

The Lighthouse Green Fuels Order

Application Reference: EN0110025

Applicant: LGF Projects Limited

Environmental Statement Volume III Appendix 10H: Noise and Vibration Assessment for Terrestrial Ecological Receptors

Document Reference: 6.3.16

Revision: 00

APFP Reg. 5(2)(a), 5(2)(l) and EIA Reg. 14

Document Information

Author	Arup
Document Title	Appendix 10H: Noise and Vibration Assessment for Terrestrial Ecological Receptors
Document Ref	6.3.16

Revision record

P01	Purpose	For CR1
	Date	July 2026

Reason for issue record

Information Classification	Date	Reason for Issue
Public		Proprietary information which will have no impact on the company if disclosed publicly.

Contents

Abbreviations	4
1 Study Area	5
2 Consultation	6
3 Assessment Methodology.....	8
3.1 Ecological Receptors	8
3.2 Baseline Sound Survey	8
3.3 Construction Noise	8
3.4 Operational Noise	10
3.5 Assumptions and Limitations	10
Construction Noise Assessment.....	10
Operational Noise Assessment	17
4 Baseline Conditions	19
5 Development Design and Impact Avoidance	21
6 Likely Impacts and Effects of the Proposed Development	22
6.1 Construction Noise	22
6.2 Operational Noise	22
7 Additional Mitigation and Enhancement Measures.....	31

Tables

Table 2.1.	Scoping Opinion Responses Relevant to Noise and Vibration Assessment for Terrestrial Ecology.....	6
Table 3.1	Construction activity assumptions.....	12
Table 4.1	Summary of Baseline Sound Levels at Measurement Locations.	20
Table 6.1	Construction Noise Assessment Results of Worst-Case Terrestrial Ecological Receptors (Without Additional Mitigation).....	23
Table 6.2	Construction Noise Assessment Results of Worst-Case Terrestrial Ecological Receptors (With Additional Mitigation).....	24

Table 6.3	Operational Noise Results for Terrestrial Ecological Receptors (With Embedded Mitigation).....	25
-----------	---	----

Figures

No table of figures entries found.

Abbreviations

Abbreviations	In Full / Term
AGI	Above Ground Installation
BAT	Best Available Techniques
BPM	Best Practicable Means
CEMP	Construction Environmental Management Plan
CFA	Continuous Flight Auger
dB(A)	The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz. In some statistical descriptors the 'A' weighting forms part of a subscript, such as L_{A10}, L_{A90}, and L_{Aeq} for the 'A' weighted equivalent continuous noise level.
Decibel (dB)	The ratio of sound pressures which people can hear is a ratio of $10^6:1$ (one million: one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.
EA	Environment Agency
ES	Environmental Statement
fCEMP	Framework CEMP
m	metres
MMO	Marine Management Organisation
NSR	Noise Sensitive Receptors
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STBC	Stockton-on-Tees Borough Council
t	tonnes
ZoI	Zone of Influence

1 Study Area

- 1.1.1 All the content related to noise assessment and impacts on terrestrial ecological receptors is covered in this appendix.
- 1.1.2 The Study Area for the Proposed Development, regarding the noise and vibration assessment for terrestrial ecological receptors, is defined as the area in which impacts arising from construction, operation and/or decommissioning could lead to significant effects for ecological receptors.
- 1.1.3 For this assessment, the largest Zol for protected and/or notable fauna species (i.e. 500m) has been applied to ensure all potential impact and effects are accounted for.

2 Consultation

2.1.1 Refer to Table 2.1 for a summary of the scoping opinion comments relevant to this noise and vibration assessment from statutory environmental bodies and the Applicant's responses.

Table 2.1 Scoping Opinion Responses Relevant to Noise and Vibration Assessment for Terrestrial Ecology.

