Scotland England Green Link 2 - English Onshore Scheme

Environmental Statement: Volume 2

Chapter 13: Noise and Vibration

May 2022

For: National Grid Electricity Transmission

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13. Noise and Vibration

13.1 Introduction

This chapter of the Environmental Statement (ES) presents the results of baseline studies and the assessment of the potential impacts of the English Onshore Scheme on noise and vibration. The chapter summarises the regulatory and policy framework related to noise and vibration, the methodology followed for the assessment and provides an overview of the existing baseline conditions. The assessment has identified the likely significant impacts to arise during the construction or operational phases of the English Onshore Scheme and identifies any mitigation necessary to avoid or reduce these impacts where possible.

Noise impacts are interrelated with **Chapter 7: Ecology and Nature Conservation**, **Chapter 9: Archaeology and Cultural Heritage**, and **Chapter 15: Socio-Economics, Recreation & Tourism**; reference should also be made to their relevant chapters.

This chapter is supported by the following Volume 3 Appendices:

- **Appendix 13A**: Acoustic Terminology (a glossary of acoustic terminology);
- **Appendix 13B**: Baseline Noise Surveys (supporting information for the baseline noise surveys);
- **Appendix 13C**: Construction Noise Modelling (supporting information for the construction noise assessments); and
- **Appendix 13D**: Operational Noise Modelling (supporting information for the operational noise assessments is provided in).

13.2 Planning Policy and Applicable Legislation

13.2.1 Introduction

This section sets out the legislative and policy framework for noise and vibration within the UK.

13.2.2 Legislation

13.2.2.1 Control of Pollution Act 1974

The Control of Pollution Act 1974 (CoPA) (Ref 13-1) requires that Best Practicable Means (BPM), as defined in Section 72 of the CoPA, are adopted to control construction noise on any given site. Sections 60 and 61 of the CoPA provide the main legislation regarding enabling works and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by the Local Planning Authority (LPA) with instructions to cease work until specific conditions to reduce noise have been adopted.

Section 61 of the CoPA provides a means to apply for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, this provides a defence for any contravention of a Section 60 notice provided the agreed conditions are maintained on-site.

A Construction and Environmental Management Plan (CEMP) will be secured through the Planning Application and will set out how the project will seek to manage noise generated during construction. The Outline CEMP is available in **Chapter 18: Outline Construction Environmental Management Plan** of the ES.

13.2.2.2 Environmental Protection Act 1990

The Environmental Protection Act 1990 (EPA) (Ref 13-2) prescribes a statutory nuisance as noise (and vibration) emitted from premises (including land) that is prejudicial to health or a nuisance.

LPAs are required to investigate any public complaints of noise and, if they are satisfied that a statutory nuisance exists or is likely to occur or recur, they must serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either simply the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity.

In determining if a noise complaint amounts to a statutory nuisance the LPA can take account of various guidance documents and existing case law as no statutory noise limits currently exist for defining a statutory nuisance. Demonstrating the use of BPM to minimise noise levels is an accepted defence against failure to comply with a noise abatement notice.

13.2.3 National Policy

As outlined in **Chapter 4: Planning Policy Context**, relevant policies of the National Planning Policy Framework (NPPF) (Ref 13-3) and relevant National Policy Statements (NPS) are material considerations in the determination of Town and Country Planning Act applications, however they do not primacy of local policies. Key aspects of the NPPF and relevant NPSs, which have been considered during the development of this chapter, are outlined below.

13.2.3.1 National Planning Policy Framework and National Policy Statements

NPS EN-1 (Ref 13-4) with particular reference to Section 5.11 and Paragraphs 5.11.4 to 5.11.7, states the following in relation to the assessment of noise:

- *5.11.4 "Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment: a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise; identification of noise sensitive premises and noise sensitive areas that may be affected; the characteristics of the existing noise environment; a prediction of how the noise environment will change with the proposed development; in the shorter term such as during the construction period; in the longer term during the operating life of the infrastructure; at particular times of the day, evening and night as appropriate. an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and measures to be employed in mitigating noise. The nature and extent of the noise assessment should be proportionate to the likely noise impact."*
- *5.11.5 "The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered."*
- *5.11.6 "Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards137 and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies."*
- *5.11.7 "The applicant should consult EA and Natural England (NE), or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account."*

NPS EN-5 (Ref 13-5) advises that generic noise effects are covered in Section 5.11 of EN-1 which are summarised above. EN-5 section 2.9 provides further guidance on the assessment of noise from overhead lines, however as the Project does not include these, these are not relevant to the assessments presented in this ES.

Draft versions of NPS EN-1 (Ref 13-4) and EN-5 (Ref 13-5) were published for consultation by the Department for Business, Energy & Industrial Strategy in September 2021. With relation to noise, the

draft EN-1 includes the consideration of impacts on health and well-being. While no specific guidance is provided in the draft EN-1 for assessment of these noise impacts, these issues have been addressed in this ES. There are no material changes with regards to noise in the draft EN-5.

NPPF, with particular reference to Paragraph 174 and 185, states the following relevant to noise:

- *174: "Planning policies and decisions should contribute to and enhance the natural and local environment by:… e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."*
- *185: "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: 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 the 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."*

13.2.3.2 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) (Ref 13-6) seeks to clarify the underlying principles and aims in existing policy documents, legislation, and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long-term vision of the government's noise policy, which is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".*

This long-term vision is supported by three aims: *"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; and*
- *Where possible, contribute to the improvements of health and quality of life."*

The 'Explanatory Note' within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the concepts:

- No Observed Effect Level (NOEL) – the level below which no effect can be detected. Below this level, there is no detectable effect on health and quality of life due to noise;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

With reference to the SOAEL, the NPSE states:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

For situations where noise levels are between the LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur.

LOAEL and SOAEL are defined in this ES in sections 13.3.5.2 (construction noise), 13.3.5.3 (construction vibration), and 13.3.5.5 (operational noise).

13.2.3.3 The Planning Practice Guidance (PPG)

The Planning Practice Guidance (PPG) (Ref 13-7) concerned with noise advises that: *"Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)".*

PPG also provides guidelines that are designed to assist with the implementation of the NPPF. The PPG states that local planning authorities should take account of the acoustic environment and in doing so consider:

- *"whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved."*

Factors to be considered in determining whether noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise, and cumulative effects.

Further details on the hierarchy of noise effects are presented in **Table 13-1**, which has been reproduced from PPG.

Table 13-1: Planning Practice Guidance Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

13.2.4 Local Policy

13.2.4.1 East Riding Local Plan, 2012-2029, Adopted 2016

The East Riding Local Plan, 2012-2029, Adopted 2016 (Ref 13-8) contains the following relevant policy to noise:

Policy EC5: Supporting the energy sector

- *"Proposals for the development of the energy sector, excluding wind energy but including the other types of development listed in Table 7, will be supported where any significant adverse impacts are addressed satisfactorily and the residual harm is outweighed by the wider benefits of the proposal. Developments and their associated infrastructure should be acceptable in terms of:*
- *"1. The cumulative impact of the proposal with other existing and proposed energy sector developments;*
- *"2. The character and sensitivity of landscapes to accommodate energy development, with particular consideration to the identified Important Landscape Areas, as shown on Figure 11;*
- *"3. The effects of development on: "i. local amenity, including noise, air and water quality, traffic, vibration, dust and visual impact."*

13.2.4.2 Selby District Core Strategy Local Plan, Adopted 2013

The Selby District Core Strategy Local Plan, Adopted 2013 (Ref 13-9) contains the following relevant policy to noise:

Policy SP19 Design Quality

- *"Proposals for all new development will be expected to contribute to enhancing community cohesion by achieving high quality design and have regard to the local character, identity and context of its surroundings including historic townscapes, settlement patterns and the open countryside;*
- *"Where appropriate schemes should take account of design codes and Neighbourhood Plans to inform good design; and*
- *"Both residential and non-residential development should meet the following key requirements: k) Preventing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water, light or noise pollution or land instability."*

13.3 Approach to Assessment

13.3.1 Introduction

This section describes the approach to the identification and assessment of impacts resulting from the construction and operation of the English Onshore Scheme on noise and vibration.

13.3.2 Summary of Consultation

13.3.2.1 Scoping Opinion Review

Table 13-2 summarises the issues raised in the scoping opinion in relation to noise and vibration and outlines how and where this has been addressed in subsequent chapters of the ES. A copy of the scoping opinion is included in **Appendix 5-A**.

Table 13-2: Scoping Opinion (Noise and Vibration)

Consultee	Summary of comment	How and where addressed
Selby District Council	The Council's Environmental Health Officer questions whether scoping out vibration is appropriate as there could be possible vibration from:	The Scoping Report advises that vibration from construction works will be assessed based on guidance from BS 5228 Part 2, which will include movement of pipework during construction and tunneling.

Consultee	Summary of comment	How and where addressed
	- movement of pipework during construction, and - possible vibration due to tunnelling under the River Ouse. Therefore, these areas should be considered before being scoped out and further information should be provided. However, it is understood these would be associated with construction, which is proposed to be scoped in. Therefore, clarification should be provided on these points.	Criteria for construction vibration is presented in section 13.3.5.3 and the assessment is presented in section 13.6.3.2.
Selby District Council	SDC welcome consultation and agreement of suitable monitoring locations, scoping of surveys and methodology. SDC agree that the use of the Highways England document Design Manual for Roads and Bridges LA111 Noise and Vibration is appropriate for the assessment of temporary changes in road traffic levels due to construction traffic. The EHO disagrees with reliance on information contained in the withdrawn previous version of this document which relates to surveys of affected people.	AECOM has agreed the general methodology for baseline noise surveys with SDC, a summary of this is provided in Table 13-3. Criteria for the assessment of construction traffic noise makes reference to DMRB LA111 and is presented in section 13.3.5.4.
Selby District Council	The assessment of operational noise using BS4142: 2014+A1:2019 - methods for rating and assessing industrial and commercial sound is agreed. In predicting the noise from the operation of the converter station, the assessment should be based on known levels of power associated with each piece of plant.	Criteria for the assessment of operational noise makes reference to BS4142 and is presented in section 13.3.5.5. Predictions of noise emissions from plant are based on the best available information at the time of writing, which is summarized in **Appendix 13-C**.
Selby District Council	Confirmation of receptors with EHO is welcomed.	AECOM has agreed the general methodology for baseline noise surveys with SDC, a summary of this is provided in Table 13-3.
Selby District Council	It is agreed that noise from operational traffic movements and cable route are scoped out of the assessment.	Operational traffic noise and cable route noise have been scoped out of the assessment.
Selby District Council	It is assumed that vibration from heavy ground works is scoped out as all sensitive receptors will be over 20 m from the works.	The Scoping Report advises that vibration from construction works will be assessed based on guidance from BS 5228 Part 2. The assessment (presented in section 13.6.3.2) has considered the potential for vibration from heavy ground works.
East Riding of Yorkshire Council	With regards to the proposed baseline sound surveys, it is recommended that the short-term monitoring includes week days, nights and weekends, if construction activities are likely to take place at these times.	Short-term monitoring has included measurements during weekday and weeknight periods as it is not envisaged that 24-hour working would take place on weekends.

13.3.2.2 Additional Consultation

Table 13-3 summarises additional consultation undertaken with relevant statutory and non-statutory consultees in relation to noise and vibration for the English Onshore Scheme and outlines how and where this has been addressed in subsequent chapters of the ES.

Table 13-3: Additional Consultation (Noise and Vibration)

Consultee	Nature of additional consultation	How and where addressed
Selby District Council	Agreement on methodology and locations for baseline noise monitoring.	Agreed by email received 29th July 2021 from Jack Hopper, Senior Environmental Health Officer.

Consultee	Nature of additional consultation	How and where addressed
East Riding of Yorkshire Council	Agreement on methodology and locations for baseline noise monitoring.	Agreed by email received 21st July 2021 from Suzanne Shuttleworth, Environmental Health Officer – Environmental Control.

13.3.3 Identification of Baseline Conditions

13.3.3.1 Desk Studies

The baseline is informed by collating data on known designated and non-designated receptors from the following sources:

- Project design drawings and maps
- Google Maps and Google Streetview

13.3.3.2 Field Studies

Fields noise survey was carried out September and October 2021 to establish the noise environment within the study area and to define baseline noise levels representative of surrounding noise sensitive receptors.

13.3.4 Assessment Method

13.3.4.1 Assessment Guidance

The following legislation, standards and guidance have been used and considered for the noise and vibration assessment.

13.3.4.2 British Standard 7445-1:2003 and 7445-2:1991

BS 7445 'Description and measurement of environmental noise' (BSI, 1991 and 2003) (Ref 13-10) defines parameters, procedures and instrumentation required for noise measurement and analysis.

13.3.4.3 British Standard 5228:2009+A1:2014

BS 5228-1 'Code of practice for noise and vibration control on construction and open sites. Noise' (Ref 13-11) provides a 'best practice' guide for noise control and includes sound power level (L_w) data for individual plant as well as a calculation method for noise from construction activities. BS 5228-2 'Code of practice provides a 'best practice' guide for noise and vibration control on construction and open sites. Vibration' **(**Ref 13-12) provides comparable 'best practice' for vibration control, including guidance on the human response to vibration.

13.3.4.4 British Standard 6472:2008

BS 6472-1 'Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting' (Ref 13-13), presents recommended frequency weighted vibration spectra (for continuous vibration) and vibration dose values (VDV) (for intermittent vibration), above which adverse comment is likely to occur in residential properties.

13.3.4.5 British Standard 7385:1993

BS 7385-2 'Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration' (Ref 13-14) presents guide values for transient and continuous vibration, above which there is a likelihood of cosmetic damage. The standard establishes the basic principles for carrying out vibration measurements and processing the data, with regard to evaluating vibration effects on buildings.

13.3.4.6 International Organization for Standardization (ISO) 4866:2010

ISO 4866:2010 'Mechanical Vibration and Shock – Vibration of Fixed Structures – Guidelines for the Measurement of Vibrations and Evaluation of Their Effects on Structures' (Ref 13-15) establishes the principles for carrying out vibration measurement and processing data with regard to evaluating vibration effects on structures.

13.3.4.7 British Standard 4142:2014+A1:2019

BS 4142 'Methods for rating and assessing industrial and commercial sound' (Ref 13-16) can be used for assessing the effect of noise of an industrial nature, including mechanical services plant noise. The method compares the difference between '*rating level*' of the industrial sound, with the '*background sound level*' at the receptor position.

