SUNNICA ENERGY FARM

EN010106

Volume 1

Environmental Statement

6.1 Chapter 11: Noise and Vibration

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Sunnica Energy Farm

Environmental Statement
Chapter 11: Noise and Vibration

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11 Noise and Vibration

11.1 Introduction

11.1.1 This chapter of the Environmental Statement (ES) presents the findings of an assessment of the likely significant effects from noise and vibration as a result of the Scheme. For more details about the Scheme, refer to **Chapter 2: Scheme Location** and **Chapter 3: Scheme Description** of this Environmental Statement **[EN010106/APP/6.1]**.

11.1.2 This chapter identifies and proposes measures to address the potential impacts and likely significant effects of the Scheme on noise and vibration, during the construction, operation, and decommissioning phases of the Scheme.

11.1.3 It assesses noise and vibration effects on human receptors and excludes assessment of noise and vibration on ecological or heritage receptors. In-combination effects on local ecological or heritage receptors due to noise from the introduction of the Scheme are assessed in **Chapter 7: Cultural Heritage** and **Chapter 8: Ecology and Nature Conservation** of this Environmental Statement **[EN010106/APP/6.1]**.

11.1.4 This chapter is supported by the following appendices in **Volume 2** of this Environmental Statement **[EN010106/APP/6.2]:**

a. Appendix 11A: Relevant Legislation and Planning Policy
b. Appendix 11B: Acoustic Terminology
c. Appendix 11C: Baseline Noise Survey
d. Appendix 11D: Construction Noise Modelling
e. Appendix 11E: Operation Noise Modelling

11.1.5 This chapter is supported by the following figures in **Volume 3** of this Environmental Statement **[EN010106/APP/6.3]:**

a. Figure 11-1: Noise Receptor Locations and Noise Monitoring Positions
b. Figure 11-2: Noise Contour Plot – Construction Plant Noise
c. Figure 11-3: Noise Contour Plot – Construction Traffic Noise
d. Figure 11-4: Noise Contour Plot – Operational Noise

11.2 Legislation and Planning Policy

11.2.1 **Appendix 11A** of this Environmental Statement **[EN010106/APP/6.2]** identifies the legislation, policy, and guidance of relevance to the assessment of significant noise and vibration effects of the Scheme.

11.2.2 In developing this assessment, it is noted that consideration needs to be given to effects with reference to EIA assessment methodology, but which also has regard to the requirements of noise policy and the concepts of LOAEL and SOAEL, as considered in the Noise Policy Statement for

England (NPSE), particularly in relation to ensuring that there are no 'significant adverse effects on health and quality of life'.

11.2.3 As such this chapter, and **Chapter 15: Human** Health has had regard to effects that might not be significant in EIA noise terms, but may be in policy terms if they are at or above SOAEL (i.e. where there may be *"significant adverse effects on health and quality of life"*). Further consideration of health effects is presented in **Chapter 15: Human Health** of this Environmental Statement **[EN010106/APP/6.1]**, which concludes no significant adverse health impacts arising from the Scheme when considering the interaction of air quality, noise and neighbourhood amenity effects reported across the ES.

11.3 Assessment Assumptions and Limitations

11.3.1 The measured ambient sound levels (taken in November 2019) have been considered as representative of the future baseline scenarios, with construction anticipated to commence in 2023 at the earliest with a peak in 2024, operation to commence in at the earliest in 2025, and decommissioning assumed to commence in 2065. Baseline noise measurements were undertaken in November 2019 and as such were prior to any lockdown measures for the coronavirus outbreak (implemented from March 2020) which may have temporarily changed the local ambient noise environment. There have been no changes in the study area since the ambient sound monitoring in November 2019 and therefore this data is considered still valid for the purpose of determining present-day noise levels[1].

11.3.2 Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort has been made such that measurements were undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions, and school holiday periods (which are often considered to result in atypical sound levels). However, a small degree of uncertainty will always remain in the values taken from such a measurement survey. Details of the baseline noise survey methodology and results are presented in **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2].**

11.3.3 Construction noise predictions have been undertaken based on the construction plant schedules and noise modelling methodology presented in **Appendix 11D** of this Environmental Statement **[EN010106/APP/6.2]**.

11.3.4 Predictions have been undertaken using BS 5228:2014+A1:2019 'Code of practice for noise and vibration control on construction and open sites' (Ref 11-1) methodologies. Noise predictions were carried out to represent a conservative scenario where construction plant is located within the Order

[1] Please see section 11.11 for consideration of on-going developments adjacent to the proposed Burwell National Grid Substation Extension.

land nearest to the identified receptors and does not take into account quieter periods when limited activities take place, or when works take place at farther distances across the Scheme. Construction noise predictions are therefore considered to be a reasonable likely worst case, representative of works associated with construction of the Scheme as well as any compound areas across the Order Limits.

11.3.5 Noise effects during the decommissioning phase of the Scheme will be similar or less than noise effects during the construction phase. The noise assessment presented for the construction phase is therefore considered representative (or an overestimate) of the decommissioning phase. As such a separate assessment for noise from the decommissioning phase is not included.

11.3.6 Noise predictions of construction vehicle movements have been undertaken based on vehicle and traffic data provided as part of the assessments carried out in **Chapter 13: Transport and Access** of this Environmental Statement **[EN010106/APP/6.1]**. Details of construction vehicle data and noise modelling methodology is presented in **Appendix 11D** of this Environmental Statement **[EN010106/APP/6.2]*.*** Construction traffic noise has been modelled for the roads leading to the access points for the Burwell National Grid Substation Extension, Sunnica East Site B, Sunnica West Sites A, and for areas within the Order limits. Further assessments have been carried out for construction vehicle movements accessing areas of the Scheme via rural roads.

11.3.7 **Chapter 13: Transport and Access** of this Environmental Statement **[EN010106/APP/6.1]** advises that the AM and PM Scheme peak hours during construction has been assessed as 06:00 to 07:00 and 19:00 to 20:00 respectively, which reflects the arrival and departure times of the staff. It concludes that the residual effects of construction traffic would result in no noticeable increase in traffic on the surrounding road network during the highway peak hours; with regards to noise this indicates that there will be no associated noise level increases during AM and PM peak hours. In order to provide a worst-case assessment of construction traffic noise effects, changes in noise levels due to construction traffic has been considered outside of these peak hours (i.e. during working hours of between 07:00 and 19:00 hours) when existing road traffic noise levels would be lower and construction traffic noise more noticeable.

11.3.8 Construction phase vibration has been assessed based on historic vibration measurement data from relevant guidance documents. No predictions of ground-borne vibration propagation have been undertaken.

11.3.9 The construction impacts have been assessed based on a 24 month construction programme. This is the Applicant's target and represents the shortest realistic construction period with all sites constructed concurrently, which will therefore generate the highest noise and vibration effects due to the greater number of road traffic trips and onsite construction activities needed to achieve this. Should the construction period be slightly longer, the noise and vibration effects would be extended in duration but would be expected to be lower in magnitude as it would involve less traffic

movements over a longer period. The conclusions of the construction impact assessment would therefore remain valid and represent the worst-case situation.

11.3.10 Noise predictions of the operational Scheme have been undertaken to predict the propagation of noise away from the Scheme in all directions and to quantify resultant noise levels at the identified noise sensitive receptor locations. Operational details have been based on the design principles set out in the Framework Operation Environmental Management Plan (OEMP) (see **Appendix 16F** of this Environmental Statement **[EN0101066/APP/6.2]**, the parameters shown in the drawings and plans set out in **Chapter 3: Scheme Description** of this Environmental Statement **[EN010106/APP/6.1]** and as secured through the drafting of the DCO **[EN010106/APP/3.1]** and its associated Works Plans **[EN010106/APP/2.2]**. Furthermore, details of operational noise modelling methodology and plant sound level data upon which it is based, and which are considered as robust assumptions for the typical sound levels expected from equipment used as part of the Scheme, is presented in **Appendix 11E** of this Environmental Statement **[EN010106/APP/6.2]*.***

11.3.11 The manufacturer has advised the same noise emission levels for both external and internal solar station plant designs be considered. Therefore, the noise assessment has considered both design options.

11.3.12 The location of the Burwell National Grid Substation Extension has been assessed based on the design Option 1 where it is located towards the Scheme boundary within National Grid land ownership nearest to receptors at Burwell, to present a worst-case scenario. Further discussion of this is presented in 11.8.38.

11.3.13 There is also the possibility the Battery Energy Storage System (BESS) may be built in phases throughout the life of the Scheme as the need arises. Should the BESS be built in phases then associated operational noise sources would be also introduced in phases. From a noise perspective it is worse to assume that the Scheme is built out in full prior to operation, as all associated plant will be in operation, which has been the basis of the assessment.

11.3.14 The placement of air conditioning units in relation to the BESS has been modelled as potentially on the outside of BESS units to present a worst-case scenario. Internal placement of air conditioning units and associated cooling fans will have lower noise emissions. Therefore, the noise assessment has considered both design options.

11.3.15 Noise from construction, operation and decommissioning phases will have a projected negligible effect on the setting of the heritage receptors at Chippenham Park and Chippenham Lodge and have not been further assessed in this ES. Based on its location and relative distance to the A11 and A14 highways, baseline noise levels measured at location LT3 (see Figure 11-1) are considered representative of typical noise levels at Chippenham Park (daytime 58 dB $L_{Aeq,16h}$ and night-time 54 dB $L_{Aeq,8h}$, see **Table 11-12**). The southern boundary of Chippenham Park is approximately

100m from the nearest Scheme boundary of Sunnica West Site A, and Chippenham Lodge is approximately 1km from the nearest Scheme boundary (cable route between Sunnica West Site A to Sunnica East Site B). At these distances from the Scheme, construction noise levels are estimated to be below existing ambient noise levels at Chippenham Park and Chippenham Lodge, and operational noise levels are estimated to be below 35 dB $L_{Aeq,T}$ at the same receptors (see Figures 11-2, 11-3 and 11-4).

