Green Hill Solar Farm

Preliminary Environmental Information Report

Chapter 14
Noise and Vibration

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14 Noise and Vibration

14.1 Introduction

14.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) undertaken to date concerning the potential impacts of the Scheme on noise and vibration during the construction, operation, and decommissioning phases. The following aspects will be considered within the noise and vibration assessment process:

- Effects arising from noise and vibration emitted by construction traffic, equipment, and plant during the construction and decommissioning phase. These effects would be temporary and short-term; and,
- Operational effects from noise generated by substations, inverters, transformers and battery units. These effects would end completely when operation of the Scheme ceases and are therefore long-term and reversible.

14.1.2 For more details about the Scheme, refer to **Chapter 4: Scheme Description** of this PEIR.

Appendices and Figures

14.1.3 This chapter is supported by the following figures in PEIR **Volume 2**:

- **Figure 14.1** Monitoring and Sensitive Receptor Locations at Green Hill A;
- **Figure 14.2** Monitoring and Sensitive Receptor Locations at Green Hill B;
- **Figure 14.3** Monitoring and Sensitive Receptor Locations at Green Hill C to E;
- **Figure 14.4** Monitoring and Sensitive Receptor Locations at Green Hill F and Green Hill BESS;
- **Figure 14.5** Monitoring and Sensitive Receptor Locations at Green Hill G;

14.1.4 This chapter is supported by the following tables:

- **Table 14.1:** Summary of Consultation and Responses;
- **Table 14.2:** Construction Time Period – LOAEL and SOAEL;
- **Table 14.3:** Magnitude of Impact for Construction Noise;
- **Table 14.4**: Magnitude of Impact for Construction Road Traffic Noise;
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- **Table 14.13:** Sensitive Noise Receptors – Green Hill F; and
- **Table 14.14:** Sensitive Noise Receptors – Green Hill G.

14.2 Consultation

14.2.1 An EIA Scoping Report was submitted to the Planning Inspectorate (PINS) in July 2024, with a formal request for Scoping Opinion. PINS subsequently issued the Scoping Opinion on the proposed scope on 30th August 2024. Consultation undertaken throughout the pre-application and scoping phase for the Scheme has informed the approach to the noise and vibration assessment and the information provided within this chapter.

14.2.2 A summary of consultation and response to the Scoping Report are outlined below in **Table 14.1**.

Table 14.1: Summary of Consultation and Responses

Consultee and Date	Response	Outcome and any further steps anticipated
The Planning Inspectorate, Scoping Opinion 30th August 2024	The Inspectorate notes that vibration from the construction phase is scoped into the ES. However, vibration from construction traffic has not been included in the list of activities therein that would potentially generate vibration. The condition of the roads have not been assessed, nor have the anticipated number and type of vehicles been provided to justify why vibration from construction traffic should be scoped out. The ES should provide evidence to confirm that ground-borne vibration generated from HGV movements (including along access routes) during construction and decommissioning would not result in significant effects on sensitive receptors or include an assessment of the LSE, unless otherwise agreed with relevant consultation bodies.	Construction traffic is assessed in this PEIR, vibration from construction traffic is assessed within the construction vibration assessment.
The Planning Inspectorate, Scoping Opinion 30th August 2024	A study area is shown in Figure 13.2 of the SR, which has been based on professional judgement. The ES should justify how the study area has been identified for assessment with reference to relevant industry guidance, sensitive receptors, and agreement with the relevant highway authorities. A plan illustrating the extent of the study area, the expected route(s) of construction traffic, and anticipated numbers of vehicle movements (including vehicle type, peak hour and daily movements) should be included in the ES.	Justification of the assessment area is presented within the PEIR, and location plans of all identified sensitive receptors are presented in Figures 14.1. Construction routes will be presented for the ES once defined.

14.3 Legislation, Planning Policy and Guidance

14.3.1 This section provides an overview of the legislation, planning policy and guidance against which the Scheme will be considered for noise and vibration.

Legislation

UK Legislation

14.3.2 The Control of Pollution Act 1974 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. 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, a Section 60 notice cannot be served provided the agreed conditions are maintained on-site.

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

Planning Policy

National Planning Policy

National Policy Statements (NPS) EN1, EN3 and EN5

14.3.4 Relevant parts of EN1 Section 5.12 states:

"5.12.1 Excessive noise can have wide-ranging impacts on the quality of human life and health such as annoyance, sleep disturbance, cardiovascular disease and mental ill-health. It can also have an impact on the environment and the use and enjoyment of areas of value such as quiet places and areas with high landscape quality.

5.12.2 The Government's policy on noise is set out in the Noise Policy Statement for England. It promotes good health and good quality of life through effective noise management. Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references to "noise" below apply equally to the assessment of impacts of vibration.

5.12.4 Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the Secretary of State in accordance with the Biodiversity and Geological Conservation section of this NPS at Section 5.4. This should consider underwater noise and vibration especially for marine developments. Underwater noise can be a significant issue in the marine environment, particularly in regard to energy production.

5.12.5 Factors that will determine the likely noise impact of a proposed development include:

- *The inherent operational noise from the proposed development, and its characteristics.*
- *The proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces).*
- *The proximity of the proposed development to quiet places and other areas that are particularly valued for their soundscape or landscape quality.*
- *the proximity of the proposed development to sites where noise may have an adverse impact on protected species or other wildlife, including migratory species.*
- *the potential presence of unexploded ordnance on the seabed."*

14.3.5 Relevant parts of EN3 Section 3.74 states:

"Applicants should include in the ES a noise assessment of the impacts on amenity in case of excessive noise from the project in line with guidance set out in Section 5.12 in EN-1."

14.3.6 EN5 Section 2.9 states:

"Applicants should … keep the visual, noise and other environmental effects to a reasonably practicable minimum"

National Planning Policy Framework (NPPF)

With regard to noise and planning, the NPPF contains the following statement at Paragraph 191:

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

- *Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason […]*

"193. 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.

"194. 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."

National Planning Policy Guidance (NPPG)

14.3.7 PPG: Noise identifies at Paragraph: 011 Reference ID: 30-011-20190722 the requirement for developments proposals to incorporate measures to mitigating the impact of noise on residential developments. In particular:

"Noise impacts may be partially offset if residents have access to one or more of:

- *A relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;*
- *A relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;*
- *A relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *A relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance).*

The Noise Policy Statement for England (NPSE)

14.3.8 The NPSE is a core guidance document informing the assessment methodology below (the details of which will follow). The NPSE's general aims are:

"Noise Policy Aims Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life"*

Guidance

- British Standards (BS) 4142:2014+A1:2019 Methods for rating and assessing Industrial and commercial sound (BS 4142:2014)
- BS 8233:2014 Guidance on sound Insulation and noise reduction for buildings (BS 8233:2014)
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1 (Noise)
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2 (Vibration)
- Calculation of Road Traffic Noise (CRTN)
- Design Manual for Roads and Bridges (DMRB) Volume 11

14.4 Assessment Methodology

14.4.1 The methodologies described in the following section have been developed in line with the relevant planning policy and appropriate industry guidance for assessing potential effects from the Scheme on noise and vibration.

Study Area

14.4.2 The Study Area for the noise and vibration assessment includes the areas of the Scheme and identified noise and vibration sensitive receptors. As the Scheme's Order limits are not to be defined until DCO submission, for PEIR, the boundaries of the Sites (Green Hill A to G and Green Hill BESS) and the Cable Route Search Area together define the extents of the Scheme.

14.4.3 For the purposes of providing an assessment of likely significant noise and vibration effects the Study Area has been determined by receptors within approximately 500m of the Sites' boundaries (including Cable Route Search Area).

