

# MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

## Environmental Statement

### Volume 3, Annex 8.2: Construction noise and vibration



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## Glossary

Term	Meaning
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
A-weighting	A frequency weighting devised to attempt to account for the fact that human response to sound is not equally sensitive to all frequencies. It consists of an electronic filter in a sound level meter which attempts to build this variability into the indicative sound level reading so that it will correlate, approximately, with the human response.
Ambient sound level, LAeq,T	The steady sound level which, over a period of time T, contains the same amount of A-weighted sound energy as the time varying sound over the same period. Also known as the equivalent continuous sound pressure level.
Attenuation	The reduction in magnitude of sound energy.



Term	Meaning
Basic Noise Level	A measure of traffic source noise prior to development. It is calculated from traffic flows, road speed, and Heavy Goods Vehicle (HGV) percentage.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Decibel	A unit used to measure or compare the intensity of a sound by comparing it with a given reference level on a logarithmic scale.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morecambe Offshore Windfarm: Generation Assets	The offshore generation assets and associated activities for the Morecambe Offshore Windfarm.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	<p>The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.</p> <p>Also referred to in this report as the Transmission Assets, for ease of reading.</p>
<a href="#">Morecambe OWL</a>	<a href="#">Morecambe Offshore Windfarm Limited is owned by Copenhagen Infrastructure Partners' (CIP) fifth flagship fund, Copenhagen Infrastructure V</a>
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
<a href="#">Morgan OWL</a>	<a href="#">Morgan Offshore Wind Limited is a joint venture between JERA Nex bp (JNbp) and Energie Baden-Württemberg AG (EnBW).</a>
Noise	An unwanted or unexpected sound.
Noise sensitive receptor	Receptors which are potentially sensitive to noise. Examples include residential properties, education facilities, community facilities, END quiet areas, international and national or statutorily designated sites, public rights of way and cultural heritage assets.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.

Term	Meaning
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables , and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.
Onshore substations	The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise a compound containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.
Peak Particle Velocity	An indicator of the magnitude of ground vibration which refers to the movement of molecular particles within the ground.
Propagation	The transmission of acoustic energy through a medium via a sound wave.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Sound	Fluctuations of pressure within a medium (gas, solid or fluid) within the audible range of loudness and frequencies which excite the sensation of hearing.
Sound Power Level, Lw	The total sound energy emitted by a source per unit time.
Sound Pressure Level, Lp	The amount of force a sound wave exerts on a surface area perpendicular to the direction of travel. A measure of the variation of sound level over a distance.
Spectrum	The presentation of sound in terms of the amount of energy at different frequencies.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above)
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning
Vibration sensitive receptor	Receptors which are potentially sensitive to vibration. Examples include dwellings, hospitals, healthcare facilities, education facilities, community facilities, buildings containing vibration sensitive equipment and cultural heritage assets.

## Acronyms

Acronym	Meaning
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard

Acronym	Meaning
CoPA	Control of Pollution Act
CRTN	Calculation of Road Traffic Noise
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EWG	Expert Working Group
HGV	Heavy Goods Vehicle
ISO	International Standard Organisation
LOAEL	Lowest Observed Adverse Effect Level
MLWS	Mean Low Water Springs
NOEL	No Observed Effect Level
OS	Ordnance Survey
PPV	Peak Particle Velocity
SOAEL	Significant Observed Adverse Effect Level

## Units

Unit	Description
dB	Decibels
h	Hour
km	Kilometre
m	Metre
mm/s	Millimetres per second

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# 1 Construction noise and vibration

## 1.1 Introduction

1.1.1.1 This document forms Volume 3, Annex 8.2: Construction noise and vibration of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets). The ES presents the findings of the Environmental Impact Assessment (EIA) process for the Transmission Assets.

1.1.1.2 This document provides the methodology and results of indicative calculations undertaken to assess the noise and vibration impacts on nearby receptors due to the construction of the Transmission Assets.

1.1.1.3 This Annex has been updated at Deadline 6 in line with the following:

- Table 1.11 updated to report numbers of receptors impacted by concurrent transient works, first submitted into the examination at D3 (REP3-068: S D3 11 Construction Noise and Vibration Assessment Clarification Note - Rev F01).
- Appendix B:
  - Construction noise impacts at receptors near landfall:
    - Table updated following technical engagement with Fylde Borough Council during between ISH4 and Deadline 5.
  - Construction noise impacts due to Direct Pipe at receptors near landfall:
    - Table updated following technical engagement with Fylde Borough Council during between ISH4 and Deadline 5.
  - Construction noise impacts at receptors along onshore cable corridor for activities concentrated within construction compounds:
    - Removed results related to receptors near landfall which were included in error.
    - Included results for Wrae Green Equitation Centre, missing from original document.
  - Construction noise impacts at receptors due to Trenchless Techniques: Correction of following errors:
    - Correction to daytime LOAEL – Almond Close.
    - Correction to daytime and evening LOAEL and SOAEL – Century Care Home and Dunepoint.
    - Correction to daytime and evening LOAEL – Kigrimol Gardens.
    - Correction of ‘Equestrian’ to ‘Equitation’ - Wrae Green Equitation Centre.

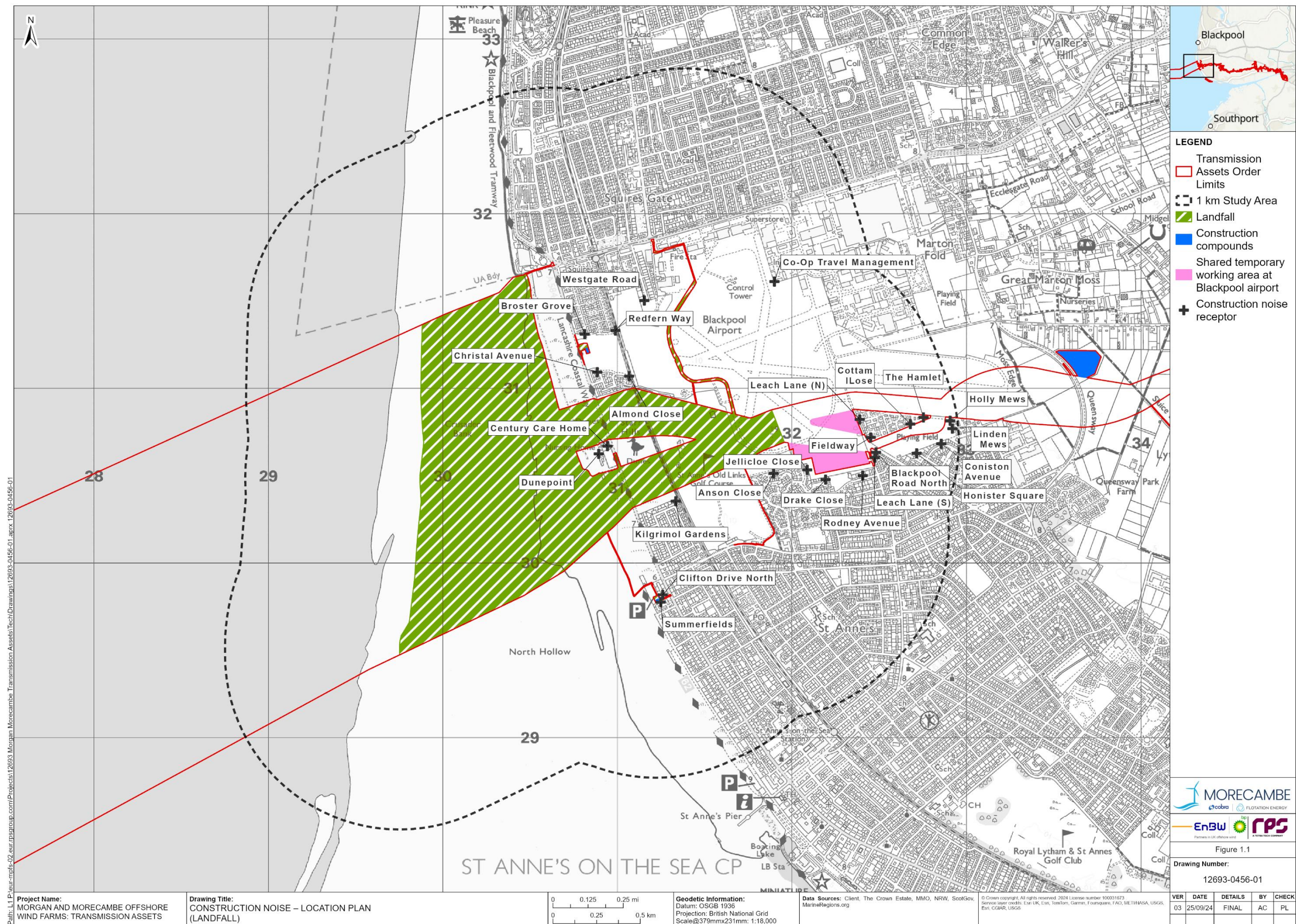
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## 1.2 Methodology

### 1.2.1 Study area

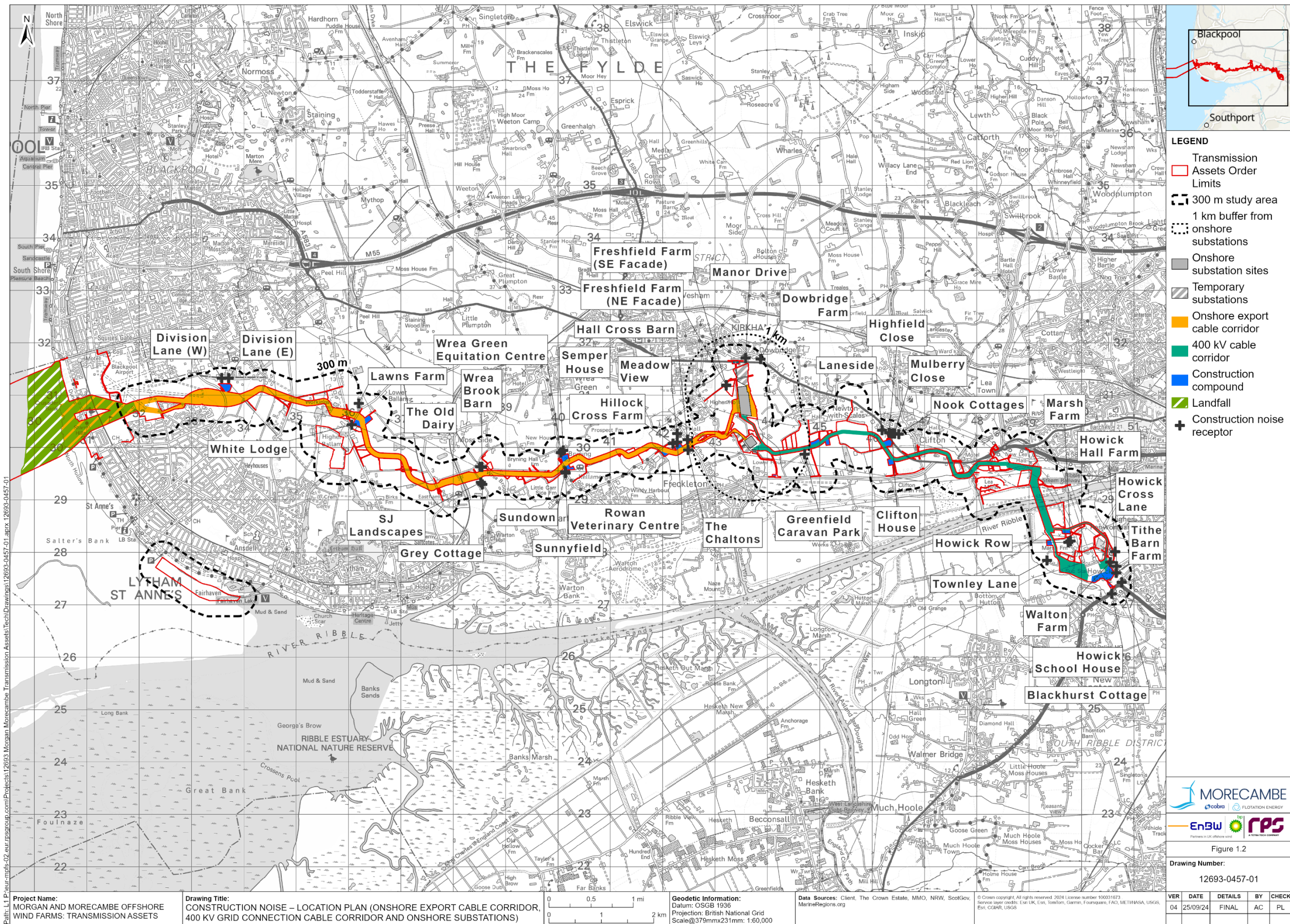
- 1.2.1.1 The study areas for noise and vibration assessment of the Transmission Assets focuses on receptors landward of Mean Low Water Springs (MLWS) where potential noise impacts are most likely to occur. The study areas have been refined from those that presented in the Preliminary Environmental Information Report following project design refinements and to better align with guidance.
- 1.2.1.2 The study areas relevant to Volume 3, Chapter 8: Noise and vibration of the ES and this annex are shown on **Figure 1.1**, **Figure 1.2** and **Figure 1.3** and are defined as:
- the area of land to be temporarily or permanently occupied during the construction, operation and maintenance, and decommissioning of the Transmission Assets (landward of MLWS);
  - noise sensitive receptors located within 1 kilometre (km) of the landfall and onshore substations;
  - noise sensitive receptors located within 300 m of the onshore export cable corridor and the 400 kV grid connection cable corridor; and
  - vibration sensitive receptors located within 100 m of onshore construction activities.





