



Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 3, Chapter 6: Onshore Noise and Vibration

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Annexes

Annex number	Annex title
Volume 3, Annex 6.1	Onshore Noise and Vibration Baseline Technical Report
Volume 3, Annex 6.2	Onshore Noise and Vibration Construction Technical Report

Glossary

Term	Meaning
Alternating current (AC) connection cables	AC cables that will connect the proposed onshore land substation to the National Grid Hawthorn Pit Substation.
AC connection cable corridor	The corridor within which the AC connection cables will be located, from the onshore land substation to the National Grid Hawthorn Pit Substation.
Ambient sound level	The total sound pressure level in a given position from all surrounding sources of noise, both near and far. Normally expressed as an equivalent continuous A-weighted sound pressure level, dB $L_{Aeq,T}$.
A-weighting	The process of weighting the observed sound pressure level at each frequency band, to approximate the sensitivity of the human ear to sounds of different frequencies. A-weighted sound pressure levels are expressed as dB(A) or dB L_{Ap} .
Commitments	Measures (embedded mitigation & secondary) to be adopted during the construction, operation and maintenance, and decommissioning phases of the Morven Hawthorn Pit Grid Connection (MHPGC) Project.
Cumulative effect	For each environmental topic, the baseline environment will be characterised, and the likely significant effect will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic and are based on the maximum spatial extent.
Cumulative effects assessment	Assessment of the likely effects arising from the MHPFC Project alongside the likely effects arising from other proposed developments on the same receptor or resource.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in sound pressure level between two sounds is given by $20 \log_{10}$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20 \mu\text{Pa}$.
Embedded mitigation	Measures included as part of the project design. Includes both primary and tertiary mitigation.
Environmental Impact Assessment (EIA)	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.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Free-field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Frequency	The number of oscillations per second of a vibrating particle in a medium, measured in Hertz (Hz) or cycles per second.
Inter-related effects	Effects that may arise from the interactions between different EIA topic effects considered within the alone assessment, potentially leading to more significant effects than if they were to be considered in isolation.
Landfall	The area in which the offshore export cables make landfall (come onshore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between the trenchless technique exit pits and the transition joint bay (TJB) inclusive of all construction works.
$L_{A90,T}$	The A-weighted sound pressure level exceeded during 90% of the time interval, T. Typically used to quantify the background sound level at a specified position.

Term	Meaning
$L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level over a time interval, T. This is an energy-average sound pressure level over the specified time period.
$L_{AFmax,T}$	The maximum A-weight sound pressure level during a specified time interval, T. Measured with “fast” time-weighting (which approximates the time-response of the human ear).
$L_{Ar,Tr}$ (Rating level)	A-weighted rating level of the specific sound source over the reference time period T_r , as defined in BS 4142:2014+A1:2019. Calculated from the specific sound level $L_{Aeq,Tr}$ with the addition of any character corrections (e.g., tonality, impulsivity, intermittency, other characteristics). Used to assess impact by comparison with $L_{A90,T}$ at the same receptor and period.
$L_{A90,T}$ (Background sound level)	A-weighted background sound level over the reference time period T: the level exceeded for 90% of the time. Determined from measurements and selected as representative of the underlying sound environment, excluding atypical events, in line with BS 4142 guidance. Used as the reference for comparison with $L_{Ar,Tr}$ at the same receptor and period.
L_r (Residual sound level)	The equivalent continuous A-weighted sound pressure level of the ambient sound remaining at a specified position when the specific sound source (the sound source being assessed) does not contribute to the ambient sound.
L_s (Specific sound level)	The equivalent continuous A-weighted sound pressure level at a specified position due to the specific sound source (the sound source being assessed).
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact.
Maximum design scenario (MDS)	The realistic, worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the MHPGC Project.
MHPGC Project Environmental Statement (ES)	The document presenting the results of the Environmental Impact Assessment process.
MHPGC Project Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
MHPGC Project Scoping Report	A Scoping Report for the MHPGC Project, scoping the likely significant effects of the project on the environment, was submitted and accepted by Planning Inspectorate (PINS) and submitted to the Scottish Ministers, via the Marine Directorate – Licencing Operations Team (MD-LOT) in February 2025.
MHPGC Project Scoping Opinions	Separate scoping opinions received from PINS (on behalf of the Secretary of State) and MD-LOT (on behalf of the Scottish Ministers) in response to the MHPGC Project Scoping Report. The MHPGC Project Scoping Opinions contain the range of issues that PINS, and MD-LOT in consultation with statutory stakeholders, have identified should be considered within the EIA process.
MHPGC Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s) (OSP), landfall, onshore export cables, the onshore land substation (LSS) and AC connection cables.
MHPGC Project PEIR Red Line Boundary: Onshore	Spatial extent used to define the environmental assessment within the PEIR. The area within which all onshore components of the MHPGC Project will be located landward of MHWS, including areas required on a temporary basis during construction and/or decommissioning (e.g. construction compounds).

Term	Meaning
Morven North Offshore Wind Array Project (hereafter 'Morven North')	The Morven North Offshore Wind Array Project which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven North Boundary.
Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project	Morven North and Morven South comprises the Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project, collectively.
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit, County Durham, which the AC connection cables will connect into from the LSS.
Noise	The terms noise and sound are often used interchangeably. Noise usually refers to unwanted or disturbing sounds that interfere with normal hearing and can be unpleasant or harmful. It is often characterised by irregularities in the sound waves and is considered a form of sound pollution.
Noise Important Area (NIA)	Noise Important Areas are locations identified as containing the 1% of the population in England that are exposed to the highest level of road traffic noise. These locations have been determined through strategic noise mapping undertaken by the Department for the Environment, Food and Rural Affairs, with the intention of identifying potential actions that could be taken to reduce noise.
Octave band	A sound made up of more than one frequency can be described using a frequency spectrum, which shows the relative magnitude of the different frequencies within it. The possible range of frequencies is continuous, but can be split up into discrete bands, often an octave or third-octave in width. Each octave band is referred to by its centre frequency, generally 63Hz, 125Hz, 250Hz, 500Hz, 1kHz etc.
Onshore export cable corridor	The proposed corridor within which onshore export cables and associated infrastructure will be laid and located, from the TJB to the LSS.
Onshore export cables	High Voltage Direct Current (HVDC) cables which bring electricity from the TJB to the onshore land substation.
Onshore Land Substation (LSS)	A purpose-built site comprising a compound containing the electrical components for converting the HVDC to HVAC power. The LSS site associated with the MHPGC Project adjusts the power quality and power factor to meet the requirements of power supply being fed to the National Grid Hawthorn Pit Substation.
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for NSIPs in England. PINS manages the application process, oversees consultation and examination, and makes a recommendation to the relevant Secretary of State on whether consent should be granted.
Primary mitigation	Measures included as part of the location or design of the MHPGC Project made during the pre-application phase that are an inherent part of the MHPGC Project and do not require additional action to be taken. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the MHPGC Project, the parameters and associated commitments secured by the DCO and marine licence, or both.
Residual effects	Effects that continue to exist after mitigation has been applied.
Secondary mitigation	Actions that will require further activity to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the ES. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. For secondary mitigation measures, both pre-mitigation and residual effects are presented.