14.4.4 Further noise surveys will be carried out along the cable corridor, once refined, to support the ES.

Impact Assessment Methodology

14.4.5 The NPSE introduced three concepts to the assessment of noise and vibration, as follows:

NOEL - No Observed Effect Level

14.4.6 This is the noise level below which no effect can be detected and below which there is no detectable effect on the health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

14.4.7 This is the noise level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

14.4.8 This is the noise level above which significant adverse effects on health and quality of life can occur.

Construction and Decommissioning Phases

14.4.9 Noise associated with construction and decommissioning works will be predicted at the assessed receptors using the methodology outlined in BS 5228-1 and will be based on plant noise emission levels, distance to receptors and plant 'on-time' (the amount of time the plant is switched on).

14.4.10 The construction impact semantic scale, set out in **Table 14.2** below, is based on the ABC method of assessment described in Annex E.3.2 of BS 5228, which sets out threshold values depending upon the ambient noise at receptors, which have been determined from the baseline sound survey.

Table 14.2 Construction Time Period - LOAEL and SOAEL

Time Period	LOAEL	SOAEL	Threshold Level $L_{Aeq,1hr}$ dB
Day (0700-1900 hours Weekday and 0700-1200 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	65 - 75
Night (2300-0700) hours	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	45 - 55
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	55 - 65

14.4.11 The magnitude of impact for construction noise is outlined in **Table 14.3** (as defined In DRMB LA 111).

Table 14.3 Magnitude of Impact for Construction Noise

Magnitude of Impact	Construction Noise Level
Neutral	No increase
Negligible	Below LOAEL
Low	Above or equal to LOAEL and below SOAEL
Medium	Above or equal to SOAEL and below SOAEL + 5 dB
High	Above or equal to SOAEL + 5 dB

Construction and Decommissioning Traffic Noise

14.4.12 Baseline traffic noise levels will be predicted at assessment receptors based on the methodology in CRTN, utilising baseline traffic flows along the construction traffic route for the proposed years of the construction phase. The percentage increase in all traffic and Heavy Goods Vehicles (HGVs) will be used to calculate the likely change in traffic noise due to construction traffic during the construction phase.

14.4.13 The magnitude of effects for construction traffic noise, as defined in DRMB LA 111 are presented in **Table 14.4**.

Table 14.4 Magnitude of Impact for Construction Road Traffic Noise

Magnitude of impact	Increase in basic noise level of closest public road used for construction traffic (dB)
Neutral	No increase
Negligible	Less than 1.0
Low	Greater than or equal to 1.0 and less than 3.0
Medium	Greater than or equal to 3.0 and less than 5.0
High	Greater than or equal to 5.0

Construction Vibration (Including Construction Traffic)

14.4.14 For construction phase vibration, the LOAEL and SOAEL Peak Particle Velocity (PPV) in mm/s is set out In DMRB LA 111 and provided in **Table 14.5**.

Table 14.5 Construction Vibration LOAELs and SOAELs (DMRB LA 111)

Time Period	LOAEL	SOAEL
All time periods	0.3 mm/s PPV	1.0 mm/s PPV

14.4.15 The magnitude of Impact for construction vibration is therefore determined in accordance with **Table 14.6**, as defined in DMRB LA 111.

Table 14.6 Magnitude of Impact for Construction Vibration

Magnitude of Impact	Vibration Level
Neutral	No increase
Negligible	Below LOAEL
Low	Above or equal to LOAEL and below SOAEL
Medium	Above or equal to SOAEL and below 10 mm/s PPV
High	Above or equal to 10 mm/s PPV

Operational Noise

14.4.16 The assessment of operational noise effects will be undertaken according to the methodology set out in BS 4142:2014.

14.4.17 The baseline noise measurements will be used to determine representative daytime and night-time background noise levels at the assessed receptors.

14.4.18 Noise from operational plant such as substations, inverters, transformers and battery storage units will be predicted using noise modelling software and plant emission data provided by the Applicant.

14.4.19 The assessment will consider the level by which the Scheme's BS 4142 rating level exceeds the prevailing background noise levels, as well as the context in which the sound will occur. BS 4142 states that a difference of +5 dB is likely to be an indication of adverse impact.

14.4.20 Where background and rating levels are low, BS 4142:2014 states that the absolute level might be as, or more, relevant than the margin by which the rating level exceeds the background noise

level. As such, it is proposed that noise limits will be a combination of a margin of 5 dB above the representative background level, subject to a fixed lower threshold of 35 dB, which would apply in low background noise situations.

14.4.21 **Table 14.7** below presents the operational noise magnitude of impacts.

Table 14.7 Method for Assessing the Magnitude of Impact

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
Negligible	No Observed Effect Level (NOEL) and No Observed Adverse Effect Level (NOAEL)	Difference between Rating Level ($L_{Ar,T}$) dB and existing background level $L_{A90,T}$ dB is less than or equal to 0dB depending on context	Justification for Effect Level: Below low impact threshold in BS4142:2014 Action Required: None
		Noise levels are below: Living Rooms: 35 dB$L_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 40 dB$L_{Aeq,16hours}$ Bedrooms Rooms: 35 dB$L_{Aeq,16hours}$ 30dB $L_{Aeq,8hr}$ $L_{AFmax,2min}$ noise levels do not exceed: 45dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Less than threshold values in Table 4 in BS8233:2014 and Table 1 in World Health Organisation (1999) Guidelines on Community Noise Action Required: None
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of ≤1dB.	Justification for Effect Level: Within negligible short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: None
Low	Lowest Observed Adverse Effect Level (LOAEL)	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is between 1-4dB, depending on context.	Justification for Effect Level: Within less likely for adverse or significant adverse impact to occur low impact threshold in BS4142:2014 Action Required: Mitigate and reduce to a minimum the exceedance over 0dB above background threshold
		Noise levels are between: Living Rooms: 35-40 dB$L_{Aeq,16hours}$	Justification for Effect Level: Exceed threshold guidelines in Table 4 of BS8233:2014 and World Health Organisation (1999)

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
		Kitchens, Dining Rooms, and Studies: 40-45 dB $L_{Aeq,16hours}$ Bedrooms Rooms: 35-40 dB $L_{Aeq,16hours}$ 30-35dB $L_{Aeq,8hr}$ $L_{AFmax,2min}$ noise levels do not exceed 45dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Guidelines on Community Noise by no greater than 5dB to achieve reasonable internal conditions as defined by Note 7 to Table 1 in BS8233:2014 Action Required: Mitigate and reduce to a minimum the exceedance over the threshold
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of 1.0-2.9dB.	Justification for Effect Level: Within minor short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Medium	Significant Observed Adverse Effect Level (SOAEL)	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is between 5-9dB, depending on context.	Justification for Effect Level: Within adverse impact threshold in BS4142:2014. Action Required Additional mitigation required to achieve effect of LOAEL or less.
		Noise levels are between: Living Rooms: 40-45 dB $L_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 45-50 dB $L_{Aeq,16hours}$ Bedrooms Rooms: 40-45 dB $L_{Aeq,16hours}$ 35-40dB $L_{Aeq,8hr}$ 45-55dB $L_{AFmax,2min}$ based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 5dB or exceeds $L_{AFmax,2min}$ (10th highest sample) Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of 3.0-4.9dB.	Justification for Effect Level: Within moderate short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required:

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
			Additional mitigation required to achieve effect of LOAEL or less.
High	Unacceptable Observed Adverse Effect Level (UOAEL)	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is equal to or greater than 10dB, depending on context.	Justification for Effect Level: Within significant adverse impact threshold in BS4142:2014 Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Noise levels exceed: Living Rooms: 45 $dBL_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 50 $dBL_{Aeq,16hours}$ Bedrooms Rooms: 45 $dBL_{Aeq,16hours}$ 40dB $L_{Aeq,8hr}$ $L_{AFmax,2min}$ noise levels exceeds 55dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 10dB or exceeds $L_{AFmax,2min}$ (10th highest sample) by 10dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.