13.3.4.8 British Standard 8233:2014

BS 8233 'Guidance on sound insulation and noise reduction for buildings' (Ref 13-17) defines criteria for noise levels in and around buildings.

13.3.4.9 ISO 9613-2:1996: Attenuation of Sound during Propagation Outdoors

ISO 9613-2:1996 'Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation' (Ref 13-18) specifies an engineering 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.

13.3.4.10 Calculation of Road Traffic Noise

Department for Transport (DfT)/ Welsh Office Memorandum 'Calculation of Road Traffic Noise' (CRTN) (Ref 13-19) describes procedures for traffic noise calculation and measurement and is suitable for environmental assessments of schemes where road traffic noise may have an effect.

13.3.4.11 Design Manual for Road and Bridges (2020)

The Highways England 'Design Manual for Road and Bridges LA 111 (Revision 2) Noise and Vibration' (DMRB) (Ref 13-20) provides guidance on the appropriate approach to be taken when assessing the noise and vibration effects arising from all road projects, including new construction, improvements and maintenance. The guidance is also useful for assessing changes in traffic noise levels as a result of non-road projects such as this.

13.3.4.12 World Health Organization Guidelines

The World Health Organization's (WHO) 'Environmental Noise Guidelines for the European Region' (Ref 13-21) provides recommendations to protect human health from noise from transportation, wind turbines and leisure. These guidelines do not cover industrial noise, however, recommend that 'Guidelines for Community Noise' (WHO, 1999) should remain valid. This recommends external daytime and evening environmental noise limits, and internal night-time limits to avoid sleep disturbance.

The WHO 'Night Noise Guidelines for Europe' (WHO, 2009) recommend updated guidelines on night-time noise limits to avoid sleep disturbance.

13.3.5 Assessment Criteria

13.3.5.1 Receptor Sensitivity

Noise sensitive receptors (NSR) have been classed depending on their use and subsequent sensitivity to noise and vibration based on professional judgement and relevant national guidance on typical target noise levels for their usage. The sensitivity of receptors to noise and vibration has been defined in **Table 13-4**.

Table 13-4: Receptor Sensitivity

Sensitivity	Description	Examples of receptor usage
High	Receptors where noise will significantly affect the function of a receptor.	• Auditoria/studios; • Specialist medical/teaching centres; and • Libraries.
Medium	Receptors where people or operations are particularly susceptible to noise.	• Residential and student accommodation; • Hotels;

Sensitivity	Description	Examples of receptor usage
		• Places of worship; • Conference facilities; • Schools in daytime; and • Hospitals/residential care homes.
Low	Receptors of low sensitivity to noise, where it may cause some distraction or disturbance.	• Offices; • Restaurants; • Public houses; and • Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf).
Negligible	Receptors where distraction or disturbance from noise is minimal.	• Residences and other buildings not occupied during working hours; • Factories and working environments with existing high noise levels; and • Sports grounds when spectator or noise is a normal part of the event.

Any noise experienced by Public Rights of Way (PRoW) users may affect the perceived amenity of their surroundings but will be limited to when they are in proximity to the EOS and, for the majority of the time, PRoW users will not be affected by noise. Users of any PRoW are not considered as sensitive receptors due to the fact that they will not be subject to long-term noise exposure that would result in health impacts.

13.3.5.2 Construction Works Noise

Annex E of BS 5228 Part 1: Noise (Ref 13-11) provides example criteria for the assessment of potential significance of construction noise effects. 'Example Method 1 – The ABC Method' has been adopted for the purposes of this assessment, as it takes into consideration the context of existing noise levels experienced at a NSR, and the method for defining construction noise limits is outlined in **Table 13-5**.

Table 13-5: BS 5228-1:2009+A1:2014 ABC Method

Assessment Category and Threshold Value Period	Threshold Value, in decibels (dB) ($L_{Aeq, T}$)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23.00−07.00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	65	70	75
NOTE 1: A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the application site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3dB due to site noise. NOTE 3: Applied to residential receptors only.			
[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values. [B)] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values. [C)] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values. [D)] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

For the appropriate period (day, evening, night, weekend etc.), the ambient noise level is determined and rounded to the nearest 5 dB and the appropriate Threshold Value is then derived. The predicted construction noise level is then compared with this Threshold Value. The criterion adopted in this

assessment for the onset of potentially significant effects is the exceedance of the $L_{Aeq,T}$ threshold level for the category appropriate to the ambient noise level at each NSR.

This is considered to be potentially equivalent to the SOAEL, although as stated in BS 5228, other project-specific factors are also considered by the assessor when determining if there is a potentially significant effect, such as the number of NSRs affected and the duration and character of the impact. The criterion for the LOAEL for this assessment is a predicted construction noise level equal to the existing ambient noise level at each NSR, i.e. resulting in a 3 dB increase in noise level when combined with the ambient noise level. Note that these criteria relate to residential NSRs only, in line with the ABC method.

With consideration of the above and the information presented in **Table 13-5**, **Table 13-6** presents the construction noise magnitude of impact criteria for residential NSRs.

Table 13-6: Construction noise magnitude of impact criteria for residential NSRs

Magnitude of Impact	Construction Noise Level $L_{Aeq,T}$ (dB)
High	Exceedance of ABC Threshold Value by >5 dB
Medium	Exceedance of ABC Threshold Value by up to 5 dB
Low	Equal to or below the ABC Threshold Value by up to 5 dB
Negligible	Below the ABC Threshold Value by ≥5 dB

13.3.5.3 Construction Works Vibration

13.3.5.3.1 Impacts on Humans - Annoyance

BS 5228 Part 2: Vibration indicates that construction activities (particularly piling) usually only generate significant vibration effects when they are located within 20 metres (m) from sensitive locations. The effect depends on the construction activity, ground conditions and receptor distance.

Table 13-7 details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for description of demolition and construction vibration impacts on human receptors based on guidance contained in BS 5228-2. For assessment purposes, the LOAEL has been set at 0.3 mm/s and the SOAEL at 1.0 mm/s.

Table 13-7: Guidance on the Impacts of Vibration (PPV) Levels

Magnitude of Impact	Peak Particle Velocity Level	Description
High	>=10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.
Medium	1.0mm/s to <10 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
Low	0.3 mm/s to <1.0 mm/s	Vibration might be just perceptible in residential environments
Negligible	0.14 mm/s to <0.3 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

13.3.5.3.2 Impacts on Buildings

In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled to those relating to annoyance (i.e. 1.0 mm/s), then it is highly unlikely that buildings will be damaged by demolition and construction vibration levels.

The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration, for example due to piling.

BS 7385-2 (Ref 13-14) provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228-2 (Ref 13-11). Guide values for transient vibration, above which cosmetic damage could occur, are given in **Table 13-8**.

Table 13-8: Transient Vibration Guide Values for Cosmetic Damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	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	
Unreinforced or light framed structures Residential or light commercial buildings	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
NOTE 1: Values referred to are at the base of the building. NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

BS 7385-2 states that the probability of building damage tends to zero for transient vibration levels less than 12.5 mm/s PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 (ISO, 2010) defines three different categories of building damage:

- cosmetic – formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick/concrete block constructions;
- minor – formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick/block; and
- major – damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks.

BS 7385-2 defines that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration twice that of minor damage. Therefore, this guidance can be used to define the magnitude of impact identified in **Table 13-9** below.

Table 13-9: Magnitude of Impact – Construction Vibration Building Damage

Magnitude of Impact	Damage risk	Continuous vibration level PPV mm/s
High	Major	30
Medium	Minor	15
Low	Cosmetic	6
Very Low	Negligible	<6

13.3.5.4 Construction Traffic Noise

Construction traffic noise impacts due to increases in traffic flows on existing roads have been estimated based on the CRTN (Ref 13-19) methodology for the calculation of the Basic Noise Level (BNL) at a reference distance of 10 m from the nearside carriageway. Predictions have been undertaken for both the “with” and “without” construction traffic scenarios.

The criteria for the assessment of traffic noise level changes have been taken from Table 3.54a of DMRB LA111 (Ref 13-20) and are provided in **Table 13-10** below.

Table 13-10: Road Traffic Noise Assessment Criteria (Temporary Changes)

Magnitude of Impact	Change in Road Traffic Noise Level $L_{A10,18h}$ (dB)
High	≥ 5
Medium	3 to <5
Low	1 to <3
Negligible	<1

13.3.5.5 Operational Noise

Operational noise from fixed plant associated with the EOS has been assessed following BS 4142 (Ref 13-16) guidance, whereby the rating level of noise emissions from activities are compared against the background level of the pre-development noise climate. The relevant parameters in this instance are as follows:

- Background sound level – $L_{A90,T}$ – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels;
- Specific sound level – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr; and
- Rating level – $L_{Ar,Tr}$ – the specific sound level plus any adjustment made for the characteristic features of the noise.

BS 4142 allows for, as an absolute worst case, a cumulative +15 dB correction to be applied to the specific sound level based upon the presence or expected presence of the following:

- Tonality - up to +6 dB penalty;
- Impulsivity - up to +9 dB penalty (this can be summed with tonality penalty); and
- Other sound characteristics (neither tonal nor impulsive but still distinctive) - +3 dB penalty.

BS 4142 states the following regarding the assessment of impacts, comparing the rating level of the new noise source with the existing background level:

- *"Typically, the greater this difference, the greater the magnitude of the impact;*
- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and*
- *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."*

The criteria for determining the magnitude of operational noise impacts at NSRs, based on guidance within BS 4142, are presented in **Table 13-11**.

Table 13-11: Operational Noise Assessment Criteria

Magnitude of Impact	Difference Between Rating Level and Background Sound Level
High	+10 dB(A) or more
Medium	Between 0 and +10 dB(A)
Low	Between -10dB(A) and 0dB(A)
Negligible	-10 dB(A) or less

For indicative assessment purposes the LOAEL is set at a rating level equal to the background noise level and the SOAEL is set at a rating level of +10 dB above background, although it should be remembered that the context assessment can vary the overall significance of effects.

Note that BS 4142 advises that any consideration of the significance of effect should also take into account other contextual factors including:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the NSR.

BS 4142 advises *"where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."* As such where any excesses of the background level are identified, further consideration will be made for the absolute level of the sound source and potential effects on residential amenity e.g. by comparison against guidance on internal noise levels set out in BS 8233.

BS 8233 (Ref 13-17) provides guidance levels for internal noise within dwellings and bedrooms of 35 dB $L_{Aeq,8hr}$ during the night-time. As such where external rating levels exceed background levels but internal levels from operational noise do not exceed the BS 8233 guidance levels, impacts will be considered as limited to a low magnitude.

13.3.5.6 Significance Criteria

The following terminology has been used to define noise and vibration effects:

- **Adverse** – detrimental or negative effects to an environmental resource or receptor;
- **Negligible** – imperceptible effects to an environmental resource or receptor; or
- **Beneficial** – advantageous or positive effects to an environmental resource or receptor.

Where adverse or beneficial noise and vibration effects have been identified, these are described using the following scale:

- **Minor** – slight, very short or highly localised effect;
- **Moderate** – limited effect (by extent, duration or magnitude), which may be important at a local scale; or
- **Major** – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

The duration of noise and vibration effects is defined as follows:

- **Short-term** – period lasting for no longer than 3 months;
- **Medium-term** – period lasting for no longer than 2 years; or
- **Long-term** – period lasting for longer than 2 year.

Table 13-12 provides a matrix showing the classification of effects depending on the sensitivity of receptors and magnitude of impact. This aligns with the methodology in **Chapter 5: Approach to Environmental Assessment**. Moderate and Major levels of significance were considered to be significant in EIA terms, whilst Negligible or Minor impacts were not considered to be significant.

Table 13-12: Significance Matrix

		Magnitude of Change			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of Receptor	**High**	Negligible/ Minor	Moderate	Major	Major
	Medium	Negligible	Minor	Moderate	Major
	Low	Negligible	Negligible	Minor	Moderate
	Negligible	Negligible	Negligible	Negligible	Negligible/ Minor

13.3.6 Assumptions and Limitations

It is considered that the baseline noise measurements are representative of the typical noise environment of identified receptors at the time of preparation of this assessment. There may have been reduced road traffic during this time period due to the lockdown measures for the Covid-19 pandemic, and in turn lower levels of existing ambient noise. However, it is very likely that this provides a more conservative assessment (as any change associated with the English Onshore Scheme would be more noticeable against a lower background) and therefore is considered appropriate for use for the assessment of noise effects.

The measured $L_{A90,T}$ background noise level has been used to define the operational noise impacts of the proposed converter station associated with the English Onshore Scheme. Background noise levels may change in the period between the survey and the future assessment years; however, as the $L_{A90,T}$ background noise level is a statistical value based on a range of measured noise data, it is not possible to predict future background noise levels with any degree of accuracy. It is considered that background noise levels are unlikely to reduce in the intervening period between the baseline surveys and opening year of the English Onshore Scheme. Consequently, it is considered that the identified effects of operational noise will be representative and robust.

Construction noise predictions have been undertaken using typical items of equipment that are used in these types of developments (details are provided in **Appendix 13-C: Construction Noise Modelling**). These items of plant are taken to be representative of the equipment that will be used during construction of the English Onshore Scheme. Noise predictions were carried out to represent a conservative scenario where all construction plant is operational at the same time. Consequently, the noise predictions may overestimate construction noise levels and can therefore be considered as worst case.

Assumptions made during the noise modelling and assessment of the operations of the converter station are as presented in **Appendix 13-D: Operational Noise Modelling**. Sound emission data for key sound emitting plant/buildings within the converter station have been taken from typical plant information of similar projects. The final design of the converter station is subject to the detailed design following the appointment of the Contractor. Therefore, the operational noise modelling undertaken has considered a representative worst-case, assessing both unmitigated and mitigated scenarios. Given the requirement for additional mitigation measures, further assessment will be undertaken at the detailed design stage, to control noise emissions in order to meet the appropriate noise limits.

13.4 Study Area

For the purposes of providing an assessment of likely significant noise and vibration effects the study area has been determined by receptors within 500 m of the English Onshore Scheme planning application boundary (as shown on **Figure 13-1**).

The key sensitive receptors that may be affected by noise and vibration are residential properties located within predominantly rural agricultural areas along the planning application boundary, and residential properties within the communities of Drax, Market Weighton, Hutton, Hutton Cranswick, Skerne and Wansford. Receptors will also include the South Shore Holiday Village located to the north of the landfall location. Receptor locations and noise monitoring positions are illustrated in **Figure 13-1**.

