East Anglia TWO Offshore Windfarm

Chapter 25

Noise and Vibration

Preliminary Environmental Information
Volume 1
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Glossary of Acronyms

AAWT	Annual Average Weekday Traffic
BAT	Best Available Technology
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
CCS	Construction Consolidation Site
CNMP	Construction Noise Management Plan
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
DMRB	Design Manual for Roads and Bridges
EPA	Environmental Protection Act
EPP	Evidence Plan Process
ETG	Expert Topic Group
eVDV	Estimated Vibration Dose Value
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ISO	International Standards Organisation
LOAEL	Lowest Observed Adverse Effect Level
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	Noise Policy Statement for England
NSR	Noise Sensitive Receptor
OAE	Observed Adverse Effect
PDS	Project Design Statement
PID	Public Information Days
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
SCDC	Suffolk Coastal District Council
SLM	Sound Level Meter
SOAEL	Significant Observed Adverse Effect Level
TMP	Traffic Management Plan
TRL	Transport Research Laboratory
TRRL	Transport and Road Research Laboratory
UAE	Unacceptable Adverse Effect
UAEL	Unacceptable Adverse Effect Level
VDV	Vibration Dose Value
WHO	World Health Organisation

Glossary of Terminology

Applicant	East Anglia TWO Limited.
Construction consolidation sites	Compounds which will contain laydown, storage and work areas for onshore construction works. The HDD construction compound will also be referred to as a construction consolidation site.
dB(A)	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
dB(Z) (or previously Lleq)	Decibels measured on a sound level meter incorporating a flat frequency weighting (Z weighting) across the frequency range.
Decibel (dB)	A unit of noise level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 µPa, the threshold of normal hearing is 0dB, and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions. Under normal conditions a change in noise level of 3dB(A) is the smallest perceptible change.
Development area	The area comprising the Proposed onshore development Area and the Offshore Development Area
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one offshore operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to the EIA and the information required to support HRA.

Horizontal directional drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Jointing bay	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
$L_{A10, T}$	The A weighted noise level exceeded for 10% of the specified measurement period (T). LA10 is the index generally adopted to assess traffic noise.
$L_{A90, T}$	The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014 it is used to define the 'background' noise level.
$L_{Aeq, T}$	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). LAeq, T is used to describe many types of noise and can be measured directly with an integrating sound level meter.
L_{Amax}	The maximum A-weighted sound pressure level recorded during a measurement.
Landfall	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.
Mitigation areas	Areas captured within the Development Area specifically for mitigating expected or anticipated impacts.
National Grid infrastructure	A National Grid substation, connection to the existing electricity pylons and National Grid overhead line realignment works which will be consented as part of the proposed East Anglia TWO project Development Consent Order but will be National Grid owned assets.
National Grid overhead line realignment works	Works required to upgrade the existing electricity pylons and overhead lines to transport electricity from the National Grid substation to the national electricity grid
National Grid overhead line realignment works area	The proposed area for National Grid overhead line realignment works.
National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia TWO project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia TWO project Development Consent Order.

National Grid substation location	The proposed location of the National Grid substation.
Natura 2000 site	A site forming part of the network of sites made up of Special Areas of Conservation and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive.
Onshore cable corridor	The corridor within which the onshore cable route will be located.
Onshore cable route	This is the construction swathe within the onshore cable corridor which would contain onshore cables as well as temporary ground required for construction which includes cable trenches, haul road and spoil storage areas.
Onshore cables	The cables which would bring electricity from landfall to the onshore substation. The onshore cable is comprised of up to six power cables and two fibre optic cables.
Proposed onshore development area	The area in which the landfall, onshore cable corridor, onshore substation, mitigation areas, temporary construction facilities (such as access roads and construction consolidation sites), and the National Grid Infrastructure will be located.
Onshore infrastructure	The combined name for all of the onshore infrastructure associated with the proposed East Anglia TWO project from landfall to the connection to the national electricity grid.
Onshore substation	The East Anglia TWO substation and all of the electrical equipment within it.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia TWO project.
Transition bay	Underground structures at the landfall that house the joints between the offshore export cables and the onshore cables.

25 Noise and Vibration

25.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the potential onshore airborne noise and vibration impacts of the proposed East Anglia TWO project. This chapter provides an overview of the baseline noise conditions where the proposed onshore development area is proposed and identifies potentially sensitive receptors to noise and vibration. The chapter presents an assessment of the potential impacts and associated mitigation for the construction, operation and decommissioning of the proposed East Anglia TWO project.

2. The assessment also considers cumulative impacts of other proposed projects. The proposed methodology adhered to for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) is discussed in ***section 25.4.3*** and ***section 25.4.4*** respectively. The chapter was prepared by Royal HaskoningDHV.

3. This chapter is supported by ***Appendix 25.1***, ***Appendix 25.2, Appendix 25.3*** and ***Appendix 25.4***. Figures which accompany this chapter are provided in Volume 2 Figures.

4. Potential impacts in relation to noise and vibration inter-relate with other technical topics as presented within other chapters of the PEIR. These are referenced within this chapter and consist of:

   - ***Chapter 22 Onshore Ecology***;
   - ***Chapter 23 Onshore Ornithology***;
   - ***Chapter 24 Archaeology and Cultural Heritage***;
   - ***Chapter 26 Traffic and Transport***;
   - ***Chapter 27 Human Health***; and
   - ***Chapter 30 Tourism Recreation and Socio-Economics***.

25.2 Consultation

5. Consultation is a key driver of the Environmental Impact Assessment (EIA) process, and continues throughout the lifecycle of a project, from its initial stages through to consent and post-consent.

6. To date, consultation with regards to noise and vibration has been undertaken via Expert Topic Group (ETG), described within ***Chapter 5 EIA Methodology***,

with meetings held in April 2018, and through the East Anglia TWO Scoping Report (ScottishPower Renewables (SPR) 2017). Feedback received through this process has been considered in preparing the PEIR where appropriate and this chapter will be updated following the next stage of consultation for the final assessment submitted with the Development Consent Order (DCO) application.

7. ***Table 25.1*** provides a summary of those consultation responses that have been received and are relevant to noise and vibration. Responses from stakeholders have been captured in the table below.

Table 25.1 Consultation Responses

Consultee	Date/ Document	Comment	Response / where addressed in the PEI
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	Detailed information as to the timing and duration of each phase of the development, indicating the programme of constructional works both offshore and onshore, should be provided.	Detailed programme information is provided in ***Chapter 6 Project Description***. Where relevant, details have been provided in relation to the noise assessment in ***section 25.6***
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	A method statement of the specific type of constructional work, including named plant for boring, drilling, piling and other potentially noisy operations, should be provided.	Details of the construction plant and equipment considered in the assessment is presented in ***section 25.4.3.*** Further detail on construction work will be provided in the ES.
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	Attenuation measures so as to achieve 'best environmental practice' should be specified for all such plant.	Attenuation has been considered as part of the modelling undertaken to inform the assessment in ***section 25.6.2***
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	All operations, which may adversely affect nearby properties, should be identified by source, location and either a sound power level or sound pressure level at a given distance should be calculated.	Details of the operational plant and equipment considered in the assessment is presented in ***section 25.6.2.*** Further detailed design of the operational activities will be provided in the ES
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	The projected noise levels for all site construction works should then be calculated at all nearby noise sensitive properties. Noise Levels should be represented as LAeq(1hour) values during daytime hours (07:00 to 19:00 hours) and LAeq(5 min.) values for	Details of the plant and equipment considered in the assessment is presented in ***Section 25.6.1***.

Consultee	Date/ Document	Comment	Response / where addressed in the PEI
		evening and night time hours (19:00 to 07:00 hours)	
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	The hours of work and all anticipated transportation movements to and from the onshore cabling route and substation site should be indicated.	Potential impacts from construction vehicle movements are assessed in ***section 25.6.1.***
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	A proposed 'complaints procedure', detailing who will undertake investigations on behalf of the construction company and the scope of amelioration in the event that complaints are justified, should be provided.	A complaints procedure will be developed and included as part of the Code of Construction Practice produced and approved prior to the start of construction. This is referred to in ***section 25.3.3.***
Suffolk County Council and Suffolk Coastal District Council	08/12/2017 Scoping Response	The Scoping Report indicates that noise disturbance from the constructional piling works of the offshore turbines and platforms are unlikely to impact on any residents. However, in the event that constructional noise complaints are received in respect to offshore work from local residents and be considered justified by the Environmental Protection Section at Suffolk Coastal District Council, then mitigation measures may be deemed necessary for night time piling operations.	It is currently considered that offshore construction activities will not have any impact to onshore receptors. However, a complaints procedure will be developed and included as part of the Code of Construction Practice produced and approved prior to the start of construction.
The Planning Inspectorate	20/12/2017 Scoping Response	There is little justification for scoping out direct and indirect impacts on human health and ecological receptors associated with noise and vibration and the inspectorate suggests that there are potential impacts.	Impacts on human health and ecological receptors are referred to in ***section 25.8*** and covered in more detail in the respective Human Health and Onshore Ecology PEIR chapters.
The Planning Inspectorate	20/12/2017 Scoping Response	There is little justification for scoping out direct and indirect impacts of operational substation noise and the inspectorate suggests that there are potential impacts.	Operational noise impacts from the substation are fully considered in ***section 25.6.2.***
The Planning Inspectorate	20/12/2017 Scoping Response	The Scoping Report does not make any reference to the Noise Policy Statement for England (NPSE) and LOAEL, SOAEL and NOAEL3 criteria. The assessment in the PEI should be based on up to date and relevant guidance	Details of the relevant policy and guidance that have informed the assessment presented in the chapter are found in ***section 25.4.1.***

Consultee	Date/ Document	Comment	Response / where addressed in the PEI
		applicable to relevant policy or justify any departure from that.	
Expert Topic Group (ETG): Suffolk County Council, Suffolk Coastal and Waveney District Council and the Environment Agency	January – May 2018 Phase 2 Consultation	The Method Statement was provided to stakeholders in advance of the meeting and was discussed and reviewed at the ETG. Following this, the baseline, study area and assessment methodology presented in the Method Statement was agreed with the following recommendations: List of cumulative projects to be included in cumulative assessment to be presented Noise baseline survey monitoring locations, timings and durations to be agreed Assessment should include weekday and weekend working.	List of projects included in the cumulative impact assessment is presented in ***section 25.7.2.*** Noise survey locations were discussed with the Suffolk Coastal and Waveney District Council Environmental Health Officer and are presented on ***Figure 25.1.***

8. Ongoing public consultation has been conducted through a series of Public Information Days (PIDs) and Public Meetings. PIDs have been held throughout Suffolk in November 2017, March 2018, and June / July 2018 with further events planned in 2019. A series of stakeholder engagement events were also undertaken in October 2018 as part of consultation phase 3.5. These events were held to inform the public of potential changes to the onshore substation location. This consultation aims to ensure that community concerns are well understood and that site specific issues can be taken into account, where practicable. Consultation phases are explained further in ***Chapter 5 EIA Methodology***. Full details of the proposed East Anglia TWO project consultation process will be presented in the Consultation Report, which will be submitted as part of the DCO application.

9. ***Table 25.2*** shows public consultation feedback pertaining to noise and vibration. Consultation phases are explained further in ***Chapter 4 Site Selection and Assessment of Alternatives***.

Table 25.2 Public Consultation Responses relevant to Noise and Vibration

Topic	Response / where addressed in the PEI
Phase 1	
• Concerns over noise and vibration	Noise and vibration impacts are assessed in ***section 25.6***
Phase 2	
• Substation noise levels during operation and switching • Noise levels in Friston • Noise impacts at Snape Maltings • Proximity to housing • Adequate screening and noise reduction measures in place	Noise and vibration impacts are assessed in ***section 25.6*** Embedded mitigation is listed in ***section 25.3.3***
Phase 3	
• Noise impacts from substation • Assessment methodology timing (e.g. avoid harvest) • Construction noise at substation, onshore cable corridor, landfall, compounds etc, including construction traffic • Use gas cooled substations to reduce noise • Topography of land contributing to noise impacts • Cumulative impact of noise with all equipment • Efficiency of trees to mitigate noise • Vibration impacts	Noise and vibration impacts are assessed in ***section 25.6*** Embedded mitigation is listed in ***section 25.3.3*** Noise and vibration assessment methodology is addressed in ***section 25.4***
Phase 3.5	
• Noise impacts from construction and operation • Construction noise impacting Thorpeness residents (including piling) • Minimal background noise at Friston	Noise impacts are assessed in ***section 25.6.1*** (construction phase) and ***section 25.6.2*** (operation phase). The assessment of background noise levels is detailed in ***section 25.5***.

25.3 Scope

25.3.1 Study Area

10. The noise and vibration study area is shown on ***Figure 25.1***. The noise and vibration study area was defined by the extent of the proposed onshore development which includes the following elements:

- Landfall;
- Onshore cable corridor;

- Onshore substation; and
- National Grid infrastructure.

11. The spatial scope of the construction noise assessment will include the following geographic coverage:

- Along the proposed onshore development area where significant activities could affect noise sensitive receptors (NSRs); and
- Traffic routes and routes subject to significant changes in traffic flows (and / or percentage HGV) associated with construction.

12. The extent of the noise and vibration study area for the construction phase road traffic noise and vibration assessment was based on details provided in ***Chapter 26 Traffic and Transport*** and agreed through traffic-specific consultation.

13. The noise and vibration assessment draws on the information provided within ***Chapter 6 Project Description*** in order to define a worst case scenario, which is subsequently assessed in this chapter.