11.3.16 Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 - HD 213/11- Revision 1: Noise And Vibration (2011) (Ref 11-7) states that: *"A change in noise level of 1dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged, and a change in noise level of 3dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow".* It is generally accepted that changes in noise levels of 1dB(A) or less are imperceptible. Due to the low level of trips associated with the operational phase of the Scheme (**Chapter 13: Transport and Access** of this Environmental Statement **[EN010106/APP/6.1]** advises that there will be 17 permanent staff on-site resulting in up to 17 additional vehicles on the road network) it is anticipated that operational traffic will result in no perceptible changes to overall road traffic noise levels across the study area. As such no further assessment of operational traffic is included in this ES.

11.3.17 No major vibration sources are envisaged to be introduced as part of the Scheme and as such there will be no associated operational vibration effects. No further assessment of operational vibration is included in this ES.

11.4 Assessment Methodology

Study Area and Sensitive Receptors

11.4.1 For the purposes of providing an assessment of likely significant noise effects the Study Area for the ES has been determined by receptors within 500m of the Order limits. The distance of 500m has been determined based on feedback from the scoping process. It is considered that receptors further than 500m will experience considerably lower levels of noise and vibration emissions as these will attenuate over distance, resulting in negligible noise and vibration effects from the Scheme; this is confirmed by the modelling outputs (noise contour plots for construction and operational phases are presented in Figure 11-2, Figure 11-3 and Figure 11-4 and summaries of predicted noise levels at receptors are presented in **Table 11-14, Table 11-15, Table 11-16** and **Table 11-17**) and conclusions in this chapter.

11.4.2 The nearest identified noise-sensitive receptors to the Scheme (and approximate distances from the Order limits) are presented in Figure 11-1 and summarised in **Table 11-1**. These receptors were determined during the scoping process through an initial desktop study as those most likely to experience adverse noise and/or vibration effects and were agreed with officers from East Cambridgeshire and West Suffolk councils as part of the noise monitoring survey plans.

11.4.3 The locations of these receptors have been considered in both the construction and operational noise assessments and are considered representative of adjacent properties. Details of ecological or heritage receptors that may be affected by noise from the introduction of the Scheme are presented in **Chapter 7: Cultural Heritage** and **Chapter 8: Ecology and Nature Conservation** of this Environmental Statement **[EN010106/APP/6.1]**.

Table 11-1 Sensitive receptor locations

Reference	Location	Description	Approx. distance from Order limits
R1	Weirs Grove / Hythe Ln, Burwell, Cambridge CB25 0EH	Residential properties	100m east of Burwell National Grid Substation Extension
R2	Fuller KW & Son farmhouse, Ness Farm, Ness Road B1102, Cambridge CB25 0DB	Residential properties	Adjacent to cable route
R3	Biggin Stud farmhouse, Newmarket Road A142, Fordham, Ely CB7 5WW	Residential properties	80m south of cable route
R4	The Green, Snailwell, Newmarket CB8 7LT	Residential properties	300m west of Sunnica West Site A
R5	Arran House Stud Bed & Breakfast, Norwich Road, Kennett, Newmarket CB8 7RQ	Hotel, Residential properties	100m east of Sunnica West Site A
R6	RF Tillbrook & Sons farmhouse, La Hogue Hall, Chippenham CB7 5PZ	Residential properties	250m east of Sunnica West Site A
R7	Dane Hill Farm, Newmarket, CB8 7QX	Residential properties	120m east of Sunnica West Site A
R8	Acacia Close, Red Lodge, Bury Saint Edmunds, IP28 8WS	Residential properties	450m east of Sunnica East Site B
R9	Badlingham Road, Chippenham CB7 5QQ	Residential properties	250m west of Sunnica East Site B
R10	Beck Rd, Isleham, Chippenham CB7 5QP	Residential properties	500m west of Sunnica East Site A

Reference	Location	Description	Approx. distance from Order limits
R11	East View, Freckenham. Bury Saint Edmunds, IP28 8HJ *(Note that this receptor is greater than 500m from Scheme boundary but was included due to potential combined noise impacts from both Sunnica East Site A and B)*	Residential properties	700m south of Sunnica East Site A , and 1.2km west of Sunnica East Site B
R12	Walnut Grove, Freckenham Road B1102, Worlington, Bury Saint Edmunds IP28 8SJ	Residential properties	200m north of Sunnica East Site B

Baseline noise surveys

11.4.4 Baseline noise monitoring has been carried out to establish the existing noise climate in the area. The monitoring procedures followed guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' (Ref 11-2) and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (Ref 11-3). All noise measurements included $L_{Aeq,T}$ and $L_{A90,T}$ sound level indicators.

11.4.5 Details of the methodology and results of baseline surveys are presented in **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2].**

11.4.6 Long-term (LT) unattended noise measurements were undertaken between the 5th to 19th November 2019. Short-term (ST) attended noise measurements were undertaken during the setup of the long-term monitors on the 5th and 12th November 2019. A weather station was set up at LT1 and LT5 for the duration of the noise survey so any periods of adverse weather conditions could be identified and omitted from noise data.

11.4.7 Monitoring locations are shown in Figure 11-1 and summarised in **Table 11-2** and have been agreed with officers from East Cambridgeshire and West Suffolk councils. Based on their surroundings and relative distance to nearby sound sources (in particular road traffic), the monitoring locations have been allocated as representative of the local noise environment at each of the various noise-sensitive receptors (shown in **Table 11-1**).

Table 11-2 Noise monitoring locations

Reference	Measurement Type	Dates	Representative of receptor
LT1	Long-term unattended noise (including frequency spectrum data) and weather (wind, temperature, rainfall)	05/11/2019-12/11/2019	R1
LT2	Long-term unattended noise	05/11/2019-08/11/2019	R3

Reference	Measurement Type	Dates	Representative of receptor
		Measurement finished early due to equipment damage although suitable data collected to establish noise climate at this location.	
LT3	Long-term unattended noise	05/11/2019-12/11/2019	R4
LT4	Long-term unattended noise	05/11/2019-12/11/2019	R5, R6, R7
LT5	Long-term unattended noise and weather (wind, temperature, rainfall)	12/11/2019-19/11/2019	R8
LT6	Long-term unattended noise	12/11/2019-19/11/2019	R10
LT7	Long-term unattended noise	12/11/2019-14/11/2019 Measurement finished early due to resident request although suitable data collected to establish noise climate at this location.	R9, R11
LT8	Long-term unattended noise	05/11/2019-12/11/2019	R12
ST1	Short-term attended noise, daytime Evening/night time measurements not taken as cable works not taking place during those periods and no associated operational effects with the cable route.	05/11/2019 12:00-15:00	R2
ST2	Short-term attended noise, daytime Taken in lieu of a long-term measurement as no safe/secure locations to leave equipment available. LT7 has been used as a representation location for ST2 and receptor R9.	12/11/2019 12:00-15:00	R9

Receptor Sensitivity

11.4.8 Sensitive receptors as listed in **Table 11-1** have been classed depending on their use and subsequent sensitivity to noise and vibration. The sensitivity of receptors to noise and vibration has been defined in **Table 11-3**.

Table 11-3 Receptor Sensitivity

Sensitivity	Description	Examples of receptor usage
Very High	Receptors where noise will significantly affect the function of a receptor.	• Auditoria/studios; • Specialist medical/teaching centres; and • Libraries.
High	Receptors where people or operations are particularly susceptible to noise.	• Residential and student accommodation; • Hotels; • Places of worship; • Conference facilities; • Schools in daytime; and • Hospitals/residential care homes.
Medium	Receptors of low sensitivity to noise, where it may cause some distraction or disturbance.	• Liveries, stables and racing schools; [2] • Offices; • Restaurants; and • Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf).
Low	Receptors where distraction or disturbance from noise is minimal.	• Residences and other buildings not occupied during working hours; • Factories and working environments with existing high noise levels; and • Sports grounds when spectator or noise is a normal part of the event.

11.4.9 Receptors R1 to R12 comprise a hotel and residential properties; as such they are of high sensitivity.

11.4.10 Noise impacts during construction, operation, or decommissioning phases on users of Public Rights of Way (PRoW) will be managed according to the wider approach set out in the Framework Construction Environmental Management Plan (CEMP) (see **Appendix 16C** of this Environmental Statement **[EN010106/APP/6.2]**) and the Framework OEMP (see **Appendix 16F** of this Environmental Statement **[EN0101066/APP/6.2]**.

11.4.11 There are several PRoWs on or abutting the Scheme and further details of PRoW locations and assessment of impacts upon them are set out in **Chapter 12: Socio-Economic and Land Use** of this Environmental Statement **[EN010106/APP/6.1]**. Any noise experienced by PRoW users will be limited to when they are in proximity to the Scheme; when they are sufficiently far from the Scheme they would not be affected by noise from

[2] Note to table: Assigned 'medium' as these receptors are considered less sensitive to noise since they are not subject to sleeping/listening/teaching scenarios which would be assigned as 'high'. There are no relevant design criteria for noise in these uses so this is based on professional judgement.

construction, operation, or decommissioning phases. As such, PRoW users have not been considered in this assessment as sensitive receptors due to the transient nature of users and that they will not be subject to long-term noise exposure that would result in health impacts.

11.4.12 Note that, as discussed in section 11.4.3, the assessment of noise effects on ecological or built heritage receptors is outside the scope of this chapter and have been assessed in other chapters where appropriate.

Construction and Decommissioning Noise

11.4.13 Annex E of BS 5228-1 provides example methods for the assessment of the significance of construction noise effects. Assessment criteria for magnitude of impact due to construction noise is presented in **Table 11-4**.

11.4.14 The LOAEL and SOAEL thresholds have been set as follows.

a. Weekdays (07:00 – 19:00) and Saturday mornings (07:00 – 13:00)
   i. LOAEL: 65 dB $L_{Aeq,T}$ / SOAEL: 75 dB $L_{Aeq,T}$
b. Saturday afternoons (13:00 – 19:00)
   i. LOAEL: 55 dB $L_{Aeq,T}$ / SOAEL: 65 dB $L_{Aeq,T}$

Table 11-4 Criteria for magnitude of impacts for construction and decommissioning noise

Magnitude of Impact	Construction noise level at façade of receptor, $L_{Aeq,T}$	
	Weekdays (07:00-19:00) and Saturday mornings (07:00-13:00)	Saturday afternoons (13:00-19:00)
Very Low	< 65 dB	< 55 dB
Low	≥ 65 dB to < 70 dB	≥ 55 dB to < 60 dB
Medium	≥ 70 dB to < 75 dB	≥ 60 dB to < 65 dB
High	≥ 75 dB	≥ 65 dB

Construction and Decommissioning Vibration (including Traffic)

11.4.15 BS 5228-2 provides further guidance on the perception of vibration within occupied buildings. This provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration, which has been considered for plant items and vehicle movements.

