West Burton Solar Project

Environmental Statement

Chapter 15: Noise and Vibration

Prepared by: Tetra Tech Limited

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Contents

Issue Sheet

Report Prepared for: West Burton Solar Project Ltd.
DCO Submission

Environmental Statement Chapter 15: Noise and Vibration

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15 Noise and Vibration

15.1 Introduction

15.1.1 This chapter of the ES evaluates the likely significant effects of the Scheme as described in **ES Chapter 4: Scheme Description [EN010132/APP/WB6.2.4]** on nearby noise and vibration sensitive receptors during construction, operation and decommissioning. The aim of this assessment is to predict the levels of noise and assess these against relevant guidelines, and where necessary, identify any required mitigation measures to make effects acceptable.

15.1.2 This chapter is supported by the following Appendices:

- **Appendix 15.1: Noise Survey Information [EN010132/APP/WB6.3.15.1]**
- **Appendix 15.2: Acoustic Terminology [EN010132/APP/WB6.3.15.2]**
- **Appendix 15.3: Assessment of Key Effects [EN010132/APP/WB6.3.15.3]**

15.1.3 This chapter includes the following elements:

- Consultation and Engagement
- Policy Context
- Assessment Methodology and Significance Criteria
- Baseline Conditions
- Embedded Design Mitigation
- Identification and Evaluation of Key Effects
- In-combination Effects
- Cumulative Effects
- Mitigation Measures
- Residual Effects
- Introduce assessment discipline

15.2 Consultation

15.2.1 A summary of consultee comments relevant to this chapter, along with information about how comments have been responded to, is set out in Table 15.1.

Table 15.1 Summary of Consultation Responses

Date	Consultee and Response	How Consultation Comment has been Addressed
March 2022	PINS Scoping Opinion	
	"*The ES should assess noise impacts from construction*	Construction traffic noise has been assessed in

	traffic where significant effects are likely to occur; the noise assessment should characterise noise impacts based on the volume of traffic, percentage of HGVs and distance from the source using a recognised methodology such as BS5228."	Section 15.7, using methodology described in DRMB LA111.
	"*Scoping Report paragraph 15.4.6 states that there would be no significant sources of vibration during operation. Considering the nature of the Proposed Development during operation, the inspectorate is content to scope this matter out. The ES should describe the potential sources of vibration arising from the operation of e.g. substation and battery storage infrastructure and any measures to control emissions.*"	The effect of vibration has been assessed in Section 15.7. Assessment of construction phase vibration includes the construction of substations, Battery Energy Storage areas, solar array panel mounting structures and excavation and compaction activities related to the cable route corridor.
	"*Scoping Report section 4.2 identifies that the type of panel to be used is not yet determined and tracking panels may be used. Should this type of panel be used, the ES should assess the potential for significant noise effects on ecological and human receptors during operation.*"	Tracking panels have been assessed within the ES to represent the worst-case with respect to noise.
May 2022	Environmental Health Officer (EHO) and Planning Officer), West Lindsey District Council	
	Tetra Tech contacted WLDC to discuss the assessment methodology for the assessment. Scoping report was provided along with	At this stage WLDC have been unable to seek the advice of consultants on this matter, therefore, the assessment has progressed

	background monitoring locations. Discussion about the use of absolute noise levels when existing background noise levels are very low.	based on advice received from Bassetlaw District Council and industry best practice.
July 2022	EHO and Planning Officer, Bassetlaw District Council	
	Tetra Tech contacted BDC to discuss the assessment methodology for the assessment. TT discussed use of absolute noise levels when existing background noise levels are very low.	BDC agreed with methodology proposed.

15.3 Legislative and Policy Content

15.3.1 This section provides an overview of the legislative and planning policy framework against which the Scheme has been considered for noise and vibration. These policies identify the need for a site-specific noise assessment to consider the impacts of construction and operational phase noise on local noise-sensitive receptors.

Legislation

Control of Pollution Act 1974

15.3.2 The Control of Pollution Act 1974 (CoPA) 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 Authority with instructions to cease work until specific conditions to reduce noise have been adopted.

15.3.3 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.

15.3.4 Prior to the commencement of construction of the Scheme (or any part thereof) a Construction Environmental Management Plan (CEMP) will be submitted to and approved by the relevant planning authority, and this will be secured by a requirement in the DCO. The CEMP must be in accordance with the **Outline CEMP [EN010132/APP/WB7.1]** which has been submitted as part of the DCO application. This will ensure the potential construction impacts are minimised including how the Scheme will seek to manage noise generated during construction and operational phase.

Environmental Protection Act 1990

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

15.3.6 Local Authorities are required to investigate any public complaints of noise, and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they 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.

15.3.7 In determining if a noise complaint amounts to a statutory nuisance the Local Authority can take account of various guidance documents and existing case law, 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.

15.3.8 The draft DCO contains provisions that limit the ability for persons to bring statutory nuisance proceedings under the EPA if the noise is created in the course of carrying out construction, use, maintenance or decommissioning of the Scheme. The DCO Application includes a **Statutory Nuisance Statement [EN010132/APP/WB7.8]**, which will be informed by the noise and vibration chapter of the Environmental Statement (ES).

National Planning Policy

15.3.9 The following planning policy, guidance and standards are of particular relevance to operational noise.

- Overarching National Policy Statement for Energy (EN-1);
- Draft National Policy Statement (NPS) for Energy (EN-1);
- National Policy Statement on Renewable Energy Infrastructure (EN-3);
- Draft revised National Policy Statement EN-3 'Renewable Energy Infrastructure;
- National Planning Policy Statement for Electrical Networks (EN-5);
- Draft NPS for Electrical Networks Infrastructure (EN-5);
- The National Planning Policy Framework (NPPF);
- The Noise Policy Statement for England (NPSE); and
- BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

15.3.10 The overarching NPS for Energy (EN-1) was adopted in July 2011 and sets out the overall national energy policy for delivering major energy infrastructure.

15.3.11 Section 5.11.4 of EN-1 deals with effects from noise and vibration, and states;

"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."*

15.3.12 The information required to address Section 5.11.4 of EN-1, is detailed within sections 15.5 (Baseline Conditions), 15.6 (Embedded Design Mitigation) and 15.7 (Identification and Evaluation of Key Effects) of this chapter.

15.3.13 Paragraph 5.11.6 of EN-1 refers to the need to assess operational noise using the principles of the relevant British Standards, for example BS 4142 'Method for rating and assessing industrial and commercial sound'.

15.3.14 With regards to the decision-making process, EN-1 (at paragraph 5.11.8) states that the project should:

- Demonstrate good design through selection of the quietest cost-effective plant available;
- Containment of noise within buildings wherever possible;
- Optimisation of plant layout to minimise noise emissions; and, where possible,
- Use landscaping, bunds or noise barriers to reduce noise transmission.

15.3.15 The overarching NPS for Energy (EN-3) was adopted in July 2011 and sets out the overall national energy policy for delivering renewable energy infrastructure. However, this does not apply to solar generation.

15.3.16 The National Policy Statement on Electricity Networks Infrastructure 5 (EN-5) was adopted in July 2011. Whilst EN-5 principally covers above-ground electricity lines of 132 kV and above, paragraph 1.8.2 confirms that EN-5 will also be relevant if the electricity network constitutes an associated development for which development

consent is sought, along with an NSIP, such as a generating station. EN-5 is therefore relevant to the Scheme, as a grid connection is proposed.

15.3.17 Noise and vibration is considered in Section 2.9 of EN-5, and refers to Section 5.11 of EN-1 with regard to generic noise considerations.

15.3.18 Section 2.9.7 of EN-5 states that audible noise effects can arise from substation equipment such as transformers, quadruple boosters and switched capacitors.

15.3.19 Section 2.9.12 of EN-5 states that applicants should have considered the following mitigation measures:

- The positioning of lines;
- Ensuring that the appropriately sized conductor arrangement is used to minimise potential noise;
- Avoiding damage to overhead line conductors which can increase potential noise effects; and
- Ensuring conductors are kept clean and free of surface contaminants during stringing / installation.

15.3.20 Draft versions of NPS EN-1 and EN-3 were published for consultation by the Department for Business, Energy & Industrial Strategy in September 2021. In relation to noise, the draft EN-1 repeats the three aims for decision makers from the 2011 NPS EN-1. Key additional points that expand on requirements in NPS EN-1 and are relevant to the Scheme are set out in paragraph 5.12.4 and require:

"an assessment of the effect of predicted changes in noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and well-being where appropriate, and noise-sensitive areas"

"measures to be employed in mitigating the effects of noise – applicants should consider using best available techniques to reduce noise impacts"

15.3.21 Additionally, the draft NPS EN-1 allows for some flexibility in design, stating (at paragraph 5.12.8) that:

"Some noise impacts will be controlled through environmental permits and parallel tracking is encouraged where noise impacts determined by an environmental permit interface with planning issues (i.e. physical design and location of development)".

15.3.22 The draft EN-3 includes the consideration of transport noise and vibration associated with solar photovoltaic generation schemes. While no specific guidance is provided in the draft EN-1 or EN-3 for assessment of these noise impacts, these issues have been addressed in this chapter.

The National Planning Policy Framework (NPPF)

15.3.23 The NPPF (updated July 2021) sets out the Government's planning policies for England, providing a framework within which local policies can be developed. The

key principle of the NPPF is a presumption in favour of sustainable development (paragraph 11). With regards to noise, section 15, Conserving and enhancing the natural environment of the National Planning Policy Framework provides the following guidance in relation to noise impacts.

"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…"

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

188. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

The Noise Policy Statement for England (NPSE)

15.3.24 The NPSE (published March 2010) sets out the role and purpose of noise policy, together with the Government's Noise Policy Vision and Aims, consistent with the NPPF.

15.3.25 The aims of the NPSE (paragraph 1.7) require that:

- Significant adverse effects on health and quality of life are avoided, while taking into account the guiding principles of sustainable development;
- Adverse effects on health and quality of life are mitigated or minimised; and
- Where possible, noise management should seek to improve health and quality of life within the context of Government policy on sustainable development.

15.3.26 Paragraph 2.24 of the NPSE states that in relation to minimising and mitigating adverse effects:

"...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

15.3.27 At paragraphs 2.20 and 2.21, the NPSE introduces the following concepts with regard to noise effects:

- No Observed Effect Level (NOEL) – This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- Lowest Observed Adverse Effect Level (LOAEL) – This is the level above which adverse effects on health and quality of life can be detected but are not necessarily significant.
- Significant Observed Adverse Effect Level (SOAEL) – This is the level above which significant adverse effects on health and quality of life occur.

15.3.28 Paragraph 2.15 of the NPSE recognises that it is not possible to have a single set of noise levels relating to the above categories which are applicable to all sources of noise in all situations, and it is acknowledged that further research is required to increase the understanding of what may constitute a significant adverse effect on health and quality of life from noise.

Planning Practice Guidance – Noise

15.3.29 The Planning Practice Guidance – Noise (PPGN) (updated July 2019) sets out guidance on how planning can manage potential noise effects in a new development.

15.3.30 In terms of how to recognise when noise could be a concern, PPGN provides a table outlining perception, outcomes, effect level and action required. This table is reproduced in Table 15.2.

Table 15.2 Operational Noise Significance Criteria

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No Specific Measures Required
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 (LOAEL)			
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 (SOAEL)			
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	Unacceptable Adverse Effect	Prevent

	stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.		

Central Lincolnshire Local Plan (2017)

15.3.31 Policy LP19 of the Central Lincolnshire Local Plan (2017) states that *"...Proposals for non-wind renewable technology will be assessed on their merits, with the impacts, both individual and cumulative, considered against the benefits of the scheme..." The policy states that assessment should take account of "Residential and Visual Amenity"*.

15.3.32 It is considered that noise and vibration impacts are intrinsic to residential amenity.

Draft Bassetlaw District Local Plan 2020-2037 (August 2021).

15.3.33 Policy ST51 of the draft Bassetlaw Local Plan 2020-2037 (August 2021) states that, *"Development that generates, shares, transmits and/or stores renewable and low carbon energy, including community energy schemes, will be supported subject to the provision of details of expected power generation based upon yield or local self-consumption of electricity and by demonstrating the satisfactory resolution of all relevant wider impacts..."*. The impacts include, *"affected existing dwellings and communities from its scale, noise, light, glare, smell, dust, emissions or flicker"*.

Other Noise Guidance

15.3.34 A summary of guidance is provided below.

- Operational Noise from the solar farms – BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound, British Standards Institute (2014 with amendments), BSi, London;
- Operational Noise from solar farms (Alternative) – BS 8233:2014 Guidance on sound insulation and noise reduction for buildings, British Standards Institute (2014), BSi, London;
- Operational Noise from solar farms (Alternative) – IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014);
- World Health Organization (WHO) Guidelines for Community Noise (1999);
- Design Manual for Roads and Bridges – LA11 Noise and Vibration (2020);
- Construction Noise – BS 5228:2009+A1 2014 Code of practice for noise and vibration control on construction and open sites: Part 1 Noise, British Standards Institute (2014 with 2019 amendments), BSi, London; and
- Construction Vibration – BS 5228:2009+A1 2014 Code of practice for noise and vibration control on construction and open sites: Part 2 Vibration, British Standards Institute (2014 with 2019 amendments), BSi, London.

15.4 Assessment Methodology and Significance Criteria

Construction Assessment Methodology

Solar Array Sites Construction Noise

15.4.1 An assessment of the potential effects of noise during construction has been carried out for the closest, and therefore most noise sensitive, residential properties and ecological designations as identified in Section 15.5 of this chapter. The assessment of construction noise is based on the ABC method of assessment using the methodology set out in British Standard 5228. The assessment is based upon typical solar farm construction activities and types and numbers of plant.

15.4.2 Under the ABC method, a threshold value noise level is determined by establishing the existing ambient noise level at each assessment location. This measured ambient noise level is then rounded to the nearest 5dB and the threshold value for each receptor is then established from Table E.1 of the standard (reproduced below as Table 15.3). This threshold value is then the L_{Aeq} noise level that should not be exceeded at the assessment location by construction activities.

15.4.3 The following construction activities are considered to be those with the most potential to result in adverse noise effects:

- Construction of tracks and hardstanding areas;
- Installation of mounting frames (vibratory piling where required);
- Installation of PV panels; and
- Construction of the substation.

15.4.4 The distance between each noise sensitive receptor and the closest point at which each construction activity (excluding construction traffic on public roads) would occur has been identified and used to calculate worst case noise levels using the source data and methodology described in BS 5228-1:2014. These predicted levels have then been assessed against significance criteria (Table 15.4) derived from those suggested in BS 5228-1:2014.

15.4.5 Noise effects during the decommissioning phase of the Scheme will be similar to or less than noise effects during the construction phase; therefore, construction and decommissioning impacts are considered together. The noise assessment presented is considered to be representative of the decommissioning phase.

Solar Array Sites Construction Vibration

15.4.6 The following construction activities are considered to be those with most potential to result in adverse vibratory effects:

- Vibratory piling of PV panel framework; and
- Vibratory compaction of tracks/hardstanding areas.

15.4.7 The levels of vibration at the specified receptors have been predicted using the formulae provided in Table E.1 of BS 5228-2:2009+A1:2014. The methodology for predicting vibration at each receptor uses the distance to the construction activity and a scaling factor based on the probability of the predicted value being exceeded. The propagation of ground-borne vibration is highly complex and is dependent upon the specific geology of the propagation path from source to receptor. However, the formulae provide a reasonable estimation of the level of vibration likely to be experienced in practice. The formulae give a peak particle velocity (PPV) which can be compared to significance criteria derived from levels specified in BS 5228-2.

15.4.8 All other construction activities are considered to produce negligible levels of vibration and as such, do not require detailed assessment.

Cable Route Corridor: Noise and Vibration

15.4.9 The Cable Route Corridor is approximately 21.3km in length and, therefore, there are a large number of receptors within the study area for the construction works. As such, it would not be practicable or proportionate to predict the noise and vibration levels from construction works at every receptor along the Cable Corridor.

15.4.10 The construction noise and vibration assessment is based on a Cable Route Corridor which is generally 50m in width (but varying at certain locations to accommodate construction access or temporary working areas in a limited number of locations), within which the cables connecting the various solar array sites to the Point of Connection (POC) at West Burton Power Station substation, Cable Route Corridor could be installed.

15.4.11 The assessment method identifies the closest receptors to the Cable Route Corridor which could be impacted by noise and vibration from the construction of the cables. Receptors located further away from the Cable Route Corridor may not experience the predicted magnitude of impact due to the screening provided by buildings positioned between the Corridor and these receptors. As such, the assessment is considered to be a reasonable worst-case in this regard, and consequently robust.

15.4.12 The construction activities for the Cable Route Corridor will include the following activities:

- Trenching and cable duct installation;
- Cable pulling and jointing; and
- Horizontal Directional Drilling (HDD).

15.4.13 Due to the type of equipment used during the construction and enabling works, it is considered that trenching and cable duct installation activities are likely to cause the greatest impact in terms of noise and vibration along the Cable Route Corridor during construction. For this reason, noise and vibration impacts for the construction of the Cable Route Corridor have been assessed based on the activities associated with trenching and cable duct installation as a worst-case.

15.4.14 A list of assessment assumptions, including the work stages and equipment details (sound power levels, quantity, percentage on-time etc.) is included in Section 15.7 and key information is detailed as follows:

- The trenching works are linear and transient in nature, whereby trench excavation, duct installation and backfilling could occur simultaneously along a 100m section at a time.
- Along roads, breaking of the road surface is required to dig the trenches, whereas over open ground, no breaking is required.

15.4.15 For the construction of the cables within the Cable Route Corridor and specifically the activities associated with trenching, the following items of vibration inducing equipment have been considered:

- A vibratory roller for re-surfacing following trenching works. It is assumed a small ride-on-roller would be used and this activity would only take place where the Cable Route Corridor requires the removal of the existing road surface.

Construction Significance Criteria

Construction Noise Significance Criteria

15.4.16 The most notable impacts due to increases in noise and vibration during construction would be during periods of earthworks and construction of site infrastructure. In addition to on-site sources, increased noise may be caused by HGV movements travelling to and from the site during construction.

15.4.17 Noise levels from potential construction activity associated with the development of the Scheme have been assessed in accordance with BS 5228-1:2009 + A1 2014 criteria which indicate if a significant effect is likely to occur at noise sensitive receptors (i.e. residential properties). In order to ensure that the assessment is worst case, it is assumed that all proposed construction activity is occurring simultaneously.

15.4.18 In accordance with the ABC method of assessment outlined in BS 5228-1:2009+A1 2014, a significant effect is deemed to occur if the site noise level exceeds the threshold level for the category appropriate to the Ambient Noise level. As shown in Section 15.5 all nearby noise sensitive premises included in this assessment are currently exposed to ambient noise levels which comply with Category A.