Scoping Opinion ID	Comment Description	Applicant Response
5.4.2	Natural England advise that the type of noise that could be generated from a project should be clearly defined. This is to ensure that noise evidence is reported using the most relevant metrics for understanding the worst-case scenario. Some types of piling works produce impulsive loud noises, and potential impacts should be established following analysis of the maximum possible sound levels in decibels. For works with less impulsive noises, modelling to understand any increases in average noise levels should be used to understand possible impacts on areas used by SPA/Ramsar/SSSI birds.	For construction noise to ecological receptors, typical noise levels ($L_{Aeq,12h}$) have been modelled and assessed. Consideration is also given to the highest noise levels from percussive noise sources such as percussive piling or breaking. Operational noise from the Proposed Development is anticipated to be dominated by steady state plant noise. Therefore, assessment of noise impacts is made with respect to activities creating the highest average noise levels (L_{Aeq}).
5.4.3	Applicants should provide sufficient information to assess if there would be a significant change from baseline noise experienced by sensitive receptors. Natural England advise that a threshold of 55dB L_{Aeq} can be used to screen out noise impacts and that above 55dB L_{Aeq} a change of greater than 3dB from the baseline at a location used by a sensitive feature requires further assessment. This further assessment should consider how the features use the site, the frequency of noise events, as well as the maximum (L_{Amax}) and average (L_{Aeq}) volume produced by any phase of the development.	A noise contour map is presented in Figure 10.7 (ES Volume II, Application Document Ref. 6.2) to demonstrate that with the proposed mitigation measures, no ecological receptors are predicted to experience significant change from baseline noise, as set out by Natural England. Of the ecological receptors that have predicted operational sound levels above the 55 dB L_{Aeq} threshold, none are predicted to experience a change of greater than 3dB from the baseline.
5.4.4	Applicants are advised to undertake modelling to establish any zones of potential bird displacement. Natural England advise that this is a minimum evidence requirement. To inform an in-combination assessment, where data is limited, Applicants are advised to provide this modelling using reasonable assumptions	See response above.

Scoping Opinion ID	Comment Description	Applicant Response
	about other projects in scope, including the length of time that each project may produce noise. Modelling should be presented in map form, inclusive of the following data: Noise contours using the relevant noise metric. This data should be presented with and without noise-reduction measures.	
A4.1 & A5.4	The proposed Noise Sensitive Receptors (NSR) do not appear to be related to the location of sensitive environmental receptors. It is essential that an appropriate baseline is determined for the assessment to consider the impact of the project. Natural England questions the rationale for the location of these receptors and welcomes discussion with the applicant to understand this further or to select other relevant locations.	Baseline sound survey locations have been discussed and agreed with Natural England to better represent ecological receptors. These can be seen in Figure 10.6 (ES Volume II, Application Document Ref. 6.2).
A5.3	The current baseline sound survey locations are not near to bird supporting habitat. Measure baseline noise levels at important bird supporting habitat.	Refer to Appendix 9A: Baseline sound survey report (ES Volume III, Application Document Ref. 6.3). Baseline sound survey locations near to bird supporting habitats have been included.

3 Assessment Methodology

3.1 Ecological Receptors

- 3.1.1 The locations of 'sensitive ecological receptors' within 500m of the Proposed Development were identified to inform this assessment.
- 3.1.2 All receptors (E1 – E93) in **Figure 10.6: Locations of Terrestrial Ecological Receptors (ES Volume II, Application Document Ref. 6.2)** have been subject to the construction and operational noise assessment.
- 3.1.3 An assessment of the potential impacts arising from construction and operational noise sources on terrestrial ecological receptors has been undertaken in line with guidance from Natural England (as outlined in Table 2.1).
- 3.1.4 Terrestrial ecological receptors with predicted sound levels below 55 dB L_{Aeq} have been screened out. For receptors where the predicted sound levels are above 55 dB L_{Aeq} , the total predicted sound level was compared to the baseline sound level. Where a change of greater than 3 dB from the baseline sound level is predicted, this is an indication that further assessment is required, including how the sensitive receptors use the site, frequency of noise events, and the highest noise levels produced by any phase of the development.

3.2 Baseline Sound Survey

- 3.2.1 Environmental sound level surveying was undertaken in March to April 2026 at locations representative of residential and ecological NSRs to establish the baseline sound conditions surrounding the Proposed Development. More detail can be found in **Appendix 9A (ES Volume III, Application Document Ref. 6.3)**.
- 3.2.2 Where undertaking sound surveys was not possible, monitoring undertaken for other local projects was used to supplement the collected baseline sound data. These are outlined in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)**.

3.3 Construction Noise

- 3.3.1 Assessments of construction noise have been undertaken in line with the methodologies presented in BS 5228-1:2009+A1:2014 (Ref 1). The assessment was carried out at the nearest ecological NSRs as a reasonable worst-case.