11.4.16 **Table 11-5** details Peak Particle Velocity (PPV) levels, a standard measure of vibration effects, and their potential effect on humans and provides a semantic scale for description of construction and demolition vibration impacts on human receptors. For assessment purposes, and further to BS 5228, the LOAEL has been set at 0.3mm/s and the SOAEL at 1.0mm/s during the daytime. Due to construction working hours being daytime only, evening and night-time disturbance is not likely.

Table 11-5 Criteria for of magnitude impacts for construction and decommissioning vibration (human response)

Magnitude of Impact	PPV Vibration Level	BS 5228-2 Description of Impact
Very Low	< 0.3 mm/s	"Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration."
Low	≥ 0.3 to < 1.0 mm/s	"Vibration might be just perceptible in residential environments." *
Medium	≥ 1.0 to < 10 mm/s	"It is likely that vibration of this level in residential environments will cause complaint, but it can be tolerated if prior warning and explanation has been given to residents."
High	≥ 10 mm/s	"Vibration is likely to be intolerable for any more than a very brief exposure to this level."

* Note to table: This includes similar uses e.g. hotels, bed and breakfasts

11.4.17 The recommended PPV vibration limits for transient vibration, above which cosmetic damage could occur for different types of buildings are provided in BS 5228-2 and presented in **Table 11-6**. For these limits, 'minor damage' is possible at vibration magnitudes that are greater than twice those given in **Table 11-6**, and 'major damage' can occur at values greater than four times the tabulated values. Consequently, the significance of effect has been provided based on the sensitivity of a building to vibration induced cosmetic damage.

Table 11-6 Transient vibration guide values for cosmetic damage (building response)

Type of building	Peak component particle velocity in frequency range of predominant pulse, at which cosmetic damage could occur (see Notes 1-4)	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures, Industrial and heavy commercial buildings	50mm/s at 4Hz and above	50mm/s at 4Hz and above
Unreinforced or light framed structures, Residential or light commercial buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50 mm/s at 40 Hz and above

Note 1: A potential negligible effect (not significant) is indicated at vibration levels up to the threshold values.

Note 2: A potential minor adverse effect (not significant) is indicated at vibration levels up to a magnitude of twice the threshold values.

Note 3: A potential moderate adverse effect (significant) is indicated at vibration levels up to a magnitude of four times the threshold values.

Note 4: A potential major adverse effect (significant) is indicated at vibration levels equal to or greater than a magnitude of four times the threshold values.

11.4.18 Given that criteria in **Table 11-6** relate to the risk of cosmetic damage, they are dependent on the type of building and its physical sensitivity to vibration. The criteria presented relate to the potential for cosmetic damage, not structural damage; cosmetic damage would precede the onset of any structural damage.

Construction and Decommissioning Traffic Noise

11.4.19 Construction and decommissioning traffic noise have been assessed taking into account the total of potential maximum vehicle movements across the entire construction programme. **Chapter 3: Scheme Description** of this Environmental Statement **[EN010106/APP/6.1]** identifies peak construction vehicle movements during month 2 of the programme, and as such the construction traffic noise predictions presented in this section may be an overestimate and therefor present a worst-case scenario.

11.4.20 Predicted construction traffic noise has been added to measured ambient noise levels at each receptor location so a potential change in noise can be derived. The temporary changes in road traffic noise levels along the local road network due to construction traffic have been assessed based on guidance from the Institute of Environmental Management and Assessment (IEMA) Guidelines for environmental noise impact assessment (2014) (Ref 11-5). Assessment criteria are presented in **Table 11-7**. For assessment purposes the LOAEL has been set as an increase of 1dB and the SOAEL as an increase of 3dB.

Table 11-7 Criteria for of magnitude impacts for construction and decommissioning traffic noise

Magnitude of Impact	Difference between pre-baseline and construction traffic noise levels, $L_{Aeq,T}$
Very Low	≥ 0dB and < 1dB
Low	≥ 1dB and < 3dB
Medium	≥ 3dB and < 5dB
High	≥ 5dB

Operational Noise

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

a. Background sound level – $L_{A90,T}$ – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels;

b. Specific sound level – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr; and

c. Rating level – $L_{Ar,Tr}$ – the specific sound level plus any adjustment made for the characteristic features of the noise.

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

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

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

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

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

11.4.23 BS4142 also advises *"where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."* As such where any excesses of the background level are identified, further consideration will be made for the absolute level of the sound source and potential effects on residential amenity.

11.4.24 The assessment criteria for noise from fixed plant installations are presented in **Table 11-8**, following guidance from BS 4142. This applies to daytime and night-time periods. For assessment purposes, the LOAEL has been set as a rating level equal to the background level and the SOAEL as a rating level 10dB above the background level.

Table 11-8 Criteria for of magnitude impacts for fixed plant noise

Magnitude of Impact	Difference between rating level[1] and background level[2]
Very Low	< 0dB
Low	≥ 0dB and < 5dB
Medium	≥ 5dB and < 10dB
High	≥ 10dB

1 - The rating level is the noise level attributable to the new source(s), plus penalties if the new source has tonal or intermittent characteristics;

2 - The background level is taken as the L_{A90}; this is the ambient noise level in the absence of the source which is exceeded for 90% of the time.

Significance Criteria

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

a. Adverse - detrimental or negative effects to an environmental resource or receptor;

b. Negligible - imperceptible effects to an environmental resource or receptor; or

c. Beneficial - advantageous or positive effects to an environmental resource or receptor.

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

a. Minor - slight, very short or highly localised effect;

b. Moderate - limited effect (by extent, duration or magnitude), which may be important at a local scale; or

c. Major - considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

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

a. Short-term - period with regular daily noise and/or vibration events lasting for no longer than one month;

b. Medium-term - period with regular daily noise and/or vibration events lasting for no longer than six months; or

c. Long-term - period with regular daily noise and/or vibration events lasting for longer than six months.

11.4.28 The magnitude of impact for each receptor (identified further to the categories of magnitude set out in Tables 11-4 to 11-4) is considered against its sensitivity to determine the significance of effect in accordance with the matrix presented in **Table 11-9**. This aligns with the methodology in **Chapter 5: EIA Methodology** of this Environmental Statement **[EN010106/APP/6.1]**.

Table 11-9 Classification of effects

Sensitivity of receptor	Magnitude of impact			
	High	Medium	Low	Very Low
Very High	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

11.4.29 Generally, effects determined to be negligible or minor are considered to be not significant in EIA terms, whereas effects classed from moderate to major adverse are considered to be significant.

11.5 Stakeholder Engagement

11.5.1 Consultation undertaken to date in relation to noise and vibration is outlined in the Consultation Report **[EN010106/APP/5.1]** which is a separate report that is submitted along with the DCO application.

11.5.2 **Table 11-10** outlines the matters raised within the Scoping Opinion and how these have been addressed through the ES in relation to noise and vibration.

Table 11-10 Main matters raised within the Scoping Opinion

Consultee	Matter raised	Response
East Cambridgeshire District Council Suffolk County Council / West Suffolk Council	Construction traffic noise should be duly considered.	Construction traffic has been assessed in section 11.8.16 to 11.8.24.

Consultee	Matter raised	Response
Suffolk County Council / West Suffolk Council	A 500m limit for the Burwell Substation Extension construction noise study area may be more appropriate.	This has been adopted in the noise study area for this ES; see section 11.4.1.
Suffolk County Council / West Suffolk Council	Confirmation is required that noise and vibration from construction traffic has been scoped out and justification for this decision.	Construction traffic has been assessed in section 11.8.16 to 11.8.24. Assessment of construction traffic vibration has been included in section 11.8.9 to 11.8.15.
Suffolk County Council / West Suffolk Council	I agree with the proposed study areas and identified noise sensitive receptors.	Noted
Suffolk County Council / West Suffolk Council	The construction period is expected to last up to 2 years with the majority of construction works completed in 2023. There is potential for construction to last 3 years if a slower phased construction plan is implemented.	The assessment of likely significant construction noise and vibration effects is based on the best available information and is considered to represent a reasonable worst-case scenario as it will lead to more plant operating simultaneously and higher offsite daily road trips. The impact of a slower construction period is discussed in section 11.3.9.
Suffolk County Council / West Suffolk Council	During the construction stage, the applicant proposes a Construction Environment Management Plan (CEMP) in part to reduce nuisance due to noise and vibration during the construction of the site(s). This will include best practicable means measures such as temporary noise barriers or localised enclosures.	The Framework Construction Environmental Management Plan (CEMP) (see **Appendix 16C** of this Environmental Statement **[EN010106/APP/6.2]**) covers mitigation measures representing Best Practicable Means.
Suffolk County Council / West Suffolk Council	The applicant proposes to assess noise and vibration from construction using the methods given in BS 5228:2009 parts 1 and 2. I agree that this is an appropriate assessment method. The noise limits recommended in Annex E of BS 5228-1 should be adopted for general construction noise. The ABC method described in section E.3.2 is appropriate. Alternatively, the limits given as "trigger levels" in Table E.2 could be adopted as upper limits for construction noise.	Construction and decommissioning noise assessment criteria is set out in Table 11-4. These are based on the example threshold levels from BS 5228-1 Table E.1 of Annex E.3.2 example 'ABC method' and Table E.2 of Annex E.4 'Example of thresholds used to determine the eligibility for noise insulation and temporary rehousing'. The alternative proposal is therefore not required.
Suffolk County Council / West Suffolk Council	Construction vibration should be assessed where it may be perceptible at receptors close to works, following guidance from Table B.1 of BS 5228-2.	Vibration effects during construction or decommissioning stages have been assessed following BS 5228-2 guidance. See section 11.8.9 to 11.8.15.