25.3.2 Worst Case Scenarios

14. This section identifies the realistic worst case parameters associated with the proposed East Anglia TWO project alone. This includes all onshore infrastructure for the proposed East Anglia TWO project and the National Grid infrastructure that the proposed East Anglia TWO project will require for ultimate connection to national electricity grid.

15. The worst case assumptions for noise and vibration impacts are presented in ***Table 25.3***. For the construction noise assessment, the worst case phase is considered to be represented by months 1 to 24. This is therefore presented in the assessment within this chapter. Impact magnitude and significance are determined for sensitive receptors which fall within the proposed East Anglia TWO project study area.

16. Details of the construction plant and equipment to be used, and considered in this assessment, can be found in ***section 25.4.3.1.2*** and details of the modelled operational equipment at the onshore substation can be found in ***section 25.6.2.1.***

Table 25.3 Realistic Worst Case Scenarios

Impact	Parameter	Notes
Construction		
Impacts related to the landfall	HDD temporary works area: 7,000m^2 (70m x 100m) Transition bay excavation footprint (for 2 transition bays): 1,554m^2 (37m x 42m) Landfall CCS: 18,400m^2 (160m x 115m) Landfall transition bays approximate quantity of spoil material (for 2 transition bays): 454m^3	Landfall to be achieved via HDD. No beach access required. For the assessment, the worst case phase for construction noise is considered to be represented by months 1 to 24 (in line with the assessment presented in ***Chapter 26 Traffic and Transport***). This is therefore presented in the assessment within this chapter.
Impacts related to the onshore cable corridor	Onshore cable route: 287,360m^2 (8,980m x 32m) Jointing bay construction excavation footprint: 570m^2 (30.6m x 18.6m). Total for 36 jointing bays: 20,520m^2 (570m^2 x 36) HDD (retained as an option to cross SPA / SSSI): • Entrance pit CCS (x1): 7,000m^2 (100m x 70m) • Exit pit CCS (x1): 3,000m^2 (100m x 30m) Onshore cable route CCS: 18,400m^2 (160m x 115m). Total for 5 CCS: 92,000m^2 (18,400m^2 x 5) Temporary roads: • Onshore cable route haul road between landfall and Snape Road (4.5m wide with additional 4m for passing places at approximately 87m intervals): 41,376m^2 • Onshore cable route and substation access haul road (9m width): 18,675m^2 • Temporary access road: 23,495m^2 Onshore cable trench approximate quantity of spoil material: 13,321m^3	Onshore cable corridor construction footprint may be located anywhere within the proposed onshore development area. The location strategy for access routes, CCS and jointing bays will be to site them near to field boundaries or roads as far as practical. Two link boxes sit underground beside each jointing bay at a depth of approximately 1.2m. The construction footprint of these is included in the jointing bay construction excavation footprint. For the assessment, the worst case phase for construction noise is considered to be represented by months 1 to 24 (in line with the assessment presented in ***Chapter 26 Traffic and Transport***). This is therefore presented in the assessment within this chapter.
Impacts related to the onshore substation	Onshore substation CCS: 17,100m^2 (190m x 90m) Permanent footprint (used as CCS during construction): 36,100m^2 (190m x 190m) Substation operational access road: 12,800m^2 (1,600m x 8m)	Construction access is included above as the onshore cable route and substation access haul road. For the assessment, the worst case phase for construction noise is considered to be represented by months 1 to 24

Impact	Parameter	Notes
		(in line with the assessment presented in ***Chapter 26 Traffic and Transport***). This is therefore presented in the assessment within this chapter.
Impacts related to the National Grid Infrastructure	National Grid substation CCS: 78,750m^2 (250m x 315m) Permanent footprint (used as CCS during construction): 45,500m^2 (325m x 140m)	Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in ***Figure 6.6*** of ***Chapter 6 Project Description***. Construction access is included above as the onshore cable route and substation access haul road. Operational access is included above as the substation operational access road. For the assessment, the worst case phase for construction noise is considered to be represented by months 1 to 24 (in line with the assessment presented in ***Chapter 26 Traffic and Transport***). This is therefore presented in the assessment within this chapter.
Operation		
Impacts related to the landfall	2 transition bays will be installed underground, each with an operational volume of 227m^3	Transition bays will be buried approximately 1.2m underground – there will no above ground infrastructure.
Impacts related to the onshore cable corridor	36 jointing bays will be installed underground, each with an operational volume of 77m^3 72 link boxes will be installed underground (2 per jointing bay), each with an operational volume of 3m^3	Jointing bays will be buried approximately 1.2m underground – there will no above ground infrastructure. Link boxes will be located underground immediately adjacent to jointing bays – there

Impact	Parameter	Notes
		will be no above ground infrastructure.
Impacts related to the onshore substation	Operational footprint: 36,100m^2 (190m x 190m) Substation operational access road: 12,800m^2 (1,600m x 8m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR).
Impacts related to the National Grid Infrastructure	National Grid operational substation: 45,500m^2 (325m x 140m)	The operational footprint does not include the additional landscaping footprint (which will be agreed post-PEIR). Design for the required overhead line (OHL) realignment work (including cable sealing end CCSs and pylon realignment CCS) is currently on going. As more detail is made available, this will be fully assessed and included in the Environmental Statement (ES) and DCO application. However, indicative locations for cable sealing end CCSs and pylon realignment CCS are shown in ***Figure 6.6*** of ***Chapter 6 Project Description***.
Decommissioning		
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left *in situ*. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.		

25.3.3 Embedded Mitigation

17. Embedded mitigation relating to noise and vibration is summarised in ***Table 25.4***. The final details of the construction mitigation would be developed once the exact plant types and locations are confirmed, this will be subject to procurement and contracting. The table first presents general mitigation measures (which would apply to all parts of the onshore electrical transmission works), and mitigation measures which would apply specifically to the landfall, onshore cable route and substation are described separately.

18. The operational noise emissions from the onshore substation will be governed by similar noise restrictions to those placed on both East Anglia ONE and East Anglia THREE. Therefore, operational noise from the onshore substation will be no greater than 35dB $L_{Aeq\ 1hr}$ during the day time and 35dB $L_{Aeq\ 15\ min}$ during the night at the NSRs. The effect of this requirement will be such that noise emissions from the onshore substation will not exceed the prescribed limit at any receptors.

Table 25.4 Embedded Mitigation Relating to Noise and Vibration

Parameter	Mitigation Measures Embedded into the Project Design
General	
Construction	A Noise and Vibration Management Scheme will be submitted to and approved by the relevant planning authority and form part of the Code of Construction Practice (CoCP). Best practice noise mitigation measures, to be implemented and controlled through the Noise and Vibration Management Scheme, will typically include: • Management of construction operating hours. • Implementation of traffic management measures such as agreed routes for construction traffic. • Use of screens and noise barriers / acoustic screens. • Construction site layout to minimise or avoid reversing with use of banksmen where appropriate. Output noise from reversing alarms set at levels for health and safety compliance. • Use of modern, fit for purpose, well maintained plant and equipment to minimise noise generation. Plant and vehicles will be fitted with mufflers / silencers maintained in good working order. Use of silenced equipment, as far as possible and low impact type compressors and generators fitted with lined and sealed acoustic covers. Doors and covers housing noise emitting plant will be kept closed when machines are in use. • No music or radios to be played on site. • Ensuring engines are switched off when machines are idle. • Regular communication with site neighbours to inform them of the construction schedule, and when noisy activities are likely to occur. • Use of pre-construction survey to identify road surface irregularities which require remediation in order to mitigate vibration impacts. A Construction Traffic Management Plan will also be submitted to and approved by the relevant planning authority which will outline measures to manage impacts of construction vehicles.
Substation	
Operation	The operational noise emissions from the onshore substation will be governed by a noise restriction of no greater than 35dB $L_{Aeq\ 1hr}$ during the day time and 35dB $L_{Aeq\ 15\ min}$ during the night at the NSRs. Industry standard noise mitigation schemes (including consideration of design) around the substation will ensure that noise emissions from the onshore substation does not exceed the levels stated in the noise requirement.

25.3.4 Monitoring

19. Post-consent, the final detailed design of the proposed East Anglia TWO project and the development of the relevant management plan(s) will refine the worst-case parameters assessed in the EIA. It is recognised that monitoring is an important element in the management and verification of the impacts of the proposed East Anglia TWO project. Outline management plans, across a number of environmental topics, will be submitted with the DCO application. These outline management plans will contain key principles that provide the framework for any monitoring that could be required. The requirement for and final appropriate design and scope of monitoring will be agreed with the relevant stakeholders and included within the relevant management plan(s), submitted for approval, prior to construction works commencing.

25.4 Assessment Methodology

20. Potential noise and vibration impacts associated with onshore construction will be assessed using the guidance contained in BS 5228:2009+A1:2014 (*Code of Practice for Noise and Vibration Control on Construction and Open Sites*), which defines the accepted prediction methods and source data for various construction plant and activities.

21. Construction noise and vibration impacts will be based on the identified construction programme and associated activities and plant, including earthworks, piling (if required), directional drilling, cable trenching and associated construction traffic.

22. Operational impacts will include noise generation associated with the onshore substation and National Grid infrastructure. The guidance and methodology contained in BS 4142:2014 (*Rating and Assessing Industrial and Commercial Sound*) will be used to assess potential noise impacts.

23. Following the identification of the proposed onshore development area, liaison with the Noise ETG, including the Suffolk Coastal District Council (SCDC) Environmental Health Officer, was undertaken to agree the approach and methodology to baseline noise surveys and the criteria to be used for the noise and vibration assessment.

25.4.1 Guidance

25.4.1.1 Legislation

24. This section provides details on key pieces of legislation which are relevant to this assessment.

25.4.1.1.1 Environmental Protection Act 1990

25. Section 79 of the Environmental Protection Act 1990 (the EPA 1990) defines statutory nuisance with regard to noise and determines that local planning authorities have a duty to detect such nuisances in their area.

26. The EPA 1990 also defines the concept of 'Best Practicable Means' (BPM) as:

- *"Practicable" means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;*
- *The means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;*
- *The test is to apply only so far as compatible with any duty imposed by law;* and
- *The test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances."*

27. Section 80 of the EPA 1990 provides local planning authorities with powers to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

25.4.1.1.2 The Control of Pollution Act 1974

28. Section 60 of the Control of Pollution Act 1974 provides powers to local planning authority officers to serve an abatement notice in respect of noise nuisance from construction works.

29. Section 61 provides a method by which a contractor can apply for 'prior consent' for construction activities before commencement of works. The 'prior consent' is agreed between the local planning authority and the contractor and may contain a range of agreed working conditions, noise limits and control measures designed to minimise or prevent the occurrence of noise nuisance from construction activities. Application for a 'prior consent' is a commonly used control measure in respect of potential noise impacts from major construction works.

25.4.1.2 National Planning Policy

25.4.1.2.1 National Policy Statements (NPS)

30. The assessment of potential impacts upon onshore noise and vibration receptors has been made with specific reference to the relevant NPS. These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIP). Those relevant to the proposed East Anglia TWO project are:

- Overarching NPS for Energy (EN-1) (DECC 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).

31. The specific assessment requirements for noise and vibration, as detailed in the NPSs, are summarised in ***Table 25.5***, together with an indication of where each is addressed within the PEIR.

Table 25.5 Summary of NPS Requirements

NPS Requirement	NPS Reference	PEIR Reference
Where noise impacts are likely to arise, the applicant should include: A description of the noise generating aspects of the development proposal leading to noise impacts including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise; Identification of noise sensitive premises and noise sensitive areas that may be affected; The characteristics of the existing noise environment; A prediction of how the noise environment will change with the proposed development; In the shorter term such as during the construction period; In the longer term during the operating life of the infrastructure; At particular times of the day, evening and night as appropriate; An assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and Measures to be employed in mitigating noise. The nature and extent of the noise assessment should be proportionate to the likely noise impact.	EN-1, paragraph 5.11.4	Refer to ***section 25.4.3.1*** for the assessment methodology for assessing potential noise and vibration impacts, ***section 25.5*** for details on the existing noise environment including the identification of noise sensitive receptors and ***section 25.6*** where any changes in noise levels as a result of the project are assessed, and any potential impacts and potential mitigation measures are identified.
The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.	EN-1, paragraph 5.11.5	Refer to ***section 25.6.1.3*** where any changes in noise levels as a result of the project from ancillary works, for example vehicle movements, are assessed and any potential impacts and potential mitigation measures are identified.

NPS Requirement	NPS Reference	PEIR Reference
Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there are assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.	EN-1, paragraph 5.11.6	Any changes in noise levels as a result of the project are assessed in ***section 25.6***, and any potential impacts and potential mitigation measures are identified. Noise assessment described within EN-3 and EN-5 relates to the offshore environment. Those potential noise impacts are considered separately within ***Chapter 10 Fish and Shellfish Ecology*** and ***Chapter 11 Marine Mammals.*** The current relevant British Standards have been used within this assessment detailed within ***section 25.4.***
The applicant should consult EA and Natural England (NE), or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.	EN-1, paragraph 5.11.7	Noise impacts on terrestrial protected species or other wildlife is considered within Chapter ***22 Onshore Ecology*** and ***Chapter 23 Onshore Ornithology.***
While standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory for dry weather conditions, they are not appropriate for assessing noise during rain. This is when overhead line noise mostly occurs, and when the background noise itself will vary according to the intensity of the rain. Therefore, an alternative noise assessment method to deal with rain-induced noise is needed, such as the one developed by National Grid as described in report TR (T) 94,199319. This follows recommendations broadly outlined in ISO 1996 (BS 7445:1991) and in that respect, is consistent with BS 4142:1997. The IPC [now the Planning Inspectorate and the Secretary of State] is likely to be able to regard it as acceptable for the applicant to use this or another methodology that appropriately addresses these particular issues.	EN-5, paragraphs 2.9.8 and 2.9.9	Design for the required OHL realignment work is currently on going. As more detail is made available, this will be fully assessed and included in the ES and DCO application. Further operational assessment of rain-induced noise is not considered necessary. BS 4142:1997 was superseded in 2014. Where BS 4142 is referred to in this document, the 2014 revision has been applied which is in accordance with current best practice. See ***Chapter 6 Project Description*** for more information on works related to overhead lines.