- 3.3.2 The construction assessments were based on information available at ES stage, including the likely sound power level of construction plant items from BS 5228-1:2009+A1:2014, percentage of on-time operation, number of items and any partial screening that could be implemented. In the absence of detailed information, reasonable worst-case assumptions were made based on benchmarking and experience from other similar projects.
- 3.3.3 The construction activities with the potential to result in temporary adverse impacts on ecological receptors are:
- Site preparation, enabling works and removal of existing foundations and hard ground (including breaking and crushing concrete);
 - Earthworks and excavation (including import and placement of fill);
 - Transporting, unloading, and installation of modules;
 - Percussive piling activities; and
 - Installation of pipelines and utilities.
- 3.3.4 Construction plant likely to be required for these works include dozers, excavators, piling rigs, tower cranes, compaction equipment, hand tools, concrete pouring equipment, tractors, and dumpers. It is important to note that noise levels from construction sites are variable over time and dependent on the location within the site of the main activities. Specifically, when construction activities occur in close proximity to receptors, noise levels are likely to be higher and decrease when the works are more distant.
- 3.3.5 The Principal Contractor for the Main Site shall conduct construction works in line with the detailed CEMP, which will be developed in accordance with **Appendix 5A: fCEMP (ES Volume III, Application Document Ref. 6.3)** and agreed with the relevant planning authority, further to Schedule 2 (Requirements) of the **Draft DCO (Application Document Ref. 3.1)**. This will ensure that best practicable means (BPM) of working are implemented. Section 9.5 of **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)** provides examples of relevant mitigation measures which could be applied under the fCEMP.
- 3.3.6 Some construction activities are expected to be carried out during day and night periods (i.e. require 24 hour working) within the Main Site, for example:
- Concrete pours associated with earthworks and substructure, and construction of structures; and

- Delivery (via ship) off-loading and installation of modules during construction.
- 3.3.7 The majority of other construction activities are expected to be carried out during daytime periods Monday to Friday 07:00 to 19:00 (except bank holidays), between 07:00 to 16:00 on Saturdays, as outlined in **Chapter 5: Construction Programme and Management (ES Volume I, Application Document Ref. 6.1)**. Construction activities outside of typical working hours are not expected to give rise to noise impacts off site. A Requirement in Schedule 2 of the **Draft DCO (Application Document Ref. 3.1)** permits certain works to be carried out outside those hours, where such construction works or deliveries:
- do not exceed the noise limits which are agreed with the relevant planning authority in accordance with the construction environmental management plan;
 - are carried out with the prior approval of the relevant planning authority and in accordance with any restrictions imposed by the relevant planning authority;
 - are continuous works; or
 - are associated with an emergency.
- 3.3.8 As far as practicable, activities that could generate noise impacts on ecological receptors will be avoided outside construction working hours. Noise monitors will be installed at the boundary of the Main Site, with a daytime and night-time noise limit to be used during construction.

3.4 Operational Noise

- 3.4.1 The methodology for the assessment of operational noise from stationary sources is covered in more detail in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)**, including noise modelling assumptions and noise emission limits.

3.5 Assumptions and Limitations

Construction Noise Assessment

- 3.5.1 The reasonable worst-case assumptions used in the construction noise assessment for ecological receptors are set out below based on the following project specific outline assumptions from **Chapter 5: Construction Programme and Management (ES Volume I, Application**

Document Ref.6.1); experience from similar projects in the UK; and professional judgement:

- Core construction working hours will be between 07:00 and 19:00 Monday to Friday (except bank holidays), Saturday 07:00 to 16:00 and Sunday 08:00 to 17:00;
- Modular plant will be delivered by ship and offloaded on the new quay within the Main Site and installed 24 hours per day, 7 days a week;
- Concrete pouring (as and when required) is proposed 24 hours per day, 7 days a week;
- Earthworks will include continuous flight auger (CFA) piling, breaking out of existing concrete foundations and hard ground, concrete crushing, as well as import and placement of granular fill to raise site levels on the Main Site;
- Construction activities associated with connection corridors are linear processes which will progress along the corridor. These activities may include modifications to existing pipelines, constructing new above or below ground pipelines, and connecting to existing Above Ground Installations (AGIs); and
- Where practicable new pipelines will be constructed in existing pipeline corridors. A replacement pipeline crossing under the Tees will be constructed in an existing tunnel between two headhouses on either side of the Tees, which will require works around the tunnel head house along the north bank of the Dabholm Gut.

3.5.2 It is likely that some construction activities may need to be undertaken outside of core working hours. This is principally because certain construction activities need to be continuous, such as concrete pouring and modular plant delivery and installation, but also potentially to manage the construction programme and ensure the completion of the works in line with the agreed timescales for commissioning.