Table 15.3: Construction Noise Thresholds at Residential Dwellings

Assessment category and threshold value period	Threshold Value $L_{Aeq,T}$ dB(A) – free-field		
	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	65	70	75

Saturdays (07:00 – 13:00)			
NOTE 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the Scheme 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 3 dB due to site noise. NOTE 3: Applies to residential receptors only.			
(a) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. (b) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values. (c) Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values. (d) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays, 07:00 – 23:00 Sundays.			

15.4.19 The expected baseline noise climate for the majority of the receptors is a daytime level of 65 dB(A), which corresponds to Category A of the ABC method.

15.4.20 Table 15.4 below gives noise criteria levels in respect to the ABC method of assessment.

Table 15.4: Noise Level Criteria (Construction Noise Assessment)

Magnitude of Effect	Noise Level Criteria	Action / Justification
Negligible	ABC Method Site L_{Aeq} noise levels are below 65 dB.	No action required. Complaints relating to plant noise unlikely
Minor	ABC Method Site L_{Aeq} noise levels are between 66 dB to 70 dB.	Mitigate to achieve site noise levels below relevant category threshold
Moderate	ABC Method Site L_{Aeq} noise levels are between 71 dB and 75 dB Or Construction activities cause noise levels to increase by more than 3dB (where ambient noise levels exceed threshold Values)	Mitigate to achieve site noise levels below relevant category threshold

Major	ABC Method Site L_{Aeq} noise levels are higher 76 dB Or Construction activities cause noise levels to increase by more than 10dB (where ambient noise levels exceed threshold Values)	Mitigate to achieve site noise levels below relevant category threshold

15.4.21 Given the length of the Cable Route Corridor, it would not be practicable or proportionate to quantify the baseline noise environment along the entire corridor. Therefore, the assessment of impacts and potential significance has been based on fixed noise criteria, rather than noise change relative to the existing ambient noise level.

Construction Vibration Significance Criteria

15.4.22 15.4.22 BS 5228:2009-2+A1:2014 sets out guidance on the effects of vibration, including vibration levels at which effects are perceptible to human receptors. Table 15.5 summarises this guidance.

Table 15.5: Vibration Significance Criteria

Vibration Level (mms^{-1})	Effect
≥ 0.3 to < 1.0 mm/s	Vibration might just be perceptible in residential environments.
≥ 1.0 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.
≥ 10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

15.4.23 It is considered that the above guidance translates into the following magnitude criteria for the purposes of this assessment.

Table 15.6: Magnitude of Effect - Vibration

Magnitude of Effect	Criteria	Action / Justification
Negligible	< 0.3 mm/s	No action required. Complaints relating to vibration unlikely

Minor	≥ 0.3 to < 1.0 mm/s	Mitigate to achieve vibration levels below relevant category threshold.
Moderate	≥ 1.0 to < 10 mm/s	Mitigate to achieve vibration levels below relevant category threshold.
Major	≥ 10 mm/s	Mitigate to achieve vibration levels below relevant category threshold.

Construction Traffic Assessment Methodology

Noise

15.4.24 Noise from construction traffic on public roads has been assessed on the basis of the change in traffic noise levels due to the addition of traffic associated with construction of the Scheme. Baseline traffic flows for each location have been sourced from **ES Chapter 14: Transport and Access [EN010132/APP/WB6.2.14]**. The percentage increases in all traffic and for HGVs have been used together with the number of vehicles, proportion of HGVs and likely speed (based on the type of road) to calculate the likely change in traffic noise level due to construction traffic for the peak of the construction programme in terms of vehicle movements, using the method described in DRMB LA111.

15.4.25 Where appropriate first floor receptor heights (4.0m) have been used to represent the worst-case (bedrooms).

Vibration

15.4.26 Vibration from traffic can be transmitted through the ground by the interaction of the vehicle tyres and the road surface. The passage of vehicles over irregularities in the road can create locally increased levels of vibration. The DMRB states that extensive research on a wide range of buildings has found no evidence of traffic induced ground borne vibration being a source of significant damage to buildings.

15.4.27 With regard to human perception, DMRB states that perceptible vibration only occurs in rare cases and notes that the normal use of a building, such as closing doors and operating domestic appliances, can produce levels of vibration similar to that of passing traffic.

15.4.28 In relation to ground-borne vibration Paragraph A5.26 of DMRB states: "Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances". The Applicant has engaged with the relevant highways authorities (Nottinghamshire and Lincolnshire County Councils) in respect of construction access routes. The **Construction Traffic Management Plan (CTMP) [EN010132/APP/WB6.3.14.2]** accompanying the DCO application provides measures that will ensure the delivery route is maintained and improved as appropriate, ensuring that levels of vibration are minimised as far as practicable.

15.4.29 No effects from traffic-induced ground-borne vibration are anticipated and such effects have therefore not been considered further.

Construction Traffic Significance Criteria

15.4.30 15.4.30 The magnitude of effects, in terms of the predicted change in traffic noise levels on public roads, expressed as LA10,18hour in accordance with CRTN, and based on criteria defined in DMRB are defined as follows:

Table 15.7: Magnitude of Effect - Construction Traffic

Magnitude of Effect	Criteria	Action / Justification
Negligible	Change in noise is: 0.0 - 0.9 dB $L_{A10,18h}$	No action required. Complaints relating to road traffic noise unlikely.
Minor	Change in noise is: 1.0 - 2.9 dB $L_{A10,18h}$	Mitigate to achieve total noise levels below relevant category threshold.
Moderate	Change in noise is: 3.0 - 4.9 dB $L_{A10,18h}$	Mitigate to achieve total noise levels below relevant category threshold.
Major	Depending on context, change in noise is: >5.0 dB $L_{A10,18h}$	Mitigate to achieve total noise levels below relevant category threshold.

15.4.31 Moderate or Major effects are regarded as being significant for the purposes of the EIA Regulations.

Operational Noise Assessment Criteria

15.4.32 In summary, the assessment process follows the methodology set out in BS 4142:2014+A1:2019, in accordance with paragraph 5.11.6 of EN-1, which comprises:

- Identification of potential receptors;
- Measurement of existing (baseline) background noise levels at a representative selection of potential receptors;
- Prediction of specific sound from the Scheme at each receptor;
- Application of appropriate corrections to the specific sound to account for the level and character of the sound (i.e., the rating level); and
- Assessment of the rating level against the prevailing background sound level, taking context into account.

15.4.33 The assessment of the potential effects of noise during operation of the Scheme has been carried out for the closest, and therefore most noise sensitive properties.

Operational Noise Significance Criteria

15.4.34 Operational noise effects at the nearest noise sensitive receptors have been assessed according to BS 4142:2014 and the guidance from the NPSE and PPGN.

15.4.35 Based upon this guidance, the following BS 4142:2014 rating differences are considered to apply:

Table 15.8 Magnitude of Effect – Operational Noise

Magnitude of Effect	Criteria	Action / Justification
Negligible	BS4142 score of zero or lower.	No action required. Score of zero or lower is an indication of the sound source having a low effect.
Minor	BS4142 score of +5 or lower.	Difference of +5 dB likely to be an indication of an adverse effect. Mitigate to achieve BS4142 score of plus 5 or lower.
Moderate	BS4142 score greater than +5.	Difference of +10 dB likely to be an indication of a significant adverse effect. Mitigate to achieve BS4142 score of plus 5 or lower.
Major	BS4142 score of +10 or higher.	Mitigate to achieve BS4142 score of 5 dB or lower.

Very Low Background and Rated Sound Levels – BS 4142 & ANC Guidance

15.4.36 Regarding low background sound BS 4142:2014+A1:2019 provides the following guidance:

For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound is low.

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.

15.4.37 The Association of Noise Consultants (ANC) Technical Note on BS 4142:2014+A1:2019 states:

BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more

acceptable outcome than would otherwise be suggested by the difference between the levels. For example, a situation might be considered acceptable where a rating level of 30 dB is 10 dB above a background sound level of 20 dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels.

15.4.38 BS 4142:2014+A1:2019 does not define low in terms of background sound or rating levels. The 1997 version of the standard defined very low background sound levels as being less than around 30 dB L_{A90}, and low rating levels as being less than about 35 dB $L_{Ar,Tr}$.

15.4.39 The Association of Noise Consultants (ANC) Technical Note on BS 4142:2014+A1:2019 states:

The Working Group suggest that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make judgement and justify it where appropriate.

15.4.40 It is therefore considered appropriate and best practice that absolute noise levels should be considered as appropriate for assessment of noise levels when existing background noise levels are low.

15.4.41 BS 8233 and the World Health Organization (WHO) 'Guidelines for Community Noise' (1999) provide guidance levels for internal noise within dwellings and bedrooms.

Table 15.9 Magnitude of Effect – Operational Noise (Internal)

Magnitude of Effect	Criteria	Action / Justification
Negligible	Noise levels are below: Bedrooms: 30 dB $L_{Aeq,8hours}$ Living Rooms: 35 dB$L_{Aeq,16hours}$	No Action Required Within BS 8233 Criteria
Minor	Noise levels are at: Bedrooms: 30 dB $L_{Aeq,8hours}$ Living Rooms: 35 dB $L_{Aeq,16hours}$	No Action Required Within BS 8233 Criteria
Moderate	Noise levels are exceeded: Bedrooms: 30 dB $L_{Aeq,8hours}$ Living Rooms: 35 dB $L_{Aeq,16hours}$	Mitigate and reduce to a achieve: Bedrooms: 30 dB $L_{Aeq,8hours}$ Living Rooms: 35 dB $L_{Aeq,16hours}$
Major	Noise levels with mitigation exceed: Bedrooms: 30 dB $L_{Aeq,8hours}$	Prevent

	Living Rooms: 35 dB $L_{Aeq,16hours}$	

15.4.42 IEMA 'Guidelines for Environmental Noise Impact Assessment' (2014) provide guidance levels for noise impact assessment based on a change in absolute noise levels as a result of the Scheme.

Table 15.10 Magnitude of Effect – Operational Noise (Change in Noise Level)

Magnitude of Effect	Criteria	Action / Justification
Negligible	Up to 3.0dB change or a reduction in noise levels	No action required – change in noise levels unlikely to be perceptible
Minor	A 3 to 4.9 dB L_{Aeq} change in sound level at a highly sensitive noise receptor	Mitigate to achieve increase in noise levels of less than 3.0 dB
Moderate	Greater than 5 dB L_{Aeq} change in sound level at a noise-sensitive receptor	Mitigate to achieve increase in noise levels of less than 3.0 dB
Major	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise	Mitigate to achieve increase in noise levels of less than 3.0 dB

Assessment of Sensitivity

15.4.43 The nature or sensitivity of all identified environmental receptors, as well as the magnitude of impact on those receptors is described in the assessment as high, medium, low or very low. What this looks like for this topic is set out in the table below.

Table 15.11: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	Residential properties (permanent tenants), schools and hospitals and sensitive species
Medium	Offices, internal teaching / training spaces
Low	Commercial premises

Assessment of Significance

15.4.44 The level of significance of each effect is determined by combining the magnitude of impact with the sensitivity of the receptor. Table 15.12 shows how the interaction of magnitude and sensitivity can be combined to determine the significance of an environmental effect.

Table 15.12: Criteria for Assessing the Significance of Noise Effects

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible

15.4.45 For the purposes of this assessment, "major/moderate" or "major" effects are considered to be significant in terms of the EIA Regulations.

15.5 Baseline Conditions

Background Survey

15.5.1 This section sets out the baseline information relevant to this chapter. There is separate baseline information relevant to the assessment of construction/operational noise levels at each of the Sites, construction traffic, and construction of the Cable Route Corridor, which is set out in the sections below.

15.5.2 The following prefixes have been used to identify the different receptors in the tables and figures that follow:

- 'R' – Nearby residential receptors used in operational and construction noise assessment.
- 'TR' – Nearby residential receptors used in construction traffic noise assessment.
- 'CR' – Nearby residential receptors used in the cable route noise assessment.

15.5.3 The baseline noise environment has been established following noise surveys undertaken at each of the four Sites as outlined in **Appendix 15.1 [EN010132/APP/WB6.3.15.1]**. The locations and summary of these measurements can be found in **Appendix 15.1**.

West Burton 1 Noise Survey

15.5.4 The baseline noise environment has been established following a noise survey undertaken from Thursday 16th September 2021 to Tuesday 21st September 2021.

Attended 15-minute short-term measurements were undertaken at nine locations during the day, evening and night-time periods with four additional locations being measured unattended over a 117-hour period. Full details of the noise monitoring survey are presented within **Appendix 15.1** and a brief summary is provided below.

15.5.5 The existing ambient noise climate was mainly dominated by road traffic noise from Broxholme Lane and Carlton Lane, occasional passing rail, and aircraft.

15.5.6 Statistical analysis of the long-term measured data, to derive representative background noise levels for the daytime and night-time periods, are shown in Figures 15.1 – 15.4 below.

Figure 15.1: Existing Daytime Background Noise Level – Statistical Analysis LT1

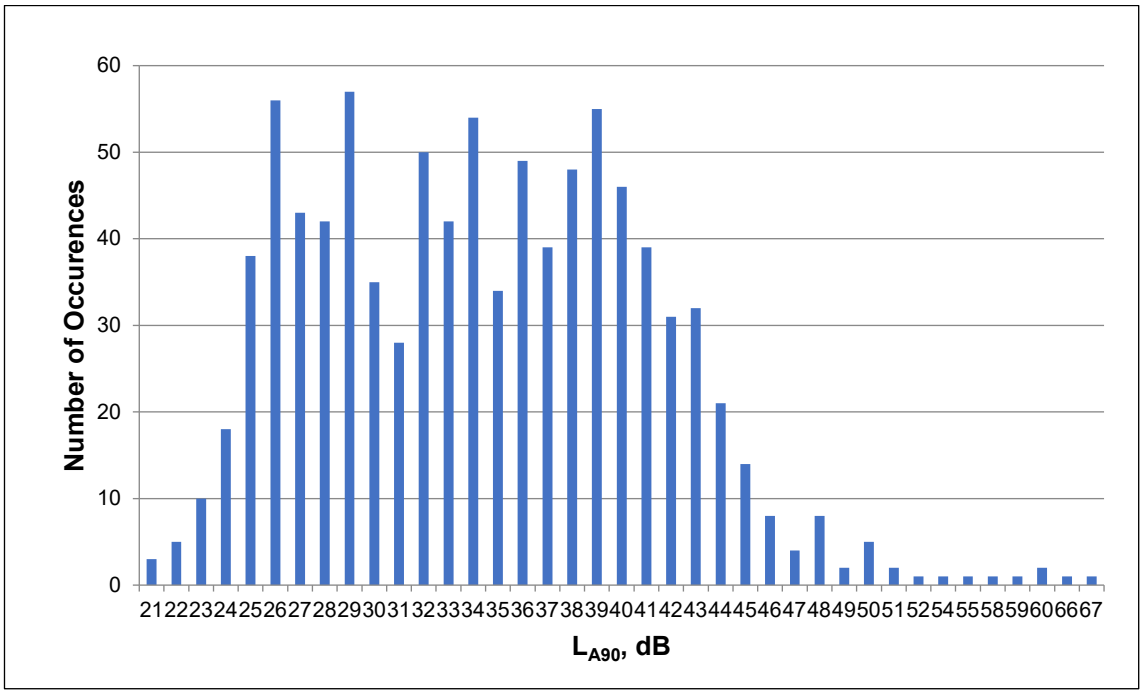


Figure 15.2 Existing Night-time Background Noise Level – Statistical Analysis LT1