13.5 Baseline Environment

13.5.1 Noise Monitoring Methodology

Baseline noise monitoring has been carried out to establish the existing noise climate in the area. The monitoring procedures followed guidance from BS 7445 (Ref 13-10) and BS 4142 (Ref 13-16).

Noise monitoring locations were determined based on the location of the English Onshore Scheme with respect to nearby NSRs. Long-term noise measurements were undertaken from 21st September to 27th September 2021 and additionally from 6th October to 15th October 2021. Short-term measurements were undertaken on the 27th and 28th September 2021.

Unattended measurements were undertaken at locations representative of key identified receptors near to the proposed landfall, at Fraisthorpe for a period of nine days, and near to the proposed converter station, adjacent to Drax Power Station for a period of six days, to include weekend, weekday and night-time periods. Each unattended sound level meter was housed within a weatherproof box with batteries to power the instrument for the full measurement duration. Appropriate outdoor all-weather equipment was used on all microphones.

All noise measurements included $L_{Aeq,T}$, $L_{A90,T}$, $L_{A10,T}$ and L_{AFmax} sound level indicators over 15-minute contiguous periods. The surveys were planned to avoid periods of high wind (>5m/s) and rainfall. Weather conditions (wind speed, rainfall etc.) were checked beforehand to ensure appropriate conditions were met. Periods of high wind and rainfall, identified in meteorological data, were removed from analysis.

A number of other factors were also taken into consideration when identifying these locations, including:

- Safety of the operators;
- Security of monitoring equipment; and
- Site accessibility.

13.5.2 Noise Monitoring Equipment

The equipment shown in **Table 13-13** was used for the baseline noise surveys.

Table 13-13: Noise Monitoring Equipment

Description	Manufacturer	Type	Serial Number	Locations Used
Calibrator	Brüel & Kjær	4231	2217877	All Sites
Sound Level Meter	01dB	DUO	12051	LT1 and LT2
Sound Level Meter	Norsonic	Type 140	1456013	ST1, ST2, ST3, ST4 and ST5

All the above equipment has in-date factory calibration certificates as shown in **Appendix 13-C**. The sound level meters were field calibrated before conducting measurements and calibration was checked at the end of the measurements, no significant drift was recorded.

13.5.3 Measurement Locations

Long-term unattended measurement locations were selected to provide representative noise data for nearby sensitive receptors proposed at the landfall where ongoing construction noise (including Horizontal Directional Drilling (HDD) works) may affect nearby receptors in the community of Wilsthorpe (LT1), and at the proposed converter station location where there will be a long-term, operational noise source from the English Onshore Scheme affecting receptors in the community of Drax (LT2).

Short-term attended measurements (weekday daytime and night-time) were carried out at selected locations along the proposed DC cable route, where construction works may affect nearby receptors in the communities of Wansford (ST1), Skerne (ST2), Hutton (ST3), Market Weighton (ST4) and Drax Village (ST5).

Note that measurements representative of receptors near to Drax comprised of a combination of long-term measurements at Wren Hall (LT2) and short-term measurements at Drax Village (ST5).

The noise monitoring locations are summarised below in **Table 13-14** along with receptor locations that the noise data is representative of. Receptor locations and noise monitoring positions are illustrated in **Figure 13-1**.

Table 13-14: Noise Monitoring Locations

Location	Location/ Address	Approx. British National Grid Coordinates (X/Y)	Measurement Date/Times
LT1 - Wilsthorpe	Near to residential properties in Wilsthorpe to the north of the landfall site.	516768, 463557	06/10/21 15:45 - 15/10/21 05:30
LT2 – Drax (Wren Hall)	At Wren Hall directly to the east of the preferred converter station site.	467140, 426979	21/09/21 13:15 - 27/09/21 12:00
ST1 - Wansford	Along Nafferton Road to the south of the cable route.	506289, 456720	28/09/2021 11:36 – 12:36 and 02:48 to 03:18
ST2 - Skerne	Along Main Street to the south of the cable route.	504872, 455437	28/09/2021 13:04 – 14:04 and 02:06 to 02:36
ST3 – Hutton	Near residences along Hutton Balk to the east of the cable route.	502249, 453134	27/09/2021 16:39 – 17:39 and 28/09/21 01:21 to 01:51
ST4 – Market Weighton	Along Sancton Road to the north of the cable route.	488780, 440914	27/09/2021 14:56 – 15:56 and 28/09/21 00:18 to 00:48
ST5 – Drax Village	To the rear of residential properties along Main Road to the south of the converter station.	467088, 426453	27/09/2021 12:52 – 13:52 and 23:01 – 23:31

13.5.4 Meteorological Conditions

Precipitation and wind speed measurements were observed throughout each attended survey. At no point during the attended surveys did the weather become unsuitable for monitoring i.e. no precipitation and average wind speed not in exceedance of 5 m/s. Meteorological data was observed throughout the duration of unattended surveys. The following 1-hour periods of data were omitted from the results for LT1 due to unsuitable monitoring conditions caused by high winds speeds:

- 23:00 on the 6th of October 2021;
- 01:00 on the 7th of October 2021;
- 03:00, 04:00, 14:00, 15:00, 16:00, 17:00, 18:00 and 19:00 on the 7th of October 2021; and
- 17:00 and 18:00 on the 13th of October 2021.

No periods of unsuitable monitoring conditions were observed for LT2.

13.5.5 Survey Results and Observations

13.5.5.1 LT1 – Wilsthorpe

LT1 is representative of residential properties in Wilsthorpe that are likely to be affected by construction works noise (potentially 24-hour working) from the landfall location and associated HDD works. The measurement location was in the woods to the south of properties nearest the landfall location.

Existing noise sources at this location included a small contribution from distant road traffic on the A165, the sea and tree leaf rustle. The nearby wind turbines to the south of the monitoring location were not in operation during the setup of monitoring equipment but were operational during equipment collection.

Noise levels have been calculated over the time periods specified in Table E.1 of BS 5228-1 and the results of the baseline monitoring are presented in **Table 13-15**. A time history chart and frequency spectrum data at LT1 are presented in **Appendix 13-B**.

Table 13-15: LT1 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	58	42
Weekday Evening (19:00 - 23:00)	57	39
Saturday Daytime (07:00 - 13:00)	50	35
Saturday Evening (13:00 - 23:00)	47	45
Sunday Daytime (07:00 - 23:00)	50	38
Night- time (23:00 - 07:00)	50	38

[1] *Mode of the 15 minute L_{A90} for the corresponding time period.*

13.5.5.2 LT2 – Drax (Wren Hall)

LT2 is representative of residential properties in Drax that are likely to be affected by construction works noise and operational noise from the converter station. The location consisted of a residential property backing onto agricultural land directly east of the proposed converter station site. The monitoring kit was secured to a fence to the south of Wren Hall.

Existing sources of noise at this location included that from Drax Power Station, distant road traffic, birds and dogs barking at Wren Hall. This location was on agricultural land and it was confirmed with the landowner that no agricultural activities were undertaken during the monitoring period.

Noise levels have been calculated over the time periods specified in Table E.1 of BS 5228-1 and the results of the baseline monitoring are presented in **Table 13-16**. A time history chart and frequency spectrum data at LT2 are presented in **Appendix 13-B**.

Table 13-16: LT2 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	53	48
Weekday Evening (19:00 - 23:00)	48	45
Saturday Daytime (07:00 - 13:00)	44	42
Saturday Evening (13:00 - 23:00)	43	37
Sunday Daytime (07:00 - 23:00)	53	40
Night- time (23:00 - 07:00)	50	46

[1] *Mode of the 15 minute L_{A90} for the corresponding time period.*

13.5.5.3 ST1 – Wansford

ST1 is representative of residential properties in Wansford that are likely to be affected by construction works noise associated with the cable installation and noise from nearby construction compounds. The measurement location was on Wansford Road, approximately 40 m north of the junction with Carr Lane.

During the day, the sources observed were traffic passing the monitoring location, distant traffic and tree leaf rustle. At night, a noise resembling that from a fan was audible although the source was not identified. Owls could also be heard. The results of attended monitoring at this location are presented in **Table 13-17**.

Table 13-17: ST1 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	58	42
Night- time (23:00 - 07:00)	32	27

[1] *Lowest of the 15 minute L_{A90} during a 1 hour daytime and 30 minute night-time measurement period.*

13.5.5.4 ST2 – Skerne

ST2 is representative of residential properties in Skerne that are likely to be affected by construction works noise associated with the cable installation and noise from nearby construction compounds. The measurement location was in a passing area on Main Street at the east of Skerne.

During the day, the sources observed were vehicles passing along Main Road. Tree leaf rustle and nearby agricultural sounds from a barn to the east were also audible. At night, wind turbines to the north of the monitoring location were audible as well as dogs barking and nearby agricultural sounds. The results of attended monitoring at this location are presented in **Table 13-18**.

Table 13-18: ST2 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	61	45
Night- time (23:00 - 07:00)	32	30

[1] *Lowest of the 15 minute L_{A90} during a 1 hour daytime and 30 minute night-time measurement period.*

13.5.5.5 ST3 – Hutton

ST3 is representative of residential properties in Hutton that are likely to be affected by construction works noise associated with the cable installation and noise from nearby construction compounds. The measurement location was on Hutton Balk and representative of the noise at the back of residential properties along Hutton Road.

During the day, the sources observed were road traffic from the A164, vehicles on Hutton Balk and birds. At night, road traffic noise from the A164 was audible as well as occasional vehicle movements on Hutton Balk. The results of attended monitoring at this location are presented in **Table 13-19**.

Table 13-19: ST3 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	58	49
Night- time (23:00 - 07:00)	46	39

[1] *Lowest of the 15 minute L_{A90} during a 1 hour daytime and 30 minute night-time measurement period.*

13.5.5.6 ST4 – Market Weighton

ST4 is representative of residential properties in Market Weighton that are likely to be affected by construction works noise associated with the cable installation and noise from nearby construction compounds. The measurement location was at the junction of Wold Road with Sancton Road.

Traffic from Sancton Road was the dominant noise source during the daytime and night-time survey. Noise from tree leaf rustle was also audible. The results of attended monitoring at this location are presented in **Table 13-20**.

Table 13-20: ST4 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	72	56
Night- time (23:00 - 07:00)	61	36

[1] *Lowest of the 15 minute L_{A90} during a 1 hour daytime and 30 minute night-time measurement period.*

13.5.5.7 ST5 – Drax Village

ST5 is representative of residential properties in Drax that are likely to be affected by construction works noise and operational noise from the converter station. The measurement location was on Field House at the rear of the residential properties of Main Road.

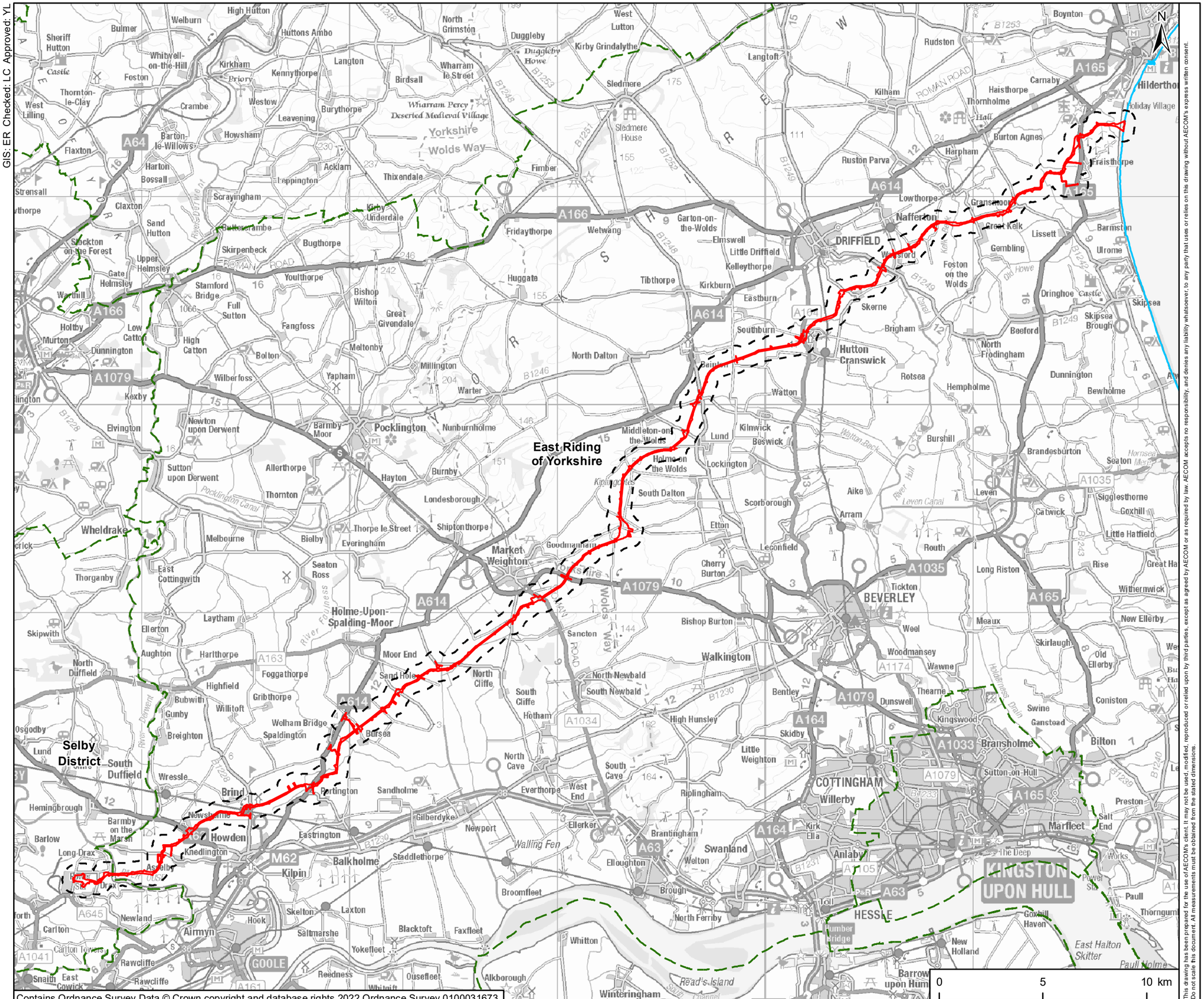
During the day, it was observed that tree leaf rustle was the dominant source. Noise from Drax Power Station was also audible. During the night, noise from Drax Power Station was dominant. The results of attended monitoring at this location are presented in **Table 13-21**.