3.5.3 The Applicant has committed to working within the hours specified in a Requirement of Schedule 2 to the **Draft DCO (Application Document Ref. 3.1)**, save for the exceptions, controlled by the second part of the Requirement. These are detailed in paragraph 3.3.6. Construction activities outside typical working hours are not expected to give rise to noise impacts off site.

- 3.5.4 Twenty-four hour working for certain activities has therefore been assessed, to set out specific mitigation and control measures required to prevent disturbance from any activities outside of core working hours.
- 3.5.5 Working hours and the approach to exceptions to the core working hours will be controlled by a Requirement to the DCO (details in paragraph 3.3.5). Effects of any such works will be minimised via best practicable means (outlined in section 9.5 of **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)**) and carefully managed.
- 3.5.6 Construction activity assumptions are summarised in Table 3.1, which represents construction plant that will be distributed over the entire site. Due to the large distances between construction activities and receptors, not all construction plant will have a material impact on every receptor. Percentage on-time is the proportion of a working day for which the construction plant will be operational.
- 3.5.7 The location of construction activity is not known at the ES stage. The Rochdale Envelope approach has been adopted, whereby a reasonable worst-case scenario is assumed, such that the site has been split into key plot areas, and associated construction activity within each plot area is assumed to be concentrated at points at the centre of each plot area. Worst-case ecological receptors have been identified based on distance from these central points to the ecological receptors.
- 3.5.8 As no detailed construction programme has been established at the ES stage, a worst-case 10-hour day for each construction phase and plot area has been assessed, which considers the loudest, most likely combination of construction plant operating simultaneously.
- 3.5.9 Maximum noise levels (L_{Amax}) have been considered qualitatively and significant L_{Amax} levels will be avoided through the Best Available Techniques (BAT) suggested in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)**.

Table 3.1 Construction activity assumptions.

Construction Stage	Activity	Equipment	Number of equipment	% on-time
Site Preparation Works	Tree cutting equipment	Feller Bunchers	1	67
	Vegetation Clearance	Petrol Driven Chainsaw	4	67
	Clearing Site	Dozer (20t)	2	67
	Excavation/Earthworks	Dump Truck (25t)	8	67

Construction Stage	Activity	Equipment	Number of equipment	% on-time
	Distribution of Material	Dump Truck (25t)	8	67
	Distribution of Material	Tipper Lorry	6	67
	Establishment Loading Wagons	Wheeled Loader	2	67
	Establishment Rolling and Compaction	Roller (18t)	2	67
	Backfill And Reinstatement	Medium Excavator (15–30 t) with Rock Breaker	2	67
	Backfill And Reinstatement	Large Hydraulic Excavator (30–50 t class)	2	67
	Extractor	Vibratory Pile Extractor / Hammer	2	67
	Breaker	Wire Saw / Concrete Cutter	2	67
	Crushing Concrete/Rubble	Tracked Crusher	2	33
	Drilling Concrete	Core Drill (electric)	6	33
	Cutting Concrete Floor Slab	Petrol Hand Held Circular Saw	2	33
	Cutting Concrete Blocks	Petrol Saw	2	33
	Maintenance works	Water bowser (dust suppression)	1	67
	Crane	Crane (50–100 t)	2	67
	Breaker	Drill Rig / Rotary Kelly Drill	2	67
	Draining Evacuation	Diesel water pump	2	90
	Temporary Power Supply	Diesel generator (Optional - if no grid power)	2	90
Contractor Compound	Lifting	Telehandler	2	67
	Distribution Of Material	Tracked excavator (30t) with vac lift	2	67
	Lorry Movement on Access Road	HIAB Lorry (self-loading)	4	67
	Concreting works	Concrete Mixer Trucks	4	33
	Concreting works	Truck mounted concrete pump	1	33
	Concreting works	Poker vibrator	2	33
	Installation	Mobile Crane (50–100t)	2	67