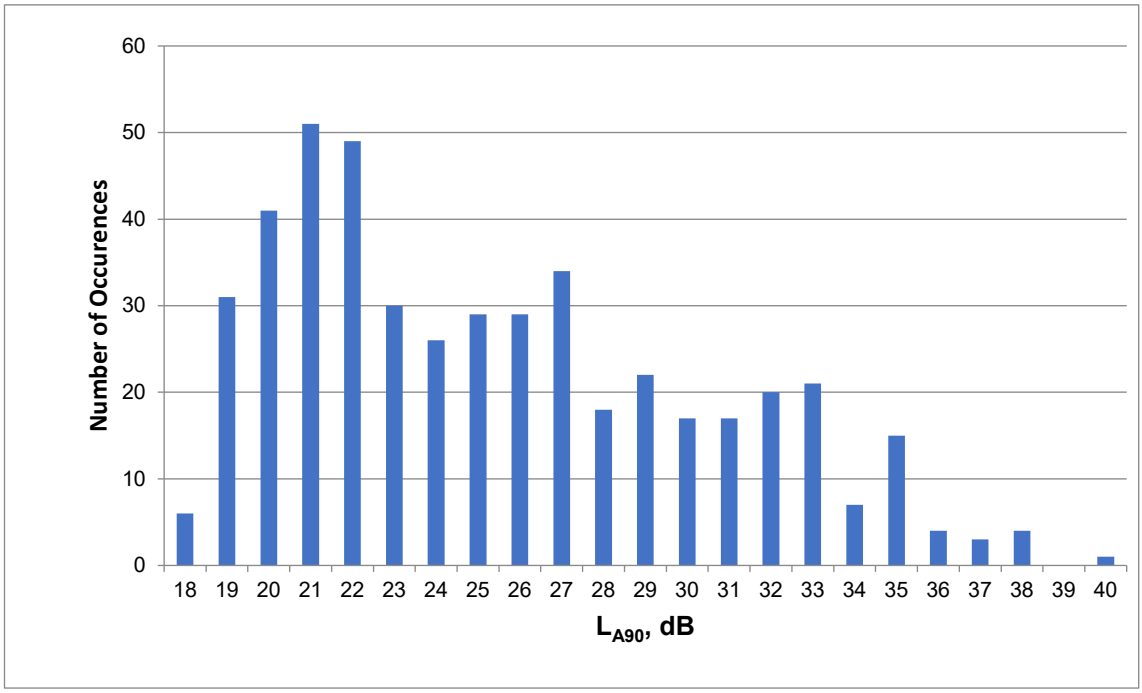


Figure 15.3: Existing Daytime Background Noise Level – Statistical Analysis LT2

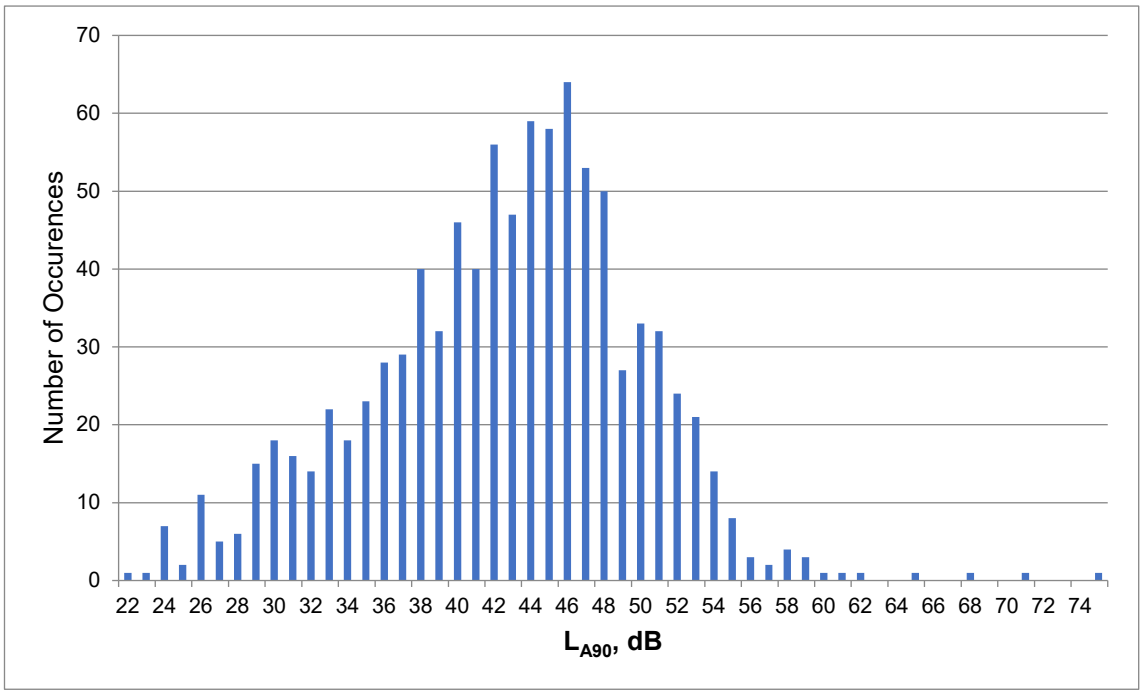
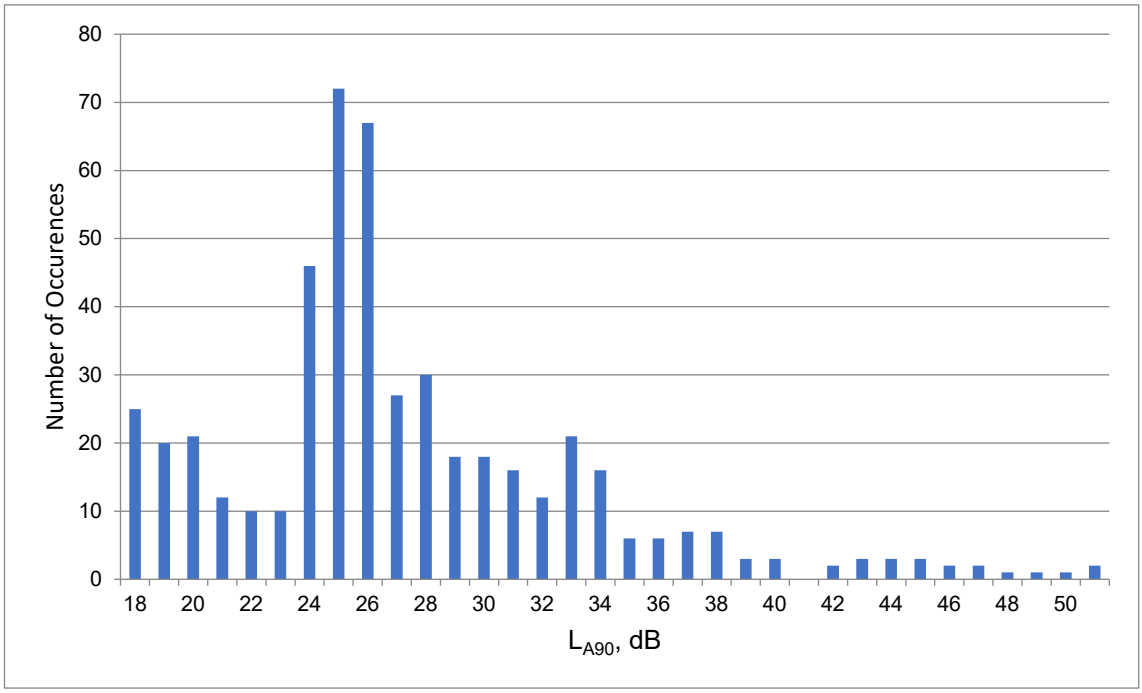


Figure 15.4: Existing Night-time Background Noise Level – Statistical Analysis LT2



Assessment Locations

15.5.7 Residential properties located closest to the Scheme infrastructure were identified using the site layout presented in **Figure 4.1 [EN010132/APP/WB6.4.4.1]** of this ES and are shown in Figure 15.5. These closest sensitive receptors are considered to be the most noise sensitive, as effects from the Scheme will be higher at these locations than at sensitive receptors located further from the Scheme.

15.5.8 Background sound levels measured at the properties listed in Table 15.13 are considered to be representative of the background noise environments at other properties in similar nearby locations. On this basis, should the predicted noise levels from the Scheme comply with limits at the assessed receptors, predicted noise levels at receptors further from the Scheme will also comply.

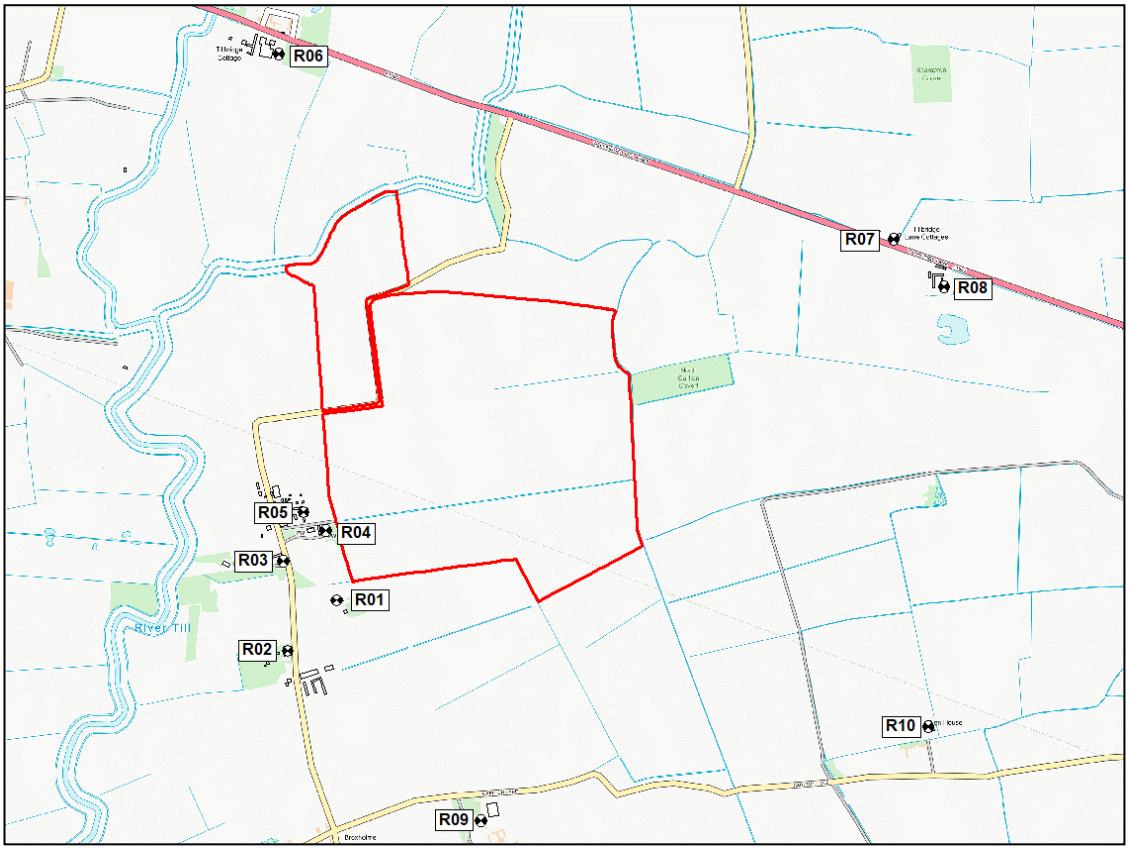
15.5.9 Assessment locations are identified in Figure 15.5.

Table 15.13 Noise Assessment Locations (Operational and Construction)

Ref	Description	Land Use Classification	Approximate Distance from Order Limits (m)	Height of Receptors (m)
R01	Boon Town	Residential	80	1.5 / 4.0
R02	Green Acres	Residential	300	1.5 / 4.0
R03	Carriers Lodge	Residential	185	1.5 / 4.0
R04	The Old Rectory	Residential	40	1.5 / 4.0

R05	The Grange	Residential	90	1.5 / 4.0
R06	Tillbridge Farm	Residential	550	1.5 / 4.0
R07	Tillbridge Lane cottages	Residential	910	1.5 / 4.0
R08	Tillbridge Lane House	Residential	1,040	1.5 / 4.0
R09	Cornhills House	Residential	800	1.5 / 4.0
R10	Fen House	Residential	1,090	1.5 / 4.0

Figure 15.5: Sensitive Receptor Location Plan



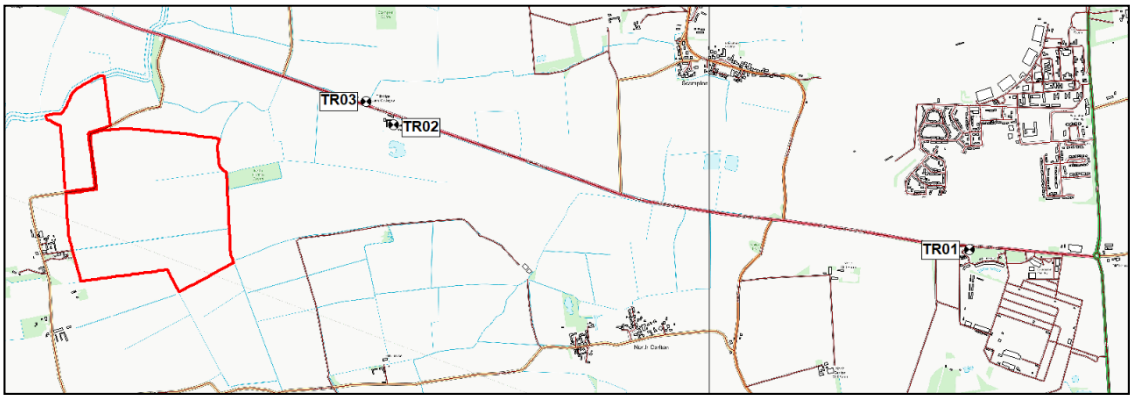
Not to scale

15.5.10 Table 15.14 below summarises the receptor locations that have been selected to represent worst-case residential receptors with relating to traffic noise on the surrounding road network. The locations of the receptors are shown in Figure 15.10.

Table 15.14 Receptor Locations (Construction Traffic Noise)

I.D.	Description	Height of Receptors (m)
TR01	30 Woodlands Edge	4.0
TR02	Till Bridge Lane House	4.0
TR03	Till Bridge Lane Cottage	4.0

Figure 15.6: Construction Traffic Noise Receptor Location Plan



Not to scale

West Burton 2 Noise Survey

15.5.11 The baseline noise environment has been established following a noise survey undertaken from Thursday 16th September 2021 to Tuesday 21st September 2021. Attended 15-minute short-term measurements were undertaken at three locations during the day, evening and night-time periods with two additional locations being measured unattended over a 116-hour period. Full details of the noise monitoring survey are presented within **Appendix 15.1 [EN010132/APP/WB6.3.15.1]**, and a brief summary is provided below. The locations of these measurements are presented in the figures below.

15.5.12 The dominant noise sources identified in the area are road traffic noise from Broxholme Lane, Cowdale Lane and Sturton Road, occasional passing rail, and aircraft.

15.5.13 Statistical analysis of the long-term measured data, to derive representative background noise levels for the daytime and night-time periods are shown in Figures 15.7 – 15.14 below.

Figure 15.7: Existing Daytime Background Noise Level – Statistical Analysis LT1

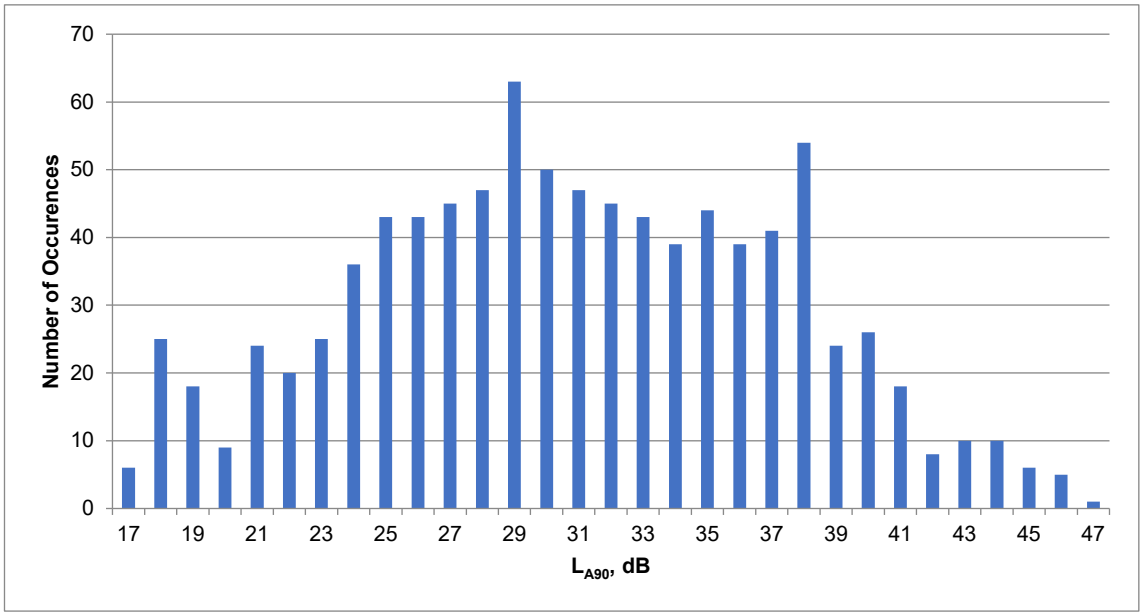


Figure 15.8: Existing Night-time Background Noise Level – Statistical Analysis LT1

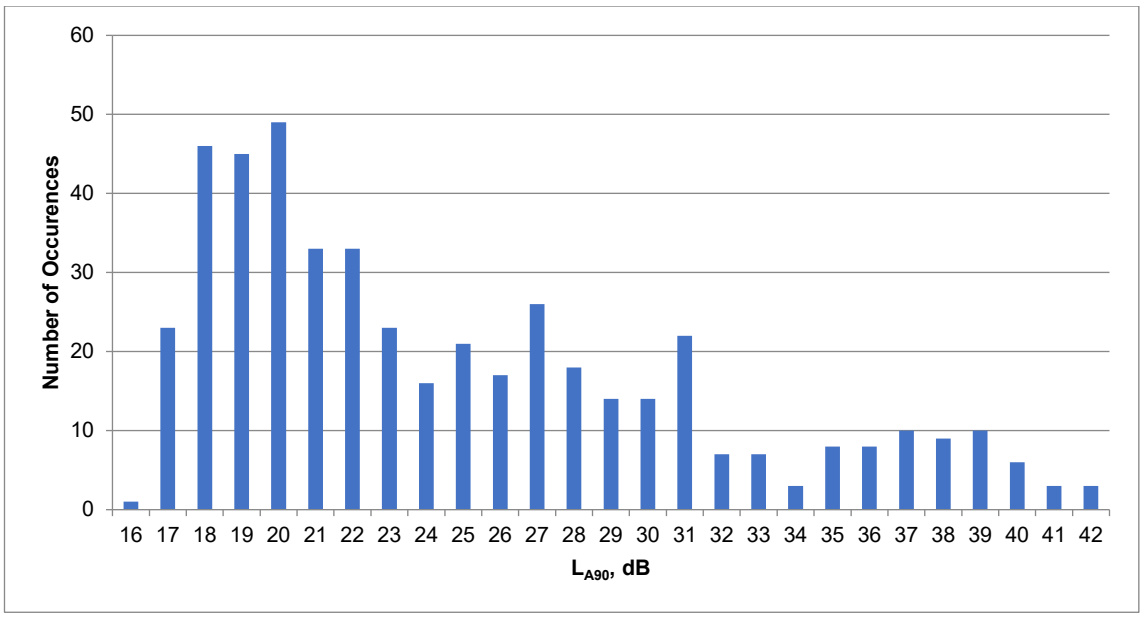


Figure 15.9: Existing Daytime Background Noise Level – Statistical Analysis LT2

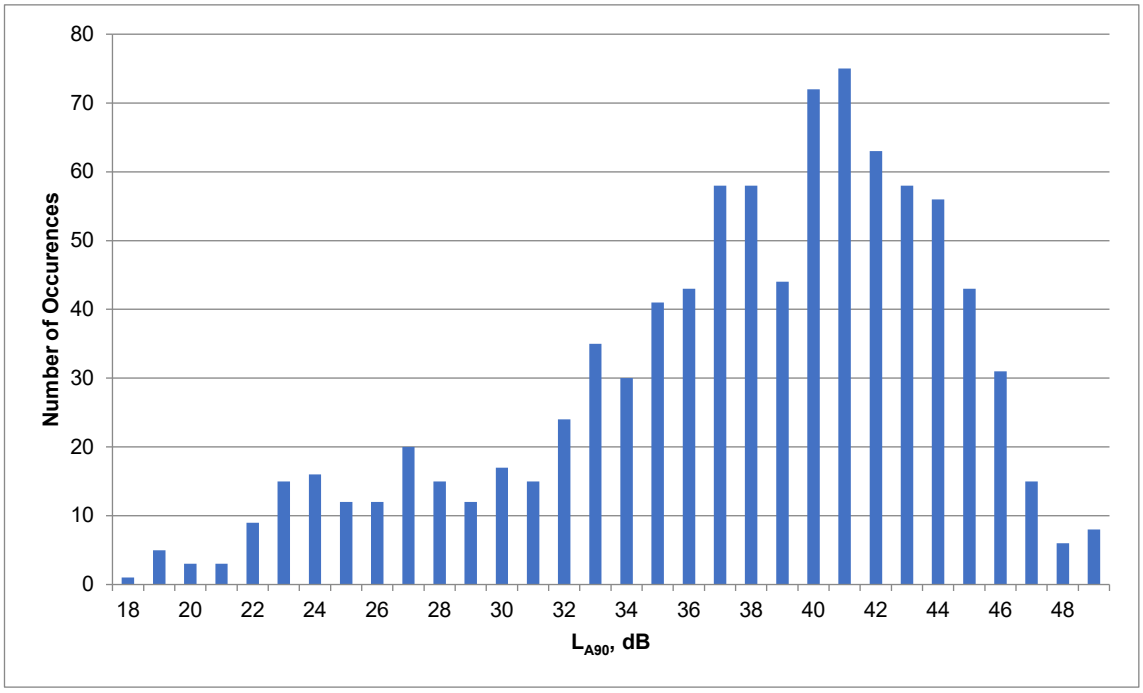


Figure 15.10: Existing Night-time Background Noise Level – Statistical Analysis LT2

