RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Environmental Statement

Volume 7

Chapter 25 – Noise (Revision 2) (Tracked)

January 2025

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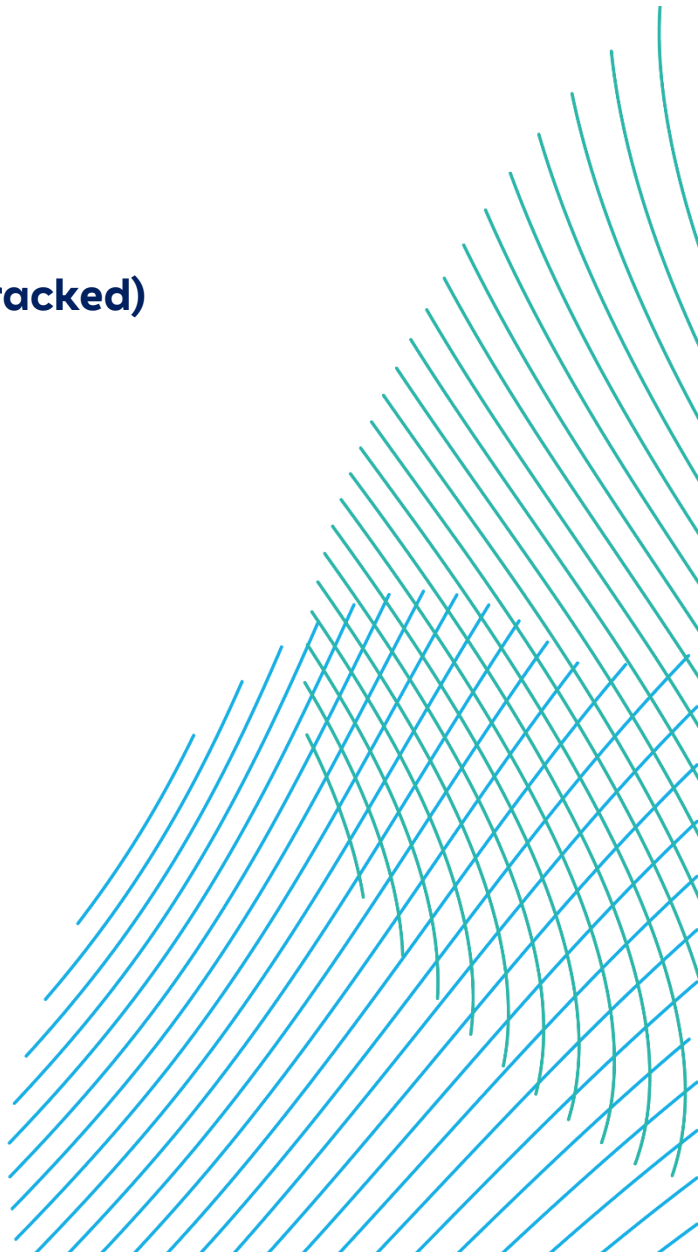

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Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
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01	N/A	N/A	Submitted for DCO Application
02	65, 66 67, 68 69 93	25.6.1.2.1 25.6.1.2.2 25.6.1.2.3 25.12	Chapter 25 Noise and Appendix 25-3 Construction Noise Assessment have been updated to address Issue Specific Hearing 2 Supplementary Agenda Questions ISH2.15.2 and ISH2.15.3 raised by the ExA prior to the ISH2. More details are contained within 'The Applicants' Responses to Issue Specific Hearing 2 Supplementary Agenda Questions' [document reference 11.5].

Contents

Tables

Volume 7 – Figures

Volume 7 – Appendices

Glossary

Term	Definition
Concurrent Scenario	A potential construction scenario for the Projects where DBS East and DBS West are both constructed at the same time.
Development Scenario	Description of how the DBS East and/or DBS West Projects would be constructed either In Isolation, Sequentially or Concurrently.
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Horizontal Directional Drill (HDD)	HDD is a trenchless technique to bring the offshore cables ashore at the landfall and can be used for crossing other obstacles such as roads, railways and watercourses onshore.
In Isolation Scenario	A potential construction scenario for one Project which includes either the DBS East or DBS West array, associated offshore and onshore cabling and only the eastern Onshore Converter Station within the Onshore Substation Zone and only the northern route of the onward cable route to the proposed Birkhill Wood National Grid Substation.
Jointing Bays	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.
Landfall	The point on the coastline at which the offshore export cables are brought onshore, connecting to the Onshore Export Cables at the Transition Joint Bay (TJB) above mean high water.

Term	Definition
Landfall Zone	The generic term applied to the entire landfall area between Mean Low Water Spring (MLWS) and the Transition Joint Bays (TJBs) inclusive of all construction works, including the landfall compounds, Onshore Export Cable Corridor and intertidal working area including the Offshore Export Cables.
Link Boxes	An underground metal box placed within a concrete pit where the metal sheaths between adjacent export cable sections are connected and earthed, installed with a ground level manhole to allow access to the link box for regular maintenance or fault-finding purposes.
Onshore Development Area	The Onshore Development Area for ES is the boundary within which all onshore infrastructure required for the Projects would be located including Landfall Zone, Onshore Export Cable Corridor, accesses, Temporary Construction Compounds and Onshore Converter Stations.
Onshore Export Cable Corridor	This is the area which includes cable trenches, haul roads, spoil storage areas, and limits of deviation for micro-siting. For assessment purposes, the cable corridor does not include the Onshore Converter Stations, Transition Joint Bays or temporary access routes; but includes Temporary Construction Compounds (purely for the cable route).
Onshore Export Cables	Onshore Export Cables take the electric from the Transition Joint Bay to the Onshore Converter Stations.
Onshore Converter Stations	A compound containing electrical equipment required to transform and stabilise electricity generated by the Projects so that it can be connected to the electricity transmission network. There will be one Onshore Converter Station for each Project.
Onshore Substation Zone	Parcel of land within the Onshore Development Area where the Onshore Converter Station infrastructure (including the haul roads, Temporary Construction Compounds and associated cable routeing) would be located.

Term	Definition
Sequential Scenario	A potential construction scenario for the Projects where DBS East and DBS West are constructed with a lag between the commencement of construction activities. Either Project could be built first.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).
Temporary Construction Compound	An area set aside to facilitate construction of the Projects. These will be located adjacent to the Onshore Export Cable Corridor and within the Onshore Substation Zone, with access to the highway.
Trenching	Open cut method for cable or duct installation.

Acronyms

Term	Definition
AAWT	Annual Average Weekday Traffic
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
BSI	British Standards Institution
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
CRTN	Construction of Road Traffic Noise
CTMP	Construction Traffic Management Plan
DBS	Dogger Bank South
DCO	Development Consent Order
DEFRA	Department for the Environment and Rural Affairs
EC	European Commission
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HVAC	High-Voltage Alternating Current

Term	Definition
HVDC	High-Voltage Direct Current
IEMA	Institute of Environmental Management and Assessment
IPMP	In-Principle Monitoring Plan
ISO	International Standards Organisation
km	Kilometre
LFR	Landfall Receptor
LOAEL	Lowest Observed Adverse Effect Level
MW	Megawatts
NAC	Noise Advisory Council
NE	Natural England
NNG	Night Noise Guideline
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptor
OAE	Observed Adverse Effect
OCoCP	Outline Code of Construction Practice

Term	Definition
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
PRoW	Public Right of Way
SOAEL	Significant Observed Adverse Effect Level
TCC	Temporary Construction Compound
TJB	Transition Joint Bay
UK	United Kingdom
WHO	World Health Organisation

25 Noise

25.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the likely onshore noise and vibration significant effects of the Projects. The chapter provides an overview of the existing environment for the proposed Onshore Development Area, followed by an assessment of likely significant effects for the construction, operation, and decommissioning phases of the Projects.
2. The assessment of likely significant effects during the construction phase includes noise and vibration from the works at the Landfall Zone, Temporary Construction Compounds, trenchless crossings and Onshore Converter Station(s), as well as noise from off-site construction road traffic.
3. The assessment of likely significant effects during the operational phase includes noise from the Onshore Converter Station(s).
4. A baseline noise survey at locations representative of the nearest noise-sensitive receptors (NSRs) to the Onshore Converter Station(s) has informed the assessment of operational noise from the Onshore Converter Station(s).
5. The assessment should be read in conjunction with the following linked chapters:
   - **Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)**;
   - **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**; and
   - **Volume 7, Chapter 17 Human Health (application ref: 7.17)**.
6. Additional information to support the Noise and Vibration assessment include:
   - **Volume 7, Appendix 25-1 Noise and Vibration Consultation Responses (application ref: 7.25.25.1)**;
   - **Volume 7, Appendix 25-2 Baseline Noise Monitoring (application ref: 7.25.25.2)**;
   - **Volume 7, Appendix 25-3 Construction Noise Assessment (application ref: 7.25.25.3)**;
   - **Volume 7, Appendix 25-4 Construction Road Traffic Noise Assessment (application ref: 7.25.25.4)**; and
   - **Volume 7, Appendix 25-5 Operational Noise Assessment (application ref: 7.25.25.5)**.

25.2 Consultation

7. Consultation with regard to noise and vibration has been undertaken in line with the general process described in **Volume 7, Chapter 7 Consultation (application ref: 7.7)** and the **Consultation Report (Volume 5, application ref: 5.1).** The key elements to date have including scoping, the ongoing Evidence Plan Process (EPP) via the noise and vibration Expert Topic Group (ETG) and the Preliminary Environmental information Report (PEIR).

8. The feedback received throughout this process has been considered in preparing the ES. This chapter has been updated following consultation in order to produce the final assessment submitted within the Development Consent Order (DCO) application. **Volume 7, Appendix 25-1 (application ref: 7.25.25.1)** provides a summary of the consultation responses received to date relevant to this topic, and details how the comments have been addressed within this chapter.

25.3 Scope

25.3.1 Effects Scoped In and Scoped Out

9. The scope of the noise and vibration assessments contained within this chapter are consistent with the **Scoping Report (Volume 5, application ref: 5.3)** and **Scoping Opinion (Volume 8, application ref: 8.7)**, where the nearest NSRs have been identified via study areas.

10. During construction, noise affecting human receptors, vibration affecting human receptors, road traffic impacts, nearshore airborne noise and cumulative impacts has been scoped into the assessment.

11. During operation noise affecting human receptors and cumulative impacts has been scoped into the assessment. Vibration affecting human receptors, road traffic impacts and nearshore airborne noise have been scoped out.

12. All impacts during decommissioning have been scoped into the assessment.

13. Offshore noise has been scoped out as per the scoping opinion, in which PINS agreed (section 3.4.1) that noise impacts from offshore activities in array areas can be scoped out due to the distance of these activities from nearest onshore receptors (c.100km).

25.3.2 Study Area

14. The noise and vibration study areas have been defined by identifying NSRs within specified buffer distances to noise and vibration-generating activities within the Onshore Development Area. Different buffer zones have been applied for different impacts:

- Construction noise – 300m from elements of the Projects Onshore Development Area that will generate noise for more than a month or at night during the construction phase;
- Construction vibration – 100m from elements of the Projects Onshore Development Area that will generate vibration during the construction phase (specifically potential horizontal directional drilling at trenchless crossings); and
- Operational noise – 500m from the elements of the Projects Onshore Development Area that will generate noise during the operational phase (the Onshore Converter Station(s)).

15. **Volume 7, Figure 25-1 (application ref: 7.25.1)** shows the NSRs which are considered in the assessment.

16. In addition, the assessment considers noise from road traffic links with the potential to be affected by the Projects during the construction phase, as defined in **Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)** and shown in **Volume 7, Figure 24-5 (application ref: 7.24.1)**.

25.3.3 Realistic Worst Case Scenario

25.3.3.1 General Approach

17. The realistic worst case design parameters for likely significant effects scoped into the EIA for the noise and vibration assessments are summarised **Table 25-1**. These are based on the project parameters described in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**, which provides further details regarding specific activities and their durations.

18. In addition to the design parameters set out in **Table 25-1**, consideration is also given to the different development scenarios still under consideration as set out in sections 25.3.3.2 to 25.3.3.4.

19. Construction working hours will include 0700 hours to 1900 hours Monday to Saturday. Construction and construction related traffic movements would generally be within these hours but there would be some vehicle movements outside these hours on the public highway for vehicles travelling to and from site.

20. It is expected that no construction activity or deliveries will be undertaken on Sundays or bank holidays, save:

- Where continuous periods of operation are required as assessed in the environmental statement, such as concrete pouring and directional drilling;

- For internal fitting out works associated with the Onshore Converter Station(s);
- For the delivery of abnormal loads to the connection works, which may cause congestion on the local road network;
- The testing or commissioning of any electrical plant installed as part of the onshore infrastructure;
- Security monitoring; and
- Activity necessary in the instance of an emergency where there is a risk to persons, the environment, delivery of electricity or property.

21. All construction operations and deliveries which are to be undertaken outside the hours specified would generally be agreed with the relevant planning authority in writing in advance and carried out within the agreed times.

22. There is potential for some of the horizontal directional drilling (HDD) works for trenchless crossings to require operations 24hrs per day during their construction and therefore there may be some deliveries or personnel movements associated with this activity outside of the normal working hours. While the Projects could use a number of different trenchless crossing techniques, this chapter has assessed HDD as a reasonable worst case and results in a conservative assessment. As such, this chapter, unlike other ES chapters, directly refers to the assessment of HDD throughout rather than a trenchless crossing technique such as HDD. Other trenchless crossing techniques as detailed in **Volume 7, Chapter 5 Project Description (application ref: 7.5)** would not be expected to represent a worst case in terms of the assessment.