Construction Stage	Activity	Equipment	Number of equipment	% on-time
	Installation	Forklift (3–5t)	2	67
	Installation	Portable generators (Optional - if no grid power)	2	100
	Installation	Scissor Lifts	2	67
	Installation	Waste Skips + Skip Lorries	2	67
Main civil / structural engineering works	Breaking Concrete	Hand Held Pneumatic Breaker	4	33
	Breaking Concrete Foundations	Tracked Excavator Fitted with Breaker	2	33
	Piling(made ground)	Large Rotary Bored Piling Rig	4	75
	Piling(obstructions)	Large Rotary Bored Piling Rig	4	33
	Piling(natural ground)	Continuous Flight Auger Rig - CFA	4	67
	Precast Concrete Piling (option)	Hydraulic Hammer Rig	2	67
	Trenching	Tracked Excavator (22t)	3	67
	Cranage	Tracked mobile crane (110t)	2	33
	Cranage	Tracked mobile crane (55t)	2	33
	Concrete Batching	Batching Plant (optional)	1	67
	Concreting	Cement mixer truck	10	67
	Pumping Concrete	Concrete pump	4	33
	Concreting(other)	Poker Vibrator	6	33
	Sheet Piling	Vibratory Piling Rig	1	33
	Excavation/Earthworks	Tracked Excavator (25t)	4	67
	Lifting	Mobile Crane (400t)	1	67
	Lifting	Tracked Mobile Crane (100t)	3	67
	Lifting	Mobile Telescopic Crane (55t)	4	67
	Lifting	Telehandler	4	67
	Access	Cherry Picker	4	67

Construction Stage	Activity	Equipment	Number of equipment	% on-time
	Access	Scissor Lift	4	67
	Pumping surface water	Diesel Water Pump	4	90
	Fuel Deliveries	Fuel Tanker	2	10
	Fabrication And Ancillary Works	Tracked excavator (30t)	1	33
	Fabrication And Ancillary Works	Angle grinder	4	67
	Fabrication And Ancillary Works	Weld machine/hand-held welder	4	67
	Fabrication And Ancillary Works	Generator for welding	2	67
	Fabrication And Ancillary Works	Bending machine	2	67
	Cleaning Roads	Road Sweeper	1	90
	Scaffolding	Various	1	67
	Temporary Power Supply	Diesel generator (optional if no power grid)	2	90
Main Mechanical and E&I works	Lifting	Crawler crane (1000t) - LR11000	1	33
	Lifting	Crawler Crane (800t) - LR1800	2	67
	Lifting	Crawler Crane (500t) - LR1500	2	67
	Lifting	Tracked Mobile Crane (100t)	3	67
	Lifting	Mobile Telescopic Crane (55t)	4	67
	Lifting	Telehandler	4	67
	Access	Cherry Picker	4	67
	Access	Scissor Lift	4	67
	Lorry Movement on Access Road	HIAB Lorry (self-loading)	4	67
	Various including testing	Compressor	6	90
	Unloading module Shipments	Geared Vessel	2	90
	Transporting Modules	SPMT	4	67
	Fabrication And Ancillary Works	Angle grinder	4	67

Construction Stage	Activity	Equipment	Number of equipment	% on-time
	Fabrication And Ancillary Works	Weld machine/hand-held welder	4	67
	Fabrication And Ancillary Works	Generator for welding	4	67
	Fabrication And Ancillary Works	Bending machine	4	67
	Fabrication And Ancillary Works	Orbital welding systems	1	33
	Fabrication And Ancillary Works	Various other tools (drills, saws, etc.)	30	67
HDD	Setup/anchors	Hydraulic hammer	1	67
	Setup/anchors	Tracked excavator (30t)	1	67
	Drilling And Pullback	Directional drill (generator)	1	67
	Drilling And Pullback	Tracked drilling rig	1	67
	Drilling And Pullback	Diesel water pump	1	100
	Drilling And Pullback	Mud Pump	1	67
	Mud Processing	Shaker/filter press/lagoon	1	67
	Other	Compressor	1	100
	Lorry Movement on Access Road	Lorry	2	67
	Lifting	Mobile telescopic (100t)	1	33
	Pipe Storage and Stringing	Tracked excavator (30t) with vac lift	2	67
	Pipe Storage and Stringing	Dozer D6	1	33
	Pipe Storage and Stringing	Hiab	1	33
	Pipe Storage and Stringing	Dumper (6t)	1	33
	Pipe Storage and Stringing	Tracked mobile crane (60t)	1	67
	Fabrication And Ancillary Works	Tracked excavator (30t)	1	33
	Fabrication And Ancillary Works	Angle grinder	1	67
	Fabrication And Ancillary Works	Weld machine/hand-held welder	1	67
	Fabrication And Ancillary Works	Generator for welding	1	67

Construction Stage	Activity	Equipment	Number of equipment	% on-time
	Fabrication And Ancillary Works	Bending machine	1	67
	Fabrication And Ancillary Works	Tracked mobile crane (60t)	2	33
	Fabrication And Ancillary Works	Coating truck	1	67
	Fabrication And Ancillary Works	NDT truck and equipment	1	67
	Fabrication And Ancillary Works	Compressor for shot blasting etc.	1	67
	Temporary Power Supply	Diesel generator	1	100

Operational Noise Assessment

- 3.5.10 Assumptions and limitations for the assessment of operational noise from stationary sources is covered in more detail in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)**.