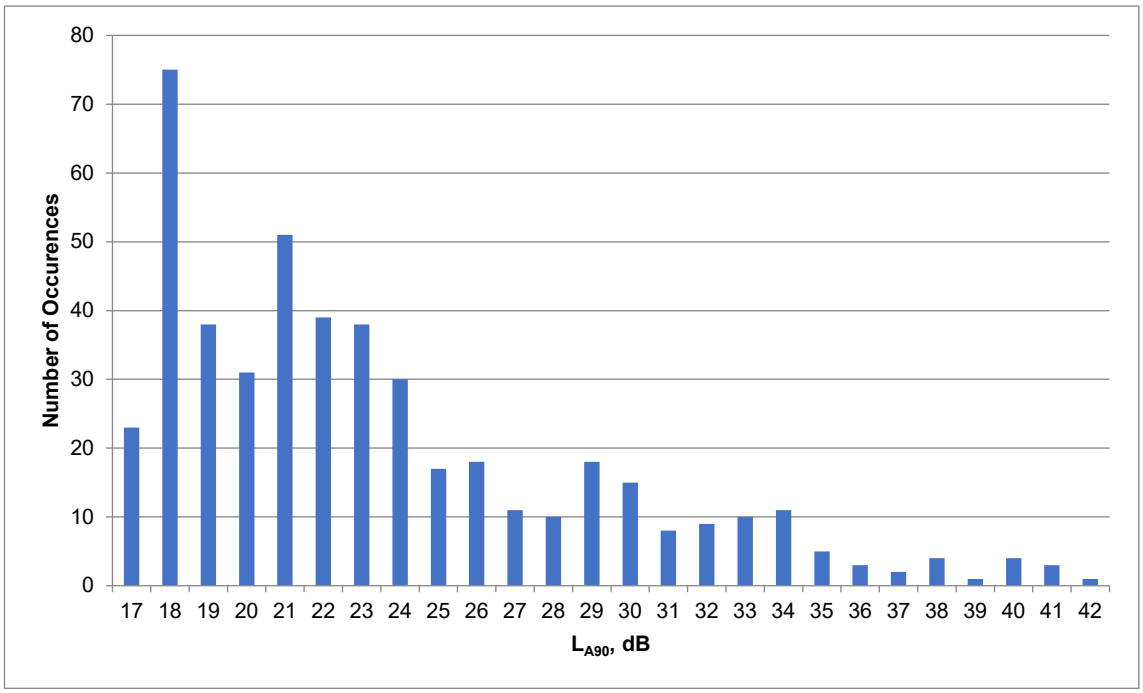


Figure 15.11: Existing Daytime Background Noise Level – Statistical Analysis LT3

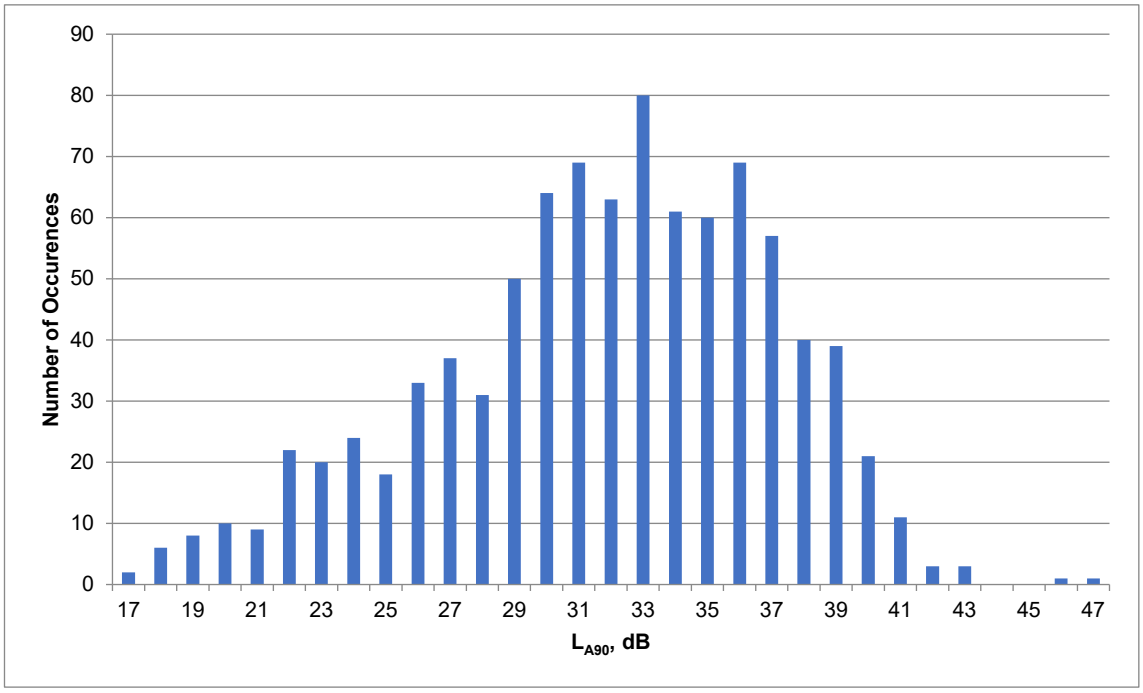


Figure 15.12: Existing Night-time Background Noise Level – Statistical Analysis LT3

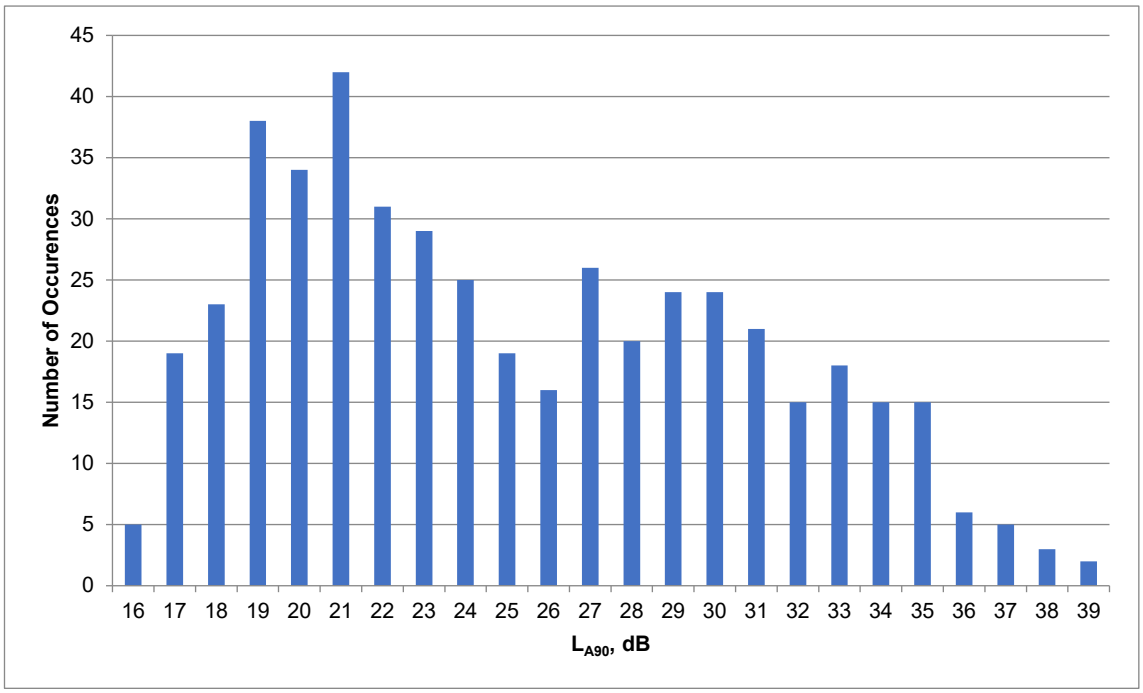


Figure 15.13: Existing Daytime Background Noise Level – Statistical Analysis LT4

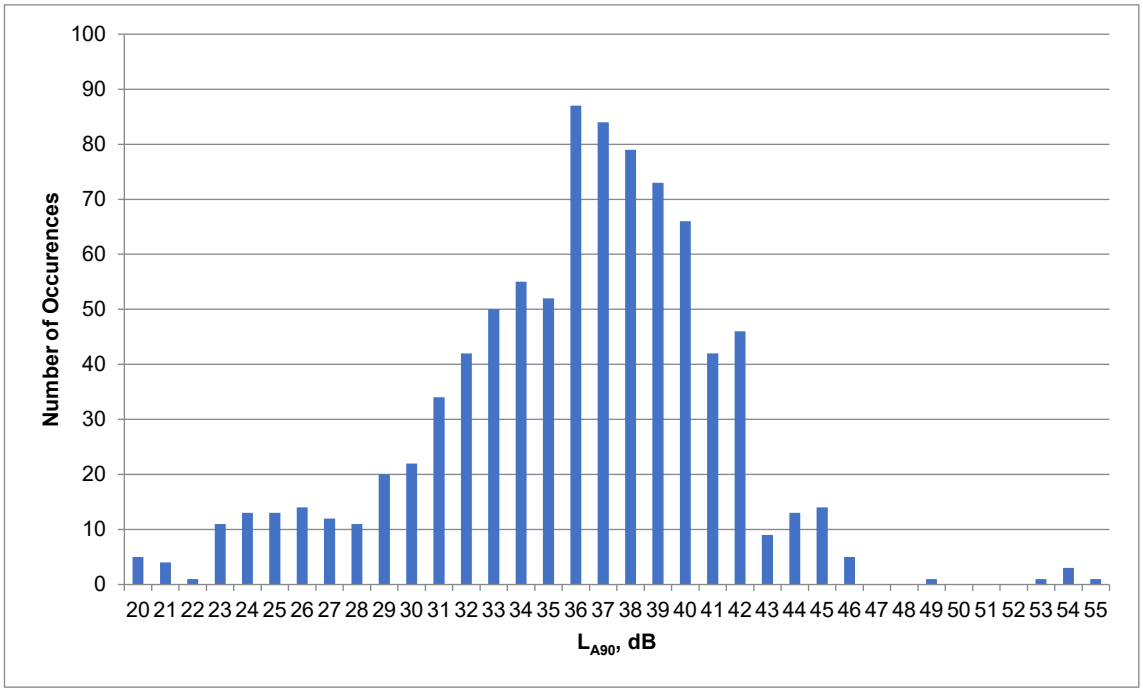
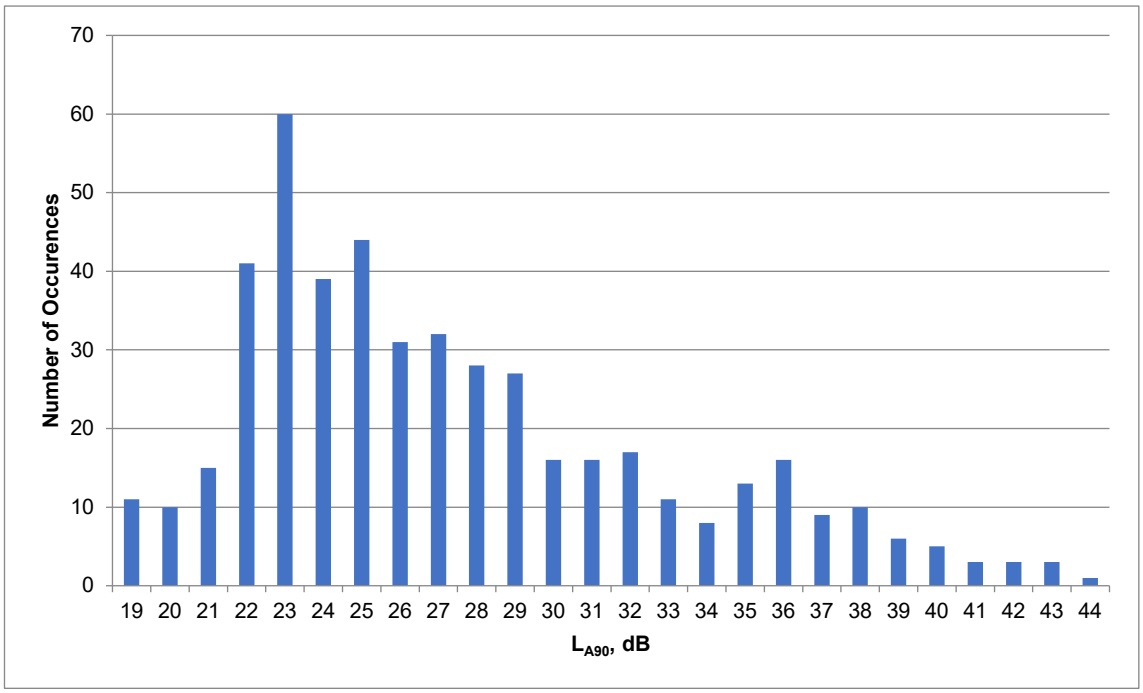


Figure 15.14: Existing Night-time Background Noise Level – Statistical Analysis LT4



Assessment Locations

15.5.14 Residential properties located closest to the Scheme infrastructure were identified using the Site layout, presented in **Figure 4.2 [EN010132/APP/WB6.4.4.2]**, and are

shown in Figure 15.14. These closest sensitive receptors are considered to be the most noise sensitive, as effects from the Scheme will be higher at these locations than at sensitive receptors located further from the Scheme.

15.5.15 Background sound levels measured at the properties listed in Table 15.15 are considered to be representative of the background noise environments at other properties in similar nearby locations. On this basis, should the predicted noise levels from the Scheme comply with limits at the assessed receptors, predicted noise levels at receptors further from the Scheme will also comply.

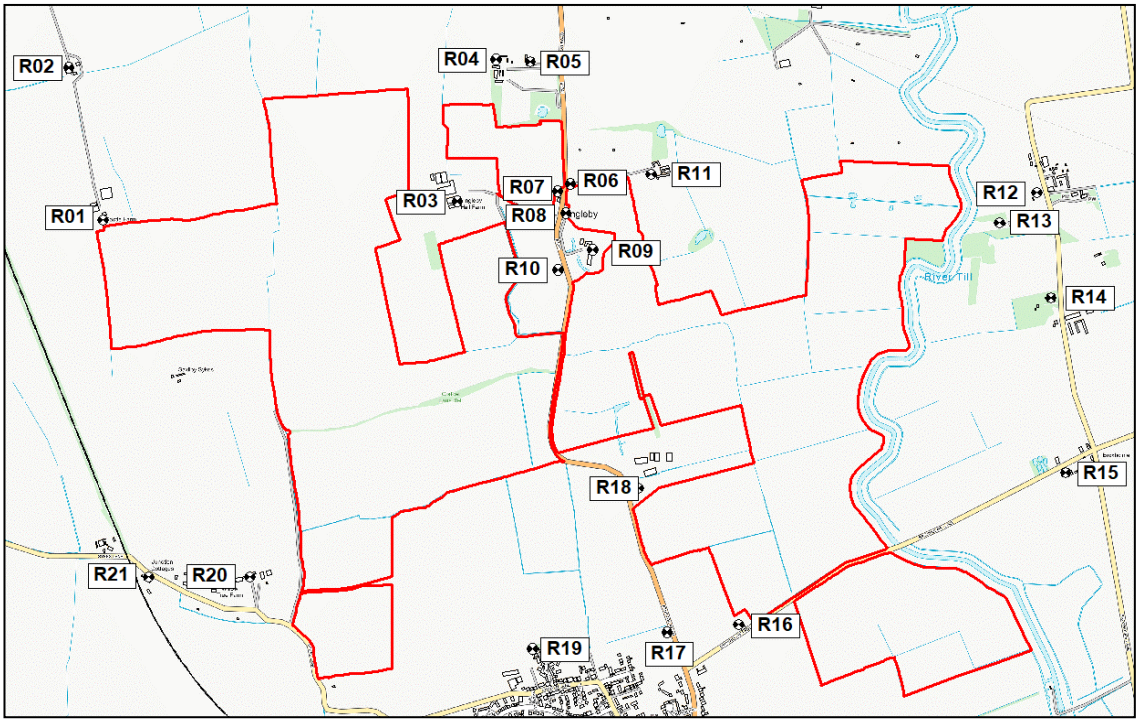
15.5.16 Assessment locations are identified in Figure 15.15 below.