25.4.1.2.2 National Planning Policy Framework

32. The National Planning Policy Framework (NPPF) (as revised in 2018) forms the basis of the Government's planning policies for England and how these should be applied. Paragraph 170 of the NPPF states planning policies and decisions should contribute to and enhance the natural and local environment by:

- "……*preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution……"*

33. Furthermore, Paragraph 180 states:

- "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
  - *mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
  - *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
  - *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

34. The NPPF also refers to the Noise Policy Statement for England (NPSE) (Defra, 2010).

25.4.1.2.3 Noise Policy Statement for England, 2010

35. The NPSE document was published by Defra in 2010 and paragraph 1.7 states three policy aims:

- *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
  - Avoid significant adverse impacts on health and quality of life;
  - Mitigate and minimise adverse impacts on health and quality of life; and
  - Where possible, contribute to the improvement of health and quality of life."

36. The first two points require that significant adverse impacts should not occur and that, where a noise level falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect:

- *"…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur." (Paragraph 2.24, NPSE, March 2010).*

37. Section 2.20 of the NPSE introduces key phrases including 'significant adverse' and 'adverse' and two established concepts from toxicology that are being applied to noise impacts:

- *"NOEL – No Observed Effect Level; this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise";* and
- *"LOAEL – Lowest Observed Adverse Effect Level; this is the level above which adverse effects on health and quality of life can be detected".*

38. Paragraph 2.21 of the NPSE extends the concepts described above and leads to a significant observed adverse effect level (SOAEL), which is defined as the level above which significant effects on health and quality of life occur.

39. The NPSE states:

- *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations". (Paragraph 2.22, NPSE, March 2010).*

40. Furthermore, paragraph 2.22 of the NPSE acknowledges that:

- *"Further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise".*

41. However not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

25.4.1.2.4 National Planning Practice Guidance for Noise (NPPG) 2014

42. The National Planning Practice Guidance for Noise (NPPG Noise, December 2014), issued under the NPPF, states that noise needs to be considered when

new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or making decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

25.4.1.3 Local Planning Policy

43. The proposed onshore development area falls under the jurisdiction of Suffolk County Council and under Suffolk Coastal District Council (SCDC) local planning authority (LPA). SCDC are in the process of merging with Waveney District Council (WDC) into an East Suffolk Council (ESC) to take effect from 1st April 2019. At the time of writing the councils have not yet merged.

44. SCDC is reviewing their current Local Plan, a First Draft Local Plan has been published for public consultation (period of consultation from 20th July to 14th September 2018) (SCDC 2018). This plan sets out strategic planning policies within East Suffolk and how the local planning authorities address the NPPF on a local basis.

45. ***Table 25.6*** provides details of these local authorities' local planning policy documents and the relevant policies in respect of onshore noise and vibration.

Table 25.6 Relevant Local Planning Policies

Document	Policy / guidance	Policy / guidance purpose
Suffolk Coastal District Council	Suffolk Coastal District Local Plan – July 2013 Est Suffolk (SCDC and WDC) Council (2018) First draft Local Plan Development Management Policy DM23: Residential Amenity	When considering the impact of new development on residential amenity, the Council will have regard to the following: (a) privacy/overlooking; (b) outlook; (c) access to daylight and sunlight; (d) noise and disturbance; (e) the resulting physical relationship with other properties; (f) light spillage, air quality and other forms of pollution; and (g) safety and security. Development will be acceptable where it would not cause an unacceptable loss of amenity to adjoining or future occupiers of the development.

25.4.1.4 Guidance Documents

46. The guidance in ***Table 25.7*** has been applied to the noise and vibration assessment.

Table 25.7 Relevant Guidance

Document	Policy / guidance purpose
British Standard (BS) 4142:2014 – Method for Rating and Assessing Industrial and Commercial Sound	Describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incidental.
BS 5228-1:2007+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise	Part 1 provides recommendations for basic methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise and/or vibration levels. The legislative background to noise and vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. This British Standard provides guidance on methods of predicting and measuring noise and assessing its impact on those exposed to it.
BS 5228-1:2007+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration	Part 2 gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels. The Standard includes tables of vibration levels measured during piling operations throughout the UK. It provides guidance concerning methods of mitigating vibration from construction, particularly with regard to percussive piling.
BS 6472-1:2008 – Guide to Evaluation of Human Exposure to Vibration in Buildings	Provides general guidance on human exposure to building vibration in the range of 1Hz to 80Hz and includes curves of equal annoyance for humans. It also outlines the measurement methodology to be employed. It introduces the concept of Vibration Dose Value (VDV) and estimated Vibration Dose Value (eVDV) for the basis of assessment of the severity of impulsive and intermittent vibration levels, such as those caused by a series of trains passing a given location.
BS 7445: Parts 1 and 2 – Description and Measurement of Environmental Noise	Provides details of the instrumentation and measurement techniques to be used when assessing environmental noise and defines the basic noise quantity as the continuous A-weighted sound pressure level (LAeq). Part 2 of BS 7445 replicates International Standards Organisation (ISO) 1996-2.
BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings	Provides a methodology to calculate the noise levels entering a building through facades and facade elements and provides details of appropriate measures for sound insulation between dwellings. It includes recommended internal noise levels which are provided for a variety of situations, and are based on World Health Organisation (WHO) recommendations.
Calculation of Road Traffic Noise (CRTN) 1988	Provides a method for assessing noise from road traffic in the UK and a method of calculating noise levels from the Annual Average Weekday Traffic (AAWT) flows and from measured noise levels. Since publication in 1988 this document has been the nationally accepted standard in predicting noise levels from road traffic. The calculation methods provided include correction factors to take account of variables affecting the creation and propagation of road traffic noise, accounting for the percentage of heavy goods vehicles (HGV), different road

Document	Policy / guidance purpose
	surfacing, inclination, screening by barriers and relative height of source and receiver.
Design Manual for Roads and Bridges (DMRB), 2011	Volume 11, Part 3, Section 7 provides guidance on the environmental assessment of noise impacts from road schemes. DMRB contains advice and information on transport-related noise and vibration, which has relevance with regard to the construction and operational traffic impacts affecting sensitive receptors adjacent to road networks. It also provides guideline significance criteria for assessing traffic related noise impacts.
ISO 3744	Specifies a method for measuring the sound pressure levels on a measurement surface enveloping a noise source, under essentially free field conditions near one or more reflecting planes, in order to calculate the sound power level produced by the noise source.
ISO 717	Defines single-number quantities for airborne sound insulation in buildings and of building elements such as walls, floors, doors, and windows.
ISO 9613-2	Specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a noise source.
WHO (1999) Guidelines for Community Noise	These guidelines present health-based noise limits intended to protect the population from exposure to excess noise. They present guideline limit values at which the likelihood of particular effects, such as sleep disturbance or annoyance, may increase. The guideline values are 50 or 55dB LAeq during the day, related to annoyance, and 45dB LA_{eq} or 60dB LA_{max} at night, related to sleep disturbance. The Guidance states: *"The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB LAeq for continuous noise and 45dB LAmax for single sound events. Lower noise levels may be disturbing depending on the nature of the source."* The WHO guidance also highlights that: "Night-time, outside sound levels about 1 metre from facades of living spaces should not exceed 45dB LA_{eq}, so that people may sleep with bedroom windows open. This value was obtained by assuming that the noise reduction from outside to inside with the window open is 15dB. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35dB LA_{eq}. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LA_{eq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB LA_{eq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development."

Document	Policy / guidance purpose
WHO (2009) Night Noise Guidelines for Europe	An extension to the WHO Guidelines for Community Noise (1999). It concludes that: "Considering the scientific evidence on the thresholds of night noise exposure indicated by Lnight outside as defined in the Environmental Noise Directive (2002148/EC), an Lnight outside of 40dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. Lnight outside value of 55dB is recommended as an interim target for those countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach."

47. The Environmental Noise directive is transposed into UK Law by The Environmental Noise (England) Regulations 2006.

25.4.2 Data Sources

48. Consideration of the surrounding environment was initially conducted using existing available geographical information including aerial and satellite photography and mapping data in order to determine the nearest Noise Sensitive Receptors (NSRs) and noise sources present within the noise and vibration study area for use in the assessment.

49. The desk data sources used and the confidence levels associated with them which informed the desk-based assessment are provided in ***Table 25.8***.

Table 25.8 Desk-Based Data Sources to Inform the Assessment

Data obtained	Year	Data source used	Coverage	Confidence
Location of noise and vibration sensitive receptors within the onshore study area	2016	Google Maps Aerial Photography	Onshore Noise and Vibration study area	High
	2018	Environment Agency Lidar Data	Onshore Noise and Vibration study area	High
	2018	Local Authority Local Plans	Onshore Noise and Vibration study area	High
	2018	Ordnance Survey maps	Onshore Noise and Vibration study area	High
	2018	Construction Phasing Plans	Construction: • Landfall • Onshore Cable Route • Onshore Substation • National Grid Infrastructure	High

Data obtained	Year	Data source used	Coverage	Confidence
	2018	Information from other projects within the area	Onshore Noise and Vibration study area	High

50. Measurements of the existing ambient noise level were required to be taken at locations considered representative of the NSRs that had the potential to be affected by the construction and operation of the proposed East Anglia TWO project.

51. Full details of the baseline noise surveys are discussed in ***section 25.5*** and ***Appendix 25.1.***

52. ***Table 25.9*** outlines the baseline noise surveys undertaken. Noise monitoring survey locations were discussed and agreed with the SCDC's Environmental Health Officer prior to survey work commencing and are shown on **Figure 25.2**.

53. The surveys were undertaken between 27th June 2018 to 12th July 2018 (with the findings used to inform the assessment presented within this PEIR. Noise measurements were undertaken in accordance with BS 7445-1:2003 *(Description and measurement of environmental noise. Guide to quantities and procedures)*. It was proposed and agreed that a baseline vibration survey was not undertaken to inform the assessment.

Table 25.9 Onshore Baseline Noise Surveys

Survey	Proposed surveying period	Summary of survey
Proposed onshore development area – focussed on cable corridor and landfall	July 2018	Short term (daily) baseline noise surveys at the landfall and along the onshore cable corridor consisting of daytime and night-time attended noise measurements at locations representative of noise sensitive receptors.
Proposed onshore development area – focussed around onshore substation and National Grid infrastructure location	July 2018	Long-term (up to a week) baseline surveys in proximity to the substation and National Grid infrastructure sites consisting of unattended, continuous noise measurements at locations representative of noise sensitive receptors.

25.4.3 Impact Assessment Methodology

54. ***Chapter 5 EIA Methodology*** outlines the general assessment approach adopted in this EIA.

25.4.3.1 Construction Phase Noise Assessment

25.4.3.1.1 Construction Phase Impact Magnitude

55. BS 5228-1:2009+A1:2014 describes several methods for assessing noise impacts during construction projects.

56. The assessment approach utilised in this PEIR is the threshold based *"ABC"* method. The method is detailed within BS 5228-1:2009+A1:2014, which specifies a construction noise limit based on the existing ambient noise level and for different periods of the day. The predicted construction noise levels were assessed against noise limits derived from advice within Annex E of BS 5228. ***Table 25.10***, reproduced from BS 5228-1:2009+A1:2014 Table E.1, presents the criteria for selection of a noise limit for a specific receptor location.

Table 25.10 Construction Noise Threshold Levels Based on the ABC Method (BS 5228:2009+A1:2014)

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night time (23.00 – 07.00)	45	50	55
Evenings and weekends (D)	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 – 13.00)	65	70	75
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

57. The *"ABC method"* described in BS 5228-1:2009+A1:2014 establishes that there is no impact below the three thresholds presented above.

58. BS 5228-1:2009+A1:2014 states:

- *"If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect."*

59. The SoundPLAN noise model used in this construction phase assessment incorporated noise sources located in the study area, nearby residential dwellings and other buildings, intervening ground cover and topographical information.

60. Noise levels for the construction phase were calculated using the methods and guidance in BS 5228-1:2009+A1:2014. This Standard provides methods for predicting receptor noise levels from construction works based on the number and type of construction plant and activities operating on site, with corrections to account for:

- The *"on-time"* of the plant, as a percentage of the assessment period;
- Distance from source to receptor;
- Acoustic screening by barriers, buildings or topography; and
- Ground type.

61. Construction noise impacts were assessed using the impact magnitude presented in ***Table 25.11*** for the daytime period, ***Table 25.12*** for the evening and weekend periods, and ***Table 25.13*** for the night time.