Term	Meaning
Sound	The terms noise and sound are often used interchangeably. Sound is a broad term that refers to any auditory experience created by vibrations that travel through a medium such as air, water, or solids to the ear.
Sound absorption	The reduction of sound energy by transmission through an absorbing medium such as an “acoustically soft” material or surface which results in a reduced reflection of incident sound.
Sound power level	A logarithmic measurement that quantifies the total sound power of a source emitted in all directions relative to a reference sound power ($W_{ref} = 1 \text{ pW}$ or 10^{-12} W). Equal to $10 \log_{10} (W / W_{ref})$ and expressed in decibels.
Sound pressure level (SPL)	Sound Pressure Level is a measure of the pressure variation caused by a sound wave relative to a reference pressure, typically $20 \mu\text{Pa}$ (the threshold of human hearing). It is expressed in decibels (dB) and describes how loud a sound is at a specific point. Root Mean Square Sound Pressure Level is the Sound Pressure Level calculated using the Root Mean Square of the sound pressure over a given time period. It provides a measure of the effective or average sound pressure, smoothing out rapid fluctuations to represent perceived loudness more accurately.
Tertiary mitigation	Actions that would occur with or without input from the EIA process feeding into the design. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects.
Onshore Noise and Vibration Study Areas	For each environmental topic, the baseline environment will be characterised, and the likely significant effect will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic and are based on the maximum spatial extent across which likely significant effects of the MHPGC Project may be experienced by the relevant receptors (i.e. Zone of Influence (Zoi)).
Transboundary effects	Assessment of likely significant effects resulting from MHPGC Project on the interests of another European Economic Area (EEA) state(s).
Transboundary impact	Potential impacts resulting from MHPGC Project and affecting another European Economic Area (EEA) state.

Acronyms

Acronym	Meaning
AAWT	Annual Average Weekday Traffic
AIS	Air Insulated Switchgear
AC	Alternating Current
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
CEA	Cumulative Effect Assessment
CNVMP	Construction Noise and Vibration Management Plan
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
CTMP	Construction Traffic Management Plan
DCC	Durham County Council

Acronym	Meaning
DCO	Development Consent Order
DRC	Dynamic reactive power compensator
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DMRB	Design Manual for Roads and Bridges
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
EWG	Expert Working Group
GIS	Gas Insulated Switchgear
JSJV	Jacobs Systra Joint Venture
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicles
HVDC	High Voltage Direct Current
ISO	International Organization for Standardization
IEMA	Institute of Environmental Management and Assessment
ISEP	Institute of Sustainability and Environmental Professionals
LOAEL	Lowest Observed Adverse Effect Level
LSS	onshore land substation
MDS	Maximum Design Scenario
MHPGC	Morven Hawthorn Pit Grid Connection
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NIA	Noise Important Areas
NML	Noise Monitoring Locations
NOAEL	No Observed Adverse Effect Level
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NPSE	Noise Policy Statement England
NR	Noise Rating
NSR	Noise Sensitive Receptors
O&M	Operations and Maintenance
ONMP	Operational Noise Management Plan
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PPGN	Planning Practice Guidance for Noise
PPV	Peak Particle Velocity

Acronym	Meaning
SCC	Sunderland City Council
SOAEL	Significant Observed Adverse Effect Level
SoS	Secretary of State
TJB	Transition Joint Bay
WHO	World Health Organisation

Units

Unit	Meaning
dB	Decibel (dB) is a logarithmic scale for describing how loud a sound is—the higher the number, the louder it sounds. A rule of thumb is a 10 dB increase is often heard as roughly twice as loud.
dB(A)	A-weighted decibel, which applies a frequency weighting to reflect the sensitivity of the human ear; commonly used for environmental noise assessment.
Hz	Hertz (Hz) is a unit of frequency, describing the number of sound or vibration cycles per second.
hr	Hours, used in sound level parameters.
m	Metres (m), used to describe distances between noise or vibration sources and receptors.
s	Seconds (s) are used to describe measurement durations or event lengths.
min	Minutes (min) are commonly used to define noise measurement or assessment periods.
mm/s	Millimetres per second (mm/s) is the standard unit for vibration velocity and is used to assess building damage and human response to vibration.
PPV	Peak Particle Velocity (PPV) is the maximum vibration velocity recorded during a vibration event, typically expressed in mm/s.

6 Onshore Noise and Vibration

6.1 Introduction

- 6.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary findings of the Environmental Impact Assessment (EIA) work undertaken to date for the Morven Hawthorn Pit Grid Connection Project (hereafter 'MHPGC Project'), as described in **Volume 1, Chapter 2: Project Description, of the PEIR**.
- 6.1.1.2 The chapter considers the potential impacts and likely significant effects in terms of onshore noise and vibration that could result from the construction, operation and maintenance (O&M) and decommissioning phases of the MHPGC Project. Specifically, it relates to the MHPGC Project PEIR Red Line Boundary: Onshore and the onshore elements of the MHPGC Project landward of Mean High Water Springs (MHWS) at landfall to the National Grid Hawthorn Pit Substation in England.
- 6.1.1.3 This chapter describes the methodology, datasets that have informed the preliminary assessment, baseline conditions, including future baseline, mitigation measures and assesses the preliminary residual likely significant effects on onshore noise and vibration that could result from the MHPGC Project.
- 6.1.1.4 The assessment is informed by the following chapters:
- **Volume 1, Chapter 2: Project Description, of the PEIR;**
 - **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR;**
 - **Volume 1, Chapter 5: Policy and Legislation, of the PEIR;**
 - **Volume 3, Chapter 5: Traffic and Transport, of the PEIR;**
 - **Volume 4, Chapter 5: Inter-related Effects, of the PEIR.**
- 6.1.1.5 The chapter also draws on information contained within the following annexes:
- **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR;**
 - **Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR;**
 - **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR;**
 - **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR.**
- 6.1.1.6 This PEIR will offer a comprehensive overview of the MHPGC Project's potential environmental impacts and mitigation measures, presenting essential data to stakeholders for review and feedback. The PEIR will also be informed by the ongoing pre-application consultation process.
- 6.1.1.7 Following statutory consultation, comments will be reviewed and considered, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate (PINS) for development consent.

6.2 Legislative and policy context

6.2.1 Overview

- 6.2.1.1 The full relevant legislation and policy context for the MHPGC Project has been detailed in **Volume 1, Chapter 5: Policy and Legislation, of the PEIR**. This section sets out the legislation and planning policy that is relevant to the preliminary onshore noise and vibration assessment.

6.2.2 Legislation

The Environmental Noise (England) Regulations, 2006

- 6.2.2.1 The Environmental Noise (England) Regulations 2006 set out requirements for Noise Action Planning to promote good health and good quality of life.
- 6.2.2.2 Regulation 15(1)(a) and (aa) of The Environmental Noise (England) Regulations 2006 is amended by The Environment (Amendment etc.) (EU Exit) Regulations 2019 which states Noise Action Plans must:

- Aim to prevent and reduce environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health;
- Aim to preserve environmental noise quality where it is good.