Table 25-1 Realistic Worst Case Design Parameters

	Parameter			
	DBS East or DBS West In Isolation	**DBS East and DBS West Concurrently**	**DBS East and DBS West Sequentially**	**Notes and rationale**
Construction				
Impact 1: Construction noise at the Landfall Zone	Landfall and nearshore activity works include the following activities, with the **worst case** noise-generating activities in **bold:** • Construction of access to the Landfall Zone TJB Construction Compound and Temporary Construction Compound; • Construction of the Landfall Zone TJB Construction Compound and Temporary Construction Compound; • HDD works, likely to require 24-hour working – worst case night-time activity (assessed as part of Impact 2 HDD); • Nearshore cable installation • **Construction of transition joint bays (TJBs) – worst case daytime activity;** • Pull-in of duct from barge (alternatively, they may be pushed from landfall side); • Pull-in of offshore high voltage cables from vessel; • Transition jointing offshore / onshore cables; • Backfilling of joint bays; • Reinstatement works. **Working Hours:** 07.00 to 19.00 Monday to Saturday No work on Sundays or bank holidays, with exceptions including emergency or engineering practicability, including: • 24-hour working may be required for landfall and nearshore cable installation, HDD works, including deliveries or personnel movements associated with this activity outside of the normal working hours.			The worst case noise-generating activity is the activity which results in the highest predicted construction noise level at an NSR. Consideration has also been given to temporal impacts: • Activities that will last more than one month in one location have been considered for the worst case daytime construction assessment. • Due to potential increased sensitivity at night, for construction activities that require 24-hour working (i.e. HDD) periods of less than month have been considered. As the location of where individual activities will occur within a worksite is not available at this stage of the Projects, construction noise levels at receptors have been predicted at NSRs by assuming that construction activities occur across the entire work site over the relevant assessment period (e.g. one month). Therefore, worksites have been modelled as area sources. Noise levels associated with landfall plant are detailed in **Volume 7, Appendix 25-3 Construction Noise Assessment (application ref: 7.25.25.3)**. **Programme/duration notes:** In a Concurrent or Sequential Scenario, civils construction will be completed for the Projects simultaneously. For the Sequential Scenario the first project would install the landfall and onshore cable ducts for the second project. The Concurrent and Sequential Scenarios would involve a greater extent of construction works, resulting in a longer duration for individual activities (e.g. construction of TJBs) compared to In Isolation. The Sequential Scenario would result in the longest
	Duration of works: 18 months overall (not continuous)	**Duration:** up to 18 months overall (not continuous)	**Duration:** up to 48 months overall (not continuous)	

	Parameter			
	DBS East or DBS West In Isolation	**DBS East and DBS West Concurrently**	**DBS East and DBS West Sequentially**	**Notes and rationale**
				duration, with some activities (e.g. TJB construction) undertaken twice with a delay (up to 18 months)
Impact 2: Construction noise along Onshore Export Cable Corridor (TCCs and HDD) Page 1/2	Onshore Export Cable Corridor works include the following activities, with the **worst case** noise-generating activities in **bold:** • Initial site investigation works; • Site survey and ecological clearance required in preparation for construction; • Construction of access to the cable corridor infrastructure; • Temporary strip and storage of topsoil for agricultural areas; • Construction and **operation of Temporary Construction Compounds (TCCs) - worst case daytime activity;** o Number of TCCs: 17 (2 main compounds, 15 satellite compounds including Landfall Zone satellite compound) • Construction of Cable Joint Bays; • Construction of temporary haul roads to facilitate the onshore export cable installation. • Excavation of trenches and installation of cable ducts (where used); • Installation of below ground chamber at the joint/link box locations, required to provide maintenance and inspection access to the cable system; • Laying or pull-in of high voltage cables within duct or direct lay in trench; • Backfilling of joint bays and cable trenches with suitable material for electrical performance and protection of cables; • Reinstatement works; • Design and construction of crossings or protective measure required due to close proximity or crossing of export cable to existing infrastructure and natural features. This includes roads, railways, rivers and streams. This may be achieved by construction of culverts/cable structures or trenchless methods including HDD or other appropriate methodologies. **In some locations HDD works are likely to require 24-hour working, including use of internal haul roads – worst case night-time activity;** • Installation of ducts and cable/ in hard ground/ road carriageways where required, including temporary traffic management and reinstatement of the surfacing surface. **Onshore Export Cable Corridor length:** Indicative corridor length between Landfall Zone and the substation zone (km): 32			The worst case noise-generating activity is the activity which results in the highest predicted construction noise level at an NSR. Horizontal directional drilling (HDD) has been assumed to be used at trenchless crossing works locations as a worst case. Consideration has also been given to temporal impacts: • Activities that will last more than one month in one location have been considered for the worst case daytime construction assessment. • Due to potential increased sensitivity at night, for construction activities that require 24-hour working (i.e. HDD) periods of less than month have been considered. As the location of where individual activities will occur within a worksite is not available at this stage of the Projects, construction noise levels at receptors have been predicted at NSRs by assuming that construction activities occur across the entire work site over the relevant assessment period (e.g. one month). Therefore, worksites have been modelled as area sources. For HDD works the approximate location of the works can better estimated and therefore HDD noise sources have been modelled as point sources. Noise levels associated with Onshore Export Cable Corridor plant are detailed in **Volume 7, Appendix 25-3 Construction Noise Assessment (application ref: 7.25.25.3)**. **HDD (worst case) at trenchless crossings notes:** 24-hour HDD working has been considered in the construction noise assessment for all potential trenchless crossings, with the following context:

<table>
<tr><th rowspan="2"></th><th colspan="4">Parameter</th></tr>
<tr><th>DBS East or DBS West In Isolation</th><th>DBS East and DBS West Concurrently</th><th>DBS East and DBS West Sequentially</th><th>Notes and rationale</th></tr>
<tr><td rowspan="2">Impact 2: Construction noise along Onshore Export Cable Corridor (TCCs and HDD)

Page 2/2</td><td colspan="3">Onward corridor length from Onshore Converter Station(s) to proposed Birkhill National Grid Substation (km): 2.5
Working Hours:
07.00 to 19.00 Monday to Saturday
No work on Sundays or bank holidays, with exceptions including emergency or engineering practicability, including:
24-hour working likely to be required for HDD works, with a higher likelihood at crossings detailed below, including deliveries or personnel movements associated with this activity outside of the normal working hours.
Crossing of the A1035 and Catfoss Drain (west of Hornsea Garden Centre) (up to c. 650m drills) (Obstacle Crossing ID RX-13)
Crossing of proposed solar farm east of A165 (up to c. 540m drills) (Obstacle Crossing ID RX-002)
Crossing of Meaux and Routh East Drain, Monk Dike and proposed solar farm west of A165 (up to c. 650m drills) (Obstacle Crossing ID WX-030)
Crossing of River Hull (up to c. 365m drills) (Obstacle Crossing ID WX-40)
Crossing of Catchwater Drain and Historic Railway Line (up to c. 590m drills) (Obstacle Crossing ID WX-059)</td><td rowspan="2">24-hour working assumed for crossings presented in this table (under Working Hours)
For the majority of the shorter length HDDs (<200m), there is a low chance that these crossings would require 24-hr working and, if required, this should be able to be managed within the temporal criteria of 10 in 15 days.
For HDDs of length 200 to 350m 24-hour working may be considered if there are significant issues, programme delays, or the ground conditions require that the bore is not left static overnight. However, 10 consecutive days should allow for completion of any larger reams and / or pull back, i.e. completed within the 10 out of 15 days.
Programme/duration notes:
In a sequential scenario, civils construction will be completed for both Projects simultaneously. The first project would install the landfall and onshore cable ducts for the second project.
The second project will only require works along the Onshore Export Cable Corridor to construct joint bays and pull cables through the ducts followed by full reinstatement. There may be up to a 21-month lag between the completion of cabling works for project 1 and the start of cabling works for project 2.
The first project would either fully reinstate the TCC or retain 50% of the TCC for use by the second project. If removed, the haul road and 50% of the TCC would need to be constructed at the commencement of the second project.</td></tr>
<tr><td>Duration: approx. 33 months</td><td>Duration: approx. 33 months</td><td>Duration: approx. 57 months</td></tr>
<tr><td>Impact 3: Construction Noise at Onshore</td><td colspan="3">Onshore Converter Station(s) construction include the following activities, with the worst case noise-generating activities in bold:
Construction of temporary haul roads;
Temporary strip and storage of topsoil for agricultural areas;</td><td>The worst case noise-generating activity is the activity which results in the highest predicted construction noise level at an NSR. Consideration has also been given to temporal impacts:</td></tr>
</table>

	Parameter			
	DBS East or DBS West In Isolation	**DBS East and DBS West Concurrently**	**DBS East and DBS West Sequentially**	**Notes and rationale**
Converter Station(s)	• Construction and operation of Temporary Construction Compounds (TCCs) Temporary Construction Compound- (assessed as part of Impact 2); • Establishment of a suitably level platforms through cut, fill and import or suitable material; • Construction of permanent access to the sites; • Installation of below ground chamber required to provide maintenance and inspection; • **Construction of Drainage, Foundations and Structures – worst case daytime activity.** **Working Hours:** 07.00 to 19.00 Monday to Saturday No work on Sundays or bank holidays, with exceptions including emergency or engineering practicability			• Activities that will last more than 1 month in one location have been considered for the worst case daytime construction assessment. Construction noise at noise sensitive receptors (NSRs) at sites has been calculated assuming all construction plant is operating simultaneously and spread across the work areas for each activity (i.e. modelled as an area noise source). Noise levels associated with onshore substation construction plant are detailed in **Volume 7, Appendix 25-3 Construction Noise Assessment (application ref: 7.25.25.3)**. **Programme notes:** The programme is assumed to be the same for the In Isolation and Concurrent Scenarios. The first project would complete all earthworks, drainage and permanent access for second converter station. As a conservative worst case assumption, the worst case plant required at the Substation Zone could be doubled, should the Projects be built Concurrently or Sequentially (as first project would complete all earthworks). A +3dB correction applied to model results for the Concurrent and Sequential Scenarios to represent double the amount of work at one site.
	Duration: approx. 4 years	**Duration:** approx. 4 years **Noise model assumptions:** Twice the construction activity compared to In Isolation (+3dB)	**Duration:** approx. 6 years **Noise model assumptions:** Double the amount of plant compared to In Isolation (+3dB)	
Impact 4: Construction Road Traffic Noise	Predicted daily peak construction traffic flows (18hr Annual Average Weekday Traffic [AAWT]), across the Traffic and Transport Study Area (TTSA) during the Projects In Isolation Scenario. **Duration:** 4 years	Predicted daily peak construction traffic flows (18hr Annual Average Weekday Traffic [AAWT]), across the Traffic and Transport Study Area (TTSA) during the Projects Concurrently Scenario. **Duration:** 4 years	Predicted daily peak construction traffic flows (18hr Annual Average Weekday Traffic [AAWT]), across the Traffic and Transport Study Area (TTSA) during the Projects Sequentially Scenario. **Duration:** 6 years	Increased number of vehicles during proposed working hours across the Traffic and Transport Study Area (TTSA) and associated traffic noise. Temporary changes in traffic on the road network due to construction activities could result in noise impacts at receptors. This assessment is based predicted daily peak construction traffic flows. The spatial scope of the assessment for all three Scenarios is the same as highways links are relevant for both Projects (In Isolation, Concurrent or Sequential).

	Parameter			
	DBS East or DBS West In Isolation	**DBS East and DBS West Concurrently**	**DBS East and DBS West Sequentially**	**Notes and rationale**
Impact 5: Construction Vibration	**Landfall Zone/Onshore Export Cable Corridor/Onshore Substation Zone:** Works include: • Enabling works • Civils works • Cable installation works • HDD/Trenchless Crossings • Reinstatement/Demobilisation • Main Compound • Secondary Compounds Piling/Trenchless Crossings: Piling works at the onshore substations have been assessed based on a single Continuous Flight Auger (CFA) piling rig for daytime works only. Low vibration piling methods will be adopted where practicable. Durations are as per the construction noise impacts for each of the Landfall Zone/Onshore Export Cable Corridor/Onshore Substation Zone.			The spatial scope of the assessment for all three scenarios is the same In Isolation, Concurrent or Sequential).
Operation				
Impact 6: Operation of Onshore Converter Station(s)	1no. HVDC substation on the eastern footprint on the substation platform commencing operation Worst case assumption: 1no. convertor stations operating on the eastern footprint.	2no. HVDC co-located substations (utilising western and eastern footprint) commencing operation Concurrently. Worst case assumption: 2no. convertor stations operating at the same time.	1no. HVDC substation commencing operation, followed by a 2 year lag, followed by 1no. HVDC substation commencing operation. Worst case assumption: 2no. convertor stations operating at the same time.	Assessed by magnitude of impact criteria based on the baseline background sound level (BS4142) and the WHO Night Noise Guidelines. The Onshore Substation Zone has been designed to fit 2no. convertor stations, with a western and eastern footprint. If one convertor station is built for DBS West or DBS East the convertor station will be built on the eastern footprint.
Decommissioning				
No final decision regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route and onshore substation has yet been made. It is also recognised that legislation and industry best practice change over time. It is likely that the onshore project equipment, including the cable, will be removed, reused or recycled wherever possible and the transition bays and cable ducts left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the worst case scenario, the impacts will be no greater than those identified for the construction phase. A decommissioning plan for the onshore works would be submitted prior to any decommissioning commencing.			

25.3.3.2 Development Options

23. Following Statutory Consultation, high voltage alternating current (HVAC) technology (previously assessed in PEIR) was removed from the Projects' design envelope (see **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)** for further information). As a result, only high voltage direct current (HVDC) technology has been taken forward for assessment purposes. The ES considers the following development scenarios:

    - Either DBS East or DBS West is built In Isolation; or
    - DBS East and DBS West are both built either Sequentially or Concurrently.

24. An In Isolation Scenario has been assessed within the ES on the basis that theoretically one Project could be taken forward without the other being built out. If an In Isolation project is taken forward, either DBS East or DBS West may be constructed. As such the onshore assessment considers both DBS East and DBS West In Isolation.

25. If an In Isolation project is taken forward, only the eastern Onshore Converter Station within the Substation Zone would be constructed. In either the Concurrent or Sequential Scenario, both Onshore Converter Station locations within the Substation Zone would be taken forward for the onshore assessment.

26. In order to ensure that a robust assessment has been undertaken, all development scenarios have been considered to ensure the realistic worst case scenario for each topic has been assessed. A summary is provided here, and further details are provided in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**.

27. The three development scenarios to be considered for assessment purposes are outlined in **Table 25-2**.

Table 25-2 Development Scenarios and Construction Durations

Development scenario	Description	Total Maximum Construction Duration (Years)	Maximum construction Duration Offshore (Years)	Maximum construction Duration Onshore (Years)
In Isolation	Either DBS East or DBS West is built in isolation.	Five	Five	Four
Sequential	DBS East and DBS West are both built Sequentially, either Project could commence construction first with staggered / overlapping construction.	Seven	A five year period of construction for each project with a lag of up to two years in the start of construction of the second project (excluding landfall duct installation) – reflecting the maximum duration of effects of seven years.	Construction works (i.e. onshore cable civil works, including duct installation) to be completed for both Projects simultaneously in the first four years, with additional works at the landfall, substation zone and cable joint bays in the following two years. Maximum duration of effects of six years.
Concurrent	DBS East and DBS West are both built Concurrently reflecting the maximum peak effects.	Five	Five	Four

28. Any differences between the Projects, or differences that could result from the manner in which the first and the second Projects are built (Concurrent or Sequential and the length of any lag) are identified and discussed where relevant in section 25.6. For each potential impact, the worst case construction scenario for the In Isolation Scenario and the Concurrent or Sequential Scenario is assessed.

25.3.3.3 Operation Scenarios

29. Operation scenarios are described in detail in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. The assessment considers the following scenarios:

- Only DBS East in operation;
- Only DBS West in operation; and
- DBS East and DBS West operating Concurrently with or without a lag of up to two years between each Project commencing operation.

30. If the Projects are built using a phased approach, there would also be a phased approach to starting the operational phase. The worst case scenario for the operational phases for the Projects have been assessed. See section 5.1.1 of **Volume 7, Chapter 5 Project Description (application ref: 7.5)** for further information on phasing scenarios for the Projects.

31. The operations lifetime of each Project is expected to be 30 years.

25.3.3.4 Decommissioning Scenarios

32. Decommissioning scenarios are described in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. Decommissioning arrangements would be agreed through the submission of a Decommissioning Plan to be submitted and approved following cessation of commercial operation prior to decommissioning commencing. For the purpose of this assessment it is assumed that decommissioning of the Projects could be conducted separately, or at the same time.