Table 25.11 Day time Construction Noise Impact Magnitude Criteria

Impact magnitude	Construction noise level, decibels (dB)		
	A 65dB threshold	B 70dB threshold	C 75dB threshold
No Impact	<65	<70	<75
Negligible Impact	>65.1 - <65.9	>70.1 - <70.9	>75.1 - <75.9
Low Impact	>66.0 - <67.9	>71.0 - <72.9	>76.0 - <77.9
Medium Impact	>68.0 - <69.9	>73.0 - <74.9	>78.0 - <79.9
High Impact	>70	>75	>80

Table 25.12 Evening and Weekends Construction Noise Impact Magnitude Criteria

Impact magnitude	Construction noise level, decibels (dB)		
	A 55dB threshold	B 60dB threshold	C 65dB threshold
No Impact	<55	<60	<65
Negligible Impact	>55.1 - <55.9	>60.1 - <60.9	>65.1 - <65.9
Low Impact	>56.0 - <57.9	>61.0 - <62.9	>66.0 - <67.9
Medium Impact	>58.0 - <59.9	>63.0 - <64.9	>68.0 - <69.9
High Impact	>60	>65	>70

Table 25.13 Night time Construction Noise Impact Magnitude Criteria

Impact magnitude	Construction noise level, decibels (dB)		
	A 45dB threshold	B 50dB threshold	C 55dB threshold
No Impact	<45	<50	<55
Negligible Impact	>45.1 - <45.9	>50.1 - <50.9	>55.1 - <55.9
Low Impact	>46.0 - <47.9	>51.0 - <52.9	>56.0 - <57.9
Medium Impact	>48.0 - <49.9	>53.0 - <54.9	>58.0 - <59.9
High Impact	>50	>55	>60

62. A proposed construction phase programme detailing duration, deliveries and equipment requirements for each phase and scenario is provided in ***Chapter 6 Project Description***. Noise modelling scenarios were derived from the proposed construction phase programme and are detailed below.

25.4.3.1.2Assumptions and Indicative Plant List

63. Based on ***Chapter 6 Project Description***, an indicative list of construction equipment has been developed and are detailed in ***Table 25.14***.

Table 25.14 Construction Plant – East Anglia TWO Project

Location	Name	No.	Source type	BS5228 Reference	LAeq (dB) at 10m	On time correction (%)
Landfall and onshore cable route	D6 Dozer	3	Point	C2.11	84.0	85
	30T Excavator	2	Point	C2.16	79.4	85
	20T Dumper	2	Point	C2.30	86.8	85
	Smooth Drum vibro road roller	2	Point	C5.20	90.8	85
	21T excavator	2	Point	C2.3	86.0	85
	5T Forward Tipping Dumper	2	Point	C4.7	91.6	85
	Loading shovel	1	Point	C10.4	91.5	85
	Tractor & fencing kit	1	Point	C4.74	84.2	85
	Tractor & trailer	1	Point	C4.75	94.0	85
	Tractor & Fuel bowser (or self-propelled)	1	Point	C6.38	89.6	85
	Tractor & Water bowser (for dust suppression)	1	Point	C6.38	89.6	85

Location	Name	No.	Source type	BS5228 Reference	LAeq (dB) at 10m	On time correction (%)
	Grader	1	Point	C6.31	92.4	85
	Telehandler	1	Point	C2.35	86.2	85
	Mobile self-contained welfare unit	1	Point	N/A SoundPLAN Library	LwA 68.2	85
	Mobile generator	1	Point	C4.76	81.0	85
	Temporary lighting	1	Point	C4.76	81.0	85
	Road surface paver & roller	1	Point	C5.30	82.2	85
	Skip Wagon Movements	Various based on Section and phase	Line	C8.21	87.2	Split evenly over 12 hour day (7 – 19hrs)
	HDD Drill		Point	N/A	LwA 105	100 (24hrs/7 days)
	Mud Pump		Point	N/A	LwA 93	100 (24hrs/7 days)
	Power Supply		Point	N/A	LwA 105	100 (24hrs/7 days)
	Tractor & Cable Drum Roller		Point	C4.74	84.2	85
	Tractor & Soil Tiller		Point	C4.74	84.2	85
	Cement Mixer		Point	C4.18	81.6	85
	Mobile Crane		Point	C4.41	77.4	85
	Crawler Crane		Point	C4.43	82.0	85
	Mobile generator		Point	C4.76	81.0	85
	Pump		Point	C2.45	75.0	85
	Cable Laying Tracked Crane		Point	C4.50	75.5	85
	Pre-Cast Concrete Truck		Point	C4.20	84.9	85
	Mobile Concrete Pump		Point	C3.26	85.6	85

Location	Name	No.	Source type	BS5228 Reference	LAeq (dB) at 10m	On time correction (%)
	Cable Winch		Point	C4.52	78.5	85
Substation As for landfall and onshore cable route plus the following additional plant	Concrete Batching Plant		Point	C4.22	81.7	85
	Dry Mix Silos		Point	C3.26	85.6	85
	JCB Wheeled Excavator		Point	C5.34	75.5	85
	3t Forward Tipping Dumper		Point	C4.9	86.5	85
	Scissor Lift		Point	C4.59	83.9	85
	Mobile Aerial Platform		Point	C4.57	80.4	85
	Mobile Crane		Point	C4.41	77.4	85
	Mobile Crane Heavy Use		Point	C4.50	75.5	85
	Specialist Gantry Crane		Point	C4.50	75.5	85
	Static Crane		Point	C4.48	85.5	85
	Forklift		Point	N/A	LwA 75.0	85
	Trench Roller		Point	C10.23	60.4	85

25.4.3.2 Construction Phase Traffic Noise Impact Magnitude

25.4.3.2.1 Road Traffic Noise and Vibration Emissions Assessment

64. Following the methodology contained in DMRB (Volume 11, Section 3, Chapter 3) an initial screening assessment was undertaken to assess whether there would be any significant changes in traffic volume and composition on surrounding local roads as a result of the project. Any road links with a predicted increase in traffic volume of 25% or a decrease of 25% were identified. Such changes in traffic volume would correspond to a 1 dBA change in noise level at the relevant road link. A change in noise level of less than 1 dBA is regarded as being imperceptible, as this is less than the minimum perceptible 3 dBA level and, therefore, of negligible magnitude. If there are no increases greater than 25% or a decrease of 25% or greater, then the DMRB guidance indicates that no further assessment needs to be conducted.

65. Links showing an increase of greater than 25% were assessed following the Basic Noise Level (BNL) calculation procedure within CRTN to predict a dB change for each link. The calculation also incorporates a correction for mean traffic speed and the percentage of heavy vehicles.

66. Construction phase road link dB change was assessed using the impact magnitude criteria in ***Table 25.15***. The thresholds for differentiating the criteria are taken from DMRB for short-term impacts and are an indication of the relative change in ambient noise as a result of the project.

Table 25.15 Magnitude Criteria for Relative Change Due to Road Traffic (Short Term)

Change in noise level ($L_{A10\ (18\ hour)}$ dB)	Impact magnitude
0.0	No change
0.1 – 0.9	Negligible Adverse
1.0 – 2.9	Minor Adverse
3.0 – 4.9	Moderate Adverse
5.0+	Major Adverse

67. Paragraph 3.32 of DMRB states that:

- *"PPVs [peak particle velocity] in the structure of buildings close to heavily trafficked roads rarely exceed 2 mm/s and typically are below 1 mm/s. Normal use of a building such as closing doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic"*

25.4.3.3 Construction Phase Vibration Impact Magnitude

25.4.3.3.1 Construction Phase Vibration Assessment

68. Ground-borne vibration can result from construction works and may lead to perceptible levels of vibration at nearby receptors, which at higher levels can cause annoyance to residents. In extreme cases, cosmetic or structural building damage can occur, however vibration levels have to be of a significant magnitude for this effect to be manifested and such cases are rare.

69. High vibration levels generally arise from 'heavy' construction works such as piling, deep excavation, or dynamic ground compaction. The use of piling during the construction of the onshore substation may be required.

70. Annex E of BS 5228-2:2009+A1:2014 contains empirical formulae derived by Hiller and Crabb (2000) from field measurements relating to resultant peak particle velocity (PPV) with a number of other parameters for vibratory compaction, dynamic compaction, percussive and vibratory piling, the vibration of stone columns and tunnel boring operations. Use of these empirical formulae enables resultant PPV to be predicted and for some activities (vibratory compaction, vibratory piling and vibrated stone columns) they can provide an indicator of the probability of these levels of PPV being exceeded.

71. The empirical equations for predicting construction-related vibration provide estimates in terms of PPV. Therefore, the consequences of predicted levels in terms of human perception and disturbance can be established through direct comparison with the BS 5228-2:2009+1A:2014 guidance vibration levels.

72. Ground-borne vibration assessments may be drawn from the empirical methods detailed in BS 5228-2:2009+1A:2014, in the Transport and Road Research Laboratory (TRRL) 246: Traffic: Traffic induced vibrations in buildings, and within the Transport Research Laboratory (TRL) Report 429 (2000): Ground-borne vibration caused by mechanical construction works.

73. However, these calculation methods rely on detailed information, including the type and number of plant being used, their location and the length of time they are in operation. Given the mobile nature of much of the plant that has the potential to impart sufficient energy into the ground, and the varying ground conditions in the immediate vicinity of the construction works, it was considered that an accurate representation of vibration conditions using these predictive methods was not possible.

74. Consequently, a series of calculations, following the methodologies referred to above, were carried out based on typical construction activities that have the potential to impart sufficient energy into the ground, applying reasonable worst case assumptions in order to determine set-back distances at which critical vibration levels may occur.

75. Humans are very sensitive to vibration, which can result in concern being expressed at energy levels well below the threshold of damage. Guidance on the human response to vibration in buildings is found in BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings, Part 1, Vibration sources other than blasting.

76. BS 6472 describes how to determine the vibration dose value (VDV) from frequency-weighted vibration measurements. VDV is defined by the following equation:

$$VDV_{b/d,\ day/night} = (\int_0^T a^4(t)dt)^{0.25}$$

77. The VDV is used to estimate the probability of adverse comment which might be expected from human beings experiencing vibration in buildings. Consideration is given to the time of day and use made of occupied space in buildings, whether residential, office or workshop.

78. BS 6472 states that in homes, adverse comment about building vibrations is likely when the vibration levels to which occupants are exposed are only slightly above thresholds of perception.

79. BS 6472 contains a methodology for assessing the human response to vibration in terms of either the VDV, or in terms of the acceleration or the peak velocity of the vibration, which is also referred to as PPV. The VDV is determined over a 16-hour daytime period or 8-hour night-time period.

80. The response of a building to ground-borne vibration is affected by the type of foundation, ground conditions, the building construction and the condition of the building. For construction vibration, the vibration level and effects detailed in ***Table 25.16*** were adopted based on BS 5228-2:2009+1A:2014. Limits for transient vibration, above which cosmetic damage could occur, are given numerically in terms of PPV.

Table 25.16 Transient Vibration Guide Values for Cosmetic Damage

Line	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50mms^{-1} at 4Hz and above	
2	Un-reinforced or light framed structures Residential or light commercial type buildings	15mms^{-1} at 4Hz increasing to 20mms^{-1} at 15Hz	20mms^{-1} at 15Hz increasing to 50mms^{-1} at 40Hz and above

81. ***Table 25.17*** lists the minimum set-back distances at which vibration levels of reportable significance for other typical construction activities may occur. BS 5228-2:2009+1A:2014 calculation methods were used to derive the set-back distances outlined in ***Table 25.17***.

Table 25.17 Predicted Distances at Which Vibration Levels May Occur

Name	Set-back distance at which vibration level (PPV) occurs			
	0.3 mm/s	1.0 mm/s	10 mm/s	15 mm/s
Vibratory Compaction (Start-up)	166m	65m	9m	6m
Vibratory Compaction (Steady State)	102m	44m	8m	6m
Percussive Piling	48m	19m	3m	2m
HGV Movement* on uneven Haul Route	277m	60m	3m	2m

Name	Set-back distance at which vibration level (PPV) occurs			
	0.3 mm/s	1.0 mm/s	10 mm/s	15 mm/s
**Vibration level based on a HGV moving at 5mph*				

82. ***Table 25.18*** reproduced from research (Rockhill et al. 2014) details minimum safe separation distance for piling activities from sensitive receptors to reduce the likelihood of cosmetic damage occurrence.

Table 25.18 Receptor Proximity for Indicated Piling Methods

	Piling Method		
Building type (limits on vibrations from Eurocode 3)	**Press-in**	**25kJ drop hammer**	**170 kW 27Hz vibrohammer**
Architectural merit	2.6m	29.6m	27.7m
Residential	0.5m	11.8m	13.8m
Light commercial	0.14m	5.9m	5.5m
Heavy industrial	0.06m	3.9m	3.7m
Buried services	0.03m	2.9m	2.2m

83. For construction vibration from sources other than blasting, the vibration level and effects presented in ***Table 25.19*** were adopted based on Table B-1 of BS 5228-2:2009+1A:2014. These levels and effects are based on human perception of vibration in residential environments.

Table 25.19 Construction Vibration - Impact Magnitude

Vibration limit PPV (mm/s)	Interpreted significance to humans	Impact magnitude
≤0.14	Vibration unlikely to be perceptible	No Impact
0.14 to 0.3	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction	Negligible
0.3 to 1.0	Vibration might just be perceptible in residential environments	Low
1.0 to ≤10.0	It is likely that vibration at this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents	Medium
≥10.0	Vibration is likely to be intolerable for any more than a brief exposure to this level	High

25.4.3.4 Operational Phase Noise Impact Magnitude

84. Where there are noise sources such as fixed plant associated with onshore assets, the most appropriate assessment guidance is BS 4142:2014. The guidance describes a method of determining the level of noise of an industrial noise source and the existing background noise level.