Control of Pollution Act 1974

- 6.2.2.3 The Control of Pollution Act 1974 offers protection against disturbance to residents that might be affected by construction activity.
- 6.2.2.4 Section 60 enables a Local Authority to serve a notice on a person (this includes a company) who is carrying out, or who is planning to carry out, works of construction, demolition, roadworks, railway maintenance etc. in order to control the noise from those operations.
- 6.2.2.5 Section 61 also enables such a person to apply to the Local Authority for consent in respect of such works. The Act introduces the concept of using 'Best Practicable Means' (BPM) to control the impact of noise, where significant impacts are likely to occur. BPM refers to the selection of plant, techniques and equipment to reduce noise whilst considering local conditions, current state of technical knowledge and the financial implications. Factors such as timing, duration, location and opportunities for acoustic screening or separation are employed; to ensure that impacts are controlled in so far as is reasonably practicable. The demonstrable use of BPM can also be used as a defence to enforcement action under nuisance legislation.
- 6.2.2.6 Section 71 sets out the Secretary of State's powers to issue codes of practice for the purpose of providing practical guidance on the minimisation of noise, including noise arising from the use of plant or machinery on construction sites and other works to which Section 60 applies. Section 71 also allows the Secretary of State to approve, by order, any code of practice issued by another body, and to approve any revision of an existing code.
- 6.2.2.7 Section 72 defines "BPM" as measures that are reasonably practicable for minimising noise, taking account of local conditions, the current state of technical knowledge and the financial implications of adopting particular methods. The definition includes the design, installation and maintenance of plant and machinery, as well as the design, construction and maintenance of buildings, structures, and acoustic works used to reduce noise while ensuring compatibility with legal duties, safety, and emergency circumstances.

Land Compensation Act 1973

- 6.2.2.8 Part 1 of the Land Compensation Act 1973 entitles property or landowners to apply for compensation if the value of an interest in land is depreciated by physical factors brought about by the use of new or (in certain situations) altered public works, including any works or land provided or used in the exercise of statutory powers. These physical factors include noise and vibration.

Environmental Protection Act 1990

- 6.2.2.9 Section 79 of the Environmental Protection Act 1990 declares several items as statutory nuisances. Under the Environmental Protection Act, the local authority is required to periodically inspect its area to detect any nuisance and, where a complaint of a statutory nuisance is made by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint. If a statutory nuisance exists, the local authority is obliged to serve an abatement notice.

The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015

- 6.2.2.10 Section 71 of the Control of Pollution Act 1974 provides that the Secretary of State may issue codes of practice for the purpose of providing practical guidance on the minimisation of noise and may, by order, approve any code of practice issued or revised for that purpose. The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015 gives formal approval to British Standard (BS) 5228-1:2009+A1:2014 (BSI, 2014) and BS 5228-2:2009+A1:2014 (BSI, 2014) as codes of practice for England. By virtue of this approval, Parts 1 and 2 of BS 5228 constitute approved codes of practice for the purposes of Section 71 of the Control of Pollution Act 1974.

6.2.3 National policy context

National Policy Statements

- 6.2.3.1 National Policy Statements (NPS) set out the primary policy framework for a Development Consent Order (DCO) under which the MHPGC Project will be considered. This framework includes guidelines, requirements and criteria that the MHPGC Project must meet to obtain consent and proceed with development.
- 6.2.3.2 **Table 6.1** provides details of the NPS relevant to onshore noise and vibration and how and where they are covered in the PEIR:
- Overarching NPS for energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2025a);
 - NPS for renewable energy infrastructure (EN-3) (DESNZ, 2025b);
 - NPS for electricity networks infrastructure (EN-5) (DESNZ, 2025c).

Table 6.1: Summary of the NPS provisions relevant to onshore noise and vibration

Summary of relevant NPS provisions	How and where considered in the PEIR
NPS EN-1	
Paragraphs 4.4.1-4.4.8 of EN-1 sets out the need to assess the effects of a proposed project on humans and states the “ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate”.	The assessment presented in Section 6.8 has informed the assessment of potential impacts of the MHPGC Project in relation to human health. The preliminary human health assessment is set out within Volume 4, Chapter 2: Human Health, of the PEIR .
Paragraphs 4.7.1-4.7.15 of EN-1 set out criteria for good design for energy infrastructure, which includes the siting and use of appropriate technologies can help mitigate adverse impacts such as noise, applied during the early stages of the project lifecycle.	The design of the MHPGC Project will continue to consider noise and vibration sensitive receptors during the site selection process, where practicable.
Paragraphs 4.12.1-4.12.8 of EN-1 state that “ <i>Issues relating to discharges or emissions from a proposed project, and which lead to other direct or indirect impacts on terrestrial, freshwater, marine, onshore, and offshore environments, or which include noise and vibration may be subject to separate regulation under the pollution control framework or other consenting and licensing regimes, for example local planning consent or marine licences. Wherever appropriate, applicants should submit applications for Environmental Permits and other necessary consents at the same time as applying to the Secretary of State for development consent.</i> ”	Details of the consultation to date are set out within Section 6.3 of this chapter. The preliminary assessment has identified noise and vibration generating activities during the construction, O&M and decommissioning phases of the MHPGC Project, albeit on the basis of a Maximum Design Scenario (MDS). Embedded mitigation measures, inherently designed to ensure compliance with applicable regulatory limits, are set out within this chapter, in Section 6.7 .
Section 5.12 sets out the expected scope of a noise assessment. Paragraph 5.12.1 of EN-1 states that “ <i>Excessive noise can have wide-ranging impacts on the quality of human life and health...</i> ” and “ <i>can also have an impact n the environment</i> ”. Paragraph 5.12.2 of EN-1 states that similar considerations should also apply to vibration “ <i>which can also cause damage to buildings</i> ”. Paragraph 5.12.6 states that “ <i>All reasonable steps taken to mitigate and minimise potential adverse effects</i> ”.	This chapter of the PEIR provides a preliminary assessment of the potential onshore noise and vibration impacts on human receptors, buildings, and the wider environment. This preliminary assessment identifies sensitive receptors and characterises baseline conditions (Section 6.4) and evaluates potential effects using appropriate significance criteria as informed by relevant guidance. Commitments adopted as part of the MHPGC Project, including those measures developed to reduce potential adverse noise and vibration related effects are set out in Section 6.7 .

Summary of relevant NPS provisions	How and where considered in the PEIR
Paragraph 5.12.9 of EN-1 states that <i>"Operational noise with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance."</i>	The assessment of operational noise has been carried out in accordance with BS 4142:2014+A1:2019. This is best practice and the recognised guidance for the assessment of operational noise impacts and effects.
Paragraph 5.12.12 of EN-1 states that <i>"Applicants should submit a detailed impact assessment and mitigation plan, including the use of noise mitigation and noise abatement technologies during construction and operation."</i>	Commitments adopted as part of the MHPGC Project, including a series of mitigation measures to be applied during the construction and O&M phases, are set out within Section 6.7 of this chapter.
NPS EN-3	
Paragraph 3.5.2 of EN-3 states that <i>"Proposals for renewable energy infrastructure should demonstrate good design, particularly ... in the design of the project to mitigate impacts such as noise..."</i>	Commitments adopted as part of the MHPGC Project, including a series of mitigation measures to be applied during the construction, O&M and decommissioning phases, are set out within Section 6.7 of this chapter.
Paragraph 3.9.38 of EN-3 states that <i>"Where the project is likely to have noise and vibration impacts the applicant must undertake an assessment as required in Section 5.12 of EN-1."</i>	This chapter of the PEIR provides a preliminary assessment of the potential onshore noise and vibration impacts, as set out in Section 6.8 of this report. Commitments adopted as part of the MHPGC Project, including mitigation in response to onshore noise and vibration related impacts, are set out within Section 6.7 of this chapter. Further measures may be implemented where potential significant noise and vibration effects are predicted in the course of further work for the ES (Section 6.14) that cannot otherwise be practicably mitigated.
NPS EN-5	
Paragraph 2.9.19 of EN-5 states that <i>"In brief, the Horlock Rules state that applicants should: keep the visual, noise and other environmental effects to a reasonably practicable minimum."</i>	Commitments adopted as part of the MHPGC Project, including mitigation in response to onshore noise and vibration related impacts, are set out within Section 6.7 of this chapter. This includes the avoidance of impacts where practicable through the siting of infrastructure away from sensitive environmental receptors.
Paragraph 2.9.39 of EN-5 states that <i>"For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory."</i>	The assessment has been completed in accordance with BS 4142:2014+A1:2019. This is best practice and the recognised guidance for the assessment of operational noise impacts and effects on human receptors.

