonstrate that the impact of noise and vibration has been properly considered when choosing plant and equipment and also, where possible, in the layout of the site and the scheduling of works. To this end the consent identifies methods of work and noise reducing measures required to minimise the noise impact'.*
- The Environmental Permitting (England and Wales) Regulations (EPR) 2016 (Ref. 7.6); The EPR 2016 require regulators to control certain activities which could harm the environment or human health.

Guidance

7.2.20. The following guidance documents have been used during the preparation of this Chapter:

- Institute of Environmental Assessment 'Guidelines for the Environmental Assessment of Road Traffic' (Ref. 7.7).
- BS 7445 (2003): Description and Measurement of Environmental Noise (Ref. 7.8).
- BS 5228, Parts 1&2 (2009) + A1 (2014): Noise and Vibration Control on Construction and Open Sites (Ref. 7.9).
- BS 6472 (2008): Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hertz (Hz) to 80 Hz) (Ref. 7.10).
- BS 7385 (1993) Part 2: Evaluation and Measurement for Vibration in Buildings (Ref. 7.11).
- BS 4142 (2014): Methods for rating and assessing industrial and commercial sound (Ref. 7.12).

- BS 8233 (2014): Guidance on sound insulation and noise reduction for buildings (Ref. 7.13).
- ISO 9613 (1996): Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. (Ref. 7.14).

Further Details on Guidance

- Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA's)) 'Guidelines for the Environmental Assessment of Road Traffic' (Ref. 7.7).
- BS 7445 (2003): Description and Measurement of Environmental Noise (Ref. 7.8); This Standard defines parameters, procedures and instrumentation required for noise measurement and analysis.
- BS 5228, Parts 1&2 (2009) + A1 (2014): Noise and Vibration Control on Construction and Open Sites (Ref. 7.9); This Standard provides an industry-accepted guide for noise and vibration control, and includes Sound Power Level (SWL) data and measured noise data at 10 m for individual plant, as well as a calculation method for noise from construction activities. This Standard also provides practical information on noise reduction measures, suggested noise limits and promotes a 'best practicable means' approach to control noise and vibration during construction activities.
- BS 6472 (2008): Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hertz (Hz) to 80 Hz) (Ref. 7.10). This Standard presents recommended frequency weighted vibration spectra (for continuous vibration) and Vibration Dose Values (VDV) (for intermittent vibration), above which adverse impacts are likely to occur in residential properties.
- BS 7385 (1993) Part 2: Evaluation and Measurement for Vibration in Buildings (Ref. 7.11); This Standard establishes the basic principles for carrying out vibration measurements and processing the data with regard to evaluating vibration impacts on buildings. In addition, this Standard presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage.
- BS 4142 (2014): Methods for rating and assessing industrial and commercial sound (Ref. 7.12); This Standard can be used for assessing the impact of noise from industrial processes and plant items. The method compares the difference between the 'rating level' of the new noise with the measured 'background level' at receptor positions.
- BS 8233 (2014): Guidance on sound insulation and noise reduction for buildings (Ref. 7.13); BS 8233 provides guidance for the control of noise in and around buildings. This Standard draws on the results of research and experience to provide information on the design of buildings, internal acoustic environments appropriate to their functions, and suitable external limits for amenity areas. It deals with control of external plant noise from outside of buildings and noise from plant and services within buildings.
- ISO 9613 (1996): Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. (Ref. 7.14) Describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of

sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in ISO 1996) under meteorological conditions.

Additional Guidance

7.2.21. Other guidance used in the assessment includes:

- The DfT (Welsh Office Memorandum): Calculation of Road Traffic Noise (1988). (Ref. 7.15) This Memorandum describes procedures for traffic noise calculations and is suitable for environmental assessments of schemes (including in England) where road traffic noise may have an impact.
- The Design Manual for Roads and Bridges (DMRB) produced by the Highways Agency (now Highways England) (Volume 11, Section 3, Part 7, HA 213/11, 2011). (Ref. 7.16) This Manual provides guidance on the assessment of road traffic noise. It presents a means of assessing road traffic noise, and provides advice on appropriate methodologies for assessment and potential impacts.
- The World Health Organisation (WHO) Guidelines for Community Noise (1999). (Ref. 7.17) These Guidelines discuss noise impacts generally and recommend guideline noise limits for community noise.
- The World Health Organisation - Night Time Noise Guidelines for Europe: 2009. (Ref. 7.18).
- Institute of Environmental Management & Assessment (IEMA) - Guidelines for Environmental Noise Impact Assessment 2014. (Ref. 7.19) The IEMA Guidelines are applicable to noise impact assessment and include core principles to achieve integration with the Environmental Impact Assessment (EIA) process. These Guidelines provide the minimum requirements for the scoping of the assessment, establishing an effective noise baseline, identifying the noise impacts and describing their consequential effects.

7.3 Scoping Opinion and Consultation

Consultation

7.3.1. Table 7-1 provides a summary of the consultation activities undertaken in support of the preparation of this Chapter.

Table 7-1 - Summary of Consultation Undertaken to Date (Noise and Vibration)

Body / Organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Environmental Health Officer (EHO) – Selby District Council	11 August 2017 (email)	Ambient noise survey methodology. The EHO has written an email to confirm that they have reviewed the WSP ambient noise survey methodology and are happy with the survey.

Body / Organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
		Agreement is welcome.
EHO – Selby District Council	06 September 2017 (email)	The EHO has written to confirm that in principle, Selby District Council are happy for WSP to use previous available baseline noise data, (measured for the Drax White Rose project) to inform the study, provided that WSP set out the reasons for the suitability/usage of the data in the assessment. A confirmation email was sent (06 September 2017) to agree that reasons for the suitability/usage of the data that will be set out in the ES.
EHO – Selby District Council	27 October 2017 (email)	The EHO has written to confirm that the minimum recommendation for the noise study area will be informed by the noise levels produced by the Proposed Scheme and the existing background noise level at noise sensitive receptors. For the ES, the study area will be flexible depending on the results of the assessment, however, it is not anticipated to extend beyond 2 km from the Site Boundary.
EHO – Selby District Council	02 January 2018 (email)	Consultation with Selby District Council undertaken to finalise the assessment methodology and noise mitigation strategy. The methodology approach for the ES was confirmed to use BS4142 for the operational phase assessment.

Scope of the Assessment

7.3.2. This section explains how the scope of the assessment has developed, and re-iterates the evidence base for insignificant effects, which have therefore been scoped out of the assessment.

7.3.3. An EIA Scoping Report was submitted to the SoS in September 2017, as presented in Appendix 1.1. A Scoping Opinion was received by the applicant from the Planning Inspectorate (on behalf of the SoS) on 23 October 2017, including formal responses from statutory consultees. The responses from the Planning Inspectorate/SoS in relation to noise and vibration, and how those requirements should be addressed by the applicant, are set out below in Table 7-2. Table 7-3 refers to the statutory consultation that the Applicant carried out and how those responses have been considered.

Table 7-2 - Scoping Opinion Summary Table (Noise and Vibration)

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
7.3.2	Operational ground borne vibration from power generating equipment and associated infrastructure	The Scoping Report does not provide details of the manufacturers specifications for rotating and reciprocating plant which would be utilised so that ground borne vibration would not be perceptible at sensitive receptor locations. Nevertheless, given that the plant would be located within the curtilage of an existing power station and given the nature of the development, the Inspectorate agrees that this can be scoped out of the ES.	Agreed, no further action needed.
7.3.2	Noise and vibration during operation of the gas pipeline	Taking into account the nature and characteristics of the Proposed Development, the Inspectorate agrees that noise and vibration during operation of the gas pipeline itself is unlikely to be significant. However, no information has been provided as to the location of the above ground installation structures and their proximity to any sensitive receptors. As such, the Inspectorate does not agree	An operational noise assessment of the AGI and GRF is included in this chapter.

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
		impacts from these elements can be scoped out.	
7.3.1	Sensitive Receptors	The noise and vibration chapter has only identified human sensitive noise receptors. The Inspectorate expects that the assessment should appropriately cross refer to the assessment of biodiversity within the ES. The Applicant's attention is also drawn to the comments of MMO and the need to provide further detail of the works required in order to scope out the River Ouse and the River Derwent from the assessment.	The noise assessment is cross referenced with the Biodiversity chapter to ensure that potential noise and vibration impact on biodiversity is considered. It is noted that the jetty has been removed from the proposals and will no longer be used during the construction phase of the Proposed Scheme.
7.3.3	Study Area	Section 7.3.3 of the Scoping Report refers to the study area, but does not indicate what this would be. The ES should clearly identify the study area used in the assessment, which should be relevant to the extent of the likely effects. This should be discussed and agreed with relevant consultees.	A consultation was held with the SDC, it was agreed that the study area would be proportional to the level of noise impact predicted. The study area used in the assessment is flexible based on the results of the noise model. The study area has been set at 2 km from any point on the site boundary, and is shown in Figure 7.1.
7.3.4	Assessment	The ES should assess any potential likely significant noise effects resulting from the operation of the	It is noted that the jetty has been removed from the

Section	Applicant's proposed matter	Planning Inspectorate's Comments	Summary of response
		jetty and crane.	proposals and will no longer be used during the construction phase of the Proposed Scheme.
7.3.4	Assessment Methodology	In referring to standards applicable to the assessment, the Scoping Report identifies in part the dates of the relevant standards. The Applicant should ensure that the most up to date version of the standards are utilised.	The most up to date versions of all relevant standards have been used and referred to in this chapter.
7.3.5	Limitation and Assumptions	The Applicant is advised to discuss and agree with the local authority the approach to be applied for noise measurements during unsuitable weather conditions.	This point was discussed with the local authority, and it was agreed that noise measurements would not be undertaken during unsuitable weather conditions.

Table 7-3 - Statutory Consultation Summary Table (Noise and Vibration)

Body / Organisation	Comments	Response
North Yorkshire County Council	Noise and Vibration - It is noted that it is recommended that a requirement for compliance with this noise mitigation is written in to the Construction Environmental Management Plan (CEMP) and agreed with SDC. North Yorkshire County Council and Selby District Council request that appropriate mitigation of the impacts of noise and vibration on residential receptors is included as a requirement in the CEMP. The	Recommendations for best practice measures to minimise and control construction noise and vibration have been included in the outline CEMP.

Body / Organisation	Comments	Response
	Council has been consulted by WSP in order to finalise the assessment methodology and noise mitigation strategy and is referred to in Table 32 of Chapter 7.	
North Yorkshire County Council	The applicant has made reference to the White Rose Scheme where the assessment criteria selected was a hybrid of British Standards BS4141: 2014, BS8233: 2014 and the World Health Organisation (WHO) Guidelines. The Council has clarified SDC's position in relation to the significance criteria in so far as BS4142: 2014 is the most appropriate means of assessing significance in this case. This project is beyond the scope of BS8233: 2014 which makes it clear the guidance "…does not provide guidance on assessing the effects of changes in the external noise levels to occupant of an existing building". The WHO guidelines are not appropriate in this case since the level values are concerned with steady state noise such as that form road traffic and not noise from an industrial source.	Confirmed. The BS4142:2014 guidance has been used as the main source to assess the significance of potential noise impacts as a result of the Proposed Scheme.

Insignificant Effects

7.3.4. The following effects have been considered insignificant, and, in line with the scoping opinion, have been scoped out of the assessment:

- Operational ground borne vibration from gas generating units and associated infrastructure.
- Noise and vibration for the operation of the Gas Pipeline.
- Road traffic during the operation of the Proposed Scheme.

Potentially Significant Effects

7.3.5. The following effects have been considered as potentially significant and are included for assessment in this Chapter.

Construction Phase

- Noise and vibration from the construction of the Site Reconfiguration Works (or Stage 0).
- Noise from Site Reconfiguration Works traffic using the surrounding road network.
- Noise from construction traffic using the surrounding road network (Stages 1 & 2).
- Noise and vibration from construction activities on Site (Stage 1 & 2).
- Noise and vibration as a result of the construction of the Gas Pipeline and associated infrastructure (Stage 1).

Operational Phase

7.3.6. For the operational phase the potentially significant effects that have been assessed in the Chapter are:

- Noise from the Power Station Site and associated infrastructure on Site for Stage 2 (Unit X operational), and then the cumulative noise from Stage 3 (Units X & Y operational).
- Noise from the Gas Pipeline - Above Ground Installation.

7.4 Assessment Methodology and Significance Criteria

Scenarios Assessed

7.4.1. The scenarios assessed in this Chapter are set out in Table 7-4.

Table 7-4 - Scenarios for Assessment (Noise and Vibration)

Stage	Title
-	Current baseline
-	Future baseline
0	Site Reconfiguration works
1	Construction of Unit X, the Gas Pipeline, the Gas Receiving Facility, the Above Ground Installation and the Battery Storage Facility.
2	Operation of Unit X, the Gas pipeline, the Gas Receiving Facility, the Above Ground Installation, the Battery Storage Facility and the construction of Unit Y.
3	Operation of Units X and Y, the Gas pipeline, the Gas Receiving Facility, the Above Ground Installation and the Battery storage Facility.
4	Decommissioning

Open Cycle vs Combined Cycle

7.4.2. The Proposed Scheme will have the option to run in open cycle or combined cycle. During open cycle the HRSG is bypassed and only the gas turbine is in operation. During the combined cycle both the gas turbine and HRSG are in operation. In

terms of noise output the open cycle operational mode will generate the highest noise levels at the stack terminations, as such the open cycle operational mode has been modelled (for both Units X and Y) as a means of a worst case assessment. It is understood that the Proposed Scheme will cycle between the two operational modes as needed, the duration of the plant operating in each operational mode will be dictated by the load requirements on the grid.

Embedded Mitigation

7.4.3. This section details the primary and tertiary mitigation which has been considered as embedded mitigation i.e. part of the Proposed Scheme.