85. BS 4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident, and combines procedures for assessing the impact in relation to:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

86. This standard is applicable to the determination of the following levels at outdoor locations:

- *"a) rating levels for sources of sound of an industrial and/or commercial nature; and*
- *b) ambient, background and residual sound levels, for the purposes of:*
  - *investigating complaints;*
  - *assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature;* and
  - *assessing sound at proposed new dwellings or premises used for residential purposes."*

87. The standard incorporates a requirement for the assessment of uncertainty in environmental noise measurements and introduces the concepts of *"significant adverse impact"* rather than likelihood of complaints. Common principles with the previous edition is the consideration of the characteristics of the sound under investigation, time of day and frequency of occurrence.

88. The standard applies to industrial/commercial and background noise levels outside residential buildings and for assessing whether existing and new industrial/commercial noise sources are likely to give rise to significant adverse impacts on the occupants living in the vicinity.

89. Assessment is undertaken by subtracting the measured background noise level from the rating level; the greater this difference, the greater the magnitude of the impact.

90. BS 4142:2014 refers to the following:

- *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context;* and
- *The lower the rating level 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".*

91. When assessing the noise from a source, which is classified as the Rated Noise Level, it is necessary to have regard to the acoustic features that may be present in the noise. Section 9.1 of BS 4142:2014 states:

- *"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

92. An operational assessment in accordance with BS 4142:2014 has been undertaken for the onshore substation as it is the only noise source associated with the operation phase. Due to the separation distance and existing ambient soundscape no penalty corrections for intermittency, tonality or impulsivity have been included. These acoustic features are added based on perceptibility at the receptor location.

93. The determination of the specific sound level free from sounds influencing the ambient sound at the assessment location is obtained by measurement or a combination of measurement and calculation. This is to be measured in terms of the $L_{Aeq, T}$, where 'T' is a reference period of:

- 1 hour during daytime hours (07:00 to 23:00 hours); and
- 15 minutes during night-time hours (23:00 to 07:00 hours).

94. The assessment of noise from proposed fixed plant associated with the project was considered at the nearest receptors.

95. To predict the noise from the operational aspects of the project, SoundPLAN noise modelling software was utilised. The model incorporated proposed buildings based on elevation drawings, proposed fixed plant and additional noise sources (such as temporary generating plant) associated with the project. The model also included nearby residential dwellings and other buildings in the onshore project area, intervening ground cover and topographical information.

96. Noise levels for the operational phase were predicted at the same NSR locations detailed in ***section 25.5***. The calculation algorithm described in ISO 9613 was used in the operational noise propagation modelling exercise.

97. The proposed East Anglia TWO project will commit to limiting operational noise from the onshore substation to a noise level no greater than 35dB $L_{Aeq\ 1hr}$ during the day time and 35dB $L_{Aeq\ 15\ min}$ during the night at the NSRs. See ***section 25.3.3*** for further details on the 35dB operational noise limit. The effect of this requirement will be such that noise emissions from the onshore substation will not exceed the prescribed limit at any receptors.

98. The magnitude of impacts that will be applied to the operational assessment, based on a quantitative assessment of noise impact using BS 4142:2014 and against a limit to operational noise from the onshore substation to 35dB $L_{Aeq\ 15\ min}$ during the night, are summarised in ***Table 25.20***.

Table 25.20 Substation Operational Noise Impact Magnitude Criteria

BS4142 Rating level ($L_{Ar,\ Tr}$ dB)	BS4142 Impact magnitude	35dB $L_{Aeq\ 15\ min}$ Rating level	35dB $L_{Aeq\ 15\ min}$ Impact magnitude
≤ (L_{A90}) Background	No impact	≤ 35dB $L_{Aeq\ 15\ min}$	No impact
> L_{90} dBA to + <3 dB	Negligible Adverse	> 35dB $L_{Aeq\ 15\ min}$ to + <3 dB	Negligible Adverse
> L_{90} dBA + >3 dB to <5 dB	Minor Adverse	> 35dB $L_{Aeq\ 15\ min}$ + >3 dB to <5 dB	Minor Adverse
> L_{90} dBA + >5 dB to 9.9 dB	Moderate Adverse	> 35dB $L_{Aeq\ 15\ min}$ + >5 dB to 9.9 dB	Moderate Adverse
L_{90} dBA + ≥10 dB	Major Adverse	35dB $L_{Aeq\ 15\ min}$ + ≥10 dB	Major Adverse

99. The equipment required at the National Grid substation for operation does not include components which would contribute any significant noise contributions in the area. Normal operational noise levels are expected to be minimal as there are no transformers on the site. Diesel generators and circuit breakers would be activated only during maintenance or during a system fault. The National Grid substation is therefore not included as part of the noise modelling presented within this chapter.

100. Noise levels associated with any operational maintenance activities are not expected to be greater than the noise of the operational substation itself. Therefore, specific reference to maintenance activity is not considered further in this assessment.

101. Modifications are also required to the existing National Grid overhead line structures. However, as the line is not significantly changing its geographical location, further assessment of the operational impacts of the proposed modifications in accordance with NPS EN-5, paragraphs 2.9.8 and 2.9.9 is not considered necessary and therefore is not considered further.

25.4.3.5 Sensitivity

102. The aims of the NPPF and the NPSE require that a SOAEL should be *"avoided"* and that where a noise level which falls between SOAEL and LOAEL, then according to the explanatory notes in the statement:

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

103. Further guidance can be found in the Planning Practice Guidance (PPG) notes which summarise the noise exposure hierarchy based on the likely average response, as summarised in ***Table 25.21***.

Table 25.21 Definitions of Sensitivity Levels for PPG Noise Exposure Hierarchy (reproduced from the NPPF)

Perception	Examples of outcomes	Increasing effect levels	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic	No Observed Adverse Effect	No specific

Perception	Examples of outcomes	Increasing effect levels	Action
	character of the area but not such that there is a perceived change in the quality of life.		measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

104. Sensitive receptors, in the context of noise and vibration, are typically residential premises but can also include schools, places of worship and noise sensitive commercial premises. ***Table 25.22*** presents the definitions used relating to the sensitivity of the receptor.

Table 25.22 Definitions of the Different Sensitivity Levels for a Noise Receptor

Sensitivity	Definition	Examples
High	Receptor has very limited tolerance of effect	Noise Receptors have been categorised as high sensitivity where noise may be detrimental to vulnerable receptors. Such receptors include certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night. Vibration Receptors have been categorised as high sensitivity where the receptors are listed buildings or Scheduled Monuments.
Medium	Receptor has limited tolerance of effect	Noise Receptors have been categorised as medium sensitivity where noise may cause disturbance and a level of protection is required but a level of tolerance is expected. Such subgroups include residential accommodation, private gardens, hospital wards, care homes, schools, universities, research facilities, national parks, (during the day); and temporary holiday accommodation at all times. Vibration Receptors have been categorised as medium sensitivity where the structural integrity of the structure is limited but the receptor is not a listed building or Scheduled Monument.
Low	Receptor has some tolerance of effect	Noise Receptors have been categorised as low sensitivity where noise may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect. Such subgroups include offices, shops, outdoor amenity areas, long distance footpaths, doctor's surgeries, sports facilities and places of worship. Vibration Receptors have been categorised as low sensitivity where the structural integrity of the structure is expected to be high. The level of vibration required to cause damage is very high and such levels are not expected to be reached during the project.
Negligible	Receptor generally tolerant of effect.	Noise Receptors have been categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include warehouses, light industry, car parks, and agricultural land. Vibration Receptors have been categorised as negligible sensitivity where vibration is not expected to be detrimental.

25.4.3.6 Impact Significance

105. Following the identification of receptor value and sensitivity and magnitude of the effect, it is possible to determine the significance of the impact. A matrix as presented in ***Table 25.23*** will be used wherever relevant.

Table 25.23 Impact Significance Matrix

		Magnitude				
		Major/High	Moderate/Medium	Minor/Low	Negligible	No impact
Sensitivity	High	*Major*	*Major*	*Moderate*	*Minor*	*Minor*
	Medium	*Major*	*Moderate*	*Minor*	*Minor*	*Negligible*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*	*Negligible*
	Negligible	*Minor*	*Negligible*	*Negligible*	*Negligible*	*Negligible*

106. The impact significance categories are divided as shown in ***Table 25.24***.

107. Where impacts are considered to be significant (moderate or major), appropriate mitigation measures will be considered in order to give protection to sensitive receptors.

108. Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

Table 25.24 Impact Significance Definitions

Impact Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore no change in receptor condition.

25.4.4 Cumulative Impact Assessment

109. The proposed East Anglia TWO project Cumulative Impact Assessment (CIA) will initially consider the cumulative impact with only the East Anglia ONE North project against two different construction scenarios (i.e. construction of the two

projects simultaneously and sequentially). The worst case scenario of each impact is then carried through to the full CIA which considers other developments which are in close proximity to the proposed East Anglia TWO and East Anglia ONE North projects.

110. For a general introduction to the methodology used for the CIA please refer to ***Chapter 5 EIA Methodology.***

25.4.5 Transboundary Impact Assessment

111. There are no transboundary impacts with regards to noise and vibration as the proposed onshore development area would not be sited in proximity to any international boundaries. Transboundary impacts are therefore scoped out of this assessment and will not be considered further.

25.5 Existing Environment

112. In order to characterise the existing noise climate within the noise study area a baseline noise survey was undertaken at locations representative of the nearest sensitive receptors as agreed with the relevant local authorities (detailed in ***Table 25.25*** and shown on ***Figure 25.2***). Measurements were conducted between 26th June 2018 and 5th July 2018.

Table 25.25 Noise Sensitive Receptors Included in Assessment

Receptor Identifier	Coordinates		Classification	Sensitivity
	X	Y		
LFR1	647538	260183	Residential	Medium
LFR2	647266	260059	Residential	Medium
LFR3	646550	260305	Residential	Medium
LFR4	646688	260908	Residential	Medium
CCR1	647541	261197	Residential	Medium
CCR2	647118	261983	Residential	Medium
CCR3	647140	262414	Residential	Medium
CCR4	646242	262318	Residential	Medium
CCR5	645467	261768	Residential	Medium
CCR5	645463	261788	Residential	Medium
CCR6	645357	262011	Residential	Medium
CCR7	645678	261211	Residential	Medium
CCR8	645325	260620	Residential	Medium
CCR9	644693	260360	Residential	Medium

Receptor Identifier	Coordinates		Classification	Sensitivity
	X	Y		
CCR10	644545	260397	Residential	Medium
CCR11	644564	260583	Residential	Medium
CCR12	644883	260910	Residential	Medium
CCR13	643817	260563	Residential	Medium
CCR14	643347	260264	Residential	Medium
CCR15	643140	260577	Residential	Medium
CCR16	643387	260616	Residential	Medium
CCR17	642668	260438	Residential	Medium
CCR18	642093	261284	Residential	Medium
CCR19	642552	261552	Residential	Medium
SSR1	641720	261616	Residential	Medium
SSR2	641831	261173	Residential	Medium
SSR3	641229	261668	Residential	Medium
SSR4	640931	260748	Residential	Medium
SSR5	641166	260801	Residential	Medium
SSR6	641432	260547	Residential	Medium
SSR7	641817	261644	Residential	Medium
SSR8	640353	260987	Residential	Medium
SSR9	640991	261683	Residential	Medium
SSR10	639932	260391	Residential	Medium
SSR11	640526	260309	Residential	Medium
SSR12	640441	261602	Residential	Medium

113. The proposed onshore development area is predominantly rural and coastal in nature, with limited significant noise sources. In addition, there are numerous individual residential properties and farms located throughout the area. The key residential areas are Thorpeness (near to the Landfall), Leiston and Knodishall Common to the north, and Friston to the south.

114. There are a number of B roads that pass through the proposed onshore development area, which form part of the noise environment. The closest major road is the A12 greater than 5km to the west of the proposed onshore development area.

115. The proposed onshore development area will be further informed through ongoing consultation with stakeholders and landowners including the confirmation of noise sensitive receptors in proximity to the works (both construction and operation).

116. The road links identified by the transport assessment as carrying construction traffic are presented below in ***Table 25.26.*** Road links likely to experience an increase in traffic flows greater than 25% were assessed further by undertaking calculations of base noise level (BNL). This assessment is presented in ***section 25.6.1.3.***

Table 25.26 Construction Road Traffic Flows – 2024[1] the proposed East Anglia TWO project

Link ID	Description	2024 Baseline flows AAWT		2024 Baseline + Development		Overall Change (%)	
		Total Vehicles	Total HGVs	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
1	A12 north of the B1122	13,976	1,290	14,363	1,544	2.8	19.7
2	A12 between the B1122 and A1094	11,876	1,159	12,229	1,413	3.0	21.9
3	A12 south of the A1094	18,934	1,126	19,329	1,380	2.1	22.5
4	B1122 from the A12 to Lover's Lane	3,029	256	3,299	381	8.9	48.8
5	B1121 from the A12 to Friston	1,332	61	1,433	61	7.6	0.0
6	A1094 from the A12 to the B1121/B1069	8,191	517	8,550	761	4.4	47.3
7	B1122 from Friston to the A1094	1,340	70	1,383	70	3.2	0.0
8	A1094 from the B1121/B1069 to Aldeburgh	5,900	264	6,005	309	1.8	17.0
9	B1069 from the A1094 to Coldfair Green	4,364	201	4,829	414	10.6	106.4
10	B1122 from Aldeburgh to the B1353	3,646	181	3,750	226	2.9	24.9
11	B1353 from the B1122 to Thorpeness	2,265	90	2,346	128	3.6	42.2

[1] This assumed construction start date has been used for the assessment presented in this PEIR. Any refinement of the programme prior to submission of the DCO will be captured in the Environmental Statement.