25.3.4 Embedded Mitigation

33. This section outlines the embedded mitigation relevant to the noise and vibration assessment, which has been incorporated into the design of the Projects or constitutes standard mitigation measures for this topic (**Table 25-3**). Mitigation is also detailed within the **Commitments Register (Volume 8, application ref: 8.6)** and cross-referenced within **Table 25-3**. Where other mitigation measures are proposed, these are detailed in the impact assessment (section 25.6).

Table 25-3 Embedded Mitigation Measures

Parameter	Embedded Mitigation Measures	Where Commitment is Secured
Acoustic enclosures for stationary plant and noise barriers at trenchless crossing locations	Localised screening will be employed, where required and practicable, via acoustic enclosures for stationary plant and noise barriers around works area for mobile plant, as secured through the **OCoCP (Volume 8, application ref: 8.9)**. The effect of localised screening has been included in the construction noise predictions.	DCO Requirement 19
Construction Noise	Prior to the commencement of construction, noise management measures will be detailed in a Code of Construction Practice (CoCP) including site specific best practicable means (BPM) noise control measures to be adopted throughout construction. An Outline CoCP (**OCoCP (Volume 8, application ref: 8.9)**) is submitted with the DCO application. Mitigation measures have been identified and will be adhered to, including, but not limited to: • Ensuring plant and machinery is turned off when not in use; • Using modern, quiet equipment and ensuring such equipment is properly maintained and regularly inspected; • Locating noise generating plant at a low level, as distant as possible from NSRs; • Plant to operate at low speeds, where possible, and incorporate automatic low-speed idling; • Locating site entrances and exits to prevent the need for vehicles to reverse and also minimise impacts upon sensitive receptors;	DCO Requirement 19

Parameter	Embedded Mitigation Measures	Where Commitment is Secured
	• Consideration to be given to temporary screening or enclosures for static noisy plant to reduce noise emissions and plant should be certified to meet relevant EC Directive standards; • Close liaison with receptors -informing local receptors about the construction works, including the timing and duration of any particularly noisy elements or works that are required to be undertaken at night; • Implementing a communication and grievance mechanism (e.g. complaint procedure) for local receptors to direct questions or report nuisance and other issues, including contact details for a site representative during construction hours; and • Consideration of programming of noisy activities to minimise adverse effects where practicable. It should be noted that certain site-specific physical construction noise mitigation measures (e.g. locations and selection of plant) will be established at a later stage when sites and methodologies are finalised; these measures will be identified in the final CoCP. Therefore, noise mitigation has not been included quantitatively in the worst case noise modelling, with exception to localised screening at trenchless crossings (as above). However, although the implementation of mitigation measures can't be accurately assessed quantitatively, the embedded measures have been taken into consideration qualitatively when assessing the significance of noise and vibration effects.	

Parameter	Embedded Mitigation Measures	Where Commitment is Secured
Construction Road Traffic Noise	An **Outline Construction Traffic Management Plan (OCTMP) (Volume 8, application ref: 8.13)** is submitted with the DCO application. The plan outlines methods to manage peak construction traffic flows and minimise significant traffic and transport impacts. The CTMP will also serve to reduce the associated construction traffic noise and the relative noise change. Traffic management measures are provided in **Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)**.	DCO Requirement 14

25.4 Assessment Methodology

25.4.1 Policy, Legislation and Guidance

25.4.1.1 National Policy Statements

34. The assessment of potential impacts upon noise and vibration has been made with specific reference to the relevant National Policy Statements (NPS) including the Overarching NPS for Energy (EN-1), the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Electricity Networks Infrastructure (EN-5). These were published in November 2023 and came into force in January 2024. The specific assessment requirements for noise and vibration, are summarised in **Table 25-4** together with an indication of the section of this chapter where each is addressed.

Table 25-4 NPS Assessment Requirements

NPS Requirement	NPS Reference	ES Section Reference
EN-1 NPS for Energy		
Where noise impacts are likely to arise from the proposed development, the applicants should include the following in the noise assessment: • a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal	EN-1, paragraph 5.12.6 and 5.12.7	The assessment methodology is presented in section 25.4.3. Section 25.5.1 presents the existing noise environment and identifies NSRs.

NPS Requirement	NPS Reference	ES Section Reference

characteristics, if the noise is impulsive, whether the noise contains particular high or low frequency content or any temporal characteristics of the noise.
• identification of noise sensitive receptors 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 (and weekends) as appropriate, and at different times of year
• an assessment of the effect of predicted changes in the noise environment on
• any noise-sensitive receptors, including an assessment of any likely impact on health and quality of life / well-being where appropriate, particularly among those disadvantaged by other factors who are often disproportionately affected by noise-sensitive areas
• if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise (footnote: noise below ground level)
• all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life
The nature and extent of the noise assessment should be proportionate to the likely noise impact.
		Section 25.6 details the anticipated changes in noise levels as a result of the Projects, includes the assessment of potential impacts and identifies mitigation measures.

NPS Requirement	NPS Reference	ES Section Reference
Applicants should consider the noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation.	EN-1, paragraph 5.12.8	Impacts from ancillary works, for example vehicle movements, are assessed in section 25.6.1.4.
Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards (footnote: for example BS 4142, BS 6472 and BS 8233) and other guidance. Further information on assessment of particular noise sources may be contained in the technology specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards (footnote: for example BS 5228) and other guidance which also give examples of mitigation strategies.	EN-1, paragraph 5.12.9	The operational noise from the Onshore Converter Station(s) is assessed in section 25.6.2 with reference to BS4142. The construction noise from the Projects is assessed in sections 25.6.1.1, 25.6.1.2 and 25.6.1.3 with reference to BS5228. The current relevant British Standards (BS) have been used within this assessment and are detailed within section 25.4.1.3.
Some noise impacts will be controlled through environmental permits and parallel tracking is encouraged where noise impacts determined by an environmental permit interface with planning issues (i.e. physical design and location of development). The applicants should consult the [Environment Agency] and/or the [Statutory Nature Conservation Bodies], and other relevant bodies, such the [Marine Management Organisation] or [Natural Resources Wales], as necessary, and in particular regarding assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The	EN-1, paragraph 5.12.10	Noise impacts on terrestrial protected species are considered within **Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**. Noise impacts on marine protected species are considered in **Volume 7, Chapter 11 Marine Mammals (application ref: 7.11)**.

NPS Requirement	NPS Reference	ES Section Reference
seasonality of potentially affected species in nearby sites may also need to be considered.		
The project should demonstrate good design through selection of the quietest or most acceptable cost-effective plant available; containment of noise within buildings wherever possible, taking into account any other adverse impacts that such containment might cause (e.g. on landscape and visual impacts; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission).	EN-1, paragraph 5.12.15	The principals of good design have been taken into consideration throughout the site selection process, where possible. See the following documents for further details: • **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)** • **Volume 7, Chapter 5 Project Description (application ref: 7.5)** • **Design and Access Statement (Volume 8, application ref: 8.8)**
A development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the NPPF, and the government's associated planning guidance on noise.	EN-1, paragraph 5.12.16	Due regard is given to statutory requirements and the quoted policy, as described in section 25.4.1.2.
The Secretary of State should not grant development consent unless they are satisfied that the proposals will meet the following aims, through the effective management and control of noise: • avoid significant adverse impacts on health and quality of life from noise;	EN-1, paragraph 5.12.17	These aims are met by the adoption of the proposed mitigation as outlined in section 25.6 and **Volume 7, Chapter 27 Human Health (application ref: 7.27).**

NPS Requirement	NPS Reference	ES Section Reference
• mitigate and minimise other adverse impacts on health and quality of life from noise; and • where possible, contribute to improvements to health and quality of life through the effective management and control of noise.		
When preparing the Development Consent Order, the Secretary of State should consider including measurable requirements or specifying the mitigation measures to be put in place to ensure that noise levels do not exceed any limits specified in the development consent. These requirements or mitigation measures may apply to the construction, operation, and decommissioning of the energy infrastructure development.	EN-1, paragraph 5.12.18	Where relevant, requirements and mitigation measures to ensure that limits are not exceeded are proposed in section 25.6.
EN-5 NPS for Electricity Networks Infrastructure		
Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors. Transformers are installed at many substations and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures). For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards (footnote: for example, BS4142) are satisfactory.	EN-5, paragraphs 2.9.37 to 2.9.38	Onshore Converter Station(s) noise is assessed in accordance with the relevant British Standard (BS 4142), as described in section 25.6.2.1.

25.4.1.2 Other Relevant National and Local Policy and Legislation

35. The NPS (see section 25.4.1.1) are the key policy documents for Nationally Significant Infrastructure Projects (NSIPs). In addition to the NPS, there are a number of pieces of policy and guidance applicable to the assessment of noise and vibration. These are presented below.

36. Further detail is provided in **Volume 7, Chapter 3 Policy and Legislative Context (application ref: 7.3)**.

25.4.1.2.1 National Planning Policy Framework

37. The National Planning Policy Framework (NPPF) (as revised in 2023) forms the basis of the Government's planning policies for England and how these should be applied. Paragraph 180 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…*"

38. Furthermore, Paragraph 190 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:*

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…"

25.4.1.2.2 Noise Policy Statement for England

39. The Noise Policy Statement for England (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.*"

40. The Explanatory Note contained within the NPSE introduces the following concepts to aid in the establishment of significant effects:

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

41. The aims of the NPSE can therefore be interpreted as follows (within the context of Government policy on sustainable development):

- The first aim is to avoid noise levels above the SOAEL.
- To consider situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur.

42. 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*".

25.4.1.2.3 National Planning Practice Guidance (NPPG) 2019

43. The National Planning Practice Guidance (NPPG), 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.

44. The document also provides more detailed guidance on the effect levels identified in the NPSE including the LOAEL and SOAEL.

25.4.1.2.4 East Riding Local Plan (adopted April 2016)

45. Policy EC5 states:

"*Proposals for the development of the energy sector, will be supported where any significant adverse impacts are addressed satisfactorily and the residual harm is outweighed by the wider benefits of the proposal. Developments and their associated infrastructure should be acceptable in terms of effects of development local amenity, including noise, air and water quality, traffic, vibration, dust and visual impact.*"

46. The local plan also states the following with regard to noise assessment:

"*Proposals should also ensure they are located at an appropriate distance from noise sensitive uses, such as housing and quiet leisure based uses, to ensure that increases in ambient noise levels are acceptable. The prevailing noise standards (e.g. BS4142 or ETSU-R-97), and any current best practice/ guidance (e.g. from the Institute of Acoustics), should be used, giving consideration to the level of existing background noise in the area. Where impacts cannot be mitigated, on-site proposals.*"

25.4.1.2.5 Hull Local Plan 2016 to 2032 (Adopted 2017)

47. Policy 18 (Renewable and low carbon energy) states:

48. *"Development that generates, transmits and/or stores renewable and/or low carbon energy will be supported where the impact is or can be made acceptable. Potential impacts that are particularly relevant to this type of development are: a. local amenity, including noise, air quality, water quality, traffic, vibration, dust, visual impact, shadow flicker and odour"*

49. Policy 49 (Noise Pollution) states:

50. *"1. Development which would site noise sensitive receptors in proximity to noisy uses or areas should demonstrate that there would be an acceptable level of amenity for end users. Where this has not been demonstrated, development will not be allowed.*

2. Development of noisy uses should demonstrate that adverse impacts of noise can be mitigated and that there would be an acceptable impact on the amenity of surrounding land uses, including the Humber Estuary International Site."

25.4.1.3 Guidance and Best Practice

25.4.1.3.1 BS 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound

51. This standard describes a method for rating and assessing sound of an industrial and/or commercial nature. This method uses outdoor sound levels to assess the likely effects from sound of an industrial or commercial nature on people who might be inside or outside a dwelling.

25.4.1.3.2 BS 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise

52. Part 1 of BS 5228 provides recommendations for methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise and/or vibration levels. It also provides guidance on methods of predicting and measuring noise and assessing its impact on those exposed to it.

25.4.1.3.3 BS 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration

53. Part 2 of BS 5228 gives recommendations for methods of vibration control on construction and open sites, where work activities generate significant vibration levels. It also provides guidance on predicting and assessing vibration levels from construction and a database of measured vibration levels during piling activities.

25.4.1.3.4 BS 7385:1993 – 'Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground Borne Vibration'

54. This standard provides guidance regarding the potential for vibration to result in building damage, including basic principles for carrying out vibration measurements and processing the data. It includes guide values for transient and continuous vibration, above which there is a likelihood of cosmetic damage.

25.4.1.3.5 BS 7445:2003 Part 1 and BS 7445:1991 Part 2 – Description and Measurement of Environmental Noise

55. These standards provide 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 (L_{Aeq}). Part 2 of BS 7445 replicates International Standards Organisation (ISO) 1996-2.

25.4.1.3.6 BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

56. This standard provides guidance on the control and assessment of noise in buildings. The document covers a range of topics including desirable noise levels inside buildings and provides a methodology to calculate noise entering a building from outside.

25.4.1.3.7 Calculation of Road Traffic Noise (CRTN) 1988

57. Provides a method for predicting traffic noise levels from the Annual Average Weekday Traffic (AAWT) flows and from measured noise levels. Since publication in 1988 this document has been the accepted standard for predicting noise levels from road traffic in the UK. The calculation methods take account of variables including speed, percentage of heavy goods vehicles (HGVs), road surfacing, gradient, screening by barriers and relative height of source and receiver.

25.4.1.3.8 Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, Revision 2

58. LA111 Noise and Vibration provides detailed methodologies for the assessment of construction and operational noise and vibration impacts from road schemes. It provides guideline significance criteria in terms of both absolute noise and vibration levels and the change in noise levels due to a scheme.

25.4.1.3.9 A Guide to Measurement and Prediction of the Equivalent Continuous Sound Level Leq, Report by a Working Party for the Technical Sub-committee of the Noise Advisory Council' (NAC)

59. This guide provides a method for the prediction of road traffic noise levels at 10m from the nearside carriageway edge which is similar to the CRTN methodology. In brief, the methodology requires separate calculations to be undertaken for Light Vehicles/Cars and HGVs. The calculated noise levels are added together to establish the overall noise level for a given link. This method can be used when traffic flows are below the minimum at which CRTN is validated.

25.4.1.3.10 ISO 9613-2:1996 Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation

60. Specifies an engineering method for calculating the attenuation of sound due to propagation outdoors, enabling prediction of sound levels at a specified distance from a source. This standard was updated in January 2024, however this was after the operational noise assessment was completed and therefore the calculations have been undertaken based on the previous version of the standard.

25.4.1.3.11 WHO (1999) Guidelines for Community Noise

61. 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 L_{Aeq} during the day, related to annoyance, and 45dB L_{Aeq} or 60dB L_{Amax} at night, related to sleep disturbance.

62. 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 L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events. Lower noise levels may be disturbing depending on the nature of the source.*"

25.4.1.3.12 WHO (2009) Night Noise Guidelines for Europe

63. These guidelines are an extension to the WHO Guidelines for Community Noise (1999). Based on evidential review, they conclude that:

"*Below the level of 30dB $L_{night,outside}$, no effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise. There is no sufficient evidence that the biological effects observed at the level below 40dB $L_{night,outside}$ are harmful to health. However, adverse health effects are observed at the level above 40dB $L_{night,outside}$.*

Therefore, 40dB $L_{night,outside}$ is equivalent to the LOAEL for night noise."