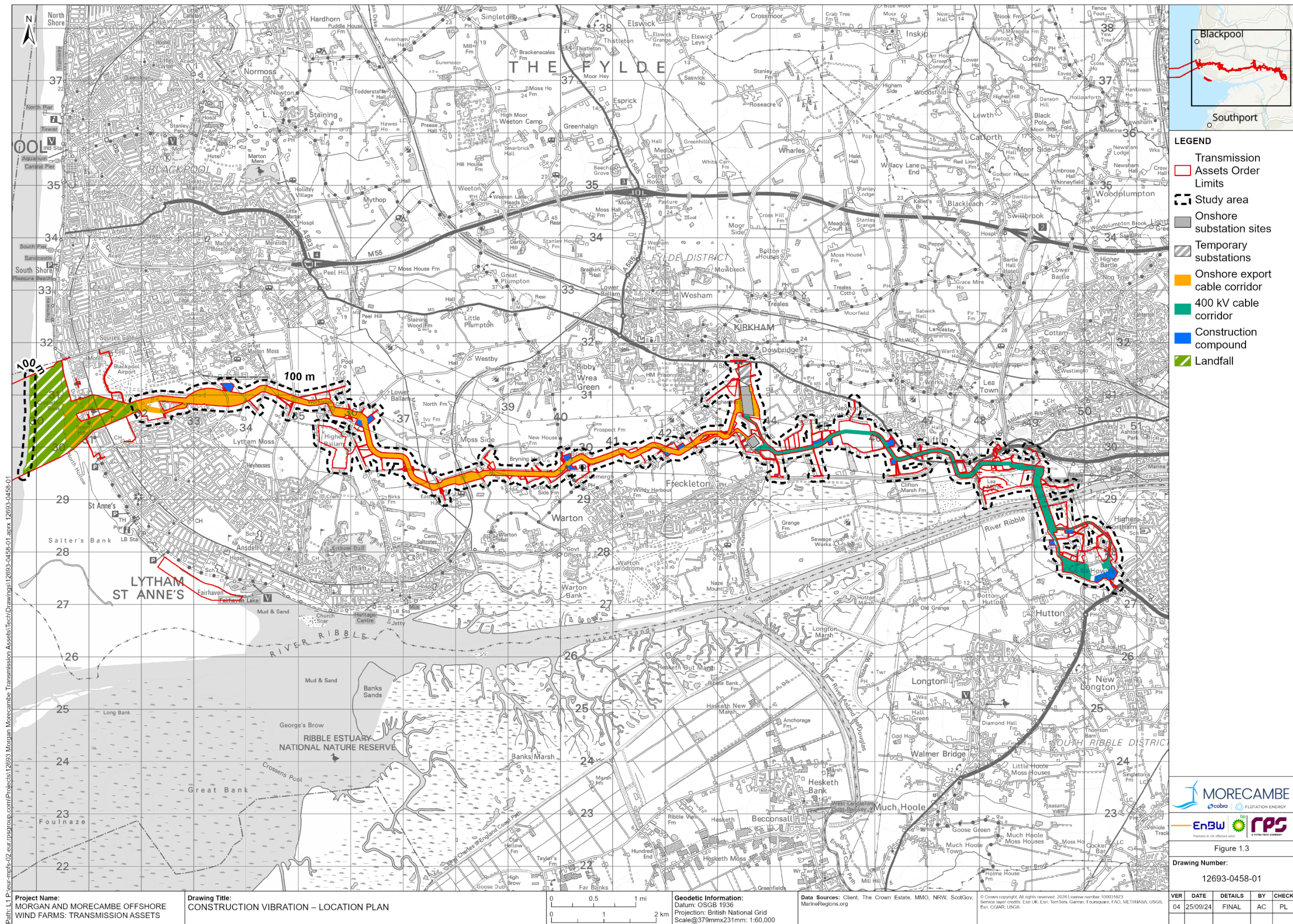
**Figure 1.1: Construction Noise Location Plan (Landfall)**





**Figure 1.2: Construction Noise - Location Plan (Onshore Export Cable Corridor, 400KV Grid Connection Corridor and Onshore Substations)**





**Figure 1.3: Construction Vibration - Location Plan**



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## 1.2.2 Legislation and guidance

1.2.2.1 This section contains a summary of the relevant guidance and legislation for construction noise and vibration control.

### Control of Pollution Act (CoPA) 1974

1.2.2.2 Section 60, Part III of the CoPA refers to the control of noise on construction sites. It outlines legislation by which Local Authorities can control noise from construction sites and prevent noise disturbance.

1.2.2.3 British Standards (BS) 5228-1:2009+A1:2014 and BS 5228 2:2009+A1:2014 were approved within The Control of Noise (Code of Practice for Construction and Open Sites) Order 2015 as suitable guidance on appropriate methods for the control of noise from construction and open sites in exercise of the powers conferred on the Secretary of State by sections 71(1)(b), (2) and (3) of the CoPA.

1.2.2.4 The CoPA provides a Local Authority with the power to serve a notice imposing requirements for the way in which construction works are to be carried out in their jurisdiction. This notice can specify:

- the plant or machinery permitted for use;
- the hours during which construction work may be undertaken;
- limits for the emission levels of noise and vibration due to the works at any time or spatial position on site; and
- any other change in circumstance.

1.2.2.5 Section 61, Part III of the CoPA refers to prior consent for work on construction sites. It provides a method by which a contractor can apply for consent to undertake construction works in advance.

1.2.2.6 Section 71, Part III of the CoPA refers to the preparation and approval of codes of practice for minimising noise.

1.2.2.7 British Standards (BS) 5228-1:2009+A1:2014 and BS 5228 2:2009+A1:2014 were approved within The Control of Noise (Code of Practice for Construction and Open Sites) Order 2015 as suitable guidance on appropriate methods for the control of noise and vibration respectively from construction and open sites in exercise of the powers conferred on the Secretary of State by sections 71(1)(b), (2) and (3) of the CoPA.

1.2.2.8 Section 72, Part III of the CoPA refers to Best Practicable Means (BPM), which is defined as:

*‘In that expression, ‘practicable’ means reasonably practicable, having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications’. Whilst ‘Means’ includes ‘the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures.’*

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### Environmental Protection Act (EPA) 1990

- 1.2.2.9 Section 79, Part III of the EPA contains a list of matters that amount to statutory nuisances and places a duty on Local Authorities to regularly inspect areas in their jurisdiction to determine where statutory nuisances may exist.
- 1.2.2.10 This section also considers and defines the concept of BPM which originates from Section 72, Part III of the CoPA.
- 1.2.2.11 The Local Authority must serve an abatement notice where it is satisfied that a statutory nuisance does exist or is likely to occur/recur. Section 80, Part III of the EPA provides Local Authorities with the power to serve an abatement to prohibit or restrict its occurrence or recurrence; and to carry out works or other actions necessary to abate the nuisance.
- 1.2.2.12 Section 82, Part III of the EPA allows a Magistrates' court to act on a complaint made by any person on the grounds that they are aggrieved by a statutory nuisance, such as noise.
- 1.2.2.13 The procedures for appeals against abatement notices are detailed in the Statutory Nuisance (Appeals) Regulations 1995.

### National Policy Statements (NPS)

- 1.2.2.14 There are currently six energy National Policy Statements (NPSs), three of which identify policy relevant to offshore wind development and the Transmission Assets, specifically:
- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero, November 2023a);
  - NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero, November 2023b); and
  - NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security & Net Zero, November 2023c).
- 1.2.2.15 NPS EN-1 and EN-3 include guidance on what matters are to be considered in the assessment including the determination of any mitigation measures required.
- 1.2.2.16 NPS EN-5 outlines matters to be considered as part of the onshore assessment of electrical networks.
- 1.2.2.17 A full breakdown of the relevant provisions of each NPS and how each is considered in the assessment of noise and vibration impacts due to the Transmission Assets is provided in Table 8.1 of Volume 3, Chapter 8: Noise and vibration of the ES.

### British Standard 5228:2009

- 1.2.2.18 This BS provides guidance, information, and procedures for the control of noise and vibration from demolition and construction sites and comprises the following two parts:



- BS 5228-1:2009+A1:2014 – ‘Code of practice for noise and vibration control on construction and open sites’ – Part 1: Noise; and
- BS 5228-2:2009+A1:2014 – ‘Code of practice for noise and vibration control on construction and open sites’ – Part 2: Vibration.

1.2.2.19 There are no set standards for the definition of the significance of construction noise effects. However, noise example criteria are provided in BS 5228-1:2009+A1:2014 Annex E and vibration example criteria are provided in BS 5228-2:2009+A1:2014 Annex B.

1.2.2.20 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on:

- community relations;
- noise and persons on site;
- neighbourhood nuisance;
- project supervision; and
- the control of noise.

1.2.2.21 The annexes include information on legislative background, noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data for on-site equipment and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

1.2.2.22 BS 5228-2:2009+A1:2014 contains information and recommendations for basic methods of vibration control arising from construction and open sites where work activities/operations generate significant levels of vibration. It includes sections on community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement. BS 5228-2:2009+A1:2014 refers to BS ISO 4866:2010; BS 7385-2:1993; BS 6472-1:2008, and BS 6472-2:2008 for further advice on the significance of vibration.

### **Design Manual for Roads and Bridges (DMRB) – LA 111 – Noise and vibration**

1.2.2.23 The DMRB LA 111 (Highways England *et al.*, 2020), provides guidance on methods for assessing noise and vibration from construction traffic.

1.2.2.24 The magnitude of noise impacts is assessed using the predicted change in the Basic Noise Level (BNL) on the closest public roads to a receptor following the introduction of construction traffic.

1.2.2.25 The noise change is calculated using the methods outlined in the Calculation of Road Traffic Noise (CRTN) (Department for Transport and Welsh Office, 1988) which considers:

- the change in traffic flow due to construction traffic;
- vehicle speed; and

- 
- the percentage of Heavy Goods Vehicles (HGVs).

1.2.2.26 Paragraph 3.19 of DMRB LA 111 states the following:

*‘Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:*

- *10 or more days or nights in any 15 consecutive days or nights;*
- *a total number of days exceeding 40 in any 6 consecutive months.’*

1.2.2.27 Additional guidance is provided for the determination of construction noise impact criteria in terms of the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL). This is summarised in Table 8.2 of Volume 3, Chapter 8: Noise and vibration of the ES and is reproduced in **Table 1.1** below for brevity and ease of reference.

**Table 1.1: Summary of noise exposure hierarchy from the Noise Policy Statement for England and Planning Practice Guidance**

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

1.2.2.28 Criteria for the impacts of construction noise and vibration have been derived based on the guidance detailed in DMRB LA 111 in conjunction with BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014. Full details are provided in **section 1.3**.

## 1.3 Assessment criteria

### 1.3.1 Construction noise

1.3.1.1 The impact criteria for construction noise has been determined in accordance with DMRB LA 111 and Annex E of BS 5228-1:2009+A1:2014. Table 3.12 and Table 3.16 of DMRB LA 111 provides the following guidance (as

summarised in **Table 1.1** above) for determining the LOAEL and SOAEL for construction noise and for determining the magnitude of impacts. These are summarised in **Table 1.2** and **Table 1.3** below.

**Table 1.2: Construction time period – LOAEL and SOAEL**

Time Period	LOAEL	SOAEL
Weekdays (07:00-19:00 hours) Saturdays (07:00-13:00 hours)	Baseline sound levels, $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014.
Evenings (19:00-23:00 hours) Saturdays (13:00-23:00 hours) Sundays (07:00-23:00 hours)		
Night (23:00-07:00 hours)		

**Table 1.3: Construction noise impact magnitude criteria**

Magnitude of Impact	Construction Noise Level
High	$L_{Aeq,T} \geq \text{SOAEL} + 5 \text{ dB}$
Medium	$\text{SOAEL} \leq L_{Aeq,T} < \text{SOAEL} + 5 \text{ dB}$
Low	$\text{LOAEL} \leq L_{Aeq,T} < \text{SOAEL}$
Negligible	$L_{Aeq,T} < \text{LOAEL}$

1.3.1.2 Section 3 of DMRB LA 111 states the following with regard to durations to be considered in the assessment of significant effects:

*‘Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:*

- 1) 10 or more days in any 15 consecutive days or nights;*
- 2) a total number of days exceeding 40 in any 6 consecutive months’*

1.3.1.3 This criteria is used to determine the likelihood of construction noise and vibration impacts for all construction activities included in this assessment.

## 1.3.2 Construction traffic noise

1.3.2.1 There may be a change in local noise levels due to contributions from construction traffic on local road networks and temporary diversion networks during the construction of the Transmission Assets.

1.3.2.2 The impact assessment has taken account of the level of the road traffic noise both with and without the construction traffic proposed for the Transmission Assets, as well as the existing sound levels at the nearest receptors.

1.3.2.3 Impact criteria for these changes have been obtained from the guidance in DMRB LA 111 and are presented in **Table 1.4** below.

**Table 1.4: Construction traffic noise impact magnitude criteria**

Magnitude of Impact	Increase in Basic Noise Level (BNL) of closest public road used for construction traffic (dB)
High	$5 \leq \text{BNL}$
Medium	$3 \leq \text{BNL} < 5$
Low	$1 \leq \text{BNL} < 3$
Negligible	$\text{BNL} < 1$

### 1.3.3 Construction vibration

- 1.3.3.1 The Impact criteria for vibration from construction have been identified based on guidance provided in BS 5228-2:2009+A1:2014. The following outline criteria in **Table 1.5** in terms of peak particle velocity (PPV) can be used to identify potential significant impacts on nearby receptors.

**Table 1.5: Construction vibration impact magnitude criteria**

Magnitude of Impact	Vibration Level, PPV, mm/s
High	$10^{(1)} \leq \text{PPV}$
Medium	$1 \leq \text{PPV} < 10$
Low	$0.3 \leq \text{PPV} < 1$
Negligible	$\text{PPV} < 0.3$

(1) Vibration at these levels is unlikely to be tolerable for more than a very brief period. Furthermore, major effects could occur below this level, particularly where impacts occur for longer periods.