7.4.4. The Proposed Scheme has been designed from the outset to ensure its impacts are minimised. This includes primary mitigation that is embedded into the design of the Proposed Scheme and tertiary mitigation that includes industry standard methods and procedures to ensure impacts from construction, operation and decommissioning are minimised.

Construction

7.4.5. For the construction phase, the following measures will be implemented to minimise the impact of construction noise from the Proposed Scheme:

- Calculations of construction noise from the Gas Pipeline have assumed the use of a 2.2m high site hoarding along the boundary of the gas pipeline route at NSRs 1 and 9 (discussed further in Section 7.6.13).
- Since tonal or impulsive noises are considered more annoying than continuous noise sources, plant items will, where practicable, be silenced or otherwise controlled through regular maintenance.
- Inherently quiet plant items will be selected, where practicable.
- High performance acoustic enclosures will be considered for plant items where practicable, not overlooking smaller plant items such as compressors and pumps; measures will be set out in the CEMP.
- When non-normal and emergency operations lead to noise levels in excess of the agreed planning limits, the operator will inform the local authority and residents as soon as practicable of the reasons for these operations, and the anticipated emergency period.

7.4.6. These measures will be secured via a construction environmental management plan (CEMP). The CEMP will be secured through a requirement contained in Schedule 2 to the draft DCO submitted with the DCO Application.

7.4.7. During decommissioning, similar mitigation measures to those described above for construction will be implemented, and will be secured via a decommissioning environmental management plan. Again, this plan will be secured through a requirement contained in Schedule 2 to the draft DCO submitted with the DCO Application.

Operation

7.4.8. Embedded mitigation for the operation of the Proposed Scheme includes the following:

- The gas turbines and major compressors are to be housed in individual acoustic enclosures, of heavy construction, specified at 85 dB (A) Sound Pressure Level at 1 m.
- Turbine filter and ventilation apertures are to be fitted with high performance silencers and designed such that all sensitive receptors benefit from screening and/or directivity corrections.
- High performance silencers will be installed in the outlet duct(s) between the gas turbines. Due to the impracticality of screening stack noise, discharge noise will be controlled using these silencers that will be tuned to attenuate low frequencies from the gas turbine exhausts.
- Unit transformers and generator transformers will be housed in an appropriate enclosure or three sided pen, to provide full screening to Noise Sensitive Receptors (NSRs).

7.4.9. In addition to the traditional assessment of significance, as set out in the IEMA guidelines, government policy dictates that noise and vibration as a result of the Proposed Scheme is also assessed and defined using guidance from the NPSE.

7.4.10. The noise and vibration significance criteria framework used for this study has been based around the PPG requirements, discussed in the policy / guidance Section 7.2.

Extent of the Study Area

7.4.11. The extent of the study area used for the noise and vibration assessment is 2 km from the Site Boundary. Based on experience of previous similar schemes it is anticipated that noise and vibration as a result of the Proposed Scheme would be imperceptible beyond 2 km. This study area was discussed and agreed with SDC as part of the consultation process and is identified in Figure 7.1.

Method of Baseline Data Collation

7.4.12. The noise and vibration impact assessment focuses on a total of 23 NSR locations, of which 10 are residential NSRs and 13 are ecological NSRs, identified in Section 7.5 and shown in Figures 7.2 and 7.3 respectively.

2013 Baseline

7.4.13. The baseline noise conditions at NSR locations 1 to 7 have been determined by way of an attended noise survey commissioned by the Applicant in 2013 to support the White Rose Carbon Capture Project. WSP has undertaken a review of the 2013 baseline survey methodology and can confirm that the survey was undertaken to the appropriate standards and requirements of BS 7445. It is noted that baseline noise conditions at the NSR locations are not anticipated to have changed significantly since 2013, as there has been no significant noise producing development in the area around the Existing Drax Power Station Complex in the

intervening period. As such, WSP is satisfied that the 2013 baseline noise data is representative of the current baseline noise levels at the NSR locations used in this study.

7.4.14. A consultation was held with SDC (Table 7-1) to confirm the use of the 2013 baseline noise data to inform this assessment, and to agree a study area for the assessment. It was agreed with SDC that 2013 baseline data could be used for the purposes of the ES assessment, and that a study area extending 2 km beyond the Site would be appropriate (see the consultation responses from SDC detailed in Table 7-1).

2017 Baseline

7.4.15. WSP has undertaken a supplementary baseline noise survey at three additional locations situated east of the Site, to include NSR locations that may be affected by the construction and operation of the Gas Pipeline (and which were not covered as part of the 2013 noise survey).

7.4.16. The supplementary baseline noise survey was undertaken using short term sampling measurements to determine the spread of noise in the area around NSR locations 8, 9 and 10 (shown in Figure 7.2.). The baseline noise survey was completed over a period of 24 hours during 14 and 15 September 2017.

7.4.17. Weather conditions were conducive to successful monitoring with wind speeds less than 5 m/s. Roads were dry, and there was no precipitation at the time of measurement. The measurement microphones were positioned in Free Field at 1.4 m above ground level and well away from any vertical reflective facades. A wind-shield was used to minimise the effects of wind noise.

7.4.18. Each measurement recorded the same five statistical parameters (L90, Leq, Lmax, L10, Lmin.) with the overall figure reported using the A-weighted frequency network.

7.4.19. All monitoring was conducted using Class 1 Sound Level Meters. A field calibrator was used to calibrate and check the meter before and after the measurement period with no change in level recorded. Specific details of the equipment used, including serial numbers and calibration dates is provided in Appendix 71.

Assessment Methodology

Construction

7.4.20. The likely construction noise levels have been predicted using the methodology set out in BS5228 in conjunction with general information regarding proposed activities.

7.4.21. The construction noise assessment procedure, as set out in BS5228 is described below:

- Stage 1: Use the indicative plant noise sound pressure values provided in Annexes C and D of BS 5228, these values have been measured at a distance of 10 m.

- Stage 2: If the distance R, in metres (m) from the point of interest to the geometric centre of the plant or activity is further away than 10 m subtract from the LAeq obtained in stage 1 using the following equation:

$$L_2 = L_1 - 20Log_{10}\frac{R}{10}$$

Where:

L1 = Measured plant noise level at 10 m distance

L2 = Predicted plant noise level at assessment location (NSR)

R = Distance between geometrical centre of noise source and assessment location (NSR).

7.4.22. The equation identified in stage 2 of the BS5228 construction noise assessment method has been used to calculate each separate identified plant noise source. This method predicts the total potential Sound Pressure Level at each NSR as a result of construction activities. Each plant noise source has been calculated as being the shortest distance between the Site Boundary and each NSR.

7.4.23. Construction noise predictions are based on the methodology outlined in BS5228: Part 1: 2009+A1 2014. Construction noise levels are predicted as a 'free-field' equivalent continuous noise level averaged over a one-hour period (LAeq,1h), and then subsequently averaged over a 12-hour working day to account for the variations in noise due to plant-on/ plant-off time throughout a full working day, the final value is provided as an LAeq,12h.

7.4.24. The significance of construction noise effects is assessed on the category threshold for the NSR as required in the ABC assessment methodology set out by BS5228, shown in Table 7-5.

Table 7-5 - BS5228 ABC Construction Noise Assessment Categories

Evaluation Period	Assessment Category DB (LAeq)					
	7.4.25.	A	7.4.26.	B	7.4.27.	C
Night-time (23:00-07:00)	7.4.28.	45	7.4.29.	50	7.4.30.	55
Evening and Weekends*	7.4.31.	55	7.4.32.	60	7.4.33.	65
Daytime (07:00-19:00)	7.4.34.	65	7.4.35.	70	7.4.36.	75

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

Category A: threshold values to use when ambient Noise levels (when rounded to

Evaluation Period	Assessment Category DB (LAeq)					
	7.4.25.	A	7.4.26.	B	7.4.27.	C
	the nearest 5 dB) are less than these values. Category B: threshold values to use when ambient Noise levels (when rounded to the nearest 5 dB) are the same as Category A values. Category C: threshold values to use when ambient Noise levels (when rounded to the nearest 5 dB) are higher than Category A values. The Category (A, B or C) is to be determined separately for each time period and the lowest Noise category is then used throughout the 24-hour cycle, e.g. a site which is category A by day and category B or C in the evening and night will be treated as category A for day, evening and night.					

7.4.5. The methodology identifies potential significant effects where forecast noise levels exceed Categories A and B. These categories consider the impact of construction in locations with lower existing ambient noise levels. Where construction noise levels are predicted to exceed the A or B Categories, but are less than the Category C threshold, then this is assessed as potentially significant in quieter areas.

7.4.6. When considering construction noise effects in terms of LOAEL and SOAEL, the LOAEL value is not fixed and will depend on the measured baseline noise level at each NSR location. The SOAEL value is aligned with the ABC assessment values shown in Table 7-5.

Methodology – Vibration

7.4.7. Vibration from construction activities may impact on adjacent buildings. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration due to impact piling. Cosmetic damage is most likely to occur within the first 20 m of piling activities; damage is less likely to occur at greater distance. Likely levels of vibration at given distances can be predicted using empirical methods and existing piling vibration data. Due to the distances involved between the Site and NSR locations vibration from construction activities is unlikely to be subjectively noticeable, and will not approach the threshold limits where structural damage to buildings may occur.

7.4.8. BS7385 establishes the basic principles for carrying out vibration measurements and processing the data with regard to evaluating vibration impacts on buildings. Table 7-6 provides recommended peak particle velocity (PPV) vibration limits for transient excitation for different types of buildings (as set out in BS7385: Part 2, 1993). The PPV values in Table 7-6 are given in two ranges as very low frequency vibration (between 4Hz to 15Hz) is potentially more damaging to light framed building structures, and therefore has a lower threshold.

Table 7-6 - Peak Particle Velocity (PPV) Limits for Cosmetic Damage1

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
Frequency, Hz	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Un-reinforced or light framed structures. Residential or light commercial type buildings[2]	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

1 Values referred to are at the base of the building.

2 At frequencies below 4 Hz a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

Methodology – Operational Noise

7.4.9. The noise impacts during operation are predicted using CadnaA noise propagation modelling software, using typical values for the proposed plant items, and considering directional and screening effects.

7.4.10. The operational noise assessment has included the following noise generating items:

- The Proposed Scheme on the Power Station Site (Stage 2 Unit X and then Stage 3 Units X & Y) .
- Gas Pipeline - Above Ground Installation (AGI).
- Gas Receiving Facility (GRF).
- Battery storage facility– mechanical cooling system.

7.4.11. It is noted that the battery storage facility will have a mechanical cooling system that will generate noise. At the time of writing, the final design of the battery storage facility is still under development, however, it is understood that external chiller units are likely to be used for cooling. To account for the potential noise created by the battery storage cooling infrastructure, the operational noise model has included external chiller units, situated along the south facing façade of the battery storage block.

7.4.12. The computer noise modelling software CadnaA (Version 4.6), which uses the ISO 9613 propagation algorithms, has been used to undertake detailed noise calculations of the generating infrastructure on the Power Station Site, the GRF and the AGI required for the Gas Pipeline. The model estimates the contribution to noise levels at each NSR location, and has been created using representative Sound Power Level information for typical plant items.

7.4.13. The model provides a noise prediction assessment for the operational phase of the Proposed Scheme on the Power Station Site, the GRF and the AGI.

7.4.14. The methodology for the assessment of operational noise for the generating infrastructure on the Power Station Site the GRF and the AGI for the Gas Pipeline is BS4142:2014. The significance of the predicted operational impact can be assessed against the semantics of BS 4142. The method compares a rating of the noise from the specific source being assessed (that is, the noise source from the Proposed Scheme) with the background sound climate existing at the relevant NSR in the absence of the source operation. The difference in levels established is taken as an indication of the magnitude of the noise impact, subject to contextual considerations [from BS 4142]:

"Typically, the greater this difference, the greater the magnitude of the impact.

A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

7.4.15. It is clear from this guidance that context is an important consideration in the assessment. The examples included in BS 4142:2014 Annex A illustrate the contextual factors that may be of importance, e.g:

- The magnitude of the differences between Rating Level and Background Sound.
- The character of the existing noise environment at receptors.
- History of noise issues (e.g. complaints) associated with the operator or the site of the specific source under assessment.
- The diurnal period during which impacts are identified, and the relevance to the type of receptor.
- The location at which actual impacts on the receptor could occur, i.e. indoor or outdoor.

7.4.16. BS 4142:2014 provides guidance on minimising and reporting factors likely to contribute to uncertainty in the assessment. This includes following best practice guidance with regards to measurement of sound levels.

7.4.17. The WHO 'Guidelines for Community Noise' provides health-based guidance on suitable noise levels intended to avoid or minimise community annoyance by noise. The guidance provides guideline noise levels for both indoor and outdoor areas. Of significance to this assessment the guidance states:

"During the daytime, few people are seriously annoyed by activities with LAeq levels below 55dB; or moderately annoyed with levels below 50dB. ..."

7.4.18. Therefore, the significance criteria incorporating BS 4142:2014 and WHO Guidelines for Community noise (presented in Table 7-9) has been adopted for the purposes of the assessment of operational noise from the Proposed Scheme.

Internal Ambient Noise Levels in Dwellings

7.4.19. BS8233 sets out recommendations for internal ambient noise levels (IANLs) within residential buildings, these are copied in Table 7-7.

Table 7-7 - BS8233 Indoor ambient noise levels for dwellings

7.4.20. **Activity**	7.4.21. **Location**	7.4.22. **0700 to 2300**	7.4.23. **2300 to 0700**
7.4.24. Resting	7.4.25. Living Room	7.4.26. 35 LAeq 16hr dB	7.4.27. -
7.4.28. Dining	7.4.29. Dining Room	7.4.30. 40 LAeq 16hr dB	7.4.31. -
7.4.32. Sleeping (Daytime Resting)	7.4.33. Bedroom	7.4.34. 35 LAeq 16hr dB	7.4.35. 30 LAeq 8hr dB

Methodology – Operational Vibration

7.4.36. It is understood that on site vibration sources will include the following:

- Balanced rotating equipment, such as turbines.
- Wind induced vibrations in the stacks to be transmitted to the foundations.