14.4.22 Whilst the noise descriptors and categories presented in Table 6 have been established through reference to relevant guidance documents, there are other factors (predominantly site context in accordance with BS4142:2014) which need to be taken into account when assessing the noise impact.

14.4.23 Therefore, a flexible approach to these categories will be undertaken in the context of how specific impacts associated with the Scheme interact with the identified sensitive receptors.

Sensitivity of Receptors

14.4.24 The sensitivity of potentially affected receptors will be assessed in line with **Table 14.8** below.

Table 14.8 Receptor Sensitivity

Sensitivity of Receptor	Definition
High	Residential dwellings, schools and hospitals
Medium	Offices, internal teaching/training spaces
Low	Commercial premises

14.4.25 Based on an initial desk-based study, the closest (and therefore worst case) receptors are residential and are therefore of High sensitivity. As such, where noise and vibration effects are considered to be not significant at the closest receptor, effects at all other receptors will also be not significant, regardless of sensitivity.

Assessment of Significance

14.4.26 The sensitivity of the receptor and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. **Table 14.9** summarises guideline criteria for assessing the significance of noise and vibration effects.

Table 14.9 Significance of Effects Matrix

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

14.4.27 Effects predicted to be of major or major/moderate significance are considered to be 'significant' in the context of the EIA. Where a departure from this approach has been taken this will be justified accordingly.

Identified Sensitive Receptors

14.4.28 The following tables presents the identified receptors nearest to each Site within the Scheme.

Table 14.10 Sensitive Noise Receptors – Green Hill A and A.2

Ref	Associated Site	Address	Distance from RLB (m)
A001	A	Pollys Cottage, Newland Road, NN6 9PZ	10
A002	A	Red Lodge, Broughton Road, NN6 9TY	300
A003	A	The Old Corner House, Broughton Road, NN6 9RH	80
A004	A	Little Acorn Farm, Newland Road, NN6 9PZ	50
A005	A	White Lodge Farm, NN6 9PY	300
A006	A	Glebe Farm, Broughton Road, NN6 9TY	250
A007	A2	New Lodge Farmhouse, Kettering Road, NN6 9PJ	50
A008	A2	Rectory Farm, Walgrave, NN6 9PS	20
A009	A2	Gibb Wood, Kettering Road, NN6 9PU	20

Table 14.11 Sensitive Noise Receptors – Green Hill B

Ref	Associated Site	Address	Distance from RLB (m)
B020	B	Tithe Farm, Moulton Road, NN6 9SH	250
B021	B	Overstone Old Rectory, Kettering Road, NN3 7XA	250

Table 14.12 Sensitive Noise Receptors – Green Hill C, D and E

Ref	Associated Site	Address	Distance from RLB (m)
C030	C	210, Wellingborough Road, NN6 0BW	30
C031	C	200, Sywell Road, NN6 0FL	30
D040	D	Highfield Lodge, Highfield Road, NN6 0EA	10
D041	D	44, Highfield Road, NN6 0EA	20
D042	D	1, Highfield Road, NN6 0EA	10
D042	D	18, Glebe Road, NN6 0DP	100
E050	E	Wilby Hall, Highfield Road, NN6 0EA	200
E051	E	63, Wilby Road, NN6 0DX	5
E052	E	4, Duchess End, NN6 0EB	90
E053	E	111, Mears Ashby Road, NN8 2FH	120
E054	E	Hockerill Farm, Main Road, NN8 2UF	15
E055	E	The Hall, Wilby Road, NN6 0DY	150
E056	E	Wards Barn, Wilby Road, NN6 0DY	5
E057	E	1, Packwood Crescent, NN6 0FA	200
E058	E	49, Packwood Crescent, NN6 0FA	200
E059	E	150, Wellingborough Road, NN6 0JS	250

Table 14.13 Sensitive Noise Receptors – Green Hill F

Ref	Associated Site	Address	Distance from RLB (m)
F070	F	185, Easton Way, NN7 1JN	150
F071	F	39, Easton Maudit, NN29 7NR	50
F072	F	St Peter and St Paul's Church, Easton Maudit, NN29 7NR	200
F073	F	11 Easton Maudit Village, NN29 7NR	30
F074	F	Home Farmhouse, Easton Maudit, NN29 7NR	50
F075	F	Stoken Hollow Farm, London Road, NN29 7NP	200
F076	F	Low Farm Cottage, Easton Maudit, NN29 7NR	150
F077	F	75, Easton Lane, NN29 7NN	60
F078	F	80, Easton Lane, NN29 7NH	5
F079	F	Slype Farm, Easton Lane, NN29 7NH	10
F080	F	44, Wollaston Road, NN29 7LT	250
F081	F	1, Fullwell Road, NN29 7LX	320

Table 14.14 Sensitive Noise Receptors – Green Hill G

Ref	Associated Site	Address	Distance from RLB (m)
G091	G	Northey Farm, London Road, NN29 7NP	50
G092	G	Nest Farm, Lavendon, MK46 4HP	180
G093	G	Lower Farm, Castle Road, MK46 4JG	15

Table 14.15 Sensitive Noise Receptors – Green Hill BESS

Ref	Associated Site	Address	Distance from RLB (m)
BESS001	BESS	Pastures Farm, Station Rd, Grendon, Northampton NN7 1JD	15
BESS002	BESS	Porters Lodge, Station Rd, Northampton NN7 1JD	100
BESS003	BESS	710 Station Rd, Grendon, Northampton NN7 1JB	450
BESS004	BESS	Church Way, Grendon, Northampton NN7 1JE	550
BESS005	BESS	Grendon Hall, 67 Main Rd, Grendon, Northampton NN7 1JW	550
BESS006	BESS	Grendon Lakes, Main Rd, Northampton NN7 1JW	450

14.5 Assessment Assumptions and Limitations

14.5.1 This preliminary assessment is based on baseline and scheme design information available at the time of writing this chapter. A full assessment is being undertaken as part of the EIA, the assessment will be developed and refined following statutory consultation and as additional information becomes available, the final assessment presented within the ES.

14.5.2 Where the scheme designs and details are either not yet known or incomplete at this stage, either assumptions have been made based on professional judgment. This assessment is an iterative process and will be both expanded and made more specific as survey data is collected, analysed and reported on, and designs are further developed. This process will be carried out in conjunction with relevant consultees and third parties as necessary to achieve the most robust outcome.

14.5.3 The methodology for noise and vibration has considered the following assumptions:

- The noise measurement locations were selected to be representative of the noise levels at the closest point of proposed receptors;
- All noise sources measured during the survey are considered to be typical of the surrounding noise environment;
- The distance between the source and nearest receptors has been measured from scale plans;
- Road traffic noise at existing and proposed receptors have been predicted using the CadnaA software, taking into account 1st order reflections from buildings and other large surfaces;

- Noise measurements were undertaken during suitable weather conditions; and,
- Noise measurements were made using Class 1, integrating sound level meters, which are accurate to 0.1dB.

14.6 Baseline Conditions

14.6.1 This section describes the baseline environmental characteristics for the Scheme and surrounding areas with specific reference to noise and vibration.

Existing Baseline

14.6.2 The baseline noise environment has been established following noise surveys undertaken across Green Hill A-G and BESS. A logging weather station was installed onsite during the surveys so any periods of adverse weather conditions can be identified and omitted from further analysis, in accordance with BS 4142:2014.

14.6.0 **Volume 2, Figures 14.1 to 14.5** present the noise monitoring locations.