Table 15.15 Noise Assessment Locations (Operational and Construction)

Ref	Description	Land Use Classification	Approximate Distance from Order Limits (m)	Height of Receptors (m)
R01	Castle Farm	Residential	20	1.5 / 4.0
R02	Aldhow Grange	Residential	600	1.5 / 4.0
R03	Ingleby Hall	Residential	120	1.5 / 4.0
R04	The Bungalow	Residential	160	1.5 / 4.0
R05	Ingleby Chase	Residential	230	1.5 / 4.0
R06	Willow Cottage	Residential	10	1.5 / 4.0
R07	1 Sturton Road	Residential	10	1.5 / 4.0
R08	2 Sturton Road	Residential	10	1.5 / 4.0
R09	Gables Manor	Residential	40	1.5 / 4.0
R10	Ingleby Hall Farm	Residential	70	1.5 / 4.0
R11	Ingleby Farm	Residential	80	1.5 / 4.0
R12	Grange Farm Cottage	Residential	300	1.5 / 4.0
R13	Carriers Farm	Residential	150	1.5 / 4.0
R14	Green Acres	Residential	500	1.5 4.0
R15	Newlands	Residential	690	1.5 / 4.0
R16	Bluebell Cottage	Residential	40	1.5 / 4.0
R17	Proposed Residential	Residential	260	1.5 / 4.0
R18	Ingleby Grange Cottages	Residential	45	1.5 / 4.0

R19	St. Botolphs Gate	Residential	540	1.5 / 4.0
R20	Sykes Farm	Residential	200	1.5 / 4.0
R21	Junction Cottages	Residential	560	1.5 / 4.0

Figure 15.15 Sensitive Receptor Location Plan



Not to scale

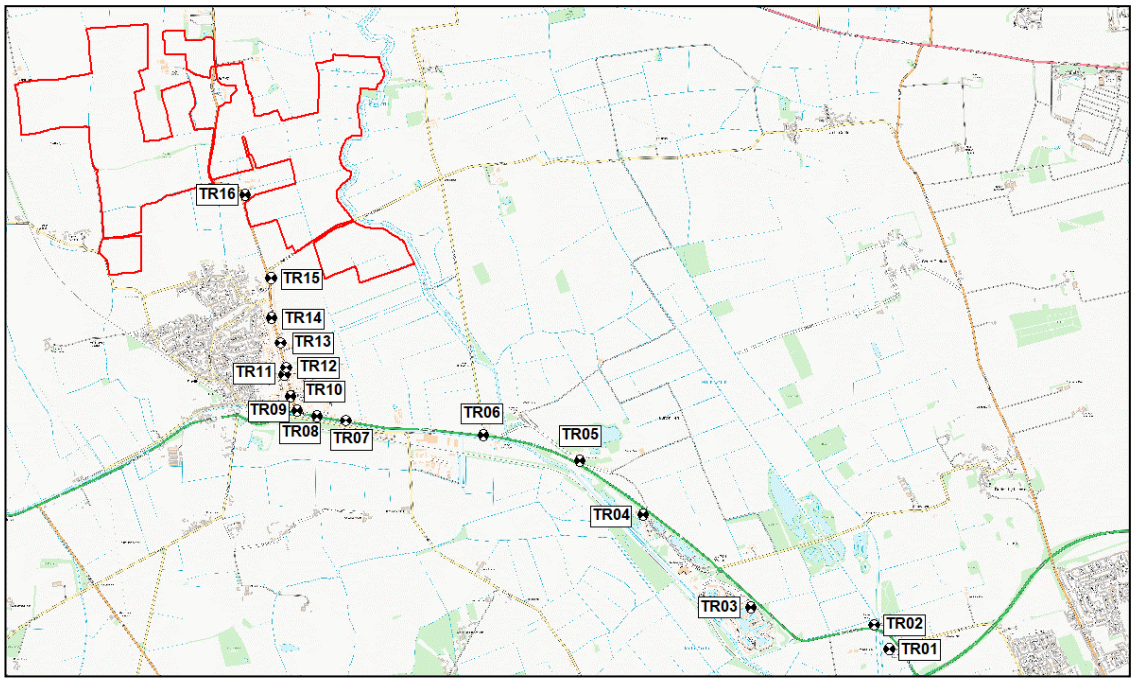
15.5.17 Table 15.16 below summarises the receptor locations that have been selected to represent worst-case residential receptors with relating to traffic noise on the surrounding road network. The locations of the receptors are shown in Figure 15.16.

Table 15.16 Receptor Locations (Construction Traffic Noise)

I.D.	Description	Height of Receptors (m)
TR01	Waves Farm	4.0
TR02	Easter Cottage	4.0
TR03	Burton Waters (south)	4.0
TR04	Burton Waters (north)	4.0
TR05	Romalyn	4.0

TR06	Odda Farm	4.0
TR07	27 Lincoln Road	4.0
TR08	7 Lincoln Road	4.0
TR09	1 Lincoln Road	4.0
TR10	14 Mill Lane	4.0
TR11	42 Mill Lane	4.0
TR12	49 Mill Lane	4.0
TR13	79 Mill Lane	4.0
TR14	112 Mill Lane	4.0
TR15	12 Sturton Road	4.0
TR16	Ingleby Grange Cottages	4.0

Figure 15.16: Construction Traffic Noise Receptor Location Plan



Not to scale

West Burton 3 Noise Survey

15.5.18 The baseline noise environment has been established following a noise survey undertaken from Thursday 16th September 2021 to Wednesday 17th November 2021. Attended 15-minute short-term measurements were undertaken at four locations during the day, evening and night-time periods with two additional

locations being measured unattended over a 117-hour period. Full details of the noise monitoring survey are presented within **Appendix 15.1 [EN010132/APP/WB6.3.15.1]**, and a brief summary is provided below.

15.5.19 The ambient noise climate was dominated by road traffic noise throughout the day, evening and night-time measurements. The main sources of noise were road traffic on Station Road, High Street, Slow Park Lane and Till Bridge Lane, occasional passing rail, and aircraft.

15.5.20 Statistical analysis of the long-term measured data, to derive representative background noise levels for the daytime and night-time periods, is shown in Figures 15.17 – 15.24 below.

Figure 15.17: Existing Daytime Background Noise Level – Statistical Analysis LT1

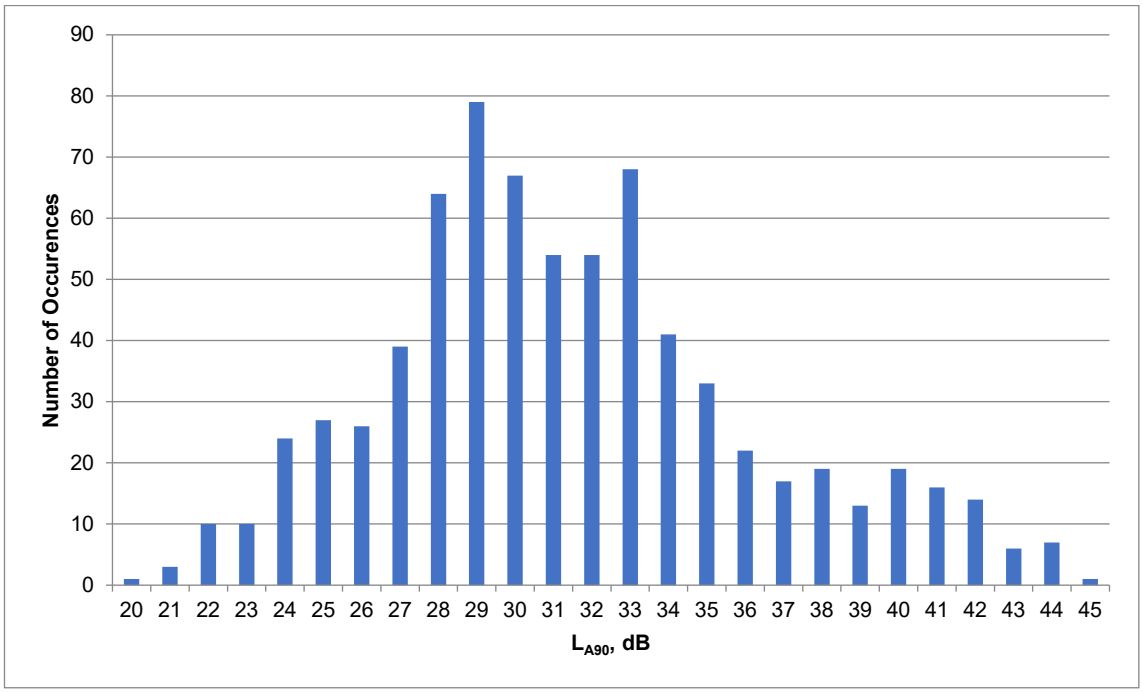


Figure 15.18: Existing Night-time Background Noise Level – Statistical Analysis LT1

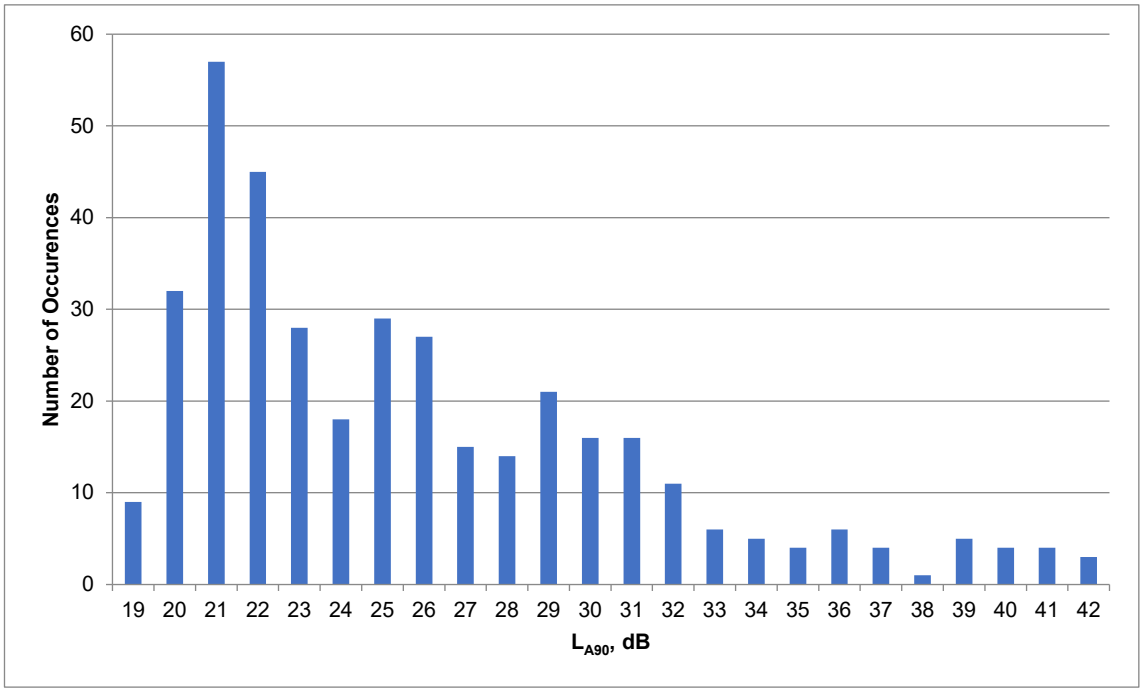


Figure 15.19: Existing Daytime Background Noise Level – Statistical Analysis LT2

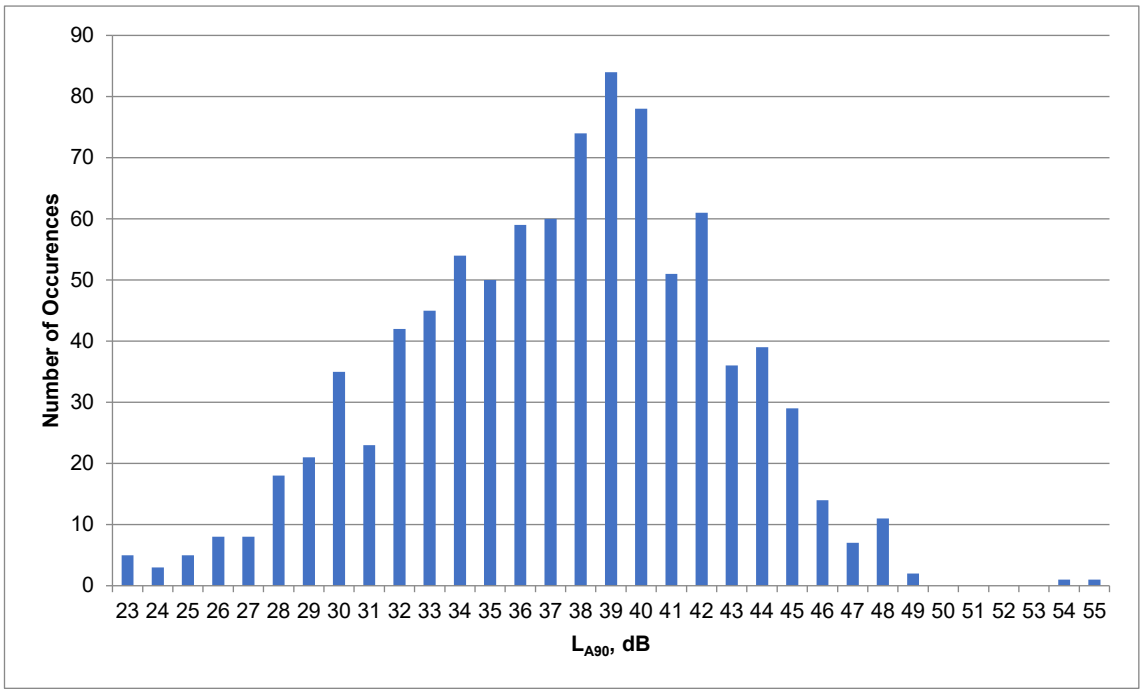


Figure 15.20: Existing Night-time Background Noise Level – Statistical Analysis LT2

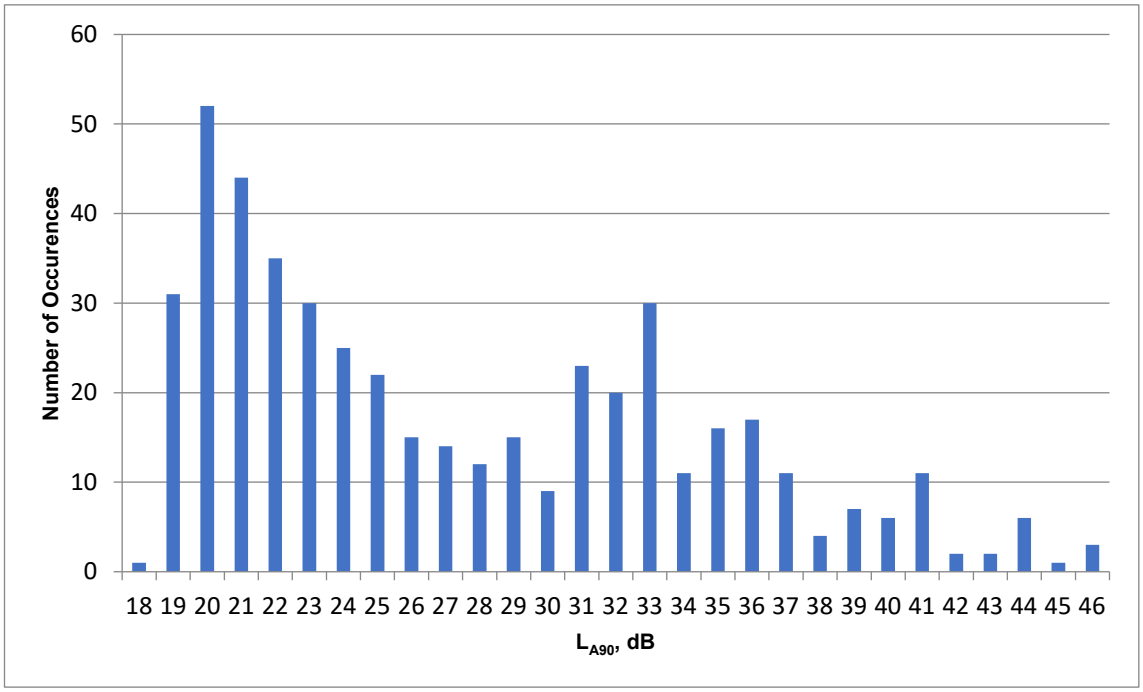


Figure 15.21: Existing Daytime Background Noise Level – Statistical Analysis LT3

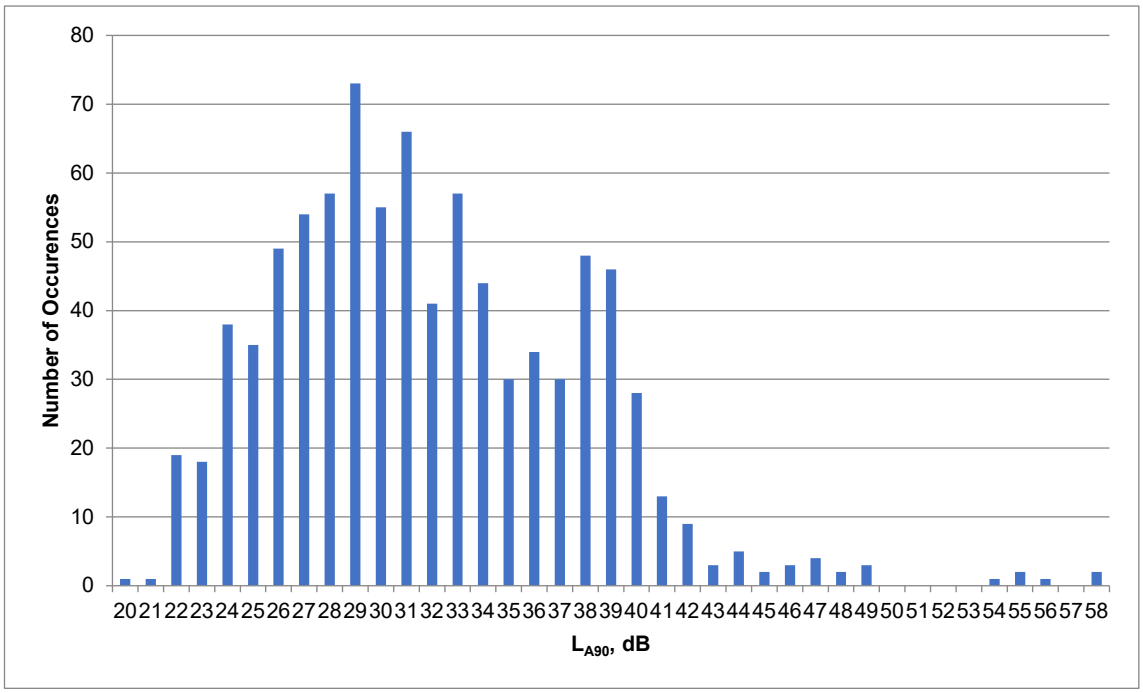


Figure 15.22: Existing Night-time Background Noise Level – Statistical Analysis LT3