- 1.3.3.2 Further comment is provided in Note C of Table B.1 in Annex B of BS 5228- 2:2009+A1:2014 which states the following:
- “Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6475-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.”*
- 1.3.3.3 The duration of construction works is not yet known. As such, the durations outlined in DMRB LA 111 (see **paragraph 1.3.1.2** above) have been considered for the assessment of significant effects.

## 1.4 Onshore construction noise and vibration assessment

### 1.4.1 Methodology

#### Construction noise

- 1.4.1.1 Construction noise impacts have been predicted based upon a construction plant list for each of the various activities required during the construction phase of the Transmission Assets. The full list of plant for each scenario is



presented in **Appendix A**. The source data presented in **Appendix A** has been corrected for the 'on-time' which has been defined as the proportion of the day, evening, or night-time period for which the plant is likely to be in operation.

1.4.1.2 The core working hours are defined as a measure within the Commitments Register as commitment number CoT18 (see Volume 1, Annex 5.3: Commitments register of the ES). The commitment is as follows:

*'Core working hours for the construction of the intertidal and onshore works will be as follows:*

- *Monday to Saturday: 07:00 - 19:00 hours; and*
- *up to one hour before and after core working hours for mobilisation ("mobilisation period") i.e. 06:00 to 20:00.*

*Activities carried out during the mobilisation period will not generate significant noise levels (such as piling, or other such noisy activities).*

*In circumstances outside of core working practices, specific works may have to be undertaken outside the core working hours. This will include, but is not limited to, works being undertaken within and/or adjacent to Blackpool Airport and cable installation at landfall and at the River Ribble. Advance notice of such works will be given to the relevant planning authority'*

1.4.1.3 Construction activities likely to require evening/weekend working include those associated with HDD works. Construction activities associated with night-time working are those associated with direct pipe trenchless installation at the landfall and concreting works at the onshore substations. As such, the evening/weekend and night-time periods have also been considered as part of the noise impact assessment.

1.4.1.4 Mitigation measures will be part of the Code of Construction Practice (CoCP), an outline CoCP (document reference J1) is submitted with the DCO. Table B.1 in Annex B of BS 5228-1:2009+A1:2014 outlines typical losses associated with construction noise mitigation measures. A summary is provided in **Table 1.6** below.

**Table 1.6: Noise reduction levels for typical construction plant mitigation**

Mitigation Measure	Indicative reduction in noise level	Justification/source
Localised acoustic screening.	Up to 10 dB	The effectiveness of an acoustic barrier is dependent upon the difference in path length between the sound travelling the shortest path between source and receiver and the increased path over the top of a barrier. Section F.2.2.2 of BS 5228:2009+A1:2014 states:  'if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier and of 10 dB when the noise screen completely hides the sources from the receiver.'

Mitigation Measure	Indicative reduction in noise level	Justification/source
Enhanced sound reduction equipment on diesel or petrol engines.	Between 5 and 10 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Ventilated enclosures around breakers and rock drills.	Up to 20 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Ventilated acoustic shed for the use of rotary drills and boring plant.	Up to 15 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Electric or hybrid construction plant.	Variable	The use of electrically powered construction equipment would reduce the noise emitted from engines and exhausts. However, the actual noise reduction is dependent upon the equipment used.

1.4.1.5 Other effective mitigation measures which may be used as alternative measures or in conjunction with those outlined in **Table 1.6** above include:

- limiting the use of loud equipment during the night-time;
- increasing the distance between concurrent construction works;
- positioning plant items away from noise-sensitive receptors; and
- avoiding simultaneous operation of loud plant items, where possible.

1.4.1.6 Two methodologies have been adopted to determine the potential noise impacts depending on whether the activity is likely to be concentrated within a single area or spread along sections of the onshore export cable corridor and 400 kV grid connection cable corridor, as detailed below.

#### **Construction activities concentrated within one area**

1.4.1.7 Construction activities likely to be concentrated within one area have been modelled using 3D acoustic modelling software (SoundPLAN v8.2). The exact locations where works will be carried out is not yet known and thus predictions have been undertaken assuming the works are located within the temporary construction compounds.

1.4.1.8 The location of each construction plant item within the compounds is not known and, as such, it has been assumed the total noise emission level for the relevant activity will be located close to the boundary nearest the receptor. This is a conservative approach and results in a slight overestimation of noise levels at receptors. The noise sources have been modelled with an average height of 2 m above local ground level.

1.4.1.9 The works assessed using this method include:

- establishing access and temporary construction compounds;

- transition joint bay (TJB) and link boxes excavation;
- TJB and link boxes wall and base construction;
- jointing of cables in the TJB and link boxes;
- backfill over the TJB and link boxes;
- trenchless technique compounds entry/exit pits; and
- onshore substation construction:
  - groundworks
  - building foundation works
  - building fabrication and plant installation.

**Transient construction activities along the onshore export cable corridor and 400 kV grid connection cable corridor**

- 1.4.1.10 There are some construction activities which are likely to be more transient in nature than those listed above and thus spread along sections of the onshore export cable corridor and 400 kV grid connection cable corridor. It is not known exactly where these works will occur at any given time and, as such, there would be a high degree of uncertainty in the output of any 3D acoustic model constructed to predict potential noise impacts.
- 1.4.1.11 An alternative method has been adopted whereby construction activities which are likely to be transient and spread along the sections of the onshore export cable corridor and 400 kV grid connection cable corridor have been predicted at various distances to determine where the impact magnitudes change within the proposed noise and vibration study areas.
- 1.4.1.12 Subsequent analysis of the number of noise-sensitive receptors where a high or medium noise impact is predicted has been undertaken using Ordnance Survey (OS) AddressBase Plus data and Geographical Information System (GIS) software. The impact magnitude bands are inserted as spatial buffers around the onshore export cable corridor and 400 kV grid connection cable corridor at the distance at which the impact magnitude changes. The number of receptors within each impact magnitude band is then calculated to determine where effects may occur.
- 1.4.1.13 The works assessed using this method include:
- site preparation;
    - fencing;
    - topsoil strip;
  - haul road construction;
  - trench excavation and duct installation;
  - trench backfill;
  - trench route and topsoil reinstatement; and
  - haul road removal.

## Trenchless techniques

- 1.4.1.14 The majority of the onshore export cable corridor and 400 kV grid connection cable corridor will be installed via open-cut trenching methods. However, cable ducting will be installed via Horizontal Directional Drilling (HDD) or other trenchless techniques where the onshore export cable corridor crosses existing infrastructure and obstacles such as major roads, rivers, and rail crossings.
- 1.4.1.15 The maximum design scenario for the installation of cable ducts at landfall is represented by the use of direct pipe with the landfall compound situated in or around Blackpool Airport. The trenchless works will be undertaken to assist with the connection of the offshore and onshore export cables in the TJB.
- 1.4.1.16 HDD (or other trenchless techniques) are likely to be required to cross the railway lines near Moss Side, as well as numerous roads, underground utilities, hedgerows and drains along the onshore export cable and 400kV grid connection cable route. These works have the potential to require weekend working (Saturday afternoons) and therefore have been assessed against the evening/weekend thresholds, in addition to the daytime period. The MDS is represented by the HDD works associated with Morecambe and Morgan being undertaken sequentially.
- 1.4.1.17 Micro-tunnelling represents the MDS at the River Ribble. No receptors have been identified within the noise and vibration study area around the River Ribble construction compounds on both sides of the river (entry and exit pits) and, as such, no assessment of impacts associated with these micro-tunnelling works is required. .

## Noise sensitive receptors

~~1.4.1.18~~ The noise sensitive receptors within the construction noise study area are listed in **Table 1.7** to

~~1.4.1.19~~ 1.4.1.18 ~~Table 1.10~~ **Table 1.10** below and are also shown on Figure 1.1.

**Table 1.7: Noise sensitive receptors near construction activities at landfall.**

Receptor	Receptor classification
Almond Close	Residential
Anson Close	Residential
Broster Grove	Residential
Century Care Home	Residential
Christal Avenue	Residential
Clifton Drive North	Residential
Co-Op Travel Management	Commercial
Drake Close	Residential
Dunepoint	Residential

Receptor	Receptor classification
Fieldway	Residential
Jellicoe Close	Residential
Kilgrimol Gardens	Residential
Leach Lane	Residential
Redfern Way	Residential
Rodney Avenue	Residential
Summerfields	Residential
Westgate Road	Residential

**Table 1.8: Noise sensitive receptors near construction activities along onshore export cable corridor and 400 kV grid connection corridor.**

Receptor	Receptor classification
Beechfield	Residential
Blackhurst Cottage	Residential
Bridge Farm	Residential
Brythorpe Lodge	Residential
Clifton House	Residential
Clifton Marsh Farm	Residential
Division Lane	Residential
Dowbridge Farm	Residential
Freshfield Farm	Residential
Greenfield Caravan Park	Residential
Greenlands Farmhouse	Residential
Hall Cross Barn	Residential
Highfield Close	Residential
Hillock Cross Farm	Residential
Howick Cross Lane	Residential
Howick Row	Residential
Howick Hall Farm	Residential
Howick School House	Residential
Laneside	Residential
Lawns Farm	Residential
Manor Drive	Residential
Marsh Farm	Residential



Receptor	Receptor classification
Marybank Farm	Residential
Meadow View	Residential
Mulberry Close	Residential
Nook Cottages	Residential
Old Toll House	Residential
Olroy House	Residential
Quaker Wood Stables	Commercial
Redfern Way	Residential
Rowan Veterinary Centre	Medical
School House	Residential
Semper House	Residential
Sundown	Residential
Sunnyfield	Residential
The Chaltons	Residential
Tithe Barn Farm	Residential
Walton Farm	Residential
Westgate Road	Residential
West Moss Lane	Residential
West Winds	Residential
White Gates	Residential
White Lodge	Residential
Wrea Green Equestrian Centre	Commercial

**Table 1.9: Noise sensitive receptors near HDD works**

Receptor	Receptor classification
Beechfield	Residential
Blackhurst Cottage	Residential
Blackpool Road North	Residential
Bridge Farm	Residential
Brythorpe Lodge	Residential
Clifton House	Residential
Clifton Marsh Farm	Residential
Coniston Avenue	Residential
Cottam Close	Residential

Receptor	Receptor classification
Division Lane	Residential
Dowbridge Farm	Residential
Freshfield Farm	Residential
Greenfield Caravan Park	Residential
Greenlands Farmhouse	Residential
Grey Cottage	Residential
Hall Cross Barn	Residential
Highfield Close	Residential
Hillock Cross Farm	Residential
Holly Mews	Residential
Honiston Square	Residential
Howick Cross Lane	Residential
Howick Hall Farm	Residential
Howick Row	Residential
Howick School House	Residential
Laneside	Residential
Lawns Farm	Residential
Linden Mews	Residential
Manor Drive	Residential
Marsh Farm	Residential
Marybank Farm	Residential
Meadow View	Residential
Mulberry Close	Residential
Nook Cottages	Residential
Old Toll House	Residential
Olroy House	Residential
Quaker Wood Stables	Commercial
Redfern Way	Residential
Rowan Veterinary Centre	Medical
School House	Residential
Semper House	Residential
SJ Landscapes	Commercial
Sundown	Residential

Receptor	Receptor classification
Sunnyfield	Residential
The Chaltons	Residential
The Hamlet	Residential
The Old Dairy	Residential
Tithe Barn Farm	Residential
Walton Farm	Residential
West Moss Lane	Residential
West Winds	Residential
Westgate Road	Residential
White Gates	Residential
White Lodge	Residential
Wrea Brook Farm	Residential
Wrea Green Equestrian Centre	Commercial

**Table 1.10: Noise sensitive receptors near Onshore Substation construction area.**

Receptor (nearest onshore substation)	Receptor classification
Dowbridge Farm (Morgan)	Residential
Freshfield Farm (Morgan)	Residential
Manor Drive (Morgan)	Residential
Marybank Farm (Morecambe)	Residential
Quaker Wood Stables (Morgan)	Commercial

### Construction vibration

~~1.4.1.20~~ [1.4.1.19](#) The use of vibratory rollers for the dynamic compaction during the construction of the haul road, construction compounds, and Onshore Substation platforms has been assessed to determine the likelihood of adverse impacts on nearby receptors.

~~1.4.1.24~~ [1.4.1.20](#) The assessment has been undertaken with reference to the guidance in Table E.1 of BS 5228-2:2009+A1:2014. This guidance provides empirically derived formula for the prediction of vibration impacts arising from mechanised construction works. During start up and run down, the resultant PPV  $v_{res}$  may be calculated using the following equation:

$$v_{res} = k_t \sqrt{n_d} \left[ \frac{A}{x + L_d} \right]^{1.5} \quad (1)$$

~~1.4.1.22~~ 1.4.1.21 The impacts with distance during steady state vibratory compaction works may be predicted using the following equation:

$$v_{res} = k_s \sqrt{n_d} \left[ \frac{A^{1.5}}{(x + L_d)^{1.3}} \right] \quad (2)$$

- $v_{res}$ : PPV (mm/s);
- $k_t$  and  $k_s$ : scaling factors associated with the probability of exceedance;
- $n_d$ : number of vibrating drums;
- $A$ : maximum amplitude of drum vibration (mm);
- $x$ : source-receiver separation distance along ground surface (m); and
- $L_d$ : vibrating roller drum width (m).

~~1.4.1.23~~ 1.4.1.22 It is understood that vibratory piling may be required for the installation of the trenchless technique entry and exit pits, as well as for the construction of the Onshore Substation platforms. The potential vibration impacts have been predicted based on the guidance in Table E.1 of BS 5228-2:2009+A1:2014 which provides the following equation for the prediction of vibration impacts due to vibratory piling:

$$v_{res} = \frac{k_v}{x^\delta} \quad (3)$$

- $v_{res}$ : PPV (mm/s);
- $k_v$ : scaling factor associated with the probability of exceedance;
- $x$ : source-receiver separation distance along ground surface (m); and
- $\delta$ : dimensionless empirical constant.
  - Start up and run down:  $\delta = 1.2$ .
  - All operations:  $\delta = 1.3$ .
  - Steady state operations:  $\delta = 1.4$ .