Noise Survey Results

14.6.1 The results of the noise measurements for monitoring positions LT1 to LT25 are presented in **Table 14.15**.

Table 14.15 Noise Survey Results

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Daytime 07:00 - 23:00	21/09/2023 – 28/09/2023	LT1	0	66.2	103.3	18.2	62.3	36.0
Weekday Night-time 23:00 – 07:00	21/09/2023 – 28/09/2023			56.5	90.9	17.4	39.8	20.0
Weekend Daytime 07:00 - 23:00	23/09/2023 – 24/09/2023			64.4	102.2	21.6	60.9	32.0
Weekend Night-time 23:00 – 07:00	23/09/2023 – 25/09/2023			56.0	89.1	21.0	49.4	34.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 3/10/2023	LT2	0	51.5	96.4	20.7	47.6	42.0
Weekday Night-time 23:00 – 07:00	28/09/2023 – 3/10/2023			38.6	73.3	19.4	34.6	32.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			49.7	88.1	20.2	44.1	29.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			36.6	69.1	18.2	33.9	36.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Daytime 07:00 - 23:00	21/09/2023 – 22/09/2023	LT3	0	60.3	91.0	22.9	57.7	38.0
Weekday Night-time 23:00 – 07:00	21/09/2023 – 23/09/2023			51.3	82.5	20.7	37.1	24.0
Weekend Daytime 07:00 - 23:00	23/09/2023 – 24/09/2023			58.6	90.5	23.0	55.9	32.0
Weekend Night-time 23:00 – 07:00	23/09/2023 – 24/09/2023			46.8	80.6	28.4	44.3	33.0
Weekday Daytime 07:00 - 23:00	21/09/2023 – 27/09/2023	LT4	300	63.0	96.9	21.8	59.5	40.0
Weekday Night-time 23:00 – 07:00	21/09/2023 – 27/09/2023			51.4	85.4	17.0	36.6	24.0
Weekend Daytime 07:00 - 23:00	23/09/2023 – 24/09/2023			60.3	85.3	26.8	56.6	32.0
Weekend Night-time 23:00 – 07:00	23/09/2023 – 25/09/2023			50.1	84.5	22.6	44.4	32.0
Weekday Daytime 07:00 - 23:00	21/09/2023 – 27/09/2023	LT5	0	57.1	89.0	22.8	56.4	54.0
Weekday Night-time 23:00 – 07:00	21/09/2023 – 27/09/2023			47.6	82.0	20.1	42.3	36.0
Weekend Daytime 07:00 - 23:00	23/09/2023 – 24/09/2023			62.0	95.8	36.7	62.1	42.0
Weekend Night-time 23:00 – 07:00	23/09/2023 – 25/09/2023			49.7	76.2	29.9	50.7	38.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 3/10/2023	LT6	100	49.8	78.6	21.0	49.2	39.0
Weekday Night-time	28/09/2023 – 3/10/2023			42.3	73.0	17.5	40.5	40.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
23:00 – 07:00								
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			43.7	82.5	23.8	45.4	31.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			39.6	69.9	18.1	38.0	36.0
Weekday Daytime 07:00 - 23:00	21/09/2023 – 28/09/2023			62.5	92.0	24.5	65.9	51.0
Weekday Night-time 23:00 – 07:00	21/09/2023 – 28/09/2023	LT7	0	54.6	80.8	16.6	48.0	24.0
Weekend Daytime 07:00 - 23:00	23/09/2023 – 24/09/2023			61.7	91.3	29.9	64.5	44.0
Weekend Night-time 23:00 – 07:00	23/09/2023 – 25/09/2023			52.9	86.2	24.1	47.7	34.0
Weekday Daytime 07:00 - 23:00	21/09/2023 – 28/09/2023			51.9	85.6	25.9	49.7	37.0
Weekday Night-time 23:00 – 07:00	21/09/2023 – 28/09/2023	LT8	0	49.6	74.6	18.4	43.6	34.0
Weekend Daytime 07:00 - 23:00	23/09/2023 – 24/09/2023			53.7	77.3	29.8	51.5	32.0
Weekend Night-time 23:00 – 07:00	23/09/2023 – 25/09/2023			50.4	69.9	28.4	51.0	40.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 3/10/2023			52.6	95.5	19.6	48.1	38.0
Weekday Night-time 23:00 – 07:00	28/09/2023 – 3/10/2023	LT9	0	41.2	70.9	16.9	36.8	41.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			49.9	90.1	20.4	45.7	29.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			40.0	73.0	17.1	36.7	36.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 3/10/2023	LT10	0	55.8	91.6	24.2	54.7	44.0
Weekday Night-time 23:00 – 07:00	28/09/2023 – 3/10/2023			46.9	88.3	21.1	43.1	32.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			53.5	89.5	23.4	51.4	35.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			46.7	88.6	18.5	42.7	36.0
Weekday Daytime 07:00 - 23:00	3/10/2023 – 10/10/2023	LT11	0	53.6	94.3	24.3	49.9	46.0
Weekday Night-time 23:00 – 07:00	3/10/2023 – 10/10/2023			43.0	76.8	20.3	37.8	30.0
Weekend Daytime 07:00 - 23:00	7/10/2023 – 8/10/2023			52.8	83.8	24.1	47.1	36.0
Weekend Night-time 23:00 – 07:00	7/10/2023 – 9/10/2023			41.8	77.7	20.1	33.7	31.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 29/09/2023	LT12	0	44.0	74.9	22.1	43.5	36.0
Weekday Night-time 23:00 – 07:00	28/09/2023 – 30/09/2023			36.1	68.5	21.1	35.3	39.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			43.3	83.2	26.1	44.5	30.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 1/10/2023			42.9	66.7	29.2	44.1	37.0
Weekday Daytime	28/09/2023 – 3/10/2023	LT13	0	59.0	95.9	25.4	58.1	37.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
07:00 - 23:00								
Weekday Night-time 23:00 – 07:00	28/09/2023 – 3/10/2023			48.9	79.2	20.6	37.5	31.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			57.5	93.0	25.0	55.0	32.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			47.1	75.8	19.8	36.1	34.0
Weekday Daytime 07:00 - 23:00	3/10/2023 – 10/10/2023	LT14	0	45.6	76.0	27.1	46.5	41.0
Weekday Night-time 23:00 – 07:00	3/10/2023 – 10/10/2023			38.5	83.4	22.4	38.5	34.0
Weekend Daytime 07:00 - 23:00	7/10/2023 – 8/10/2023			43.6	72.8	27.3	44.7	39.0
Weekend Night-time 23:00 – 07:00	7/10/2023 – 9/10/2023			37.3	70.0	22.5	35.6	34.0
Weekday Daytime 07:00 - 23:00	3/10/2023 – 10/10/2023	LT15	0	62.4	97.7	28.8	65.9	48.0
Weekday Night-time 23:00 – 07:00	3/10/2023 – 10/10/2023			54.3	89.4	23.7	48.6	35.0
Weekend Daytime 07:00 - 23:00	7/10/2023 – 8/10/2023			60.7	97.4	30.5	64.1	41.0
Weekend Night-time 23:00 – 07:00	7/10/2023 – 9/10/2023			53.5	82.4	22.5	47.9	37.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 3/10/2023	LT16	750	62.0	102.9	26.3	59.1	42.0
Weekday Night-time 23:00 – 07:00	28/09/2023 – 3/10/2023			52.8	87.4	19.7	42.0	37.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			60.7	102.7	25.4	55.5	33.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			50.6	82.1	19.6	40.2	38.0
Weekday Daytime 07:00 - 23:00	30/09/2023 – 3/10/2023	LT17	0	48.3	78.0	27.0	49.8	39.0
Weekday Night-time 23:00 – 07:00	30/09/2023 – 3/10/2023			42.5	74.9	25.6	42.1	34.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			46.6	72.6	26.7	49.1	41.0
Weekend Night-time 23:00 – 07:00	30/09/2023 – 2/10/2023			40.5	75.9	22.6	37.0	37.0
Weekday Daytime 07:00 - 23:00	3/10/2023 – 10/10/2023	LT18	0	47.3	77.0	29.9	47.0	46.0
Weekday Night-time 23:00 – 07:00	3/10/2023 – 10/10/2023			41.5	79.4	29.6	41.5	37.0
Weekend Daytime 07:00 - 23:00	7/10/2023 – 8/10/2023			44.4	75.8	33.1	44.9	42.0
Weekend Night-time 23:00 – 07:00	7/10/2023 – 9/10/2023			40.8	73.1	29.1	41.3	38.0
Weekday Daytime 07:00 - 23:00	28/09/2023 – 3/10/2023	LT19	0	42.5	83.2	25.7	42.9	36.0
Weekday Night-time 23:00 – 07:00	28/09/2023 – 3/10/2023			38.1	58.4	22.9	38.3	28.0
Weekend Daytime 07:00 - 23:00	30/09/2023 – 1/10/2023			39.9	70.5	25.8	41.6	36.0
Weekend Night-time	30/09/2023 – 2/10/2023			35.5	68.3	23.0	34.5	35.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
23:00 – 07:00								
Weekday Daytime 07:00 - 23:00	20/02/2024 – 27/02/2024	LT20	100	57.0	93.3	34.4	54.2	38.0
Weekday Night-time 23:00 – 07:00	20/02/2024 – 27/02/2024			49.7	87.3	33.6	44.1	36.0
Weekend Daytime 07:00 - 23:00	24/02/2024 – 25/02/2024			55.4	86.8	32.8	51.9	36.0
Weekend Night-time 23:00 – 07:00	24/02/2024 – 25/02/2024			46.2	79.0	34.0	39.7	35.0
Weekday Daytime 07:00 - 23:00	20/02/2024 – 23/02/2024	LT21	0	49.4	94.6	32.4	47.7	38.0
Weekday Night-time 23:00 – 07:00	20/02/2024 – 23/02/2024			43.8	78.8	29.7	43.8	40.0
Weekend Daytime 07:00 - 23:00	24/02/2024			43.7	82.7	30.6	41.0	33.0
Weekend Night-time 23:00 – 07:00	24/02/2024 – 25/02/2024			36.9	68.6	28.2	36.8	35.0
Weekday Daytime 07:00 - 23:00	20/02/2024 – 27/02/2024	LT22	0	56.3	89.2	27.6	56.0	42.0
Weekday Night-time 23:00 – 07:00	20/02/2024 – 27/02/2024			48.9	85.3	20.5	47.6	39.0
Weekend Daytime 07:00 - 23:00	24/02/2024 – 25/02/2024			54.7	90.8	25.7	54.6	38.0
Weekend Night-time 23:00 – 07:00	24/02/2024 – 25/02/2024			45.0	73.5	20.5	44.6	28.0
Weekday Daytime 07:00 - 23:00	08/05/2024 – 11/05/2024	LT23	0	63.5	102.7	23.8	67.0	42.0