Contextual considerations

- 3.5.11 The locations at the ecological receptors are typically subject to a mix of sound sources at construction and operational stages, including intermittent noise from heavy goods vehicles (HGVs) and other road traffic, car horns, construction activities such as drilling and piling, and continuous industrial noise from the operational plant. These sounds vary in character: traffic contributes fluctuating noise, construction activity generates irregular impulsive sounds with high maximum levels (e.g. piling and drilling), and the operational plant produces a steady, continuous noise that could dominate during quieter periods.
- 3.5.12 The measured baseline sound levels (L_{Aeq}) reported in **Appendix 9A: Baseline sound survey report (ES Volume III, Application Document Ref. 6.3)** are the logarithmic average of sound levels over the monitoring period. During the baseline sound measurements, events that generate high maximum noise levels, such as HGVs and vehicle passing, loading/unloading, drilling and banging at the port, are captured within the L_{Aeq} , but their impact is smoothed out by the averaging inherent in calculation of the L_{Aeq} .
- 3.5.13 Qualitatively, construction noise is expected to include similar types of sources to those already present: HGV movements comparable to those currently accessing the port, and engine noise from excavators likely to be

continuous and broadly similar to, or not worse than, passing lorries. Likewise, impulsive sounds from construction activities (e.g. piling and drilling) are anticipated to have a similar character to the sounds currently experienced at the ecological receptors from nearby port operations and industrial sites. Overall, the types and characteristics of noise expected during construction are likely to be similar to those currently experienced at the ecological receptors.

4 Baseline Conditions

- 4.1.1 To provide an assessment of the likely significance of noise from the Proposed Development for terrestrial ecological receptors, it was necessary to identify and understand the baseline conditions of each receptor.
- 4.1.2 **Appendix 9A (ES Volume III, Application Document Ref. 6.3)** details the following regarding the environmental sound surveys:
- Details of measurement locations, including observations, noise levels and meteorological data;
 - Measurement standards and methodology; and
 - Tabular and graphical results.
- 4.1.3 A summary of the measured baseline sound levels (both from the 2026 Arup survey conducted for this ES, and from desktop sources) are presented in Table 4.1, along with the worst-case ecological receptors that the measurements represent.
- 4.1.4 Further details on sources, methodology, measured sound levels, meteorological data, and justification of typical background sound levels can be found in **Appendix 9A (ES Volume III, Application Document Ref. 6.3)**. Maps of the baseline measurement locations and terrestrial ecological receptors can be found in **Figure: 9.3: Locations of Baseline Environmental Sound Survey Results Used for the Proposed Development** and **Figure 10.6: Locations of Terrestrial Ecological Receptors**, respectively (ES Volume II, Application Document Ref. 6.2).

Table 4.1 Summary of Baseline Sound Levels at Measurement Locations.

Measurement ID	Measurement Address	Worst-Case Terrestrial Ecological Receptor	Measured Background Sound Level (dB L _{Aeq})		
			Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)
U1	Emergency Access Rd, Stockton-on-Tees, Middlesbrough TS2 1FB	E20 Seal Sands	45	46	45
U8	Teesside Power Ltd, Tees Valley 2 Site, Huntsman Drive, TS2 1UE, United Kingdom	E39 LGF Main Site south	52	51	49
U3	Dabholm Road, Redcar and Cleveland, Tees Valley, England, TS6 6UD, United Kingdom	E42 Bran Sands Lagoon	55	52	52

5 Development Design and Impact Avoidance

- 5.1.1 Details on embedded mitigation and good practice measures for construction and operational noise can be found in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)** and the **fCEMP (Appendix 5A, ES Volume III, Application Document Ref. 6.3)**.