64. In addition to the above, the following is also stated,

"*Considering the scientific evidence on the thresholds of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive (2002148/EC), an $L_{night,outside}$ 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. $L_{night,outside}$ 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.*"

25.4.2 Data and Information Sources

25.4.2.1 Site Specific Surveys

65. In order to provide site specific and up to date information on which to base the impact assessment, a baseline sound survey within the vicinity of proposed Onshore Converter Station(s) was conducted during October - November 2022 and January 2023. The scope and extent of the baseline survey was agreed with East Riding of Yorkshire Council. Note that the scope of the survey included substation zones that have now been discounted and only data from locations relevant to the operational assessment have been presented in this chapter.

25.4.2.2 Other Available Sources

66. Other sources that have been used to inform the assessment are listed in **Table 25-5**.

Table 25-5 Other Available Data and Information Sources

Data Set	Spatial Coverage	Year	Notes
Google Maps Aerial Photography	Onshore Study Area	2023	The data was used to determine sensitive receptors in the noise and vibration study area.
Topographical data: Environmental Agency LiDAR Data (Open Licence)	Onshore Study Area	2022	The data was used in the operational and construction noise assessment models to incorporate topography of the noise and vibration study area.
OS Mapping	Onshore Study Area	2023	The data was used to import buildings into the operational and construction noise assessment models and to determine sensitive receptors.
Road traffic AAWT data	Traffic and Transport Study Area (TTSA)	2023	Used to assess construction road traffic noise impacts.

25.4.3 Impact Assessment Methodology

67. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** provides a summary of the general impact assessment methodology applied. The following sections describe the methods used to assess the likely significant effects on noise and vibration.

25.4.3.1 Definitions

68. For each potential impact, the assessment identifies receptors sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts (i.e. magnitude) on given receptors. The definitions of sensitivity and magnitude for the purpose of the noise and vibration assessment are provided in **Table 25-6** and **Table 25-7.**

Table 25-6 Definition of Sensitivity for a Noise and Vibration Receptor

Sensitivity	Definition
High	Noise and vibration receptors are categorised as high sensitivity where noise and vibration may be detrimental to vulnerable receptors or particularly noise sensitive activities. Such receptors include certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night.
Medium	Noise receptors are 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 (during the day); • Schools; • Universities; • Research facilities; • National parks (during the day); • Temporary holiday accommodation (including holiday lets); and • Places of worship.

Sensitivity	Definition
Low	Noise receptors are 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 (including cafes); • Outdoor amenity areas during the day (including recreation, public amenity space/play areas and Public Right of Ways (PRoWs); • Doctor's surgeries; and • Sports facilities.
Negligible	Noise receptors are categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include: • Warehouses; • Light / heavy industry; • Car parks; and • Agricultural land.

Table 25-7 Definition of Magnitude of Impacts

Magnitude	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the receptor's character or distinctiveness. The impact gives rise to serious concern; it should be considered as unacceptable.
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the receptor's character or distinctiveness. The impact gives rise to some concern, but it is likely to be tolerable (depending on its scale and/or duration).

Magnitude	Definition
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the receptor's character or distinctiveness. The impact is undesirable, but of limited concern.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the receptor's character or distinctiveness. The impact is at a threshold of predictive quantification and is not of concern.

25.4.3.2 Significance of Effect

69. The assessment of significance of an effect is informed by the sensitivity of the receptor and the magnitude of the impact. The determination of significance is guided by the use of an effect significance matrix presented in **Table 25-8**. Definitions of each level of significance are provided in **Table 25-9**. For the purposes of this assessment, any effect that is of major or moderate significance is considered to be significant in EIA terms, whether this be adverse or beneficial. Any effect that has a significance of minor or negligible is not significant.

Table 25-8 Noise and Vibration Significance of Effect Matrix

		Adverse Magnitude				Beneficial Magnitude			
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor*	Minor*	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

* Negligible for the construction road traffic noise and operational noise assessments to align with guidance in the DMRB (discussed in section 25.4.3.4) and BS 4142 (discussed in section 25.4.3.6).

Table 25-9 Definition of Effect Significance

Significance	Definition
Major	Very large or large change in receptor condition, which is 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 is 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.

25.4.3.3 Construction Phase Noise Assessment Methodology

70. BS 5228-1 makes reference to durations when outlining methods of assessing construction noise effects, referring to assessing construction "works "*likely to continue for a significant period of time (either continuously or sporadically)*", and "*a duration of a month or more, unless works of a shorter duration are likely to result in significant effect*". For high construction noise levels over shorter durations BS5228-1 makes reference to "*a period of 10 or more days of working in any 15 consecutive days*". Therefore, the following activities have been scoped into the quantitative assessment of construction noise.

- Daytime: worst case activities that are likely to take one month or more in a given location.
- Night-time: All potential night-time work has been assessed even where the duration will be less than one month. The magnitude of the effect will take account of both the predicted noise construction noise levels and the duration of the relevant works / activity.

71. Noise levels for the construction phase have been predicted using CadnaA 3D modelling software and using the methods and guidance in BS 5228-1. The 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.

72. Construction noise impacts are assessed using the criteria presented in **Table 25-10** for the daytime, evening and weekend, and night-time. The significance of construction noise effects is defined, at each receptor within the study area, by combining the magnitude of impact and receptor sensitivity, as presented in the significance of effect matrix (**Table 25-8**).

Table 25-10 Construction Noise Magnitude of Impact Criteria

Magnitude of impact	**Construction noise level (dB $L_{Aeq,T}$)**			**NPSE/PPG category**
	Daytime[1]	**Evenings and weekends[2]**	**Night-time[3]**	
High	≥80	≥70	≥60	-
Medium	≥75 to <80	≥65 to <70	≥55 to <60	Lower end of range is equivalent to SOAEL
Low	≥65 to <75	≥55 to <65	≥45 to <55	Lower end of range is equivalent to LOAEL
Negligible	<65	<55	<45	-

1 – 07:00-19:00 weekdays, 07:00-13:00 Saturdays

2 – 19:00-23:00 weekdays, 13:00-23:00 Saturdays, 07:00-23:00 Sundays

3 – 23:00-07:00

73. In accordance with BS 5228-1, there are other project-specific factors which can be considered, any or all of which may be relevant depending on the specific situation. The following demonstrates the other factors that can be considered to determine the magnitude of impact, receptor sensitivity and effect significance:

- The duration of the impact;
- The timing of the impact, night-time impacts being more likely to be considered significant than daytime impacts (at residential receptors), due to potential sleep disturbance;
- The location of the impact at the NSR, for example, a receptor may contain areas which are more or less sensitive than others, for example in a school, office spaces or kitchens would be considered less sensitive than classrooms;
- The nature, times of use and design of the receptor, for example a NSR which is not used at night would not be considered sensitive to night-time construction works;
- The nature of the receptor, for example, some building facades have inherently high sound insulation that may reduce impacts inside the building.

25.4.3.4 Construction Phase Road Traffic Noise Assessment Methodology

74. The road links required for construction traffic are detailed with **Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)**, specifically **Volume 7, Figure 24-1 (application ref: 7.24.1)**.

75. Construction road traffic noise impacts have been determined by assessing the change in Basic Noise Level (BNL) in accordance with the methodology provided in CRTN. As per the guidance in CRTN a 'low-flow correction' can be applied to AAWT total vehicular 18hr flows between ≥1000 to ≤4000 vehicles.

76. The CRTN methodology was used for all road links within the traffic study area for the following scenarios:

- RTN Scenario 1: 2026 Future Base (AAWT);
- RTN Scenario 2: 2026 Future Base (AAWT) + Construction traffic for the Projects In Isolation (Peak 18hr Weekday);
- RTN Scenario 3: 2026 Future Base (AAWT) + Construction traffic for the Projects Sequentially (Peak 18hr Weekday); and
- RTN Scenario 4: 2026 Future Base (AAWT) + Construction traffic for the Projects Concurrently (Peak 18hr Weekday).

77. Construction road traffic noise impacts were determined by assessing the change in BNL, compared to the 2026 Future Base, for the Projects built In Isolation, Sequentially and Concurrently.

78. For road links that were outside the CRTN range for traffic flow data (below 1000 vehicles per 18hr) the method from the Noise Advisory Council (NAC) guide has been used to calculate the $L_{Aeq,16hr}$ noise level (CRTN predicts $L_{A10,18hr}$ noise levels) of road traffic noise at 10 metres. As per the road links where the CRTN BNL methodology is used, construction road traffic noise impacts have been determined by assessing the change in calculated road traffic noise.

79. Magnitude of impact criteria for construction traffic noise are displayed in **Table 25-11**, taken from DMRB. The significance of road traffic noise effects is defined, for each road link, by combining the magnitude of impact and receptor sensitivity, as presented in the significance of effect matrix (**Table 25-8**). Note, however, that DMRB defines effects in terms of negligible, minor, moderate and major effects, based on residential receptors. Therefore, as residential receptors are defined as being of medium sensitivity, a negligible impact at medium sensitivity receptors is assessed as a negligible effect instead of a minor adverse effect to align with the guidance in DMRB.

Table 25-11 Magnitude of Impact Criteria for Relative Change Due to Construction Road Traffic

Magnitude of impact	Increase in BNL of closest public road used for construction traffic (dB)
High	≥5.0
Medium	≥3.0 to <5.0
Low	≥1.0 to <3.0
Negligible	>0.0 to <1.0
No Impact	= 0.0

80. In assessing the significance of effect for construction road traffic noise, consideration is also given to the absolute noise levels, with reference to absolute noise criteria for operational road traffic noise from DMRB, reproduced in **Table 25-12**.

Table 25-12 DMRB Operational Noise LOAELs and SOAELs for all receptors

Time Period	LOAEL	SOAEL
Day (06:00-24:00)	55dB $L_{A10,18hr}$ façade	68dB $L_{A10,18hr}$ façade
Night (23:00-07:00)	40dB $L_{night, outside}$ (free-field)	55dB $L_{night, outside}$ (free-field)

25.4.3.5 Construction Phase Vibration Assessment Methodology

81. 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 occupants. In extreme cases, cosmetic or structural building damage can occur, but only at extremely high vibration levels and such cases are rare.

82. Typically, perceptible ground-borne vibration is only emitted by 'heavy' construction works such as piling, deep excavation, or dynamic ground compaction.

83. 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. BS 7385-2 provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228-2. Guide values for transient vibration in terms of peak particle velocity (PPV), above which cosmetic damage could occur, are given in **Table 25-13**.

Table 25-13 Transient Vibration Guide Values for Cosmetic Damage

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

84. BS 7385-2 states that the probability of building damage tends to zero for transient vibration levels less than 12.5mm.s^{-1} PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

85. BS 7385-2 states that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration twice that of minor damage. The values presented in **Table 25-13** refer to the likelihood of cosmetic damage. ISO 4866:2010 defines three different categories of building damage:

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

86. The vibration level and effects presented in **Table 25-14** are taken from Table B-1 of BS 5228-2. These levels and effects are based on human perception of vibration in residential environments. The significance of construction vibration effects is defined, for each receptor within the study area, by combining the magnitude of impact and receptor sensitivity, as presented in the significance of effect matrix (**Table 25-8**).

Table 25-14 Construction Vibration – Example of Human Perception in Buildings

Vibration limit PPV (mm/s)	Interpreted significance to humans	Magnitude of impact	NPSE/PPG Category
<0.14	Vibration unlikely to be perceptible	Negligible	NOEL
0.14 to 0.3	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction		Lower end of range is equivalent to LOAEL

Vibration limit PPV (mm/s)	Interpreted significance to humans	Magnitude of impact	NPSE/PPG Category
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	Lower end of range is equivalent to SOAEL
>10.0	Vibration is likely to be intolerable for any more than a brief exposure to this level	High	

87. Predicted construction vibration levels at receptors which exceed a value of 1mm.s^{-1} have the potential to result in a significant effect. However, the same additional project-specific factors which can influence the construction noise effect significance (as discussed in section 25.4.3.3) are considered relevant to vibration impacts. Hence, the same process for considering these other factors should be used to determine the vibration effect significance. Of relevance to annoyance effects due to vibration is the number of times vibration levels exceed a particular threshold. For example, even a relatively high level of vibration (but below building damage thresholds) may be unlikely to result in significant effects if it only occurs on a small number of occasions.

88. Comparison of the criteria in **Table 25-13** and **Table 25-14** shows that the levels at which building damage may occur are significantly above those which are considered tolerable by the occupants. The assessment therefore applies the criteria for human annoyance. Assuming that the vibration impacts will be controlled to avoid significant annoyance effects, then building damage is not anticipated. It should be noted however that building damage criteria are absolute values and don't take duration of effect into account.

25.4.3.6 Operational Onshore Converter Station(s) Noise Assessment Methodology

89. Noise levels from the operational fixed plant of the proposed Onshore Converter Station(s) have been predicted using CadnaA 3D modelling software and using the methods and guidance in ISO 9613. Noise modelling parameters are presented in **Volume 7, Appendix 25-5 (application ref: 7.25.25.5)**.

90. The operational noise magnitude of impact criteria for the Onshore Converter Station(s) are discussed below and are based BS4142 and the WHO Night Noise Guidance for Europe (NNG).

91. BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature and is referred to in NPS EN-1 and East Riding of Yorkshire Council Local Plan. 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.

92. The basis of BS 4142 is a comparison between the background sound level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- Background sound level – $L_{A90,T}$ – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F (Fast) and quoted to the nearest whole number of decibels;
- Specific sound level – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a reference time interval, Tr (1 hour during the daytime hours (07:00 to 23:00 hours) and 15 minutes during night-time hours (23:00 to 07:00 hours));
- Residual Sound Level - $L_{Aeq,T}$ - the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- Rating level – $L_{Ar,Tr}$ – the specific sound level plus a "character correction" if required for the acoustic features of the noise such as tonality, impulsivity and intermittency.

93. When comparing the background and the rating sound levels, the standard states that:

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

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

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

d) 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".

94. When assessing the noise from a source, it is necessary to have regard to the acoustic features that may be present. Section 9.1 of BS 4142 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.*"

95. For clarity, an explanation of each character correction type (taken from BS 4142:2014+A1:2019, page 13 and 14) based on the 'subjective method' is provided here:

- Tonality - For sound ranging from not tonal to prominently tonal a correction of between 0dB and +6dB for tonality can be applied. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.
- Impulsivity - A correction of up to +9dB can be applied for sound that is impulsive. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible.
- Intermittency - When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

- Other sound characteristics - Where the specific sound feature characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

96. BS 4142 also provides a number of objective methods for identifying character corrections.

97. Based on the guidance in BS 4142, a suitable operational noise LOAEL is considered to be a rating level equal to background sound levels, as this is the threshold at which impacts are considered to be low. It could be argued that this is an 'onerous' or 'safe' interpretation of the standard as the standard states that adverse impacts are likely to occur at or above 5dB above background sound levels.

98. Notwithstanding the above, it is also necessary to consider the context; of particular relevance to this assessment are the absolute sound levels. Regarding absolute sound levels, BS 4142 states that *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

99. The WHO NNG for Europe was published to complement the WHO Guidelines for Community Noise and introduced additional research on the effects of night-time noise exposure. This uses $L_{night,outside}$ as a noise indicator for long-term health effects, which is defined as a yearly average of night noise level outside at the façade.