National Planning Policy Framework

- 6.2.3.3 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2026) has the potential to be considered important and relevant to the Secretary of State (SoS) consideration of the MHPGC Project. **Table 6.2** provides details of the elements of the NPPF that are relevant to onshore noise and vibration and how and where they are covered in the PEIR or will be covered within the ES.

Table 6.2: Summary of NPPF requirements relevant to onshore noise and vibration

NPPF section	How and where this is considered in the PEIR
Paragraph 198 of the NPPF states that: <i>“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:</i> (a) <i>mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;</i> (b) <i>identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...”</i>	Owing to the nature of the design of the MHPGC Project, where appropriate, the preliminary onshore noise and vibration assessment has been conducted against a series of precautionary, worst case reasonable assumptions. Commitments adopted as part of the MHPGC Project, including mitigation in response to onshore noise and vibration related impacts, are set out within Section 6.7 of this chapter.

Noise Policy Statement for England

- 6.2.3.4 The Noise Policy Statement for England (NPSE) (Department for Environment, Food and Rural Affairs (Defra), 2010) sets out the long term vision of Government noise policy which is to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.
- 6.2.3.5 The NPSE outlines the following three aims for the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:
- Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life;
 - Where possible, contribute to the improvement of health and quality of life.
- 6.2.3.6 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation (WHO). These are:
- No Observed Effect Level (NOEL): the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
 - Lowest Observed Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected.
- 6.2.3.7 The NPSE extends these to the concept of a significant observed adverse effect level:
- Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.
- 6.2.3.8 It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to vary for different sources, receptors and at different time of the day.

Planning Practice Guidance

- 6.2.3.9 The Planning Practice Guidance: Noise (PPGN) (Ministry of Housing, Communities & Local Government, 2019) supports the policies set out in the NPPF and includes guidance on noise.
- 6.2.3.10 The PPGN provides guidance on how to determine the noise impact in terms of whether a significant adverse effect is likely to occur and/or whether a good standard of amenity can be achieved.
- 6.2.3.11 In line with the NPSE, the PPGN applies the concepts from toxicology of effect levels, with the same definitions as stated above. A noise exposure hierarchy is then defined within the PPGN, as

reproduced in **Table 6.3**. This provides guidance as to the need to avoid and prevent the occurrence of significant adverse effects due to noise, based on the likely average response.

Table 6.3: Planning Practice Guidance noise exposure hierarchy

Response	Examples of outcome	Increasing effect level	Action
NOEL			
Not noticeable	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Lowest Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL			
Noticeable and disruptive	Noticeable and disruptive	Noticeable and disruptive	Noticeable and disruptive
Noticeable and very disruptive	Noticeable and very disruptive	Noticeable and very disruptive	Noticeable and very disruptive

6.2.4 Local policy context

6.2.4.1 The MHPGC Project lies within the jurisdiction of Durham County Council (DCC). The following local policy that is relevant to onshore noise and vibration and has informed the assessment of preliminary effects in this chapter, their relevance to the MHPGC Project is outlined in **Table 6.4**.

- County Durham Plan (Durham County Council, 2020).

Table 6.4: Local policy relevant to onshore noise and vibration

Policy description	How and where considered in the PEIR
County Durham Plan	
Policy 31: Amenity and Pollution requires proposals that have the potential to lead to unacceptable levels of noise and vibration, either individually or cumulatively, to identify mitigation to reduce the impact on the environment, amenity of people or human health, to an acceptable level.	Commitments adopted as part of the MHPGC Project, including mitigation where there is considered to be potential for unacceptable levels of onshore noise and vibration individually and cumulatively, are set out within Section 6.6.2. Owing to the nature of the design of the MHPGC Project, the preliminary onshore noise and vibration assessment has been conducted against a series of precautionary, worst case reasonable assumptions.

6.3 Consultation and engagement

6.3.1 Scoping

- 6.3.1.1 A Scoping Report for the MHPGC Project was issued to the Planning Inspectorate (PINS) and Marine Directorate – Licencing Operations Team (MD-LOT) in February 2025 (RPS, 2025). Following consultation with the appropriate statutory bodies, PINS (on behalf of the SoS) and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025; MD-LOT, 2025, respectively).
- 6.3.1.2 **Table 6.5** sets out the key comments raised during the scoping process specific to onshore noise and vibration, with details of how these comments have been addressed within the PEIR.

Table 6.5: Summary of scoping responses relevant to onshore noise and vibration

Comment	How and where considered in the PEIR
PINS	
ID 4.6.1: The Scoping Report proposes to scope out an assessment of noise and vibration from underground cables during operation. The Inspectorate agrees that noise and vibration from the operation of the underground cable is unlikely to result in significant effects and is content that this matter can be scoped out of further assessment.	Noise and vibration effects associated with the operation of the onshore export cables and AC connection cables have been scoped out, as agreed with PINS, on the basis that no significant effects are likely to arise from the operation of the associated underground cables.
ID 4.6.2: In the decommissioning scenario where the underground cables are left in-situ, the Inspectorate is content that this matter can be scoped out of further assessment. Should there be a possibility that the underground cables will be removed during decommissioning then an assessment will be required in the ES.	An assessment of noise and vibration effects in relation to decommissioning activities associated with the onshore export cables and AC connection cables has been scoped out, as agreed with PINS, on the basis that underground cables would be left in situ.
ID 4.6.3: Vibration from the O&M of the Substation - Limited justification is presented for the proposed scoping out of this matter in the Scoping Report. The Inspectorate does not agree to scope this matter out given the uncertainties regarding the chosen location of the converter station and the proximity to sensitive receptors. The Scoping Report provides limited information regarding anticipated operational vibration levels. The ES should provide an assessment of operational vibration or information demonstrating the absence of likely significant effects, with evidence of any agreement with relevant consultation bodies.	Drawing on experience from comparable substation sites and other electrical infrastructure in the UK, operational LSS plant (e.g., transformers, shunt reactors, cooling fans and ancillary rotating equipment) is not a material source of ground borne vibration beyond the immediate equipment plinths. Such plant is typically: • Static electrical equipment with limited rotating machinery, generally fitted with balancing and resilient/anti-vibration mountings as standard good practice; • Installed on substantial foundations that further damp vibration transmission into the ground; • Operated continuously in a steady state rather than in impulsive modes that would increase vibration risk. There are no residential receptors within 75m of the Blue LSS Option Area and 100m of the Green LSS Option Area (see Section 6.8.3). It is considered that any operational vibration from the LSS would be well below human perception thresholds and far below levels associated with building response or damage as contextualised by BS 6472-1 (BSI, 2009) and BS 7385-2 (BSI, 1993). On this basis, and as agreed with stakeholders (Noise and Vibration EWG, 14.07.26) (see Table 6.6), an assessment of operational vibration has been scoped out.