Period	Monitoring Date and Times	Location	Distance from RLB (m)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Night-time 23:00 – 07:00	08/05/2024 – 11/05/2024			58.1	89.5	18.8	56.1	26.0
Weekend Daytime 07:00 - 23:00	08/05/2024 – 11/05/2024			63.1	94.5	30.8	66.8	44.0
Weekend Night-time 23:00 – 07:00	08/05/2024 – 11/05/2024			55.4	84.7	18.7	52.6	22.0
Weekday Daytime 07:00 - 23:00	08/05/2024 – 14/05/2024	LT24	0	65.4	101.2	25.4	69.0	42.0
Weekday Night-time 23:00 – 07:00	08/05/2024 – 14/05/2024			60.4	89.5	20.7	55.9	32.0
Weekend Daytime 07:00 - 23:00	08/05/2024 – 14/05/2024			64.0	93.0	26.8	68.2	44.0
Weekend Night-time 23:00 – 07:00	08/05/2024 – 14/05/2024			57.5	87.7	21.4	55.2	31.0
Weekday Daytime 07:00 - 23:00	08/05/2024 – 15/05/2024	LT25	0	50.5	89.1	19.2	49.1	38.0
Weekday Night-time 23:00 – 07:00	08/05/2024 – 15/05/2024			52.1	89.3	18.3	40.9	24.0
Weekend Daytime 07:00 - 23:00	08/05/2024 – 15/05/2024			53.3	86.0	21.6	51.4	36.0
Weekend Night-time 23:00 – 07:00	08/05/2024 – 15/05/2024			54.1	81.6	19.9	40.1	22.0

Future Baseline

14.6.2 This section considers changes to the baseline conditions, described above, that might occur in the absence of the Scheme and during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **Chapter 2: EIA Process and Methodology**.

14.6.3 In the absence of the Scheme, it is anticipated that the only factor that would change the noise levels is the road traffic. (Once road traffic has been assessed, the future baseline noise levels and change in noise levels will be presented in this section.)

14.6.4 In absence of the Scheme, it is considered there will be no change to the future baseline for noise and vibration. The baseline details as presented above (including road traffic noise) are not anticipated to change in the absence of the Scheme.

14.7 Embedded Mitigation Measures

14.7.1 The way that potential environmental impacts have been or will be prevented, avoided or mitigated to reduce impacts through design and/or management of the Scheme is outlined in this section and will be taken into account as part of the assessment of the potential effects. Proposed environmental enhancements are also described where relevant.

14.7.2 The following embedded mitigation measures for construction/operation/decommissioning have been incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO application.

Embedded Construction Mitigation Measures

Noise from Earthworks and Construction

14.7.3 In order to reduce the potential impact of noise generated by the construction phase of the scheme, at existing receptor locations in the immediate vicinity of the Sites, mitigation measures would be required. Best working practice would be implemented during each phase of the earthworks and construction works at the Site. The construction works would follow the guidelines in BS5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003. The following measures would be put in place to minimise noise emissions and implemented via a Construction Environmental Management Plan (CEMP), which typically covers matters such as:

- When works are taking place within close proximity to the sensitive receptors identified, the screening of noise sources via the erection of temporary screens would be employed;
- All machinery would be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;
- Site staff would be made aware that they are working adjacent to a sensitive area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
- Where reasonably practicable, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor;
- Adherence to any time limits imposed on noisy works by the local authority;
- Implement set working hours;
- Ensure engines are turned off when possible; and
- Should earthworks and construction activities need to be carried out during night-time hours, the local authority may include a planning condition that requests advance notice and details of any night working to provided.

Vibration from Earthworks and Construction

14.7.4 BS5228-2 indicates that mitigation might include the use of alternative methods, removal of obstructions, provision of cut-off trenches, reduction of energy input per blow, reduction of resistance to penetration.

14.7.5 As the construction programme and methodologies become more defined, earthworks and construction vibration would be reviewed and a detailed strategy for control would be devised and implemented via the CEMP, where appropriate.

Embedded Operation Mitigation Measures

14.7.6 An operational environmental management plan (OEMP) will be used during the operational stage of the development. This document will provide details regarding noise management of any maintenance works, as well as the upkeep of equipment and complaint procedure.

Embedded Decommissioning Mitigation Measures

14.7.7 Decommissioning mitigation measures will be the same as construction mitigation measures with similar best practice measures.

14.8 Assessment of Likely Impacts and Effects

14.8.1 Taking into account the embedded mitigation measures as detailed in Section 14.7, the potential for the Scheme to generate effects was assessed using the methodology as detailed in Section 1.4 of this Chapter. In the sections below, associated impacts and effects during the construction, operation and decommissioning phases of the scheme are discussed.