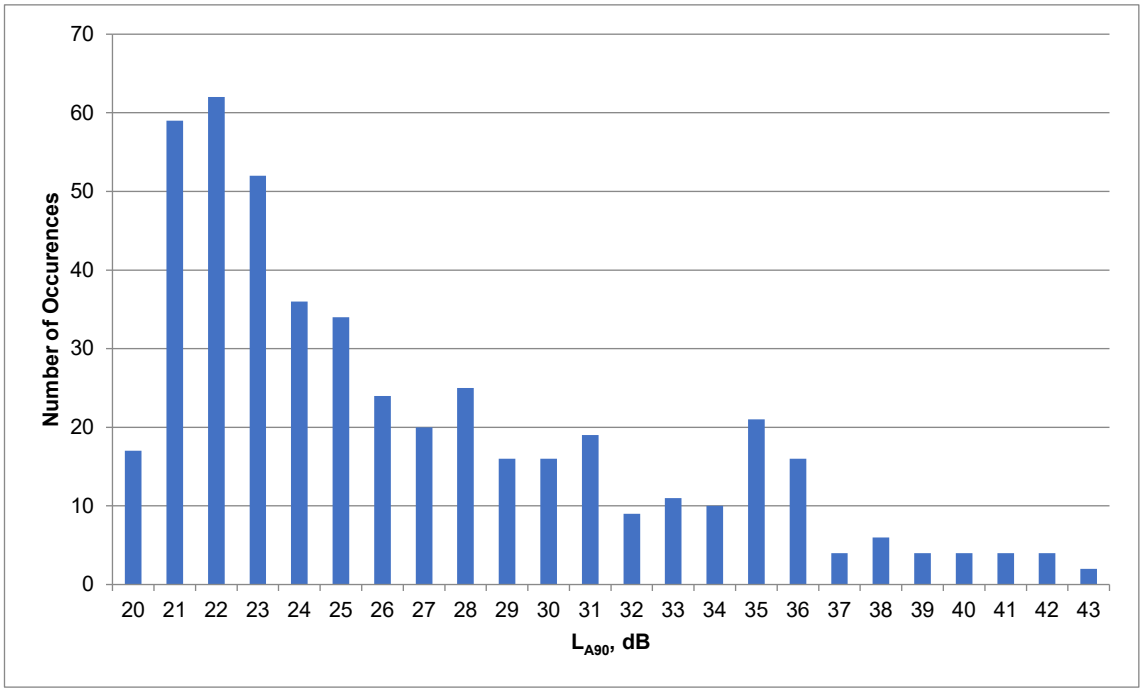


Figure 15.23: Existing Daytime Background Noise Level – Statistical Analysis LT4

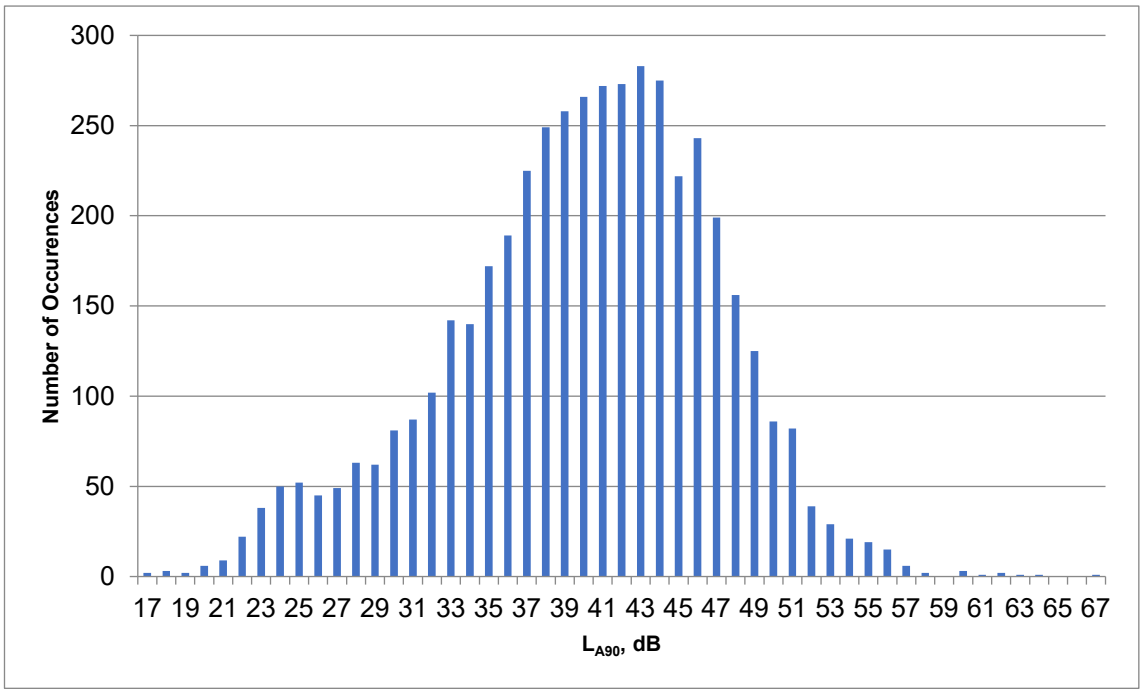
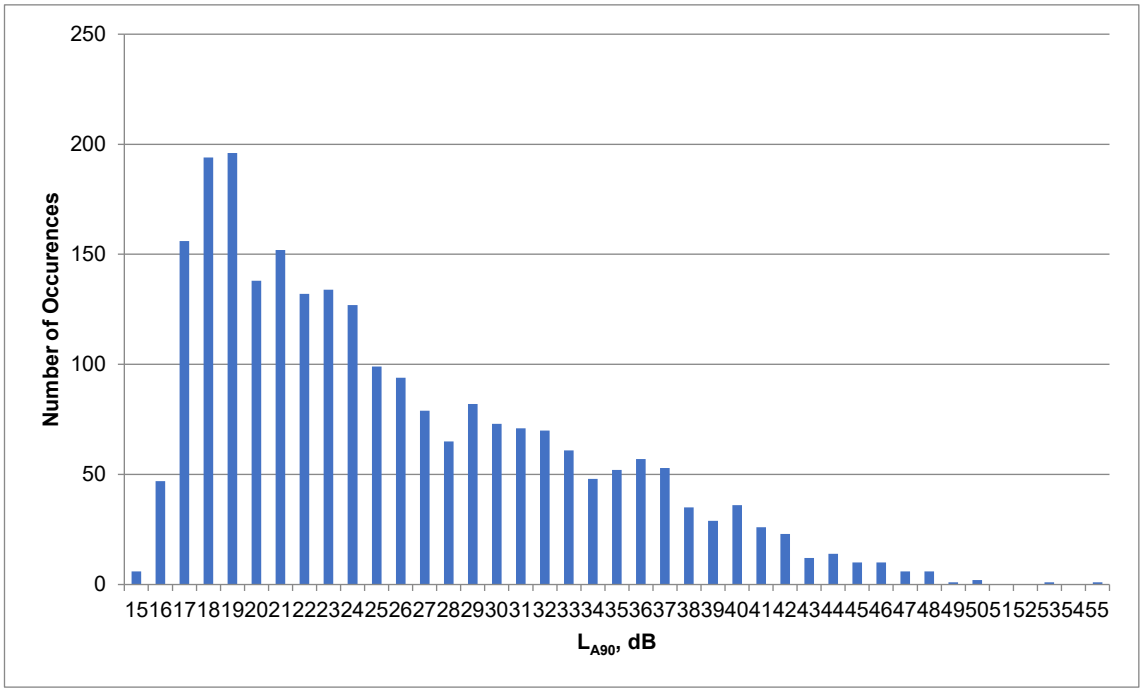


Figure 15.24: Existing Night-time Background Noise Level – Statistical Analysis LT4



Assessment Locations

15.5.21 Residential properties located closest to the Scheme infrastructure were identified using the Site layout, presented in **Appendix 4.3 [EN010132/APP/WB6.4.4.3]**, and are shown in Figure 15.25. These closest sensitive receptors are considered to be the most noise sensitive, as effects from the Scheme will be higher at these locations than at sensitive receptors located further from the Scheme.

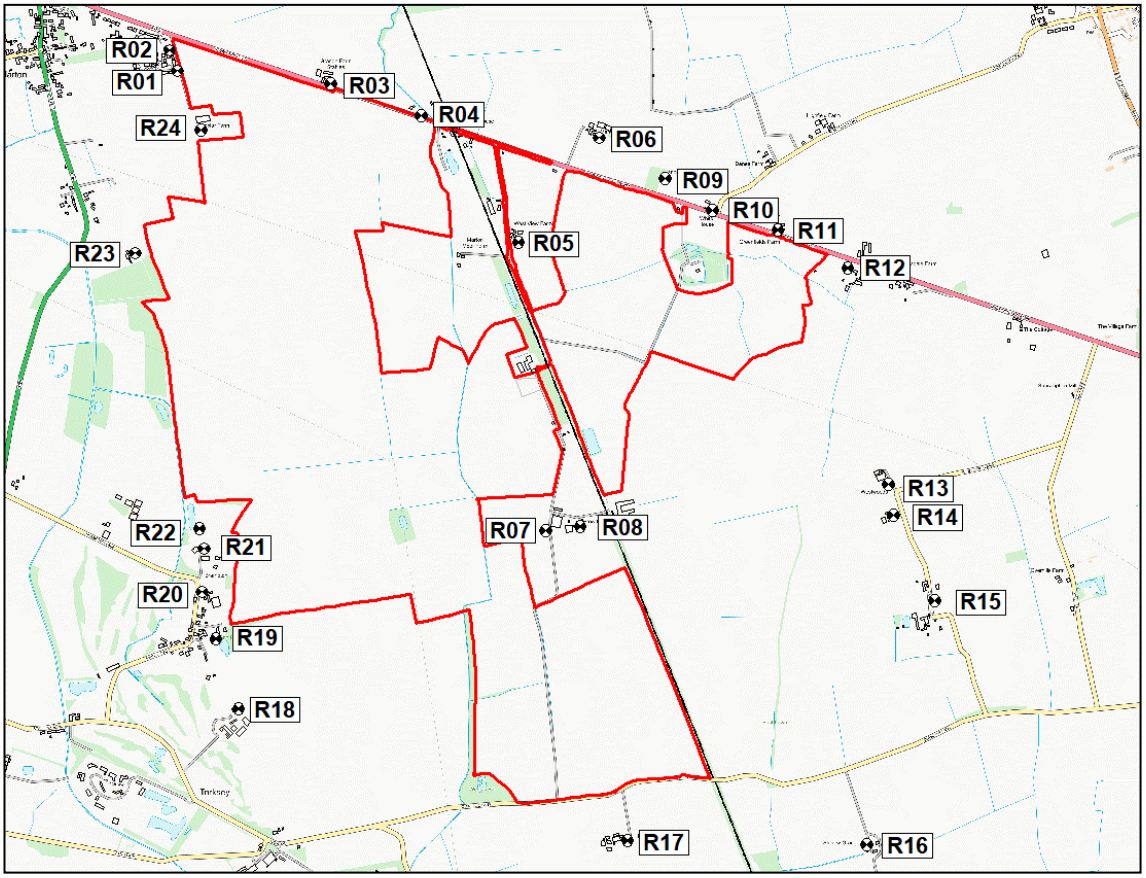
15.5.22 Background sound levels measured at the properties listed in Table 15.17 are considered to be representative of the background noise environments at other properties in similar nearby locations. On this basis, should the predicted noise levels from the Scheme comply with limits at the assessed receptors, predicted noise levels at receptors further from the Scheme will also comply.

Table 15.17 Noise Assessment Locations (Operational and Construction)

Ref	Description	Land Use Classification	Approximate Distance from Order Limits (m)	Height of Receptors (m)
R01	10 Spafford Close	Residential	10	1.5 / 4.0
R02	Adams Way	Residential	20	1.5 / 4.0
R03	Marton Grange	Residential	25	1.5 / 4.0
R04	South View	Residential	25	1.5 / 4.0
R05	West View Farm	Residential	130	1.5 / 4.0

R06	Manor Farm	Residential	150	1.5 / 4.0
R07	Stow Park	Residential	100	1.5 / 4.0
R08	Stow Park	Residential	150	1.5 / 4.0
R09	Ashcroft	Residential	80	1.5 / 4.0
R10	White House	Residential	20	1.5 / 4.0
R11	Greenfields Farm	Residential	20	1.5 / 4.0
R12	Plumpton House	Residential	40	1.5 / 4.0
R13	Little Westwoods	Residential	760	1.5 / 4.0
R14	West wood Farm	Residential	1,100	1.5 / 4.0
R15	Mill View	Residential	1,100	1.5 / 4.0
R16	Aldhow Grange	Residential	700	1.5 / 4.0
R17	High Wood Farm	Residential	200	1.5 / 4.0
R18	Grange Bungalow	Residential	350	1.5 / 4.0
R19	Granary House	Residential	90	1.5 / 4.0
R20	Manor Farm	Residential	125	1.5 / 4.0
R21	Bellwood Grange Farm	Residential	130	1.5 / 4.0
R22	Bellwood Grange Farm	Residential	130	1.5 / 4.0
R23	Brampton Grange	Residential	60	1.5 / 4.0
R24	Poplar Farm	Residential	40	1.5 / 4.0

Figure 15.25 Sensitive Receptor Location Plan



Not to scale

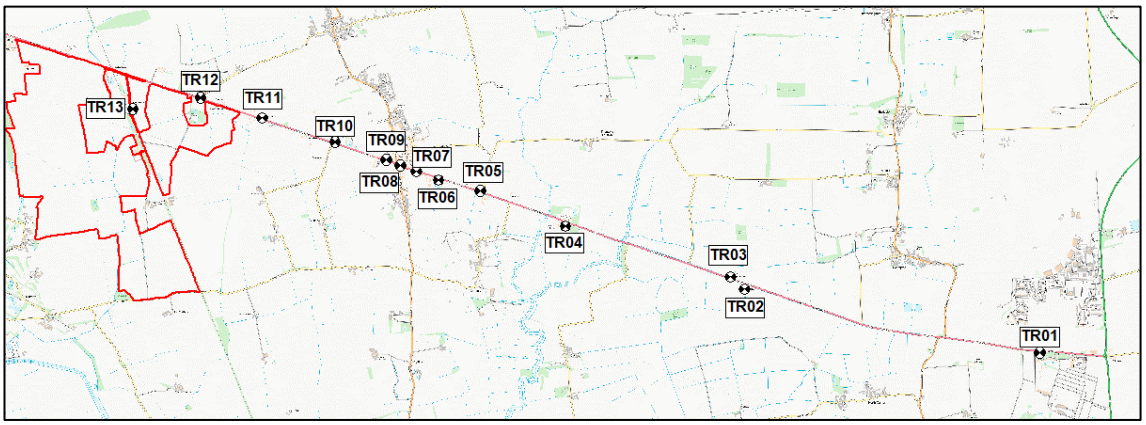
15.5.23 Table 15.18 below summarises the receptor locations that have been selected to represent worst-case residential receptors with relating to traffic noise on the surrounding road network. The locations of the receptors are shown in Figure 15.16.

Table 15.18 Receptor Locations (Construction Traffic Noise)

I.D.	Description	Height of Receptors (m)
TR01	30 Woodlands Edge	4.0
TR02	Till Bridge Lane House	4.0
TR03	Till Bridge Lane Cottage	4.0
TR04	Till Bridge Farm	4.0
TR05	Aunsby House	4.0
TR06	Tillbridge Lodge	4.0
TR07	14 Tillbridge Road	4.0
TR08	The Old Chapel	4.0

TR09	1 Stretton Close	4.0
TR10	Stretton House	4.0
TR11	Gallowsdale Farm	4.0
TR12	White House	4.0
TR13	West View Farm	4.0

Figure 15.26: Construction Traffic Noise Receptor Location Plan

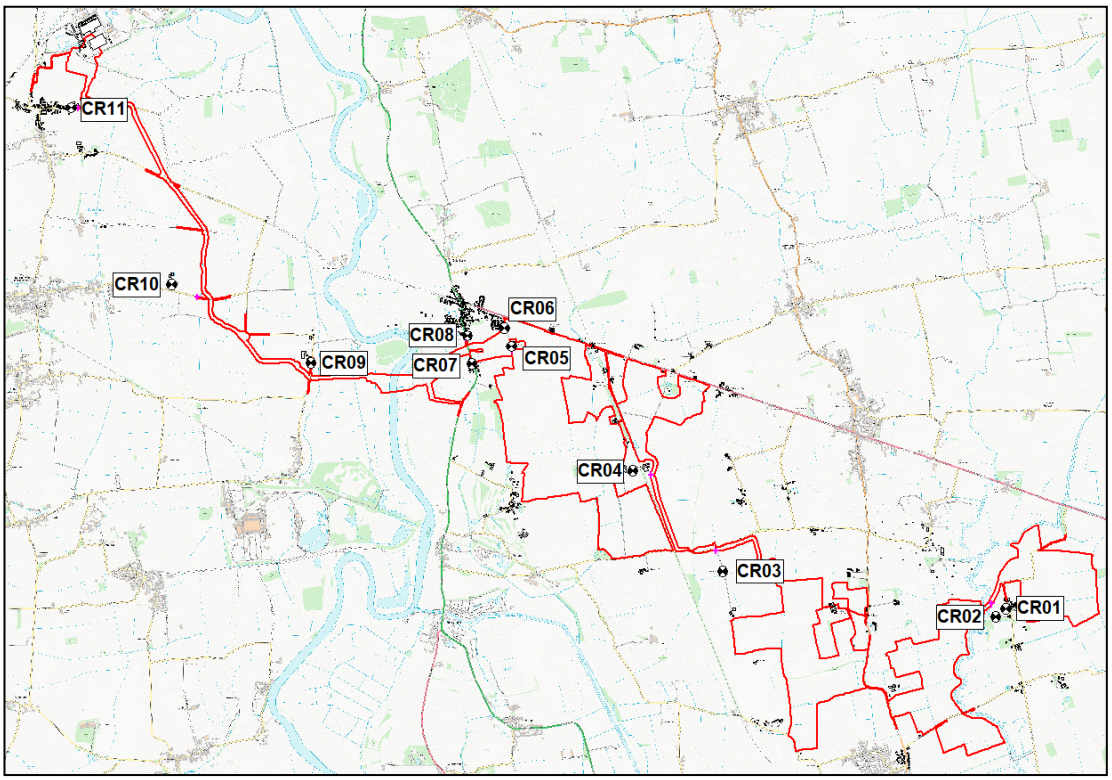


Not to scale

Cable Route Corridor

15.5.24 Figure 15.27 below shows the Order Limits for the whole Scheme including the Cable Route Corridor.

Figure 15.27: Overall Scheme Including the Cable Route Corridor



Not to scale

Assessment Locations

15.5.25 Residential properties located closest to the Cable Route Corridor were identified using the site layout Figures within the ES **[EN010132/APP/WB6.4.4.1 – 6.4.4.4]** , and the **Location Plan [EN010132/APP/WB2.1]** which defines the Order Limits. These closest sensitive receptors are considered to be the most noise sensitive, as effects from the Scheme will be higher at these locations than at sensitive receptors located further from the Scheme.

15.5.26 Assessment locations are identified in Figure 15.24.

Table 15.19: Noise Assessment Locations (Operational and Construction)

Ref	Description	Height of Receptors (m)
CR01	Pingles	1.5
CR02	Carriers Farm	1.5
CR03	Aldhow Grange	1.5

CR04	Stow Park	1.5
CR05	Poplar Farm	1.5
CR06	10 Spafford Close	1.5
CR07	66 High Street	1.5
CR08	The Hawthorns	1.5
CR09	Marlyn House	1.5
CR10	Field House Farm	1.5
CR11	North Street Farm	1.5

15.6 Embedded Design Mitigation

15.6.1 The way that potential environmental impacts have been or will be prevented, avoided or mitigated to reduce impacts to a minimum through design and/or management of the Scheme is outlined in this section and has been taken into account as part of the assessment of the potential effects. Most of the equipment and activities utilised during construction and decommissioning will be the same and therefore noise emissions during these processes are expected to be similar. Proposed environmental enhancements are also described where relevant. The mitigation measures for both the construction/decommissioning and operational phases, are outlined below.