Link ID	Description	2024 Baseline flows AAWT		2024 Baseline + Development		Overall Change (%)	
		Total Vehicles	Total HGVs	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
12	Lover's Lane / Sizewell Gap	3,322	116	3,621	241	9.0	108.1
13	Aldringham Lane	2,712	118	2,750	118	1.4	0.0
14	B1069 from Lovers Lane to B1119	3,029	256	3,190	256	5.3	0.0
15	B1069 from Coldfair Green to B1119	4,364	201	4,524	201	3.7	0.0

25.5.1 Survey Practice

117. Baseline survey measurements were conducted in accordance with current guidance, including BS 4142:2014 Method for Rating and Assessing Industrial and Commercial Sound and BS 7445:2003 Description and measurement of environmental noise and the methodology used was agreed with relevant stakeholders during ETG meetings.

118. Sound level meters (SLM) were fully calibrated, traceable to UKAS standards and satisfied the requirements of BS EN 61672-1:20131F for a 'Class 1' Sound Level Meter (SLM).

119. For all measurement locations during the noise survey, SLMs were set to record the following:

- L_{Aeq} – the equivalent continuous sound pressure level over the measurement period. This parameter was standardised as pertinent for land use within BS 7445:2003;
- L_{Amax} – the maximum sound pressure level occurring within the defined measurement period;
- L_{A90} – the sound pressure level exceeded for 90% of the measurement period and is indicative of the background noise level; and
- L_{A10} - the sound pressure level exceeded for 10% of the measurement period. The L_{A10} index is used within the CRTN as an appropriate descriptor of traffic noise.

120. The equivalent continuous sound pressure level (L_{Aeq}) is the conventional descriptor of environmental noise and is defined below:

$$L_{eq,T} = 10 \times \log\left[\frac{1}{T}\int \frac{\rho^2(t)\partial t}{\rho_0^2}\right] dB$$

121. Noise measurements are normally taken with an A-weighting (denoted by a subscript 'A') to approximate the frequency response of the human ear.

122. Noise measurements were conducted with the SLMs mounted on tripods at a height of between 1.2m and 1.5m above ground level and 3.5m away from any reflecting surface other than the ground, i.e. in free-field conditions. The instruments were calibrated before and after the survey using a portable calibrator. No significant deviation in the calibration level was observed.

123. A record of the meteorological conditions during the survey was made. Any measurements taken during periods of rain or when average wind speeds exceed 5ms^{-1} were screened from the results.

25.5.2 Deriving Background Levels

124. Background noise levels used in the assessment were obtained from the baseline measurements. The measurement locations used were considered to be representative of the nearest NSR and had been previously agreed with the relevant local authority.

125. The background noise levels for the unattended measurement periods (ranging from 5 to 7 days) were assessed using statistical analysis of the measured L_{A90} values.

126. Assessment values for receptor locations at the onshore substation have been derived from long term and short-term measurements. Details of the baseline noise survey are presented in ***Appendix 25.1***. At some locations, there was no long-term monitor set up, due to land access issues. At these locations, short-term attended monitoring was conducted. These locations are identified and discussed further in ***Appendix 25.1***.

25.5.3 Anticipated Trends in the Baseline Conditions

127. The baseline noise monitoring survey provides a clear representation of the existing soundscape within the study area of the project. Noise is managed and driven by EU, UK and local legislation and policies. The UK's noise strategy and standards are enacted through management actions at a local authority level. There is a policy trend towards the achievement and maintenance of the noise environment across the UK, which is reflected in the local planning policies detailed in ***section 25.4.1.3***. Predicted noise levels due to a change in land use, new developments and associated vehicles are assessed as part of the development planning and consent process.

128. Potential impacts to the prevailing soundscape should be minimised, avoided, or mitigated to suitable levels (in accordance with current legislation, policy and guidance), avoiding an adverse impact, where possible. In addition to planning controls there is a clear trend for noise from vehicle, commercial and industrial sources to be driven down in compliance with stricter legislation and guidance. Consequently, in relation to the project and its immediate receiving environment it is reasonable to predict a general steady baseline soundscape would be maintained.

25.6 Potential Impacts

129. This section outlines potential impacts as a result of the project and their significance, using the assessment methodology described in ***section 25.4*** and ***Chapter 5 EIA Methodology***. As the construction of the onshore substation will potentially have different impacts in terms of the type and magnitude than those of the onshore cable route, the magnitude of these are discussed separately under the same impact where relevant, however the greater of the two magnitudes is used to define the significance of that impact overall.

130. The following assessments focus on the impact of predicted noise on residential receptors as these are considered to be the determining receptor when considering impact significance. Residences are generally the nearest type of receptor to the proposed construction works. Commercial and leisure facilities are of a lower sensitivity and therefore where these are closer than residences to aspects of the construction, the impact significance would be less.

131. Along the onshore cable route there are locations where users of Public Rights of Way (PRoW) could be affected by noise from construction works but this would be temporary as the user passes the works; please refer to ***Chapter 30 Tourism, Recreation and Socio-Economics*** for amenity impacts upon PRoW.

132. There are potential inter-relationships with other disciplines, namely, ***Chapter 22 Onshore Ecology, Chapter 23 Onshore Ornithology, Chapter 24 Archaeology and Cultural Heritage, Chapter 26 Traffic and Transport, Chapter 27 Human Health*** and ***Chapter 30 Tourism Recreation and Socio-Economics.*** The potential impacts could be related to the construction and operational phases of the project.

25.6.1 Potential Impacts during Construction

133. Construction impacts will be temporary in nature and include noise and vibration generating activities associated with:

- Earthworks along the onshore cable route, at the landfall and at the onshore substation;

- General construction activities along the onshore cable route, at the landfall and at the onshore substation;
- Directional drilling works; and
- Heavy goods vehicles (HGVs) delivering to site.

25.6.1.1 Impact 1: Increased Noise on Residential Receptors Along the Proposed onshore development Area

134. As a worst-case scenario, HDD has been assumed to be in operation at the landfall location for 24 hours a day and assessed accordingly; for all other construction activities at the landfall, onshore cable route and substation the assessment is based on construction between the hours of 07:00 to 19:00 Monday to Saturday. ***Table 25.27*** presents the predicted noise level at the nearest residential receptors to the landfall including embedded mitigation for the construction phase, as outlined in ***section 25.3.3***.

Table 25.27 Landfall Construction Noise proposed East Anglia TWO Project – Predicted Impacts Month 1 to 24

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Worst Case Predicted Receptor Noise level dBA	Worst Case Impact Magnitude	Worst Case Impact Significance
LFR1	Daytime	A (65)	58.0	No Impact	Negligible
	Evening	A (55)	38.4	No Impact	Negligible
	Night	B (50)	39.3	No Impact	Negligible
LFR2	Daytime	A (65)	52.3	No Impact	Negligible
	Evening	A (55)	38.0	No Impact	Negligible
	Night	A (45)	38.2	No Impact	Negligible
LFR3	Daytime	A (65)	62.5	No Impact	Negligible
	Evening	A (55)	35.5	No Impact	Negligible
	Night	A (45)	35.6	No Impact	Negligible
LFR4	Daytime	A (65)	48.0	No Impact	Negligible
	Evening	A (55)	37.4	No Impact	Negligible
	Night	A (45)	37.9	No Impact	Negligible

135. The results show that predicted noise levels from construction works during the proposed East Anglia TWO project at the landfall location would be of no impact

magnitude on receptors of medium sensitivity and therefore impacts would be of **negligible** significance. Therefore, no additional mitigation is required.

136. ***Table 25.28*** presents the predicted daytime noise level at the nearest residential receptors along the onshore cable route including embedded mitigation for the construction phase, as outlined in ***section 25.3.3***.

Table 25.28 Onshore Cable Route Construction Noise proposed East Anglia TWO Project – Predicted Impacts Month 1 to 24 Daytime

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude	Impact Significance
CCR1	Daytime	A (65)	55.7 to 59.1	No Impact	Negligible
CCR2	Daytime	A (65)	54.7 to 62.5	No Impact	Negligible
CCR3	Daytime	A (65)	45.0 to 48.2	No Impact	Negligible
CCR4	Daytime	A (65)	46.0 to 47.8	No Impact	Negligible
CCR5	Daytime	A (65)	43.9 to 46.2	No Impact	Negligible
CCR6	Daytime	A (65)	42.5 to 44.4	No Impact	Negligible
CCR7	Daytime	A (65)	59.5 to 64.7	No Impact	Negligible
CCR8	Daytime	A (65)	46.3 to 51.6	No Impact	Negligible
CCR9	Daytime	A (65)	49.4 to 56.5	No Impact	Negligible
CCR10	Daytime	A (65)	48.0 to 61.9	No Impact	Negligible
CCR11	Daytime	A (65)	46.8 to 59.6	No Impact	Negligible
CCR12	Daytime	A (65)	47.6 to 51.8	No Impact	Negligible
CCR13	Daytime	A (65)	43.8 to 56.9	No Impact	Negligible
CCR14	Daytime	A (65)	51.0 to 54.4	No Impact	Negligible
CCR15	Daytime	A (65)	49.7 to 55.7	No Impact	Negligible
CCR16	Daytime	A (65)	50.5 to 54.0	No Impact	Negligible
CCR17	Daytime	A (65)	52.3 to 55.7	No Impact	Negligible
CCR18	Daytime	A (65)	48.3 to 51.1	No Impact	Negligible
CCR19	Daytime	A (65)	44.3 to 46.5	No Impact	Negligible

137. The results show that predicted noise levels from construction works during the proposed East Anglia TWO project at the onshore cable route NSRs would be of no impact magnitude on receptors of medium sensitivity and therefore impacts

would be of **negligible** significance. Therefore no additional mitigation is required.

138. ***Table 25.29*** presents the predicted noise level for the Saturday 13:00 to 19:00hrs period at the nearest residential receptors along the onshore cable route including embedded mitigation for the construction phase, as outlined in ***section 25.3.3***.

Table 25.29 Onshore Cable Route Construction noise proposed East Anglia TWO Project – Predicted Impacts Month 1 to 24 Weekends

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude Range	Impact Significance Range
CCR1	Saturday 13:00 to 19:00	A (55)	55.7 to 59.1	Negligible to Medium	Negligible to Moderate
CCR2		A (55)	54.7 to 62.5	No Impact to High	Negligible to Major
CCR3		A (55)	45.0 to 48.2	No Impact	Negligible
CCR4		A (55)	46.0 to 47.8	No Impact	Negligible
CCR5		A (55)	43.9 to 46.2	No Impact	Negligible
CCR6		A (55)	42.5 to 44.4	No Impact	Negligible
CCR7		A (55)	59.5 to 64.7	Medium to High Impact	Moderate to Major
CCR8		A (55)	46.3 to 51.6	No Impact	Negligible
CCR9		A (55)	49.4 to 56.5	No Impact to Low	Negligible to Minor
CCR10		A (55)	48.0 to 61.9	No Impact to High	Negligible to Major
CCR11		A (55)	46.8 to 59.6	No Impact to Medium	Negligible to Moderate
CCR12		A (55)	47.6 to 51.8	No Impact	Negligible
CCR13		A (55)	43.8 to 56.9	No Impact to Low	Negligible to Minor
CCR14		A (55)	51.0 to 54.4	No Impact	Negligible
CCR15		A (55)	49.7 to 55.7	No Impact to Negligible	Negligible to Minor
CCR16		A (55)	50.5 to 54.0	No Impact	Negligible
CCR17		A (55)	52.3 to 55.7	No Impact to Negligible	Negligible to Minor

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude Range	Impact Significance Range
CCR18		A (55)	48.3 to 51.1	No Impact	Negligible
CCR19		A (55)	44.3 to 46.5	No Impact	Negligible

139. The results show that predicted noise levels from construction works during the Saturday period 13:00 to 19:00hrs for proposed East Anglia TWO project at the onshore cable route NSRs would be of no impact to high impact magnitude on receptors of medium sensitivity and therefore impacts would range from **negligible** to **major** significance. Therefore additional mitigation is required during this assessed time period.

140. ***Table 25.30*** presents the predicted noise level at the nearest residential receptors in proximity to the onshore substation including embedded mitigation for the construction phase, as outlined in ***section 25.3.3***.

Table 25.30 Onshore Substation Construction Noise Proposed East Anglia TWO Project – Predicted Impacts Month 1 to 24 Daytime

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude	Impact Significance
SSR1	Daytime	A (65)	46.5 to 51.0	No Impact	Negligible
SSR2	Daytime	A (65)	48.8 to 56.3	No Impact	Negligible
SSR3	Daytime	A (65)	44.8 to 49.4	No Impact	Negligible
SSR4	Daytime	A (65)	45.3 to 48.9	No Impact	Negligible
SSR5	Daytime	A (65)	48.7 to 52.4	No Impact	Negligible
SSR6	Daytime	A (65)	49.7 to 53.0	No Impact	Negligible
SSR7	Daytime	A (65)	45.5 to 49.5	No Impact	Negligible
SSR8	Daytime	A (65)	40.7 to 44.1	No Impact	Negligible
SSR9	Daytime	A (65)	43.1 to 47.4	No Impact	Negligible
SSR10	Daytime	A (65)	37.8 to 40.5	No Impact	Negligible
SSR11	Daytime	A (65)	40.5 to 43.5	No Impact	Negligible
SSR12	Daytime	A (65)	39.5 to 43.0	No Impact	Negligible

141. The results show that predicted daytime noise levels from construction works during the proposed East Anglia TWO project at the substation locations would be of no impact magnitude on receptors of medium sensitivity and therefore impacts would be of **negligible** significance. Therefore, no additional mitigation is required.