Consultee	Matter raised	Response
Suffolk County Council / West Suffolk Council	It shall be a requirement in the CEMP for vibration levels to be monitored at agreed sensitive locations for compliance with guidance levels in BS 5228 and, if required, appropriate mitigation adopted.	Significant vibration effects during construction or decommissioning stages are not expected (see section 11.8.9 to 11.8.15) and no additional mitigation, enhancement or monitoring measures are considered to be required. Good industry standard measures have been incorporated into the embedded design measures which are discussed in section 11.7.2.
Suffolk County Council / West Suffolk Council	Noise from proposed permanent plant must be assessed using methods given in BS4142:2014.	Operational plant noise has been assessed following BS4142:2014+A1:2019 guidance; see section 11.8.25 to 11.8.39.
Suffolk County Council / West Suffolk Council	A baseline noise survey is required to establish the existing noise levels at all identified receptors.	A baseline noise survey has been undertaken, and methodology has been agreed with the environmental health officers for West Suffolk Council and East Cambridgeshire Council; see sections 11.4.4 to 11.4.7. For receptors close to sites where operational noise may be expected, long-term noise monitoring has been carried out at positions representative of surrounding noise-sensitive receptors (R1, R3-R12) to establish background noise levels during day and night-time periods over both weekdays and weekends. Short-term attended noise monitoring / sample measurements of overall duration three hours was carried out at receptors R2 and R9. This comprised of three 1-hour duration measurements taken in consecutive hours. Details of the baseline noise survey methodology and results are presented in **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2].**
Suffolk County Council / West Suffolk Council	As construction is expected to occur during day-time periods only, survey work close to cabling routes could be done by attended short term measurements during proposed construction periods. A minimum of 3 representative measurements must be taken at each receptor (in consecutive hours for assessment periods longer than 1 hour) to represent the proposed assessment period.	
Suffolk County Council / West Suffolk Council	For receptors close to sites where operational noise may be expected (i.e. near Sunnica East, Sunnica West and near the Substation Extension at Burwell), long term measurements are preferable. As plant will operate 24 hours a day, 7 days a week, unattended noise loggers may be best suited to establish background noise levels during day and night-time periods over both weekdays and weekends. If sample measurements are used, they must establish the typical lowest background noise levels at each receptor and include at least 3 representative measurements at each receptor during each assessment period.	

Consultee	Matter raised	Response
East Cambridgeshire District Council (District Councillor for Burwell)	Local residents regularly complain of significant background noise pollution associated with the Burwell substation.	Complaint history and the results of subsequent investigations of noise from the Burwell substation have been discussed with the health officer for West Suffolk Council and East Cambridgeshire Council. The baseline noise survey has been tailored to consider existing noise from the Burwell substation as experienced at Burwell, which has been considered in the BS4142 assessment; see sections 11.4.4 to 11.4.7, 0 and 11.8.25 to 11.8.39. Analysis of the frequency spectrum data from long-term monitoring at Burwell is presented in **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2]**.
East Cambridgeshire District Council (District Councillor for Burwell)	From my understanding of solar farms they produce very little noise once operational. The Environmental Impact Scoping Report does mention potential noise from inverters and transformers as well as battery storage plant but does not specifically say how this will be mitigated. I am aware that other sites appear to house these units which would be one effective way of controlling any noise. I would expect the most substantial noise to occur during the construction and decommissioning of the site.	No specific noise mitigation measures have been included for operational plant, based on the output of the quantitative assessment. Section 11.8.25 to 11.8.39 shows that the modelled impacts associated with operational noise are not predicted to be significant. The wider approach to management of operational noise in the design of the Scheme is set out in **Appendix 16F: Framework Operation Environmental Management Plan** (OEMP) of this Environmental Statement **[EN0101066/APP/6.2**].
East Cambridgeshire District Council (Environmental Health Technical Officer (Domestic))	Construction times and deliveries during the construction phase should be restricted daytime hours Monday-Saturday and no working on Sundays or bank holidays.	Working hours onsite will run from 7am until 7pm Monday to Saturday. This is set out in the Framework CEMP, which will be secured through the DCO. Management of traffic (including deliveries) within the site and being let onto the highway network will be managed through a Construction Traffic Management Plan (CTMP) and secured in a requirement attached to the DCO.

Consultee	Matter raised	Response
Planning Inspectorate	Applicant's proposed matters to scope out: Operational traffic noise The Inspectorate is content that the Proposed Development is unlikely to generate large volumes of operational traffic. Therefore, significant effects from noise and vibration from traffic during operation are not anticipated and can be scoped out of the assessment. Applicant's proposed matters to scope out: Road traffic noise during construction, operational and decommissioning stages of the scheme The Scoping Report chapter does not address these matters in detail and therefore does not provide sufficient justification for the approach. With details such as construction traffic routes and operational traffic routes still to be determined, the Inspectorate cannot agree to these matters being scoped out. Any significant effects associated with these matters should be assessed in the ES.	It is not expected that operational development traffic would result in significant increases in local road traffic noise levels as there would be a very low number of staff required to visit site for maintenance purposes. As such no detailed assessment of operational traffic is included in this ES; see section 11.3.15. The potential for significant effects due to construction and decommissioning traffic has been assessed in section 11.8.16 to 11.8.24.
Planning Inspectorate	Applicant's proposed matters to scope out: Ground-borne vibration from the construction, operation and decommissioning of the scheme The Scoping Report chapter does not clearly set out the intention of scoping out these matters. Paragraph 11.2.4 of the Scoping Report explains that there are no operational vibration effects associated with the Sunnica East Site, the Sunnica West Site, or the Burwell substation extension. As such, the Inspectorate agrees that vibration in relation to operation may be scoped out at this stage. The Scoping Report, however, does not set out reasoning for the scoping out of vibration relating to construction and decommissioning of the Proposed Development. The	No major vibration sources are envisaged to be introduced as part of the Scheme and as such there will be no associated operational vibration effects; see section 11.3.17. Vibration effects during construction or decommissioning stages have been assessed following BS 5228-2 guidance, and included in section 11.8.9 to 11.8.15.

Consultee	Matter raised	Response
	Inspectorate notes the need for horizontal directional drilling among other construction techniques which may culminate in vibration effects. Therefore, the Inspectorate is unable to agree to the scoping out of these matters out of the ES. The ES should assess significant effects associated with these matters.	
Planning Inspectorate	Clarification The assessment study area should be defined according to the extent of the likely impact. The ES should explain where the receptor locations are and identify these on a suitably detailed figure.	The Study Area and receptor locations have been defined in section 11.4.1 to 11.4.3. Assessment receptor locations are shown in Figure 11-1.
Planning Inspectorate	Study Area The Inspectorate notes from the description of the study area that the Burwell substation construction is to have a study area of 100m, the same as the cable corridor. The Inspectorate considers that noise and vibration impacts during construction of the substation may differ from those associated with a cable corridor. Therefore, the Inspectorate recommends that a wider study area (e.g. 500m) is applied and takes into account the extent of the likely impact. This is a view that is also expressed by East Cambridgeshire Council. The Applicant should make effort to agree the study area with the relevant consultation bodies.	A 500m study area has been included in the construction noise study area for this ES (including Burwell) and agreed with East Cambridgeshire District Council and West Suffolk District Council; see section 11.4.1
Planning Inspectorate	The ES should identify the 'representative' receptors. It should also explain how monitoring locations were chosen with reference to relevant information including noise contour mapping.	Noise monitoring locations have been agreed with officers from East Cambridgeshire District Council and West Suffolk District Council. The methodology for selection of assessment receptor positions and monitoring locations is discussed in sections 11.4.1 to 11.4.7.

Consultee	Matter raised	Response
Planning Inspectorate	The Scoping Report references the assessment of noise during construction and decommissioning but omits the mention of vibration. Vibration should be assessed alongside noise (noting that operational vibration is to be scoped out).	Vibration effects during construction or decommissioning stages have been assessed following BS 5228-2 guidance; see section 11.8.9 to 11.8.15.
Planning Inspectorate	The noise assessment in the ES should assess significant effects to ecological receptors as well as human. As such, consideration should be given to the findings of the biodiversity and ecological surveys in terms of identifying sensitive receptors. The Applicant should make effort to engage with relevant consultation bodies on this matter.	An assessment of noise on ecological receptors will be presented in **Chapter 8: Ecology and Nature Conservation** of this Environmental Statement **[EN010106/APP/6.1]**. Noise effects on wildlife have been assessed in conjunction with other effects on wildlife as part of the ecological assessments.
Planning Inspectorate	The Scoping Report sets out the National Planning Policy and includes Noise Policy Statement England. However, the Scoping Report does not reference how significance of effect will be determined. The Applicant should ensure that the ES methodology is consistent with up-to-date guidance and policy.	The ES methodology is set out in **Appendix 11A** of this Environmental Statement **[EN010106/APP/6.2]** and is based on the latest UK policy and guidance on noise and vibration. Assessment criteria for the magnitude of impact and significance of noise and vibration effects are presented in section 11.4.
Planning Inspectorate	The ES should provide details of the anticipated construction working hours (including any night time working required) and incorporate this into the assessment of likely significant effects. This should be consistent with the working hours specified in the DCO.	Working hours onsite will run from 7am until 7pm Monday to Saturday. This is set out in the Framework CEMP, which will be secured through the DCO.
Planning Inspectorate	The Inspectorate notes that weather and time can influence monitoring results for noise (and vibration). However, the Scoping Report does not indicate if this information will be collated and presented in the ES. For the avoidance of doubt this information should be included within the ES along with an explanation about the extent to which this affects the findings in the assessment	Weather conditions (wind, rain) was monitored during baseline surveys. Surveys were planned to avoid any adverse weather conditions (e.g. periods of rain, wind speeds >5m/s); any data affected by adverse weather will be excluded from data analysis, as explained in section 11.6.

11.5.3 Table 11-11 summarises the main matters raised during the Statutory Consultation and how these have been addressed through the ES in relation to noise and vibration.