7.4.37. All fixed reciprocating and rotating plant items will be seated on anti-vibration mounts to isolate mechanical vibration at source. Over the distances involved between the Power Station Site and the NSR locations, it is anticipated that the level of induced vibration will be imperceptible at the nearest sensitive receptor. As such, vibration impacts as a result of the operation of the Proposed Scheme, including the Gas Pipeline, GRF and AGI are scoped out of this study and are not discussed further, this is as agreed by the Planning Inspectorate in the Scoping Opinion.

Significance Criteria

7.4.38. For noise and vibration, the predicted level of impact and significance has been determined on the basis of the potential change from baseline levels as a result of the Proposed Scheme and the sensitivity of receptors, with residential receptors considered as highly sensitive. The likely significant effect has been determined based on the concept of LOAEL and SOAEL, these are described in the PPG as follows:

LOAEL Definition

"Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."

SOAEL Definition

"Noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

7.4.39. The assessment of potential effects as a result of the Proposed Scheme has taken into account both the construction, operational and decommissioning phases. The construction phase includes enabling works, demolition, earthworks and construction activities as set out in Chapter 3: Site and Project Description.

Effect Significance

7.4.40. The following terms have been used to define the significance of the effects identified:

- Major effect: where the Proposed Scheme could be expected to have a very significant effect (either positive or negative) on receptors.
- Moderate effect: where the Proposed Scheme could be expected to have a significant noticeable effect (either positive or negative) on receptors.
- Minor effect: where the Proposed Scheme could be expected to result in a small, barely noticeable effect (either positive or negative) on receptors.
- Negligible: where no discernible effect is expected as a result of the Proposed Scheme on receptors.

Construction / Decommissioning

7.4.41. The noise impacts of decommissioning will be similar to those that will be assessed for construction. The assessment will therefore be carried out on the same basis as that for those arising from construction activities. The assessment has assumed all residential NSR locations to have high sensitivity.

7.4.42. Significance criteria for construction noise and vibration have been derived from a review of appropriate British Standards, as follows:

- Construction noise thresholds at residential NSR locations have been informed by the guidance in BS5228, Example Method 1 - The ABC method.
- Construction vibration thresholds at residential NSR locations have been informed by the guidance in BS7385.

1.2.1 Based on the recommended noise and vibration thresholds set out in these Standards a scale for the description of the significance of construction noise and vibration is shown in Table 7-8.

Table 7-8 - Construction and Decommissioning Noise and Vibration – Significance Criteria

Magnitude of Change	Description	Significance of Effect	LOAEL and SOAEL Thresholds
Negligible	Below the ABC threshold value by 5dB Vibration levels < 0.15 mm/s	Negligible	NOEL
Low	Equal to or below the ABC threshold value Vibration levels > 0.15 mm/s, but < 1 mm/s.	Minor	LOAEL
Medium	Exceedance of ABC threshold value by up to 5dB Vibration levels > 1 mm/s but < 5 mm/s.	Moderate	SOAEL
High	Exceedance of ABC threshold value by up to 10dB Vibration levels > 5 mm/s.	Major	SOAEL

Operation

7.4.43. The significance criteria for operational noise has been based on a review of appropriate British Standards and guidance documents, as follows:

- Operational noise thresholds at residential NSR locations have been informed by the guidance in BS4142.
- Noise thresholds for external amenity areas have been informed by the WHO Guidelines for Community Noise document.

7.4.44. The assessment has assumed all residential NSR locations to have high sensitivity. All noise levels shown in Table 7-9 are intended as Free Field noise levels.

Table 7-9 - Operational Noise - Significance Criteria

Magnitude of Change	BS4142 Noise Rating Level, dB(A)	Who Guidelines External Amenity Noise, dB(A)	Significance of Effect	LOAEL and SOAEL Thresholds

Magnitude of Change	BS4142 Noise Rating Level, dB(A)	Who Guidelines External Amenity Noise, dB(A)	Significance of Effect	LOAEL and SOAEL Thresholds
Negligible	BS4142 noise rating level below the existing background noise.	<50	Negligible	NOEL
Low	BS4142 noise rating level not more than 5 dB above existing background noise	50-55	Minor	LOAEL
Medium	BS4142 noise rating level between 5 and 10 dB above existing background noise.	55-60	Moderate	SOAEL
High	BS4142 noise rating level more than 10 dB above the existing background noise	>60	Major	SOAEL

7.5 Baseline Conditions

Current Baseline

7.5.1. This study has included both residential NSR locations and ecological NSR locations, both are classed as highly sensitive. Tabke 7-10 provides a summary of the residential NSR locations used in the noise assessment for the Proposed Scheme. Figure 7.2 shows the Power Station Site, the Pipeline Area and the residential NSR locations.

Table 7-10 - Summary of Residential NSR Locations

Measurement Location	Baseline Survey Date	Approx Distance from Site, m	Coordinates	
			X	Y
NSR 1 - Wren Hall	2013	580	467273.78	427168.97
NSR 2 - Long Drax	2013	1648	468154.27	428110.53
NSR 3 - Old Lodge	2013	948	467529.8	428120.05

Measurement Location	Baseline Survey Date	Approx Distance from Site, m	Coordinates	
			X	Y
NSR 4 - Drax Abbey Farm	2013	846	467049.27	428277.76
NSR 5 - Foreman's Cottage	2013	967	466831.24	428479.92
NSR 6 – Barlow	2013	2000	464860.63	428370.24
NSR 7 - Camblesforth	2013	1719	465325.79	426113.03
NSR 8 - Station Cottage - Hales Lane	2017	1110	466694.48	426389.44
NSR 9 - Briden Bungalow - Main Road	2017	1213	467775.16	426863.51
NSR 10 - Willow Row Drain - Residential	2017	2171	468386.64	426176.81

7.5.2. Table 7-11 provides a summary of the ecological sensitive receptor locations used in the noise assessment for the Proposed Scheme. Figure 7.3 illustrates the ecological sensitive receptor locations.

Table 7-11 - Summary of the Ecological Sensitive Receptor Locations

Measurement Location	Approx Distance from Site, m	Coordinates	
		X	Y
NSR 11 - River Ouse 1	1800	468494.1	428034.7
NSR 12 - River Ouse 2	1785	468595.4	427671.9
NSR 13 - Disused Railway SINC 2	850	467677.9	427493.1
NSR 14 - Woodland 1	550	467350	427581.6
NSR 15 - Woodland 2	800	467617.1	427173.4
NSR 16 - Woodland 3	450	466755.2	426990.2
NSR 17 - Woodland 4	930	466536.8	426469.3
NSR 18 - Woodland 5	1250	465989	426460.9
NSR 19 - Development Parcel E	260	466637.6	427877.4

Measurement Location	Approx Distance from Site, m	Coordinates	
		X	Y
NSR 20 - Development Parcel B	420	466780.4	428011.8
NSR 21 - Disused Railway SINC 1	1200	468168.3	427921.1
NSR 22 - River Derwent 1	1640	467768.3	428714.7
NSR 23 - River Derwent 2	1620	468020.2	428632.2

7.5.3. The Power Station Site is within the Existing Drax Power Station Complex. The surrounding area is mainly open agricultural land with scattered residential dwellings. The village of Drax lies approximately 800 m to the south east of the site, the village of Camblesforth is approximately 1 km to the south west, Barlow is approximately 1 km to the west of the site and the village of Long Drax is approximately 1.5 km to the north east of the site. The Carbon capture readiness reserve space, which is also the temporary laydown area for construction, is located adjacent to the Power Station Site, and shown in Figure 1.3.

7.5.4. The route of the Gas Pipeline runs east from the Power Station Site for a distance of approximately 3 km through predominantly open agricultural land. The pipeline corridor passes within 50 m of NSR 9.

7.5.5. Baseline noise levels at NSR locations have been taken from a baseline noise survey undertaken in 2013 for the Drax White Rose Project. There has been no significant development in the area since the 2013 survey, as such, the 2013 baseline noise levels are considered to be representative of the current baseline noise levels.

7.5.6. Baseline noise data has been supplemented with an ambient noise survey undertaken by WSP during 14 and 15 September 2017. The supplementary WSP survey was undertaken primarily to include potential NSR locations along the proposed Gas Pipeline route (i.e. the Pipeline Area).

7.5.7. During the 2017 survey it was observed that the noise climate at the monitoring locations was largely dominated by distant road traffic during the daytime. During the night time when road traffic levels reduce a continuous low level noise is audible from the Existing Drax Power Station Complex.

7.5.8. Figure 7.2 shows the NSR measurement locations for both the 2013 and 2017 baseline noise surveys.

7.5.9. The full results of the 2017 survey are provided in the noise monitoring forms in Appendix 7.1. The background noise levels used in the assessment have been derived by statistical analysis of both the 2013 and 2017 survey data. A summary

of the typical day time and night time back ground noise levels at the NSR locations, is shown in Table 7-11.

7.5.10. As discussed, the Proposed Scheme has assessed two scenarios for the Stage 0 Site Reconfiguration Works assessment

- The first scenario assumes the Stage 0 - Site Reconfiguration Works are part of the Proposed Scheme. This scenario is referred to as the "current baseline" as it reflects the existing situation in which the Stage 0 - Site Reconfiguration Works have not been carried out.
- The second scenario assumes the Stage 0 - Site Reconfiguration Works have already been carried out at the time the Proposed Scheme is implemented. This scenario is referred to as the "future baseline" as it reflects a baseline at a future time when the Stage 0 - Site Reconfiguration Works would have been completed.

7.5.11. For the future baseline, one of the three existing coal fired units on the power station site will be converted to biomass, to give a total of four biomass units and two coal fired units. There is not anticipated to be any change in noise or vibration levels to the environment as a result of converting fuel from coal to biomass, as such this element of the Stage 0 Reconfiguration Works is not assessed further in this study.

7.5.12. 7Other changes on the Power Station Site during Stage 0 Reconfiguration Works include removal of modular office buildings, steel framed sheds, the visitors centre and stores buildings. These buildings are all below 18 m in height and therefore do not currently provide any acoustic screening from the existing major plant noise sources on site. Therefore, when these buildings are removed as part of the reconfiguration works there will be no change in the current baseline noise levels at NSR locations. As the "current baseline" and "future baseline" noise levels will be the same they are hereafter in this chapter referred to simply as the baseline.

7.5.13. Table 7-12 provides a summary of the baseline noise levels during the daytime and night time.

Table 7-12 - Summary of Baseline Noise Levels at NSR Locations

Measurement Location	Baseline Noise Level, dB L_{A90}	
	Daytime (0700-2300)	Night Time (2300-0700)
NSR 1 - Wren Hall	35	35
NSR 2 - Long Drax	32	26
NSR 3 - Old Lodge	32	27
NSR 4 - Drax Abbey Farm	35	24
NSR 5 - Forman's Cottage	35	28

Measurement Location	Baseline Noise Level, dB L_{A90}	
	Daytime (0700-2300)	Night Time (2300-0700)
NSR 6 - Barlow	35	24
NSR 7 - Camblesforth	43	40
NSR 8 - Station Cottage - Hales Lane	49	42
NSR 9 - Briden Bungalow - Main Road	43	37
NSR 10 - Willow Row Drain - Residential	42	35

7.6 Assessment of Likely Significant Impacts and Effects

Stage 0 – Site Reconfiguration Works

On site activities – Noise Assessment

7.6.1. The construction activity hours for the Stage 0 Site Reconfiguration Works are proposed to be secured by way of a requirement to the draft DCO (Document reference 3.1) as follows:

- Monday to Friday: 07:00 hrs – 19:00 hrs (with a “start-up” period from 06:00 hrs – 07:00 hrs, and “shut-down” period from 19:00 hrs – 20:00 hrs only at the Laydown Area (described in Work No. 9 in Schedule 1 of the draft DCO (document reference 3.1) during which time activities including changing into / out of work gear, arrival / departure of workers, pre / post work briefings, opening up or securing the Site will take place)
- Saturday: 07:00 hrs – 13:00 hrs (with a “start-up” period from 06:00 hrs – 07:00 hrs, and “shut-down” period from 13:00 hrs – 14:00 hrs only at the Laydown Area (described in Work No. 9 in Schedule 1 of the draft DCO (document reference 3.1))
- Sunday: No Construction Activity

7.6.2. For the Site Reconfiguration Works on the Power Station Site it is reasonable to assume that similar plant items and processes will be used as the for the construction phase on the Power Station Site. Table 7-13 overleaf details the predicted noise levels at receptor locations as a result of the Stage 0 Site Reconfiguration Works. The predicted noise levels are assessed against the BS5228 significance criteria detailed in Table 7-8. The vibration impact is predicted to be negligible.