### Construction traffic

~~1.4.1.24~~ 1.4.1.23 The change in the BNL due to the introduction of additional vehicles onto local highways as part of the construction of the Transmission Assets has been calculated using the method outlined in CRTN, as detailed in **paragraph 1.2.2.25**.

~~1.4.1.25~~ 1.4.1.24 The 18-hour BNL  $L_{10,18h}$  is calculated using the linear equation for Chart 3 of CRTN reproduced in equation 4 below. This equation is empirically derived and depends upon the traffic flow (Q) at a mean speed (V) of 75 km/h assuming no HGVs.

$$L_{10,18hr} = 29.1 + 10 \log_{10} Q \quad (4)$$

~~1.4.1.26~~ 1.4.1.25 This BNL is adjusted by a correction (C) to account for variations in mean traffic speed (V) and the percentage of HGVs (p) using the empirically derived equation in Chart 4 of CRTN, as given by equation 5 below.

$$C = 33 \log_{10} \left( V + 40 + \frac{500}{V} \right) + 10 \log_{10} \left( 1 + \frac{5p}{V} \right) - 68.8 \quad (5)$$

## 1.4.2 Results

### Construction noise

1.4.2.1 The full tabulated results of the 3D acoustic modelling are presented in **Appendix B**.

1.4.2.2 The results of the construction noise assessment for works spread along the Onshore Infrastructure Area are presented in **Table 1.11** below. The impacts have been predicted based upon the LOAEL at receptors where baseline sound levels were lowest to inform a robust assessment. The table presents the varying distances from the cable corridor which are associated with low, medium and high impacts likely to result from individual construction activities and the number of receptors within each of these bands.

**Table 1.11: Number of receptors per construction noise impact magnitude band.**

Location	Impact magnitude band distance (m)			Number of receptors		
	High	Medium	Low	High	Medium	Low
<b>Site Preparation</b>						
<del>Landfall</del> <u>East of TJB, Blackpool Airport Land</u>	<del>60</del> <u>84</u>	<del>150</del> <u>6</u>	<del>425</del> <u>597</u>	<del>63</del> <u>290</u>	<del>22</del> <u>476</u>	<del>555</del> <u>2208</u>
<del>Onshore Export Cable Corridor</del>	<del>60</del>	<del>106</del>	<del>1,500</del>	<del>19</del>	<del>13</del>	<del>7500</del>
<del>Onshore</del> <u>East of Blackpool Airport, West of Substations</u>	<del>60</del> <u>84</u>	<del>150</del> <u>6</u>	<del>750</del> <u>2118</u>	<del>956</del>	<del>4</del> <u>107</u>	<del>320</del> <u>27922</u>
400 kV Grid Connection Cable Corridor	<del>60</del> <u>84</u>	<del>150</del> <u>6</u>	<del>900</del> <u>2118</u>	<del>928</del>	<del>12</del> <u>147</u>	<del>3900</del> <u>16043</u>
<b>Trench excavation and duct installation</b>						
<del>Landfall</del> <u>East of TJB, Blackpool Airport Land</u>	<del>43</del> <u>73</u>	<del>75</del> <u>129</u>	<del>300</del> <u>515</u>	<del>31</del> <u>261</u>	<del>44</del> <u>423</u>	<del>240</del> <u>1844</u>
<del>Onshore Export Cable Corridor</del>	<del>43</del>	<del>75</del>	<del>1,060</del>	<del>16</del>	<del>10</del>	<del>3750</del>

Location	Impact magnitude band distance (m)			Number of receptors		
	High	Medium	Low	High	Medium	Low
<del>Onshore</del> <a href="#">East of Blackpool Airport, West of Substations</a>	<del>43</del> <a href="#">73</a>	<del>75</del> <a href="#">129</a>	<del>530</del> <a href="#">1826</a>	<del>0</del> <a href="#">49</a>	<del>4</del> <a href="#">85</a>	<del>320</del> <a href="#">21663</a>
400 kV Grid Connection Cable Corridor	<del>43</del> <a href="#">73</a>	<del>75</del> <a href="#">129</a>	<del>1,050</del> <a href="#">1826</a>	<del>0</del> <a href="#">23</a>	<del>7</del> <a href="#">84</a>	<del>4300</del> <a href="#">13413</a>
<b>Trench backfill</b>						
<del>Landfall</del> <a href="#">East of TJB, Blackpool Airport Land</a>	<del>43</del> <a href="#">61</a>	<del>75</del> <a href="#">109</a>	<del>300</del> <a href="#">435</a>	<del>34</del> <a href="#">222</a>	<del>44</del> <a href="#">361</a>	<del>240</del> <a href="#">1548</a>
<del>Onshore</del> Export Cable Corridor	<del>43</del>	<del>75</del>	<del>1,060</del>	<del>16</del>	<del>10</del>	<del>3750</del>
<del>Onshore</del> <a href="#">East of Blackpool Airport, West of Substations</a>	<del>43</del> <a href="#">61</a>	<del>75</del> <a href="#">109</a>	<del>530</del> <a href="#">1544</a>	<del>0</del> <a href="#">42</a>	<del>4</del> <a href="#">67</a>	<del>320</del> <a href="#">15605</a>
400 kV Grid Connection Cable Corridor	<del>43</del> <a href="#">61</a>	<del>75</del> <a href="#">109</a>	<del>1,050</del> <a href="#">1544</a>	<del>0</del> <a href="#">17</a>	<del>7</del> <a href="#">48</a>	<del>4300</del> <a href="#">10643</a>
<b>Trench route reinstatement</b>						
<del>Landfall</del> <a href="#">East of TJB, Blackpool Airport Land</a>	<del>48</del> <a href="#">57</a>	<del>85</del> <a href="#">101</a>	<del>335</del> <a href="#">403</a>	<del>36</del> <a href="#">208</a>	<del>44</del> <a href="#">333</a>	<del>140</del> <a href="#">23</a>
<del>Onshore</del> Export Cable Corridor	<del>48</del>	<del>85</del>	<del>1,190</del>	<del>19</del>	<del>7</del>	<del>5400</del>
<del>Onshore</del> <a href="#">East of Blackpool Airport, West of Substations</a>	<del>48</del> <a href="#">57</a>	<del>85</del> <a href="#">101</a>	<del>595</del> <a href="#">1428</a>	<del>0</del> <a href="#">40</a>	<del>4</del> <a href="#">63</a>	<del>320</del> <a href="#">13116</a>
400 kV Grid Connection Cable Corridor	<del>48</del> <a href="#">57</a>	<del>85</del> <a href="#">101</a>	<del>1,190</del> <a href="#">1428</a>	<del>0</del> <a href="#">15</a>	<del>11</del> <a href="#">40</a>	<del>5900</del> <a href="#">9419</a>
<b>Haul road removal</b>						
<del>Landfall</del> <a href="#">East of TJB, Blackpool Airport Land</a>	<del>54</del> <a href="#">68</a>	<del>95</del> <a href="#">120</a>	<del>375</del> <a href="#">479</a>	<del>36</del> <a href="#">249</a>	<del>47</del> <a href="#">398</a>	<del>150</del> <a href="#">1711</a>
<del>Onshore</del> Export Cable Corridor	<del>54</del>	<del>95</del>	<del>1,240</del>	<del>19</del>	<del>12</del>	<del>5800</del>
<del>Onshore</del> <a href="#">East of Blackpool Airport, West of Substations</a>	<del>54</del> <a href="#">68</a>	<del>95</del> <a href="#">120</a>	<del>61</del> <a href="#">701</a>	<del>0</del> <a href="#">45</a>	<del>4</del> <a href="#">78</a>	<del>320</del> <a href="#">18841</a>
400 kV Grid Connection Cable Corridor	<del>54</del> <a href="#">68</a>	<del>95</del> <a href="#">120</a>	<del>1,240</del> <a href="#">1701</a>	<del>0</del> <a href="#">20</a>	<del>10</del> <a href="#">61</a>	<del>6400</del> <a href="#">12143</a>

## Construction vibration

### 1.4.2.3

Impact magnitude bands have been generated to count how many receptors will be impacted during the dynamic compaction of the haul roads, construction of the temporary construction compounds, and the construction of the Onshore Substation platforms. Consideration has also been given to the potential vibration impacts arising due to piling activities for the installation of the trenchless technique entry/exit pits and construction of the

Onshore Substation platforms. The results are presented in **Table 1.12** below.

**Table 1.12: Number of receptors per construction vibration impact magnitude band.**

Location	Impact magnitude band distance (m)			Number of receptors		
	High	Medium	Low	High	Medium	Low
Dynamic compaction						
Haul Road	10	26	60	0	51	96
Temporary Construction Compounds (Onshore Export Cable Corridor)				0	33	189
Temporary Construction Compounds (Onshore Substations)				0	0	1
Onshore Substation Platforms				0	0	0
Vibratory piling						
Trenchless Technique Entry/Exit Pits	10	23	58	0	72	173
Onshore Substation Platforms				0	0	1

- 1.4.2.4 It should be noted that the assessment has not accounted for any vibration control measures to be included as part of the Construction Noise and Vibration Management Plan and that the results of the assessment present the highest possible vibration levels within the parameters of the empirical formulae used for predictions.

### Construction traffic

- 1.4.2.5 The full results of the construction traffic noise assessment are tabulated in **Appendix C**.
- 1.4.2.6 In summary, the existing baseline traffic flows on local highway networks are generally high with a minimum Basic Noise Level (BNL) of 60 dB(A) and a maximum BNL of 81 dB(A). As such, the introduction of construction vehicles to these networks does not contribute to a noticeable change to the BNL on the highway links for which baseline data is available.
- 1.4.2.7 As such, overall, the magnitude of impact is predicted to be low on residential dwellings adjacent to these roads, resulting in a minor adverse significance which is not significant.



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## 1.5 References

- British Standards Institution (2014a) *'British Standard 5228-1:2009+A1:2014 (2014) Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'*
- British Standards Institution (2014b) *'British Standard 5228-2:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'*
- British Standards Institution (2008), *'British Standard 6472-1:2008 – Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting'*
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- International Organisation for Standards (2010), *'ISO 4866:2010 – Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures'*
- International Organisation for Standards (1996) *'ISO 9613-2:1996 – Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'*.

## Appendix A: Construction Noise Source Spectra

Establish Access and TCC											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 dozer	1	100	103	92	94	91	90	96	80	74	99
30T excavator	2	100	93	92	95	94	90	87	84	79	96
20T dumper (Tipping)	3	50	115	104	108	103	103	104	97	93	109
20T dumper (Empty)	3	50	100	93	93	93	93	98	83	74	101
Smooth drum vibro road roller	1	100	108	100	91	90	88	83	77	72	93
21T excavator	1	100	98	101	94	91	90	88	87	84	96
5T tipping dumper (idling)	1	50	93	81	72	74	77	75	66	57	81
5T tipping dumper (driving)	1	50	106	102	88	87	87	87	82	75	93
Loading shovel	1	100	103	101	94	93	93	90	90	79	98
Tractor & fencing kit	1	100	97	89	96	93	96	88	79	73	98
Tractor & trailer	1	70	109	102	92	92	89	88	80	75	95
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Grader	1	10	106	105	101	97	102	96	92	83	105
Telehandler	1	70	96	90	83	82	95	83	71	64	96
Mobile crane	1	25	102	93	90	86	89	88	81	73	94

Establish Access and TCC											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile generator	2	25	85	82	86	80	79	75	66	57	84
Temporary lighting	6	25	92	85	80	76	73	69	70	63	80
Tipper lorry	3	100	112	106	98	98	98	97	94	91	104
Vibratory piling rig	2	10	104	103	100	103	105	103	98	88	109
Road surface paver & roller	1	25	99	96	93	92	91	88	86	77	96

TJB Excavation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	1	100	90	89	92	91	87	84	81	76	93
20T Dumper (Tipping)	3	50	93	92	95	94	90	87	84	79	96
Smooth Drum vibro road roller	1	10	98	102	93	92	90	85	79	74	95
20T Dumper (Empty)	3	50	100	93	93	93	93	98	83	74	101
21T excavator	1	50	95	101	94	91	90	88	87	84	96
5T tipping dumper (tipping)	1	50	93	84	75	77	80	78	69	60	84
5T tipping dumper (empty)	1	50	106	102	88	87	87	87	82	75	93
Tractor & fuel bowser	1	10	95	96	99	96	99	100	91	81	104
Tractor & water bowser	1	25	86	100	98	92	92	91	84	83	98

TJB Excavation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile welfare unit	1	25	71	81	82	79	72	68	63	56	80
Mobile generator	2	25	82	85	89	83	82	78	69	60	87
Temporary lighting	4	25	87	82	77	73	70	66	67	60	76
Pump	2	100	91	74	68	71	72	70	63	56	76
9T tipping dumper (tipping)	1	50	106	86	90	85	85	86	79	75	91
9T tipping dumper (empty)	1	50	105	91	91	91	91	96	81	72	99
13T tipping dumper (tipping)	1	50	100	90	94	89	89	90	83	79	95
13T tipping dumper (empty)	1	50	105	95	95	95	95	100	85	76	103

TJB Wall and Base Construction											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor & trailer	1	50	108	101	91	91	88	87	79	74	94
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
20T dumper (tipping)	2	50	113	102	106	101	101	102	95	91	107
20T dumper (empty)	1	50	88	79	71	74	75	83	65	60	85
Mobile concrete pump	1	50	94	88	81	80	93	81	69	62	94