Table 11-11 Main matters raised during Statutory Consultation

Consultee	Matter raised	Response
Public Health England / Landowners	Noise impacts during construction and operational phases on PRoW users, equestrian users on bridleways and horses in training facilities.	The Applicant recognises the importance of incorporating features within the Scheme design to minimise disturbance to those living, working and visiting the area. onsite substations, BESS and solar stations will be located away from PRoW. The Applicant has developed its proposals for construction and operational phases based upon the outcomes of its assessments. The Applicant's proposals for mitigation and managing construction and operational phase impacts from the Scheme are set out in the Framework CEMP and the Framework OEMP, which will be secured through the DCO. Due to the transient nature of PRoW users they will not be subject to long-term noise exposure that would result in any health impacts. Any noise experienced by PRoW users will be limited to when they are in proximity to the Scheme; when they are sufficiently far from the Scheme they would not be affected by noise from construction, operation or decommissioning phases. No health impacts or long-term significant effects are considered to arise on PRoW users, equestrian users on bridleways or horses in training facilities. On this basis, no further detailed assessment is considered to be required for these receptors.
Landowners	Noise impacts during construction and operational phases on golf club users.	Precautionary working methods will be implemented to minimise potential adverse effects during construction and operation across the entire Scheme. The Applicant's proposals for managing construction impacts from the Scheme are set out in the Framework CEMP and the Framework OEMP.

Consultee	Matter raised	Response
		Noise contour plots for construction and operational phases are presented in Figure 11-2, Figure 11-3 and Figure 11-4. Section 11.8.1 to 11.8.8, 11.8.16 to 11.8.24, and 11.8.25 to 11.8.39 shows that the modelled impacts associated with construction and operational noise are not predicted to be significant. On this basis, no long-term significant effects on golf club users are considered to arise.
West Suffolk Council, East Cambridgeshire District Council, Suffolk County Council and Cambridgeshire County Council	The Preliminary Environmental Information (PEI) Report has not correctly addressed the variation between threshold daytime noise levels and the threshold levels at weekends, namely Saturdays after 1300 hours. The levels categorised as appropriate for describing the lowest observed adverse effect level (LOAEL) and the significant observed adverse effect level (SOAEL) must be revisited as it is not a single threshold level of the noise that is to be considered but also the day of the week that construction is occurring and when elevated noise levels may occur.	Construction and decommissioning noise assessment criteria is set out in Table 11-4 and section 11.4.13-11.4.14. This defines assessment criteria and LOAEL and SOAEL during weekdays (07:00-19:00), Saturday mornings (07:00-13:00) and Saturday afternoons (13:00-19:00).
West Suffolk Council, East Cambridgeshire District Council, Suffolk County Council and Cambridgeshire County Council	The potential for low frequency hum from any of the proposed fixed plant is an issue that needs to be considered, and technical evidence provided in any final report if predictions show negligible adverse impact. Measurements of the existing Burwell substation did not identify distinguishable low frequency components from transformers already on site, but no data has been supplied to provide confidence that low frequency hum will not be an issue at any residential properties in the West Suffolk area	Noise from the existing Burwell Substation was not audible above road traffic noise during daytime site visits at LT1 / R1. Analysis of the frequency spectrum data from LT1 (see **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2]**) does not identify any tonal features in the local noise environment which may have been attributed to the existing Burwell Substation. Section 11.8.25 to 11.8.39 shows that the modelled impacts associated with operational noise are not predicted to be significant.. While the Burwell National Grid Substation Extension may result in an audible change to absolute levels of noise at the nearest receptors, it is not expected that plant installations at the expansion would result in any noticeable changes to the character of existing noise environment in this area.

11.6 Baseline Conditions

11.6.1 During the surveys the dominant noise source at the majority of the locations was observed to be road traffic from the surrounding road network. During site attendance, it was observed that LT1 was also influenced by occasional aircraft noise and ST2 was influenced by leaves blowing in the wind. Aircraft noise was also noted at LT3, LT6 and ST2. While these intermittent sound sources are audible in the area, the typical background noise environment is considered to be dominated by road traffic noise.

11.6.2 Noise from the existing Burwell Substation was not audible above road traffic noise during daytime site visits at LT1 / R1. Analysis of the frequency spectrum data from LT1 (see **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2]**) does not identify any tonal features in the local noise environment which may have been attributed to the existing Burwell Substation.

11.6.3 A weather station was set up to measure the meteorological conditions during the survey. Periods that were not conductive to environmental noise measurements as per guidance in BS 4142 (i.e. wind speeds greater than 5m/s and/or precipitation) were removed from further data analysis.

11.6.4 A summary of the noise monitoring results is presented in **Table 11-12** (long-term measurements) and **Table 11-13** (short-term measurements). Night-time noise levels are considered to be representative of evening and early morning periods. Further details of the baseline noise surveys are provided in **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2]**.

Table 11-12 Summary of long-term noise monitoring results

Reference	Representative of receptor	Daytime 07:00-23:00		Night-time 23:00-07:00	
		Average Ambient $L_{Aeq,16h}$ dB	Typical Background $L_{A90,15min}$ dB	Average Ambient $L_{Aeq,16h}$ dB	Typical Background $L_{A90,15min}$ dB
LT1	R1	49	36	40	29
LT2	R3	75	62	70	46
LT3	R4	58	46	54	40
LT4	R5, R6, R7	66	58	59	48
LT5	R8	60	54	54	40
LT6	R10	67	38	57	30
LT7	R9, R11	69	43	62	35
LT8	R12	60	45	54	35

Table 11-13 Summary of short-term noise monitoring results

Reference	Representative of receptor	Ambient $L_{Aeq,T}$ dB	Background $L_{A90,T}$ dB
ST1	R2	70	48
ST2	R9	60	47

11.7 Embedded Design Mitigation

11.7.1 The way that potential environmental impacts have been or will be avoided, prevented, reduced, or off-set through design, and / or management of the Scheme are outlined below and will be taken into account as part of the assessment of the potential effects. Proposed environmental enhancements are also described where relevant. The mitigation measures for both the construction/decommissioning and operational phases, are outlined below.

Construction and Decommissioning Phases

11.7.2 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 Best Practicable Means (BPM – further defined in **Appendix 11A** of this Environmental Statement **[EN010106/APP/6.2]**) and are included within the Framework CEMP (see **Appendix 16C** of this Environmental Statement **[EN010106/APP/6.2]**) and will be able to be included in a Decommissioning Environmental Management Plan which will be prepared pursuant to the Framework DEMP, prior to the decommissioning phase as outlined in **Chapter 3: Scheme Description** of this Environmental Statement **[EN010106/APP/6.1]**, to manage noise and vibration emissions from construction and decommissioning activities. Examples of BPM that will be implemented during construction and decommissioning works are presented below:

a. Ensuring that all appropriate processes, procedures and measures are in place to minimise noise before works begin and throughout the construction programme;

b. All contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which should form a prerequisite of their appointment;

c. Ensuring that, where reasonably practicable, noise and vibration is controlled at source (e.g. the selection of inherently quiet plant and low vibration equipment), review of the construction programme and methodology to consider quieter methods, consideration of the location of equipment on-site and control of working hours;

d. Use of modern plant, complying with applicable UK noise emission requirements;

e. Hydraulic techniques for breaking to be used in preference to percussive techniques, where reasonably practicable;

f. Drop heights of materials will be minimised;

g. Plant and vehicles will be sequentially started up rather than all together where reasonably practicable;

h. Off-site pre-fabrication where reasonably practicable;

i. Use of screening locally around significant noise producing plant and activities; Screening would be designed to minimise landscape and visual impacts

j. Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications;

k. All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;

l. Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Order limits to be conducted in such a manner as to minimise noise generation, as far as reasonably practicable;

m. All vehicles used on-site shall incorporate reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance where reasonably practicable;

n. Appropriate routing of construction traffic on public roads and along access tracks pursuant to the CTMP;

o. Provision of information to ECDC and WSC and local residents to advise of potential noisy works that are due to take place;

p. Noisy works will not be undertaken until after 10:00 hours in the Work Areas close to Snailwell Gallops in Sunnica West Site A, specifically W03, W04 and ECO5 (note that this has been agreed with the relevant landowners during consultation and through various meetings); and

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

11.7.3 Generally, the project will submit a Section 61 application which will be the mechanism for construction mitigation details to be agreed. A construction noise and vibration monitoring scheme shall be developed and agreed with appropriate stakeholders prior to commencement of construction works as part of the Section 61 consent application process. Requirements for monitoring during the decommissioning stages will be outlined in the Decommissioning Environmental Management Plan.

11.7.4 Consideration will also be given to traffic routing, timing and access points to the Order limits to minimise noise impacts at existing receptors following

appointment of a principal contractor, and as construction working methods are developed. Contractors will issue a project route map and delivery schedule to control construction traffic. Such matters, alongside management of HGVs within the site and being let onto the highway network will be managed through a CTMP and secured through a DCO requirement. A Framework CTMP is provided in **Appendix 13C** of this Environmental Statement **[EN010106/APP/6.2]**.

Operational Phase

11.7.5 At this stage of the assessment no specific noise mitigation measures have been included for operational plant. Plant associated with the solar stations and BESS will be selected and designed to minimise any tonal, impulsive, or intermittent characteristics to received noise emissions at surrounding receptors.

11.7.6 While noise emissions from new transformer plant associated with the Burwell National Grid Substation Extension may have tonal characteristics, due to the existing presence of transformer plant noise from the Burwell Substation and road traffic noise, it is not expected that any tonal features from new transformers would be noticeable at receptors in Burwell.

11.7.7 Plant installations assumed representative of solar farm developments as used in the operational noise assessment are set out in **Appendix 11E** of this Environmental Statement **[EN010106/APP/6.2].** The wider approach to management of operational noise in the design of the Scheme is set out in **Appendix 16F: Framework Operation Environmental Management Plan** (OEMP) of this Environmental Statement **[EN0101066/APP/6.2]**.

11.8 Assessment of Likely Impacts and Effects

11.8.1 The impacts and effects associated with the construction/decommissioning and operational phases of the Scheme are outlined in the sections below. The assessments have been assessed following consideration of the embedded mitigation measures as described in section 11.7.

Construction and Decommissioning Noise

11.8.2 The assessment of predicted construction noise levels at surrounding receptors from construction plant is summarised in **Table 11-14** and a noise contour plot is presented in Figure 11-2. The noise levels during decommissioning are expected to be similar or lower than shown below.