Table 13-21: ST5 Noise Monitoring Results

Time Period	$L_{Aeq, T}$ dB	$L_{A90, 15min}$[1] dB
Weekday Daytime (07:00 - 19:00)	53	49
Night- time (23:00 - 07:00)	41	38

[1] *Lowest of the 15 minute L_{A90} during a 1 hour daytime and 30 minute night-time measurement period.*

GIS: ER Checked: LC Approved: YL



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Scale @ A3 1:170,000

nationalgrid

PROJECT

Scotland England Green Link 2

KEY

- Planning Application Boundary
- 500m Study Area
- Mean Low Water Springs
- District Borough Unitary Boundary

TITLE

Figure 13-1
Study Area

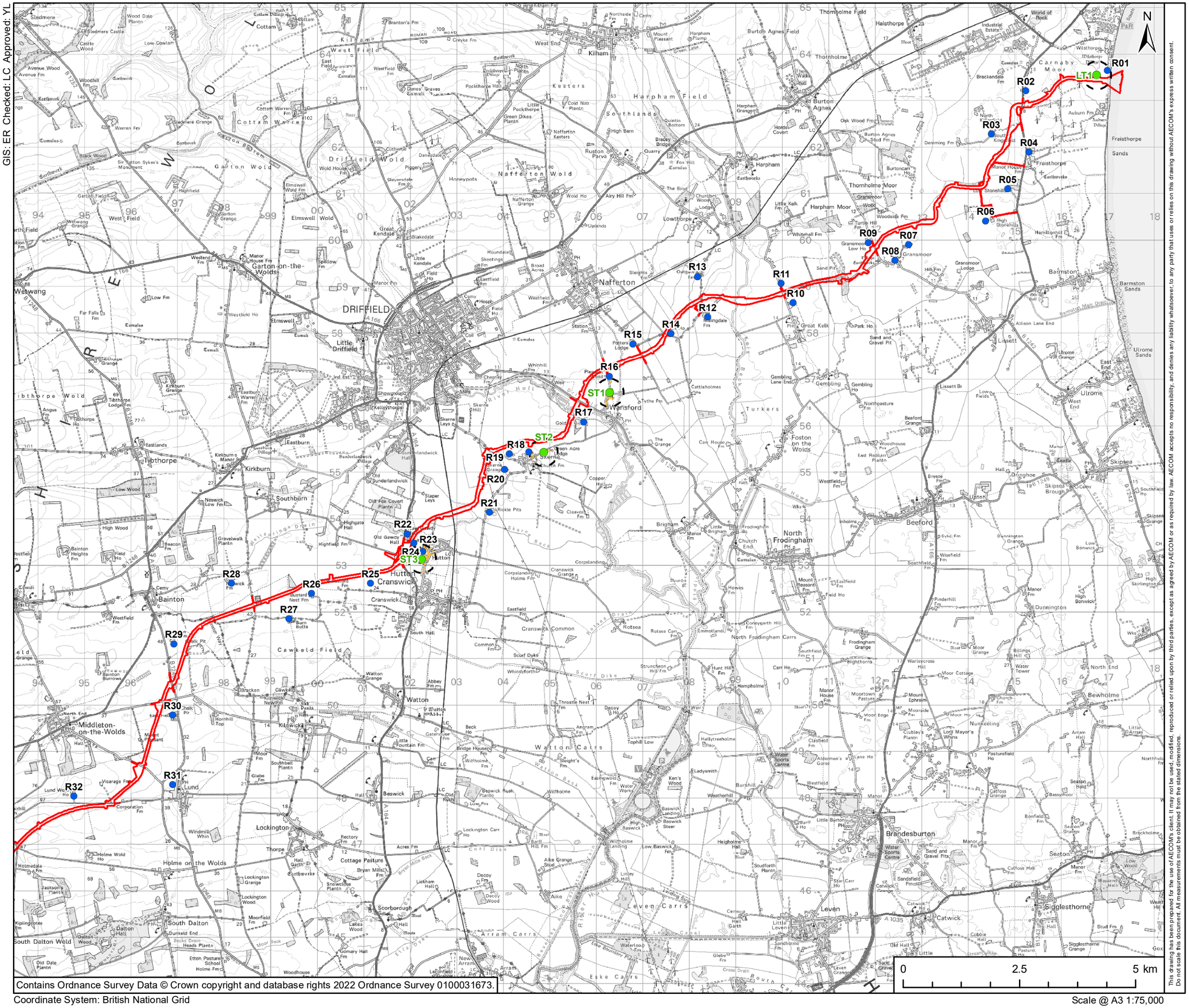
REFERENCE

SEGL2_T_ES_13-1_v3_20220529

SHEET NUMBER: 1 of 1

DATE: 29/05/2022

GIS: ER Checked: LC Approved: YL



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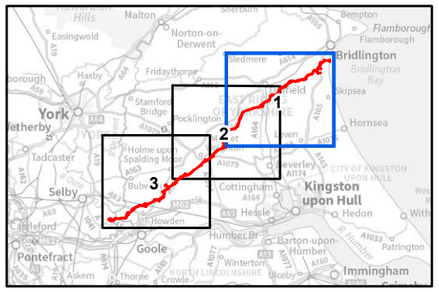
PROJECT

Scotland England Green Link 2

KEY

- Planning Application Boundary
- Noise Receptor Location
- Noise Monitoring Location
- Noise Monitoring Location - 300m Study Area
- Building Location



TITLE

Figure 13-2
Receptor Locations and Noise Monitoring Positions

REFERENCE

SEGL2_T_ES_13-2_v3_20220529

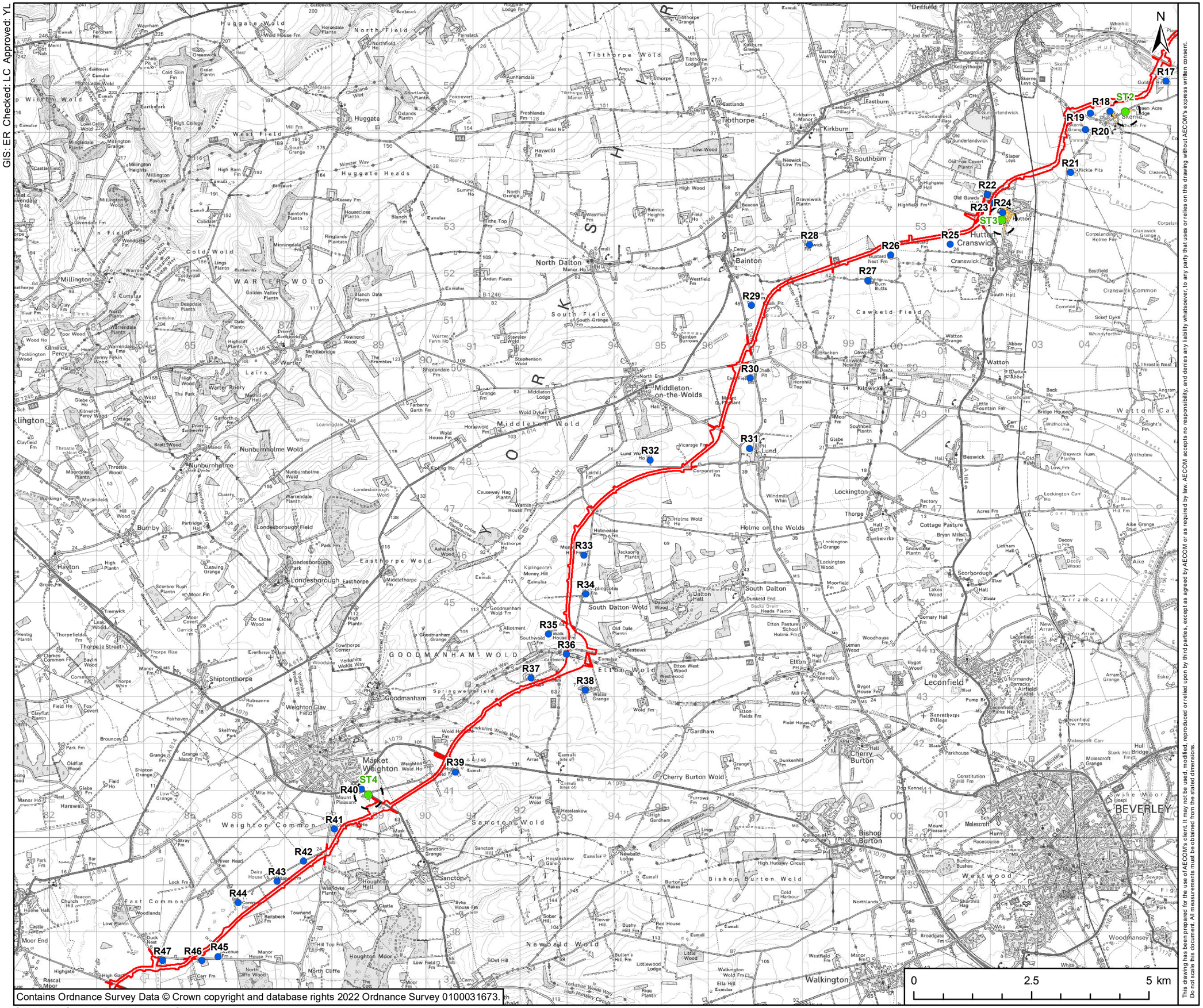
SHEET NUMBER

1 of 3

DATE

29/05/2022

GIS: ER Checked: LC Approved: YL



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nationalgrid

PROJECT

Scotland England Green Link 2

KEY

- Planning Application Boundary
- Noise Receptor Location
- Noise Monitoring Location
- Noise Monitoring Location - 300m Study Area
- Building Location

TITLE

Figure 13-2
Receptor Locations and Noise Monitoring Positions

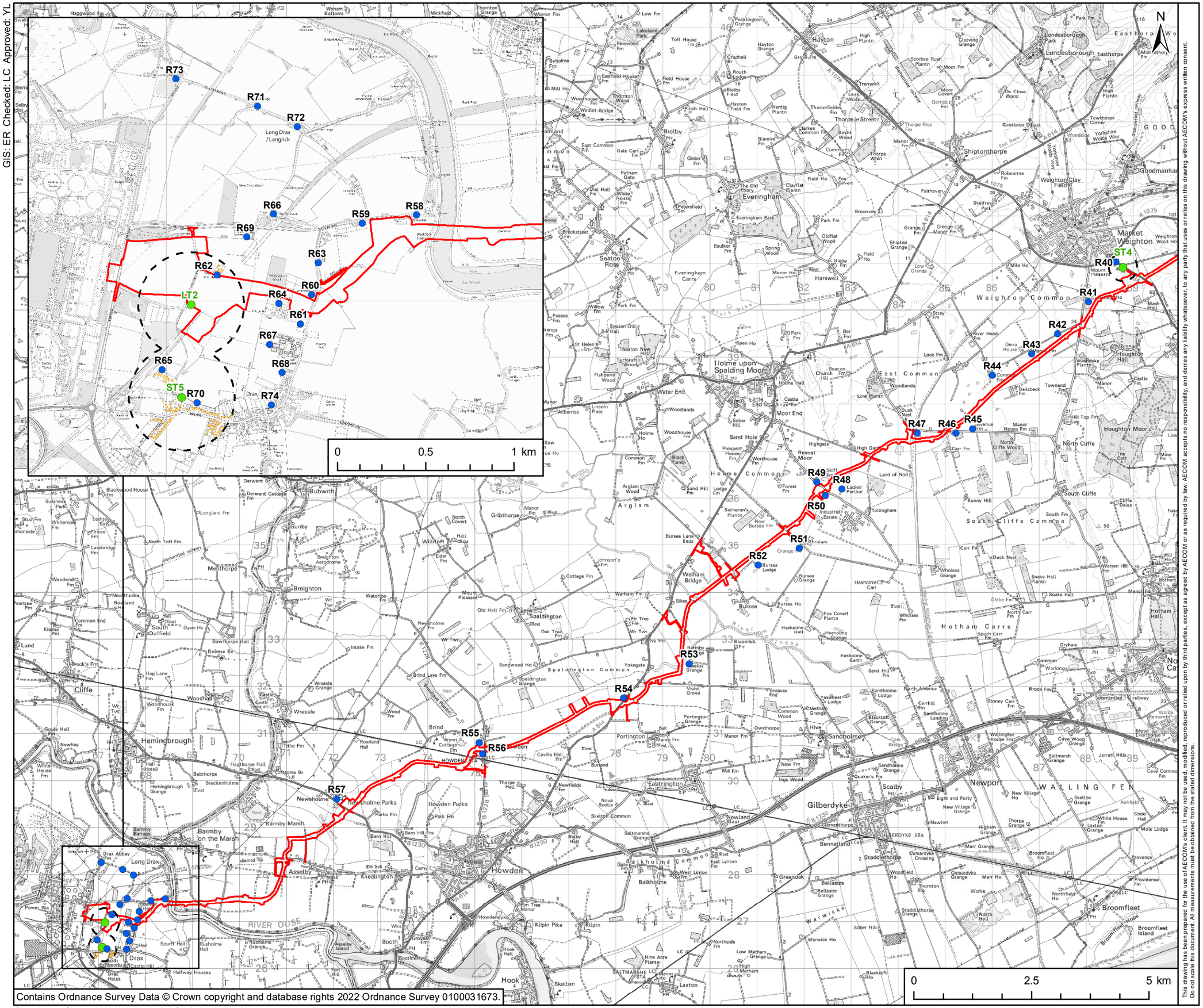
REFERENCE

SEGL2_T_ES_13-2_v3_20220529

SHEET NUMBER: 2 of 3

DATE: 29/05/2022

GIS: ER Checked: LC Approved: YL



Coordinate System: British National Grid

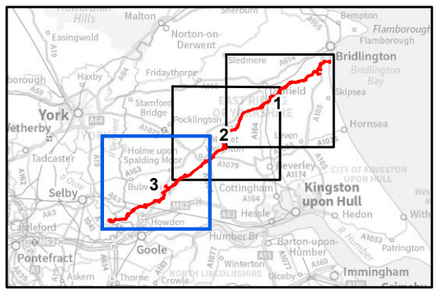
nationalgrid

PROJECT

Scotland England Green Link 2

KEY

- Planning Application Boundary
- Noise Receptor Location
- Noise Monitoring Location
- Noise Monitoring Location - 300m Study Area
- Building Location



TITLE

Figure 13-2
Receptor Locations and Noise Monitoring Positions

REFERENCE

SEGL2_T_ES_13-2_v3_20220529

SHEET NUMBER: 3 of 3

DATE: 29/05/2022

13.6 Potential Impacts

13.6.1 Introduction

This section presents the findings of the assessment of the likely significant effects of the English Onshore Scheme in respect of noise and vibration.