142. ***Table 25.31*** presents the predicted noise level at the nearest residential receptors in proximity to the onshore substation including embedded mitigation for the weekend period during the construction phase, as outlined in ***section 25.3.3***.

Table 25.31 Onshore Substation Construction Noise Proposed East Anglia TWO Project – Predicted Impacts Month 1 to 24 Weekends

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude Range	Impact Significance Range
SSR1	Saturday 13:00 to 19:00	A (55)	46.5 to 51.0	No Impact	Negligible
SSR2		A (55)	48.8 to 56.3	No Impact to Low	Negligible to Minor
SSR3		A (55)	44.8 to 49.4	No Impact	Negligible
SSR4		A (55)	45.3 to 48.9	No Impact	Negligible
SSR5		A (55)	48.7 to 52.4	No Impact	Negligible
SSR6		A (55)	49.7 to 53.0	No Impact	Negligible
SSR7		A (55)	45.5 to 49.5	No Impact	Negligible
SSR8		A (55)	40.7 to 44.1	No Impact	Negligible
SSR9		A (55)	43.1 to 47.4	No Impact	Negligible
SSR10		A (55)	37.8 to 40.5	No Impact	Negligible
SSR11		A (55)	40.5 to 43.5	No Impact	Negligible
SSR12		A (55)	39.5 to 43.0	No Impact	Negligible

143. The results show that predicted noise levels from construction works during the Saturday period 13:00 to 19:00hrs for the proposed East Anglia TWO project at the substation locations would be of no impact magnitude at most receptors of medium sensitivity with the exception of SSR2. Therefore, impacts would be of **minor** significance at SSR2, and of **negligible** significance at all other receptors. Therefore additional mitigation is required at receptor SSR2. Enhanced mitigation measures are detailed in ***section 25.6.1.2***.

25.6.1.2 Enhanced Mitigation

144. During the weekend period (13:00 to 19:00) the predicted impact significance (including standard mitigation) at some onshore cable route and onshore substation receptors was determined to range from **negligible** to **major**.

145. In order to ensure these impacts are mitigated as far as reasonably possible, the aforementioned standard mitigation, coupled with more site specific solutions such as the use of screening such as temporary noise barriers and/or temporary spoil bunds, would be applied where appropriate.

146. As an example of the relative effectiveness of applying a temporary localised noise barrier BS 5228 states:

- *"as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation."*

147. The residual magnitude of effect after enhanced mitigation measures are applied will be negligible on a medium sensitive receptor. Using the significance matrix detailed in ***Table 25.23*** this represents a negligible impact.

25.6.1.3 Impact 2: Increased Noise on Residential Receptors from Off-Site Construction Traffic Noise

148. ***Table 25.26*** shows road links identified as carrying construction traffic. Only road links likely to experience an increase in traffic flows greater than 25%, as assessed in ***Chapter 26 Traffic and Transport,*** have been assessed further by undertaking calculations of base noise level (BNL). Assessment against the 2024[2] baseline is presented in ***Table 25.32***. This is considered the worst case year for assessment as the earliest year for the start of construction. Any later years would have higher baseline traffic flows and therefore a lesser impact magnitude. Assessments of construction commencing in later years (2026, 2028 and 2030) are included in ***Appendix 25.2***.

[2] This assumed construction start date has been used for the assessment presented in this PEIR. Any refinement of the programme prior to submission of the DCO will be captured in the Environmental Statement.

Table 25.32 Calculated BNL – 2024 Baseline vs. 2024 Baseline and the proposed East Anglia TWO project Traffic

Link ID	Description	Speed (mph)	2024 Baseline BNL, dBA L10,18hr	2024 Baseline and the proposed East Anglia TWO project BNL, dBA, L10,18hr	Overall Change dBA	Impact Magnitude
1	A12 north of the B1122	30.0	70.5	70.9	0.4	Negligible
		40.0	71.7	72.2	0.5	Negligible
2	A12 between the B1122 and A1094	30.0	69.9	70.4	0.5	Negligible
		50.0	72.5	72.9	0.4	Negligible
		60.0	73.8	74.2	0.4	Negligible
3	A12 south of the A1094	30.0	71.0	71.4	0.4	Negligible
		50.0	73.8	74.1	0.3	Negligible
4	B1122 from the A12 to Lover's Lane	30.0	63.6	64.7	1.1	Minor
		40.0	64.9	65.9	1.0	Negligible
		60.0	67.7	68.5	0.8	Negligible
5	B1121 from the A12 to Friston	30.0	59.0	59.2	0.2	Negligible
		40.0	60.5	60.7	0.2	Negligible
		60.0	63.5	63.7	0.2	Negligible
6	A1094 from the A12 to the B1121/B1069	30.0	67.4	68.3	0.9	Negligible
		40.0	68.8	69.5	0.7	Negligible
7	B1122 from Friston to the A1094	30.0	59.2	59.3	0.1	No change
		60.0	63.6	63.7	0.1	Negligible
8	A1094 from the B1121/B1069 to Aldeburgh	30.0	65.5	65.7	0.2	Negligible
		60.0	69.9	70.1	0.2	Negligible
9	B1069 from the A1094 to Coldfair Green	30.0	64.2	65.7	1.5	Minor
		40.0	65.7	67.0	1.3	Minor
10	B1122 from Aldeburgh to the B1353	30.0	63.5	63.9	0.4	Negligible
		40.0	65.0	65.3	0.3	Negligible
		60.0	67.9	68.2	0.3	Negligible
11	B1353 from the B1122 to Thorpeness	30.0	61.2	61.8	0.6	Negligible
		60.0	65.7	66.1	0.4	Negligible

Link ID	Description	Speed (mph)	2024 Baseline BNL, dBA L10,18hr	2024 Baseline and the proposed East Anglia TWO project BNL, dBA, L10,18hr	Overall Change dBA	Impact Magnitude
12	Lover's Lane / Sizewell Gap	60.0	67.2	68.2	1.0	Negligible
13	Aldringham Lane	30.0	62.1	62.1	0.0	No change
		40.0	63.5	63.6	0.1	Negligible
14	B1069 from Lovers Lane to B1119	30.0	63.6	63.8	0.2	Negligible
15	B1069 from Coldfair Green to B1119	30.0	64.2	64.3	0.1	Negligible
		40.0	65.7	65.8	0.1	Negligible

149. ***Table 25.32*** shows that predicted impacts are at worst of a minor adverse impact magnitude at a medium sensitivity receptor resulting in a **minor adverse** significance. Therefore no additional mitigation is required.

25.6.1.4 Impact 3: Construction Vibration

150. Operation of HDD rigs and ancillary equipment is expected to produce the greatest vibration impacts and is therefore taken forward as the worst case for vibration assessment.

151. Vibration levels decay very rapidly with distance from a source (BS 5228-2:2009+A1:2014). A representative example of HDD given within BS 5228-2:2009+A1:2014 is for boring through silts overlying sandstone with a PPV of 8 mm/s at 4.5m from the source, decreasing to a PPV of 2.7mm/s at 7m from the source and 1.8mm/s at 12m from the source.

152. Given the distances between sources of vibration during the construction works and the NSRs it is clear that PPV levels would be below the criteria outlined in ***section 25.4.3.3*** at the NSRs along the proposed onshore development area. Vibration impacts from construction works would be of negligible magnitude on receptors of medium sensitivity and therefore of **minor adverse** significance. Therefore no additional mitigation is required.

153. Heavy vehicles on smooth road surfaces do not produce significant levels of vibration at road side receptors. However, vibration can result from sudden wheel impacts as vehicles pass over holes and cracks on the road surface. Potentially this may result in transient exceedances of BS 5228-2:2009+A1:2014 criteria. The majority of buildings would be resilient to the worst case vibration levels anticipated.

154. Should discontinuities (e.g. potholes) exist on the roads adjacent to any listed buildings within the traffic study area, it is considered that there is the potential for vibration levels to exceed the minimum PPV as specified within ***Table 25.17***.

25.6.2 Potential Impacts during Operation

25.6.2.1 Operation Impact 1: Increased Noise on Residential Receptors from the Onshore Substation

155. The impact assessment has been undertaken using the unmitigated worst case scenario for the potential components that could be used at the onshore substation and based on the fixed plant requirements detailed in ***Chapter 6 Project Description*** and presented in ***Table 25.33***, ***Table 25.34*** and ***Table 25.35***.

156. Operations at the onshore substation are proposed 24 hours a day. A detailed SoundPLAN noise model was created to assess noise levels as a result of the proposed plant required. Ground absorption was incorporated into the SoundPLAN model using a coefficient of 0.6 to represent the mixed ground between the sound sources and receiver for the topographical data.

157. For clarity, the modelled plant is detailed in ***Table 25.33***.

Table 25.33 Modelled Noise Sources

Noise Source	Units	Sound Power Level dB(A)	Sound Pressure Level dB(A)	Drawing Item	Height (m)
Main Transformer (with enclosure)	2		58 at 1m from enclosure	1	2.5
Main Transformer (without enclosure)	2	101 per unit		1	2.5
Main Transformer (Forced Cooling System)	2	87 per unit		2	1.5
Shunt Reactor	2		62 at 1m from enclosure	3	2.5
STATCOM Air core reactor	6	83/phase 88/3 phases	-	4	2
STATCOM Filter Air Core Reactor	6	70/phase 75/3 phases	-	5	At three heights: 2m; 4m and 6m

Noise Source	Units	Sound Power Level dB(A)	Sound Pressure Level dB(A)	Drawing Item	Height (m)
STATCOM Filter Capacitor Bank	6	83/phase 88/3 phases	-	6	At three heights: 2m; 4m and 6m
Aux. Transformer	2	67 per unit	-	7	2
Air Coolers	10	80 per unit	-	8	2
STATCOM HVAC Units	4	79 per unit	-	9	2
Extractors (GIS Building)	15	See Noise HVAC Table	-	10	

158. Extractors included in model associated with the GIS building design are detailed in ***Table 25.34***.

Table 25.34 GIS Building Noise Sources

Fan	Model	Location	Sound Pressure Level dB(A)	Height (m)
EF1	Vent Axia (VSP40014)	GIS room (4 units)	46 at 3m	8.2 (lowest point to GFL)
EF2	Vent Axia (VSP25012)	Relay room (1 unit)	50 at 3m	3.5
		Store room (1 unit)		
		Mess room (1 unit)		
		Meter room (1 unit)		
		Generator room 1 (1 unit)		
		Generator room 2 (1 unit)		
EF3	Vent Axia (315-12B)	Store room (2 units)	58 at 3m	3.5
		Cleaner (1 unit)		
EF4	Vent Axia (171 04 020F)	Cleaner (2 units)	34 at 3m	3.5

159. Spectral data for plant included in model associated with the onshore substation are detailed in ***Table 25.35***.

Table 25.35 Frequency Spectrum 1/1 Octave - Plant

Plant	Octave Band Centre Frequency (Hz)/dB(A)							
	63	125	250	500	1K	2K	4K	8K
Auxiliary Transformer	59	60	53	49	46	39	37	55
STATCOM HVAC Units	51	61	73	73	75	70	59	47
STATCOM Air Core Reactor	44	80	45	77	75	18	14	14
STATCOM Filter Capacitor Bank	44	80	45	77	75	18	14	14
Harmonic Filter	47	83	48	80	78	21	17	17
Air Coolers	52	62	74	74	76	71	60	48
Main Transformer Forced COOLING SYSTEM	59	69	81	81	83	78	67	55
STATCOM Filter Aircore Reactor	31	67	32	64	62	5	1	1
Main Transformer	78	89	89	91	91	85	84	99
Enclosure Main Transformers	22	24	26	30	39	45	48	47
Enclosure Shunt Reactor	28	30	32	36	45	51	54	53
Shunt Reactor	81	102	92	98	97	95	88	85

160. Calculated operational noise levels have been determined at GF – Ground Floor (Daytime) and 1st Floor levels (Night time) and compared with the background noise levels at each receptor, which have been derived from the measured baseline noise data contained within ***Appendix 25.1***.

161. The proposed East Anglia TWO project will limit operational noise from the onshore substation to be no greater than 35dB $L_{Aeq\ 1hr}$ during the day time and 35dB $L_{Aeq\ 15\ min}$ during the night at the NSRs. The effect of this operational noise limit will be such that noise emissions from the onshore substation will not exceed the prescribed limit at any receptors.

162. The impact of the predicted noise levels from the onshore substation (including the installation of harmonic filters) at surrounding residential receptors (medium sensitivity) are presented in ***Table 25.36***. The magnitude of effects has been assessed in accordance with BS 4142:2014 and against the 35dB $L_{Aeq\ 15\ min}$ requirement by comparison with impact criteria within ***section 25.4.3.4***.

163. ***Table 25.36*** shows the maximum unmitigated operational noise impact (i.e. during the night).