100. The WHO Night Noise Guidance for Europe (NNG) found that below 30dB $L_{night,outside}$ there are no observed effects on sleep. Furthermore, there is no evidence that biological effects observed at levels below 40dB $L_{night,outside}$ are harmful to health. At levels above 55dB $L_{night,outside}$, the NNG detailed that adverse health effects occur frequently and there is limited evidence that the cardio-vascular system is coming under stress.

101. Further to the above, during the night-time period occupants of residential dwellings (nearest receptors) are likely to be inside their properties. Where night-time operational noise from the Onshore Converter Station(s) is 40 dB $L_{Aeq,8hrs(23:00-07:00)}$ outside a dwelling, even with windows open internal noise levels are likely to approximately 27 dB $L_{Aeq,8hrs(23:00-07:00)}$ (assuming 13 dB for a partly open window). For the majority of the time when windows are closed, noise levels would be significantly lower than this.

102. BS 8233 states that, for steady external noise sources, it is desirable that internal noise levels in bedrooms do no exceed 30 dB $L_{Aeq,8hr}$. This value is generally agreed to represent LOAEL. Therefore, an external night-time noise level of 40 dB $L_{Aeq,T}$ outside is unlikely to result in adverse impacts inside a dwelling.

103. Therefore, based on the NNG and the guidance in BS 8233, the following effect levels for absolute operational noise levels from the Onshore Converter Station(s) at night are also relevant, with reference to the NPSE categories:

- 30dB $L_{Aeq,8hrs(23:00-07:00)}$ - NOEL;
- 40dB $L_{Aeq,8hrs(23:00-07:00)}$ - LOAEL; and
- 55dB $L_{Aeq,8hrs(23:00-07:00)}$ - SOAEL.

104. Further to the above, it is important to note that the internal ambient noise criteria of BS 8233 are based on noise or sound *'without specific character'*, described as sound that *contains 'distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content'*. If and where operational sound contains these characteristics this will be further considered, in addition to the absolute levels above, when identifying night-time impacts.

105. The magnitude of impact is based on a predicted level of operational noise sources, based on the BS4142 (rating level compared to background sound level) and absolute night-time sound levels is presented in **Table 25-15**. For the assessment of operational noise during night-time, the higher of the two assessment criteria has been used. For example if the background sound level is 45dB L_{A90} the LOAEL is equal to 45dB $L_{Ar,Tr}$ ($L_{Ar,Tr}$ is the rating level) not 40dB $L_{Aeq,8hrs}$. Conversely, if the background sound level is 35dB L_{A90} the LOAEL is equal to 40dB $L_{Aeq,8hrs}$ not 35dB $L_{Ar,Tr}$.

Table 25-15 Operational Noise Magnitude of Impact Criteria for Industrial/Commercial Noise Sources

Magnitude of impact	Excess of rating level over background sound level (dB)	NPSE/PPG category using BS 4142 criteria	Absolute night-time (23:00 to 07:00 hrs) noise level criteria	NPSE / PPG category
High	≥ 10		>55dB $L_{Aeq,8hrs}$	

Magnitude of impact	Excess of rating level over background sound level (dB)	NPSE/PPG category using BS 4142 criteria	Absolute night-time (23:00 to 07:00 hrs) noise level criteria	NPSE / PPG category
Medium	≥ 5 and <10	Lower end of range is equivalent to SOAEL		Lower end of range is equivalent to SOAEL
Low	> 0 to < 5dB	LOAEL to SOAEL	40 to ≤55dB $L_{Aeq,8hrs}$	LOAEL to SOAEL
Negligible	> -10 to ≤ 0	NOEL to LOAEL	30 to ≤40dB $L_{Aeq,8hrs}$	NOEL to LOAEL
No Impact	≤ -10	Below NOEL	≤30dB $L_{Aeq,8hrs}$	Below NOEL

106. When identifying effects based on the relative impact criteria in **Table 25-15**, and using the effects matrix, this is likely to result in an overestimate of effects as BS4142 already includes a consideration of receptor sensitivity (applied to residential or similar receptors). For example, a BS4142 assessment finding of -5dB would result in a minor effect, whereas the standard states this is below adverse effects. Therefore, the matrix (**Table 25-8**) has been updated to reflect this (please see footnote to table). Note that this does not apply to absolute noise impact criteria.

25.4.4 Cumulative Effect Assessment Methodology

107. The cumulative effect assessment (CEA) considers other schemes, plans, projects and activities that may result in significant effects in cumulation with the Projects. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** (and accompanying **Volume 7, Appendix 6-1 Onshore Cumulative Assessment (application ref: 7.6.6.1)**) provides further details of the general framework and approach to the CEA.

25.4.4.1 Cumulative Construction Phase Noise and Vibration Assessment Methodology

108. Due to the information available and the uncertainty regarding programming of activities for cumulative schemes, the cumulative construction phase assessment for noise and vibration has been undertaken qualitatively, with discussion of likely construction effects. Reference is made to the construction noise and construction vibration methodologies as appropriate (set out in sections 25.4.3.3 and 25.4.3.5).

25.4.4.2 Cumulative Construction Phase Road Traffic Noise Assessment Methodology

109. The methodology for assessing cumulative road traffic noise follows the same methods as the "Construction Phase Road Traffic Noise Assessment Methodology", outlined in section 25.4.3.4 using CRTN and NAC guidance and DMRB criteria (**Table 25-11**).

110. The CRTN methodology was used for all road links within the traffic study area for the following scenarios (all AAWT, 18hr):

- RTN Scenario 1: 2026 Future Base;
- RTN Scenario 5: 2026 Future Base + Peak daily construction traffic for the Projects In-Isolation + Traffic for cumulative schemes;
- RTN Scenario 6: 2026 Future Base + Peak daily construction traffic for the Projects Sequentially + Traffic for cumulative schemes;
- RTN Scenario 7: 2026 Future Base + Peak daily construction traffic for the Projects Concurrently + Traffic for cumulative schemes.

111. This has been undertaken using traffic data and cumulative scheme analysis provided by the Projects' transport consultant. The cumulative schemes included in the cumulative traffic data are reported in the cumulative effects assessment in section 25.8.

25.4.4.3 Cumulative Operational Phase Assessment Methodology

112. Due to the information available and the uncertainty regarding likely noise levels from cumulative schemes, the cumulative operational phase assessment has been undertaken qualitatively, with discussion of likely operational effects. Reference is made to the methodology set out in 25.4.3.6 as appropriate.

25.4.5 Assumptions and Limitations

113. Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort is made to ensure that measurements are undertaken in such a way to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions. However, a small degree of uncertainty will always remain in the values taken from such a measurement survey.

114. Baseline sound levels presented include 2 locations (A and B) where noise was monitored over a two-week period, which included October half term (24 to 28 October 2022). Monitoring during this time period was agreed with East Riding of Yorkshire Council Environmental Health Department. Measured noise levels during holidays and non-holiday periods were found to be similar.

115. 3D construction noise predictions are based on a preliminary understanding of construction works, including the likely construction schedule and activities as well as the types of plant and equipment which are likely to be used. These assumptions have been provided by the Projects' construction consultants. The assumptions are considered representative of a reasonably foreseeable worst case. The plant and equipment for the worst case activities are detailed in **Volume 7, Appendix 25-3 (application ref: 7.25.25.3)**. The design process is ongoing and this information may change once a construction contractor is appointed.

116. Most of the construction noise impacts along the Onshore Export Cable Corridor will be of short-duration (less than one month) in a given location however the following key activities may take longer than one month and therefore noise predictions have been carried out for:

- Operation of compounds; and
- Trenchless crossing works along the Onshore Export Cable Corridor i.e. HDD.

117. There are also obstacles that have been identified in each section of the Onshore Export Cable Corridor that would be crossed using trenchless techniques and may require 24-hour working using HDD. HDD would be the worst case of the trenchless techniques and is therefore taken forward as a worst case activity for the purposes of this assessment. It is noted that other trenchless crossing techniques may be used during construction as identified in **Volume 7, Chapter 5 Project Description (application ref: 7.5)** however these are not considered worst case in terms of the noise assessment.

118. It is understood that all construction works are proposed to be undertaken during the daytime, except for potential HDD trenchless crossing works at some crossings. HDD works are continuous activities and require flexibility to potentially continue 24 hours a day for brief periods. It should be noted that noise predictions of HDD works include embedded noise mitigation of screening of stationary plant. This is detailed in **Volume 7, Appendix 25-3 (application ref: 7.25.25.3)**.

119. 3D operational noise predictions are based on an outline design and preliminary design metrics, including the likely plant type and quantities that will be used as well as their noise emissions (sound power levels). These assumptions have been provided by the Projects' Onshore Converter Station(s) design consultants (Mott MacDonald). The assumptions are considered representative of a reasonably foreseeable worst case. The plant and equipment for the converter station are detailed in **Volume 7, Appendix 25-5 (application ref: 7.25.25.5)**.

25.5 Existing Environment

25.5.1 Baseline Noise Environment

120. An understanding of the baseline noise environment is required to assist in the determination of the significance of potential impacts during both construction and operational phases.

121. A total of 51 NSR locations have been identified and are presented in **Table 25-16**. Note that this a reduction compared to PEIR (due to refinement of the Onshore Development Area) but receptor IDs have remained the same to aid review and comparison of PEIR and ES noise and vibration chapters.

122. NSR locations were chosen to represent the worst case for each NSR across the Onshore Development Area, within the buffer zones defined in section 25.3.2 . It should be noted some NSR locations represent the worst case location of multiple residential dwellings. Where relevant, the number of properties affected are discussed in the assessments. **Volume 7, Figure 25-1 (application ref: 7.25.1)** shows the locations of NSRs which are considered in the assessment.

123. The NSRs for the construction road traffic impacts (impact 4) are defined by the road links, and individual properties will be referred to if relevant (i.e., if potentially significant impacts are identified) to provide additional context to road traffic noise predictions.

Table 25-16 Onshore Noise Sensitive Receptors Included in Noise and Vibration Assessments

NSR Identifier	Coordinates		Classification	Sensitivity	Potential Impacts (excl. Impact 4)
	X	Y			
R1	517765	455943	Residential	Medium	1, 2
R2	517336	457637	Residential	Medium	2
R3	517414	455124	Residential	Medium	1, 2, 5
R4	517616	455099	Residential	Medium	1, 2, 5
R5	517282	455048	Education	Medium	2
R6	518142	455105	Residential	Medium	1
R7	517560	454581	Residential	Medium	2

NSR Identifier	Coordinates		Classification	Sensitivity	Potential Impacts (excl. Impact 4)
	X	Y			
R13	514433	449028	Residential	Medium	2
R14	514875	446081	Residential	Medium	2
R15	514752	446378	Residential	Medium	2
R16	511377	443545	Residential	Medium	2
R19	509163	442245	Education	Medium	2, 5
R22	508594	442430	Residential	Medium	2, 5
R23	508291	442241	Residential	Medium	2
R24	508184	442105	Residential	Medium	2
R25	506507	443165	Residential	Medium	2
R26	503617	441906	Residential	Medium	2
R27	503105	441364	Residential	Medium	2
R29	502969	441369	Residential	Medium	2
R30	502867	441355	Residential	Medium	2
R33	502080	441179	Residential	Medium	2
R34	501913	441765	Residential	Medium	2, 5
R35	501183	441043	Residential	Medium	2
R37	501934	438191	Residential	Medium	2
R38	501835	437956	Residential	Medium	2, 5
R39	502021	437001	Education	Medium	2, 3, 6
R40	502459	437120	Residential	Medium	2
R42	502509	436990	Healthcare	Medium	2, 3, 6

NSR Identifier	Coordinates		Classification	Sensitivity	Potential Impacts (excl. Impact 4)
	X	Y			
R43	502543	436497	Residential	Medium	2, 5, 6
R46	502837	436280	Residential	Medium	2
R47	503342	435888	Residential	Medium	2, 5
R48	503617	435667	Residential	Medium	2
R51	501295	438889	Residential	Medium	2
R53	504728	441206	Residential	Medium	2
R54	501123	439618	Residential	Medium	2
R55	513746	444423	Residential	Medium	2
R56	510798	442379	Residential	Medium	2
R57	502152	436034	Residential	Medium	6
R58	514345	447010	Residential	Medium	2
R59	506784	442506	Residential	Medium	2
R60	506946	443246	Residential	Medium	2
R61	516425	454206	Residential	Medium	2
R62	515183	453365	Residential	Medium	2
R63	513999	451285	Residential	Medium	2
R64	514527	448278	Residential	Medium	2
R65	514215	449743	Residential	Medium	2
R66	502562	436624	Residential	Medium	2, 5, 6
R67	502579	436748	Residential	Medium	2, 6
R68	503516	442438	Residential	Medium	2

NSR Identifier	Coordinates		Classification	Sensitivity	Potential Impacts (excl. Impact 4)
	X	Y			
R69	517182	455432	Residential	Medium	1
R70	504464	441132	Residential	Medium	2

124. Measurement locations (representative of individual or groups of NSRs) were identified and agreed with East Riding of Yorkshire Council's Environmental Health Department for the assessment of noise from the Onshore Converter Station(s). Eleven measurements locations representative of operational Onshore Converter Station(s) receptors (impact 5) were surveyed between during October/November 2022 and January 2023, eight of which have been scoped out of the operational assessment as they are no longer within the Noise and Vibration study area.

125. The baseline sound survey results presented in this chapter comprised of unattended measurements at three NSRs with the potential to be impacted by operational noise from the Onshore Converter Station(s). Measurements were conducted in accordance with relevant guidance, including BS 4142 and BS 7445.

126. Analysis of the baseline data has been undertaken. A summary of the unattended baseline sound survey results, representative of operational (Impact 6) NSRs R39, R40, R42, R43 and R57, is provided in **Table 25-17**. Further details of the survey and analysis can be found in **Volume 7, Appendix 25-2 (application ref: 7.25.25.2)**.

Table 25-17 Baseline Noise Monitoring Results

Measurement Location	NSR	Daytime (07:00 – 23:00)		Night-time (23:00 – 07:00)	
		$L_{Aeq,T}$ (dB)	L_{A90} (dB)	$L_{Aeq,T}$ (dB)	L_{A90} (dB)
A	R39	49	45	40	31
B	R40, R42, R43, R66, R67	58	53	50	30
D	R57	47	44	39	26

25.5.2 Future Trends

127. Noise is managed by 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 improvement and maintenance of the noise environment across the UK, which is reflected in current legislation, policy and guidance. 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.

129. One issue that could potentially impact future background sound levels is the ongoing change away from combustion engine road vehicles to electric vehicles. Recent research has shown that at most normal road speeds there is unlikely to be a significant change in road noise as the dominant source of sound is tyre noise. It is therefore considered unlikely that future background sound levels will be reduced or significantly altered due to future changes to road vehicles.

130. Consequently, in relation to the Projects and its immediate receiving environment it is reasonable to predict a steady baseline soundscape would be generally maintained.

131. There will be some change to the future noise climate for receptors in proximity to the A164 and Jocks Lodge Junction Improvement Scheme, which is due to be operational from 2027. There may be some changes in residual sound at receptors due to changes in road alignment and the re-routing of traffic, including at noise monitoring location B. However, it is considered unlikely that the representative background sound level (L_{A90}) will be significantly changed. Additionally, as outlined in the operational assessment (section 25.6.2), the criteria for the night-time operational assessment for the Onshore Converter Station(s) is based on an absolute noise criteria, therefore changes in future baseline conditions will not affect the results of the assessment.