Comment	How and where considered in the PEIR
ID 4.6.4: The Inspectorate agrees to scope this matter out [traffic noise and vibration on the existing road network during the operational phase] on the basis that operational traffic movements are likely to be infrequent and unlikely to give rise to significant effects.	Traffic noise and vibration related effects during the O&M phase have been scoped out, as agreed with PINS, on the basis that operational traffic movements are expected to be infrequent and therefore unlikely to result in significant effects.
ID 4.6.5: Several receptors have been identified, however the distance of the receptors from the proposed development and study areas has not been stated. A plan showing the locations of these identified receptors should be included in the ES.	Noise and vibration sensitive receptors and relevant study areas are set out within Figure 6.1, Figure 6.2, Figure 6.3 and Figure 6.4 . The distance of relevant receptors from the MHPGC Project and LSS Option Areas is set out within Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR .

6.3.2 Further consultation and engagement

- 6.3.2.1 Following the MHPGC Project Scoping Report, a series of further consultation and engagement activities with key stakeholders has been undertaken. A technical note titled Morven Hawthorn Pit Grid Connection Project Noise and Vibration Survey Approach was issued to Expert Working Group (EWG) members in September 2025. The main purpose of this technical note was to seek agreement on the environmental noise survey scope and methodology. The note presented the identified Noise Sensitive Receptors (NSRs), proposed survey methodology (attended and unattended measurements), noise monitoring locations (NMLs) (including NSRs considered to be represented), survey duration and timing. Stakeholder responses are summarised in **Table 6.6**.
- 6.3.2.2 The first meeting of the Traffic and Transport & Noise and Vibration EWG was held in December 2025. A second Noise and Vibration EWG was held in July 2026. The key points of discussion are summarised in **Table 6.6**.

Table 6.6: Summary of further consultation and engagement

Date	Consultee and response type	Comment	How and where considered in the PEIR
19.09.2025	DCC, email correspondence	Environmental Health and Consumer Protection Officers reviewed the Noise and Vibration Survey Approach Technical Note and agreed with the proposed baseline survey scope, identified NSRs and stated NMLs, methodology, timing and durations.	The environmental noise survey results are summarised in Section 6.4 of this chapter and presented in detail within Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR . The methodology and approach agreed with stakeholders has been followed.
09.12.2025	Traffic and Transport and Noise and Vibration EWG Meeting. Attendees: National Highways, Jacobs Systra Joint Venture (JSJV) and Sunderland City Council (SCC) Apologies: DCC, Environment Agency, Sustrans NE	In relation to onshore noise and vibration, the EWG meeting covered a number of topics, including the following: • Scoping Opinion comments; • The scope of the baseline noise survey and progress update; • The Onshore Noise and Vibration Study Areas; • The onshore noise and vibration assessment scope, including the assessment methodology for construction noise and vibration; • Initial mitigation and commitments. No written response to or comment on the meeting minutes or content	Scoping responses relevant to onshore noise and vibration and how they have been addressed in the PEIR are presented in Section 6.3.1 . Details of the scope of the baseline noise survey are provided in Section 6.4.4 and Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR . The Onshore Noise and Vibration Study Areas are defined in Section 6.4.2 . The methodology and scope of onshore noise and vibration assessment is set out in Section 6.5 and Section 6.6 respectively. The assessment of construction noise and vibration impacts are set out in

Date	Consultee and response type	Comment	How and where considered in the PEIR
		presented was received from EWG members following the EWG meeting.	Section 6.8 and Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR. Commitments adopted by the MHPGC Project relevant to onshore noise and vibration are set out in Section 6.7 .
14.07.2026	Noise and Vibration EWG Meeting. Attendees: DCC Environment Protection Team	The EWG meeting covered a number of topics, including the following: - An update on the findings of the baseline noise survey; - The onshore noise and vibration assessment scope, including clarification of the proposed Study Areas, assessment methodology and criteria; - The approach to the assessment of vibration from O&M of the LSS; - Initial mitigation and commitments. Following the EWG Meeting, on the 10 August 2026 DCC provided a written response confirming agreement with the proposed assessment scope and methodology summarised in the meeting minutes.	Details of the baseline noise survey are provided in Section 6.4.4 and Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR. The Onshore Noise and Vibration Study Areas are defined in Section 6.4.2 , and the methodology and scope of onshore noise and vibration methodology is set out in Section 6.5 and Section 6.6 respectively. The assessment of construction noise and vibration impacts are set out in Section 6.8 and Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR. Commitments adopted by the MHPGC Project relevant to onshore noise and vibration are set out in Section 6.7 .

6.4 Baseline Characterisation

6.4.1 Overview

6.4.1.1 **Volume 1, Chapter 2: Project Description, of the PEIR** sets out the description of the MHPGC Project and **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the preliminary environmental information.

6.4.1.2 This section describes the methods and data sources used to characterise the baseline in relation to onshore noise and vibration within the relevant study areas and describes the existing baseline characteristics at sensitive receptors.

6.4.2 Onshore Noise and Vibration Study Areas

6.4.2.1 For the purposes of identifying potential onshore noise and vibration sensitive receptors, a series of Onshore Noise and Vibration Study Areas have been defined from the MHPGC Project PEIR Red Line Boundary: Onshore out to the following distances:

- The Onshore Construction Noise Study Area (as set out within **Figure 6.1**), an area extending 300m from the MHPGC Project PEIR Red Line Boundary: Onshore. As stated within the Design Manual for Roads and Bridges (DMRB) LA 111: Noise and Vibration guidance, "a study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors" (DMRB, 2020). In addition, BS 5228-1 states that over distances of 300 m noise predictions should be treated with caution especially where a soft ground correction factor has been applied, because of the increasing importance of meteorological effects;
- The Onshore Construction Vibration Study Area (as set out within **Figure 6.1**), an area extending 100m from the MHPGC Project PEIR Red Line Boundary: Onshore. As stated within

the DMRB LA111 guidance, “a study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors” (DMRB, 2020);

- The Onshore Construction Road Traffic Noise Study Area (as set out within **Figure 6.2**), an area extending 50m from the kerb line of the local road network where construction traffic (i.e. With development scenario) would result in a change in basic noise level (BNL) of 1dB or more, when compared to the baseline scenario (i.e. Without development scenario), in accordance with DMRB LA 111 (DMRB, 2020);
- The Onshore Operational Noise Study Area (as set out within **Figure 6.3**), an area extending 600m from the Blue LSS Option Area and Green LSS Option Area, based on professional judgement, drawing on experience of projects of a similar scale and nature.

6.4.2.2 Given the nature of activities undertaken during the decommissioning phase are likely to be less intensive and of a reduced scale when compared to construction, associated noise related effects are anticipated to be of a similar, if not, lower scale than those predicted during construction. The Onshore Construction Noise Study Area, Onshore Construction Vibration Study Area and Construction Road Traffic Noise Study Area have therefore also been used for the decommissioning phase preliminary assessment.