The potential impacts of the development on noise and vibration have been split into construction phase and operational phase of the development. Potential impacts have been assessed based on the methodology outlined in section 12.3.3 and in **Chapter 5: Approach to EIA**, where a description of impact definitions is provided in **Table 5-2**. All potential impacts identified are regarded to be adverse, unless stated otherwise.

Potential noise and vibration impacts during the construction phase are likely to result from work activities associated with landfall site preparation and cable installation, plant installation, converter station construction, cable laying, and construction-related vehicle movements within the English Onshore Scheme boundary and along access routes. However, any noise and vibration effects from the construction phase will be temporary and reversible with no lasting residual effect.

During the operation of the converter station, there will be noise from the electrical and mechanical equipment. This will be a long-term operational sound source which may affect receptors within the community of Drax. Operational traffic movements are expected to be limited, as such changes in road traffic noise due to English Onshore Scheme are also expected to be limited and therefore potential effects have been scoped out of the impact assessment.

The DC Cable route will be installed below ground and will not produce any operational noise emissions, and has therefore also been scoped out of the impact assessment.

No major vibration sources are envisaged to be introduced as part of the English Onshore Scheme and as such there will be no associated operational vibration effects. It is proposed that operational vibration is scoped out of any further assessment.

13.6.2 Mitigation by Design

Where possible embedded mitigation measures, or mitigation by design, have been incorporated into the design of the English Onshore Scheme such that they inform its detailed design and/or how it shall be constructed. Through iterative assessment, potential impacts have been predicted and opportunities to mitigate them identified with the aim of preventing or reducing impacts as much as possible, such as avoiding routeing of the DC cable immediately adjacent to residential properties wherever possible and siting/orientating the converter station to prevent potentially long-term noise disturbance. This approach provides the opportunity to prevent or reduce adverse effects from the outset. Other measures which are embedded into the design are standard good working practices that will be followed by the Contractor during installation and construction of the English Onshore Scheme. Further details are provided below.

13.6.2.1 Construction noise

Mitigation measures for construction activities representing BPM are covered in Section 13.7.1. These are generic mitigation recommendations and are typically applicable to most construction sites. They are embedded into the design as standard good working practices that will be followed by the Contractor during installation and construction of the English Onshore Scheme. However, the effectiveness of the application of mitigation measures is dependent on the construction methodology and the appointed construction contractor. Consequently, the potential reduction in noise as a result of the mitigation measures cannot be accurately quantified so unmitigated noise predictions have been undertaken and unmitigated noise effects have been identified to represent a worst-case.

Whilst considered embedded into the delivery of the Project, these measures constituting BPM are outlined in Section 13.8 and are assessed in the residual effects (Section 13.9).

13.6.2.2 Operational Noise and Vibration

During the detailed design stage, potential significant residual noise effects will be mitigated by location and design. This will include appropriate acoustic design, use of cladding and shielding where appropriate and, where practical siting and orientating of equipment away from site boundaries and NSRs.

13.6.2.3 Decommissioning Noise and Vibration

The scale and nature of activities undertaken during decommissioning would be similar to those described previously for construction, and they would be temporary during the period of decommissioning activities on site. Following the removal of the structures and the reinstatement of the land there would be no further potential effects from noise and vibration. The potential effects from decommissioning should therefore be regarded as the same as construction as described in greater detail below.

13.6.3 Assessment of Potential Impacts: Construction Phase

Based upon the analysis and summary of the results of the baseline ambient sound survey in **Table 13-15** to **Table 13-21**, **Table 13-22** sets out the BS 5228-1 'ABC' noise threshold categories at each NSR for the day, evening and night-time periods as set out.

Table 13-22: Measured Free-field $L_{Aeq,T}$ Noise Levels and Associated "ABC" Assessment Category

Measurement Location	Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)		Evenings and weekends		Night-time (23:00 – 07:00)	
	$L_{Aeq,T}$ dB	ABC	$L_{Aeq,T}$ dB	ABC	$L_{Aeq,T}$ dB	ABC
LT1	58/50	A	47	A	50	B
LT2	53/44	A	43	A	50	B
ST1	58	A	-	-	32	A
ST2	61	A	-	-	32	A
ST3	58	A	-	-	46	A
ST4	72	B	-	-	61	C
ST5	53	A	-	-	41	A

For evening periods at receptors represented by short-term measured noise data, limits have been assigned using conservative assumptions including:

- assuming the lowest measured sound level for the given time period from other representative measurement locations; and
- assuming indicative weekend noise limits based upon the most conservative Category A values.

Table 13-23: Indicative Construction Noise Limits / SOAEL Values

Measurement Location	Construction noise limit $L_{Aeq,T}$ dB (free-field) / SOAEL values					
	Weekday daytime 07:00 – 19:00	Weekday evening 19:00 – 23:00	Night 23:00 – 07:00	Saturday 07:00 – 13:00	Saturday 13:00 – 23:00	Sunday 07:00 – 23:00
LT1	65	55	45	65	55	55
LT2	65	55	45	65	55	55
ST1	65	55	45	65	55	55
ST2	65	55	45	65	55	55
ST3	65	55	45	65	55	55

ST4	70	55	55	65	55	55
ST5	65	55	45	65	55	55

13.6.3.1 Construction Noise Predictions

This section discusses the potential noise and vibration effects on NSRs arising during the construction phase of the English Onshore Scheme. Noise effects are assessed for the construction of:

- Construction and installation at the landfall;
- Cable installation; and
- Construction of the converter station and underground AC cables.

13.6.3.1.1 The Landfall

The subsea cables will connect to the underground cables at a buried Transition Joint Pit (TJP) at the Landfall. Horizontal directional drilling (HDD) will be utilised to install the cables across the intertidal area to avoid direct impacts to the headland and beach area. The TJP is an underground chamber constructed of reinforced concrete that houses the cable joints between the subsea and underground DC cables. A temporary compound area (up to approximately 100 m x 100 m) is required during cable installation to accommodate temporary construction equipment and storage areas.

Construction activities within the landfall area will include compound construction, site mobilisation, site operations, materials deliveries, drilling of cable ducts and cable pulling, site demobilisation and site reinstatement and anticipated construction vehicles will include heavy goods vehicles (HGVs), light goods vehicles, vans and cars. Abnormal Indivisible Load (AIL) movements will also be required to allow cable delivery to the landfall area.

It is anticipated that site preparation works would take place within normal working hours, Mon-Fri 7am-7pm; Sat 8 am to 5 pm. Individual drill operations, however (i.e. the entire sequence of activities pertaining to a single bore) are carried out continuously until completion and therefore may include 24-hour working. The expected duration of works to set up the drilling location, complete drilling activities and pull the ducts back through for cable pulling at the Landfall is likely to be approximately two months (and excludes cable jointing).

13.6.3.1.2 The Underground DC Cable Route

The proposed underground DC cable route will be installed by a combination of open cut and trenchless methods. Open cut methods will be utilised more commonly across the underground cable route as it will be utilised when installing the cables within open agricultural land. Areas of trenchless methods, likely to be HDD, have been identified across the route (as shown on **Figure 3-5**) and will typically be utilised where obstacles and sensitive features including, A and B roads, railways, main rivers, and environmentally designated sites require to be crossed. HDD locations are described in detail in **Chapter 3: Description of the English Onshore Scheme**.

The installation of the underground DC cables requires a working width up to 40 m wide to be established along the length of the cable route. The planning application provides for a Limit of Deviation approximately 20 m (i.e. 10 m either side) beyond the working width through most of the route.

Typical work activity phasing for the installation of the DC cables would include:

- Establishing the construction compounds to facilitate delivery of plant and material to start installation activities;
- Bellmouth creation and construction compound establishment, amending existing access routes (where necessary);
- Creation of haul road/working width;
- Cable trench excavation and HDD of sensitive crossings;
- Establishing joint bays;
- Cable laying/ pulling through ducts; and
- Cable trench backfilling and reinstatement.

The indicative programme and duration of likely installation methods are described in **Chapter 3: Description of the English Onshore Scheme**. The overall programme is about five years.

The majority of works activities would be completed under normal working hours/restrictions as follows:

- Mon-Fri: 07.00-19.00;
- Sat: 08.00-17.00; and
- No working on Sundays, or Bank Holidays.

Some works activities may need to occur outside of normal working hours/times, including some 24-hour working, due to activities requiring to be undertaken continuously (such as HDD and cable jointing). Where work outside of times is necessary prior notification will be provided to the LPA.

13.6.3.1.3 The Converter Station and Underground AC Cable Route

The proposed converter station site is located to the immediate east of the existing Drax Power Station, North Yorkshire, within an agricultural field. The construction compound is located northeast of the proposed converter station site, east of Wren Hall Lane. The converter station has a 5 ha footprint. Indoor/housed electrical equipment are located on the eastern side of converter station platform (maximum building height up to 30 m) and the outdoor electrical equipment on western side of converter station platform (the scale of which is subject to detailed design).

The majority of works activities as outlined in section 13.6.3.1.3 would be completed during core work periods; however, some works activities may need to occur outside of these hours and times due to activities not being able to be paused (such as concrete pouring and delivery of abnormal loads). The overall construction programme is scheduled to last for up to five years.

13.6.3.1.4 Construction Noise Prediction Methodology

Noise levels experienced by local NSRs during construction works depend upon several variables, the most significant of which are:

- the noise generated by plant or equipment used on site, generally expressed as sound power levels (L_w) or the vibration generated by the plant;
- the periods of use of the plant on site, known as its on-time;
- the distance between the noise/vibration source and the receptor;
- the noise attenuation due to ground absorption, air absorption and barrier effects;
- in some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- the time of day or night the works are undertaken.

Based on the above, five phases of construction activities which are considered to be representative of the worst-case construction noise impact have been assessed (see **Appendix 13-C** for further detail on the activities included within each phase). These are:

- Phase 1: Access Roads and Compound Construction;
- Phase 2: Trenching, establishing joint bays & HDD;
- Phase 3: Cable Installation;
- Phase 4: Landfall Construction; and
- Phase 5: Converter Station Construction.

Indicative predicted noise levels for construction of the English Onshore Scheme have been based on construction methods used for similar projects in the UK, as the construction approach is subject to the appointed Contractor. This gives an indication of where, at what stage and what construction activities may lead to potentially adverse and significant adverse effects at identified NSRs.

The predicted levels apply to core weekday daytime (07:00 – 19:00) working, although could approximate to other time periods where construction work of the same rate and intensity is proposed. Noise predictions assume constant operation of equipment from 07:00 – 18:00 periods which is a

conservative worst-case assumption. Noise level data have been taken from Annex C and D of BS 5228-1. Details regarding the noise prediction methodology, including a full list of indicative construction plant and associated sound power levels (Lw) for each construction phase, are presented in **Appendix 13-C**.

13.6.3.1.5 Summary of Indicative Noise Predictions

As an initial screening exercise, noise predictions were undertaken for worst case scenario of the construction activities to determine any areas where residential properties would be exposed to construction noise levels greater than the 65 dB $L_{Aeq,12h}$ impact threshold level. As the 65 dB $L_{Aeq,12h}$ threshold represents low magnitude effect for normal daytime working.

A summary of indicative noise predictions at selected NSR locations for construction activities associated with the above scenarios are presented in **Table 13-24** and shown in **Figure 13-1**. Each of the NSRs identified are residential properties. The locations of the selected receptors are shown in **Appendix 13-C**, and represent NSRs along the whole route. Values above the daytime threshold (and SOAEL) of 65 dB $L_{Aeq,12h}$ are shown in **red**.

Table 13-24: Indicative Free-Field Construction Noise Levels during Daytime

Receptor	Indicative free-field construction noise levels during daytime construction activity (dB $L_{Aeq,12h}$)				
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Rec01	60	54	53	53	-
Rec02	61	56	54	31	-
Rec03	60	56	54	26	-
Rec04	57	52	51	29	-
Rec05	56	52	50	25	-
Rec06	56	50	48	22	-
Rec07	59	55	53	-	-
Rec08	57	53	51	-	-
Rec09	65	58	55	-	-
Rec10	61	55	53	-	-
Rec11	63	57	54	-	-
Rec12	59	54	52	-	-
Rec13	56	52	49	-	-
Rec14	**67**	63	61	-	-
Rec15	61	56	52	-	-
Rec16	**66**	59	57	-	-
Rec17	61	55	53	-	-
Rec18	63	58	57	-	-
Rec19	64	60	58	-	-
Rec20	60	55	53	-	-
Rec21	58	53	51	-	-
Rec22	65	61	59	-	-
Rec23	**71**	**66**	64	-	-
Rec24	61	56	54	-	-
Rec25	62	59	57	-	-
Rec26	61	59	57	-	-
Rec27	55	53	51	-	-
Rec28	54	52	50	-	-
Rec29	59	57	55	-	-
Rec30	60	56	55	-	-
Rec31	53	50	48	-	-

Receptor	Indicative free-field construction noise levels during daytime construction activity (dB $L_{Aeq,12h}$)				
Rec32	59	57	55	-	-
Rec33	59	57	55	-	-
Rec34	58	55	53	-	-
Rec35	58	54	52	-	-
Rec36	**66**	61	58	-	-
Rec37	64	61	59	-	-
Rec38	57	50	48	-	-
Rec39	59	56	54	-	-
Rec40	58	52	50	-	-
Rec41	64	61	60	-	-
Rec42	64	61	60	-	-
Rec43	64	62	60	-	-
Rec44	59	57	55	-	-
Rec45	59	57	55	-	-
Rec46	64	60	58	-	-
Rec47	**68**	56	54	-	-
Rec48	61	57	55	-	-
Rec49	**67**	59	57	-	-
Rec50	**67**	61	58	-	-
Rec51	57	53	51	-	-
Rec52	61	58	56	-	-
Rec53	63	58	55	-	-
Rec54	**70**	63	60	-	-
Rec55	**66**	60	58	-	-
Rec56	**70**	65	61	-	-
Rec57	63	54	51	-	-
Rec58	**70**	64	61	-	44
Rec59	**68**	56	54	-	38
Rec60	**73**	**69**	**67**	-	50
Rec61	**66**	61	59	-	49
Rec62	**76**	56	53	-	63
Rec63	64	59	57	-	49
Rec64	**69**	**67**	65	-	53
Rec65	58	46	44	-	55

Noise predictions, based on unmitigated scenarios, indicate that a temporary exceedance of the SOAEL is likely to occur at some NSRs (residential properties). This would result in **Moderate** and **Major** impacts at 16 NSRs (refer to **Table 13-25**), which would be significant. The works associated with these impacts are predominantly access road and construction compound establishment (Phase 1) but also include cable trenching (Phase 2) and cable installation (Phase 3). The noisiest activities for each of these Phases experienced at any NSR is expected to periodic whilst that phase is being completed, in particularly with works associated with the access routes and cable route establishment/cable installation due to their linear nature.