Construction Noise and Vibration

15.6.2 Measures to control noise as defined in Annex B of BS 5228-1 and measures to control vibration as defined in Section 8 of BS 5228-2 will be adopted where reasonably practicable. These measures represent BPM and are included within the **Outline Construction Environmental Management Plan (CEMP) [EN010132/APP/WB7.1]** submitted with the application.

15.6.3 Examples of BPM that 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;
- Appropriate routing of construction traffic on public roads and along access tracks;
- 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;

- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications; and
- During noisy activities, localised screening of noise generating sources, such as temporary site hoarding will be implemented to minimise any potential impacts on nearby noise sensitive receptors.

15.6.4 Working hours onsite are likely to be Monday to Friday 07:00 – 18:00 and between 08:00 and 13:30 on Saturdays. However, some activities may be required outside of these times (such as the delivery of abnormal loads, night-time working for cable construction works in public highways or horizontal directional drilling activities). No noisy operations will take place during mobilisation/shut down, this being 1 hour before and after working hours.

15.6.5 A construction noise monitoring scheme will be developed and agreed with appropriate stakeholders following appointment of a principal contractor and prior to commencement of construction works through the CEMP, and as part of the discharge of a requirement included in the DCO (and as part of any Section 61 consent application under the Control of Pollution Act 1974, if applicable). The principles of the noise monitoring regime are set out in the Outline CEMP accompanying the DCO application. Requirements for monitoring during the decommissioning stages will be set out and agreed through the Decommissioning Environmental Management Plan which will be secured through a requirement in the DCO (an **Outline Decommissioning Statement [EN010132/APP/WB7.2]** is submitted with the DCO application). The noise monitoring scheme is expected to be similar to that for the construction phase.

15.6.6 Consideration will also be given to traffic routing, timing and access points to the Site and Cable Route Corridor to minimise noise impacts at existing receptors as detailed construction working methods are developed. Management of Heavy Goods Vehicles (HGV) within the DCO Site and being let onto the highway network will be managed through a Construction Traffic Management Plan (CTMP). The requirement for the CTMP will be secured through a 'Requirement' in the DCO, linked to the **Outline Construction Traffic Management Plan [EN010132/APP/WB6.3.14.2]** submitted as part of the Application.

15.6.7 Exceedances of the SOAEL are unlikely to take place due to the fact that BPM will be adopted and secured through the CEMP. For example, the use of temporary acoustic barriers can provide approximately 10 dB of noise attenuation which can reduce noise levels to below the SOAEL.

Operational Phase

15.6.8 Preliminary assessment of operational noise was undertaken based on worst-case assessment criteria, for example, all plant noise sources operating simultaneously at maximum capacity, 24 hours a day. The results of these assessments have been used to inform the design of development layouts, as follows:

- Where possible, the distance from the nearest residential receptors to the substation and energy storage facility and onsite transformers and inverters has been maximised.
- Where required, manufacturer-supplied noise mitigation will be installed.
- Where required, noise generating equipment will be enclosed / containerised.

15.6.9 Embedded mitigation measures for the Sites and the Cable Route Corridor are presented below.

Embedded Mitigation – West Burton 1

15.6.10 Following assessment, no further embedded mitigation has been included for West Burton 1.

Embedded Mitigation – West Burton 2

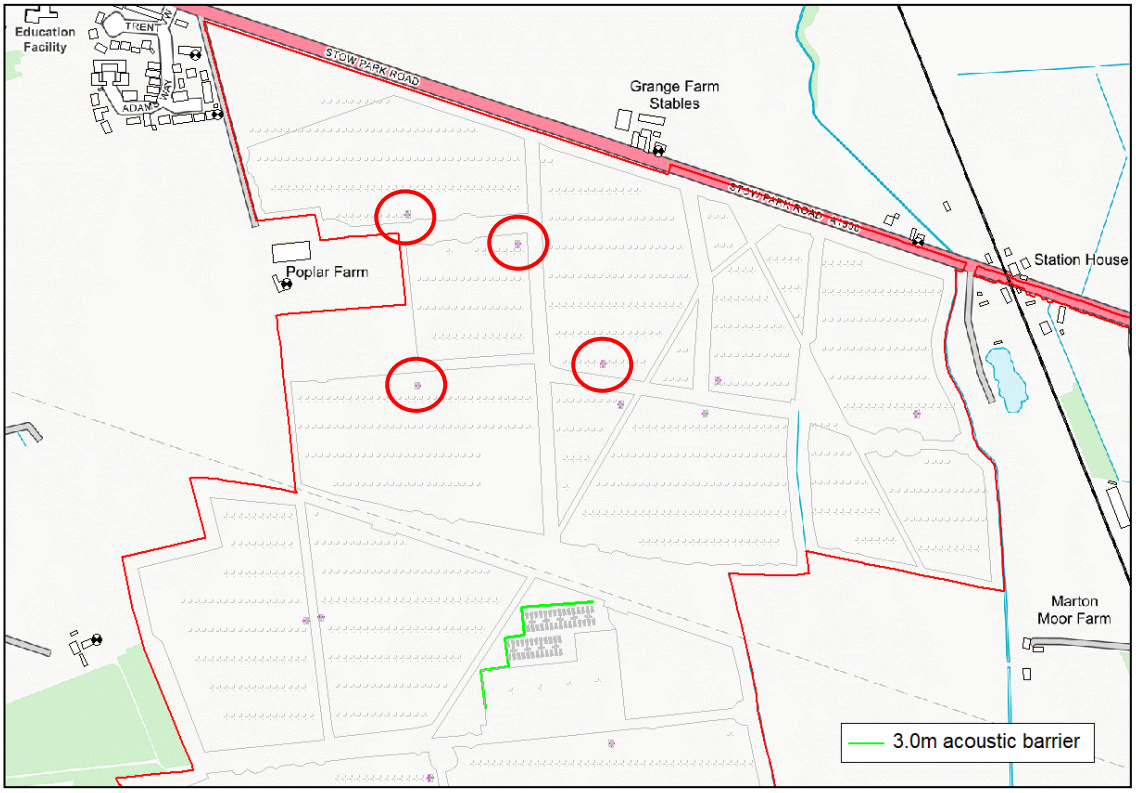
15.6.11 Following assessment, no further embedded mitigation has been included for West Burton 2.

Embedded Mitigation – West Burton 3

15.6.12 A 3.0m high acoustic barrier has been included as part of the design within the Site at the location presented in green in Figure 15.28 below. Acoustic barriers will be of a close boarded construction with a minimum mass per square metre of 10 kg/m^2.

15.6.13 Acoustic louvres providing noise reduction of at least 10 dB will be used for the Conversion Units circled in red.

Figure 15.28: West Burton 3 – Mitigation



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Embedded Mitigation – Cable Route Corridor

15.6.14 Following assessment, no further embedded mitigation has been included for the Cable Route Corridor.

15.6.15 Application of the above embedded mitigation measures will ensure that operational noise and vibration effects are minimised as far as reasonably practicable.

15.7 Identification and Evaluation of Key Effects

Construction Noise

15.7.1 Assessments have been undertaken to provide an indication of the likely noise levels based on typical construction activities and equipment that will be used for the Scheme.

15.7.2 As a worst-case and at the closest distance to the nearest sensitive receptors, the following main noise-generating activities have been assessed, although this does not cover all activities that could take place (e.g. works involving other static or moving plant items that will produce lower levels of noise):

- Site preparation, which will likely include the use of excavators and dozers;

- Installation of solar PV panels, which will likely include the use of piling rigs and excavators; and
- Trenching and installation of the Cable Route Corridor, which will likely include the use of excavators and dozers.

15.7.3 Information regarding noise emissions from equipment used during the construction phase has been obtained from Annex C of BS 5228-1-2009 '*Code of practice for noise and vibration control on construction and open sites – Part 1:Noise*'.

15.7.4 This data has been obtained by field measurements for items of plant in actual use on construction and open sites in the UK. Levels quoted in the database are based on an average (logarithmic) of measured sound levels, and where appropriate have been derived from more than one model of similarly sized plant. The results are presented as un-weighted octave band activity L_{eq} levels, and overall A-weighted activity L_{eq} levels in dB. All sound pressure levels are standardized to 10 metres from the plant.

15.7.5 The items of plant and associated noise levels shown in Table 15.20 below has been used for the purposes of this assessment and consider the range of typical activities likely to be employed during the construction phase of the Scheme. For the purposes of the assessment, Items of mobile plant have been positioned in the areas on the Order limits that are close to existing residential dwellings.

Table 15.20 Mobile Plant Construction Phase

Mobile Plant	BS 5228-1:2009 Annex C Ref.	Octave Band Centre Frequency (Hz)								Sound Power Level SWL [dB(A)]
		63	125	250	500	1K	2K	4K	8K	
Hardstanding and Tracks										
Tracked Excavator	Table C.2 No.21	103	104	100	96	93	91	85	77	99
Dump Truck	Table C.2 No.30	113	102	106	101	101	102	95	91	107
Vibratory Roller	Table C.5 No.20	118	110	101	100	98	93	87	82	103
Active Piling										
Telescopic Handler	Table C.4 No.54	107	101	94	93	106	94	82	75	107
Piler	Table C.3 No.17	115	105	100	101	99	97	93	85	104

Electrical Compound Installation										
Telescopic Handler	Table C.4 No.54	107	101	94	93	106	94	82	75	107
Tracked Mobile Crane	Table C.4 No.50	96	99	96	90	94	94	83	74	99

15.7.6 Noise levels from potential construction activity associated with the development of the site have been assessed in accordance with BS 5228 criteria which indicates if a significant effect is likely to occur at noise sensitive properties.

15.7.7 This assessment has been undertaken in order to establish the maximum external noise levels at neighbouring properties for the proposed construction activity of the site and whether typical plant and activities will be within these levels. In order to present a worst-case assessment, the model considers that all sources will be operating together with an on-time of 100%.

Cable Route Corridor

15.7.8 The items of plant and associated noise levels are presented in Table 15.21. For the purposes of the assessment, Items of plant have been positioned in the areas on the route that are close to the nearest existing residential receptors.

Table 15.21 Mobile Plant Construction Phase – Cable Route Corridor

General Activity	Specific Activity	Equipment	Sound Power Level (L_w)	BS 5228-1 Ref.	No. of Items	% on-time
Excavation and duct installation and road re-surfacing along roads	Breaking road surface	Hand-held circular saw (petrol)	115	C.5-36	1	5%
	Breaking road surface	Mini excavator with hydraulic breaker	111	C.5-2	1	10%
	Breaking road surface	Road breaker (hand-held pneumatic)	110	C.5-3	1	10%
	Trenching	Mini tracked excavator	93	C.4-68	1	10%
	Backfilling	Diesel generator	84	C.4-82	1	100%
	Backfilling	Dump Truck	107	C.2-30	1	20%

General Activity	Specific Activity	Equipment	Sound Power Level (L_w)	BS 5228-1 Ref.	No. of Items	% on-time
	Backfilling	Vibratory Roller	95	C.5-27	1	10%
Excavation and duct installation open ground	Trenching	Mini tracked excavator	93	C.4-68	1	10%
	Trenching	Dump Truck (idling)	84	C.4-24	1	40%
	Backfilling	Dump Truck	107	C.2-35	1	20

15.7.9 The assessment of construction noise for each scheme is presented below.

Assessment of Construction Noise - West Burton 1

15.7.10 As detailed in Table 15.3.1 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**, the predicted noise levels are below the daytime construction noise criteria of 65 dB L_{Aeq} at all sensitive receptors.

15.7.11 The predictions of noise have been based on the closest distance to each construction activity. In practice, construction will only occur at the closest point to each receiver for a short period of time before moving further away, with an associated reduction in noise levels.

15.7.12 The effect of construction noise on nearby sensitive receptors is assessed as **negligible**. Receptor sensitivity is high, given that each receptor identified is residential and therefore the magnitude of change is **moderate/minor** and not significant for the purposes of the EIA Regulations.

Assessment of Construction Noise - West Burton 2

15.7.13 As detailed in Table 15.3.2 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**, the predicted noise levels are below the daytime construction noise criteria of 65 dB L_{Aeq} at all sensitive receptors.

15.7.14 The predictions of noise have been based on the closest distance to each construction activity. In practice, construction will only occur at the closest point to each receiver for a short period of time before moving further away, with an associated reduction in noise levels.

15.7.15 The effect of construction noise on nearby sensitive receptors is assessed as **negligible**, receptor sensitivity is high and therefore the magnitude of change is **moderate/minor** and not significant for the purposes of EIA Regulations.

Assessment of Construction Noise - West Burton 3

15.7.16 As detailed in Table 15.3.3 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**, the predicted noise levels are below the daytime construction noise criteria of 65 dB L_{Aeq} at all sensitive receptors.

15.7.17 The predictions of noise have been based on the closest distance to each construction activity. In practice, construction will only occur at the closest point to each receiver for a short period of time before moving further away, with an associated reduction in noise levels.

15.7.18 The effect of construction noise on nearby sensitive receptors is assessed as **negligible**, receptor sensitivity is high and therefore the magnitude of change is **moderate/minor** and not significant for the purposes of the EIA Regulations.

Assessment of Construction Noise West Burton - Cable Route Corridor

15.7.19 As detailed in Table 15.3.4 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**, the predicted noise levels are below the daytime construction noise criteria of 65 dB L_{Aeq} at all sensitive receptors, with the exception of CR07, CR08 and CR09. The magnitude of impact is assessed as major and therefore the magnitude of change is **major**. However, when determining the magnitude of effect for construction noise it is necessary to consider the duration of the construction activities.

15.7.20 Given that construction activities for the Cable Route Corridor are transient, it is considered unlikely that a major impact would be experienced for any prolonged duration due to the temporary nature of construction operations. In addition, BPM will be implemented as described in Paragraph 15.6.3.

Construction Vibration

15.7.21 It is considered that any periods of construction vibration experienced at each separate receptor would unlikely exceed one month, with no permanent residual effect once works are completed. As such, any construction vibration effects are considered to be short-term in duration.

15.7.22 The assessment of the effect of construction vibration for each scheme is presented below.

Assessment of Construction Vibration – West Burton 1

15.7.23 As explained in section 15.4, potential levels of vibration from vibratory piling have been estimated using the formulae presented in BS 5228 and the distances to nearest sections of piling activities.

15.7.24 Table 15.3.5 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** presents the predicted Peak Particle Velocity (PPV) levels for the piling activities, at the nearest assessed receptor.

15.7.25 Vibration due to piling operations during the construction of the PV panel framework is likely to be above the level of perception at the nearest assessed receptor (0.3mm/s as set out in Table 15.6 of section 15.4). Therefore, the magnitude

of effect is anticipated to be **minor** at all residential receptors. Receptor sensitivity is high and therefore the magnitude of change is **moderate** and not significant for the purposes of the EIA Regulations.

Assessment of Construction Vibration – West Burton 2

15.7.26 As explained in section 15.4, potential levels of vibration from vibratory piling have been estimated using the formulae presented in BS 5228 and the distances to nearest sections of piling activities.

15.7.27 Table 15.3.6 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** presents the predicted Peak Particle Velocity (PPV) levels for the piling activities, at the nearest assessed receptor.

15.7.28 Vibration due to piling operations during the construction of the PV panel framework is likely to be above the level of perception at the nearest assessed receptor (0.3mm/s as set out in Table 15.6 of section 15.4). Therefore, the magnitude of effect is anticipated to be **minor** at all residential receptors. Receptor sensitivity is high and therefore the magnitude of change is **moderate** and not significant for the purposes of the EIA Regulations.

Assessment of Construction Vibration – West Burton 3

15.7.29 As explained in section 15.4, potential levels of vibration from vibratory piling have been estimated using the formulae presented in BS 5228 and the distances to nearest sections of piling activities.

15.7.30 Table 15.3.7 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**presents the predicted Peak Particle Velocity (PPV) levels for the piling activities, at the nearest assessed receptor.

15.7.31 Vibration due to piling operations during the construction of the PV panel framework is likely to be above the level of perception at the nearest assessed receptor (0.3mm/s as set out in Table 15.6 of section 15.4). Therefore, the magnitude of effect is anticipated to be **minor** at all residential receptors. Receptor sensitivity is high and therefore the magnitude of change is **moderate** and not significant for the purposes of the EIA Regulations.

Assessment of Construction Vibration – West Burton Cable Route Corridor

15.7.32 As discussed in section 15.4, potential levels of vibration from vibratory compaction have been estimated using the formulae presented in BS 5228 and the distances to nearest compaction activities.

15.7.33 Using the vibratory compaction (steady state) formula from Table E.1 of BS 5228-2, the minimum distance from receptor to compaction activity that will result in a greater than negligible effect is equal to 38m. The only assessed receptors that fall within this category are receptors CR07, CR08 and CR09 which are approximately 20m from the Cable Route Corridor. The estimated PPV value for a receptor at a distance of 20m from a compaction activity is 0.75mm/s which according to Table 15.6 corresponds to an effect level of **minor**. The receptor sensitivity is high, and

therefore, the magnitude of change is **moderate** and not significant for the purposes of the EIA Regulations.

Construction Traffic Noise

15.7.34 18 hr Annual Average Weekday Traffic (AAWT) traffic flows have been used to model the change in road traffic level as a result of the Scheme. Traffic flows have been taken from Chapter 14 – Transport and Access **[EN010132/APP/WB6.2.14]**, the model input traffic flows for the West Burton Scheme are presented in the table below.

Table 15.22: Baseline Two-Way Traffic Flows (AAWT) plus Construction Traffic

Ref	Link	Base 2025			Base 2025 plus Construction		
		Total Vehicles	HGV	HGV%	Total Vehicles	HGV	HGV%
West Burton 1 and 3							
1	A15	12,027	2,010	17%	12,267	2,040	17%
2	Till Bridge Lane (A1500)	4,295	743	17%	4,535	773	17%
West Burton 1							
3	West Burton 1 Access Road	174	24	14%	226	34	15%
West Burton 2							
4	A57	12,085	645	5%	12,181	658	5%

15.7.35 The proposed construction vehicle routes to each area are summarised below:

- West Burton 1 and 3 – via the A15 and Till Bridge Lane (A1500); and
- West Burton 2 – via the A57 and Mill Lane.

15.7.36 The routes are presented in Figures 5.1 – 5.6 of the CTMP (**Appendix 14.2** of the Transport and Access Chapter of the ES **[EN010132/APP/WB6.3.14.2]**).