Table 7-13 - Stage 0 Site Reconfiguration Works - Predicted Noise Levels at Residential NSR Locations

Reconfiguration Works	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Noise Level, L_{Aeq}, dB	47.9	38.9	43.7	44.7	43.5	37.2	38.5	42.3	41.5	36.5

Table 7-14 - Stage 0 Site Reconfiguration Works - Predicted Noise Levels at Ecological NSR Locations

Ecological Sensitive Receptor Locations	Predicted Noise Level, L_{Aeq} dB
NSR 11 - River Ouse 1	38.1
NSR 12 - River Ouse 2	38.2
NSR 13 - Disused Railway SINC 2	44.6
NSR 14 - Woodland 1	48.4
NSR 15 - Woodland 2	45.1
NSR 16 - Woodland 3	50.1
NSR 17 - Woodland 4	43.8
NSR 18 - Woodland 5	41.3
NSR 19 - Development Parcel E	58.3
NSR 20 - Development Parcel B	55.9
NSR 21 - Disused Railway SINC 1	54.0
NSR 22 - River Derwent 1	53.0
NSR 23 - River Derwent 2	39.0

7.6.3. The sensitivity of residential NSRs 1 to 10 in Table 7-13 is considered to be high, and the magnitude of change prior to mitigation, is considered to be negligible. Therefore, there is likely to be no effect, of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

7.6.4. The sensitivity of ecological NSRs 11 to 23 in Table 7-14 is considered to be high. The magnitude of impact and significance of effect from the predicted noise levels, as a result of the Site Reconfiguration Works, is discussed in Chapter 9 (Biodiversity).

Stage 0 – Traffic Noise Assessment

7.6.5. Noise will be associated with the Stage 0 Site Reconfiguration Works traffic. Public roads will be used by such traffic as far as possible, although minor roads will also have to be used for access. Noise arising from these additional vehicles will potentially increase noise levels from the local roads, although the impact will be in the short term restricted to the duration of the Site Reconfiguration Works period and will vary day to day as progress is made.

7.6.6. An assessment of the change in noise associated with increased Site Reconfiguration Works traffic along existing local roads has been undertaken. The calculation procedure has been undertaken in accordance with the guidance contained within the Calculation of Road Traffic Noise (CRTN) 1988. (Ref: 7.15)

7.6.7. It is understood that all road traffic, including construction traffic and construction worker traffic related to the Site Reconfiguration Works will use the M62 and A645, as this is the most direct route from major carriageways to the Proposed Scheme. To provide a

reasonable worst case assessment, the total estimated daily Site Reconfiguration Works traffic has been applied to all routes to cover all eventualities.

7.6.8. The Stage 0 Site Reconfiguration Works traffic assessment assumes that all equipment will be transported by road. Table 7-15 presents the Site Reconfiguration Works traffic assessment summary for Stage 0. The assessment compares the predicted baseline traffic flow (Do Nothing) with the predicted traffic flow including Site Reconfiguration Works traffic for the Proposed Scheme (Do Scheme). The DMRB states 'In the period following a change in traffic flow, people may find benefits or disadvantages when the noise changes are as small as 1 dB(A) - equivalent to an increase in traffic flow of 25 % or a decrease in traffic flow of 20%'.

Table 7-15 - Stage 0 Site Reconfiguration Works Traffic Noise Assessment

Junctions Assessed	2022 Do nothing flow	2022 Do Scheme flow	Percentage change	Magnitude of noise impact
A164/A645	1585	1707	8%	Negligible
A614/Airmyn Road	2091	2214	6%	Negligible
M62/A614	5497	5718	4%	Negligible
A645/New Road	1350	1516	12%	Negligible
A1041/A645	1677	1720	3%	Negligible
A63/A1041	3054	3260	7%	Negligible

7.6.9. The assessment predicts that the increase from the Stage 0 Site Reconfiguration Works traffic flow is below 25%, it can therefore be concluded that noise increase from construction traffic will be negligible. The predicted noise increase from baseline as a result of Site Reconfiguration Works traffic is less than 1dB. As such, the cumulative noise increase (from Site Reconfiguration Works activities on-site and HGV movements on the roads) is predicted to be negligible and not significant.

Stage 1 – Construction of Unit X

Noise Assessment for Construction of Unit X

7.6.10. Construction activity inevitably leads to some degree of noise disturbance at locations in close proximity to the construction activities. It is, however, a temporary source of noise. The noise levels generated by construction activities would have the potential to impact upon nearby noise sensitive receptors. Noise levels at any one location will vary as different combinations of plant machinery are used and throughout the construction of the Proposed Scheme as the construction activities and locations change.

7.6.11. Table 7-16 presents the noise levels associated with typical construction activities, and predicts the likely noise level contributed by each item of plant at each NSR. The estimated

Sound Pressure Levels shown are worst-case estimates based on distance attenuation and the acoustic screening provided by the site hoarding.

7.6.12. The assessment has considered noise from construction activities related to the following:

- Construction works on Unit X.
- Construction works for the Gas Pipeline, AGI and GRF within the Pipeline Construction Area.
- Construction works for the battery storage facility for Unit X and the building to house the battery storage (for Units X and Y).
- Construction traffic using the surrounding road network in relation to both the works on the Power Station Site, the use of the Carbon capture readiness reserve space as temporary laydown area, and the Gas Pipeline Construction Area.

7.6.13. At NSR1 (Wren Hall) and NSR 9 (Briden Bungalow) the construction noise calculations have assumed the use of a continuous 2.2 m high site hoarding, with a minimum length of 100m (to be installed with a minimum length of 50 m either side of the identified NSR locations, so the NSR being protected is situated at the centre point of the hoarding) along the boundary of the Gas Pipeline works. The site hoarding is estimated to provide a 10 dB reduction in construction noise levels, provided that the hoarding blocks line of sight between construction works and NSR locations.

7.6.14. Table 7-16 provides a summary of results predicted for the Stage 1 construction noise sources, both individually and all together. The full calculations are provided in Appendix 7.2.

Table 7-16 - Stage 1 Construction - Predicted Noise Levels at NSR, LAeq dB

Construction Area	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Unit X and Battery Storage Facility Construction	47.9	38.9	43.7	44.7	43.5	37.2	38.5	42.3	41.5	36.5
Gas Pipeline, AGI and GRF	62.9	37.3	46.3	42.8	39.4	31.9	32.7	38.9	54.0	33.3
Total Stage 1 Construction Noise Unit X + Gas Pipeline, AGI and GRF	62.9	41.2	48.2	46.9	44.9	38.3	39.5	43.9	54.3	38.2

Table 7-17 - Stage 1 Construction Works - Predicted Noise Levels at Ecological NSR Locations

Ecological Sensitive Receptor Locations	Predicted Noise Level, L_{Aeq} dB
NSR 11 - River Ouse 1	42.0
NSR 12 - River Ouse 2	43.4
NSR 13 - Disused Railway SINC 2	57.8
NSR 14 - Woodland 1	53.8
NSR 15 - Woodland 2	69.6
NSR 16 - Woodland 3	51.6
NSR 17 - Woodland 4	45.7
NSR 18 - Woodland 5	43.5
NSR 19 - Development Parcel E	58.5
NSR 20 - Development Parcel B	56.1
NSR 21 - Disused Railway SINC 1	54.7
NSR 22 - River Derwent 1	53.0
NSR 23 - River Derwent 2	40.1

7.6.15. It is noted that the worst case predicted construction noise level at NSR 1 is 62.9 LAeq dB, the main contribution to this predicted level is due to the construction of the Gas Pipeline, which runs within 50m of NSR 1. It is noted that this predicted construction noise level will be for a limited duration only as the Gas Pipeline works pass by NSR 1. Construction noise levels will then reduce as progress is made on the Gas Pipeline route and construction activities move further away.

7.6.16. The sensitivity of NSRs 1 to 10 in Table 7-16 is considered to be high, and the magnitude of change, prior to mitigation, is considered to be negligible. Therefore, there is likely to be no effect, which is of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

7.6.17. The sensitivity of ecological NSRs 11 to 23 in Table 7-17 is considered to be high. The magnitude of impact and significance of effect from the predicted noise levels, as a result of the Stage 1 Construction Works, is discussed in Chapter 9 (Biodiversity).

Stage 1 – Vibration Assessment for Construction of Unit X, the Battery Storage Facility, Ga 7.108

7.6.18. The identified construction plant/equipment items used in this assessment are not recognised as sources of high levels of vibration. Indeed, even at a close distance of 10 m, PPV levels significantly less than 1 mm/s are generated. For example, a bulldozer would typically generate a PPV of approximately 0.6 mm/s and a heavy lorry on poor road surface would generate a PPV of less than 0.1 mm/s. These values are well below limits at which cosmetic building damage becomes likely (15 mm/s). Over the distances involved between

any construction activities and sensitive receptors the vibration impact is predicted to be negligible. In terms of effects this level of impact is in the NOEL category.

Stage 1 - Traffic Assessment for Construction Works during Stage 1

7.6.19. Noise will be associated with construction traffic associated with Stage 1 of the Proposed Scheme. Public roads will be used by such traffic as far as possible, although minor roads will also have to be used for access. Noise arising from these additional vehicles will potentially increase noise levels from the local roads, although the impact will be in the short term restricted to the duration of the construction period and will vary day to day as construction progress is made. The construction hours are proposed to be secured by way of a requirement to the draft DCO (document reference 3.1) as follows:

- Monday to Friday: 07:00 hrs – 19:00 hrs (with a "start-up" period from 06:00 hrs – 07:00 hrs, and "shut-down" period from 19:00 hrs – 20:00 hrs only at the Laydown Area (described in Work No. 9 in Schedule 1 of the draft DCO (document reference 3.1) during which time activities including changing into / out of work gear, arrival / departure of workers, pre / post work briefings, opening up or securing the Site will take place)
- Saturday: 07:00 hrs – 13:00 hrs (with a "start-up" period from 06:00 hrs – 07:00 hrs, and "shut-down" period from 13:00 hrs – 14:00 hrs only at the Laydown Area (described in Work No. 9 in Schedule 1 of the draft DCO (document reference 3.1))
- Sunday: No Construction Activity

7.6.20. Table 7-18 presents the construction traffic assessment summary. It is understood that most construction traffic will use the M62 and A645 as this is the most direct route from the major carriageways to the Proposed Scheme. The assessment compares the predicted traffic flow during the baseline (Do Nothing) with the highest predicted construction traffic for the Proposed Scheme (Do Scheme). It is noted that the assessment has taken into account the use of the vehicle passing place to be constructed on Rusholme Lane for the purposes of the Gas Pipeline / AGI construction.

7.6.21. The construction traffic assessment assumes that all construction equipment will be transported by road.s Pipeline, AGI and GRF

Table 7-18 - Summary of Construction Traffic Noise Assessment for Stage 1 Construction Works

Junctions Assessed	2022 Do nothing flow	2022 Do Scheme flow	Percentage change	Magnitude of noise impact
A164/A645	1585	1707	8%	Negligible
A614/Airmyn Road	2091	2214	6%	Negligible
M62/A614	5497	5718	4%	Negligible
A645/New Road	1350	1516	12%	Negligible
A1041/A645	1677	1720	3%	Negligible
A63/A1041	3054	3260	7%	Negligible

7.6.22. The assessment predicts that the increase from construction traffic flow is below 25%, it can therefore be concluded that noise increase from construction traffic will be negligible. The predicted noise increase from baseline as a result of construction traffic is less than 1 dB. As such, the cumulative noise increase (from construction activities and construction traffic movements on the roads associated with the Stage 1 construction on the Site) will be negligible and not significant.

7.6.23. Table 7-19 provides a summary of the combined predicted noise effects as a result of the Stage 1 construction works and Stage 1 construction traffic.

Table 7-19 - Summary of Predicted Construction and Traffic Noise Effects for Stage 1

Construction Area	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Total Stage 1 Construction Noise Unit X + Gas Pipeline, AGI and GRF	62.9	41.2	48.2	46.9	44.9	38.3	39.5	43.9	54.3	38.2
Predicted Traffic noise Increase	< 1dB	< 1dB	< 1dB	< 1dB	< 1dB	< 1dB	< 1dB	< 1dB	< 1dB	< 1dB
Total Combined Stage 1 Noise Effects	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Stage 2 – Operation of Unit X and Construction of Unit Y

Noise Assessment for the Operation of the Gas Pipeline and AGI and Gas Receiving Facility

7.6.24. The operation of the Gas Pipeline will not give rise to audible noise under normal conditions. Therefore, (in line with Table 7-9) noise impacts from operation of the Gas Pipeline are considered to be negligible.

7.6.25. There will be an AGI located where the Gas Pipeline connects to the National Gas Transmission System. The operation of the AGI may give rise to some audible noise during maintenance and inspection (i.e. when scheduled maintenance work is required / when small volumes of gas may need to be vented or re-compressed). Such maintenance and inspection operations will be infrequent and would be carried out during the daytime. Table 7-20 shows the approximate distances between the AGI location and the closest NSR locations.

Table 7-20 - Closest NSR distances to AGI

NSR	Distance to Proposed AGI Location
NSR 10 – Willow Row Drain	1,200 m
NSR 12 - River Ouse 2	1,600 m
NSR 15 - Woodland 2	2,125 m

7.6.26. Based on the distances of the proposed AGI location from the nearest NSR locations (and in line with Table 7-9), noise impacts from the operation of the AGI are considered to be negligible, and as such are not considered further in this study.

7.6.27. The Gas Receiving Facility (GRF) is understood to include compressors and pumps, which will be contained within a building with external flues. Noise from the operation of the GRF has been included in the operational noise model. The cumulative predicted operational noise levels are reported below in the assessment for the operation of Unit X.

Noise Assessment for the Operation of Unit X

7.6.28. The computer noise modelling software CadnaA (Version 4.6), which uses the ISO 9613 propagation algorithms has been used to undertake a noise calculation. The model estimates the contribution to noise levels at each NSR location, and has been created using a representative Sound Power Level for major plant items.

7.6.29. A number of assumptions with regards to the noise control have been included on major plant items, as embedded mitigation, these are identified in the methodology Section 7.4.

7.6.30. The model considers normal operational noise for the open cycle mode as this is considered the worst case in terms of noise emissions. Noise due to black-start facilities and other non-normal operation plant items have not been considered.