6 Likely Impacts and Effects of the Proposed Development

6.1 Construction Noise

- 6.1.1 The construction noise assessment identified one terrestrial ecological receptor point (E42 in **Figure 10.6: Locations of Terrestrial Ecological Receptors (ES Volume II, Application Document Ref. 6.2)**, which represents Bran Sands Lagoon and Dabholm Gut) where the noise levels will increase above the screening threshold (55dB L_{Aeq}) and experience a change of greater than 3dB above the baseline. This will cause a likely significant effect at this receptor (without additional mitigation).
- 6.1.2 Refer to Table 6.1 and Table 6.2 for a summary of the construction noise assessment results with and without additional mitigation (where required).

6.2 Operational Noise

- 6.2.1 The operational noise assessment concluded that with embedded mitigation (such as stacks noise emission limits outlined in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1)**), there are no terrestrial ecological receptors that experience operational noise levels above 55dB L_{Aeq}. Therefore, it is unlikely operational noise from the Proposed Development will have significant effects on ecological features.
- 6.2.2 Refer to Table 6.3 and **Figure 10.7: Operational Noise Assessment on Terrestrial Ecological Receptors (ES Volume II, Application Document Ref. 6.2)** for a summary of the operational noise assessment results.

Table 6.1 Construction Noise Assessment Results of Worst-Case Terrestrial Ecological Receptors (without additional mitigation).

Ecological Receptor	Ecological Receptor Location	Daytime Background Sound Level (dB L _{Aeq})	Daytime Construction Noise (dB L _{Aeq})	Total Sound Level (dB)	Difference (dB)	Assessment
E20	SABIC Brinefields	45	54	54	+9	No significant effect, total sound level does not exceed 55 dB L _{Aeq} threshold
E39	Reclamation Pond	52	52	55	+3	No significant effect, total sound level does not exceed 55 dB L _{Aeq} threshold
E42	Bran Sands Lagoon	50	61	62	+7	Exceeds 55 dB L _{Aeq} threshold and greater than 3dB change above baseline. Requires further assessment, likely significant effect

Table 6.2 Construction Noise Assessment Results of Worst-Case Terrestrial Ecological Receptors (With Additional Mitigation).

Ecological Receptor	Ecological Receptor Location	Representative Baseline Sound Survey Location	Daytime Background Sound Level (dB L _{Aeq})	Daytime Construction Noise (dB L _{Aeq})	Total Sound Level (dB L _{Aeq})	Difference (dB)	Assessment
E42	Bran Sands Lagoon	U3	55	51	56	+1	No significant effect, change above baseline not greater than 3dB

Table 6.3 Operational Noise Results for Terrestrial Ecological Receptors (With Embedded Mitigation).

Ecological Receptor	Daytime Measured Background Sound Level (dB L _{Aeq,12h})	Specific Sound Level (dB L _{Aeq})	Baseline and Specific Sound Level (dB L _{Aeq})	Sound Level Relative to Background (dB)	Assessment
E1	55	43	55	0	No significant effect
E2	55	49	56	1	No significant effect
E3	55	47	56	1	No significant effect
E4	55	37	55	0	No significant effect
E5	55	35	55	0	No significant effect
E6	55	34	55	0	No significant effect
E7	55	33	55	0	No significant effect
E8	55	39	55	0	No significant effect
E9	50	31	50	0	No significant effect
E10	50	34	50	0	No significant effect
E11	50	33	50	0	No significant effect
E12	50	31	50	0	No significant effect
E13	45	35	45	0	No significant effect
E14	45	35	45	0	No significant effect
E15	45	34	45	0	No significant effect
E16	45	36	46	1	No significant effect
E17	45	34	45	0	No significant effect

Ecological Receptor	Daytime Measured Background Sound Level (dB L _{Aeq,12h})	Specific Sound Level (dB L _{Aeq})	Baseline and Specific Sound Level (dB L _{Aeq})	Sound Level Relative to Background (dB)	Assessment
E18	45	35	45	0	No significant effect
E19	45	45	48	3	No significant effect
E20	45	47	49	4	No significant effect
E21	45	43	47	2	No significant effect
E22	45	41	47	2	No significant effect
E23	67	43	67	0	No significant effect
E24	67	43	67	0	No significant effect
E25	67	41	67	0	No significant effect
E26	67	60	68	1	No assessment required
E27	67	66	70	3	No assessment required
E28	67	51	67	0	No assessment required
E29	67	51	67	0	No assessment required
E30	67	51	67	0	No assessment required
E31	45	42	47	2	No significant effect
E32	45	42	47	2	No significant effect
E33	52	42	52	0	No significant effect
E34	52	42	52	0	No significant effect
E35	52	41	52	0	No significant effect