15.7.37 The assessment of construction traffic noise for each site is presented below.

Assessment of Construction Traffic Noise West Burton 1

15.7.38 A quantitative assessment has been undertaken to establish the change in road traffic noise level due to increased vehicle movements as a result of the Scheme. Baseline traffic flows and predicted increases in traffic have been obtained from Chapter 14: Transport and Access **[EN010132/APP/WB6.2.14]** in this ES and reproduced in Table 15.22 above.

15.7.39 The results of the assessment are presented in Table 15.3.8 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**. It can be seen that the maximum predicted change in noise level is less than 1 dB and such is considered to be of negligible magnitude.

15.7.40 Effects from construction traffic are assessed as **negligible** for the A15 and Till Bridge Lane and therefore the magnitude of change is **moderate/minor**, which is not significant for the purposes of the EIA Regulations.

Assessment of Construction Traffic Noise West Burton 2

15.7.41 A quantitative assessment has been undertaken to establish the change in road traffic noise level due to increased vehicle movements on the A57 and Mill Lane, as a result of the Scheme. Baseline traffic flows, and predicted increases in traffic have been obtained from Chapter 14: Transport and Access **[EN010132/APP/WB6.2.14]** and reproduced in Table 15.22 above.

15.7.42 The results of the assessment are presented in Table 15.3.9 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**. It can be seen that the maximum predicted change in noise level is less than 1 dB and such is considered to be of negligible magnitude.

15.7.43 Effects from construction traffic are assessed as **negligible** for the A57 and Mill Lane and therefore the magnitude of change is **moderate/minor**, which is not significant for the purposes of the EIA Regulations.

Assessment of Construction Traffic Noise West Burton 3

15.7.44 A quantitative assessment has been undertaken to establish the change in road traffic noise level due to increased vehicle movements on the A15 and Till Bridge Lane, as a result of the Scheme. Baseline traffic flows, and predicted increases in traffic have been obtained from Chapter 14: Transport and Access **[EN010132/APP/WB6.2.14]** of this ES and reproduced in Table 15.22 above.

15.7.45 The results of the assessment are presented in Table 15.3.10 of **Appendix 15.3 [EN010132/APP/WB6.3.15.3]**. It can be seen that the maximum predicted change in noise level is less than 1 dB and such is considered to be of negligible magnitude.

15.7.46 Effects from construction traffic are assessed as **negligible** for the A15 and Till Bridge Lane and therefore the magnitude of change is **moderate/minor**, which is not significant for the purposes of the EIA Regulations.

Assessment of Construction Traffic Noise Cable Route Corridor

15.7.47 The construction programme for the Scheme is set out in Chapter 4. This forecasts that the construction period for the Cable Route will be approximately 20 months. The Route will be constructed in sections of approximately 4km at a time. Each section will take approximately 90 working days.

15.7.48 For the construction of the Cable Route, 19 temporary accesses are required, approximately one every kilometer. The locations of these accesses are shown in Figure 14.5 of Chapter 14 and are listed in Paragraph 14.7.55.

15.7.49 As stated, the Grid Connection Route will be built out in phases. Each access will be used for approximately 90 days during the construction phase. It is likely that around four or five accesses will be in use concurrently.

15.7.50 It is forecast that each access will generate up to eight arrivals and eight departures per day for the delivery of material and equipment. Around half of these will be HGV trips and half LGV trips. There will also be around 10 construction workers per access, arriving by car and shuttle bus.

15.7.51 HGV trips will largely consist of 10m tipper trucks. However, there will be a small number of abnormal load movements associated with cable drum deliveries.

15.7.52 As set out, the forecast traffic flow for the construction of the grid connection route is low and will only last approximately 90 days at each access.

15.7.53 This low level of traffic will not trigger the need for further assessment as percentage increases in road traffic of this magnitude are considered to be insignificant, as a percentage increase of traffic of 25%, corresponds to a change in noise level of 1 dB. Therefore, no detailed assessment of the likely significant effects, based on changes in traffic flows has been undertaken.

Operational Noise

Conversion Units

15.7.54 The primary sources of noise from the operational development are the inverters and transformers serving the solar panels. It is understood that these will be housed in conversion units located around the Sites.

15.7.55 The manufacturer's data does not contain octave-band data, therefore a typical frequency spectrum has been applied, which is considered robust. The octave-band source data used within the modelling is presented in Table 15.23 below.

Table 15.23: Conversion Unit Input Data

Unit	Sound Power Level SWL [dB(A)]	Octave Band Centre Frequency Hz							
		63	125	250	500	1000	2000	4000	8000
SMA Conversion Unit	90	53	64	72	77	78	76	85	81

Solar PV Panels

15.7.56 All Sites forming the Scheme will be serviced by tracker solar panels or fixed solar panels. The candidate tracker unit is the Soltec Tracker which has a Sound Pressure Level of 50.1 dB L_{Aeq} at 1m distance. Fixed solar panels do not have any moving parts and therefore have no noise emission associated with them.

Substation

15.7.57 The primary noise associated with the substations is the transformers. There are different types of substations required across the Scheme, 400kV and 132kV. The Applicant's electrical engineering consultants has advised that both units will operate with a Sound Power Level of 88 dB.

15.7.58 No octave-band data is available for the substation equipment, therefore a typical spectrum has been applied and adjusted to a level of 88 dB.

Table 15.24: Transformer Input Data

Unit	Sound Power Level SWL [dB(A)]	Octave Band Centre Frequency Hz							
		63	125	250	500	1000	2000	4000	8000
Transformer	88	88	94	93	86	80	62	60	54

Energy Storage

15.7.59 The West Burton 3 site will accommodate an Energy Storage System (sometimes referred to as a 'BESS').

15.7.60 The main noise source from the BESS units are the inverters that service them, the inverters will operate at a Sound Pressure Level of 79.8 dB at 1m distance, which equates to a Sound Power Level of 87 dB. No octave band data is provided for the BESS inverters therefore a spectrum has been applied and adjusted to a Sound Power level of 87 dB.

Table 15.25: Battery Storage Inverter Input Data

Unit	Sound Power Level SWL [dB(A)]	Octave Band Centre Frequency Hz							
		63	125	250	500	1000	2000	4000	8000
Inverter	87	57	68	75	81	79	77	83	79

Rating Corrections

15.7.61 BS 4142 states that corrections should be applied to account for certain acoustic features which have the potential to increase the level of effect at nearby properties.

15.7.62 The character of the sound from the Scheme will generally be low level and constant, with no rapid change in level or character of noise. Therefore, no impulsive penalty is considered necessary.

15.7.63 However, due to the type of plant proposed, tonal elements may be perceptible at the nearest noise sensitive receptors. As such a +2 dB correction for tonal characteristics has been applied to the calculations.

15.7.64 It is considered that the plant will not have identifiable on/off conditions, with many items operating at gradually varying loads relative to the intensity of light incident upon the solar panels and the air temperature. Therefore, no intermittency penalty has been applied.

Noise Modelling Methodology

15.7.65 Three-dimensional noise modelling has been undertaken based on the source data to predict noise levels at a large number of locations both horizontally and vertically. CADNA (v2022) noise modelling software has been used. This model is based on the ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken. The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered.

15.7.66 The following parameters were used in the prediction model:

- The HV transformers have been modelled at a height of 2.9m. All other sources have been modelled at 2.5m;
- A ground absorption factor of G=0.8 (soft ground); and
- Receiver heights of 1.5m (ground floor – living rooms) and 4.0m (first floor - bedrooms).

15.7.67 Calculations have been based on the assumption that the BESS Inverters and Substation Transformers will operate simultaneously at full capacity, which represents worst-case conditions during the peak daytime and night-time periods. The conversion units and Trackers will only operate at full capacity during the daytime hours; however, they have been included in the night-time assessment to represent a worst-case scenario to cover the early morning hours during the summer months.

15.7.68 It should be noted that the above assessment incorporates a number of worst-case assumptions, including all noise sources being fully operational throughout the night-time period. Many of the noise sources will be dependent on the level of sunlight, and therefore, load, and batteries are likely only to be used for electricity export during peak demand periods. As such, the night-time noise levels are likely to be substantially lower in practice.

Assessment of Operational Noise - West Burton 1

15.7.69 The assessment presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** Table 15.3.11 shows that noise levels from the solar farm are predicted to be up to +8 dB above the existing background noise levels at the closest sensitive receptors during the daytime and up to +14 dB during the night-time, which according to Table 15.9 of the ES, is an indication of a **major** effect and **major** significance.

15.7.70 However, the measured existing background noise levels at the monitoring locations in the assessment are below 30 dB for both daytime and night-time periods, which would fall within the very low category. The rating levels at these receptors are also below the 35 dB, which would be defined as low. It is therefore

considered appropriate and best practice that absolute noise levels should be considered as appropriate for assessment of noise at these locations.

15.7.71 The noise intrusion assessment in accordance with criteria within WHO/BS 8233 guidance is presented in **Appendix 15.3:** Tables 15.3.12 and 15.3.13, indicates that internal L_{Aeq} noise levels from all potential noise sources, during both the daytime and night-time periods are predicted to be below the WHO/BS8233 noise intrusion guidance at all sensitive receptors. This is an indication of a **negligible** effect and **moderate/minor** significance, resulting in a not significant effect for the purposes of the EIA Regulations.

15.7.72 The combined change in noise level assessment is presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]:** Tables 15.3.14 and 15.3.15. The results presented show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution from the Site. The contribution from the Site falls within the **negligible** magnitude of effect level and therefore **moderate/minor** significance, resulting in a not significant effect for the purposes of the EIA Regulations.

Assessment of Operational Noise West Burton 2

15.7.73 The assessment presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** Table 15.3.16 shows that noise levels from the Site are predicted to be up to +6 dB above the existing background noise levels at the closest sensitive receptors during the daytime and up to +21 dB during the night-time, which according to Table 15.9 of this chapter, is an indication of a **major** effect and **major** significance.

15.7.74 However, the measured existing background noise levels at the monitoring locations in the assessment are below 30 dB for both daytime and night-time periods, which would fall within the very low category. The rating levels at these receptors are also below the 35 dB, which would be defined as low. It is therefore considered appropriate and best practice that absolute noise levels should be considered as appropriate for assessment of noise at these locations.

15.7.75 The noise intrusion assessment in accordance with criteria within WHO/BS 8233 guidance is presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** Tables 15.3.17 and 15.3.18, indicate that internal L_{Aeq} noise levels from all potential noise sources, during both the daytime and night-time periods are predicted to be below the WHO/BS8233 noise intrusion guidance at all sensitive receptors. This is an indication of a **negligible** effect and **moderate/minor** significance, resulting in anot significant effect for the purposes of the EIA Regulations.

15.7.76 The combined change in noise level assessment is presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** Tables 15.3.19 and 15.3.20. The results presented show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution from the Site. The contribution from the Site falls within the **negligible** magnitude of effect level and is therefore of **moderate/minor** significance, resulting in a not significant effect for the purposes of the EIA Regulations.

Assessment of Operational Noise West Burton 3

15.7.77 The assessment presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** Table 15.3.21 shows that noise levels from the solar farm are predicted to be up to +8 dB above the existing background noise levels at the closest sensitive receptors during the daytime and up to +19 dB above the existing background noise levels during the night-time, which according to Table 15.9 of the ES, is an indication of a **major** effect and **major** significance.

15.7.78 However, the measured existing background noise level at the monitoring locations in the assessment are below 30 dB for the night-time period, which would fall within the very low category. The rating levels at these receptors are also below the 35 dB, which would be defined as low. It is therefore considered appropriate and best practice that absolute noise levels should be considered as appropriate for assessment of noise at these locations, particularly during the night-time period.

15.7.79 The noise intrusion assessment in accordance with criteria within WHO/BS 8233 guidance is presented in **Appendix 15.3** Tables 15.3.22 and 15.3.23, which indicates that internal L_{Aeq} noise levels from all potential noise sources, during both the daytime and night-time periods are predicted to be below the WHO/BS8233 noise intrusion guidance at all sensitive receptors. This is an indication of a **negligible** effect and **moderate/minor** significance, resulting in a not significant effect for the purposes of the EIA Regulations.

15.7.80 The combined change in noise level assessment is presented in **Appendix 15.3 [EN010132/APP/WB6.3.15.3]** Tables 15.3.24 and 15.3.25. The results presented show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution from the Site. The contribution from the Site falls within the **negligible** magnitude of effect level and is therefore of **moderate/minor** significance, resulting in a not significant effect for the purposes of the EIA Regulations.

15.8 In-Combination Effects

15.8.1 Due to there being no shared sensitive receptors in close proximity to either of the sites, no potential in-combination operational noise effects have been identified.

15.9 Cumulative Effects

15.9.1 A 'long list' of potential cumulative development sites is provided in **Appendix 2.3 [EN010132/APP/WB6.3.2.3]** of this ES and the more substantial developments are shown on the plan at Figure 2.1 (Cumulative Assessments Site Plan **[EN010132/APP/WB6.4.2.1]** of the ES. Of particular relevance to any cumulative assessment are the Cottam Solar Project and Gate Burton Solar Project (both NSIP schemes).

15.9.2 We have examined the following projects (or potential projects) for the cumulative assessment, which are considered to have the potential to have a transport impact effect on the Study Area:

- Cottam Solar Project

- Gate Burton Energy Park
- EDF West Burton C
- Decommissioning of West Burton A
- Saxilby Heights
- Development at Land off Sturton Road
- Blyton Driving Centre
- Wood Lane Solar Farm

15.9.3 It is considered that cumulative noise effects during the construction and operational phases may occur when developments are within 500m of a common receptor. At greater distances, any noise emissions would be attenuated such that there would normally be no combined effect.

Table 15.26: Potential Cumulative Developments

Application	Applicant for 'Other development' & Brief Description	Approximate Distance from Scheme	Within 500m
Cottam Solar Project	IGP West Burton Solar Project Development comprising four electricity generating stations, each with anticipated capacity in excess of 50 MW (solar energy and storage)	1.5 km north of WB1	No (excluding the Cable Route Corridor, dealt separately below)
Gate Burton Energy Park	Low Carbon Gate Burton 500MW solar and energy storage	0.7 km north of WB3	No (excluding the Cable Route Corridor, dealt separately below)
EDF West Burton C	EDF West Burton C 299MW gas fired generating capacity	6.5 km north west of WB3	No
Decommissioning of West Burton A	Decommissioning of West Burton A.	6.5 km north west of WB3	No
LPA application reference (West Lindsey): 131174 137071 141615	Outline planning application for 230 residential development, to include associated estate roads and open space. Access to be considered and not reserved	0.35 km south of WB2	Yes

	for subsequent applications. Saxilby Heights		
LPA application reference (West Lindsey): 132286 138574 142107 142022 130813 140143 139469 138472	Hybrid application to include planning application for the erection of up to 133 dwellings with all matters reserved and change of use of agricultural land to cemetery. Land off Sturton Road, Saxilby	0.23 km south of WB2	Yes
LPA application reference (West Lindsey): 133907 143820 142807 142806 141141	Land off Stow Park Road, Marton Hybrid planning application to include outline planning application for the erection of up to 39 dwellings with all matters reserved and change of use of agricultural land to school car park.	On the opposite side of A1500 to WB3	No

15.9.4 The scheme (represented by application numbers 131174, 137071 and 141615) at Saxilby Heights is considered to be further away from the site of West Burton 2 than existing receptors already assessed in the sections above and therefore will not be considered any further.

15.9.5 The scheme at land off Sturton Road (represented by application numbers 132286, 138574, 142107, 142022, 130813, 140143, 139469 and 138472) is considered to be further away from the site of West Burton 2 than existing receptors already assessed in the sections above and therefore will not be considered any further.

15.9.6 The scheme at land off Stow Park (represented by application numbers 133907, 143820, 142807, 142806 and 141141) is considered to be further away from the site of West Burton 3 than existing receptors already assessed in the sections above and therefore will not be considered any further.

Cable Route Corridor

15.9.7 Part of the Cable Route Corridor for the Scheme will overlap with the cable routes of the Gate Burton and Cottam solar farm schemes. There is potential for all three

schemes' cable routes to be constructed either simultaneously or sequentially, causing cumulative noise effects at nearby sensitive receptors.

15.9.8 The likely construction method would be to build all three projects' ducts at the same time, leaving the cables to be pulled through separately at the time of construction for each individual project. As set out in Section 15.4 of this ES chapter, the methodology that has been used to assess the impact of the cable installation has been to model the noisiest construction activities (trenching and duct installation) at the closest distance to each of the nearby sensitive receptors operating simultaneously at full capacity over a one-hour period, therefore, providing a worst-case assessment.

15.9.9 Given that construction activities for the Cable Route Corridor are transient, it is considered unlikely that a major impact would be experienced for any prolonged duration due to the temporary nature of construction operations. In addition , BPM will be implemented as described in Paragraph 15.6.3. Therefore, no significant cumulative effects are identified for the Cable Route Corridor.

15.10 Additional Mitigation Measures

15.10.1 Mitigation is required in order for effects to be not significant and has been included as embedded mitigation as set out in section 15.6 above. The embedded mitigation is considered sufficient to make the noise and vibration effects of the Scheme acceptable at each of the sensitive receptors, and therefore no additional mitigation is specified in this assessment, as it is not considered necessary.

15.11 Residual Effects

Construction Noise

15.11.1 The construction noise levels at all receptors are predicted to be within the 65 dB(A) noise level limit, except for three of the nearest receptors along the proposed cable route. However, construction noise is temporary, and the assessment assumes that all construction activities will be happening simultaneously across the Sites, which is considered to be a worst-case scenario. Construction activity on the Sites and along the Cable Route Corridor would likely be experienced by limited receptors at any given time as work progresses across the Scheme. Therefore, the magnitude of change is **negligible** which results in a **moderate/minor** residual effect which is not significant for the purposes of the EIA Regulations.

Construction Vibration

15.11.2 Construction activities are temporary. Construction activity on the Sites would likely be experienced limited receptors at any given time as work progresses across the Scheme. Therefore, the magnitude of change is **negligible** which results in a **moderate/minor** residual effect which is not significant for the purposes of the EIA Regulations.

Operational Noise

15.11.3 Assessments have been undertaken in accordance with the guidance contained within BS 4142 and have predicted that operational noise levels at the nearest receptors to the Scheme would exceed the existing background noise levels in many cases, and as such have been assessed as having moderate/major significance effects. However, due to very low existing background noise levels at the receptors, and as stated within BS 4142, alternative guidance has been used to assess noise impacts, which considers absolute noise levels created by the Scheme. As such, embedded mitigation is being used to ensure noise levels during the operational phase do not result in significant impacts in accordance with WHO/BS 8233 and IEMA guidance. Therefore, considering context, the magnitude of change is **negligible** which results in a **moderate/minor** residual effect which is not significant for the purposes of the EIA Regulations.