Construction Noise

14.8.2 The following main noise-generating activities will be assessed for the ES, 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 push press piling rigs and excavators; and
- Trenching and installation of the cable route, which will likely include the use of excavators and dozers

14.8.3 Typical noise levels from these types of activities with multiple plant carrying out heavy ground works can be up to 85 dB $L_{Aeq,T}$ at a distance of 10m, without the use of any noise reduction measures (i.e. circumstances where equipment is in continuous use and no site hoarding or acoustic barriers are in place.)

14.8.4 Construction noise levels at surrounding receptors will vary depending on the locations and types of works taking place. Due to the variation in construction works activities and locations across the Sites, it is considered that any periods of regular high construction noise levels experienced at a receptor would be of a limited short-term duration (i.e. less than one month). Occupants of nearby receptors are likely to be more tolerable of these events if they are provided with timings and duration of high noise generating events.

14.8.5 In practice, for the majority of the construction activities, high-noise works will take place at farther distances from a receptor such that construction noise levels would only likely exceed the LOAEL. As exceedances of the LOAEL are likely to occur throughout the construction programme, all reasonable steps will be taken to mitigate and minimise the effects through adoption of BPM.

14.8.6 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.

14.8.7 Typical construction noise levels across the overall duration of the construction programme will likely be limited to a low magnitude impact. For receptors of high sensitivity this equates to a moderate adverse effect which is not significant.

Construction and Decommissioning Traffic Noise

14.8.8 18hr 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 13 – Transport and Access**. The predicted noise level and change in average daytime level is shown in Table 14.16.

Table 14.16 Traffic Noise Assessment Table

Receptor Ref	Associated Green Hll Site	Representative Noise Level L_{Aeq}, dB	Predicted Construction Traffic Noise		
			Do Minimum (L_{Aeq}, dB)	Do Something (L_{Aeq}, dB)	Change in Noise Level (dB)
A001	A	64.4	48.8	48.9	0.1
A002	A	64.4	56.9	56.9	0
A003	A	64.4	54.1	54.1	0
A004	A	57.1	54.1	54.1	0
A005	A	57.1	49.3	49.4	0.1
A006	A	57.1	63.5	63.7	0.2
A007	A	57.1	54.6	54.6	0
A008	A	57.1	67.4	67.4	0
A009	A	58.6	63.1	63.1	0
A010	A	49.7	55.6	55.7	0.1
A011	A	49.7	58.7	58.8	0.1
A012	A	64.4	58.4	58.4	0
A015	A2	60.3	79.2	79.2	0
A016	A2	60.3	65.5	65.5	0
A017	A2	60.3	51.6	51.6	0
B020	B	43.7	27.9	27.9	0
B021	B	61.7	34.8	34.8	0
B022	B	51.9	38.6	38.6	0
B023	B	51.9	36.3	36.3	0
B024	B	51.9	36.7	36.7	0
B025	B	43.7	23.4	23.4	0
B026	B	43.7	24.4	24.4	0
B027	B	43.7	26.6	26.6	0
C030	C	57.1	46.1	46.4	0.3
C031	C	47.6	47.4	47.7	0.3
C032	C	53.5	56.8	57.1	0.3
D040	D	46.7	58.4	58.8	0.4
D041	D	53.5	54.8	55.2	0.4
D042	D	46.7	56.4	56.7	0.3
D043	D	52.8	55.4	55.7	0.3
D044	D	41.8	57.1	57.4	0.3
D045	D	52.8	54.5	54.7	0.2
E050	E	41.8	55.8	56.1	0.3
E051	E	57.5	48.1	48.4	0.3

Receptor Ref	Associated Green Hll Site	Representative Noise Level L_{Aeq}, dB	Predicted Construction Traffic Noise		
			Do Minimum (L_{Aeq}, dB)	Do Something (L_{Aeq}, dB)	Change in Noise Level (dB)
E052	E	47.1	50.2	50.5	0.3
E053	E	53.5	46.9	46.9	0
E054	E	60.7	49.8	49.8	0
E055	E	53.5	69.1	69.1	0
E056	E	60.7	70.6	70.7	0.1
E057	E	53.5	55.6	55.6	0
E058	E	60.7	57.5	57.5	0
E059	E	53.5	69.1	69.1	0
E060	E	60.7	70.8	70.7	-0.1
E061	E	53.5	56.9	56.9	0
E062	E	43.6	58.4	58.4	0
E063	E	37.3	68.1	71.7	3.6
E064	E	43.6	70.3	73.7	3.4
F070	F	54.7	54.5	54.5	0
F071	F	54.7	63.6	63.6	0
F072	F	54.7	43.1	43.1	0
F073	F	54.7	49.5	49.6	0.1
F074	F	54.7	65.2	65.2	0
F075	F	54.7	64.9	64.9	0
F076	F	54.7	54.2	54.2	0
F077	F	54.7	72.2	72.2	0
F078	F	43.7	47.1	47.1	0
F079	F	43.7	47.7	47.7	0
F080	F	43.7	47.7	47.8	0.1
F081	F	55.4	47.2	47.2	0
F082	F	55.4	58.2	58.3	0.1
F083	F	55.4	59.3	59.3	0
F084	F	55.4	55	55	0
G090	G	64	28	28	0
G091	G	57.5	16	16	0
G092	G	63.1	20.5	20.5	0

Construction Vibration

14.8.9 BS 5228-2 refers to the Transport Research Laboratory (TRL) report 429 'Groundborne Vibration Caused by Mechanised Construction Works' (2000). Figure 50 of the TRL report indicates that ground vibration from miscellaneous vehicle operations on construction sites (including scrapers,

rollers, dumpers, breakers, dozers and HGVs) are in the region of 1 mm/s PPV at approximately 10m, decreasing to the region of 0.1 mm/s PPV at approximately 50m.

14.8.10 Actual vibration levels from works are dependent on a number of factors including ground conditions, plant or vehicle size, the nature of the works (in particular piling methods), the speed of HGV movements and the quality of surface of haul or other temporary roads. Based on the assumed HGV speeds on access routes and regular maintenance of access route road surfaces, vibration from vehicles on the access roads will be minimised.

14.8.11 BS 5228-2 indicates that impact or vibratory piling activities generally only generate vibration impacts when they are located less than 20m from sensitive locations. The impact depends on the type of piling, ground conditions, and receptor distance. Vibration from smaller scale push piling techniques, which are proposed be used for the installation of solar module mounting structures, are generally limited to 1mm/s for distances up to 10m.

14.8.12 Based on the distances between the Sites and surrounding receptors to locations where heavy ground works (excavation, push piling) may take place, it is considered that vibration from construction works experienced at sensitive receptors will be below the LOAEL and therefore limited to very low adverse magnitude impacts as per the criteria in Table 15-5. For receptors of high sensitivity this would be equivalent to a moderate effect, which is not significant.

14.8.13 Vibration levels from activities (including on-site works and construction HGV traffic) are anticipated to be below the level at which there is any potential for cosmetic damage to structures as per the criteria in Table 15.6 and as such is a negligible effect which is not significant.

14.8.14 It is considered that any periods of construction vibration experienced at a receptor would be unlikely to 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.

Significance of Effect

14.8.15 Table 14.11 shows that the maximum change in noise level from construction noise, which includes traffic noise, is predicted to be +3.6 dB at E063 receptor, equivalent to a moderate adverse effect, which is not significant. It should be noted that due to the availability of construction traffic data, the assessment has been modelled as a worst case and will be reassessed in the ES.

Operation

Noise from Proposed Solar and BESS Equipment

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

14.8.17 The manufacturer's data does not contain octave-band data; therefore, a typical frequency spectrum has been applied. The octave-band source data used within the modelling is presented in Table 14.17.

Table 14.17 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

14.8.18 All Sites within 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

14.8.19 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.