TJB Wall and Base Construction											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Telehandler	1	25	71	74	75	72	65	61	56	49	73
Mobile welfare unit	2	50	88	85	89	83	82	78	69	60	87
Mobile generator	4	25	91	84	79	75	72	68	69	62	79
Temporary lighting	2	100	94	87	81	84	85	83	76	69	89
Pump	1	50	93	81	72	74	77	75	66	57	81
5T tipping dumper (idling)	2	50	98	91	91	91	91	96	81	72	99
5T tipping dumper (driving)	1	100	99	88	79	74	72	70	73	62	81
Air compressor	1	10	96	94	94	87	83	86	84	79	93
Concrete poker unit	1	50	106	102	88	87	87	87	82	75	93

Jointing of Cables in TJBs											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor & trailer	1	50	108	101	91	91	88	87	79	74	94
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Mobile crane	1	25	102	93	90	86	89	88	81	73	94
Cable laying tracked crane	1	25	85	83	18	79	86	78	70	61	87

Jointing of Cables in TJBs											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Telehandler	1	50	94	88	81	80	93	81	69	62	94
Mobile welfare unit	1	20	71	74	75	72	65	61	56	49	73
Crawler crane	1	25	85	83	18	79	86	78	70	61	87
Mobile generator	2	100	91	88	92	86	85	81	72	63	90
Temporary lighting	4	50	94	87	82	78	75	71	72	65	82
Pump	2	100	94	87	81	84	85	83	76	69	89

Backfill Over TJBs											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	1	100	90	89	92	91	87	84	81	76	93
20T dumper (tipping)	2	50	113	102	106	101	101	102	95	91	107
20T Dumper (empty)	2	50	98	91	91	91	91	96	81	72	99
21T excavator	1	100	98	101	94	91	90	88	87	84	96
5T tipping dumper (idling)	1	50	93	81	72	74	77	75	66	57	81
5T tipping dumper (driving)	1	50	106	102	88	87	87	87	82	75	93
Loading shovel	1	100	103	101	94	93	93	90	90	79	98
Trench Roller	1	75	99	95	84	88	84	81	77	74	90

Backfill Over TJBs											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor & trailer	1	25	105	98	88	88	85	84	76	71	91
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Cement mixer	1	25	72	76	69	69	68	64	62	60	73
Pre-cast concrete truck	1	5	102	90	86	88	81	76	74	69	88
Telehandler	1	25	91	85	78	77	90	78	66	59	91
Mobile welfare unit	1	25	71	74	75	72	65	61	56	49	73
Mobile generator	2	25	85	82	86	80	79	75	66	57	84
Temporary lighting	4	25	91	84	79	75	72	68	69	62	79
Pump	2	100	94	87	81	84	85	83	76	69	89

Site Preparation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 dozer	1	100	103	92	94	91	90	96	80	74	99
30T excavator	2	100	93	92	95	94	90	87	84	79	96
20T dumper (tipping)	3	50	115	104	108	103	103	104	97	93	109
20T dumper (empty)	3	50	100	93	93	93	93	98	83	74	101



Site Preparation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Smooth drum vibro road roller	1	100	108	100	91	90	88	83	77	72	93
21T excavator	1	100	98	101	94	91	90	88	87	84	96
5T tipping dumper (idling)	1	50	93	81	72	74	77	75	66	57	81
5T tipping dumper (driving)	1	50	106	102	88	87	87	87	82	75	93
Loading shovel	1	100	103	101	94	93	93	90	90	79	98
Tractor & fencing kit	1	100	97	89	96	93	96	88	79	73	98
Tractor & trailer	1	70	109	102	92	92	89	88	80	75	95
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Grader	1	10	106	105	101	97	102	96	92	83	105
Telehandler	1	70	96	90	83	82	95	83	71	64	96
Mobile welfare unit	1	25	71	74	75	72	65	61	56	49	73
Mobile generator	2	25	85	82	86	80	79	75	66	57	84
Temporary lighting	12	25	95	88	83	79	76	72	73	66	83
Tipper lorry	3	100	112	106	98	98	98	97	94	91	104

Trench Excavation and Duct Installation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	2	100	93	92	95	94	90	87	84	79	96
20T dumper (tipping)	2	50	113	102	106	101	101	102	95	91	107
20T dumper (empty)	2	50	98	91	91	91	91	96	81	72	99
21T excavator	2	100	101	104	97	94	93	91	90	87	99
5T tipping dumper (idling)	2	50	96	84	75	77	80	78	69	60	84
5T tipping dumper (driving)	2	50	109	105	91	90	90	90	85	78	96
Loading shovel	2	50	103	101	94	93	93	90	90	79	98
Trench roller	2	50	100	96	85	89	85	82	78	75	91
Tractor & trailer	1	50	108	101	91	91	88	87	79	74	94
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & Water bowser	1	25	89	97	95	89	89	88	81	80	95
Telehandler	1	50	94	88	81	80	93	81	69	62	94
Mobile welfare unit	1	25	71	74	75	72	65	61	56	49	73
Mobile generator	2	25	85	82	86	80	79	75	66	57	84
Temporary lighting	8	25	94	87	82	78	75	71	72	65	82
Pump	2	100	94	87	81	84	85	83	76	69	89
Cement wagon	2	100	91	96	96	96	92	91	86	84	98

Trench Backfill											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	2	100	93	92	95	94	90	87	84	79	96
20T dumper (tipping)	2	50	113	102	106	101	101	102	95	91	107
20T dumper (empty)	2	50	98	91	91	91	91	96	81	72	99
21T excavator	2	100	101	104	97	94	93	91	90	87	99
5T tipping dumper (idling)	2	50	96	84	75	77	80	78	69	60	84
5T tipping dumper (driving)	2	50	109	105	91	90	90	90	85	78	96
Loading shovel	2	100	106	104	97	96	96	93	93	82	101
Trench roller	2	75	102	98	87	91	87	84	80	77	93
Tractor & trailer	1	25	105	98	88	88	85	84	76	71	91
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Telehandler	1	25	91	85	78	77	90	78	66	59	91
Mobile welfare unit	1	100	78	81	82	79	72	68	63	56	80
Mobile generator	2	100	91	88	92	86	85	81	72	63	90
Temporary lighting	8	100	100	93	88	84	81	77	78	71	88
Pump	2	100	94	87	81	84	85	83	76	69	89

Trench Route Reinstatement											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 dozer	2	100	106	95	97	94	93	99	83	77	102
30T excavator	2	100	93	92	95	94	90	87	84	79	96
20T dumper (tipping)	2	50	113	102	106	101	101	102	95	91	107
20T dumper (empty)	2	50	98	91	91	91	91	96	81	72	99
Smooth drum vibro road roller	1	50	105	97	88	87	85	80	74	69	90
21T excavator	1	100	98	101	94	91	90	88	87	84	96
5T tipping dumper (idling)	2	50	96	84	75	77	80	78	69	60	84
5T tipping dumper (driving)	2	50	109	105	91	90	90	90	85	78	96
Loading shovel	2	100	106	104	97	96	96	93	93	82	101
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Mobile welfare unit	1	25	71	74	75	72	65	61	56	49	73
Mobile generator	2	25	85	82	86	80	79	75	66	57	84
Temporary lighting	8	25	94	87	82	78	75	71	72	65	82
Trenching machine	1	100	109	98	100	97	96	102	86	80	105
Tractor & soil tiller	1	25	91	83	90	87	90	82	73	67	92

Haul Road Removal											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 dozer	2	100	106	95	97	94	93	99	83	77	102
30T excavator	2	100	93	92	95	94	90	87	84	79	96
20T dumper (tipping)	2	50	113	102	106	101	101	102	95	91	107
20T dumper (empty)	2	50	98	91	91	91	91	96	81	72	99
Smooth drum vibro road roller	1	50	105	97	88	87	85	80	74	69	90
21T excavator	1	100	98	101	94	91	90	88	87	84	96
5T tipping dumper (idling)	2	50	96	84	75	77	80	78	69	60	84
5T tipping dumper (driving)	2	50	109	105	91	90	90	90	85	78	96
Loading shovel	2	100	106	104	97	96	96	93	93	82	101
Tractor & fencing kit	1	50	94	86	93	90	93	85	76	70	95
Tractor & trailer	1	50	108	101	91	91	88	87	79	74	94
Tractor & fuel bowser	1	10	88	89	92	89	92	93	84	74	97
Tractor & water bowser	1	25	89	97	95	89	89	88	81	80	95
Tractor & soil tiller	1	25	91	83	90	87	90	82	73	67	92
Mobile welfare unit	2	25	74	77	78	75	68	64	59	52	76
Mobile generator	2	25	85	82	86	80	79	75	66	57	84
Temporary lighting	12	25	95	88	83	79	76	72	73	66	83
Tipper lorry	3	100	112	106	98	98	98	97	94	91	104

Haul Road Removal											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Trenching machine	1	100	109	98	100	97	96	102	86	80	105

Direct Pipe – Landfall <sup>1</sup>											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile generator	1	100	88	85	89	83	82	78	69	60	87
Telehandler	1	75	96	90	83	82	95	83	71	64	96
30T excavator	1	100	90	89	92	91	87	84	81	76	93
21T excavator	1	100	98	101	94	91	90	88	87	84	96
Temporary lighting	4	25	91	84	79	75	72	68	69	62	79
Water pump	1	100	68	63	57	57	56	51	48	36	60
HDD drilling rig	1	10	70	69	66	69	71	69	64	54	75
Directional drill generator	1	100	94	107	101	99	99	99	95	88	105
HDD mounting supports	1	25	79	85	75	70	75	82	86	79	89
Mud pump	1	100	97	92	86	86	85	80	77	65	89

<sup>1</sup> Detailed plant not available for Direct Pipe at time of assessment. Therefore, HDD plant assumed. Plant quantities are per export cable

Direct Pipe – Landfall <sup>1</sup>											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mixing Tank	2	100	85	86	92	85	82	80	76	73	89
Cuttings/recycling tank	2	100	86	87	93	86	83	81	77	74	90

HDD Compound – Onshore Cable Route <sup>2</sup>											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile generator	1	100	88	85	89	83	82	78	69	60	87
Telehandler	2	75	99	93	86	85	98	86	74	67	99
30T excavator	2	100	93	92	95	94	90	87	84	79	96
21T excavator	1	100	98	101	94	91	90	88	87	84	96
Temporary lighting	8	25	94	87	82	78	75	71	72	65	82
Mobile crane	1	50	105	96	93	89	92	91	84	76	97
Water pump	2	100	71	66	60	60	59	54	51	39	63
HDD drilling rig	2	10	73	72	69	72	74	72	67	57	78
Directional drill generator	2	100	97	110	104	102	102	102	98	91	108

<sup>2</sup> Plant quantities are per export cable



HDD Compound – Onshore Cable Route <sup>2</sup>											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
HDD mounting supports	2	25	82	88	78	73	78	85	89	82	92
Mud pump	2	100	100	95	89	89	88	83	80	68	92
Mixing Tank	2	100	85	86	92	85	82	80	76	73	89
Cuttings/recycling tank	2	100	86	87	93	86	83	81	77	74	90

Micro-Tunnelling Compound – River Ribble											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile generator	1	100	88	85	89	83	82	78	69	60	87
Telehandler	1	75	96	90	83	82	95	83	71	64	96
30T excavator	2	100	93	92	95	94	90	87	84	79	96
21T excavator	2	100	101	104	97	94	93	91	90	87	99
Temporary lighting	4	25	91	84	79	75	72	68	69	62	79
Mobile crane	2	50	109	100	97	93	96	95	88	80	101
Water pump	2	100	71	66	60	60	59	54	51	39	63
Tunnel boring machine	2	50	63	62	59	62	64	62	57	47	68

Substation Groundworks											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	6	100	98	97	100	99	95	92	89	84	101
Excavator (hydraulic breaker)	4	100	95	91	89	90	93	93	91	86	99
D6 dozer	4	75	108	97	99	96	95	101	85	79	104
Air compressor	4	100	105	94	85	80	78	76	79	68	87
20T dumper (tipping)	8	70	120	109	113	108	108	109	102	98	114
20T dumper (empty)	2	100	101	94	94	94	94	99	84	75	102
Generator	2	100	86	83	87	81	80	76	67	58	85
Crusher	2	80	129	122	115	117	111	107	102	95	117
Smooth drum vibro road roller	2	70	109	101	92	91	89	84	78	73	94

Substation Access Road and Car Parking											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
21T excavator	2	100	101	104	97	94	93	91	90	87	99
20T dumper (tipping)	4	50	116	105	109	104	104	105	98	94	110
20T dumper (empty)	1	50	95	88	88	88	88	93	78	69	96
Asphalt spreader with lorry	1	100	99	98	93	93	92	90	83	77	97
Smooth drum vibro road roller	2	70	109	101	92	91	89	84	78	73	94

Substation Access Road and Car Parking											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Grader	1	100	116	115	111	107	112	106	102	93	115

Substation Concreting Works											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile generator	1	100	88	85	89	83	82	78	69	60	87
Concrete poker unit	4	70	110	108	108	101	97	100	98	93	107
Mobile concrete pump / concrete mixer truck	1	80	90	81	73	76	77	85	67	62	87
Temporary lighting	4	25	91	84	79	75	72	68	69	62	79

Substation Building and High Voltage Plant Installation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile crane	1	50	105	96	93	89	92	91	84	76	97
Lorry	3	25	108	94	86	85	89	84	83	76	93
MEWP	2	75	82	81	75	76	75	75	66	57	80

Substation Building and High Voltage Plant Installation											
Plant Item	Quantity	% On-Time	Sound Power Level (dB) at 1/1-Octave Band Centre Frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
20T dumper (tipping)	4	50	116	105	109	104	104	105	98	94	110
20T dumper (empty)	4	50	101	94	94	94	94	99	84	75	102
Air compressor	1	100	99	88	79	74	72	70	73	62	81
Forklift	2	50	98	92	88	86	86	82	78	75	90
Grinder	5	50	89	83	84	92	102	109	105	105	113
Pneumatic chipper/drill	3	50	91	80	76	79	79	84	92	93	96