25.6 Assessment of Significance

25.6.1 Potential Effects During Construction

132. Assumptions regarding the plant for each construction activity covered in the assessments for Impacts 1 to 3 are provided in **Volume 7, Appendix 25-3 (application ref: 7.25.25.3)**, along with predicted construction noise level at each NSR.

25.6.1.1 Impact 1: On-site Construction Noise at Landfall Zone

133. Construction activities at the Landfall Zone have potential to lead to noise impacts at NSRs.

134. Construction activities at the Landfall Zone include activities such as construction of the landfall compound (including access and haul roads), laying of offshore export cables (nearshore) and construction of the transition joint bay. The noise impacts of the construction of TJBs at the Landfall Zone have been assessed as the worst case activity.

135. Construction activities at the Landfall Zone will be undertaken Monday to Saturday 07:00 to 19:00 except for potential HDD works at trenchless crossings which are likely to require 24-hour working at the landfall and which have been assessed separately in Impact 2 (section 25.6.1.2).

25.6.1.1.1 Magnitude of Impact – All Scenarios

136. All scenarios (In Isolation, Sequentially and Concurrently) have been assessed as the Landfall Zone is the same for each scenario with the same predicted quantities of plant.

137. The highest predicted monthly daytime noise levels at the nearest NSRs during TJB construction activities (worst case activity) within the landfall are 65dB $L_{Aeq,T}$ at R4. Results indicate worst case noise levels from landfall activities are predicted to cause, at-worst, a marginal low impact at this NSR during daytime and a marginal medium magnitude of impact on Saturday afternoons (assessed as “evenings and weekends”). For those NSRs with increased separation from the construction works the magnitude of impacts is no greater than negligible.

25.6.1.1.2 Significance of Effect – All Scenarios

138. The Concurrent and Sequential Scenarios would be the worst-case scenarios in terms of duration, but the effect will be temporary in all scenarios.

139. The predicted noise levels are 1dB above the threshold of magnitude impacts for landfall construction activities at R4, the worst affected receptor. As discussed in **Table 25-3**, not all embedded mitigation measures (e.g. close liaison with receptors, placement of plant) can be assessed quantitatively at this stage. With the implementation of embedded noise mitigation the construction noise impact at R4 can be reduced below the threshold.

140. The NSR worst affected by daytime landfall activities, R4, is medium sensitivity, therefore a potential temporary **minor** adverse effect (not significant) is predicted from landfall construction activities.

141. With qualitative embedded mitigation measures taken into consideration the medium magnitude of impact due to the landfall construction work on Saturday afternoons has been found to be temporary **minor adverse** (not significant) effect.

25.6.1.2 Impact 2: On-site Construction Noise at Temporary Construction Compounds and Potential Horizontal Directional Drilling Locations

142. Construction activities at along the Onshore Export Cable Corridor have the potential lead to noise impacts at NSRs.

143. Construction activities include excavation of trenches, construction and use of temporary haul roads and laying or pull of Onshore Export Cables.

144. The worst case daytime activity and weekend in terms of noise that may last more than one month has been identified to be the operation of TCCs (operating Monday to Saturday 07:00 to 19:00).

145. HDD may be used in selected locations for crossing of existing infrastructure and natural features and this may require 24-hour working. 24-hour working is likely to last less than a month at most locations, however due to increased receptor sensitivity at night (potential effects on sleep etc.) a noise assessment for this activity has been undertaken.

25.6.1.2.1 Magnitude of Impact – All Scenarios

146. All Scenarios (In Isolation, Sequentially and Concurrently) have been assessed together as the locations for TCCs and trenchless crossings are the same for all scenarios with the same predicted quantities of plant. It is however noted that, depending on the final design of the trenchless crossings, the siting of the crossings (e.g. HDD entry/exit location) could be closer to receptors for both Projects being built compared to one Project being built due to an increased cable installation width for two sets of cable routes. For all scenarios a reasonable worst case HDD location has been used and is the same for all scenarios.

147. **Table 25-18** presents the predicted number of NSRs per magnitude of impact for the worst case Onshore Export Cable Corridor construction activities. Further details are provided in **Volume 7, Appendix 25-3 (application ref: 7.25.25.3).**

148. Note that the assessed magnitude of impact does not take into account duration of activities (days/weeks/months), only the daytime or night-time noise level $L_{Aeq,T}$. Temporal context is provided in the conclusion on significance of effects (section 25.6.1.2.2).

Table 25-18 Magnitude of Impact Due to Construction Noise Along the Onshore Export Cable Corridor

Negligible	Low	Medium	High
TCCs Daytime*			
23	1	0	0
TCCs Evenings and Weekends			
10	13	1	0
HDD Night-time*			
17	~~20~~26	7	5
*Note that there are 24 and 39 receptors within the 300 m study area for TCC and HDD locations respectively.			

149. The operation of TCCs is predicted to cause no greater than a low noise impact during daytime and no greater than a low noise impact during evenings and weekends (i.e. Saturday afternoons), with exception to R2 which is in close proximity to the Emergency Beach Access TCC.

150. A predicted monthly average noise level of 67dB $L_{Aeq,T}$ is predicted for the Emergency Beach Access TCC, based on the plant likely to be used for the operation of TCCs. This would lead to a low impact during daytime hours and a medium impact during Saturday afternoon. However, this is likely to be an overestimation of noise as this TCC will not service the construction of the onshore cable export corridor and is only expected to be used in the event of emergency access to the beach. Therefore, the noise impact of this TCC is predicted to be negligible.

151. The haul roads that will be operated during the construction of the Projects have been reviewed. It is considered unlikely that the vast majority of haul roads will lead to adverse noise impacts due to distances to receptors or proximity to busy roads. However, two haul roads pass near to residential properties, one in front of R23 and in front of R46 which could lead to adverse impacts.

152. The haul road close to R23 is associated with Section 6A of the onshore export cable corridor. For the peak period of construction in this section there are predicted to be approximately 40 HGV movements per day for approximately three months of trench excavation, during the Projects being built Concurrently (worst case). Based on NAC methods applied to the road traffic noise assessment, noise levels from this number of vehicles are predicted to be less than 50 dB $L_{Aeq,12h}$ (07.00 – 23.00) at the most-affected NSR. Therefore, the impact of haul road traffic noise at R23 has been assessed to be negligible.

153. The haul road close to R46 is associated with Section 15 of the onshore export cable corridor. For this section there will be approximately nine months of trench excavation. During this phase of works there is predicted to be between 34 and 55 HGV movements per day, during the Projects being built Concurrently (worst case). Access to the works areas will be shared between this haul road and the A1079, therefore assuming half the HGV movements use this haul route, this would lead to 28 movements per day during a peak month. Based on NAC methods applied to the road traffic noise assessment, noise levels from this number of vehicles is predicted to be less than 50 dB $L_{Aeq,12h}$ (07.00 – 23.00) at the most-affected NSR. Therefore, the impact of haul road traffic noise at R46 has been assessed to be negligible.

154. The highest predicted monthly night-time noise levels (~~63~~60-~~69dB~~ 65 dB $L_{Aeq,T}$) at the NSRs due to potential HDD locations are at receptors within approximately 50 m of the works. These noise levels are likely to lead to a high impact at five NSRs (R3, R19, R38, R43 and R66). It is predicted that there will also be medium adverse impacts at seven NSRs (R4, ~~R5,~~ R23, R35, R37, R47, ~~and~~ R51 and R58) due to night-time construction noise from HDD works.

25.6.1.2.2 Significance of Effect – All Scenarios

155. The effect of noise from the operation of TCCs during the construction phase is predicted to be **minor adverse** (not significant) at all NSRs (medium sensitivity) during daytime and Saturday afternoon hours.

156. In general haul roads associated with compounds do not pass close by to sensitive receptors and are unlikely to lead to significant effects. The exception to this is the haul roads that pass close to R23 and R46 where negligible impacts are predicted. Therefore, the effects from haul roads associated with compounds is predicted to be at-worst **minor adverse** (not significant).

157. The assessment results show that a negligible or low impact is predicted for 27 of the 39 NSRs scoped into the assessment of HDD noise night-time impacts. All of these 27 receptors are of medium sensitivity and therefore the effect is at-worst **minor adverse** (not significant) for these receptors.

158. Should HDD works be required at night, the initial numerical assessment indicates that medium or high impacts are predicted at 12 medium-sensitivity NSRs due to night-time HDD activities, leading to **moderate** and **major adverse** (significant) effects. However, other factors such as duration and the need for 24-hour working have also been taken into consideration, as well as non-quantitative noise mitigation measures that form part of the **OCoCP (Volume 8, application ref: 8.9).**

159. As stated in the assessment methodology (section 25.4.3.3), it is important that the likelihood and duration of any night-time works are considered, in addition to the level of impact (i.e. predicted noise level), when identifying the significance of effects. The likelihood that 24-hour working will be required, and the duration of any such works, varies between each HDD crossing.

160. Therefore, where medium or high impacts have been identified, the likelihood and duration of 24-hour working has also been considered when identifying effects. It is important to note that any night-time HDD working will be significantly shorter than the one-month period referred to in BS 5228-1.

161. The assessment of HDD noise effects for NSRs where night-time impacts are high or medium are presented in **Table 25-19**.

162. Temporary **moderate adverse** (significant) effects are predicted at R3 (residential receptors on Hornsea Road, by potential 200-250m HDD crossing of Hornsea Road), at R19 (residential receptor at Manor House Farm by the potential 250-300m HDD crossing of Poultry Farm Track), and ~~and~~ at NSRs R43 and R66 (residential receptors on A164 by the potential 300-350m HDD crossing of the A164)

Table 25-19 Significance of Effect Due to Potential Night-time HDD Construction Works

NSR	Magnitude of Impact	Crossing ID	Crossing Length	Likelihood of 24-hour HDD working*	Significance of Effect
R3	High	ID-00003	200-350m	Medium	Moderate
R4	Medium				Minor
R19	~~Medium~~High	ID-00064	200-350m	Medium	~~Minor~~Moderate
R23	Medium	ID-00067	200-350m	Medium	Minor
R35	Medium	ID-00102	200-350m	Medium	Minor
R37	Medium	ID-00114	<200m	Low	Minor
R38	High				Minor
R43	High	ID-~~00131~~00129	200-350m	Medium	Moderate
~~R48~~	~~Medium~~	~~ID-00140~~	~~<200m~~	~~Low~~	~~Minor~~
R47	Medium	ID-00144	<200m	Low	Minor
R51	Medium	ID-00109	<200m	Low	Minor
R58	Medium	ID-00037	<200m	Low	Minor
R66	High	ID-0012~~931~~	200-350m	Medium	Moderate

*Low likelihood – HDD <200m in length. It is less likely that 24-hr HDD works will be required and if so, works will only be for relatively short period of time and unlikely to be approaching 10 in consecutive 15 nights.

Medium likelihood: For HDDs of length 200 to 350m. HDD night-work may be considered if there are significant issues, programme delays, or the ground conditions require that the bore is not left static overnight. 10 consecutive days should allow for completion of any larger reams and / or pull back, i.e. works should completed within the 10 out of 15 day period.

25.6.1.2.3 Mitigation and Residual Significance of Effect

163. Potential temporary moderate adverse (significant) effects have been predicted at R3, R19, R43 and R66 due to HDD works at night. These activities are likely to be able to be controlled to no more than 10 nights if 24-hour working is required and therefore any impacts will only occur for a relatively short period of time. However these activities still have the potential to cause effects such as sleep disturbance during that time. To mitigate these potential significant effects the following additional mitigation measures will be considered:

- Further screening of noise: Localised screening around specific equipment is included within the numerical noise predictions used in this assessment. Where practicable, further screening in the form of noise barriers at the site boundary or in proximity to the affected properties will be used (e.g. between the HDD works area at crossing ID-00003 and R3).
- Programming of works: The effect of night-time construction will be minimised by ensuring that HDD at crossings ID-00003 (R3), ID-00064 (R19) and ID-~~00131~~ 00129 (R43, R66) are programmed to avoid times of the year when the climate is warmer (e.g. summer) and residents may open windows at night to avoid overheating. When windows are closed, noise levels inside dwellings will be significantly reduced.

164. With the proposed additional mitigation in place, moderate adverse effects at R3, R19, R43 and R66 due to HDD works would be controlled to **minor** adverse (not significant) effects.

25.6.1.3 Impact 3: On-site Construction Noise at Onshore Convertor Station(s)

165. Construction activities at the Onshore Substation Zone have the potential lead to noise impacts at NSRs.

166. Construction activities related to the Onshore Converter Station(s) include establishment of a level platform (cut, fill and import of material), construction of permanent access to the site and construction of foundations and the structure, with working hours of Monday to Saturday 07:00 to 19:00.

167. The worst case daytime activity and weekend in terms of noise that may last more than one month has been identified to be the construction of drainage, foundations and structures.

25.6.1.3.1 Magnitude of Impact – All Scenarios

168. All scenarios (In Isolation, Sequentially and Concurrently) have been assessed together as the location and noise generated by the worst case activity of construction of foundations and structure will be the same for all scenarios.

169. The highest predicted monthly daytime and Saturday afternoon (assessed as "evenings and weekends") noise levels at the nearest NSRs during Onshore Converter Station(s) construction activities in the In Isolation, Sequential and Concurrent Scenarios are up to 65 dB $L_{Aeq,T}$ at R39. Therefore, the worst case noise levels from Onshore Converter Station(s) activities are predicted to cause a negligible impact during daytime and a low impact during Saturday afternoon.

25.6.1.3.2 Significance of Effect – All Scenarios

170. The receptors worst-affected by the Onshore Converter Station(s) construction activities are of medium sensitivity, therefore the effect would be **minor adverse** (not significant) for the Onshore Converter Station(s) construction activities under all scenarios. No additional mitigation measures are required however best practice measures will be followed at all construction sites and works will follow the CoCP.

25.6.1.4 Impact 4: Noise from Off-Site Construction Traffic

171. Off-site construction traffic related to the Projects has the potential to lead to noise impacts at NSRs.

25.6.1.4.1 Magnitude of Impact – All Scenarios

172. The assessment for all scenarios (In Isolation, Sequentially and Concurrently) have been presented together to provide a comparison between scenarios.

173. Road links required to be used by construction traffic for the Projects are presented in **Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)**. Road links with flows at or above 1,000 AAWT were assessed by undertaking BNL calculations using the CRTN method, and those below 1,000 AAWT were assessed by using the NAC method calculations. Peak daily flows were used to provide a worst case assessment. Further details are provided in **Volume 7, Appendix 25-4 (application ref: 7.25.25.4)**.

174. Two road links with flows below 1,000 have been scoped out due having no NSRs and being in proximity with busier roads (the location of these can be seen in **Volume 7, Figure 24-5 (application ref: 7.24.1)**):

- Link 7 – Dunnington Lane: There are no NSRs along this road and the nearest NSR to this road is a residential property on A165 Beeford to

Brandesburton (Link 3). Noise at this receptor is likely to be dominated by Link 3 (2026 Future AAWT = 8619, BNL = 72.1dB $L_{A10,18h}$).