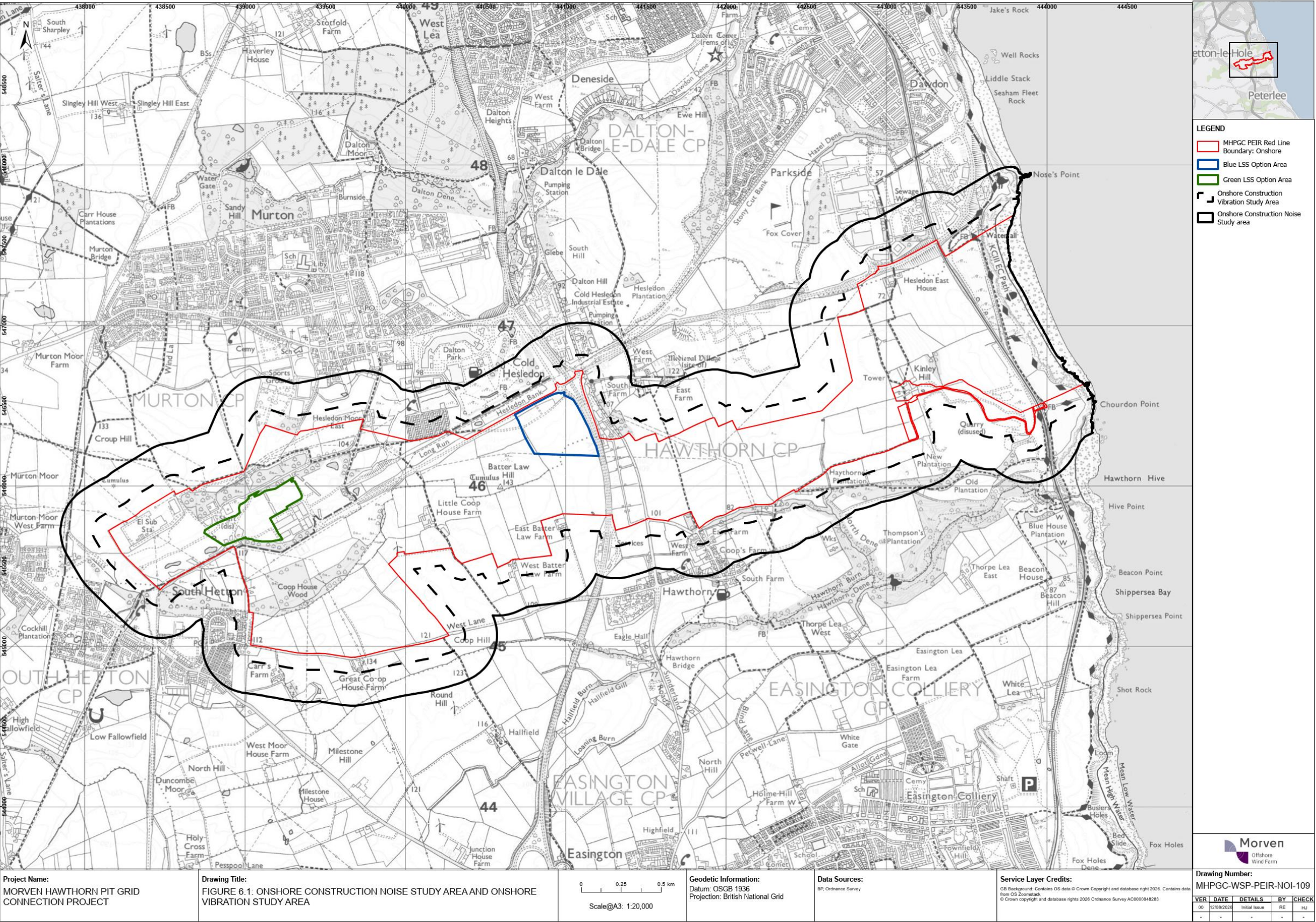


Figure 6.1: Onshore Construction Noise Study Area and Onshore Construction Vibration Study Area



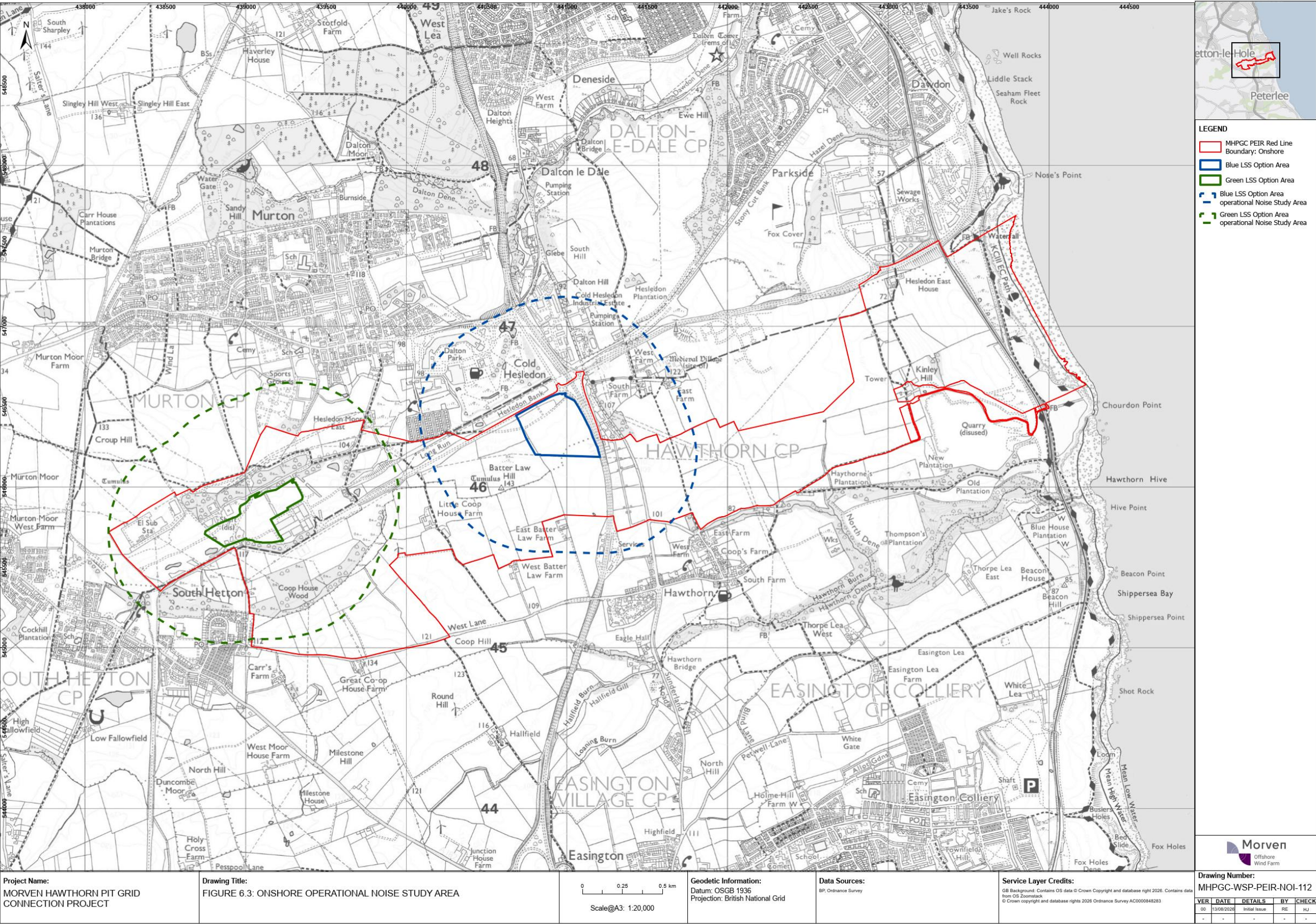


Figure 6.3: Onshore Operational Noise Study Area

6.4.3 Relevant guidance

- 6.4.3.1 The preliminary assessment has been carried out in accordance with the following guidance documents.