## Appendix B: Construction Noise Model Output

### Construction noise impacts at receptors near landfall

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
<a href="#">Almond Close</a>	<a href="#">53</a>	<a href="#">65</a>	<a href="#">36</a>	<a href="#">Negligible</a>	<a href="#">35</a>	<a href="#">Negligible</a>	<a href="#">35</a>	<a href="#">Negligible</a>	<a href="#">30</a>	<a href="#">Negligible</a>	<a href="#">36</a>	<a href="#">Negligible</a>
<a href="#">Anson Close</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">48</a>	<a href="#">Negligible</a>	<a href="#">52</a>	<a href="#">Negligible</a>	<a href="#">51</a>	<a href="#">Negligible</a>	<a href="#">45</a>	<a href="#">Negligible</a>	<a href="#">52</a>	<a href="#">Negligible</a>
<a href="#">Blackpool Road North</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">54</a>	<a href="#">Low</a>	<a href="#">51</a>	<a href="#">Negligible</a>	<a href="#">50</a>	<a href="#">Negligible</a>	<a href="#">43</a>	<a href="#">Negligible</a>	<a href="#">50</a>	<a href="#">Negligible</a>
<a href="#">Broster Grove</a>	<a href="#">73</a>	<a href="#">75</a>	<a href="#">34</a>	<a href="#">Negligible</a>	<a href="#">31</a>	<a href="#">Negligible</a>	<a href="#">31</a>	<a href="#">Negligible</a>	<a href="#">26</a>	<a href="#">Negligible</a>	<a href="#">32</a>	<a href="#">Negligible</a>
<a href="#">Century Care Home</a>	<a href="#">73</a>	<a href="#">75</a>	<a href="#">36</a>	<a href="#">Negligible</a>	<a href="#">35</a>	<a href="#">Negligible</a>	<a href="#">35</a>	<a href="#">Negligible</a>	<a href="#">29</a>	<a href="#">Negligible</a>	<a href="#">35</a>	<a href="#">Negligible</a>
<a href="#">Christal Avenue</a>	<a href="#">73</a>	<a href="#">75</a>	<a href="#">23</a>	<a href="#">Negligible</a>	<a href="#">17</a>	<a href="#">Negligible</a>	<a href="#">18</a>	<a href="#">Negligible</a>	<a href="#">13</a>	<a href="#">Negligible</a>	<a href="#">19</a>	<a href="#">Negligible</a>
<a href="#">Clifton Drive North</a>	<a href="#">73</a>	<a href="#">75</a>	<a href="#">21</a>	<a href="#">Negligible</a>	<a href="#">16</a>	<a href="#">Negligible</a>	<a href="#">17</a>	<a href="#">Negligible</a>	<a href="#">12</a>	<a href="#">Negligible</a>	<a href="#">17</a>	<a href="#">Negligible</a>
<a href="#">Co-Op Travel Management</a>	<a href="#">66</a>	<a href="#">70</a>	<a href="#">39</a>	<a href="#">Negligible</a>	<a href="#">36</a>	<a href="#">Negligible</a>	<a href="#">36</a>	<a href="#">Negligible</a>	<a href="#">31</a>	<a href="#">Negligible</a>	<a href="#">37</a>	<a href="#">Negligible</a>
<a href="#">Coniston Avenue</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">45</a>	<a href="#">Negligible</a>	<a href="#">41</a>	<a href="#">Negligible</a>	<a href="#">40</a>	<a href="#">Negligible</a>	<a href="#">35</a>	<a href="#">Negligible</a>	<a href="#">41</a>	<a href="#">Negligible</a>
<a href="#">Cottam Close</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">44</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">Negligible</a>	<a href="#">33</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">Negligible</a>
<del>Almond</del> <a href="#">Drake Close</a>	<del>49</del> <a href="#">54</a>	<a href="#">65</a>	<del>59</del> <a href="#">61</a>	<a href="#">Low</a>	<del>56</del> <a href="#">58</a>	<a href="#">Low</a>	<del>55</del> <a href="#">57</a>	<a href="#">Low</a>	<del>49</del> <a href="#">51</a>	<del>Low</del> <a href="#">Negligible</a>	<del>56</del> <a href="#">57</a>	<a href="#">Low</a>
<a href="#">Dunepoint</a>	<a href="#">73</a>	<a href="#">75</a>	<a href="#">34</a>	<a href="#">Negligible</a>	<a href="#">33</a>	<a href="#">Negligible</a>	<a href="#">33</a>	<a href="#">Negligible</a>	<a href="#">27</a>	<a href="#">Negligible</a>	<a href="#">33</a>	<a href="#">Negligible</a>
<a href="#">Fieldway</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">55</a>	<a href="#">Low</a>	<a href="#">52</a>	<a href="#">Negligible</a>	<a href="#">51</a>	<a href="#">Negligible</a>	<a href="#">45</a>	<a href="#">Negligible</a>	<a href="#">51</a>	<a href="#">Negligible</a>
<del>Century Care Home</del> <a href="#">Holly Mews</a>	<del>69</del> <a href="#">54</a>	<del>70</del> <a href="#">65</a>	<a href="#">43</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">Negligible</a>	<a href="#">33</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">Negligible</a>

<del>Co-Op Travel Management</del> Honister Square	<del>66</del> 54	<del>70</del> 65	<del>38</del> 47	Negligible	<del>34</del> 45	Negligible	<del>34</del> 44	Negligible	<del>28</del> 38	Negligible	<del>34</del> 45	Negligible
Jellicoe Close	54	65	60	Low	57	Low	56	Low	50	Negligible	56	Low
<del>Kilgrimol Gardens</del> Dunepoint	<del>60</del> 53	65	40	Negligible	<del>36</del> 40	Negligible	<del>36</del> 39	Negligible	<del>30</del> 33	Negligible	<del>36</del> 40	Negligible
Leach Lane (N)	54	65	65	Medium	62	Low	61	Low	55	Low	61	Low
Leach Lane (S)	54	65	59	Low	56	Low	55	Low	49	Negligible	56	Low
<del>Linden Mews</del> Kilgrimol Gardens	<del>58</del> 54	65	<del>39</del> 45	Negligible	<del>34</del> 42	Negligible	<del>34</del> 42	Negligible	<del>29</del> 36	Negligible	<del>35</del> 42	Negligible
Redfern Way	53	65	<del>53</del> 34	<del>Low</del> Negligible	<del>50</del> 33	Negligible	<del>49</del> 33	Negligible	<del>43</del> 27	Negligible	<del>49</del> 33	Negligible
Rodney Avenue	54	65	58	Low	56	Low	54	Low	48	Negligible	55	Low
Summerfields	73	75	35	Negligible	31	Negligible	32	Negligible	26	Negligible	32	Negligible
<del>Westgate Road</del> The Hamlet	<del>53</del> 54	65	<del>52</del> 42	Negligible	<del>48</del> 35	Negligible	<del>47</del> 35	Negligible	<del>41</del> 29	Negligible	<del>48</del> 35	Negligible
Westgate Road	53	65	35	Negligible	33	Negligible	33	Negligible	28	Negligible	34	Negligible

### Construction noise impacts due to Direct Pipe at receptors near landfill

Name	Direct pipe (day)				Direct pipe (weekend)				Direct pipe (night-time)			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Almond Close	<del>49</del> <u>53</u>	65	28	Negligible	47	55	28	Negligible	<del>46</del> <u>42</u>	<del>50</del> <u>45</u>	<del>28</del> <u>31</u>	Negligible
<a href="#">Anson Close</a>	<u>54</u>	<u>65</u>	<u>43</u>	<a href="#">Negligible</a>	<u>50</u>	<u>55</u>	<u>43</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>44</u>	<a href="#">Low</a>
<a href="#">Blackpool Road North</a>	<u>54</u>	<u>65</u>	<u>33</u>	<a href="#">Negligible</a>	<u>50</u>	<u>55</u>	<u>33</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>35</u>	<a href="#">Negligible</a>
Broster Grove	73	75	24	Negligible	<del>73</del> <u>69</u>	<del>75</del> <u>69</u>	24	Negligible	<del>73</del> <u>65</u>	<del>75</del> <u>65</u>	25	Negligible
<a href="#">Century Care Home</a>	<u>73</u>	<u>75</u>	<u>28</u>	<a href="#">Negligible</a>	<u>69</u>	<u>69</u>	<u>28</u>	<a href="#">Negligible</a>	<u>65</u>	<u>65</u>	<u>30</u>	<a href="#">Negligible</a>
Christal Avenue	73	75	10	Negligible	<del>73</del> <u>69</u>	<del>75</del> <u>69</u>	10	Negligible	<del>73</del> <u>65</u>	<del>75</del> <u>65</u>	17	Negligible
Clifton Drive North	73	75	9	Negligible	<del>73</del> <u>69</u>	<del>75</del> <u>69</u>	9	Negligible	<del>73</del> <u>65</u>	<del>75</del> <u>65</u>	16	Negligible
<a href="#">Co-Op Travel Management</a>	<u>66</u>	<u>70</u>	<u>29</u>	<a href="#">Negligible</a>	<u>44</u>	<u>55</u>	<u>29</u>	<a href="#">Negligible</a>	<u>41</u>	<u>45</u>	<u>30</u>	<a href="#">Negligible</a>
<a href="#">Coniston Avenue</a>	<u>54</u>	<u>65</u>	<u>30</u>	<a href="#">Negligible</a>	<u>50</u>	<u>55</u>	<u>30</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>31</u>	<a href="#">Negligible</a>
<a href="#">Cottam Close</a>	<u>54</u>	<u>65</u>	<u>18</u>	<a href="#">Negligible</a>	<u>50</u>	<u>55</u>	<u>18</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>23</u>	<a href="#">Negligible</a>
Drake Close	54	65	37	Negligible	<del>54</del> <u>50</u>	<del>65</del> <u>55</u>	37	Negligible	54	65	40	Low
<a href="#">Dunepoint</a>	<u>73</u>	<u>75</u>	<u>28</u>	<a href="#">Negligible</a>	<u>69</u>	<u>69</u>	<u>28</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>27</u>	<a href="#">Negligible</a>
Fieldway	54	65	24	Negligible	<del>54</del> <u>50</u>	<del>65</del> <u>55</u>	24	Negligible	<del>54</del> <u>39</u>	<del>65</del> <u>45</u>	27	Negligible
<a href="#">Holly Mews</a>	<u>54</u>	<u>65</u>	<u>18</u>	<a href="#">Negligible</a>	<u>50</u>	<u>55</u>	<u>18</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>24</u>	<a href="#">Negligible</a>
<a href="#">Honister Square</a>	<u>54</u>	<u>65</u>	<u>32</u>	<a href="#">Negligible</a>	<u>50</u>	<u>55</u>	<u>32</u>	<a href="#">Negligible</a>	<u>39</u>	<u>45</u>	<u>33</u>	<a href="#">Negligible</a>

Name	Direct pipe (day)				Direct pipe (weekend)				Direct pipe (night-time)			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Jellicloe Close	54	65	39	Negligible	<del>54</del> 50	<del>65</del> 55	39	Negligible	<del>54</del> 39	<del>65</del> 45	41	Low
<a href="#">Kilgrimol Gardens</a>	<a href="#">53</a>	<a href="#">65</a>	<a href="#">31</a>	<a href="#">Negligible</a>	<a href="#">47</a>	<a href="#">55</a>	<a href="#">31</a>	<a href="#">Negligible</a>	<a href="#">42</a>	<a href="#">45</a>	<a href="#">32</a>	<a href="#">Negligible</a>
Leach Lane (N)	54	65	38	Negligible	<del>54</del> 50	<del>65</del> 55	38	Negligible	<del>54</del> 39	<del>65</del> 45	40	Low
Leach Lane (S)	54	65	35	Negligible	<del>54</del> 50	<del>65</del> 55	35	Negligible	<del>54</del> 39	<del>65</del> 45	36	Negligible
<a href="#">Linden Mews</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">28</a>	<a href="#">Negligible</a>	<a href="#">50</a>	<a href="#">55</a>	<a href="#">28</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">45</a>	<a href="#">29</a>	<a href="#">Negligible</a>
Redfern Way	53	65	26	Negligible	<del>53</del> 50	<del>65</del> 55	26	Negligible	<del>53</del> 39	<del>65</del> 45	26	Negligible
Rodney Avenue	54	65	34	Negligible	<del>54</del> 50	<del>65</del> 55	34	Negligible	<del>54</del> 39	<del>65</del> 45	36	Negligible
Summerfields	73	75	24	Negligible	<del>73</del> 69	<del>75</del> 69	24	Negligible	<del>73</del> 65	<del>75</del> 65	25	Negligible
<a href="#">The Hamlet</a>	<a href="#">54</a>	<a href="#">65</a>	<a href="#">28</a>	<a href="#">Negligible</a>	<a href="#">50</a>	<a href="#">55</a>	<a href="#">28</a>	<a href="#">Negligible</a>	<a href="#">39</a>	<a href="#">45</a>	<a href="#">30</a>	<a href="#">Negligible</a>
<a href="#">Westgate Road</a>	<a href="#">53</a>	<a href="#">65</a>	<a href="#">27</a>	<a href="#">Negligible</a>	<a href="#">47</a>	<a href="#">55</a>	<a href="#">27</a>	<a href="#">Negligible</a>	<a href="#">42</a>	<a href="#">45</a>	<a href="#">28</a>	<a href="#">Negligible</a>

### Construction noise impacts at receptors along the onshore cable corridor for activities concentrated within construction compounds

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
<del>Almond Close</del>	<del>49</del>	<del>65</del>	<del>36</del>	<del>Negligible</del>	<del>35</del>	<del>Negligible</del>	<del>35</del>	<del>Negligible</del>	<del>30</del>	<del>Negligible</del>	<del>36</del>	<del>Negligible</del>
<del>Anson Close</del>	<del>54</del>	<del>65</del>	<del>48</del>	<del>Negligible</del>	<del>52</del>	<del>Negligible</del>	<del>51</del>	<del>Negligible</del>	<del>45</del>	<del>Negligible</del>	<del>52</del>	<del>Negligible</del>



Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
Beechfield	49	65	51	Low	47	Negligible	46	Negligible	40	Negligible	47	Negligible
Blackhurst Cottage	47	65	54	Low	51	Low	50	Low	43	Negligible	50	Low
Bridge Farm	68	70	58	Negligible	55	Negligible	54	Negligible	48	Negligible	54	Negligible
<del>Broster Grove</del>	<del>73</del>	<del>75</del>	<del>34</del>	<del>Negligible</del>	<del>31</del>	<del>Negligible</del>	<del>31</del>	<del>Negligible</del>	<del>26</del>	<del>Negligible</del>	<del>32</del>	<del>Negligible</del>
Brythorpe Lodge	49	65	51	Low	48	Negligible	47	Negligible	41	Negligible	48	Negligible
<del>Century Care Home</del>	<del>69</del>	<del>70</del>	<del>36</del>	<del>Negligible</del>	<del>35</del>	<del>Negligible</del>	<del>35</del>	<del>Negligible</del>	<del>29</del>	<del>Negligible</del>	<del>35</del>	<del>Negligible</del>
<del>Christal Avenue</del>	<del>73</del>	<del>75</del>	<del>23</del>	<del>Negligible</del>	<del>17</del>	<del>Negligible</del>	<del>18</del>	<del>Negligible</del>	<del>13</del>	<del>Negligible</del>	<del>19</del>	<del>Negligible</del>
<del>Clifton Drive North</del>	<del>73</del>	<del>75</del>	<del>21</del>	<del>Negligible</del>	<del>16</del>	<del>Negligible</del>	<del>17</del>	<del>Negligible</del>	<del>12</del>	<del>Negligible</del>	<del>17</del>	<del>Negligible</del>
Clifton House	56	65	57	Low	54	Negligible	53	Negligible	47	Negligible	54	Negligible
Clifton Marsh Farm	49	65	52	Low	49	Low	48	Negligible	42	Negligible	48	Negligible
<del>Co-Op Travel Management</del>	<del>66</del>	<del>70</del>	<del>39</del>	<del>Negligible</del>	<del>36</del>	<del>Negligible</del>	<del>36</del>	<del>Negligible</del>	<del>31</del>	<del>Negligible</del>	<del>37</del>	<del>Negligible</del>
Division Lane (E)	52	65	64	Low	61	Low	60	Low	54	Low	60	Low

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
Division Lane (W)	52	65	62	Low	59	Low	58	Low	52	Low	59	Low
Dowbridge Farm	63	65	52	Negligible	48	Negligible	47	Negligible	41	Negligible	48	Negligible
<del>Drake Close</del>	<del>54</del>	<del>65</del>	<del>61</del>	<del>Low</del>	<del>58</del>	<del>Low</del>	<del>57</del>	<del>Low</del>	<del>51</del>	<del>Negligible</del>	<del>57</del>	<del>Low</del>
<del>Dunepoint</del>	<del>60</del>	<del>65</del>	<del>34</del>	<del>Negligible</del>	<del>33</del>	<del>Negligible</del>	<del>33</del>	<del>Negligible</del>	<del>27</del>	<del>Negligible</del>	<del>33</del>	<del>Negligible</del>
<del>Fieldway</del>	<del>54</del>	<del>65</del>	<del>55</del>	<del>Low</del>	<del>52</del>	<del>Negligible</del>	<del>51</del>	<del>Negligible</del>	<del>45</del>	<del>Negligible</del>	<del>51</del>	<del>Negligible</del>
Freshfield Farm (NE Facade)	47	65	43	Negligible	39	Negligible	39	Negligible	33	Negligible	39	Negligible
Freshfield Farm (SE Facade)	47	65	45	Negligible	40	Negligible	40	Negligible	34	Negligible	40	Negligible
Greenfield Caravan Park	59	65	51	Negligible	48	Negligible	47	Negligible	41	Negligible	48	Negligible
Greenlands Farmhouse	49	65	57	Low	54	Low	53	Low	47	Negligible	53	Low
Grey Cottage	42	65	37	Negligible	32	Negligible	32	Negligible	27	Negligible	33	Negligible
Hall Cross Barn	48	65	58	Low	54	Low	53	Low	47	Negligible	54	Low
Highfield Close	56	65	58	Low	54	Negligible	53	Negligible	48	Negligible	54	Negligible

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
Hillock Cross Farm	48	65	60	Low	56	Low	55	Low	49	Low	56	Low
Howick Cross Lane	47	65	57	Low	54	Low	53	Low	47	Low	53	Low
Howick Hall Farm	47	65	46	Negligible	43	Negligible	42	Negligible	36	Negligible	43	Negligible
Howick Row	42	65	55	Low	52	Low	51	Low	45	Low	51	Low
Howick School House	48	65	60	Low	57	Low	56	Low	49	Low	56	Low
Jellicoe Close	54	65	60	Low	57	Low	56	Low	50	Negligible	56	Low
Kilgrimol Gardens	58	65	40	Negligible	40	Negligible	39	Negligible	33	Negligible	40	Negligible
Laneside	56	65	55	Negligible	52	Negligible	51	Negligible	45	Negligible	51	Negligible
Lawns Farm	68	70	53	Negligible	50	Negligible	49	Negligible	43	Negligible	49	Negligible
Leach Lane (N)	54	65	65	Medium	62	Low	61	Low	55	Low	61	Low
Leach Lane (S)	54	65	59	Low	56	Low	55	Low	49	Negligible	56	Low
Manor Drive	63	65	54	Negligible	51	Negligible	50	Negligible	44	Negligible	50	Negligible

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
Marsh Farm	42	65	56	Low	53	Low	52	Low	46	Low	53	Low
Marybank Farm	59	65	56	Negligible	53	Negligible	52	Negligible	46	Negligible	53	Negligible
Meadow View	48	65	55	Low	51	Low	50	Low	45	Negligible	51	Low
Mulberry Close	56	65	56	Low	53	Negligible	52	Negligible	46	Negligible	52	Negligible
Nook Cottages	56	65	54	Negligible	51	Negligible	50	Negligible	44	Negligible	51	Negligible
Old Toll House	59	65	53	Negligible	50	Negligible	49	Negligible	43	Negligible	49	Negligible
Olroy House	49	65	48	Negligible	43	Negligible	43	Negligible	37	Negligible	43	Negligible
Quaker Wood Stables	50	65	68	Medium	65	Medium	64	Low	57	Low	64	Low
Redfern Way	53	65	34	Negligible	33	Negligible	33	Negligible	27	Negligible	33	Negligible
Redney Avenue	54	65	58	Low	56	Low	54	Low	48	Negligible	55	Low
Rowan Veterinary Centre	48	65	65	Medium	62	Low	61	Low	55	Low	61	Low
School House	68	70	57	Negligible	54	Negligible	53	Negligible	47	Negligible	54	Negligible

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
Semper House	49	65	58	Low	55	Low	54	Low	47	Negligible	54	Low
SJ Landscapes	42	65	34	Negligible	28	Negligible	28	Negligible	23	Negligible	29	Negligible
Summerfields	73	75	35	Negligible	31	Negligible	32	Negligible	26	Negligible	32	Negligible
Sundown	49	65	68	Medium	65	Medium	63	Low	57	Low	64	Low
Sunnyfield	49	65	65	Medium	62	Low	61	Low	55	Low	61	Low
The Chaltons	48	65	57	Low	54	Low	53	Low	47	Negligible	53	Low
The Old Dairy	42	65	31	Negligible	24	Negligible	25	Negligible	19	Negligible	25	Negligible
Tithe Barn Farm	47	65	59	Low	55	Low	54	Low	48	Low	55	Low
Townley Lane	42	65	47	Low	43	Low	43	Low	37	Negligible	43	Low
Walton Farm	47	65	55	Low	52	Low	51	Low	45	Negligible	52	Low
West Moss Lane	68	70	55	Negligible	53	Negligible	51	Negligible	45	Negligible	52	Negligible
West Winds	49	65	59	Low	56	Low	55	Low	49	Low	55	Low
Westgate Road	53	65	35	Negligible	33	Negligible	33	Negligible	28	Negligible	34	Negligible

Name	LOAEL (dB)	SOAEL (dB)	Establish Access and TCC		Joint Bay Excavation		Joint Bay Base Construction		Cable Jointing		Joint Bay Backfill	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact
White Gates	68	70	61	Negligible	58	Negligible	57	Negligible	51	Negligible	58	Negligible
White Lodge	68	70	65	Negligible	62	Negligible	61	Negligible	55	Negligible	61	Negligible
Wrea Brook Barn	42	65	35	Negligible	29	Negligible	29	Negligible	24	Negligible	30	Negligible
<a href="#">Wrea Green Equestrian Centre</a>	<a href="#">42</a>	<a href="#">65</a>	<a href="#">61</a>	<a href="#">Low</a>	<a href="#">58</a>	<a href="#">Low</a>	<a href="#">57</a>	<a href="#">Low</a>	<a href="#">50</a>	<a href="#">Low</a>	<a href="#">57</a>	<a href="#">Low</a>

### Construction noise impacts at receptors due to Trenchless Techniques

Name	Trenchless techniques (day)				Trenchless techniques (weekend)				Trenchless techniques (night-time) <sup>3</sup>			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Almond Close	<del>49</del> <a href="#">53</a>	65	24	Negligible	47	55	24	Negligible	-	-	-	-
Anson Close	54	65	32	Negligible	50	55	32	Negligible	-	-	-	-
Beechfield	49	65	35	Negligible	48	55	35	Negligible	-	-	-	-
Blackhurst Cottage	47	65	31	Negligible	44	55	31	Negligible	-	-	-	-
Blackpool Road North	54	65	57	Low	50	55	57	Medium	39	45	57	High

<sup>3</sup> Night-time levels only reported for receptors in vicinity of Blackpool Airport, where trenchless techniques are likely to be undertaken during night time hours

Name	Trenchless techniques (day)				Trenchless techniques (weekend)				Trenchless techniques (night-time) <sup>3</sup>			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Bridge Farm	68	70	45	Negligible	64	65	45	Negligible	-	-	-	-
Broster Grove	73	75	22	Negligible	69	69	22	Negligible	-	-	-	-
Brythorpe Lodge	49	65	43	Negligible	47	55	43	Negligible	-	-	-	-
Century Care Home	<del>69</del> 73	<del>70</del> 75	23	Negligible	<del>65</del> 69	<del>65</del> 69	23	Negligible	-	-	-	-
Christal Avenue	73	75	11	Negligible	69	69	11	Negligible	-	-	-	-
Clifton Drive North	73	75	9	Negligible	69	69	9	Negligible	-	-	-	-
Clifton House	56	65	40	Negligible	53	55	40	Negligible	-	-	-	-
Clifton Marsh Farm	49	65	36	Negligible	48	55	36	Negligible	-	-	-	-
Coniston Avenue	54	65	47	Negligible	50	55	47	Negligible	39	45	47	Medium
Co-Op Travel Management	66	70	17	Negligible	44	55	17	Negligible	-	-	-	-
Cottam Close	54	65	46	Negligible	50	55	46	Negligible	39	45	47	Medium
Division Lane (E)	52	65	42	Negligible	44	55	42	Negligible	-	-	-	-
Division Lane (W)	52	65	42	Negligible	44	55	42	Negligible	-	-	-	-
Dowbridge Farm	63	65	33	Negligible	59	60	33	Negligible	-	-	-	-
Drake Close	54	65	38	Negligible	50	55	38	Negligible	-	-	-	-
Dunepoint	<del>60</del> 73	<del>65</del> 75	20	Negligible	<del>56</del> 69	<del>60</del> 69	20	Negligible	-	-	-	-
Fieldway	54	65	54	Low	50	55	54	Low	39	45	55	High
Freshfield Farm (NE Facade)	47	65	37	Negligible	45	55	37	Negligible	-	-	-	-

Name	Trenchless techniques (day)				Trenchless techniques (weekend)				Trenchless techniques (night-time) <sup>3</sup>			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Freshfield Farm (SE Facade)	47	65	40	Negligible	45	55	40	Negligible	-	-	-	-
Greenfield Caravan Park	59	65	37	Negligible	57	60	37	Negligible	-	-	-	-
Greenlands Farmhouse	49	65	39	Negligible	47	55	39	Negligible	-	-	-	-
Grey Cottage	42	65	46	Low	41	55	46	Low	-	-	-	-
Hall Cross Barn	48	65	53	Low	46	55	53	Low	-	-	-	-
Highfield Close	56	65	40	Negligible	53	55	40	Negligible	-	-	-	-
Hillock Cross Farm	48	65	40	Negligible	46	55	40	Negligible	44	45	55	High
Holly Mews	54	65	55	Low	50	55	55	Medium	39	45	47	Medium
Honister Square	54	65	47	Negligible	50	55	47	Negligible	-	-	-	-
Howick Cross Lane	47	65	40	Negligible	44	55	40	Negligible	-	-	-	-
Howick Hall Farm	47	65	47	Low	44	55	47	Low	-	-	-	-
Howick Row	42	65	47	Low	41	55	47	Low	-	-	-	-
Howick School House	48	65	36	Negligible	46	55	36	Negligible	-	-	-	-
Jellicloe Close	54	65	36	Negligible	50	55	36	Negligible	-	-	-	-
Kilgrimol Gardens	<del>58</del> 53	65	26	Negligible	<del>54</del> 47	55	26	Negligible	-	-	-	-
Laneside	56	65	37	Negligible	53	55	37	Negligible	-	-	-	-