14.8.20 No octave-band data is yet available for the substation equipment at the time of writing; therefore, a typical spectrum has been applied and adjusted to a level of 88 dB.

Table 14.18 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

14.8.21 The Scheme includes a Battery Energy Storage System (BESS).

14.8.22 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 14.18 BESS 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

14.8.23 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.

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

14.8.25 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.

14.8.26 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 PV Panels and the air temperature. Therefore, no intermittency penalty (which may increase the perceptibility of plant) has been applied.

Noise Modelling Methodology

14.8.27 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. CadnaA (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.

14.8.28 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).

14.8.29 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.

14.8.30 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 actual night-time noise levels are likely to be significantly lower.

Table 14.19 Operational Noise Assessment Table

Receptor Ref	Associated Green Hill Site	Time Period	Representative Noise Level L_{A90}, dB	Predicted Operational Noise (L_{Aeq}, dB)	Change in Noise Level (dB)
A001	A	Daytime (07:00 – 23:00)	32	23.9	-8.1
		Night-time (23:00 – 07:00)	34	27.2	-6.8
A002	A	Daytime (07:00 – 23:00)	32	21.1	-10.9
		Night-time (23:00 – 07:00)	34	19.8	-14.2
A003	A	Daytime (07:00 – 23:00)	32	20.6	-11.4
		Night-time (23:00 – 07:00)	34	22.5	-11.5
A004	A	Daytime (07:00 – 23:00)	42	20.9	-21.1
		Night-time (23:00 – 07:00)	38	21.9	-16.1
A005	A	Daytime (07:00 – 23:00)	42	20.9	-21.1
		Night-time (23:00 – 07:00)	38	23.4	-14.6
A006	A	Daytime (07:00 – 23:00)	42	23.9	-18.1
		Night-time (23:00 – 07:00)	38	25.6	-12.4
A007	A	Daytime (07:00 – 23:00)	42	20	-22
		Night-time (23:00 – 07:00)	38	21.1	-16.9
A008	A	Daytime (07:00 – 23:00)	42	23	-19
		Night-time (23:00 – 07:00)	38	23.9	-14.1

Receptor Ref	Associated Green Hill Site	Time Period	Representative Noise Level L_{A90}, dB	Predicted Operational Noise (L_{Aeq}, dB)	Change in Noise Level (dB)
A009	A	Daytime (07:00 – 23:00)	32	20.1	-11.9
		Night-time (23:00 – 07:00)	33	22.1	-10.9
A010	A	Daytime (07:00 – 23:00)	42	34.4	-7.6
		Night-time (23:00 – 07:00)	36	34.8	-1.2
A011	A	Daytime (07:00 – 23:00)	42	33.8	-8.2
		Night-time (23:00 – 07:00)	36	34.6	-1.4
A012	A	Daytime (07:00 – 23:00)	32	23.9	-8.1
		Night-time (23:00 – 07:00)	34	25.1	-8.9
A015	A.2	Daytime (07:00 – 23:00)	32	22.9	-9.1
		Night-time (23:00 – 07:00)	32	20.5	-11.5
A016	A.2	Daytime (07:00 – 23:00)	32	26.5	-5.5
		Night-time (23:00 – 07:00)	32	23.3	-8.7
A017	A.2	Daytime (07:00 – 23:00)	32	19.1	-12.9
		Night-time (23:00 – 07:00)	32	20	-12
B020	B	Daytime (07:00 – 23:00)	31	28.2	-2.8
		Night-time (23:00 – 07:00)	36	28.6	-7.4
B021	B	Daytime (07:00 – 23:00)	44	17.5	-26.5
		Night-time (23:00 – 07:00)	34	20.7	-13.3
B022	B	Daytime (07:00 – 23:00)	32	9.2	-22.8
		Night-time (23:00 – 07:00)	34	14.1	-19.9
B023	B	Daytime (07:00 – 23:00)	32	26.9	-5.1
		Night-time (23:00 – 07:00)	34	27.2	-6.8
B024	B	Daytime (07:00 – 23:00)	32	20.4	-11.6
		Night-time (23:00 – 07:00)	34	21.2	-12.8
B025	B	Daytime (07:00 – 23:00)	31	17.7	-13.3
		Night-time (23:00 – 07:00)	36	18	-18
B026	B	Daytime (07:00 – 23:00)	31	20.5	-10.5
		Night-time (23:00 – 07:00)	36	21.4	-14.6
B027	B	Daytime (07:00 – 23:00)	31	27.4	-3.6
		Night-time (23:00 – 07:00)	36	27.6	-8.4
C030	C	Daytime (07:00 – 23:00)	35	27.6	-7.4
		Night-time (23:00 – 07:00)	32	30.7	-1.3
C031	C	Daytime (07:00 – 23:00)	35	31.5	-3.5
		Night-time (23:00 – 07:00)	32	32.8	0.8
C032	C	Daytime (07:00 – 23:00)	42	19.3	-22.7
		Night-time (23:00 – 07:00)	36	20.6	-15.4

Receptor Ref	Associated Green Hill Site	Time Period	Representative Noise Level L_{A90}, dB	Predicted Operational Noise (L_{Aeq}, dB)	Change in Noise Level (dB)
D040	D	Daytime (07:00 – 23:00)	35	28.3	-6.7
		Night-time (23:00 – 07:00)	32	30.3	-1.7
D041	D	Daytime (07:00 – 23:00)	35	27	-8
		Night-time (23:00 – 07:00)	32	28.9	-3.1
D042	D	Daytime (07:00 – 23:00)	36	22.2	-13.8
		Night-time (23:00 – 07:00)	30	25.8	-4.2
D043	D	Daytime (07:00 – 23:00)	36	21	-15
		Night-time (23:00 – 07:00)	30	23.8	-6.2
D044	D	Daytime (07:00 – 23:00)	32	19.2	-12.8
		Night-time (23:00 – 07:00)	31	20	-11
D045	D	Daytime (07:00 – 23:00)	35	27	-8
		Night-time (23:00 – 07:00)	32	28.5	-3.5
E050	E	Daytime (07:00 – 23:00)	30	26.3	-3.7
		Night-time (23:00 – 07:00)	37	28.7	-8.3
E051	E	Daytime (07:00 – 23:00)	33	30.2	-2.8
		Night-time (23:00 – 07:00)	37	30.8	-6.2
E052	E	Daytime (07:00 – 23:00)	33	27.2	-5.8
		Night-time (23:00 – 07:00)	37	29.9	-7.1
E053	E	Daytime (07:00 – 23:00)	41	14.3	-26.7
		Night-time (23:00 – 07:00)	37	16.5	-20.5
E054	E	Daytime (07:00 – 23:00)	41	20.4	-20.6
		Night-time (23:00 – 07:00)	37	20.7	-16.3
E055	E	Daytime (07:00 – 23:00)	41	12.1	-28.9
		Night-time (23:00 – 07:00)	37	16.8	-20.2
E056	E	Daytime (07:00 – 23:00)	41	19.7	-21.3
		Night-time (23:00 – 07:00)	37	20.3	-16.7
E057	E	Daytime (07:00 – 23:00)	41	14.6	-26.4
		Night-time (23:00 – 07:00)	37	16.9	-20.1
E058	E	Daytime (07:00 – 23:00)	39	24.1	-14.9
		Night-time (23:00 – 07:00)	34	25.8	-8.2
E059	E	Daytime (07:00 – 23:00)	39	25.7	-13.3
		Night-time (23:00 – 07:00)	34	28.9	-5.1
E060	E	Daytime (07:00 – 23:00)	32	20.8	-11.2
		Night-time (23:00 – 07:00)	31	22	-9
E061	E	Daytime (07:00 – 23:00)	32	19.8	-12.2
		Night-time (23:00 – 07:00)	31	22.5	-8.5