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

- 6.4.3.2 BS 5228-1:2009+A1:2014 (BSI, 2014a) provides a methodology for predicting and assessing noise levels generated by fixed and mobile plant used for a range of typical construction activities. The standard includes a database of noise levels at a reference distance of 10m from the source and a simple noise propagation model that can be used to make allowance for effects such as source-receiver distances, ground properties, and utilisation time. The standard then provides several examples of determining the significance of effects due to noise associated with construction works.

- 6.4.3.3 As per the Scoping Report, impact magnitudes and effect levels for each receptor have been determined by applying the method set out in Annex E.3.2 of BS 5228-1 (The ABC Method) and are set out within **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**.

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

- 6.4.3.4 BS 5228-2:2009+A1:2014 (BSI, 2014b) sets out guidance on the prediction and assessment of vibration levels from construction. It provides guidance on assessing the likelihood of adverse comments due to human perception of tactile vibration, with vibration impacts expressed in terms of the Peak Particle Velocity (PPV), mm·s⁻¹. It provides recommendations for controlling or mitigating vibration impacts and includes a database of measured vibration levels during piling activities.

Calculation of Road Traffic Noise (CRTN)

- 6.4.3.5 CRTN (Department of Transport, 1988) sets out a method for calculating road traffic noise levels from Annual Average Weekday Traffic (AAWT) flows as well as a method for measurement of road traffic noise levels. It is recognised as the accepted standard for predicting noise levels from road traffic in the UK. The calculation method uses several input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles (HGVs), road surfacing, gradient, screening by barriers and relative height difference and distance between source and receiver. Road traffic noise levels are expressed in terms of the UK road traffic noise index, dB LA10,18hour (06:00-00:00).

Design Manual for Roads and Bridges (DMRB) LA111: Noise and Vibration

- 6.4.3.6 DMRB LA111: Noise and Vibration (DMRB, 2020) provides guidance on the assessment of noise and vibration impacts arising from major road projects and is an industry recognised framework commonly referenced for the traffic noise effects of other major infrastructure schemes. The assessment is initially based on predicted changes in road traffic noise level in the short-term. The evaluation of significance then includes consideration of context and absolute noise and vibration levels relative to defined LOAEL and SOAEL values, as defined in the NPSE (Defra, 2010)).

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

- 6.4.3.7 BS 4142:2014+A1:2019 (BSI, 2019) provides a method for rating industrial and commercial sound and assessing resulting impacts upon people. The method is applicable to the assessment of operational noise from fixed plant installations such as the LSS.
- 6.4.3.8 The basis of BS 4142:2014+A1:2019 is a comparison between the existing background sound level at residential locations and the expected rating level of the industrial / commercial sound from the source under consideration. The rating level includes a correction to account for sound features more likely to attract attention to the sound source (such as tonality, or impulsivity).

- 6.4.3.9 An initial estimate of impact is determined from the difference between the background sound level and the rating level. Where the rating level does not exceed the background sound level, this indicates the sound source would have a low impact, subject to context. In determining significance, BS 4142:2014+A1:2019 then requires context and relevant site-specific information to be considered, such as the absolute level of industrial / commercial noise, the character and level of the residual sound, the sensitivity of the receptor and whether the residential receptor includes measures that secure good acoustic conditions indoors.

ISO 9613-2:2024 Attenuation of sound during propagation outdoors. Part 2: Engineering method for the prediction of sound pressure levels outdoors

- 6.4.3.10 International Organization for Standardization (ISO) 9613-2:2024 (ISO, 2024) provides a standard method for predicting the attenuation of sound during propagation outdoors, allowing for factors such as distance, ground and air absorption, and obstacles such as buildings, walls, etc. This allows sound pressure levels to be estimated at nearby receptors accounting for these factors. This method has been applied, via a sound propagation model developed in the Datakustik CadnaA software package, for the assessment of operational noise within **Section 6.8**.

6.4.4 Baseline data sources

Desk study

- 6.4.4.1 Baseline information in relation to the identification of noise and vibration related receptors was collated through a detailed desk review to identify receptors likely to be sensitive to noise and/or vibration and existing and proposed sources of noise and/or vibration as a result of the MHPGC Project. The following data was reviewed and assessed:

- Satellite imagery to identify the nearest NSRs and vibration receptors;
- Ordnance Survey mapping of the study areas;
- Strategic Noise Mapping from the Round 4 Noise Action Planning for England and the associated Noise Important Areas (NIA) (Defra, 2024).

- 6.4.4.2 Professional judgement has been applied as to the likely presence of existing sources of noise and/or vibration, such as the local road and rail network and existing commercial or industrial uses. The findings of the desk study informed the selection of monitoring locations and the scope of the baseline survey.

Site-specific baseline noise surveys

- 6.4.4.3 The existing noise baseline has been determined through site-specific surveys undertaken in October 2025 to inform the PEIR. Noise measurements were undertaken in accordance with the requirements of BS 7445-1:2003 (BSI, 2003). The measurement locations were presented and discussed with the EWG during the December 2025 and July 2026 meetings.
- 6.4.4.4 The surveys comprise a mix of long-term unattended and short-term attended noise measurements at a total of 13 locations (as set out in **Figure 6.4**) considered to be representative of the existing residential receptors within the Onshore Noise and Vibration Study Areas. The baseline noise measurement locations were agreed with DCC as set out in **Section 6.3.2** of this chapter and were considered representative of the nearest noise sensitive receptors.
- 6.4.4.5 Full details of the survey methodology are set out in **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.