Ecological Receptor	Daytime Measured Background Sound Level (dB L _{Aeq,12h})	Specific Sound Level (dB L _{Aeq})	Baseline and Specific Sound Level (dB L _{Aeq})	Sound Level Relative to Background (dB)	Assessment
E36	52	38	52	0	No significant effect
E37	52	37	52	0	No significant effect
E38	52	35	52	0	No significant effect
E39	52	54	56	4	No significant effect
E40	52	50	54	2	No significant effect
E41	55	37	55	0	No significant effect
E42	50	34	50	0	No significant effect
E43	50	32	50	0	No significant effect
E44	50	31	50	0	No significant effect
E45	50	31	50	0	No significant effect
E46	50	30	50	0	No significant effect
E47	45	37	46	1	No significant effect
E48	45	38	46	1	No significant effect
E49	45	37	46	1	No significant effect
E50	45	31	45	0	No significant effect
E51	45	38	46	1	No significant effect
E52	45	37	46	1	No significant effect
E53	45	36	45	0	No significant effect

Ecological Receptor	Daytime Measured Background Sound Level (dB L _{Aeq,12h})	Specific Sound Level (dB L _{Aeq})	Baseline and Specific Sound Level (dB L _{Aeq})	Sound Level Relative to Background (dB)	Assessment
E54	45	35	45	0	No significant effect
E55	45	33	45	0	No significant effect
E56	45	32	45	0	No significant effect
E57	45	32	45	0	No significant effect
E58	45	27	45	0	No significant effect
E59	45	32	45	0	No significant effect
E60	45	31	45	0	No significant effect
E61	57	33	57	0	No significant effect
E62	67	41	67	0	No significant effect
E63	67	41	67	0	No significant effect
E64	52	35	52	0	No significant effect
E65	52	34	52	0	No significant effect
E66	52	35	52	0	No significant effect
E67	45	34	45	0	No significant effect
E68	45	33	45	0	No significant effect
E69	45	31	45	0	No significant effect
E70	45	30	45	0	No significant effect
E71	45	30	45	0	No significant effect

Ecological Receptor	Daytime Measured Background Sound Level (dB L _{Aeq,12h})	Specific Sound Level (dB L _{Aeq})	Baseline and Specific Sound Level (dB L _{Aeq})	Sound Level Relative to Background (dB)	Assessment
E72	45	32	45	0	No significant effect
E73	45	34	45	0	No significant effect
E74	45	35	45	0	No significant effect
E75	45	35	45	0	No significant effect
E76	57	35	57	0	No significant effect
E77	57	35	57	0	No significant effect
E78	45	39	46	1	No significant effect
E79	45	39	46	1	No significant effect
E80	45	39	46	1	No significant effect
E81	45	37	46	1	No significant effect
E82	45	36	46	1	No significant effect
E83	45	37	46	1	No significant effect
E84	45	38	46	1	No significant effect
E85	45	36	46	1	No significant effect
E86	45	35	45	0	No significant effect
E87	45	34	45	0	No significant effect
E88	45	33	45	0	No significant effect
E89	45	32	45	0	No significant effect

Ecological Receptor	Daytime Measured Background Sound Level (dB L _{Aeq,12h})	Specific Sound Level (dB L _{Aeq})	Baseline and Specific Sound Level (dB L _{Aeq})	Sound Level Relative to Background (dB)	Assessment
E90	50	24	50	0	No significant effect
E91	45	33	45	0	No significant effect
E92	45	35	45	0	No significant effect
E93	50	30	50	0	No significant effect

7 Additional Mitigation and Enhancement Measures

- 7.1.1 Additional mitigation of construction noise is required to remove likely significant effects at one terrestrial ecological receptors (E42 in **Figure 10.6: Locations of Terrestrial Ecological Receptors (ES Volume II, Application Document Ref. 6.2))**.
- 7.1.2 Acoustic screening (in line with best practice and guidance set out in **Chapter 9: Noise and Vibration (ES Volume I, Application Document Ref. 6.1))** can provide up to 10dB reduction in construction noise levels by removing line of sight from the activities to receptors.
- 7.1.3 Refer to Table 6.2 for a summary of the construction noise assessment results with this additional mitigation.

7.1.4