Table 13-25: Indicative Free-Field Construction Noise Levels during Daytime – Summary of Exceedance

Receptor	Indicative free-field construction noise levels during daytime construction activity (dB $L_{Aeq,12h}$)				
	Highest predicted levels	Daytime Limits	Exceedance	Magnitude of Impact	Significant Effects
Rec14	67	65	2	Medium	Moderate
Rec16	66	65	1	Medium	Moderate
Rec23	71	65	6	High	Major
Rec36	66	65	1	Medium	Moderate
Rec47	68	65	3	Medium	Moderate
Rec49	67	65	2	Medium	Moderate
Rec50	67	65	2	Medium	Moderate
Rec54	70	65	5	Medium	Moderate
Rec55	66	65	1	Medium	Moderate
Rec56	70	65	5	Medium	Moderate
Rec58	70	65	5	Medium	Moderate
Rec59	68	65	3	Medium	Moderate
Rec60	73	65	8	High	Major
Rec61	66	65	1	Medium	Moderate
Rec62	76	65	11	High	Major
Rec64	69	65	4	Medium	Moderate

Temporary exceedances of the SOAEL are identified at the above listed NSR due to the fact that the NSRs are located in close proximity to construction activities under phase 1 (construction of access roads and/ or construction compounds). These enabling works typically require the use of excavators, dump trucks and deliveries of aggregate. The establishment of the temporary accesses and construction compound, and therefore the period in which exceedance of the SOAEL could occur, is consequently short-term and temporary.

Noise predictions indicate that a temporary exceedance of the SOAEL is likely to occur at Rec23, Rec60 and Rec64 during trenching (Phase 2) and Rec60 during installation of the HVDC cable (Phase 3). As with Phase 1, the noise effect related to the construction activities in close proximity to this receptor would typically be short term.

It should be noted that predictions cover a worst-case scenario where predictions account for high noise generating activities taking place in close proximity to receptors. Consequently, there will be variation in noise levels during construction works depending on the location of works. However, mitigation measures would be adopted to minimise exceedances of the SOAEL as far as reasonably practicable.

13.6.3.2 Construction Vibration

Surface plant, such as cranes, compressors and generators, are not recognised as sources of high levels of ground-borne vibration. Reference to Figure C2 of 'Control of Vibration and Noise During Piling' (Ref 13-22) confirms that PPVs significantly less than 5 mm/s are generated by such machinery, even at distances of only 10 m. For example, the indication is that a bulldozer would generate a PPV of approximately 0.6 mm/s; and a 'heavy lorry on [a] poor road surface' a PPV of less than 0.1 mm/s at 10 m. These values are well below levels at which cosmetic building damage are predicted to occur; the lower levels being 15 mm/s for predominantly transient vibrations and 7.5 mm/s for continuous vibrations at the base of residential or lighter framed commercial buildings. The aforementioned values are also below the 1.0 mm/s level stated in BS 5228-2 (see **Table 13-7**) where it is likely that vibration in residential environments will result in complaints, but can be tolerated if prior warning and explanation is given to residents. The level of vibration for building damage is a higher magnitude than for human sensitivity to vibration.

It is generally accepted that, without a highly detailed understanding of the media, waveform, and frequency distribution, ground-borne vibration prediction methods are "beset with complexities and uncertainties" (Ref 13-23). However, it is unlikely that typical construction and demolition working routines would generate levels of vibration at local receptors at a level where cosmetic damage would be expected to be sustained or cause adverse effects for local residents. The level of impact at different receptors will be dependent upon a number of factors including distance between the works, ground conditions and the specific activities being undertaken. The closest residential receptor to proposed works (excluding accesses) is at Kiplingcotes Station which is approximately 20 m from the planning application boundary, adjacent to a section of HDD'd cable installation. Accordingly, at this stage and without mitigation, it is anticipated that the significance of vibration effects would be no greater than **Minor** at the closest sensitive receptor for all the construction activities (including HDD) of the English Onshore Scheme.

Piling is only considered likely to result in a significant effect where it is undertaken at distances of approximately 25 m or less to a vibration sensitive building. The only likely piling works that may be required will be during construction of the converter station. The minimum distance between any piling works for the construction of the converter station and the nearest receptor Wren Hall is about 150 m and therefore ground borne vibration is unlikely to be an issue during piling works. Therefore construction vibration would result in **Negligible** impacts, which would not be significant.

13.6.3.3 Construction Traffic

As per the traffic impact assessment (**Chapter 14: Traffic and Transport**), the assessment of noise associated with construction traffic was undertaken for 2025 and 2026 as the identified periods of greatest traffic generation forecasted by the English Onshore Scheme. CRTN equations have been applied to the 2025 and 2026 road traffic data to calculate the impact of noise due to construction traffic. The potential changes in road traffic noise on these roads as a result of the English Onshore Scheme have been considered by calculating the CRTN BNL at 10 m from the road and comparing the change. **Table 13-26** presents the results of the assessment. This has also included for a 20% uplift in projected construction vehicle numbers to account for any uncertainties in the construction programming and to ensure consideration of the worst case for the purpose of the assessment.

Table 13-26: Changes in Road Traffic Noise as A Result of Construction

	2025 Assessment % Increase			2026 Assessment % Increase		
	All Traffic	HGV	Change in BNL dB	All Traffic	HGV	Change in BNL dB
A156	0.5%	2.1%	0.1	0.4%	1.2%	0.0
Main Road	0.7%	1.4%	0.0	0.4%	0.5%	0.0
Main Street	1.5%	3.3%	0.1	0.9%	1.3%	0.0
Carr Lane	4.6%	24.7%	0.6	2.6%	11.0%	0.3
Wansford Road	0.5%	2.2%	0.1	0.3%	0.9%	0.0
B1249	0.9%	4.0%	0.1	0.4%	1.3%	0.0
Driffield Road	4.0%	22.8%	0.7	1.4%	7.7%	0.2
A164 Beverley Road	0.1%	0.2%	0.0	0.0%	0.1%	0.0
Burnbutt Lane	4.6%	28.7%	0.6	2.7%	13.2%	0.3
A164	0.3%	1.1%	0.0	0.2%	0.4%	0.0
B1248 Station Road	0.6%	2.5%	0.1	0.3%	0.7%	0.0
Beverley Road	2.8%	15.6%	0.4	1.4%	7.4%	0.2
Unnamed Road	4.8%	18.5%	0.5	2.8%	7.9%	0.2
Holme Wold Road	3.6%	15.3%	0.4	2.1%	6.4%	0.2
Fisher Street	4.3%	6.5%	0.3	2.5%	2.5%	0.1
Unnamed Road (east of Kiplingcotes Lane)	3.1%	10.4%	0.3	1.8%	4.2%	0.1

	2025 Assessment % Increase			2026 Assessment % Increase		
Kiplingcotes Lane	3.9%	6.5%	0.2	2.3%	2.5%	0.1
A1079	0.3%	1.3%	0.0	0.2%	0.5%	0.0
A1034 Sancton Road	0.3%	1.1%	0.0	0.1%	0.2%	0.0
Cliffe Road	1.5%	3.5%	0.1	0.9%	1.1%	0.0
Sand Lane	1.1%	2.6%	0.1	0.6%	1.0%	0.0
Lock Lane	4.0%	6.7%	0.3	2.3%	2.6%	0.1
Skiff Lane	1.5%	3.2%	0.1	0.0%	0.0%	0.0
Drain Lane	3.2%	6.2%	0.2	1.8%	2.4%	0.1
Burnsea Lane	4.2%	9.6%	0.3	2.4%	3.9%	0.1
A614 Holme Road	0.6%	1.6%	0.1	0.4%	0.9%	0.0
B1228 Wood Lane	0.9%	2.3%	0.1	0.3%	0.7%	0.0
A63 Selby Road	0.4%	1.9%	0.1	0.2%	0.9%	0.0
Main Street Near Assesslby (East of the Ouse)	0.5%	1.2%	0.0	0.3%	0.5%	0.0
Redhouse Lane	4.4%	17.1%	0.6	1.1%	3.5%	0.1
New Road	0.9%	3.2%	0.1	6.4%	10.4%	0.4
A645 Adj. Power Station Access	0.0%	0.0%	0.0	0.7%	1.8%	0.1
Main Road (Drax)	0.0%	0.0%	0.0	0.0%	0.0%	0.0
A645 E	0.0%	0.0%	0.0	0.7%	1.5%	0.1

The resultant change in noise levels is considered to be representative of the change in road noise that may be experienced at nearby noise receptors. The magnitude of impact due to construction traffic noise has been identified from the calculated change in road traffic noise due to construction traffic using the criteria set out in **Table 13-10**. The significance of effect has been derived based on the assumption that affected receptors will be of Medium sensitivity (i.e. residential).

Table 13-26 demonstrates that construction traffic will result in increases in traffic noise of less than 1 dB at all road sections. An increase of this magnitude is Negligible and equivalent to a temporary **Negligible** impact (not significant) at residential receptors.

13.6.4 Assessment of Potential Impacts: Operational Phase

13.6.4.1 Underground DC Cables

As the DC cables will be underground, there will be no operation noise or vibration effects.

13.6.4.2 Converter Station

The converter station, includes the following features which have the potential to be significant noise sources:

- Converter station transformer and converter transformer cooling;
- Valve coolers;
- Converter reactors (inside the reactors hall);
- AC filters (inside the AC filters hall); and
- AC cooling/ventilation.

It should be noted that the noise levels of the plant above are only to provide indicative noise levels, and the noise levels generated will be dependent on the size, type and configuration of the plant. The final items of plant will be determined at detailed design following the appointment of the Contractor. Some items of plant can be housed in building and enclosures, which will be designed during detailed design to achieve the operational noise limits.

Based on the items of plant and the indicative noise levels, a worst-case indicative assessment has been undertaken, assuming that all items of plant are operating at the same time. Further details of the sound source sound power level (Lw) data, the settings used in the noise modelling software and the list of assumptions used are presented in **Appendix 13-D**.

In the absence of additional mitigation, the predicted free-field operational specific sound levels at the NSRs around the proposed converter station site are presented in **Table 13-27**.

Table 13-27: Predicted Worst-case Operational Specific Sound Levels

Receptor	Predicted Operational Specific Sound Level $L_{Aeq,T}$ dB	
	Daytime	Night-time
Rec 62 (Wren Hall)	38	39
Rec64 (Main Road)	32	32
Rec 65 (Field House)	39	39
Rec 66 (The Northwoods)	32	32
Rec 67 (The Read School)	31	32
Rec 69 (Traveller Park)	35	35
Rec 70 (Drax Village West)	33	33
Rec 71 (The Lodge)	27	27
Rec 72 (Peer Tree Avenue)	26	27
Rec 73 (Drax Abbey Farm)	30	30

The representative background sound levels for the above NSRs are derived based on measured sound levels at LT2 (**Table 13-16**) and ST5 (**Table 13-21**). The lowest measured background sound levels are $L_{A90,\ 15min}$ 40 dB for daytime $L_{A90,\ 15min}$ 38 dB for night-time. These levels are used for the BS 4142 assessment.

13.6.4.3 BS4142 assessment results

The daytime BS 4142 assessments are presented in **Table 13-28** and the night-time BS 4142 assessments are presented in **Table 13-29**. The magnitude of impact and effect classification has been included in the tables, to provide context for the BS 4142 assessment outcomes, with reference to the semantic scales in **Table 13-11** and **Table 13-12**. The values presented are the differences between the representative *background sound level* at each NSR and the predicted *rating level* (the *specific sound level* $L_{Aeq,T}$ presented in plus the character correction). Positive values in the table indicate an excess of the *rating level* over the *background sound level*.

The assessment has assumed that potential noise of a tonal, impulsive or intermittent nature will be designed out of the converter station during the detailed design phase by the selection of appropriate plant, building cladding, louvres and silencers/attenuators as necessary. However, inclusion of a +3 dB correction for other distinctive character has been included at this stage as a conservative approach for each NSR with the potential to identify the new sound source in their existing acoustic environment.

In accordance with **Table 13-12**, the values presented in **Table 13-28** and **Table 13-29**, for the worst-case scenario produce a range of impact magnitudes from low to medium impact at the 10 NSRs. This would result in effects between **Minor adverse (not significant)** to **Moderate adverse (significant)**, subject to consideration of context. Moderate adverse effects are identified for the NSRs closer to the converter station. Drax Power Station has been a continuously operating industrial source in the study area. This is likely to mean that residents at all NSRs are already accustomed to an industrial source.

Nevertheless, on the basis of the above and the potential desire to reduce noise levels so that the rating level will be equal or lower that the background sound level, potential mitigation options to reduce sound levels have been considered and discussed in section 13.7.2.