Receptor Ref	Associated Green Hill Site	Time Period	Representative Noise Level L_{A90}, dB	Predicted Operational Noise (L_{Aeq}, dB)	Change in Noise Level (dB)
E062	E	Daytime (07:00 – 23:00)	32	24.1	-7.9
		Night-time (23:00 – 07:00)	31	26.1	-4.9
E063	E	Daytime (07:00 – 23:00)	32	22.9	-9.1
		Night-time (23:00 – 07:00)	31	23.9	-7.1
E064	E	Daytime (07:00 – 23:00)	32	24.9	-7.1
		Night-time (23:00 – 07:00)	31	26.5	-4.5
F070	F	Daytime (07:00 – 23:00)	38	21.3	-16.7
		Night-time (23:00 – 07:00)	28	22.6	-5.4
F071	F	Daytime (07:00 – 23:00)	38	22.8	-15.2
		Night-time (23:00 – 07:00)	28	24	-4
F072	F	Daytime (07:00 – 23:00)	38	29.3	-8.7
		Night-time (23:00 – 07:00)	28	30.4	+2.4
F073	F	Daytime (07:00 – 23:00)	38	30.7	-7.3
		Night-time (23:00 – 07:00)	28	32	+4
F074	F	Daytime (07:00 – 23:00)	38	28.4	-9.6
		Night-time (23:00 – 07:00)	28	29.8	+1.8
F075	F	Daytime (07:00 – 23:00)	38	27.1	-10.9
		Night-time (23:00 – 07:00)	28	28.7	+0.7
F076	F	Daytime (07:00 – 23:00)	38	17.4	-20.6
		Night-time (23:00 – 07:00)	28	20.7	-7.3
F077	F	Daytime (07:00 – 23:00)	38	26.7	-11.3
		Night-time (23:00 – 07:00)	28	27.3	-0.7
F078	F	Daytime (07:00 – 23:00)	33	23.6	-9.4
		Night-time (23:00 – 07:00)	35	24.9	-10.1
F079	F	Daytime (07:00 – 23:00)	33	30.9	-2.1
		Night-time (23:00 – 07:00)	35	31.5	-3.5
F080	F	Daytime (07:00 – 23:00)	33	29.3	-3.7
		Night-time (23:00 – 07:00)	35	30.1	-4.9
F081	F	Daytime (07:00 – 23:00)	36	26.2	-9.8
		Night-time (23:00 – 07:00)	35	27.6	-7.4
F082	F	Daytime (07:00 – 23:00)	36	25.4	-10.6
		Night-time (23:00 – 07:00)	35	26.7	-8.3
F083	F	Daytime (07:00 – 23:00)	36	23.4	-12.6
		Night-time (23:00 – 07:00)	35	24.6	-10.4
F084	F	Daytime (07:00 – 23:00)	36	26.2	-9.8
		Night-time (23:00 – 07:00)	35	27.2	-7.8

Receptor Ref	Associated Green Hill Site	Time Period	Representative Noise Level L_{A90}, dB	Predicted Operational Noise (L_{Aeq}, dB)	Change in Noise Level (dB)
G090	G	Daytime (07:00 – 23:00)	32	26.9	-5.1
		Night-time (23:00 – 07:00)	31	28.2	-2.8
G091	G	Daytime (07:00 – 23:00)	42	21.6	-20.4
		Night-time (23:00 – 07:00)	22	23.7	+1.7
G092	G	Daytime (07:00 – 23:00)	42	22.5	-19.5
		Night-time (23:00 – 07:00)	22	23	+1
BESS001	BESS	Daytime (07:00 – 23:00)	39	36.2	-2.8
		Night-time (23:00 – 07:00)	34	36.7	+2.7
BESS001	BESS	Daytime (07:00 – 23:00)	39	34.6	-4.4
		Night-time (23:00 – 07:00)	34	35.2	+1.2
BESS001	BESS	Daytime (07:00 – 23:00)	36	38.5	+2.5
		Night-time (23:00 – 07:00)	35	39.4	+4.4
BESS001	BESS	Daytime (07:00 – 23:00)	36	34.2	-1.8
		Night-time (23:00 – 07:00)	35	34.9	-0.1
BESS001	BESS	Daytime (07:00 – 23:00)	36	31.6	-4.4
		Night-time (23:00 – 07:00)	35	32.6	-2.4
BESS001	BESS	Daytime (07:00 – 23:00)	42	30.4	-11.6
		Night-time (23:00 – 07:00)	38	30.8	-7.2

Significance of Effect

14.8.31 The assessment result shown Table 14.3.11 shows that noise levels from the Scheme are predicted to be below the existing background noise levels at the closest sensitive receptors during the daytime and up to +4 dB during the night-time, which is an indication of a Moderate/Minor effect which is not significant.

14.8.32 However, the measured existing background noise level at the monitoring locations in the assessment are below 30 dB for both daytime and night-time periods, which would be of Negligible magnitude. 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.

Decommissioning

14.8.33 The decommissioning phase will involve be very similar noise sources (i.e. construction equipment used for the deconstruction of frames and associated road traffic) to construction with similar or the same effects.

Significance of Effect

14.8.34 Noise levels during the decommissioning phase are expected to be limited to a low magnitude impact. For receptors of high sensitivity this equates to a moderate adverse effect which is not significant.

14.9 Additional Mitigation Measures

14.9.1 At this stage, no additional mitigation measures for the Scheme are considered to be required given that no significant adverse effects are expected. However, this will be investigated further within the ES.

14.9.2 No additional mitigation is required during the operational phase of Schemes/Sites/Cable Corridor due to the negligible effect from the proposed solar and BESS equipment and traffic noise.

14.10 Residual Effects

14.10.1 This section summarises the residual significant effects of the Scheme following the implementation of embedded/additional mitigation as outlined in Section 14.9 of this chapter.

14.10.2 It is anticipated that through the use of further mitigation measures (e.g. the use of enclosures, louvres and/or acoustic barriers around inverters and BESS cooling fans), operational noise from equipment associated with the scheme will result in no significant residual adverse effects.

Cumulative Effects

14.10.3 Cumulative noise effects during construction and operation 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.

14.10.4 The ES will give consideration to potential cumulative effects of the Scheme and other relevant projects within the vicinity of the Scheme on a single receptor/resource.

14.10.5 A list of cumulative projects can be found in **Volume 1, Appendix 2.2** of the PEIR, the list will be reviewed and refined in preparation of the DCO application submission through further consultation and will be presented and assessed in the ES. The preliminary cumulative effects are listed within **Chapter 25: Cumulative Effects** of the ES.

14.11 Cumulative effects

14.11.1 The cumulative effects of noise and vibration generated from the Scheme will be fully assessed in the ES.

In-combination effects

14.11.2 The in-combination effect interaction is the effect over and above the individual effects assessed in other chapters and is described as the difference between the change caused to a receptor from one effect alone and the change caused to the receptor from all effects combined.

14.11.3 The review of other topics assessments has concluded that there is no potential for significant effect interactions on noise and vibration receptors as a result of the Scheme at this stage.

14.12 Summary

14.12.1 This chapter of the PEIR has identified the existing environment in relation to noise and vibration and the assessment work that has been undertaken to date including baseline environmental noise surveys, construction noise and traffic assessments, and operational noise and traffic assessments.

14.12.2 Mitigation measures including noise management plans will be developed during the ES phase and have been described with potential residual effects outlined.

14.12.3 The ES will fully assess the noise and vibration effects of the construction, operational, and decommissioning activities from the Scheme.

References

Ref.1 British Standards Institute (BSI). (2003). BS 7445:2003. Description and Measurement of Environmental Noise. United Kingdom.

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Ref.9 World Health Organisation (WHO). (1999). Guidelines for Community Noise.