7.6.31. The noise levels used in the model for the major noise sources are as follows:

- The gas turbine and generator housing will be limited to a Sound Pressure Level of 85 dB(A) at 1 m. Unit X would have up to two gas turbines.
- The gas turbine and HRSG will be contained within a turbine building. Unit X would have up to two HRSGs.
- Stack terminations modelled at a height of 120 m will be limited to a Sound Power Level of 111 dB(A) during open cycle, and 98 dB(A) during combined cycle. Unit X will have up to four stacks.
- Battery storage facility – Mechanical cooling infrastructure modelled at ground level with Sound Power Level of 85 dB(A).
- The gas compressor station stack termination has been modelled at a height of 6 m and will be limited to a sound power level of 86dB(A).

7.6.32. Table 7-21 presents a summary of the predicted operational noise levels from Unit X only, whilst operating in the open cycle mode.

7.6.33. Figure 7.4. Shows the noise contour plot to illustrate the predicted spread of noise levels from the operation of Unit X at the Power Station Site.

Table 7-21 - Stage 2 - Unit X Only - Predicted Operational Noise Levels at Residential NSR Locations

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	39.8	33.4	30.2	37.8	34.9	12.1	29.8	31.8	35.4	26.4

Table 7-22 - Stage 2 - Unit X Only - Predicted Operational Noise Levels at Ecological NSR Locations

Ecological Sensitive Receptor Locations	Predicted Noise Level, L_{Aeq} dB
NSR 11 - River Ouse 1	24.2
NSR 12 - River Ouse 2	25.1
NSR 13 - Disused Railway SINC 2	32.5
NSR 14 - Woodland 1	35.8
NSR 15 - Woodland 2	33.5
NSR 16 - Woodland 3	39.1
NSR 17 - Woodland 4	33.9
NSR 18 - Woodland 5	14.1
NSR 19 - Development Parcel E	27
NSR 20 - Development Parcel B	34.6
NSR 21 - Disused Railway SINC 1	28.9
NSR 22 - River Derwent 1	27.8
NSR 23 - River Derwent 2	28.3

Stage 2 - External Amenity Noise Levels

7.6.34. Table 7-21 shows that the operational noise levels from Unit X are predicted to meet with the recommended noise limits for amenity areas at all NSR locations. The sensitivity of NSRs 1 to 10 is considered to be high, and the magnitude of change prior to mitigation is considered to be negligible. Therefore, there is likely to be no effect, which is considered to be of negligible significance. This is below the NOEL threshold.

Stage 2 - Unit X Operational Noise Levels at Ecological NSR Locations

7.6.35. The sensitivity of ecological NSRs 11 to 23 in Table 7-22 is considered to be high. The magnitude of impact and significance of effect from the predicted noise levels, as a result of the operation of Unit X, is discussed in Chapter 9 (Biodiversity).

Stage 2 - Unit X Operation – BS 4142 Assessment

7.6.36. The operational noise assessment is based on the BS 4142 methodology, the Standard indicates that penalties could be applicable for noise characteristics such as intermittency, impulsivity and tonality, to reflect that these types of noise are considered more annoying than continuous noise sources. As noise from the proposed plant items is not yet present, establishing a penalty or rating for sound characteristics likely to increase distinctiveness (perception) or annoyance (response) requires professional judgement. Gas turbines are inherently tonal, as such a 3dB penalty has been applied to account for this (shown as the Acoustic Feature Correction in Table 7-23 and Table 7-24 below). Intermittent and impulsive

noise characteristics have been discounted from this assessment, as the main noise producing elements would be from gas turbines which will produce a steady noise.

7.6.37. Table 7-23 and Table 7-24 show the BS4142 assessment summaries for daytime and night time, taking account of the Acoustic Feature Correction, which, when added to the predicted noise level, gives the combined noise level, referred to as the Rating Level.

Table 7-23 - BS 4142 Stage 2 – Unit X - Assessment Summary – Daytime

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	37.4	29.8	27.7	33.3	31.7	12.1	27.4	29.9	32.2	12.3
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	40.4	32.8	30.7	36.3	34.7	15.1	30.4	32.9	35.2	15.3
Daytime Background Noise Level, LA90 dB	35	32	32	35	35	35	43	49	43	42
Difference, dB	5.4	0.8	-1.3	1.3	-0.3	-19.9	-12.6	-16.1	-7.8	-26.7

Table 7-24 - BS 4142 Stage 2 – Unit X - Assessment Summary – Night Time

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	37.4	29.8	27.7	33.3	31.7	12.1	27.4	29.9	32.2	12.3
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	40.4	32.8	30.7	36.3	34.7	15.1	30.4	32.9	35.2	15.3

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Daytime Background Noise Level, LA90 dB	35	26	27	24	28	24	40	42	37	35
Difference, dB	5.4	6.8	3.7	12.3	6.7	-8.9	-9.6	-9.1	-1.8	-19.7

Daytime Results for Unit X

7.6.38. The sensitivity of NSR 1 is considered to be high, and the magnitude of change prior to mitigation is considered to be medium. Therefore, there is likely to be a direct, long-term negative effect on NSR 1, which is considered to be of moderate significance prior to the implementation of mitigation measures. This is above the SOAEL threshold.

7.6.39. The sensitivity of NSRs 2, and 4 is considered to be high, and the magnitude of change prior to mitigation is considered to be low. Therefore, there is likely to be a direct, long-term negative effect on NSRs 2, and 4, which is of minor significance prior to the implementation of mitigation measures. This is above the LOAEL threshold.

7.6.40. The sensitivity of NSRs 3, 5, 6, 7, 8, 9 and 10 is considered to be high, and the magnitude of change prior to mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the proposed Scheme is below the existing background noise level at the NSR location. Therefore, there is likely to be a no effect on NSRs 3, 5, 6, 7, 8, 9 and 10, which is of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

7.6.41. The results of the daytime operational noise assessment identify that secondary mitigation will be needed to meet appropriate noise levels; this is discussed further in Section 7.7.

Night Time results for Unit X

7.6.42. The sensitivity of NSR 4 is considered to be high, and the magnitude of change prior to mitigation is considered to be high. Therefore, there is likely to be a direct, long-term negative effect on NSR 4, which is of major significance prior to the implementation of mitigation measures. This is above the SOAEL threshold.

7.6.43. The sensitivity of NSRs 1, 2 and 5 is considered to be high, and the magnitude of change prior to mitigation is considered to be medium. Therefore, there is likely to be a direct, long-term negative effect on NSRs 1, 2 and 5, which is of moderate significance prior to the implementation of mitigation measures. This is above the SOAEL threshold.

7.6.44. The sensitivity of NSR 3 is considered to be high, and the magnitude of change prior to mitigation is considered to be low. Therefore, there is likely to be a direct, long-term negative effect on NSR 3, which is of minor significance prior to the implementation of mitigation measures. This is above the LOAEL threshold.

7.6.45. The sensitivity of NSRs 6, 7, 8, 9 and 10 is considered to be high, and the magnitude of change prior to mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the proposed Scheme is below the existing background noise level at the NSR location. Therefore, there is likely to be a no effect on NSRs 6, 7, 8, 9 and 10, which is of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

7.6.46. The results of the night time operational noise assessment identifies that secondary mitigation will be needed to meet appropriate noise levels; this is discussed further in Section 7.7.

Stage 2 - Construction of Unit Y

7.6.47. It is noted that at Stage 2 the Gas Pipeline, AGI and part of the GRF will be complete and in-situ, as such the Stage 2 construction works will only be undertaken on the Power Station Site and the Carbon capture readiness reserve space where the temporary construction laydown area would be located. The on-site construction works anticipated for Stage 2 will be the same as for on-site construction works for Stage 1; therefore, the magnitude of impact from construction vibration is also predicted to negligible for the Stage 2 construction works.

Traffic Assessment for Construction Works during Stage 2

7.6.48. It is noted that at Stage 2 the Gas Pipeline will be complete and in-situ. For Stage 2, the construction traffic will only be accessing the Power Station Site (and the adjacent Laydown Area described as Work No. 9B in Schedule 1 to the draft DCO (document reference 3.1)), which, when compared to Stage 1 will result in a reduced construction traffic flow on local roads. As such, the magnitude of impact from construction road traffic noise is also predicted to negligible and not significant for the Stage 2 construction works.

7.6.49. **Error! Reference source not found.** presents the noise levels associated with construction activities related to the construction of Unit Y, and predicts the likely noise level contributed by each item of plant at each NSR. The estimated Sound Pressure Levels shown are worst-case estimates based on distance attenuation only.

7.6.50. The assessment has considered noise from construction activities related to the following:

- Construction works on Unit Y.
- Installation of 100MW storage capability into the battery storage building
- Construction traffic using the surrounding road network.

7.6.51. Table 7-25 provides a summary of results for the Stage 2 noise predictions for the construction works related to Unit Y. The full calculations are provided in Appendix 7.

7.6.52. The type and duration of noise produced at construction and operation are different, as such, the methodologies used to assess noise effects from construction and operation of industrial facilities are different (construction noise from the Proposed Scheme is assessed using the BS5228 methodology, operational noise is assessed using the BS4142 methodology). The assessment methodologies for construction and operation are not interchangeable, however, due to the intended programme of the Proposed Scheme (whereby during Stage 2, Unit X will be operational whilst Unit Y is under construction) it is necessary to quantify the likely combined noise levels at NSR locations from the simultaneous operation of Unit X and construction of Unit Y.

7.6.53. Table 7-26 provides a summary of the predicted LAeq dB noise levels at NSR locations from the Operation of Unit X and the Construction of Unit Y. The predicted noise levels have been logarithmically summed to provide a total combined noise level as a result of the construction and operational activities at each NSR location.

Table 7-25- Stage 2 – Summary of Predicted Construction Noise Levels at Residential NSR Locations (LAeq dB)

Construction Area	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Unit Y Construction	47.9	38.9	43.7	44.7	43.5	37.2	38.5	42.3	41.5	36.5

Table 7-26 - Stage 2 – Summary of Combined Operation and Construction Noise Levels at Residential NSR Locations (LAeq dB)

Item	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Unit X Predicted Operational Noise Level, LAeq dB	39.8	33.4	30.2	37.8	34.9	12.1	29.8	31.8	35.4	26.4
Unit Y Predicted Construction Noise Level, LAeq dB	47.9	38.9	43.7	44.7	43.5	37.2	38.5	42.3	41.5	36.5
Combined LAeq dB	48.5	40.0	43.9	45.5	44.1	37.2	39.0	42.7	42.5	36.9
Increase Above Construction Noise Level, dB	0.6	1.1	0.2	0.8	0.6	0.0	0.5	0.4	1.0	0.4

Stage 2 - Construction Noise Assessment – Results

7.6.54. The sensitivity of NSRs 1 to 10 in Table 7-25 is considered to be high, and the magnitude of change prior to mitigation is considered to be negligible. Therefore, in line with Table XX, there is likely to be a no effect on NSRs 1 to 10, which is of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

Stage 2 – Combined Construction and Operational Noise Assessment – Results

7.6.55. The predicted noise levels for the construction of Unit Y (as shown in Table 7-25) are likely to be the dominant noise levels at NSR locations during the construction period. However, in line with the BS5228 methodology, the predicted construction noise levels are negligible at all NSR locations.

7.6.56. Table 7-26 shows the combined noise assessment for the construction of Unit Y and the operation of Unit X, the results show an increase of <1dB above the construction noise levels at all NSR locations, with the exception of NSR 2, which shows an increase of 1.1dB. It is considered that the predicted increases are extremely minor, and are unlikely to be subjectively noticeable at NSR locations. As such, the combined noise impact from the construction of Unit Y and the operation of Unit X is considered to be negligible and not significant.

Table 7-27 - Stage 2 – Summary of Predicted Construction Noise Levels at Ecological NSR Locations

Ecological Sensitive Receptor Locations	Predicted Noise Level, L_{Aeq} dB
NSR 11 - River Ouse 1	38.1
NSR 12 - River Ouse 2	38.2
NSR 13 - Disused Railway SINC 2	44.6
NSR 14 - Woodland 1	48.4
NSR 15 - Woodland 2	45.1
NSR 16 - Woodland 3	50.1
NSR 17 - Woodland 4	43.8
NSR 18 - Woodland 5	41.3
NSR 19 - Development Parcel E	58.3
NSR 20 - Development Parcel B	55.9
NSR 21 - Disused Railway SINC 1	54.0
NSR 22 - River Derwent 1	53.0
NSR 23 - River Derwent 2	39.0

7.6.57. The sensitivity of ecological NSRs 11 to 23 in is considered to be high. The magnitude of impact and significance of effect from the predicted noise levels, as a result of the Stage 2 Construction Works, is discussed in Chapter 9 (Biodiversity).

Stage 3 – Operation of Units X and Y, AGI, GRF and Battery Storage Facility

7.6.58. A summary of the operational noise assessment for Unit X, Unit Y, the AGI, the GRF and battery storage facility for the daytime and night time are shown in Table 7-28 and Table 7-29.

7.6.59. Figure 7.5 shows the noise contour plot to illustrate the predicted spread of noise levels from the simultaneous operation of Units X and Y at the Power Station Site.

7.6.60. It is noted that the assessment takes account of the 3 dB Acoustic Feature Correction for tonality, which, when added to the predicted noise level, gives the combined noise level, referred to as the Rating Level.