Table 25.36 Predicted Onshore Substation Operational Noise Impact – Night time

Name	Receptor Sensitivity	Measured Background Noise Level (dBA)	Predicted Rating Noise Level Night time	Difference (dBA)	BS4142 Impact magnitude	Impact Significance Without Additional Mitigation	35dBA criteria impact magnitude	35dBA criteria Impact Significance Without Additional Mitigation
SSR1	Medium	33	30.1	-2.9	No Impact	Negligible	No impact	Negligible
SSR2	Medium	27	32.7	5.7	Moderate	Moderate	No impact	Negligible
SSR3	Medium	30	28.6	-1.4	No Impact	Negligible	No impact	Negligible
SSR4*	Medium	27	25.5	-1.5	No Impact	Negligible	No impact	Negligible
SSR5	Medium	27	28.1	1.1	Negligible	Minor	No impact	Negligible
SSR6*	Medium	27	22.7	-4.3	No Impact	Negligible	No impact	Negligible
SSR7	Medium	35	28.0	-7.0	No Impact	Negligible	No impact	Negligible
SSR8*	Medium	27	20.7	-6.3	No Impact	Negligible	No impact	Negligible
SSR9	Medium	27	26.0	-1.0	No Impact	Negligible	No impact	Negligible
SSR10	Medium	31	16.2	-14.8	No Impact	Negligible	No impact	Negligible
SSR11	Medium	30	19.7	-10.3	No Impact	Negligible	No impact	Negligible
SSR12	Medium	28	18.2	-9.8	No Impact	Negligible	No impact	Negligible

Note: * Background taken from SSR5

164. Using the BS4142 criteria, the results show that noise levels would be of no impact magnitude at most receptors of medium sensitivity during the night time and therefore of **negligible** significance, except for receptor SSR2 and SSR5, where a **moderate adverse** and **minor adverse** significance are predicted respectively using the BS4142 criteria.

165. However, due to limiting operational noise from the onshore substation to no greater than 35dB $L_{Aeq\ 15\ min}$ during the night at the NSRs, the results show that noise levels would have an impact magnitude of no impact at all receptors (medium sensitivity) and therefore be of **negligible** significance. Therefore no additional mitigation is required.

25.6.3 Potential Impacts during Decommissioning

166. No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left *in situ*. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.

25.7 Cumulative Impacts

25.7.1 Cumulative Impact with Proposed East Anglia ONE North Project

167. The East Anglia ONE North offshore windfarm project (the proposed East Anglia ONE North project) is also in the pre-application stage. The proposed East Anglia ONE North project will have a separate DCO application but is working to the same programme of submission as the proposed East Anglia TWO project. The two projects will share the same landfall and cable route and the two onshore substations will be co-located and feed into the same National Grid substation.

168. The proposed East Anglia TWO project CIA will therefore initially consider the cumulative impact with only the East Anglia ONE North project.

169. The CIA considers the proposed East Anglia TWO project and the proposed East Anglia ONE North project under two construction scenarios:

- Scenario 1 - the proposed East Anglia TWO project and proposed East Anglia ONE North project are built simultaneously; and
- Scenario 2 - the proposed East Anglia TWO project and the proposed East Anglia ONE North project are built with a construction gap.

170. The worst case (based on the assessment of these two construction scenarios) for each impact is then carried through to the wider CIA which considers other developments which are in close proximity to the proposed East Anglia TWO project (***section 25.7.2***). The operational phase impacts will be the same irrespective of the construction scenario. For a more detailed description of the assessment scenarios please refer to ***Chapter 5 EIA Methodology***.

Full assessment of scenario 1 and scenario 2 can be found in ***Appendix 25.4***. This assessment found that the overall significance of the impacts are same irrespective of construction scenario. Impacts are identified in ***Table 25.37***.

Table 25.37 Summary of Potential Impacts for Noise and Vibration under Either Construction Scenario

Potential Impact	Receptor	Sensitivity	Value	Magnitude	Significance	Examples of Potential Mitigation Measures	Residual Impact Significance
Construction Impacts with the proposed East Anglia ONE North project							
Impact 1: Increased noise on residential receptors along the Proposed onshore development Area	Residential	Medium	Medium	No Impact to Major Impact	Negligible to Major	Site specific solutions in some locations such as the use of screening such as temporary noise barriers and/or temporary spoil bunds	**No Impact to Negligible Impact.**
Impact 2: Increased noise on residential receptors from off-site construction traffic noise	Residential	Medium	Medium	Minor Impact	Minor adverse	n/a	**Minor adverse**
Impact 3: Vibration disturbance along the Proposed onshore development Area	Residential	Medium	Medium	Negligible	Minor adverse	n/a	**Minor adverse**
Operation Impacts with the proposed East Anglia ONE North project							
Impact 1: Increased operational noise on residential from the substations	Residential	Medium	Medium	No Impact to Moderate Impact BS4142 criteria Negligible (35dBA criteria)	Negligible to Moderate (BS4142 criteria) Minor adverse (35dBA criteria)	Best Practice Measures (BPM), use of quieter equipment, use of enclosures and localised screening.	**Negligible**

25.7.2 Cumulative Impact Assessment with Other Developments

171. The assessment of cumulative impacts has been undertaken here as a two stage process. Firstly, all impacts considered in ***section 25.6*** have been assessed for the potential to act cumulatively with other projects. Potential cumulative impacts are set out in ***Table 25.38.***

Table 25.38 Potential Cumulative Impacts

Impact	Potential for Cumulative Impact	Rationale
Construction		
Other proposed and consented developments and their associated road traffic.	Yes	There is potential for impacts associated with noise and vibration generated during the construction phase site works to lead to a cumulative impact with other proposed developments (already consented and those in the planning system) where the construction phases of other schemes overlap with East Anglia TWO Scenario 1 and Scenario 2, and where activities will occur in proximity to the same receptors.
Operation		
Other onshore electrical infrastructure within the vicinity of the onshore substation	Yes	There is a potential for a cumulative impact associated with operational phase to occur during operation of the onshore substation in conjunction with other operational noise sources within the vicinity of the onshore substation. Implementation of appropriate mitigation within the detail design should ensure that any impacts will be of negligible significance.
Decommissioning		
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left *in situ*. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.		

172. The second stage of the CIA is an assessment of whether there is spatial overlap between the extent of potential effects of the onshore infrastructure and the potential effects of other projects scoped into the CIA upon the same receptors. To identify whether this may occur, the potential nature and extent of effects arising from all projects scoped into the CIA have been identified and any overlaps between these and the effects identified in ***section 25.6.*** Where there is an overlap, an assessment of the cumulative magnitude of effect is provided.

173. Following a review of projects which have the potential to overlap temporally or spatially with the proposed East Anglia TWO project, one development has been scoped into the CIA. ***Table 25.39*** provides detail regarding the project.

174. The full list of projects for consideration will be updated following PEIR and agreed in consultation with local authorities. The remainder of the section details the nature of the cumulative impacts against all those receptors scoped in for cumulative assessment.

Table 25.39 Summary of Projects considered for the CIA in Relation to Noise and Vibration

Project	Status	Development period	[3]Distance from East Anglia TWO site (km)	Project definition	Level of information available	Included in CIA	Rationale
Sizewell C New Nuclear Power Station	Scoping Opinion Adopted by SoS on 02.06.2014	Uncertain	0.49km	Full Scoping Report (2014)[4] and Stage 2 Pre-application Consultation Report (2016)[5] available	Tier 5[6]	No	As this project is subject to an EIA, it is likely that this development will implement site-specific measures to mitigate noise associated with construction works which would be implemented as part of a CoCP specific for the development. It is therefore not anticipated that any cumulative effects associated with the construction phase will be significant.

[3] Shortest distance between the considered project and East Anglia TWO– unless specified otherwise
[4] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-000103-Sizewell%20C%20EIA%20Scoping%20Report_Main%20text.pdf
[5] http://sizewell.edfenergyconsultation.info/wp-content/uploads/2016/11/EDF_SZC_Stage2_ConsultationDoc_sfw.pdf
[6] Based on criteria outlined in ***section 5.7.2*** of ***Chapter 5 EIA Methodology***

25.7.2.1 Cumulative Impact during Construction

175. There is the potential for cumulative impacts at landfall and onshore cable route receptors in proximity to the proposed East Anglia TWO project works as a result of the simultaneous construction of proposed East Anglia TWO project, proposed East Anglia ONE North project and Sizewell C New Nuclear Power Station onshore project infrastructure. However, the magnitude of any cumulative effects is dependent on the construction phasing of the Sizewell C New Nuclear Power Station project relative to the proposed East Anglia TWO project.

176. Sizewell C New Nuclear Power Station is subject to an EIA, and as such will need to consider the impacts of noise and vibration, including those cumulative impacts with the proposed East Anglia TWO project. Furthermore, it is likely that this development will implement site-specific measures to mitigate noise associated with construction works which would be implemented as part of a CoCP specific for the development. It is therefore not anticipated that any cumulative effects associated with the construction phase will be significant.

177. Therefore, the Sizewell C New Nuclear Power Station is not being taken forward into the CIA at the PEIR stage for noise and vibration. This will be considered again for the ES should more information regarding the Sizewell C New Nuclear Power Station project become available.

25.7.2.2 Cumulative Impact during Operation

178. A cumulative operational assessment with Sizewell C New Nuclear Power Station was not undertaken. Noise emitted from the operation of Sizewell C New Nuclear Power Station would not be expected to contribute to any effect at the substation sensitive receptors considered as part of the proposed East Anglia TWO project. This is due to the separation distance (>5km) between the onshore substation and National Grid substation and the likely location of the Sizewell C New Nuclear Power Station.

25.8 Inter-relationships

179. A summary of the likely inter-related effects arising from the proposed East Anglia TWO development on water resources and flood risk is provided in ***Table 25.40*** below.

Table 25.40 Inter-relationships Relevant to The Assessment of Noise Impacts

Inter-relationship all phases and linked chapter	Section where addressed	Rationale
Chapter 22 Onshore Ecology	***Table 25.27***	Noise and vibration disturbance to protected species
Chapter 23 Onshore Ornithology	***Table 25.28***	Noise and vibration disturbance to protected species

Inter-relationship all phases and linked chapter	Section where addressed	Rationale
Chapter 24 Archaeology and Cultural Heritage	***Table 25.30***	There could be potential noise impacts related to construction traffic movements and construction plant operating in proximity.
Chapter 26 Traffic and Transport	***Table 25.32***	Influence of construction traffic on local amenity.
Chapter 27 Human Health	***Table 25.36***	There could be potential noise impacts related to construction traffic movements construction plant operating in proximity.
Chapter 30 Tourism, Recreation and Socio-economics	***Table 25.36***	There could be potential noise impacts related to construction traffic movements construction plant operating in proximity.

25.9 Interactions

180. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The areas of interaction between impacts are presented in ***Table 25.41***, along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 25.41 Interactions Between Impacts

Interactions between Impacts **Construction impacts**			
	Impact 1: Increased noise on residential receptors along the Proposed Onshore Development Area	**Impact 2: Increased noise on residential receptors from off-site construction traffic noise**	**Impact 3: Vibration disturbance along the Proposed Onshore Development Area**
Impact 1: Increased noise on residential receptors along the Proposed Onshore Development Area	-	Yes	Yes
Impact 2: Increased noise on residential receptors from off-site construction traffic noise	Yes	-	Yes
Impact 3: Vibration	Yes	Yes	-

Interactions between Impacts			
disturbance along the Proposed Onshore Development Area			
Operation impacts			
	Operation Impact 1: Increased operational noise on residential receptors from the substations		
Operation Impact 1: Increased operational noise on residential receptors from the substations	-		
Decommissioning impacts			
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left *in situ*. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.			

25.10 Summary

181. A summary of the findings of the PEIR for noise and vibration is presented in ***Table 25.42***. In accordance with the assessment methodology presented in ***section 25.4***, this table should only be used in conjunction with the additional narrative explanations provided in ***section 25.6***. This demonstrates that, post mitigation, all impacts have a maximum residual impact of **negligible** significance. There will therefore be no impacts resulting from the proposed East Anglia TWO development that are considered to be significant in EIA terms (i.e. moderate or major adverse).

182. A summary of potential cumulative impacts for noise and vibration is also presented in ***Table 25.42.***

Table 25.42 Potential Impacts Identified for Noise and Vibration

Potential Impact	Receptor	Sensitivity	Value	Magnitude	Significance	Examples of Potential Mitigation Measures	Residual Impact Significance
Construction							
Impact 1: Increased noise on residential receptors along the Proposed onshore development Area	Residential	Medium	Medium	No Impact to Major Impact	Negligible to Major	Site specific solutions in some locations such as the use of screening such as temporary noise barriers and/or temporary spoil bunds	**No Impact to Negligible Impact.**
Impact 2: Increased noise on residential receptors from off-site construction traffic noise	Residential	Medium	Medium	Minor Impact	Minor adverse	n/a	**Minor adverse**
Impact 3: Vibration disturbance along the Proposed onshore development Area	Residential	Medium	Medium	Negligible	Minor adverse	n/a	**Minor adverse**
Operation							
Impact 1: Increased operational noise on residential from the substations	Residential	Medium	Medium	No Impact to Moderate Impact BS4142 criteria No Impact (35dBA criteria)	Negligible to Moderate (BS4142 criteria) Negligible (35dBA criteria)	Best Practice Measures (BPM), use of quieter equipment, use of enclosures and localised screening.	**Negligible**

Potential Impact	Receptor	Sensitivity	Value	Magnitude	Significance	Examples of Potential Mitigation Measures	Residual Impact Significance
Decommissioning							
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation will likely be removed and be reused or recycled. It is expected that the onshore cables will be removed and recycled, with the transition bays and cable ducts (where used) left in situ. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.							

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