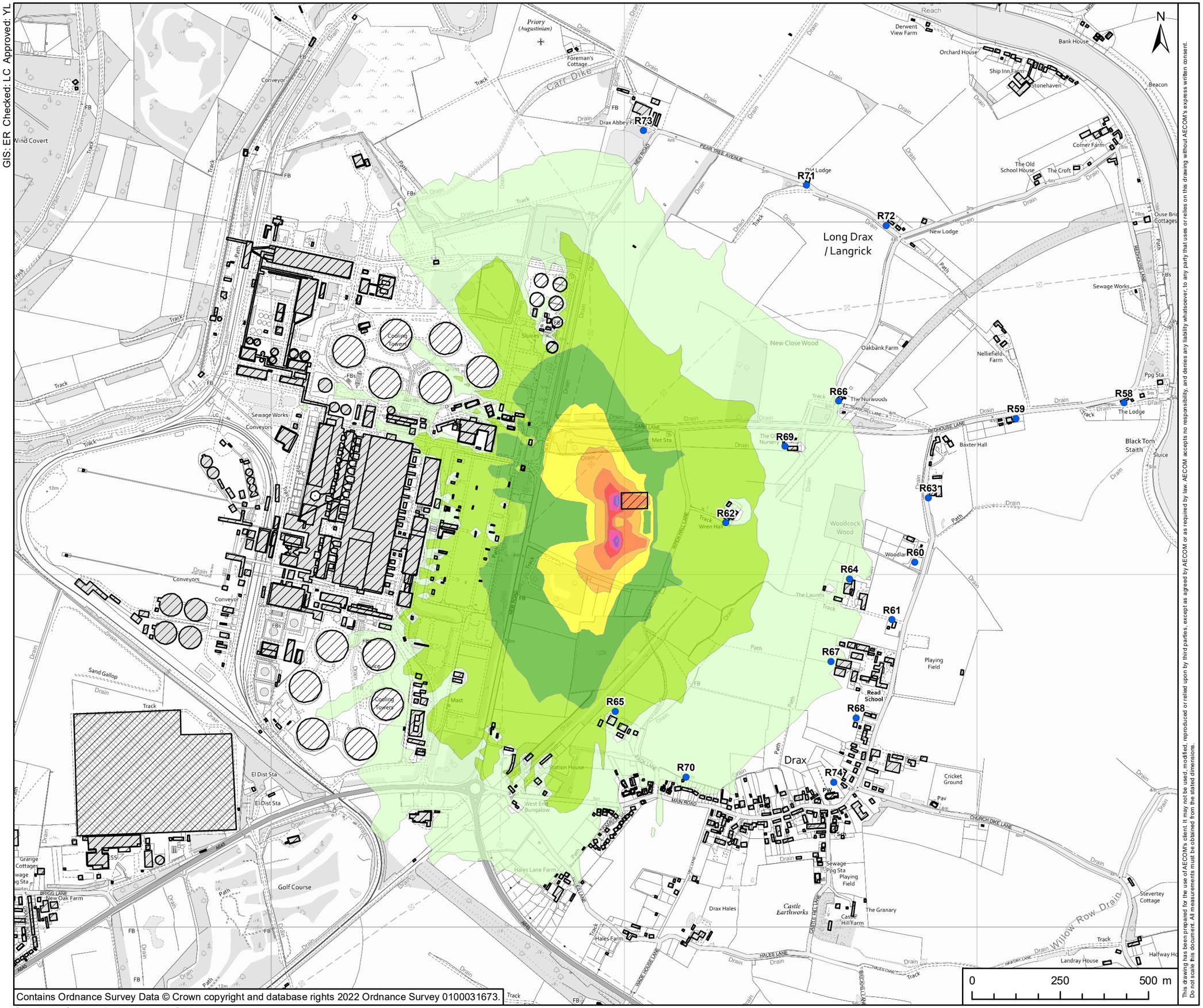
Table 13-28: Daytime BS 4142 Assessment without Additional Mitigation

	Rec62 (Wren Hall)	Rec64 (Main Road)	Rec65 (Field House)	Rec66 (The Northwoods)	Rec67 (The Read School)	Rec69 (Traveller Park)	Rec70 (Drax Village West)	Rec71 (The Lodge)	Rec72 (Peer Tree Avenue)	Rec73 (Drax Abbey Farm)
Specific sound level L_s ($L_{Aeq,Tr}$), dB	38	32	39	32	31	35	33	27	26	30
Acoustic feature correction, dB	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
Rating level ($L_{Ar,Tr}$), dB	41	35	42	35	34	38	36	30	29	33
Representative future background sound level ($L_{A90,T}$), dB	40	40	40	40	40	40	40	40	40	40
Excess of rating level over background sound level ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	+1	-5	+2	-5	-6	-2	-4	-10	-11	-7
BS 4142 guidance	Between 'Low' and 'Adverse' impact	'Low' impact	Between 'Low' and 'Adverse' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact
Magnitude of impact (assigned **from Table 13-11)**	Medium	Low	Medium	Low	Low	Low	Low	Low	Low	Low
Initial classification of effect (assigned from **Table 13-12)**	Moderate	Minor	Moderate	Minor	Minor	Minor	Minor	Minor	Minor	Minor
Uncertainty: Significantly different 'representative' background and ambient sound level values could be obtained using updated baseline data and using different statistical analysis methods. Additionally, background/ ambient sound level data measured at a small number of NSRs are assumed to be representative of conditions at other NSR.										

Table 13-29: Night-time BS4142 Assessment without Additional Mitigation

Receptor	Rec 62 (Wren Hall)	Rec64 (Main Road)	Rec 65 (Field House)	Rec 66 (The Northwoods)	Rec 67 (The Read School)	Rec 69 (Traveller Park)	Rec 70 (Drax Village West)	Rec 71 (The Lodge)	Rec 72 (Peer Tree Avenue)	Rec 73 (Drax Abbey Farm)
Specific sound level L_s ($L_{Aeq,Tr}$), dB	38	32	39	32	31	35	33	27	26	30
Acoustic feature correction, dB	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
Rating level ($L_{Ar,Tr}$), dB	41	35	42	35	34	38	36	30	29	33
Representative future background sound level ($L_{A90,T}$), dB	38	38	38	38	38	38	38	38	38	38
Excess of rating level over background sound level ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	3	-3	4	-3	-4	0	-2	-8	-9	-5
BS 4142 guidance	Between 'Low' and 'Adverse' impact	'Low' impact	Between 'Low' and 'Adverse' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact	'Low' impact
Magnitude of impact (assigned from Table 13-11)	Medium	Low	Medium	Low	Low	Low	Low	Low	Low	Low
Initial classification of effect (assigned from Table **13-12**)	Moderate	Minor	Moderate	Minor	Minor	Minor	Minor	Minor	Minor	Minor
Uncertainty: Significantly different 'representative' background and ambient sound level values could be obtained using updated baseline data and using different statistical analysis methods. Additionally, background/ ambient sound level data measured at a small number of NSR are assumed to be representative of conditions at other NSR.										

GIS: ER Checked: LC Approved: YL



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Coordinate System: British National Grid

Scale @ A3 1:10,000

nationalgrid

PROJECT

Scotland England Green Link 2

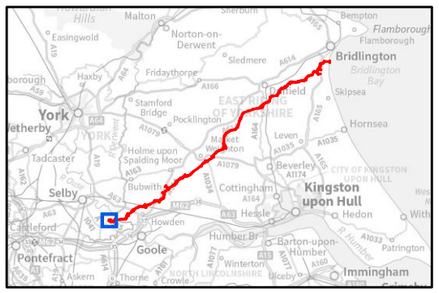
KEY

- Noise Receptor Location
- Building Location

Operational Noise Contour

Lday (dBA)

- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 -50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70



TITLE

Figure 13-3
Operational Noise Map
Lday h = 1.5 m
Grid Size 20 x 20 m

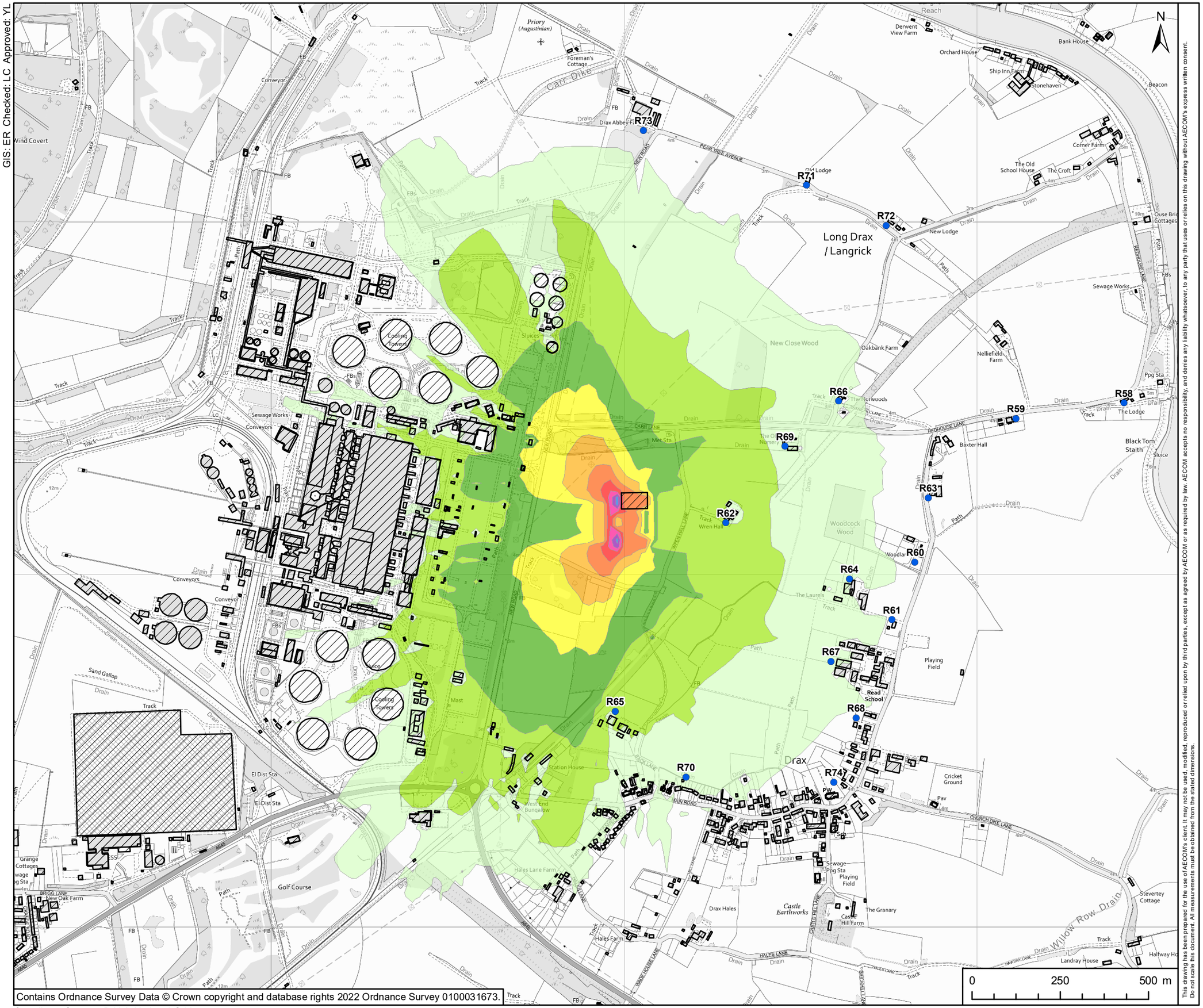
REFERENCE

SEGL2_T_ES_13-3_v1_20220530

SHEET NUMBER: 1 of 1

DATE: 30/05/2022

GIS: ER Checked: LC Approved: YL



Coordinate System: British National Grid

Scale @ A3 1:10,000

nationalgrid

PROJECT

Scotland England Green Link 2

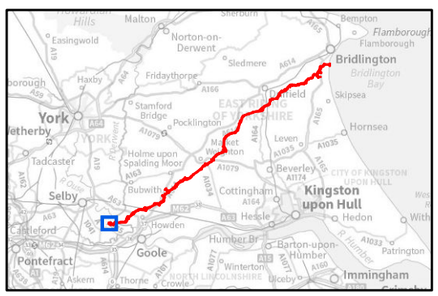
KEY

- Noise Receptor Location
- Building Location

Operational Noise Contour

Lnight (dBA)

- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 -50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70



TITLE

Figure 13-4
Operational Noise Map
Lnight h = 4 m
Grid Size 20 x 20 m

REFERENCE

SEGL2_T_ES_13-4_v1_20220530

SHEET NUMBER: 1 of 1

DATE: 30/05/2022

13.7 Project Specific Mitigation

13.7.1 Construction Phase Mitigation

This assessment of construction noise has identified some potential short term, temporary Moderate and Major adverse (significant) noise effects during the construction of the English Onshore Scheme. There is also potential for significant noise effects if work were to take place at the same intensity during evenings/night-time and/or other weekend periods. Measures would therefore be put in place to control or restrict activities during evenings/night-time so as not to exceed the SOAEL. Control of construction noise and vibration is proposed to be secured by a planning condition. By timing construction works and avoiding noisier activities (or limiting them to those which are unavoidable e.g. HDD or jointing which require continuous working) being undertaken at night, Major adverse effects can therefore be reduced Moderate adverse effects to Minor adverse.

The preferred approach for controlling construction noise and vibration is to reduce levels at source, where reasonably practicable. Sometimes a greater noise or vibration level (such as those identified in **Table 13-25**) may be acceptable if the overall construction time, and therefore length of disruption, is reduced, including those where exceedances of the SOAEL is predicted.

Measures to mitigate noise will be implemented during the construction phase of the English Onshore Scheme in order to minimise impacts at local NSRs and ecological receptors, particularly with respect to activities required outside of core working hours. Mitigation measures will be secured through the approval and implementation of the CEMP, as outlined in **Chapter 18: Construction Environmental Management Plan**.

Mitigation measures covered in the CEMP represent the adoption of BPM, as defined in Section 72 of the CoPA. Examples of BPM from BS 5228-1 will be implemented during construction works are presented below:

- Unnecessary revving of engines will be avoided and equipment will be switched off when not in use;
- Internal haul routes will be kept well maintained;
- Rubber linings in, for example, chutes and dumpers will be used to reduce impact noise;
- Drop heights of materials will be minimised;
- Plant and vehicles will be sequentially started up rather than all together;
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas; and
- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications.

The need for monitoring of noise levels during construction will also be determined through the detailed assessment undertaken and will be the subject of discussion between the Contractor and the LPA. Noise monitoring would allow periods where elevated noise levels arise be identified and allow works to be halted or alternative working practices to be explored. The Contractor will need to adhere to any site-specific noise monitoring related conditions imposed by the LPA. Any incidents of noise limits being exceeded will be reported by the Contractor to the Applicant to forward to the LPA as soon as is practical.

Residual effects after mitigation are described in Section 13.8. As described in Section 13.5 the potential reduction in noise as a result of the mitigation measures is dependent on the application and implementation by the appointed Contractor, and cannot be accurately quantified, a qualitative judgement has been made based on professional experience in determining the likely magnitude of residual effects.

The effect of noise and vibration at nearby sensitive receptors can also be minimised through a good communication strategy. Prior to works being undertaken, liaison will be undertaken with the occupiers of sensitive receptors that may be adversely affected by construction noise. Providing information on the construction works and advance notice of when high noise generating activities are taking place

can reduce adverse effects. As significant noise effects are predicted at receptors within approximately 100 m of the cable route, properties within this area should be communicated with. All communications will contain contact details on the timings and duration of proposed works along with contact details for whom any questions or complaints should be directed.