Table 7-28 - Stage 3 - BS 4142 - Operation of Units X and Y, AGI, GRF and Battery Storage Facility - Assessment Summary – Daytime

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	39.9	33.3	30.2	37.5	34.4	12.1	29.5	32.2	35.1	14.4
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	42.9	36.3	33.2	40.5	37.4	15.1	32.5	35.2	38.1	17.4
Daytime Background Noise Level, LA90 dB	35	32	32	35	35	35	43	49	43	42
Difference, dB	7.9	4.3	1.2	5.5	2.4	-19.9	-10.5	-13.8	-4.9	-24.6

Table 7-29 - Stage 3 - BS 4142 - Operation of Units X and Y, AGI, GRF and Battery Storage Facility - Assessment Summary – Night Time

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	39.9	33.3	30.2	37.5	34.4	12.1	29.5	32.2	35.1	14.4
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	42.9	36.3	33.2	40.5	37.4	15.1	32.5	35.2	38.1	17.4

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Night Time Background Noise Level, LA90 dB	35	26	27	24	28	24	40	42	37	35
Difference, dB	7.9	10.3	6.2	16.5	9.4	-8.9	-7.5	-6.8	1.1	-17.6

Stage 3 - Daytime Results for Units X and Y, AGI, GRF and Battery Storage Facility

7.6.61. The sensitivity of NSRs 1 and 4 are considered to be high, and the magnitude of change prior to mitigation is considered to be medium. Therefore, when Units X and Y are operating in open cycle, there is likely to be a direct, long-term negative effect on NSRs 1 and 4, of moderate significance prior to the implementation of mitigation measures. This is above the SOAEL threshold.

7.6.62. The sensitivity of NSRs 2, 3 and 5 is considered to be high, and the magnitude of change prior to mitigation is considered to be low. Therefore, when Units X and Y are operating in open cycle, there is likely to be a direct, long-term negative effect on NSRs 2, 3 and 5, of minor significance prior to the implementation of mitigation measures. This is above the LOAEL threshold.

7.6.63. The sensitivity of NSRs 6, 7, 8, 9 and 10 is considered to be high, and the magnitude of change prior to mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the proposed Scheme is below the existing background noise level at the NSR location. Therefore, when Units X and Y are operating in open cycle, there is likely to be no effect on NSRs 6, 7, 8, 9 and 10, which is of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

Stage 3 - Night Time Results for Units X and Y, AGI, GRF and Battery Storage Facility

7.6.64. The sensitivity of NSRs 2 and 4 is considered to be high, and the magnitude of change prior to mitigation is considered to be high. Therefore, when Units X and Y are operating in open cycle there is likely to be a direct, long-term negative effect on NSRs 2 and 4, of major significance prior to the implementation of mitigation measures. This is above the SOAEL threshold.

7.6.65. The sensitivity of NSRs 1, 3 and 5 is considered to be high, and the magnitude of change prior to mitigation is considered to be medium. Therefore, when Units X and Y are operating in open cycle, there is likely to be a direct, long-term negative effect on NSRs 1, 3 and 5, of moderate significance prior to the implementation of mitigation measures. This is above the SOAEL threshold.

7.6.66. The sensitivity of NSR 9 is considered to be high, and the magnitude of change prior to mitigation is considered to be low. Therefore, when Units X and Y are operating in open cycle, there is likely to be a direct, long-term negative effect on NSR 9, of minor significance prior to the implementation of mitigation measures. This is above the LOAEL threshold.

7.6.67. The sensitivity of NSRs 6, 7, 8 and 10 is considered to be high, and the magnitude of change prior to mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the proposed Scheme is below the existing background noise level at the NSR location. Therefore, when Units X and Y are operating in open cycle, there is likely to be a no effect on NSRs 6, 7, 8 and 10, which is of neglible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

Stage 3 – Predicted perational Noise Levels for Units X and Y at Ecological NSR Locations

7.6.68. Table 7-30 provides a summary of the predicted operational noise levels from Units X and Y at ecological NSR locations.

Table 7-30 - Stage 3 - Units X and Y - Predicted Operational Noise Levels at Ecological NSR Locations

Ecological Sensitive Receptor Locations	Predicted Noise Level, LAeq dB
NSR 11 - River Ouse 1	27.4
NSR 12 - River Ouse 2	28.4
NSR 13 - Disused Railway SINC 2	35.9
NSR 14 - Woodland 1	38.6
NSR 15 - Woodland 2	36
NSR 16 - Woodland 3	40.9
NSR 17 - Woodland 4	35.9
NSR 18 - Woodland 5	14.9
NSR 19 - Development Parcel E	38.9
NSR 20 - Development Parcel B	36.2
NSR 21 - Disused Railway SINC 1	32.1
NSR 22 - River Derwent 1	31.3
NSR 23 - River Derwent 2	30.6

7.6.69. The sensitivity of ecological NSRs 11 to 23 in Table 7-30 is considered to be high. The magnitude of impact and significance of effect from the predicted noise levels, as a result of the operation of Units X and Y, is discussed in Chapter 9 (Biodiversity).

Decommissioning

7.6.70. For the decommissioning phase it is reasonable to assume that similar plant items and processes will be used as for the construction phase. Table 7-31 overleaf details the predicted noise levels at receptor locations as a result of the decommissioning works on-site. The predicted noise levels are assessed against the BS5228 significance criteria detailed in Table 7-8.

Table 7-31 - Decommissioning Works - Predicted Noise Levels at Residential NSR Locations

Reconfiguration Works	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Noise Level, LAeq, dB	47.9	38.9	43.7	44.7	43.5	37.2	38.5	42.3	41.5	36.5

7.6.71. The sensitivity of residential NSRs 1 to 10 in Table 7-31 is considered to be high, and the magnitude of change prior to mitigation, is considered to be negligible. Therefore, as a result of the decommissioning works there is likely to be no effect, of negligible significance prior to the implementation of mitigation measures. This is below the NOEL threshold.

Table 7-32 - Decommissioning Works - Predicted Noise Levels at Ecological NSR Locations

Ecological Sensitive Receptor Locations	Predicted Noise Level, L_{Aeq} dB
NSR 11 - River Ouse 1	38.1
NSR 12 - River Ouse 2	38.2
NSR 13 - Disused Railway SINC 2	44.6
NSR 14 - Woodland 1	48.4
NSR 15 - Woodland 2	45.1
NSR 16 - Woodland 3	50.1
NSR 17 - Woodland 4	43.8
NSR 18 - Woodland 5	41.3
NSR 19 - Development Parcel E	58.3
NSR 20 - Development Parcel B	55.9
NSR 21 - Disused Railway SINC 1	54.0
NSR 22 - River Derwent 1	53.0
NSR 23 - River Derwent 2	39.0

7.6.72. The sensitivity of the ecological NSRS 11 to 23 in Table 7-32 is considered high. The magnitude of impact and significance of effect from the predicted noise levels, as a result of the decommissioning works, is discussed in Chapter 9 (Biodiversity).

7.7 Mitigation and Enhancement Measures

7.7.1. This section sets out the secondary mitigation requirements and enhancement measures required.

Site Reconfiguration Works / Stage 0

7.7.2. The Site Reconfiguration Works assessment has identified that noise and vibration from activities on the Power Station Site, and traffic using the surrounding road network are predicted to be negligible. As such, no secondary mitigation measures are required.

Construction Phase / Stage 1 & Stage 2 (in relation to construction of Unit Y)

7.7.3. The construction assessment has identified that levels of noise are predicted to be negligible at all NSR locations. As such, no secondary mitigation measures are required.

Operational Phase / Stage 2 (in relation to Unit X) & Stage 3 (in relation to both Units X & Y)

7.7.4. The operational noise assessment has identified that moderate effects are identified at NSR locations during the daytime, and major noise effects are identified during night time. A review of the noise model has shown that the dominant noise levels are located at the 4 No. open cycle stack terminations (being the exhaust gas emission point at the top of the stacks), each stack modelled with a sound power level of 111 dB(A) when running in open cycle.

7.7.5. To meet with appropriate noise levels at NSR locations it is recommended that the noise emitted from the top of the 4 No exhaust gas emission stacks should not exceed a sound power level of 98 dB(A). To achieve this, acoustic attenuators will be required in the 4 No open cycle stacks.

Decommissioning Phase

7.7.6. The decommissioning phase assessment has identified that noise and vibration from activities on Site, and traffic using the surrounding road network are predicted to have negligible effects. As such, no secondary mitigation measures are required.

7.8 Residual Effects

Stage 0 – Site Reconfiguration Works

7.8.1. Noise and vibration effects for the Site Reconfiguration Works are predicted to be negligible, as such there are negligible residual effects.

Stage 1 – Construction of Unit X

7.8.2. Noise and vibration effects for the construction of Unit X are predicted to be negligible, as such there are negligible residual effects.

Stage 2 – Operation of Unit X and Construction of Unit Y

7.8.3. Table 7-33 and Table 7-34 show the results of the operational noise assessment for daytime and night time, with the use of the recommended attenuators in the exhaust gas emission

Table 7-33 - Stage 2 – Operation of Unit X with Mitigation - BS 4142 Assessment Summary – Daytime

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	31.3	18.8	18.6	22.6	20.7	10.1	15.7	22.5	21.4	12.1
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	34.3	21.8	21.6	25.6	23.7	13.1	18.7	25.5	24.4	15.1
Daytime Background Noise Level, LA90 dB	35	32	32	35	35	35	43	49	43	42
Difference, dB	-0.7	-10.2	-10.4	-9.4	-11.3	-21.9	-24.3	-23.5	-18.6	-26.9

Table 7-34 - Stage 2 – Operation of Unit X with Mitigation - BS 4142 Assessment Summary – Night Time

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	31.3	18.8	18.6	22.6	20.7	10.1	15.7	22.5	21.4	12.1
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	34.3	21.8	21.6	25.6	23.7	13.1	18.7	25.5	24.4	15.1

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Night Time Background Noise Level, LA90 dB	35	26	27	24	28	24	40	42	37	35
Difference, dB	-0.7	-4.2	-5.4	1.6	-4.3	-10.9	-21.3	-16.5	-12.6	-19.9

Stage 2 – BS 4142 Daytime Results

7.8.4. The sensitivity of NSRs 1 to 10 is considered to be high, and the magnitude of change following mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the proposed Scheme is below the existing background noise level at the NSR location. Therefore, when Unit X is operating, there is likely to be no effect on NSR locations, which is of negligible significance following the implementation of mitigation measures. This is below the NOEL threshold.

Stage 2 – BS 4142 Night Time Results

7.8.5. The sensitivity of NSR 4 is considered to be high, and the magnitude of change following mitigation is considered to be low. Therefore, when Unit X is operating, there is likely to be a direct, long-term negative effect on NSR 4, which is of minor significance following the implementation of mitigation measures. This is above the LOAEL threshold.

7.8.6. The sensitivity of NSRs 1, 2, 3, 5, 6, 7, 8, 9 and 10 is considered to be high, and the magnitude of change following mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the proposed Scheme is below the existing background noise level at the NSR location. Therefore, when Unit X is operating, there is likely to be no effect on NSR locations 1, 2, 3, 5, 6, 7, 8, 9 and 10, which is of negligible significance following the implementation of mitigation measures. This is below the NOEL threshold.

Stage 3 – Operation of Units X and Y

7.8.7. Table 7-35 and Table 7-36 show the results of the operational noise assessment for daytime and night time, with the use of the recommended attenuators in the exhaust gas emission.

Table 7-35 - Stage 3 – Operation of Units X and Y with Mitigation - BS 4142 Assessment Summary – Daytime

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	32.2	21.2	19.9	25.7	22.8	8.1	17.4	23.4	23.4	12.3
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	35.2	24.2	22.9	28.7	25.8	11.1	20.4	26.4	26.4	15.3
Daytime Background Noise Level, LA90 dB	35	32	32	35	35	35	43	49	43	42
Difference, dB	0.2	-7.8	-9.1	-6.3	-9.2	-23.9	-22.6	-22.6	-16.6	-26.7

Table 7-36 - Stage 3 – Operation of Units X and Y with Mitigation - BS 4142 Assessment Summary – Night Time

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Predicted Operational Noise Level, LAeq dB	32.2	21.2	19.9	25.7	22.8	8.1	17.4	23.4	23.4	12.3
Acoustic Feature Correction, dB	3	3	3	3	3	3	3	3	3	3
Rating Level, dB(A)	35.2	24.2	22.9	28.7	25.8	11.1	20.4	26.4	26.4	15.3

Location	NSR 1 Wren Hall	NSR 2 Long Drax	NSR 3 Old Lodge	NSR 4 Drax Abbey Farm	NSR 5 Foremans Cottage	NSR 6 Barlow	NSR 7 Camblesforth	NSR 8 Station Cottage	NSR 9 Briden Bungalow	NSR 10 Willow Row Drain
Night Time Background Noise Level, LA90 dB	35	26	27	24	28	24	40	42	37	35
Difference, dB	0.2	-1.8	-4.1	4.7	-2.2	-12.9	-19.6	-15.6	-10.6	-19.7

Stage 3 - BS4142 Daytime Results

7.8.8. The sensitivity of NSR 1 is considered to be high, and the magnitude of change following mitigation is considered to be low. Therefore, when Units X and Y are operating, there is likely to be a direct, long-term negative effect on NSR 1, which is of minor significance following the implementation of mitigation measures. This is above the LOAEL threshold.

7.8.9. The sensitivity of NSRs 2, 3, 4, 5, 6, 7, 8, 9 and 10 is considered to be high, and the magnitude of change following mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the Proposed Scheme is below the existing background noise level at the NSR location. Therefore, when Units X and Y are operating, there is likely to be no effect on NSR locations 2, 3, 4, 5, 6, 7, 8, 9 and 10, which is of negligible significance following the implementation of mitigation measures. This is below the NOEL threshold.

Stage 3 - BS4142 Night Time Results

7.8.10. The sensitivity of NSRs 1 and 4 is considered to be high, and the magnitude of change following mitigation is considered to be low. Therefore, when Units X and Y are operating, there is likely to be a direct, long-term negative effect on NSRs 1 and 4, which is of minor significance following the implementation of mitigation measures. This is above the LOAEL threshold.

7.8.11. The sensitivity of NSRs 2, 3, 5, 6, 7, 8, 9 and 10 is considered to be high, and the magnitude of change following mitigation is considered to be negligible. Where a negative number is shown in the results, this identifies that the predicted noise level from the Proposed Scheme is below the existing background noise level at the NSR location. Therefore, when Units X and Y are operating, there is likely to be no effect on NSR locations 2, 3, 5, 6, 7, 8, 9 and 10, which is of negligible significance following the implementation of mitigation measures. This is below the NOEL threshold.