11.8.3 Details of the methodology, assumptions, and source sound level data for construction noise modelling is presented in **Appendix 11D** of this Environmental Statement **[EN010106/APP/6.2].**

Table 11-14 Construction / decommissioning noise assessment

Receptor	Sensitivity	Predicted Construction Noise Level $L_{Aeq,T}$ dB	Magnitude of Impact	Significance of Effect
R1	High	46	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R2	High	56	Very low (weekdays and Saturday mornings) Low (Saturday afternoons)	Negligible to Minor Adverse
R3	High	56	Very low (weekdays and Saturday mornings) Low (Saturday afternoons)	Negligible to Minor Adverse
R4	High	42	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R5	High	51	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R6	High	50	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R7	High	40	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R8	High	36	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R9	High	42	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R10	High	34	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R11	High	26	Very low (weekdays, Saturday mornings and afternoons)	Negligible
R12	High	46	Very low (weekdays, Saturday mornings and afternoons)	Negligible

11.8.4 Predicted noise levels at receptors R2 and R3 are 56dB which as per the criteria in **Table 11-4** indicates a very low magnitude impact during weekdays and Saturday mornings and a low magnitude impact during Saturday afternoons. For receptors of high sensitivity, this equates to a **negligible** to **minor adverse** effect which is not significant.

11.8.5 For all other receptors, predicted noise levels are no greater than 51dB which indicates a very low magnitude impact. For receptors of high sensitivity, this equates to a **negligible** effect which is not significant.

11.8.6 While there may be excesses of the LOAEL during Saturday afternoons (55dB) no excesses of the LOAEL during weekdays and Saturday mornings (65dB) are expected. No excesses of the SOAEL (75dB during weekday and Saturday mornings or 65dB during Saturday afternoons) are expected.

11.8.7 It is considered that noise impacts are likely to be greatest during the early stages of the works programme, where ground works are required as heavier plant is likely to be used. In practice, noise levels and resulting impacts are likely to vary during the different construction phases. The nature of construction work means that the highest levels of noise may exist for only a matter of days or even hours and there would be regular periods, even during the course of a single day, when the assumed noisy plant will not be in operation during breaks or changes of working routine.

11.8.8 Due to the variation in works locations across the duration of the construction programme, it is considered that any periods of noticeable regular construction noise events (i.e. above existing ambient levels) experienced at a receptor would not exceed one month other than at R1 which is located near to the Burwell National Grid Substation Extension (estimated construction duration 24 weeks). As such, the duration of any construction noise effects is considered to be temporary, short-term (other than at R1 which is considered to be medium-term), with no permanent residual effect from construction or decommissioning once works are completed.

Construction and Decommissioning Vibration

11.8.9 BS 5228-2 makes reference to the Transport Research Laboratory (TRL) report 429 'Groundborne Vibration Caused by Mechanised Construction Works' (2000) (Ref 11-4). 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 travelling to and from and within the site) are in the region of 1mm/s PPV at approximately 10m, decreasing to the region of 0.1mm/s PPV at approximately 50m.

11.8.10 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.

11.8.11 BS 5228-2 indicates that vibration levels from drilling activities (applicable to any horizontal directional drilling activities associated with the cable route) are below 1mm/s PPV at 10m and below 0.5mm/s PPV at 20m.

11.8.12 It also 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, or from auger piling techniques which may be required for foundations of the substations, BESS and solar stations, are generally limited to 1mm/s for distances up to 10m.

11.8.13 Based on the distances between the Order limits and surrounding receptors (15m to 500m) to locations where heavy ground works (excavation, push piling) may take place, it is considered that vibration from construction works (including HGV movements on access roads) experienced at sensitive receptors will be limited to very low adverse magnitude impacts as per the criteria in **Table 11-5**. For receptors of high sensitivity this would be equivalent to a **negligible** effect, which is not significant (see **Table 11-9**). The exception to this would be receptors R2 and R12, which may be close enough to experience low adverse magnitude impacts, equivalent to a **minor adverse** effect, which is again not significant. This would not equate to any risk of cosmetic or structural damage and merely represents a level at which some vibration may be experienced by people in this location.

11.8.14 While there may be excesses of the LOAEL (0.3mm/s PPV) when works take place at their closest approach to receptors R2 and R12, no excesses of the SOAEL (1mm/s PPV) are expected

11.8.15 The construction programme is targeting a 24 months duration with varying works locations although consistent levels of associated traffic movements throughout the programme. As such, the duration of any construction vibration effects is considered to be temporary, short-term (other than at R1 which is located near to the Burwell National Grid Substation Extension access road and as such considered to be medium-term), with no permanent residual effect once works are completed.

Construction and Decommissioning Traffic Noise

11.8.16 An assessment of construction traffic noise for the roads leading to the main access points (at Burwell Substation, Sunnica West Site A and Sunnica East Site B) and movements within the Scheme boundary at surrounding receptors is presented in **Table 11-15**. A noise contour plot is presented in Figure 11-3. The associated decommissioning traffic noise is expected to be similar or lower than shown below.

11.8.17 Details of the methodology, assumptions, and vehicle flow data for construction traffic noise modelling is presented in **Appendix 11D** of this Environmental Statement **[EN010106/APP/6.2].**

Table 11-15 Construction / decommissioning traffic noise assessment

Receptor	Sensitivity	$L_{Aeq,1hr}$ dB noise level				Magnitude of Impact	Significance of Effect
		Measured Ambient	Predicted Construction Traffic	Combined	Difference		
R1	High	49	33	49	<1	Very low	Negligible
R2	High	70	35	70	<1	Very low	Negligible

Receptor	Sensitivity	$L_{Aeq,1hr}$ dB noise level				Magnitude of Impact	Significance of Effect
		Measured Ambient	Predicted Construction Traffic	Combined	Difference		
R3	High	75	29	75	<1	Very low	Negligible
R4	High	58	25	58	<1	Very low	Negligible
R5	High	66	34	66	<1	Very low	Negligible
R6	High	66	30	66	<1	Very low	Negligible
R7	High	66	23	66	<1	Very low	Negligible
R8	High	60	26	60	<1	Very low	Negligible
R9	High	60	30	60	<1	Very low	Negligible
R10	High	67	25	67	<1	Very low	Negligible
R11	High	69	30	69	<1	Very low	Negligible
R12	High	60	21	60	<1	Very low	Negligible

11.8.18 Predicted noise levels from construction traffic along access routes leading to the main access points and within the Scheme boundary and are not predicted to result in an increase in ambient noise levels. No excesses of the LOAEL (1dB increase) or SOAEL (3dB increase) are predicted. As per the criteria in **Table 11-7** this indicates a very low magnitude impact. For receptors of high sensitivity, this equates to a **negligible** effect which is not significant.

11.8.19 Additional assessment has been carried out to predict roadside noise levels due to construction vehicles accessing areas of the Scheme via rural roads. Details of the methodology, assumptions, and vehicle flow data for construction traffic noise modelling along rural roads is presented in **Appendix 11D** of this Environmental Statement **[EN010106/APP/6.2].** The modelling has considered daily average traffic flows associated with construction phases of Sunnica East Site A and B, Sunnica West Site A and B and the cable route, as these will most likely require various vehicle access along rural roads not considered in the noise contour plots shown in Figure 11-3 . As traffic will be dispersed on various rural roads these are considered to represent a reasonable worst-case assessment.

11.8.20 For rural roads during the construction for Sunnica East Sites A and B, roadside noise levels are predicted to be 57 dB $L_{Aeq,1hr}$. Existing ambient noise levels at receptors R8 to R12 around Sunnica East Sites A and B range from 60 to 69 dB $L_{Aeq,16h}$ during the daytime. This may result in noise level increases of up 2 dB, which as per the criteria in **Table 11-7** indicates at most a low magnitude impact. For receptors of high sensitivity, this equates to a **minor adverse** effect which is not significant.

11.8.21 For rural roads during the construction for Sunnica West Site A and B , roadside noise levels are predicted to be 56 dB $L_{Aeq,1hr}$. Existing ambient noise levels at receptors R3 to R7 around Sunnica West Sites A and B range from 58 to 75 dB $L_{Aeq,16h}$ during the daytime. This may result in noise level increases of up 2 dB, which as per the criteria in **Table 11-7** indicates at most a low magnitude impact. For receptors of high sensitivity. This equates to a **minor adverse** effect which is not significant.

11.8.22 For rural roads during construction of Grid Connection Route A and Grid Connection Route B, roadside noise levels are predicted to be 48 dB $L_{Aeq,1hr}$. This is not expected to result in any noise increases and therefore equates to a **negligible** effect which is not significant.

11.8.23 While there may be excesses of the LOAEL (1dB increase) on rural roads, no excesses of the SOAEL (3dB increase) are predicted.

11.8.24 The construction programme is expected to be 24 months duration and with reasonably consistent levels of associated traffic movements throughout the programme. As such, the duration of any construction noise effects is considered to be temporary, medium-term, with no permanent residual effect once works are completed.

Operational Noise

11.8.25 The assessment of predicted operational noise levels at surrounding receptors from operational plant during various stages of the works is summarised in **Table 11-16** (daytime periods) and **Table 11-17** (night/early morning/late evening periods).

11.8.26 Details of the methodology, assumptions, and source sound level data for operational noise modelling is presented in **Appendix 11E** of this Environmental Statement **[EN010106/APP/6.2].** The modelling has assumed that receptors would constitute a ground-floor living room during the daytime, and a first-floor bedroom during the night/early morning/late evening.

11.8.27 It has been assumed that all plant is in operation continuously during the daytime and night-time. Predicted rating levels ($L_{Ar,Tr}$) have been compared against the typical background level ($L_{A90,15min}$) and assessed as per the criteria in Table 11-8. A noise contour plot is presented in Figure 11-4.

11.8.28 As discussed in 11.7.5 and 11.7.6 of this ES, it is not expected that received noise levels from plant experienced at surrounding receptors will contain any noticeable tonal, impulsive, or intermittent characteristics. As such no acoustic feature character corrections have been applied in the determination of the rating levels.