Name	Trenchless techniques (day)				Trenchless techniques (weekend)				Trenchless techniques (night-time) <sup>3</sup>			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
Lawns Farm	68	70	46	Negligible	64	65	46	Negligible	-	-	-	-
Leach Lane (N)	54	65	29	Negligible	50	55	29	Negligible	39	45	40	Low
Leach Lane (S)	54	65	37	Negligible	50	55	37	Negligible	39	45	50	High
Linden Mews	54	65	50	Negligible	50	55	50	Low	-	-	-	-
Manor Drive	63	65	33	Negligible	59	60	33	Negligible	-	-	-	-
Marsh Farm	42	65	46	Low	41	55	46	Low	-	-	-	-
Marybank Farm	59	65	42	Negligible	57	60	42	Negligible	-	-	-	-
Meadow View	48	65	42	Negligible	46	55	42	Negligible	-	-	-	-
Mulberry Close	56	65	41	Negligible	53	55	41	Negligible	-	-	-	-
Nook Cottages	56	65	41	Negligible	53	55	41	Negligible	-	-	-	-
Old Toll House	59	65	36	Negligible	57	60	36	Negligible	-	-	-	-
Olroy House	49	65	39	Negligible	47	55	39	Negligible	-	-	-	-
Quaker Wood Stables	50	65	43	Negligible	47	55	43	Negligible	-	-	-	-
Redfern Way	53	65	23	Negligible	47	55	23	Negligible	-	-	-	-
Rodney Avenue	54	65	36	Negligible	50	55	36	Negligible	-	-	-	-
Rowan Veterinary Centre	48	65	40	Negligible	46	55	40	Negligible	-	-	-	-
School House	68	70	45	Negligible	64	65	45	Negligible	-	-	-	-
Semper House	49	65	40	Negligible	47	55	40	Negligible	-	-	-	-

Name	Trenchless techniques (day)				Trenchless techniques (weekend)				Trenchless techniques (night-time) <sup>3</sup>			
	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact	LOAEL (dB)	SOAEL (dB)	Level (dB)	Impact
SJ Landscapes	42	65	52	Low	41	55	52	Low	-	-	-	-
Summerfields	73	75	23	Negligible	69	69	23	Negligible	-	-	-	-
Sundown	49	65	51	Low	47	55	51	Low	-	-	-	-
Sunnyfield	49	65	50	Low	47	55	50	Low	-	-	-	-
The Chaltons	48	65	56	Low	46	55	56	Medium	-	-	-	-
The Hamlet	54	65	52	Negligible	50	55	52	Low	39	45	49	Medium
The Old Dairy	42	65	49	Low	41	55	49	Low	-	-	-	-
Tithe Barn Farm	47	65	32	Negligible	44	55	32	Negligible	-	-	-	-
Townley Lane	42	65	47	Low	41	55	47	Low	-	-	-	-
Walton Farm	47	65	34	Negligible	44	55	34	Negligible	-	-	-	-
West Moss Lane	68	70	42	Negligible	64	65	42	Negligible	-	-	-	-
West Winds	49	65	40	Negligible	47	55	40	Negligible	-	-	-	-
Westgate Road	53	65	24	Negligible	47	55	24	Negligible	-	-	-	-
White Gates	68	70	47	Negligible	64	65	47	Negligible	-	-	-	-
White Lodge	68	70	49	Negligible	64	65	49	Negligible	-	-	-	-
Wrea Brook Barn	42	65	51	Low	41	55	51	Low	-	-	-	-
Wrea Green Equestrian Centre	42	65	41	Negligible	41	55	41	Low	-	-	-	-



## Construction noise impacts near the onshore substations

Name	LOAEL – day (dB)	SOAEL – day (dB)	Car park and access		Groundworks		Building foundations		Building fabrication and HV Plant		LOAEL – night (dB)	SOAEL– night (dB)	Concrete pour	
			Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact	Level (dB)	Impact			Level	Impact
Dowbridge Farm	63	65	51	Negligible	49	Negligible	41	Negligible	41	Negligible	56	60	35	Negligible
Freshfield Farm (SE Facade)	47	65	44	Negligible	52	Low	46	Negligible	46	Negligible	42	45	40	Negligible
Manor Drive	63	65	53	Negligible	49	Negligible	41	Negligible	42	Negligible	56	60	35	Negligible
Marybank Farm	59	65	55	Negligible	54	Negligible	47	Negligible	47	Negligible	51	55	37	Negligible

## Appendix C: Construction traffic noise assessment results

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A584 between Waterloo Road and Squires Gate Lane	10410	132	66.3	10471	132	66	0	Negligible
Waterloo Road between A585 and B5262 roundabout.	2227	151	57	2437	151	58	1	Low
A5073 Waterloo Road between B5262 roundabout and B5261	10557	57	66	10766	57	66	0	Negligible
B5262 between A5073 Waterloo Road and A5230 Squires Gate Lane	8056	32	65	8116	32	65	0	Negligible
B5261 between A5073 Waterloo Road and A5230 Squires Gate Lane	9041	86	66	9113	86	66	0	Negligible
A5073 Waterloo Road between B5261 roundabout and Preston New Road	13795	184	68	14012	184	69	1	Low
A583 between B5390 and M55 J4	23902	519	70	24136	519	70	0	Negligible
A5230 between A584 and Westgate Road	14321	381	68	14418	396	68	0	Negligible
Westgate Road from A5230 and Access A4, A5, A6	925	0	49	925	0	49	0	Negligible
A5230 between Westgate Road and Amy Johnson Way	16143	284	68	16249	298	68	0	Negligible
Amy Johnson Way between A5230 and A10, A11, S13	18484	826	69	18484	826	69	0	Negligible

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A5230 between Amy Johnson Way and B5261	15899	533	68	16014	547	68	0	Negligible
A5230 between B5261 and Ashworth Road Roundabout	18223	1060	71	18456	1144	72	1	Low
A5230 between Ashworth Road roundabout and M55 J4	32790	1229	73	33178	1313	73	0	Negligible
A584 Clifton Drive North between A5230 Squires Gate Lane and North Beach Car Park	19886	245	69	19978	259	69	0	Negligible
Highbury Road W between A584 and St Anne's Old Links Golf Club.	5240	32	63	5240	32	63	0	Negligible
A584 Clifton Drive North between North Beach Car Park and Saltcotes Road	13124	101	67	13227	101	67	0	Negligible
B5261 Queensway between A5230 Waterloo Road and accesses A7 / A8	11649	196	67	11865	265	67	0	Negligible
B5261 Queensway between accesses A7 / A8 and Kilnhouse Lane	11649	196	69	11806	238	69	0	Negligible
Kilnhouse Lane from B5261 Queensway and Blackpool Road North junction	7792	171	65	7952	213	65	0	Negligible
Blackpool Road North from Kilnhouse Lane junction and access 5	1744	6	55	1901	49	55	0	Negligible

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
B5261 between Blackpool Road N and B5410 junction	16374	300	68	16439	300	68	0	Negligible
B5261 between B5410 junction and A584	19334	162	69	19398	162	69	0	Negligible
B5410 between B5261 junction and Moss Hall Lane	9770	82	66	9820	82	66	0	Negligible
B5410 between roundabout with School Road and Preston New Road roundabout	12744	129	69	12799	134	69	0	Negligible
A5853 Preston New Road between B5410 roundabout and M55 J4	25865	323	72	26077	328	72	0	Negligible
Peel Road between Ballam Road and Preston New Road	1545	10	57	1610	10	57	0	Negligible
Ballam Road between Peel Road and accesses A16 and A19	3209	11	61	3278	25	61	0	Negligible
Ballam Road between accesses A16 and A19 and A584 East Beach	3209	11	61	3264	11	61	0	Negligible
Saltcotes Road between A584 Preston Road and Access A36 and A37	5323	64	63	5373	64	63	0	Negligible
B5259 Saltcotes Road between B5260 Station Road and Corka Lane Access	4687	63	61	4745	71	61	0	Negligible
B5259 Saltcotes Road between Corka Lane Access and A25 / A26	4687	63	63	4742	68	63	0	Negligible

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
Ballam Road between Peel Road and Fox Lane Ends	2135	16	60	2243	44	60	0	Negligible
A583 between B5410 roundabout and Fox Lane Ends	11545	156	69	11737	156	70	1	Low
B5260 Fox Lane Ends between A583 Preston New Road and Balham Road	5909	56	64	6052	104	64	0	Negligible
B5260 Fox Lane Ends between Balham Road and Ribby Road roundabout	5909	56	64	6005	86	64	0	Negligible
B5259 between B5260 mini roundabout and A583	8268	90	64	8342	90	64	0	Negligible
Bryning Lane between B5260 mini roundabout and Accesses A42 - A45	7482	107	63	7600	135	63	0	Negligible
Bryning Lane between Accesses A42-A45 and Lytham Road	5268	101	62	5323	101	62	0	Negligible
A584 Preston Road between Saltcotes Road and Church Road	15991	302	68	16089	302	68	0	Negligible
A583 between Fox Lane Ends and A585 roundabout	10875	304	70	11144	351	70	0	Negligible
A585 between A583 and J3 of M55	16269	352	72	16533	457	72	0	Negligible
A583 between A585 and Kirkham Road	13678	273	71	13993	334	71	0	Negligible



Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
Kirkham Road between A583 Kirkham Bypass and Access A52	7509	90	67	7632	102	67	0	Negligible
Kirkham Road between Access A52 and A53 and A584	4444	52	63	4542	52	63	0	Negligible
A584 between Church Road and Kirkham Road	15191	140	68	15298	140	68	0	Negligible
A584 Preston New Road between accesses A48 and A49	14190	241	71	14543	366	71	0	Negligible
A584 Preston New Road between Kirkham Road and Access A48	14190	241	71	14543	366	71	0	Negligible
A584 Preston New Road between A583 Blackpool Road and Access A51	14469	418	71	14821	544	71	0	Negligible
A584 Preston New Road between accesses A49 / A51	14469	418	71	14821	544	71	0	Negligible
A583 Kirkham Bypass between Freckleton/Kirkham Road and Morgan substation access	11302	116	70	11590	165	70	0	Negligible
A583 Kirkham Bypass between Morgan substation access and access A50	11302	116	70	11593	165	70	0	Negligible
A583 Kirkham Bypass between access A50 and accesses A52 / A53	11302	116	70	11589	165	70	0	Negligible

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A583 Kirkham Bypass between accesses A52 / A53 and Preston New Road	11302	116	70	11589	165	70	0	Negligible
Lodge Lane between Access A65 A66 and A583	2140	23	62	2140	23	62	0	Negligible
A583 Blackpool Road between Preston New Road and access A56	25163	660	74	25669	835	74	0	Negligible
A583 Blackpool Road between accesses A56 / A57	25163	660	74	25663	829	74	0	Negligible
A583 Blackpool Road between access A57 and Preston Western Distributor	25163	660	74	25649	826	74	0	Negligible
A582 Edith Rigby Way from A583 and Avice Pimblett Way	13880	990	71	14294	1196	71	0	Negligible
A582 Edith Rigby Way from Avice Pimblett Way and William Young Way	16890	1156	72	17301	1361	72	0	Negligible
William Young Way	4724	67	65	4775	67	65	0	Negligible
A582 Edith Rigby Way between William Young Way and M55 Junction 2	16473	1163	72	16883	1369	72	0	Negligible
A583 Riversway between Preston Western Distributor junction and Nelson Way	20866	704	73	21172	760	73	0	Negligible
Nelson Way from A583 Riversway to Access A71	4015	205	62	4225	261	62	0	Negligible

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
M55 between M6 J32 and M55 J1	70425	4683	81	71148	5073	81	0	Negligible
M55 between J1 (A6) and J2 (PWD)	72919	7511	81	73659	7900	82	1	Low
M55 between J2 (PWD) and J3 (A585)	66062	4360	81	66500	4544	81	0	Negligible
M55 between J3 (A585) and J4 (Preston New Road)	46650	2566	80	46904	2645	81	1	Low
M6 (North of M55 junction)	73948	11758	82	74281	12074	83	1	Low
M6 between J32 and J31A	131149	16262	84	131947	16737	84	0	Negligible
M6 between J31A and J31	153933	21560	85	154733	22034	85	0	Negligible
M6 between J31 and J30	159200	21898	85	159990	22372	85	0	Negligible
M61 between M6 J30 and M61 J9 (M65 junction)	75170	8227	82	75829	8701	82	0	Negligible
M65 east of J2 (M61 junction)	65476	7353	81	65859	7668	81	0	Negligible
M61 south of M61 J9 (M65 junction)	69830	7010	81	70246	7325	81	0	Negligible
M65 between M61 J9 and M6 J29	53056	5734	80	53224	5819	80	0	Negligible
M6 between M6 J30 (M61 junction) and A6 junction	83957	13307	82	84612	13782	82	0	Negligible
M6 south of J29 (M65 junction)	100391	15711	83	100774	16027	83	0	Negligible
A6 between M65 roundabout and A582 roundabout	40896	2308	76	41152	2392	76	0	Negligible
A582 between A6 junction and B5254	31412	2156	75	31667	2240	75	0	Negligible

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A582 Farington Road between B5254 junction and Croston Road roundabout	25527	1179	74	25783	1264	74	0	Negligible
A582 Flensburg Way	22086	804	73	22344	889	73	0	Negligible
A582 Penwortham Way between Flensburg Way roundabout and Chain House Lane junction	22939	559	73	23204	644	73	0	Negligible
A582 Penwortham Way between Chain House Lane junction and Pope Lane	19503	462	73	19769	547	74	1	Low
A582 Penwortham Way between Pope Lane junction and A59	18483	663	72	18748	747	72	0	Negligible
A59 between A582 roundabout and Liverpool Road junction	17582	1051	72	17856	1136	72	0	Negligible
A59 southwest of Liverpool Road junction to Lindle Lane	23029	657	70	23336	741	70	0	Negligible
Liverpool Road between A59 junction and Howick Cross Lane access	10224	45	66	10401	78	66	0	Negligible
Howick Cross Lane between Liverpool Road and Penwortham substation access	1034	13	49	1148	46	50	1	Low