- Link 58 – Ings Road: There are no NSRs along this road and the nearest NSR to this road is a residential property adjacent to A1035/A164 (Link 57). Noise at this NSR is likely to be dominated by Link 57 (2026 Future AAWT = 10161, BNL = 71.2dB $L_{A10,18h}$).

175. Changes in calculated road traffic noise levels due to construction traffic have been predicted. **Table 25-20** shows that, except for one road link (Link 73 – Eske Lane, discussed below), all links are predicted to cause impacts of no greater than low magnitude of impact. The Projects in Isolation has the fewest roads with low impacts and the Projects built Concurrently has the most roads with low impacts.

176. One high impact has been identified for all scenarios, on Eske Lane (Link 73). The nearest NSRs are two individual residential properties, approximately 10 m from the road edge of Eske Lane. Existing traffic movements on this road are low (18-hour AAWT = 47) and construction traffic could add 72 (In-Isolation Scenario) to 150 vehicles (Concurrent Scenario) (including 38 to 53 heavy vehicles) per day leading to a change in road traffic noise of more than 5dB.

Table 25-20 Magnitude of Impact Due to Peak Construction Road Traffic

No impact	Negligible	Low	Medium	High
Projects In Isolation				
9	46	8	0	1
Projects Sequentially				
9	42	12	0	1
Projects Concurrently				
9	40	14	0	1

25.6.1.4.2 Significance of Effect – All Scenarios

177. **Table 25-21** shows the significance of effect due to peak construction traffic. All NSRs along the identified road links are considered to be medium sensitivity, and no high sensitivity receptors have been identified.

178. The high impact due to the change in road traffic noise at Eske Lane has been assessed to be temporary **minor adverse** (not significant) effect for the following reasons:

- Following the implementation of agreed traffic measures within the **Outline CTMP (Volume 8, application ref: 8.13)** (see embedded mitigation **Table 25-3**), the effect at NSRs on Eske Lane will be reduced.
- The assessment is based on worst-case peak traffic flows, which will cause noise levels of this magnitude for a relatively short period of time. Based on the change in BNL due to the average Projects traffic flows over the entire construction period, the change in road traffic noise levels is between 3 and 5dB (medium impact).
- Façade noise levels due to total road traffic (including peak Projects construction traffic) on Eske Lane are predicted to be 57 to 58dB $L_{A10,18hr}$. Absolute noise levels are predicted to be marginally (2 to 3dB) above the LOAEL for operational noise levels and significantly below (10 to 11dB) below the SOAEL according to DMRB criteria for absolute road traffic noise levels (**Table 25-12**).

Table 25-21 Significance of Effect Due to Peak Construction Road Traffic

No impact	Negligible	Minor	Moderate	Major
Projects In Isolation				
9	46	9	0	0
Projects Sequentially				
9	42	13	0	0
Projects Concurrently				
9	40	15	0	0

179. Construction road traffic noise is assessed to have at-worst a **minor adverse** (not significant) residual effect. Therefore, no additional mitigation measures are proposed.

25.6.1.5 Impact 5: Construction Vibration

180. Construction activities have the potential to lead to vibration impacts at NSRs.

181. Trenchless crossing works (assumed as a worst-case to be the operation of HDD rigs and ancillary equipment) would produce the greatest vibration impact along the Onshore Export Cable Corridor and is therefore taken forward as the worst case for the vibration assessment. These impacts are considered to be the same for all scenarios as the drilling along the cable route will only happen once for all scenarios.

25.6.1.5.1 Magnitude of Impact – All Scenarios

182. All scenarios (In Isolation, Sequentially and Concurrently) have been assessed together as the locations of trenchless crossings are the same for all scenarios. It is however noted that, depending on the final design of the trenchless crossings, the siting of the crossings (e.g. HDD entry/exit location) could be closer to receptors for both Projects being built compared to one Project being built due to an increased cable installation width for two sets of cable routes. For all scenarios a reasonable worst case HDD location has been assessed.

183. Vibration levels decay very rapidly with distance from a source. A representative example of HDD given within BS 5228-2 is for boring through silts overlying sandstone and generating a PPV of 8mm/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 12 m from the source. Based on this data it is expected that vibration levels would drop to 1mm/s at approximately 15m from the source and drop to 0.3mm/s at 20 to 25m from the source.

184. The closest receptors are R3 and R66, each approx. 30m from the potential HDD crossing of Hornsea Road, and R43, approx. 25m from the potential HDD crossing of the A164. At these distances vibration levels are predicted to be approximately 0.3mm/s based on the measured data from BS 5228-2, and as a worst case assumption these are assessed to lead to a low impact at these receptors. All other receptors within the 100m study area are expected to be subject to vibration levels below 0.3mm/s, with a negligible impact.

185. The operation of piling rigs is considered to produce the greatest vibration levels from the construction of the Onshore Converter Station(s), however there are no NSRs within 100m of the Substation Zone, therefore this impact is scoped out.

25.6.1.5.2 Significance of Effect – All scenarios

186. Vibration from HDD could lead to a low impact at R3, R43 and R66 based on the nearest potential HDD location. This represents an effect of no greater than **minor** adverse at medium sensitivity receptors. The drilling location will be at the nearest location to these NSRs for a relatively short duration, and therefore the worst case vibration level is only expected to be present for less than a week. Therefore, no additional mitigation measures are proposed over and above the embedded mitigation.

25.6.2 Potential Effects During Operation

25.6.2.1 Impact 6: Operation of Onshore Converter Station(s).

187. The operation of the Onshore Converter Station(s) has the potential to lead to noise impacts at NSRs.

25.6.2.1.1 Magnitude of Impact – All scenarios

188. The assessment for all scenarios (In Isolation, Sequentially and Concurrently) have been presented to provide a comparison between scenarios.

189. The daytime operational noise modelling results and magnitude of impact assessment are presented in **Table 25-22**. Daytime noise from the Onshore Converter Station(s) is predicted to have negligible impact at Butt Farm (R39), with no impact predicted at all other NSRs. Predicted noise levels are up to 2dB higher for 2no. HVDC converter stations (Concurrent/Sequential Scenarios) compared to 1no. HVDC converter station (In Isolation Scenario), however there is no change in effect level for NSRs between these scenarios.

Table 25-22 Daytime Operational Noise Assessment – Onshore Converter Station(s)

Receptor	**Typical background sound level, dB $L_{A90,1h}$**	**Rating level, dB $L_{Ar,1h}$**		**Excess of rating level over background sound level, dB**		**Magnitude of impact**
		Isolation	**Concurrent / Sequential**	**Isolation**	**Concurrent / Sequential**	
R39	45	36*	38*	-9	-7	Negligible
R40	53	29	31	-24	-22	No impact
R42	53	30	31	-23	-22	No impact
R43	53	28	29	-25	-24	No impact

Receptor	Typical background sound level, dB $L_{A90,1h}$	Rating level, dB $L_{Ar,1h}$		Excess of rating level over background sound level, dB		Magnitude of impact
		Isolation	Concurrent / Sequential	Isolation	Concurrent / Sequential	
R57	44	30	31	-14	-13	No impact
R66	53	31	31	-22	-22	No impact
R67	53	32	33	-21	-20	No impact
*A +2dB BS4142 penalty has been added to the specific sound level as a worst case as there is potential that there may be a "tone which is just perceptible at the noise receptor". Note that other receptors are screened or further away from items of plant that would lead to tonal noise and therefore any tonal sound is likely to be significantly below background / residual levels.						

190. The night-time operational noise modelling results and magnitude of impact assessment are presented in **Table 25-23**. Note that for the night-time assessment the absolute noise criteria have been used due to the background sound levels at NSRs.

191. Night-time noise from the converter stations is predicted to have negligible impact at all receptors, except that no impact is predicted at R43 for all scenarios and R40 for one Project in isolation (In Isolation Scenario). Noise levels are up to 2dB higher for both Projects in operation (Concurrent Scenario and Sequential Scenario) compared to one Project in operation.

192. Noise from the converter stations may include a tonal sound that is 'just perceptible' at R39. However, this is unlikely to significantly increase the level of impact (+ 2 dB with reference to BS 4142) and as the predicted noise levels for all scenarios are comfortably below the 40 dB $L_{Aeq,8hrs}$ criteria, the impacts at the most affected receptors are still considered to be negligible.

Table 25-23 Night-time Operational Noise Assessment – Onshore Converter Station(s)

Receptor	Isolation Night-time noise level, dB $L_{Aeq,8hrs}$	Concurrent /Sequential Night-time noise level, dB $L_{Aeq,8hrs}$	Magnitude of impact
R39	34	36	Negligible
R40	29	31	No Impact / Negligible
R42	30	31	Negligible
R43	28	29	No Impact
R57	30	31	Negligible
R66	31	31	Negligible
R67	32	33	Negligible

25.6.2.1.2 Significance of Effect – All scenarios

193. During night-time (23.00 – 07.00) operational impacts due to Onshore Converter Station(s) noise are predicted to be no greater than negligible for residential receptors, which are medium sensitivity. This represents **minor** adverse (not significant) effects at medium sensitivity receptors. No additional mitigation measures are therefore proposed. No effects are predicted during daytime hours (07.00 – 23.00).

25.6.3 Potential Effects During Decommissioning

194. No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it recognised that industry best practice, rules and legislation change over time. It is likely the cables would be pulled through the ducts and recycled, with the Jointing Bays and ducts capped and sealed then left in situ.

195. If required by legislation in place at the time, a full EIA would be carried out ahead of any decommissioning works. The programme for onshore decommissioning is expected to be similar in duration to the construction phase. The detailed activities and methodology would be determined later within the project lifetime. Any such methodology and associated mitigation would be agreed with the relevant authorities and statutory consultees through a decommissioning plan in accordance with the requirements of the **Draft DCO (Volume 3, application ref: 3.1)**. The detailed activities and methodology are expected to include:

- Dismantling and removal of outside electrical equipment from site located outside of the Onshore Converter Station(s) buildings;
- Removal of cabling from site;
- Dismantling and removal of electrical equipment from within the Onshore Converter Station(s) buildings;
- Removal of main Onshore Converter Station(s) buildings and minor services equipment;
- Demolition of support buildings and removal of fencing;
- Landscaping and reinstatement of the site (including land drainage); and
- Removal of areas of hard standing.

196. Whilst details regarding the decommissioning are currently unknown, it is anticipated that the impacts would be similar or less than those during construction (as night-time working is less likely to be necessary).

25.7 Potential Monitoring Requirements

197. Construction noise and vibration will be monitored in line with the CoCP, which will outline the noise and vibration monitoring measures for the construction phase, as well as procedures for dealing with complaints and managing potential exceedances of relevant noise and vibration criteria.

198. Requirement 21 of the **Draft DCO (Volume 3, application ref: 3.1)** would require a noise management plan for the control of noise during the operational phase of the Projects to be prepared and implemented. This would require an assessment of operational noise to be carried out, and a scheme for monitoring noise levels to be set out.

25.8 Cumulative Effects Assessment

199. Cumulative effects can be defined as incremental effects on that same receptor from other proposed and reasonably foreseeable schemes and developments in combination with the Projects. This includes all schemes that result in a comparative effect that is not intrinsically considered as part of the existing environment and is not limited to offshore wind projects.

200. The overarching method followed in identifying and assessing potential cumulative effects is set out in **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** and **Volume 7, Appendix 6-1 Onshore Cumulative Assessment (application ref: 7.6.6.1)**. The approach is based upon the Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment (PINS 2017). The approach to the CEA is intended to be specific to DBS Projects and takes account of the available knowledge or the environment and other activities around the Onshore Development Area.

201. The CEA has followed a four-stage approach developed from the Planning Inspectorate Advice Note Seventeen. These stages are set out in Table 1-2 **of Volume 7, Appendix 6-1 Onshore Cumulative Assessment (application ref: 7.6.6.1)**. Stage four of this process, the CEA assessment is undertaken in two phases. The first step in the CEA is the identification of which residual impacts assessed for the Projects on their own have the potential for a cumulative impact with other plans, projects and activities. This information is set out in **Table 25-24** which sets out the potential impacts assessed in this chapter and identifies the potential for cumulative effects to arise, providing a rationale for such determinations. Only potential impacts assessed as negligible or above are included in the CEA. Those assessed as 'no impact' are not taken forward as there is no potential for them to contribute to a cumulative impact.

Table 25-24 Potential Cumulative Impacts

Impact	Potential for cumulative effect	Justification
Construction		
Impact 1: Potential interaction with construction noise at Landfall Zone	No	There are a no known schemes within 300m of the landfall construction NSRs at this stage, therefore no cumulative effects are expected at NSRs in proximity of the landfall.
Impact 2: Potential interaction with construction noise along the Onshore Export Cable Corridor	Yes	Residual noise effects on NSRs may be exacerbated by other schemes that are located in proximity to the NSRs.
Impact 3: Potential interaction with construction noise at Onshore Converter Station(s).	Yes	Residual noise effects on NSRs may be exacerbated by other schemes that are located in proximity to the NSRs.
Impact 4: Construction Road Traffic Noise	Yes	Schemes currently in planning have the potential to cause increases in road traffic during the construction phase. Therefore, there is potential for cumulative road traffic noise effects on NSRs in proximity to the road links scoped into the construction road traffic noise assessment. Links which have been assessed to have no noise effect are scoped out.

Impact	Potential for cumulative effect	Justification
Impact 5: Construction Vibration	Yes	Schemes currently in planning have potential to cause vibration impacts. However, it is considered that there is a low likelihood of interactions as high vibration activities are often over short durations and would need to be in close proximity to cause cumulative effects.
Operation		
Impact 6: Potential interaction with operational noise at Onshore Converter Station(s) location	Yes	Residual noise effects on NSRs may be exacerbated by other schemes that are located in proximity to the NSRs.
Decommissioning		
The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As such, cumulative effects during the decommissioning phase are assumed to be the same as those identified during the construction phase.		

202. The second stage of the CEA is a project specific assessment of the potential for any significant cumulative effects to arise due to the construction and/or operation and maintenance of the Projects. To do this, a short list of schemes for CEA has been produced relevant to noise and vibration following the approach outlined in **Volume 7, Appendix 6-1 (application ref: 7.6.6.1)**. The second stage of this assessment is only undertaken if the first stage identifies that cumulative effects are possible.

203. The CEA has been based on information available on each potential scheme (e.g. as set out on the East Riding of Yorkshire Council and Hull City Council planning portals and the Planning Inspectorate website) as of January 2024. It is noted that the other scheme details available may change in the period up to construction or may not be available in detail at all. The assessment presented here is therefore considered to be conservative, with the level of impacts expected to be reduced compared to those presented here.

204. The following search distances (matching those used to define the noise and vibration study area) have been used to determine the shortlist:

- Cumulative construction noise – schemes approximately 300m from NSRs identified in the construction noise assessments (Impacts 1-3);
- Cumulative construction road traffic noise – schemes that have the potential to use road traffic links included in the construction road traffic noise assessment (Impact 4).
- Cumulative construction vibration – schemes approximately 100m from NSRs identified is the construction vibration assessment (Impact 5); and
- Cumulative operational noise – schemes approximately 500m from the NSRs identified for the operational assessment (Impact 6).