11.8.29 The assessment of operational noise during the night-time/early morning/late evening period has assumed all plant would be in operation during summer months with an early sunrise (i.e. approximately 05:00 to 07:00 hours) and late sunset (i.e. after 21:00 hours).

11.8.30 Operational noise has not been assessed for receptor R2 as this is located approximately 3km from the nearest operational noise sources of the Scheme. Operational noise effects at this receptor will be **negligible** and not significant due to that distance.

Table 11-16 Operational noise assessment – Daytime periods

Receptor	Sensitivity	dB Noise Level			Magnitude of Impact	Significance of Effect
		Background $L_{A90,15min}$	Rating $L_{Ar,Tr}$	Difference		
R1	High	36	32	-4	Very low	Negligible
R3	High	62	19	-43	Very low	Negligible
R4	High	46	26	-20	Very low	Negligible
R5	High	58	36	-22	Very low	Negligible
R6	High	58	30	-28	Very low	Negligible
R7	High	58	27	-31	Very low	Negligible
R8	High	54	22	-32	Very low	Negligible
R9	High	43	33	-10	Very low	Negligible
R10	High	38	26	-12	Very low	Negligible
R11	High	43	26	-17	Very low	Negligible
R12	High	45	28	-17	Very low	Negligible

Table 11-17 Operational noise assessment – Night/Early morning/Late evening periods

Receptor	Sensitivity	dB Noise Level			Magnitude of Impact	Significance of Effect
		Background L_{A90}	Rating $L_{Ar,Tr}$	Difference		
R1	High	29	35	+6	Medium	Moderate Adverse
R3	High	46	23	-23	Very low	Negligible
R4	High	40	30	-10	Very low	Negligible
R5	High	48	40	-8	Very low	Negligible
R6	High	48	34	-14	Very low	Negligible
R7	High	48	29	-19	Very low	Negligible
R8	High	40	30	-10	Very low	Negligible

Receptor	Sensitivity	dB Noise Level			Magnitude of Impact	Significance of Effect
		Background L_{A90}	Rating $L_{Ar,Tr}$	Difference		
R9	High	35	35	0	Low	Minor Adverse
R10	High	30	29	-1	Very low	Negligible
R11	High	35	29	-6	Very low	Negligible
R12	High	35	32	-3	Very low	Negligible

11.8.31 Exceedances of the LOAEL (rating level equal to background level) is predicted at receptor R1 and R9 during the night. No other exceedances of the LOAEL are identified. Exceedances of the SOAEL (rating level 10dB above background levels) are not predicted at any of the receptors.

11.8.32 Operational noise levels at R1 are predicted to be 32dB during the daytime and 35dB during the night, which is below background levels during the day but exceeds the night-time background noise level (which includes the existing Burwell substation) by 6dB. The exceedance of the night-time background noise level is equivalent to a **moderate adverse** effect, which is potentially significant; however these criteria are based on an external receptor position outside a dwelling, and does not consider attenuation from walls or glazing, or taken into account internal noise affecting room occupants during night-time hours.

11.8.33 As per BS4142 guidance the assessment of operational noise can also take the additional step of taking into context the absolute noise level that will be experienced at receptors where background levels are low, as is the case at Burwell (36 dB L_{A90} during the daytime and 29 dB L_{A90} during the night, see Table 11-12).

11.8.34 Assuming that, at night, residents will be inside their property, they would benefit from noise attenuation from the building envelope. A building envelope with a partially open window is generally accepted to attenuate noise by at least 10dB (BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (Ref 11-6) suggests up to 15dB).

11.8.35 BS 8233:2014 provides guidance levels for internal noise within dwellings and bedrooms of 35dB $L_{Aeq,T}$ during the daytime and 30dB $L_{Aeq,T}$ during the night-time, and with regards to absolute noise levels within dwellings are considered equivalent to LOAEL. BS 8233:2014 also advises that internal noise levels 5 dB greater than the guidance levels are 'reasonable' which are considered equivalent to SOAEL.

11.8.36 Consequently, the predicted internal noise level is, at highest, 25dB $L_{Ar,Tr}$. This absolute noise level is considered not to be of sufficient magnitude to exceed the LOAEL or SOAEL for internal noise (i.e. an absolute night-time noise level within a bedroom of 30 and 35dB $L_{Aeq,T}$ respectively) to warrant a significant noise effect. Consequently, night-time noise at R1 is considered to have a low magnitude impact, be **minor adverse** and not significant.

11.8.37 Measurements of the existing noise environment at R1 at monitoring location LT1 have not identified any tonal features in the local noise environment which may have been attributed to the existing Burwell Substation. Details of this analysis are presented in **Appendix 11C** of this Environmental Statement **[EN010106/APP/6.2].** While the Burwell National Grid Substation Extension may result in an audible change to absolute levels of noise at the nearest receptors, it is not expected that the expansion would result in any noticeable changes to the character of existing noise environment in this area.

11.8.38 As discussed in **Chapter 3: Scheme Description** of this Environmental Statement **[EN010106/APP/6.1]** Option 1 for the Burwell National Grid Substation Extension is within National Grid land ownership to the east of the existing substation, adjacent to Weirs Drove, approximately 200m west of Burwell and 100m west from assessment receptor R1, which has been assessed as a worst-case scenario. The Option 2 location is to the north of the existing substation approximately 450m from Burwell, such that operational noise levels will be lower at human receptors compared to the preferred location.

11.8.39 Predicted rating levels of operational onsite infrastructure at receptors R3 to R12 are below the existing background levels, other than at R9 where rating levels are equal to the background level during the early morning/late evening/night period. As per the criteria in **Table 11-8**, this indicates a low magnitude impact at R9 and a very low magnitude impact at R3 to R8 and R10 to R12. For receptors of high sensitivity, this equates to a **negligible** to **minor adverse** effect, which is not significant.

11.8.40 Operational noise is a permanent and long-term duration effect but, considered as an absolute noise level, is predicted to be **minor adverse** at worst and therefore not significant.

Summary of Effects

11.8.41 **Table 11-18** outlines the likely magnitude of impacts and significance of effects for the construction/decommissioning and operation phases.

Table 11-18 Summary of Magnitude of Impact and Significance of Effect

Receptor	Sensitivity (Value)	Description of Impact	Magnitude of Impact	Significance of Effect	Significant effect (Yes / No)
Construction and decommissioning – noise					
R1 (residential properties)	High	Construction and decommissioning works noise	Very low, adverse, temporary (medium-term)	Negligible	No

Receptor	Sensitivity (Value)	Description of Impact	Magnitude of Impact	Significance of Effect	Significant effect (Yes / No)
R2-R3 (residential properties and hotel)	High	Construction and decommissioning works noise	Very low to Low, adverse, temporary (short-term)	Negligible to Minor Adverse	No
R4-R12 (residential properties and hotel)	High	Construction and decommissioning works noise	Very low, adverse, temporary (short-term)	Negligible	No
Construction and decommissioning – vibration					
R1 (residential properties)	High	Construction and decommissioning works vibration	Very low, adverse, temporary (medium-term)	Negligible	No
R3-R11 (residential properties and hotel)	High	Construction and decommissioning works vibration	Very low, adverse, temporary (short-term)	Negligible	No
R2 and R12 (residential properties)	High	Construction and decommissioning works vibration	Low, adverse, temporary (medium-term)	Minor Adverse	No
Construction and decommissioning – traffic noise					
R1-R12 (residential properties and hotel)	High	Construction and decommissioning traffic noise	Very low to low, adverse, temporary (medium-term)	Negligible to Minor Adverse	No
Operational – noise					
R1 and R9 (residential properties)	High	Operational noise	Very low to Low, adverse, permanent (long-term)	Negligible to Minor Adverse	No
R3-R8, R10-R12 (residential properties and hotel)	High	Operational noise	Very low, adverse, permanent (long-term)	Negligible	No

11.9 Additional Mitigation and Enhancement Measures

11.9.1 As per the requirements of NPSE and Planning Practice Guidance (PPG), where excesses of the LOAEL are identified then noise should be ‘mitigated and reduced to a minimum’. Construction noise levels may exceed the

LOAEL (but not the SOAEL) throughout the construction programme, so all reasonable steps will be taken to mitigate and minimise the effects through adoption of BPM.

11.9.2 Operational plant noise levels may exceed the LOAEL (but not the SOAEL), and so the OEMP that is brought forward for approval in detailed design will set out how the scheme design and operational plant levels have been developed to mitigate and reduce effects to a minimum. This will include consideration of sound output levels, positioning of plant and, if necessary and practicable, implementation of acoustic barriers.

11.9.3 No other additional mitigation, enhancement, or monitoring measures for the construction/decommissioning and operational phases are considered to be required given that no significant adverse impacts that have been predicted.

11.9.4 It is acknowledged that the DCO allows flexibility for the location of solar stations in accordance with the Works Plans, such that the finalised locations may be closer to receptors, however due to the distances to receptors and the predicted noise levels (which are for a reasonable worst-case scenario) it is considered that the conclusions of the operational noise assessment will remain unchanged.

11.9.5 Any potential elevations in noise levels due to shifting the location of solar stations will be offset through procuring equipment with lower (than modelled) sound power levels or through silencers and/or acoustic barriers on equipment, which will be reflected in the OEMP brought forward at detailed design.

11.10 Residual Effects

11.10.1 Taking into account the embedded mitigation measures, noise effects during the construction/decommissioning and operational phases are predicted to be negligible to minor adverse and therefore not considered significant.

11.10.2 No significant noise effects are identified, and noise and vibration levels from construction/decommissioning and operation phases are not predicted to exceed the SOAEL. As concluded in **Chapter 15: Human Health** of this Environmental Statement **[EN010106/APP/6.1]** which concludes no significant adverse health impacts arising from the Scheme when considering the interaction of air quality, noise and neighbourhood amenity effects reported across the ES

11.10.3 **Table 11-19** outlines the likely residual construction/decommissioning phase noise effects.