Monitoring of noise complaints and reporting to the Applicant for immediate investigation and action. A display board will be installed on-site and a website will be set up. These will include contact details for the Site Manager or alternative public interface with whom nuisance or complaints can be lodged. A logbook of complaints will be prepared and managed by the Site Manager.

Mitigation, monitoring and a communication strategy measures will be part of the CEMP (**Chapter 18: Outline Construction Environmental Management Plan**).

13.7.2 Operational Phase Mitigation

The assessment suggested Moderate effects for NSR located closer to the converter station such as Rec62 Wren Hall and Rec65 Field House. Consequently, further mitigation is recommended to be incorporated into the detailed design.

Mitigation measures and general principles to achieve this may include, but not be limited to, the following depending upon potential benefits achieved from such measures:

- reducing the breakout noise from plant through use of enhanced enclosures, or potentially containing them within a building;
- reducing air inlet noise emissions by addition of further in-line attenuation;
- reducing stack outlet noise emissions by addition of silencers or sound proofing panels;
- reducing fin fan cooler noise emissions by screening, attenuation, or fitting low noise fans;
- screening or enclosing the compressors or other equipment;
- use of screening or bunding to shield receptors from noise sources; and/or
- orientation of plant within the site to provide screening of low-level noise sources by other buildings and structures, or orientating fans and the air inlets away from sensitive receptors.

Consultation with project engineers has confirmed further sound reduction is achievable either through reduction of sound power level at source of the plant procured or the measures listed in this section. During detailed design of the plant it may be desirable or more practical to apply higher attenuation to some plant items/buildings in order to reduce the attenuation applied to remaining plant items/buildings.

It is assumed that 10 dB overall reduction is achievable when assessing the residual effects in Section 13.8 after mitigation.

13.8 Residual Effects

13.8.1 Assessment of Residual Effects: Construction Phase

Due to the embedding of design mitigation and additional construction mitigation into the English Onshore Scheme the residual construction noise effects can be reduced, for example major to moderate or moderate to minor adverse.

A summary of the likely significant residual effects, following the implementation of appropriate mitigation to reduce noise and vibration during construction is presented in **Table 13-30** below. Residual noise effects for Scenario 1 have been split into route sections as described in **Chapter 3: Description of the English Onshore Scheme**.

13.8.2 Assessment of Residual Effects: Operational Phase

Due to the embedding of design mitigation and additional operational phase mitigation into the English Onshore Scheme the residual operational effects of the English Onshore Scheme will reduce.

A summary of the likely significant residual effects, following the implementation of appropriate mitigation to reduce noise during operational phase is presented in **Table 13-31** below.

Table 13-30: Summary of Construction Phase Likely Significant Residual Effects

Receptor	Sensitivity	Description of Potential Impact	Magnitude	Significance	Mitigation Measure(s)	Residual Effect	
						Magnitude	Significance
Rec14 & Rec16	Medium	Phase 1 noise emissions due to works on Route Section 1	Medium	Moderate (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Low	Minor (not significant)
Rec23	Medium		High	Major (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Medium	**Moderate (significant)**
Rec01- 13, Rec 15, Rec**22, Rec24-28**	Medium		Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
Rec36	Medium	Phase 1 noise emissions due to works on Route Section 2	Medium	Moderate (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Low	Minor (not significant)
Rec29-35, Rec37-41	Medium		Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
Rec47, Rec49-50, Rec54-56	Medium	Phase 1 noise emissions due to works on Route Section 3	Medium	Moderate (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Low	Minor (not significant)
Rec42-46, Rec48, Rec51-53, Rec57	Medium		Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)

Receptor	Sensitivity	Description of Potential Impact	Magnitude	Significance	Mitigation Measure(s)	Residual Effect	
						Magnitude	Significance
Rec60, Rec62	Medium	Phase 1 noise emissions due to works on Route Section 4	High	Major (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Medium	**Moderate (significant)**
Rec58-59**,** Rec61, **Rec64**	Medium		Medium	Moderate (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Low	Minor (not significant)
Rec63, Rec65	Medium		Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
Rec23, Rec60, Rec64	Medium	Noise emissions due to Scenario 2 construction activities	Medium	Moderate (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Negligible to Low	Negligible /Minor (not significant)
Rec01-22, Rec 24-**59, Rec61-6**3, Rec65	Medium		Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
Rec60	Medium	Noise emissions due to Scenario 3 construction activities	Medium	Moderate (significant)	Further detailed assessment and CEMP once contractor appointed, monitoring and good communication etc.	Negligible to Low	Negligible /Minor (not significant)
Rec01-**59, Rec61-65**	Medium		Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
Rec01-06	Medium	Noise emissions due to Scenario 4 construction activities	Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
Rec58-65	Medium	Noise emissions due to Scenario 5 construction activities	Negligible to Low	Negligible /Minor (not significant)	Best practicable means as covered in the CEMP	Negligible	Negligible (not significant)
All	Medium	Vibration effects on NSR	Very low	Minor (not significant)	Not required	Very low	Minor (not significant)

Receptor	Sensitivity	Description of Potential Impact	Magnitude	Significance	Mitigation Measure(s)	Residual Effect	
						Magnitude	Significance
All	Medium	Construction traffic noise effects on NSR	Negligible	Negligible	Not required	Negligible	Negligible

Table 13-31: Summary of Operational Phase Likely Significant Residual Effects

Receptor	Sensitivity	Description of Potential Impact	Magnitude	Significance	Mitigation Measure(s)	Residual Effect	
						Magnitude	Significance
Rec62 and Rec65	Medium	Converter station noise emissions	Medium	Moderate (significant)	Additional noise mitigation such as selection of quieter equipment and noise enclosure to achieve overall 10 dB reduction	Low	Minor (not significant)
Rec64, Rec66, Rec67, Rec69-73	Medium	Converter station noise emissions	Minor	Minor (not significant)		Negligible	Negligible (not significant)

13.9 Cumulative Effects

13.9.1 Assessment of Intra-project Effects

As outlined in **Chapter 1: Introduction**, the English Onshore Scheme forms one element of the wider Project, along with the Marine Scheme and Scottish Onshore Scheme. Due to the distances of separation between the English Onshore Scheme and the Scottish Onshore Scheme, intra-Project cumulative effects to individual receptors will not occur, for example no property or ecological site would experience effects from both the English Onshore Scheme and Scottish Onshore Scheme. Similarly, although there is a slight overlap of the English Onshore Scheme and Marine Scheme in the intertidal area between Mean High Water Springs and Mean Low Water Springs (as shown in Figure 1-2), as the HVDC cable reaches the landfall site (part of the English Onshore Scheme) via HDD, the works which could give rise to environmental impacts are physically separated and hence no significant intra-Project cumulative effects to individual receptors are predicted to occur.

The separate EIA/EA reports produced for the English Onshore Scheme, Marine Scheme and Scottish Onshore Scheme provide an environmental assessment of each topic area for which potential environmental effects could arise from that element. Once the assessment of the other elements of the Project is complete, a Bridging Document will be prepared which summarises the main interactions of these three individual environmental assessments. The Bridging Document will be made available as soon as it is available, but as highlighted above, there are no significant in-combination impacts between the English Onshore Scheme, Marine Scheme or Scottish Onshore Scheme. This section, therefore, provides an assessment of the combined and cumulative effects relating to the English Onshore Scheme only. For full definitions of terminology and details of other projects considered in this assessment see Chapter 17: Cumulative Assessment.

As shown in **Table 13-24**, intra-project effects due to construction of different elements of the proposed English Onshore Scheme are unlikely to occur due to the linear nature of the development at all NSR.

13.9.2 Assessment of Inter-project Effects

The following cumulative developments have been identified within the noise and vibration study area:

- Drax Bioenergy with Carbon Capture and Storage (located immediately adjacent to the converter station site).
- 40 dwellings at land north of Houghton Close, Market Weighton (approximately 230 m north of the underground DC cable route).
- Solar farm at Back Lane, Skerne (overlapping / adjacent to the underground DC cable route).

13.9.2.1 Inter-project Construction Noise Effects

Cumulative noise effects on the identified receptors may occur in the event that construction works at Cumulative Schemes listed in **Chapter 17: Cumulative Effects** take place simultaneously with construction activities for the English Onshore Scheme. The precise scale of additional noise effects will be dependent on the exact works taking place at each location at any one time; however, the use of site hoardings and compliance with the mitigation measures detailed within the CEMP will reduce these effects as far as possible. It has been assumed that the other developments will also be required to adopt BPM as standard working practices during their demolition and construction phases and that noise and vibration levels will comply with set limits.

The number of Cumulative Schemes in proximity to the English Onshore Scheme means that cumulative construction noise effects of an adverse nature may occur at sensitive receptors. Other developments that could result in a cumulative impact on shared receptors with the English Onshore Scheme are as follows:

- Drax Bioenergy with Carbon Capture and Storage – Rec58-65 (NSIP-4)
- Dwellings at Houghton Close – Rec40-41 (ERYC-13)
- Solar Farm at Back Lane, Skerne – Rec17-20 (ERYC-22)

The degree of potential cumulative noise effect is dependent on the location of the receptor relative to the planning application boundary and other Cumulative Schemes considered which are under

construction. Additionally, the scheduling of construction works and intensity of works that are occurring at the English Onshore Scheme and Cumulative Schemes.

Communications should be undertaken with the Cumulative Schemes identified above so that, where practicable, works can be scheduled to minimise the exposure of sensitive receptors to significant adverse cumulative levels of construction noise for extended periods of time due to simultaneous activities on adjacent sites. Mitigation measures set out within the agreed CEMP will be applied during all construction activities to reduce adverse levels of cumulative construction noise and vibration as far as reasonably practicable. Given that these measures are applied at all Cumulative Schemes, it is unlikely that there will be an additive noise effect so, based on the residual effects presented in **Table 13-30**, cumulative construction noise effects are likely to be not significant.

13.9.2.2 Inter-project Construction Vibration Effects

Cumulative Schemes are sufficiently separated from sensitive receptors and the English Onshore Scheme such that cumulative vibration is unlikely. Consequently, cumulative construction vibration effects are equivalent to residual effects presented in **Table 13-30** and not significant.

13.9.2.3 Inter-project Construction Traffic Noise Effects

The construction traffic assessment has applied an uplift of 20% to the construction traffic to account for any uncertainty with the programme and vehicles. Given this, even if the cumulative construction traffic doubles due the cumulative construction traffic, changes in noise due to cumulative construction traffic is unlikely to cause noise increase to be over 1 dB. This is equivalent to a Negligible impact and a **Negligible** effect at residential receptors. Consequently, cumulative construction traffic noise effects are equivalent to residual effects presented in **Table 13-30** and not significant.

13.9.2.4 Inter-project Operational Noise Effects

It is expected that building services noise from each of the Cumulative Schemes will be designed to achieve operational noise limits at the nearest noise sensitive receptor to each development. Consequently, it is considered that the likely cumulative effect on building services noise would remain being **Negligible** (not significant), assuming the same target criteria are adopted for those developments.

13.10 Summary of Assessment

This chapter has presented the assessment of potential noise and vibration effects during the construction and operational phases of the English Onshore Scheme. Where necessary, means of mitigating the potential significant adverse noise and vibration effects on existing NSRs have been provided. All NSRs identified as part of the assessment are residential properties.

An environmental noise survey was undertaken to establish background noise levels at locations representative of the nearest NSRs based on the location of the English Onshore Scheme. Unattended measurements and short-term attended measurements were undertaken in September 2021. As expected, in rural areas the existing background noise levels are low. The background noise levels are higher at monitoring location LT2 due to noise emitted from Drax Power Station.

Construction noise levels have been estimated based on data in BS 5228-1. At this stage a worst-case assessment has been undertaken based on typical construction activities. Potentially significant effects would be mitigated by adopting best practicable means and enforcement of actions included in the CEMP. As significant effects are short-term and temporary, provision of information containing the timings and duration of construction activities can allow residents of affected to accept higher noise levels. As such, noise during the construction phase is assessed as being, at worst, **Moderate Adverse** (significant). Potentially significant effects are identified at 16 NSRs; 10 of these are located within East Riding of Yorkshire, six are located within Selby District.

Typical construction working practices are unlikely to generate levels of vibration at local receptors above which cosmetic damage to structures is predicted to occur. Residual effects due to construction vibration is assessed as being, at worst, **Minor Adverse** (not significant) at the nearest NSR due to the separation distance between it and the construction works.

All NSRs are predicted to have **Negligible** (not significant) residual effects due to construction traffic accessing the site.

Careful design and, where necessary, appropriate attenuation measures, will be employed to ensure that the day to day operational noise from the converter station does not exceed the existing background noise levels at the nearest existing NSR by 5 dB. This is regarded to be eminently achievable based on the options and opportunities available to the Contractor for detailed design. With mitigation measures in place, noise emissions from the operational converter station are assessed as, at worst, **Minor Adverse** (not significant). The potential for low frequency noise from the converter station will be considered during the detailed design stage and if necessary appropriate isolation and attenuation measures will be incorporated into the design.

13.11 References

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Ref 13-4 Department of Energy and Climate Change, *Overarching National Policy Statement for Energy EN-1, 2011.*

Ref 13-5 Department of Energy and Climate Change, *NPS EN-5 National policy statement for electricity networks infrastructure (EN-5), 2011.*

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Ref 13-7 Department for Communities and Local Government, *"National Planning Practice Guidance," 2014.*

Ref 13-8 East Riding of Yorkshire Council, *The East Riding Local Plan 2012-2029, 2016.*

Ref 13-9 Selby District Council, *Selby District Core Strategy Local Plan, 2013.*

Ref 13-10 British Standards Insitute*, "BS 7445 - Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use," BSi, London, 1991.*

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Ref 13-12 British Standards Institute, *"BS 5228-2:2009+A1:2014 – Code of practice for Noise and Vibration control on construction and open sites. Vibration, BSi, London.," 2014.*

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Ref 13-14 British Standards Institute, *"BS 7385-2 – Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration," 1999.*

Ref 13-15 International Standards Organisation, *"ISO 4866 Mechanical vibration and shock -- Vibration of fixed structures -- Guidelines for the measurement of vibrations and evaluation of their effects on structures.," 2010.*

Ref 13-16 British Standards Institute, *"BS 4142 - Methods for rating and assessing industrial and commercial sound," BSi , London, 2019.*

Ref 13-17 British Standards Institute, *"BS 8233 – Guidance on sound insulation and noise reduction for buildings," 2014.*

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Ref 13-22 British Steel, *'Control of Vibration and Noise During Piling', 1998.*

Ref 13-23 Thornley-Taylor, R.M., *'Ground Vibration Prediction and Assessment'*