205. A total of ten schemes have been identified for inclusion on the short list of schemes to be assessed cumulatively for noise and vibration. Schemes that have not been considered as resulting in likely cumulative significant effects for noise and vibration are either; outside of the search areas, or do not overlap temporally (e.g. Dogger Bank A and B).

206. Summary information on the short list schemes progressing through this exercise (i.e. the short list of other schemes) for assessment on noise and vibration is provided below in **Table 25-25** This table presents each of the shortlisted schemes and considers the likelihood of cumulative effects.

207. The cumulative construction road traffic assessment has been undertaken separately and is presented in subsequent paragraphs.

Table 25-25 Short List of Schemes Considered Within the Noise and Vibration Cumulative Effects Assessment

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
A164 and Jock Lodge	1	Construction activities for this scheme could be	Based on the indicative programmes for the Projects and A164 scheme it is likely that the

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Improvement Scheme		as near as 10m to R43, with the next nearest receptors being R42 and R40 (120-140m). Scoped in for Cumulative RTN Assessment.	A164 construction works would be completed before the Projects construction in proximity to these receptors (HDD works) would commence. The Projects' HDD construction effects at R43 (minor adverse with additional mitigation) may be exacerbated by the preceding A164 works (i.e. total duration of construction effects could be increased). However, due to the short duration of the HDD works this is unlikely to significantly increase the level of effect and significant adverse effects can be avoided with good communication and stakeholder engagement and cumulative effects can be controlled to **minor adverse** (not significant). See Cumulative RTN Assessment, **Table 25-26**.
Creyke Beck Solar Farm	1	The nearest construction NSRs are R48 and R46 (100-150m). The nearest operational NSRs are R57 (180m) and R43 (340m).	Based on the indicative programmes for the Projects and Solar Farm scheme it is likely that the Solar construction works would be completed before the Projects construction in proximity to these receptors (HDD works) would commence. The Projects' HDD construction effects at R48 and R46 may be exacerbated by the preceding Solar Farm works (i.e. total duration of construction effects could be increased). However, due to the short duration of the HDD works this is unlikely to significantly increase the level of effect and the cumulative effects are expected to be **minor adverse** (not significant).

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
			Considering the large distances between the proposed operational Solar Farm and the operational NSRs, as well as the relatively low noise levels generated by solar farms, it expected that the cumulative effects at these receptors will be no worse than assessed for the Projects only (**negligible** during daytime, **minor adverse** during night-time).
Tickton Bridge Solar	1	The nearest construction NSRs are R24 which are within 10 - 20m of the scheme, with the next nearest receptor being R23 at 220m.	Timings for the construction of the Solar Farm scheme are currently unknown and therefore a temporal overlap has been considered as a worst case assumption. Construction noise effects at R24 due to the Projects are considered minor adverse during daytime and Saturday afternoons due to a TCC 150m northeast, with noise levels below 50dB $L_{Aeq,T}$. Considering these relatively low noise levels and the proximity of the Solar Farm scheme, it is likely that any construction noise from the Solar Farm scheme will be dominant, and unlikely to be increased by noise from the Projects during any potential overlap. Typically, solar farm construction works don't generate high levels of noise. As the Solar Farm construction is due to be carried out between the hours of 07.00 to 19.00 on Monday to Friday and 08.00 to 16.00 on Saturdays (see 22/00824/STPLF Planning Statement), noise can be controlled below a significant adverse effect. It is considered likely that the cumulative noise

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
			effect will be no greater than **minor adverse** (not significant).
Heron Lakes	1	Scoped in for Cumulative RTN Assessment. No other physical or temporal overlap.	See Cumulative RTN Assessment, **Table 25-26**.
Hornsea 4 Offshore Wind Farm	1	Scoped in for Cumulative RTN Assessment. No other physical or temporal overlap.	See Cumulative RTN Assessment, **Table 25-26**.
Creyke Beck Substation Extension	2	Scoped in for Cumulative RTN Assessment. No other physical or temporal overlap.	See Cumulative RTN Assessment, **Table 25-26**.
Proposed Birkhill Wood National Grid Substation	2	Scoped in for Cumulative RTN Assessment. The only construction NSR within 300m of the scheme is R47, approximately 270m from the scheme.	See Cumulative RTN Assessment, **Table 25-26**. Timings for the construction of the Birkhill Wood substation scheme are currently unknown and therefore a temporal overlap has been considered as a worst case assumption. Construction noise effects at R47 due to the Projects is considered minor adverse during day, evenings/weekends and night-time due to HDD works. Due to the distance between the substation scheme and the nearest NSR it is considered unlikely that the construction of the substation will generate high levels of noise at this R47. It is therefore considered likely that the cumulative noise effect will be no

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
			worse than **minor adverse** (not significant).
JBM Peartree Hill Solar Farm	2	The nearest construction NSRs are R56 (approximately 100m)	Timings for the construction of the scheme will be post-2026 but further details of timing are currently unknown, therefore a temporal overlap has been considered as a worst case assumption. Construction noise effects at R56 due to the Projects is considered minor adverse during potential HDD works (47dB $L_{Aeq,T}$ daytime / 43dB $L_{Aeq,T}$ night-time), approximately 280m away. Considering this and the closer proximity of the Peartree Hill scheme to R56 (100m) , it is likely that any construction noise from the Peartree Hill scheme will be dominant, and unlikely to be increased by noise from the Projects during any potential overlap. Typically, solar farm construction works don't generate high levels of noise. Therefore, it is considered likely that the cumulative noise effect will be no worse than **minor adverse** (not significant).
Proposed Beverley Household Recycling Centre[1]	3	See Cumulative RTN Assessment, **Table 25-26**.	See Cumulative RTN Assessment, **Table 25-26**. Timings for the construction of the recycling centre scheme are

[1] The Applicants are aware that the Proposed Beverley Household Recycling Centre application has been refused however kept in CEA longlist due to professional judgement and stakeholder request

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
		The nearest construction NSRs to the recycling centre building are R29 and R30, approximately 150 to 200m from the scheme.	currently unknown and therefore a temporal overlap has been considered as a worst case assumption. Construction noise effects at R27, R29 and R30 due to the Projects is considered minor adverse during daytime and Saturday afternoons due to a TCC approximately 150m north, with noise levels below 55dB $L_{Aeq,T}$. It is considered unlikely that the construction of the household recycling centre will generate high levels of noise at these NSRs, and noise may be also be masked by road traffic noise from the A1035. Due to the distance between the recycling centre and the nearest NSR it is considered unlikely that the construction will generate high levels of noise Therefore, it is considered likely that the cumulative noise effect will be no worse than **minor adverse** (not significant).
Continental Link Multi-purpose Interconnector	3	Details of the scheme design are not available at this stage, however the scheme proposal involves a landfall along the Holderness Coast (Flamborough to Spurn Point), with grid connection at Creyke Beck Substation therefore, depending on the chosen landfall location there	Timings and locations for the construction of the scheme are currently unknown and therefore a temporal and physical overlap has been considered as a worst case assumption. Note that it is considered unlikely that a temporal overlap would occur in reality. Based on limited information on the scheme it is assumed that similar construction activities to the Projects may occur: installing a cable route with trenching and crossing of obstacles using trenchless techniques such as HDD. In the unlikely event that

Scheme Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
		could be some physical overlap with the red line boundary of the Projects.	HDD works for the Interconnector scheme happen at night, in close proximity to NSRs already experiencing HDD night-time work from the Projects, this could potentially lead to significant effects. However, this can be controlled to a **minor adverse** effect by the specific embedded mitigation measures set out in the assessment of HDD noise effects.

208. The assessment of cumulative construction road traffic effects has been based on traffic data that included contributions from identified cumulative schemes. Road links required to be used by construction traffic for the Projects are presented in **Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)**. Road links with flows at or above 1,000 AAWT were assessed by undertaking BNL calculations using the CRTN method, and those below 1,000 AAWT were assessed by using the NAC method calculations. Peak daily flows were used to provide a worst case assessment. Further details are provided in **Volume 7, Appendix 25-4 (application ref: 7.25.25.4)**.

209. Road links assessed as no effect due to the construction of the Projects have been scoped out of the cumulative assessment, as well as links 7 and 36 due to proximity with busier roads (this reasoning is set out in more detail in the road traffic noise assessment, section 25.6.1.4.1).

210. Changes in calculated road traffic noise levels due to cumulative construction traffic flows have been predicted. All NSRs along the identified road links are considered to be medium sensitivity, and no high sensitivity receptors have been identified. **Table 25-20** shows the significance of effect, based on all receptors being medium sensitivity, due to peak construction road traffic noise and cumulative schemes road traffic noise.

211. Eske Lane has been assessed as a minor adverse effect for the reasons set out in section 25.6.1.4.2 (implementation of the CTMP, relatively short duration of peak flows, below significant absolute traffic noise levels).

212. Cumulative construction road traffic noise is assessed to have at-worst a **minor adverse** (not significant) residual effect.

Table 25-26 Significance of Effect Due to Peak Construction Road Traffic and Cumulative Schemes

Negligible	Minor	Moderate	Major
Projects In Isolation, Sequentially or Concurrently			
46	10	0	0

213. The CEA for noise and vibration has not identified any schemes where significant cumulative effects are likely to arise.

25.9 Transboundary Effects

214. There are no transboundary effects with regard to noise and vibration as the Onshore Development Area would not be sited in proximity to any international boundaries. Transboundary effects are therefore scoped out of this assessment and not considered further.

25.10 Interactions

215. The effects identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between effects are presented in **Table 25-27**. This provides a screening tool for which effects have the potential to interact. **Table 25-28** provides an assessment for each receptor (or receptor group) as related to these impacts.

216. Within **Table 25-28** the effects are assessed relative to each development phase to see if multiple effects could increase the significance of the effect upon a receptor. Following this a lifetime assessment is undertaken which considers the potential for effects to affect receptors across all development phases.

Table 25-27 Interactions Between Impacts - Screening

Potential Interactions between Impacts					
Construction					
	Impact 1: Construction Noise at Landfall Zone	Impact 2: Construction Noise along Onshore Export Cable Corridor (TCCs and HDD)	Impact 3: Construction Noise at Onshore Converter Station(s)	Impact 4: Construction Road Traffic Noise	Impact 5: Construction Vibration
Impact 1: Construction Noise at Landfall Zone		Yes	No	Yes	Yes
Impact 2: Construction Noise along Onshore Export Cable Corridor (TCCs and HDD)	Yes		Yes	Yes	Yes
Impact 3: Construction Noise at Onshore Converter Station(s)	No	Yes		Yes	Yes
Impact 4: Construction Road Traffic Noise	Yes	Yes	Yes		Yes

Potential Interactions between Impacts					
Impact 5: Construction Vibration	Yes	Yes	Yes	Yes	
Operation					
	Impact 6: Operation of Onshore Converter Station(s)				
Impact 6: Operation of Onshore Converter Station(s)					
Decommissioning					
It is anticipated that the decommissioning impacts would be similar in nature to those of construction.					

Table 25-28 Interaction Between Impacts - Phase and Lifetime Assessment

Receptor	Highest Significance Level				
	Construction	**Operation**	**Decommissioning**	**Phase Assessment**	**Lifetime Assessment**
Residential	Minor adverse	Negligible	Minor adverse	No greater than individually assessed impacts. There may be interactions between the Landfall and Onshore Export Cable Corridor construction as well as the Onshore Export Cable Corridor and Onshore Converter Station(s) construction. It should be noted that worst case assumptions have been used for each impact (Impacts 1-3 and 4) of the construction noise and vibration assessment therefore the effect level is unlikely to increase the significance of effect.	No greater than individually assessed impacts. The Onshore Converter Station(s) assessment indicates minor adverse effects for NSRs throughout the Projects' lifetime which is considered not significant in EIA terms; therefore, it is considered that these impacts would not combine to increase the significance level of any impacts identified in this assessment.

25.11 Inter-relationships

217. For noise and vibration there are potential inter-relationships between other topics assessed within this ES including Traffic and Transport, Ecology and Health. A summary of the potential inter-relationships between these topics is provided in **Table 25-29**.

Table 25-29 Noise and Vibration Inter-relationships

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
Construction			
Construction traffic	**Volume 7, Chapter 24 Traffic and Transport (application ref: 7.24)**	Section 25.6.1.4	Influence of noise associated with construction traffic on local amenity.
Construction and Operation			
Onshore ecology noise levels	**Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18)**	Section 25.6	Potential noise impacts at ecological receptors.
Heath impacts	**Volume 7, Chapter 27 Human Health (application ref: 7.27)**	Section 25.6	Potential human health impacts related to increase in noise and vibration at NSRs.
Decommissioning			
As per the construction phase.			

25.12 Summary

218. This chapter has provided a characterisation of the existing environment for noise and vibration based on baseline noise survey data and baseline road traffic data.

219. The chapter should be read in conjunction with **Volume 7, Appendices 25-1** to **25-5 (application ref: 7.25.25.1** to **7.25.25.5)** which provide further detail on the consultation with stakeholders, baseline noise monitoring, noise modelling methodology and results.

220. Temporary noise and vibration effects during construction have been assessed. With appropriate mitigation in place, significant adverse effects can be avoided. Should 24-hour HDD working be required, and where moderate pre-mitigation effects are identified, ~~at crossings of Hornsea Road and the A164,~~ additional mitigation (programming of works and noise screening) will be implemented.

221. Changes in noise level at NSRs due to increases in construction traffic relating to the Projects have been assessed. It has been found that minor adverse effects are likely to occur in a number of locations but with appropriate mitigation no significant effects have been identified.

222. Noise emissions from the operational Onshore Converter Station(s) have been assessed to lead to no worse than minor adverse effects at NSRs, which are not significant.

223. The cumulative effects assessment for noise and vibration has not identified any schemes where significant cumulative effects could arise.

224. A summary of noise and vibration effects of the Projects is provided below in **Table 25-30**.

Table 25-30 Summary of Potential Likely Significant Effects on Noise and Vibration

Potential Impact	Receptor	Sensitivity	Magnitude of Impact	Pre-mitigation Effect	Mitigation Measures Proposed	Residual Effect
Construction						
Impact 1: Construction Noise at Landfall Zone	Residential	Medium	Medium	Minor Adverse	N/A	**Minor Adverse**
Impact 2: Construction Noise along Onshore Export Cable Corridor – TCCs (Daytime, Evenings and Weekends)	Residential	Medium	Low	Minor Adverse	N/A	**Minor Adverse**
Impact 2: Construction Noise along Onshore Export Cable Corridor – HDD (Night-time)	Residential	Medium	High	Moderate Adverse	Noise screening Programming of works	**Minor Adverse**
Impact 3: Construction Noise at Onshore Converter Station(s)	Residential	Medium	Negligible	Minor Adverse	N/A	**Minor Adverse**
Impact 4: Construction Road Traffic Noise	Residential	Medium	No Impact – Low (63/64 links) High (1/64 links)	Minor Adverse	N/A	**Minor Adverse**
Impact 5: Construction Vibration	Residential	Medium	Low	Minor Adverse	N/A	**Minor Adverse**
Operation						
Impact 6: Operation of Onshore Converter Station(s)	Residential	Medium	Negligible	Minor Adverse	N/A	**Minor Adverse**
Decommissioning						
The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A Decommissioning Plan would be provided prior to any decommissioning commencing onshore.						

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