Context of the BS4142 Assessment

7.8.12. According to BS 4142, the assessment indicates that following the application of secondary mitigation the magnitude of noise change at NSR locations 1 and 4 will be low, when the plant is operating. Contextual assessment elements deemed relevant according to the BS 4142 method are considered further below.

7.8.13. It is widely accepted that an open ventilation window will provide some 10 dB noise reduction from external environmental noise levels, this is a conservative estimate. With the Proposed Scheme in operation the highest predicted noise impact at any NSR location is 32.2 dB, at NSR 1 Wren Hall. Assuming a bedroom window is open for ventilation during the night time hours, and using the conservative estimate of a 10 dB reduction through the open window would result in an IANL within the bedroom of 22.2 dB, which comfortably meets with the BS 8233 night time noise limit recommendation of 30 dB.

External Amenity Noise Levels

7.8.14. The WHO ‘Guidelines for Community Noise’ provides health-based guidance on suitable noise levels intended to avoid or minimise community annoyance. The guidance provides

guideline noise levels for both indoor and outdoor areas. Of significance to this assessment the guidance states:

"During the daytime, few people are seriously annoyed by activities with LAeq levels below 55dB; or moderately annoyed with levels below 50dB. ..."

7.8.15. The assessment has shown, in Table 7-35, that operational noise levels as a result of the Proposed scheme in amenity areas, such as gardens, are predicted to comfortably meet with recommended values at all NSR locations.

Decommissioning

7.8.16. Noise and vibration effects for the decommissioning phase are predicted to be negligible, as such there are negligible residual effects.

7.9 Limitations and Assumptions

Construction Phase

7.9.1. The construction noise assessment has been developed based on the following assumptions:

- Noise data for plant items and activities taken from BS 5228.
- Calculations have assumed that all construction plant items would be operational at the same time and in the same location to provide a reasonable worst case noise prediction.
- Ground absorption has not been considered in the construction noise calculations.
- Noise screening effects provided by the 2.2 m site hoarding at identified NSR locations.

Operational Phase

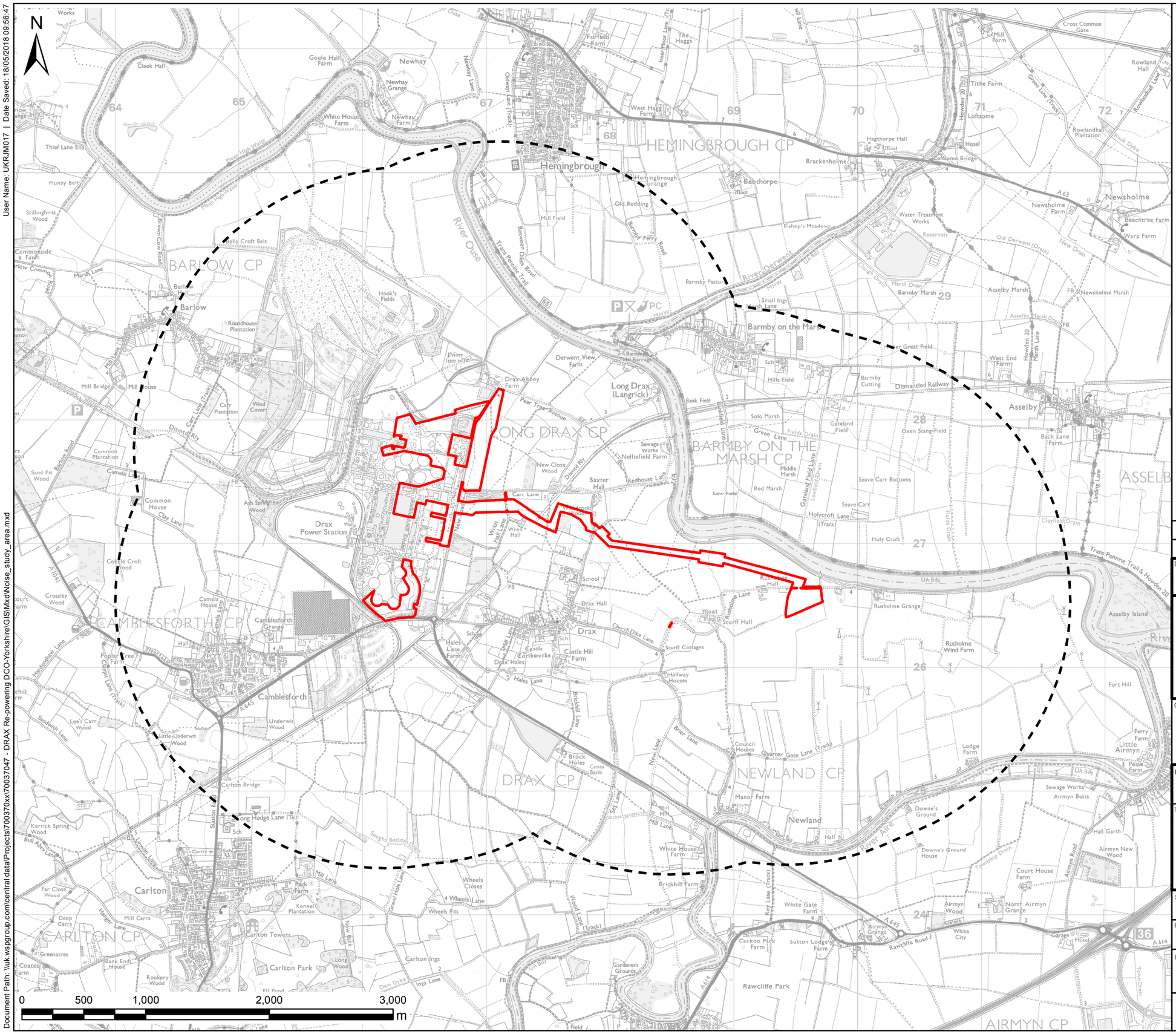
7.9.2. The limitations and assumptions for the operational assessment are as follows:

- The gas turbine and generator housing will be limited to a sound pressure level of 85 dB(A) at 1 m.
- The Proposed Scheme will use the existing cooling infrastructure, no new cooling infrastructure has been modelled.
- Baseline noise data used for the assessment was undertaken by another party for the White Rose CCS.
- ISO 9613 methodology has been used to include downwind / worst case propagation.
- Ground absorption for the operational assessment has been set to mixed.
- Stack terminations (pre-mitigation) modelled at a height of 120 m are limited to a sound power level of 111 dB(A) for open cycle and 98 dB(A) for combined cycle, this has been modelled using spectral data.
- Stack terminations (following the application of secondary mitigation) modelled at a height of 120 m are limited to a sound power level of 98 dB(A).

Table 7-37 - Summary of Effects Table for Noise and Vibration

Description of Effects	Receptor	Significance and Nature of Effects Prior to Mitigation / Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Stage 0 – Reconfiguration Works				
No Effects	-	-	-	-
Stage 1 – Reconfiguration Works				
No Effects	-	-	-	-
Stage 2 – Operation of Unit X and Construction of Unit Y				
Cumulative Noise Effects - Daytime	NSR 1	Moderate / - / P / D / LT	Acoustic attenuators in the 2 No. open cycle stacks	Negligible
	NSRs 2, 3 & 4	Minor / - / P / D / LT	Acoustic attenuators in the 2 No. open cycle stacks	Negligible
Cumulative Noise Effects – Night Time	NSR 4	Major / - / P / D / LT	Acoustic attenuators in the 2 No. open cycle stacks	Minor / - / P / D / LT
	NSR 1, 2 & 5	Moderate / - / P / D / LT	Acoustic attenuators in the 2 No. open cycle stacks	Negligible
	NSR 3	Minor / - / P / D / LT	Acoustic attenuators in the 2No. open cycle stacks	Negligible
Stage 3 – Operation of Units X and Y				

Description of Effects	Receptor	Significance and Nature of Effects Prior to Mitigation / Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Cumulative Noise Effects - Daytime	NSRs 1 & 4	Moderate / + / T / I / MT	Acoustic attenuators in the 4 No open cycle stacks	Minor / + / T / I / MT
	NSRs 2, 3 & 5	Minor / + / T / I / MT	Acoustic attenuators in the 4 No open cycle stacks	Negligible
Cumulative Noise Effects – Night Time	NSR 1	Moderate / + / T / I / MT	Acoustic attenuators in the 4 No open cycle stacks	Negligible
	NSR 2	Major / + / T / I / MT	Acoustic attenuators in the 4 No open cycle stacks	Minor / + / T / I / MT
	NSR 4	Major / + / T / I / MT	Acoustic attenuators in the 4 No open cycle stacks	Minor / + / T / I / MT
	NSRs 3 & 5	Moderate / + / T / I / MT	Acoustic attenuators in the 4 No open cycle stacks	Negligible
Decommissioning				
No effects	-	-	-	-



Key

Site Boundary

Study Area

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)

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A	12/04/2018	RMcC	FIRST ISSUE	PB	CT

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PROJECT: The Drax Power (Generating Stations) Order

TITLE: Figure 7.1 Noise Study Area

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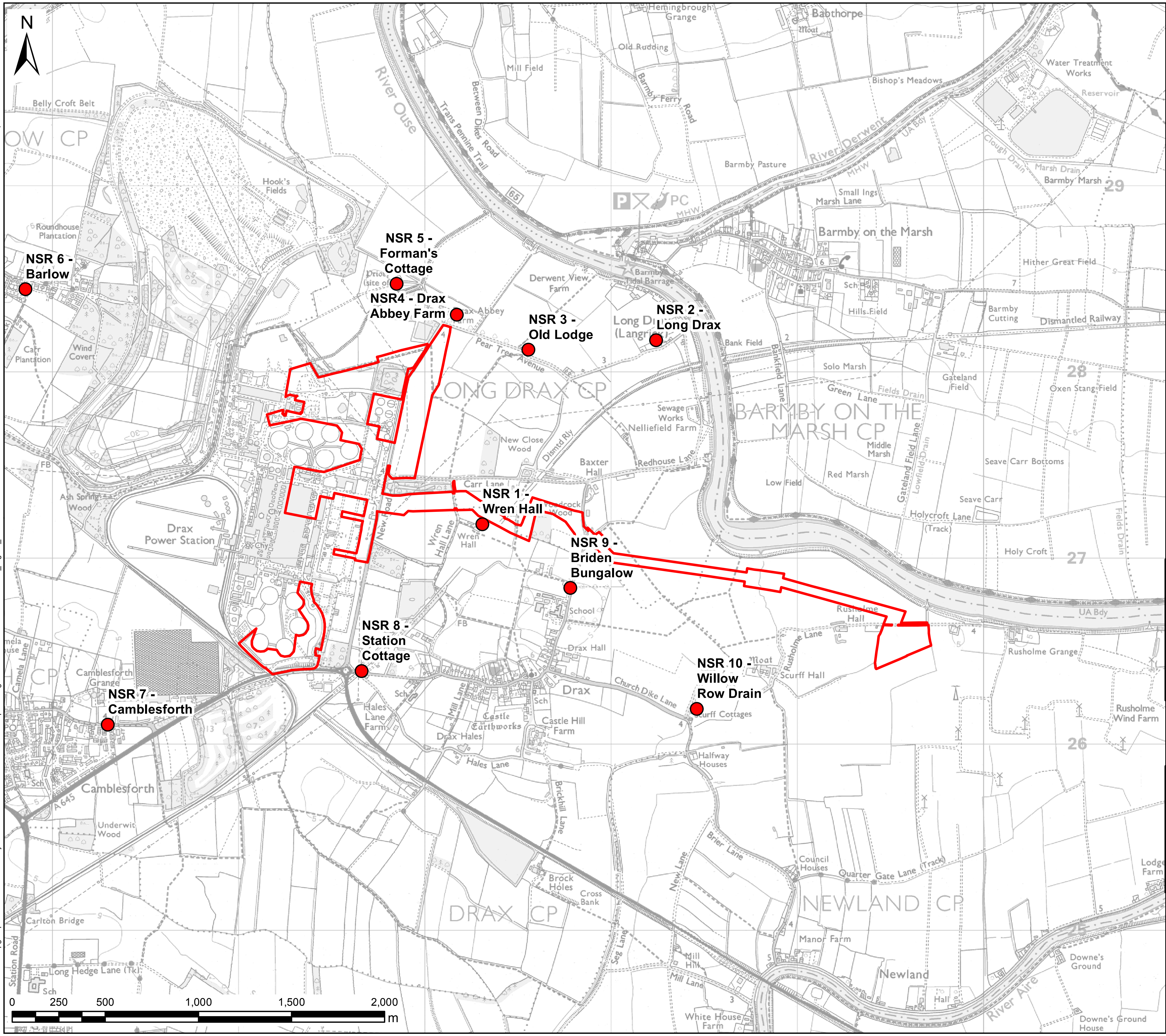

Key
- Site Boundary
- Noise Sensitive Receptor (NSR)

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Figure 7.2
Noise Sensitive Receptors
- Residential Locations