Table 11-19 Summary of Residual Effects during Construction and Decommissioning

Receptor	Description of impact	Significance of effect without mitigation	Mitigation/Enhancement measure	Residual effect after mitigation
R1, R4-R12 (residential properties and hotel)	Construction and decommissioning works noise	Negligible	None beyond embedded measures	Negligible
R2-R3 (residential properties and hotel)	Construction and decommissioning works noise	Negligible to Minor Adverse	None beyond embedded measures	Negligible to Minor Adverse
R1, R3-R11 (residential properties and hotel)	Construction and decommissioning vibration	Negligible	None beyond embedded measures	Negligible
R2 and R12 (residential properties)	Construction and decommissioning vibration	Minor Adverse	None beyond embedded measures	Minor Adverse
R1-R12 (residential properties and hotel)	Construction and decommissioning traffic noise	Negligible	None beyond embedded measures	Negligible

11.10.4 **Table 11-20** outlines the likely residual operational phase noise effects.

Table 11-20 Summary of Residual Effects during Operation

Receptor	Description of impact	Significance of effect without mitigation	Mitigation/Enhancement measure	Residual effect after mitigation
R1 and R9 (residential properties)	Operational noise	Negligible to Minor Adverse	None beyond embedded measures	Negligible to Minor Adverse
R2-R8, R10-R12 (residential properties and hotel)	Operational noise	Negligible	None beyond embedded measures	Negligible

11.11 Cumulative Effects

11.11.1 Cumulative noise effects during construction and operation phases may occur when developments are within 500m of each other. At greater

distances, any noise emissions would be attenuated such that there would normally be no combined effect.

11.11.2 The following developments in **Table 11-21** have been identified to be within 500m of the Scheme. Further information is provided in **Chapter 5: EIA Methodology** of this Environmental Statement **[EN010106/APP/6.1].**

Table 11-21 Cumulative Developments within 500m of the Scheme

Scheme ID	Application reference	Applicant for 'other development' and brief description	County	District	Distance from the Order limits
85	17/01838/ESF	Hybrid planning application (part outline part full) for demolition, alteration and extension of blocks B, C and D, falling within Use Class B1 offices/laboratory, outline planning permission sought for the erection of an Amenities Block/Incubator Hub, Use Classes A1, A3 and D2 offices/laboratory, Use Class B1 a Gateway Building, Use Class B1 offices/Laboratory, Mid Tech Buildings 1 and 2, Use Classes B2 and B8, with associated site access, circulation, car parking, sub stations, landscaping and site assembly works (including retaining walls)	CCC	ECDC	87m south from the Grid Connection Route B, to the west of Sunnica West Site B
95	17/02205/FUL	Development of a 49.9MW battery storage facility, bridge and associated infrastructure	CCC	ECDC	35m south of the Burwell National Grid Substation Extension
96	19/00155/FUL	Application for the construction and operation of a 49.9MW battery storage facility, fencing, landscape planting and site access on land adjacent to the operational Burwell 400kV substation	CCC	ECDC	Adjacent and to the south of the Burwell National Grid Substation Extension

Scheme ID	Application reference	Applicant for 'other development' and brief description	County	District	Distance from the Order limits
271	SCC/0063/19F	Installation and use of washing plant for the recycling of inert waste, with associated access onto the highway.	SCC	WSDC	52m east of Sunnica East Site B
348	20/00557/ESF	Proposed Development of a Solar Farm and Ancillary Development	CCC	ECDC	236m west from the Burwell National Grid Substation Extension
375	20/00316/FUL	Proposed single storey Japanese shrine, located in the garden to the south of Fordham Abbey, with hard landscape footpath leading to entrance of the building	CCC	ECDC	423m north of Sunnica West Site B
562	DC/21/0217/FUL	Planning application - a. Commercial polyhouses with office and welfare area; b. hardstanding and loading bays, car parking, reservoir, landscaping and associated works; c. new access	SCC	WSDC	175m south east of Sunnica East Site B
696	DC/21/1621/HYB	Hybrid planning application - a. proposed 70 kilometre pipeline and associated above ground infrastructure at Gazeley, Isleham and Woodditton; b. Outline planning application - for above ground infrastructure at Bexwell, Kentford, Lady's Green and Rede with all matters reserved except for access	SCC	WSDC	Cuts across cable route
716	DC/21/1510/FUL	Planning application - 148 dwellings with associated open space, highway and landscaping	SCC	WSDC	0.4km East of Sunnica East Site B

Scheme ID	Application reference	Applicant for 'other development' and brief description	County	District	Distance from the Order limits
746	21/01276/SCOPE	SCOPING OPINION - Following Screening Opinion 21/00854/SCREEN for the proposal for Solar PV development, battery storage and cable connection at Land North of New England Farm, Heath Road, Swaffham Bulbeck	CCC	ECDC	Adjacent to Burwell Substation
756	21/00816/FUL	Construction of a 30MW battery energy storage system facility and associated access, landscaping and other infrastructure works	CCC	ECDC	Adjacent to Burwell Substation
757	N/A	National Grid Substation extension to the existing Burwell Substation.	CCC	ECDC	Within Burwell Substation

11.11.3 The noise assessment submitted for scheme ID 85 (17/01838/ESF) identifies potential moderate adverse (significant) noise effects on receptors along Fordham Road during construction works. However, these are only at receptors to the north of this development which are located approximately 3km from the Scheme boundary; as such it is not considered that it would give rise to any adverse construction noise effects, with no predicted change to the residual effects as shown in Table 11-19. Operational noise effects are identified to be negligible (not significant) and therefore there is no predicted change to the residual effects as shown in **Table 11-20.**

11.11.4 Scheme ID 271 (SCC/0063/19F), 375 (20/00316/FUL), 562 (DC/21/0217/FUL) and 716 (DC/21/1510/FUL) may result in some interactive construction noise if they are constructed at the same time as the Scheme. However due to their relatively small scale and nature of development, it is not considered that they would give rise to any significant adverse construction noise effects. Therefore, there is no predicted change to the residual effects as shown in Table 11-19 (i.e. negligible at R1 and R4-R12, up to minor adverse at R2 and R3)**.** The effect of these developments on the residual operational effects would be negligible (not significant) and therefore there is no predicted change to the residual effects as shown in **Table 11-20** (i.e. up to minor adverse at R1 and R9, negligible at R2-R8 and R10-R12)**.**

11.11.5 The noise assessment submitted for scheme ID 696 (DC/21/1621/HYB) indicates no adverse noise effects on receptors common to those assessed for the Scheme. While the proposed pipeline cuts across the cable route between Sunnica West Site A and Sunnica East Site B, there are no nearby

receptors at this intersection that would experience interactive adverse noise effects associated with the construction or operation of either scheme.

11.11.6 Scheme ID 95 (17/02205/FUL), 96 (19/00155/FUL), 348 (20/00557/ESF), 746 (21/01276/SCOPE) and 756 (21/00816/FUL) comprise the construction and operation of battery storage facilities and a solar farms adjacent to the Burwell National Grid Substation Expansion and the village of Burwell. As such there is the potential for interactive noise effects with these developments and the Scheme on common noise-sensitive receptors in Burwell (represented by receptor R1).

11.11.7 The construction noise assessments submitted for scheme ID 95, 96 and 348 conclude that there will be no significant adverse noise effects from construction works noise on local receptors. No construction noise assessments were carried out for scheme ID 746 or 756 however it is expected these would be similar. Any overlapping of construction phases between the Scheme and these developments has the potential to contribute to in-combination cumulative effects, which could increase the overall level of construction noise as well as the overall duration of construction noise effects. While the residual construction noise effects of the Scheme in isolation are negligible to minor adverse and not significant (as shown in **Table 11-19**), should all four developments be constructed at the same time then cumulative effects from construction noise affecting the nearest receptors at Burwell may be up to **moderate adverse,** but temporary with no permanent effect. It is unlikely in reality that the construction of all these developments will overlap together, however to minimise the potential for cumulative effects the Scheme will have a designated Site Manager during construction who will liaise with these other developments to identify measures that can be undertaken to minimise disruptions and noise effects.

11.11.8 The operational noise assessments submitted for the battery storage facilities (scheme ID 95, 96 and 756) each conclude that predicted noise levels from operational plant will be below LOAEL and not result in significant adverse noise effects. The assessment submitted for the solar farm (scheme ID 348) did not include a comparison to LOAEL/SOAEL however concluded that noise levels from operational plant will be negligible and not significant and will not exceed background levels, which is equivalent to below LOAEL in this assessment. Scheme ID 746 is currently only in scoping stages therefore did not include any supporting noise assessments but would be expected to result in similar effects as scheme ID 348.

11.11.9 While the residual operational noise effects of the Scheme in isolation on receptors within Burwell are above LOAEL (but below SOAEL) and up to minor adverse and not significant (as shown in **Table 11-20),** the operation of all four developments at the same time could increase the overall level of industrial-type noise experienced by receptors in Burwell. However, as operational noise from the cumulative developments are below LOAEL, it is not expected that this would lead to excesses of the SOAEL or result in any significant adverse operational noise effects on local noise receptors. As

such, cumulative effects from operational noise affecting the nearest receptors at Burwell are considered to be limited to **minor adverse**.

11.11.10 Scheme ID 757 is an extension that National Grid are building directly next to the Burwell National Grid Substation Extension. There is currently no application or supporting noise assessments for this and information regarding this scheme is not available in order to make a professional judgment on potential noise effects. As such this scheme has not been further considered in this cumulative assessment.

11.12 References

Ref 11-1 British Standards Institute (2014 with 2019 amendments) BS 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Noise, BSi, London.

Ref 11-2 British Standards Institute (2003); BS 7445 – Description and environment of environmental noise – Part 1: Guide to quantities and procedures, BSi, London.

Ref 11-3 British Standards Institute (2014 with 2019 amendments); BS 4142 – Methods for rating and assessing industrial and commercial sound, BSi, London

Ref 11-4 Hiller, D. M., and G. I. Crabb, (2000); Groundborne Vibration Caused by Mechanised Construction Works. TRL Report 429

Ref 11-5 Institute of Environmental Management and Assessment (2014); Guidelines for environmental noise impact assessment

Ref 11-6 British Standards Institute (2014); BS 8233 – Guidance on sound insulation and noise reduction for buildings, BSi, London

Ref 11-7 Highways Agency (2011) Design Manual for Road and Bridges Volume 11 Section 3 Part 7-Traffic Noise and Vibration.