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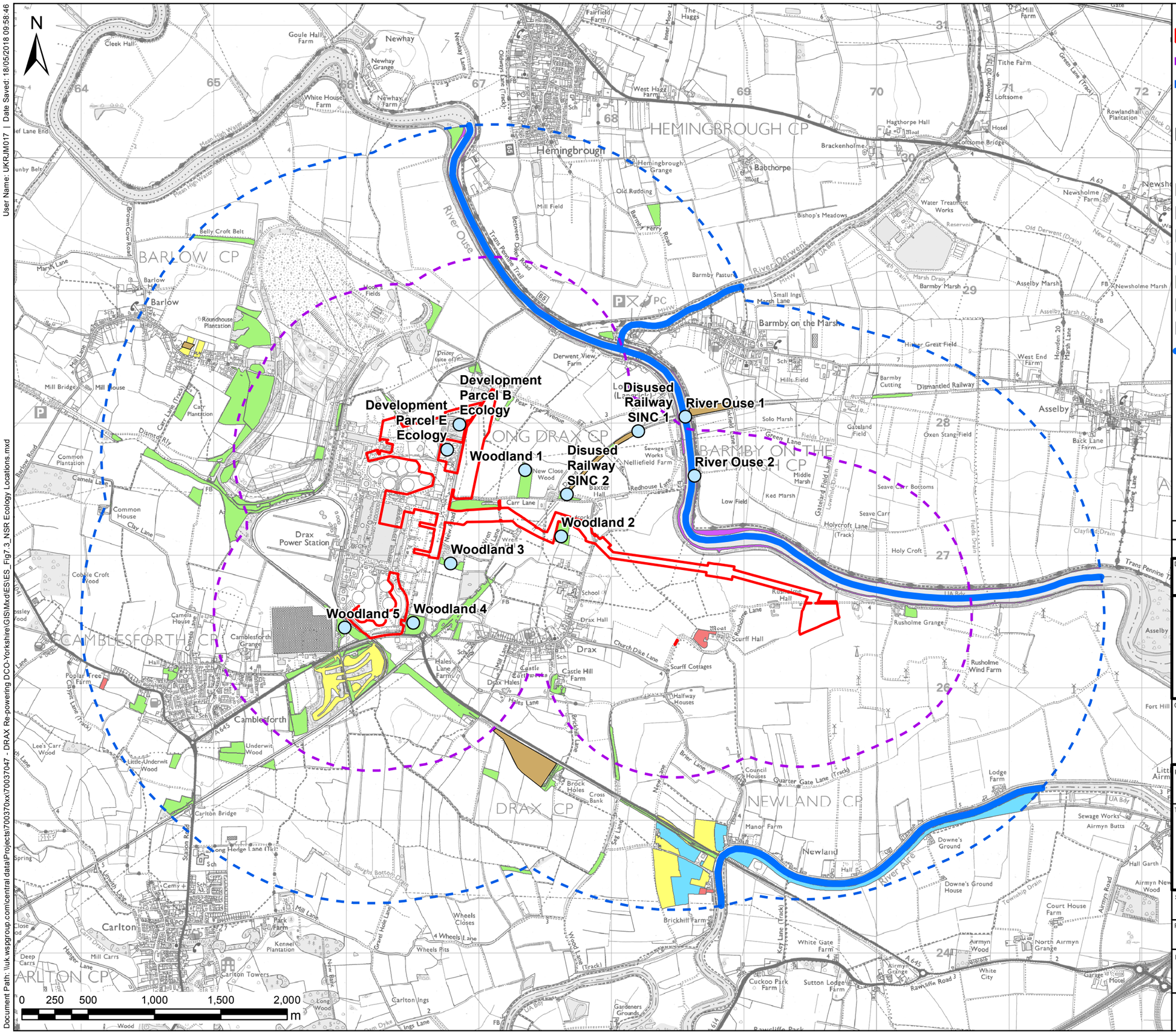

Key

- Site Boundary
- 1km Buffer
- 2km Buffer
- Ecological Sensitive Receptor
- Sites of Importance for Nature Conservation (SINC)

Priority Habitats

- Coastal and floodplain grazing marsh
- Deciduous woodland
- Lowland fens
- Lowland meadows
- Mudflats
- Traditional orchard
- No main habitat but additional habitats
- River

Note:
No Ancient Woodland located within 2km of the Site Boundary

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TITLE: Figure 7.3
Noise Sensitive Receptors
- Ecology Locations

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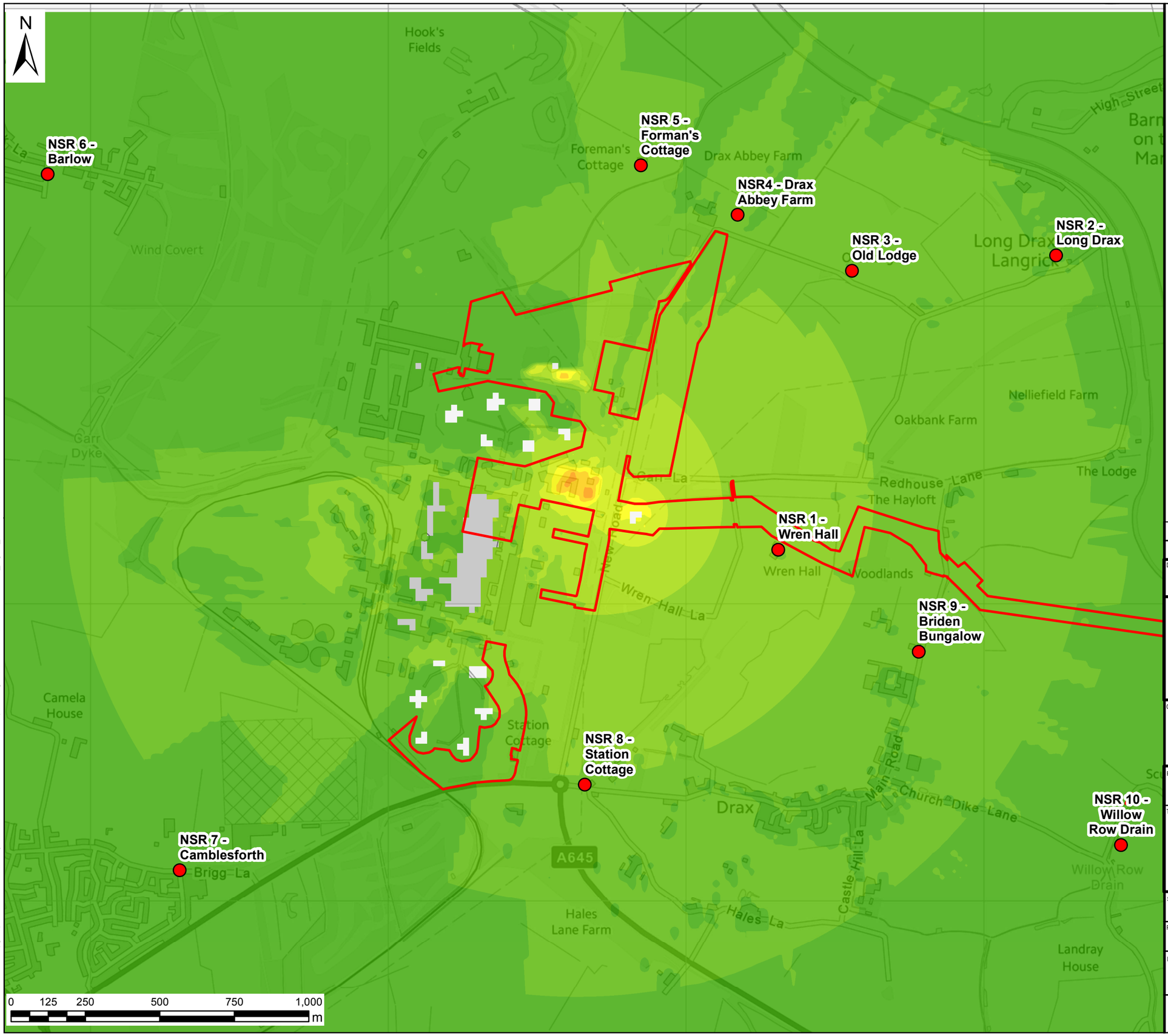

Key

- Site Boundary
- Noise Sensitive Receptor (NSR)

Unit X only - No Mitigation

L Aeq 1hr

- < 30 dB
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65

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Figure 7.4
Unit X Noise Contour Plot

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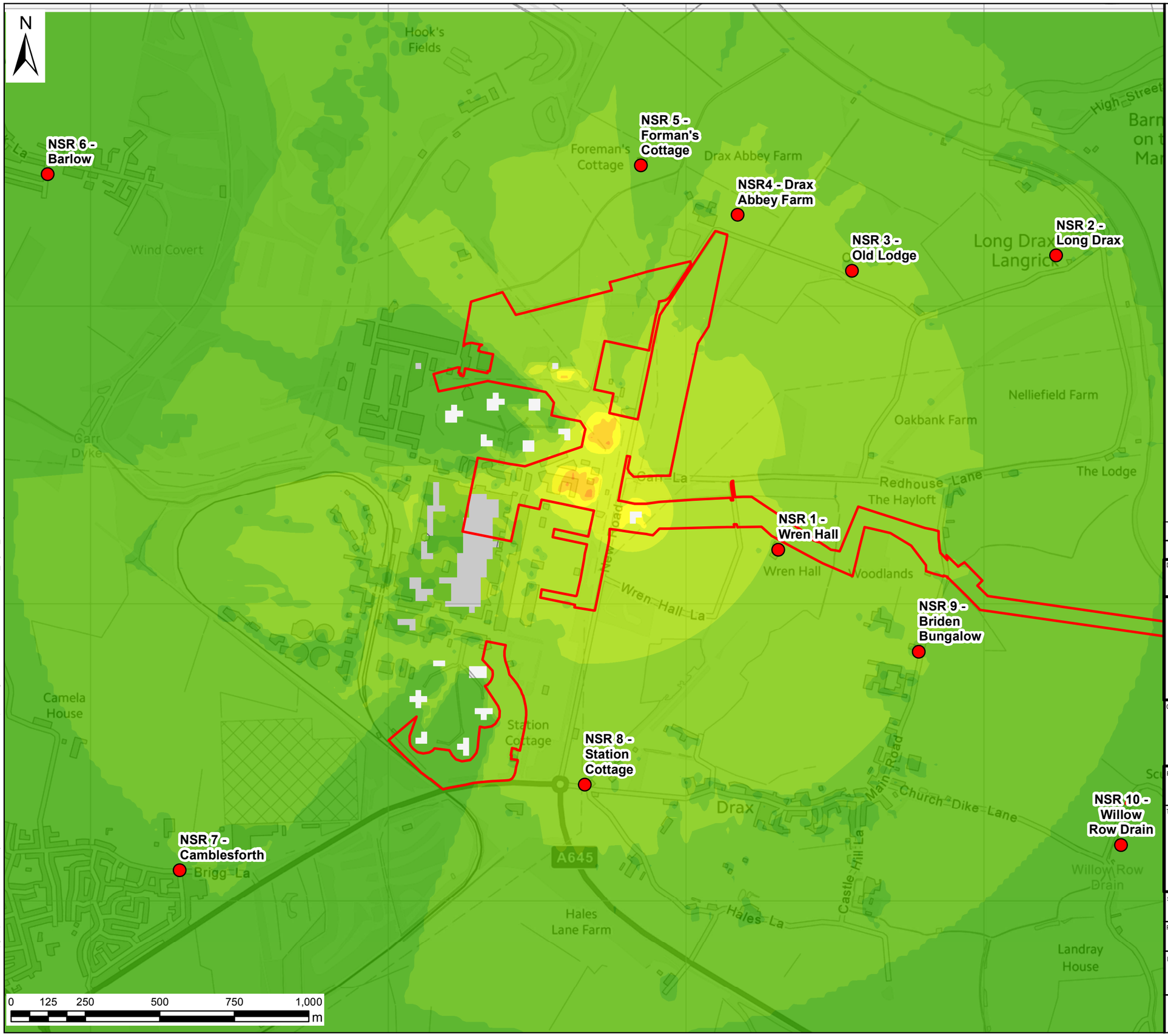
7003704-7.4	A



Key

- Noise Sensitive Receptor (NSR)
- Site Boundary

Units X & Y - No Mitigation

L Aeq 1hr

- < 30 dB
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65

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Figure 7.5
Units X & Y Noise Contour Plot

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70037047	PB	RMcC	23/04/2018

DRAWING No: 7003704-7.5 REV: A

REFERENCES

- Ref. 7.1 The NPS EN-1 (Overarching National Policy Statement for Energy)
- Ref. 7.2 The NPS EN-2
- Ref. 7.3: The National Planning Policy Framework (NPPF, DCLG 2012
- Ref. 7.4: The Noise Policy Statement for England 2010 (NPSE)
- Ref. 7.5: The Control of Pollution Act (CoPA) 1974
- Ref. 7.6: The Environmental Permitting (England and Wales) Regulations (EPR) 2010
- Ref. 7.7: Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA's)) 'Guidelines for the Environmental Assessment of Road Traffic'
- Ref. 7.8: BS 7445 (2003): Description and Measurement of Environmental Noise
- Ref. 7.9: BS 5228, Parts 1&2 (2009) + A1 (2014): Noise and Vibration Control on Construction and Open Sites
- Ref. 7.10: BS 6472 (2008): Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hertz (Hz) to 80 Hz)
- Ref. 7.11: BS 7385 (1993) Part 2: Evaluation and Measurement for Vibration in Buildings
- Ref. 7.12: BS 4142 (2014): Methods for rating and assessing industrial and commercial sound
- Ref. 7.13: BS 8233 (2014): Guidance on sound insulation and noise reduction for buildings
- Ref. 7.14: ISO 9613 (1996): Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation
- Ref. X.15: The DfT (Welsh Office Memorandum): Calculation of Road Traffic Noise (1988).
- Ref. 7.16: The Design Manual for Roads and Bridges (DMRB) produced by the Highways Agency (Volume 11, Section 3, Part 7, HA 213/11, 2011).
- Ref. 7.17: The World Health Organisation (WHO) Guidelines for Community Noise (1999).
- Ref. 7.18: The World Health Organisation - Night Time Noise Guidelines for Europe: 2009.
- Ref. 7.19: Institute of Environmental Management & Assessment (IEMA) - Guidelines for Environmental Noise Impact Assessment 2014.