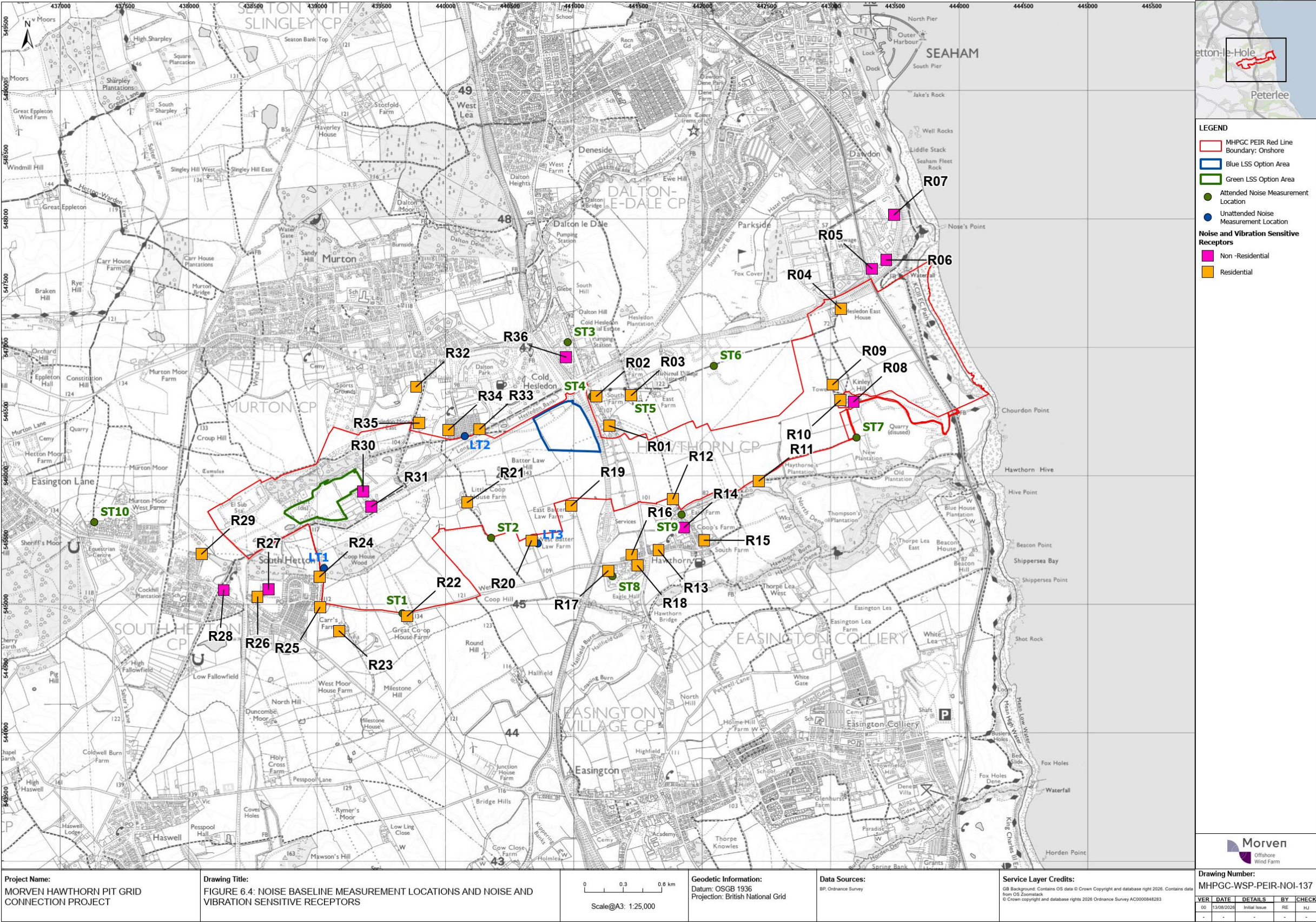


Figure 6.4: Noise Baseline Measurement Locations and Noise and Vibration Sensitive Receptors

6.4.5 Overview of baseline environment

6.4.5.1 The baseline noise climate at NSRs within the Onshore Construction Noise Study Area and Onshore Operational Noise Study Area was characterised and quantified during site-specific baseline noise surveys undertaken in October 2025. Measurement of baseline vibration levels at sensitive receptors within the Onshore Construction Vibration Study Area has not been undertaken. The full details of the survey and results are presented in **Volume 3, Annex 6.1 Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.

Noise and vibration sensitive receptors

6.4.5.2 Residential and non-residential sensitive receptors within the Onshore Construction Noise Study Area, the Onshore Construction Vibration Study Area and the Onshore Operational Noise Study Area have been considered when assessing potential impacts associated with noise and vibration as a result of the construction, O&M and decommissioning of the MHPGC Project.

6.4.5.3 The locations of the noise and vibration sensitive receptors are set out within **Table 6.7** and shown in **Figure 6.4**. Individual noise sensitive receptors within the Onshore Noise and Vibration Study Areas which are in close proximity, of the same use class and considered likely to be similarly affected by the MHPGC Project, have been grouped.

Table 6.7: Noise and vibration sensitive receptors within the Onshore Noise and Vibration Study Areas

Recept or group ID	Receptor type	Receptor name	Receptor description
R01	Residential	Cold Hesledon South Residential	Approximately 5 dwellings on Stockton Road
R02	Residential	Cold Helsedon North Residential	Approximately 4 dwellings on Stockton Road
R03	Residential	Cold Hesledon East Residential	Approximately 4 dwellings including Olde Ramsey's Barn, Rosewood Cottage, Saddleback Cottage and Tamworth Cottage
R04	Residential	Hillcroft Residential	Approximately 2 dwellings south of Fox Cover Industrial Estate
R05	Non-Residential	Spectrum Business Park South West	Lighthouse View Workspace (offices) within the south west area of Spectrum Business Park
R06	Non-Residential	Spectrum Business Park South	Fit240 24 hour gym and an office unit within the south area of Spectrum Business Park
R07	Non-Residential	Spectrum Business Park Central and North	Approximately 13 units of varying uses, including offices, within the central and north area of Spectrum Business Park
R08	Non-Residential	Kinley Hill Farm	Kinley Hill Farm Equestrian Riding School
R09	Residential	Kinley Hill Tower	Kinley Hill Tower Grade II Listed Building and self-service holiday accommodation
R10	Residential	Kinley Hill Farm Residential	Approximately 1 dwelling at Kinley Hill Farm
R11	Residential	Hawthorn Dene Residential	Approximately 3 dwellings to the west of Hawthorn Dene
R12	Residential	Hawthorn North Residential	Approximately 8 dwellings within the north of Hawthorn. This includes select dwellings in and around St Michael's Rise.
R13	Residential	Hawthorn Central Residential	Approximately 66 dwellings within the central area of Hawthorn. This includes select dwellings in and around the area of High West Lane, Stockton Road and West Lane.

Recept or group ID	Receptor type	Receptor name	Receptor description
R14	Non-Residential	St Michael and All Angels Church	St Michael and All Angels Church
R15	Residential	Hawthorn South East Residential	Approximately 32 dwellings within the south east area of Hawthorn. This includes select dwellings in and around Belmont Avenue and West Lane.
R16	Residential	Hawthorn North West Residential	Approximately 24 dwellings within the north west area of Hawthorn. This includes select dwellings on High West Lane and Stockton Road.
R17	Residential	Hawthorn West Residential	Approximately 12 dwellings within the west area of Hawthorn. This includes select properties on Western Park.
R18	Residential	Hawthorn South West Residential	Approximately 31 dwellings within the west area of Hawthorn. This includes select dwellings on Western Park.
R19	Residential	East Batter Law Farm Residential	Approximately 2 dwellings at East Batter Law Farm.
R20	Residential	West Batter Law Farm Residential	Approximately 3 dwellings at West Batter Law Farm.
R21	Residential	Little Coop House Farm Residential	Approximately 1 dwelling at Little Coop House Farm.
R22	Residential	Great Co-op House Farm Residential	Approximately 1 dwelling at Great Co-op House Farm.
R23	Residential	Carr's Farm Residential	Approximately 2 dwellings at Carr's Farm.
R24	Residential	South Hetton (Windermere Road) Residential	Approximately 28 dwellings on Windermere Road to the north east of South Hetton, including at Woodlands Caravan Storage.
R25	Residential	South Hetton East Residential	Approximately 82 dwellings to the east of South Hetton. This includes select dwellings in and around the area of Coronation Square, Hawthorn Cottages, Grasmere Terrace and West Lane.
R26	Residential	South Hetton South East Residential	Approximately 171 dwellings within the east area of South Hetton. This includes select dwellings in and around the area of Bevin Square, West Lane, Jamieson Street, Phalp Street, Palmer Street and Brydon Crescent.
R27	Non-Residential	South Hetton Welfare Park	Bowling green and associated buildings at South Hetton Welfare Park.
R28	Non-Residential	South Hetton Independent Methodist Church	South Hetton Independent Methodist Church.
R29	Residential	South Hetton (Clarence Gate) Residential	Approximately 21 dwellings on Clarence Gate within the central area of South Hetton.
R30	Non-Residential	Jade Business Park Phase 1 Units 4 to 7	Jade Business Park Phase 1 Units 4 to 7.
R31	Non-Residential	Jade Business Park Phase 1 Units 1 to 3	Jade Business Park Phase 1 Units 1 to 3.
R32	Residential	Murton South Residential	Approximately 16 dwellings to the south of Murton, including on Fairfield Grove.

Recept or group ID	Receptor type	Receptor name	Receptor description
R33	Residential	Hesledon Moor South Residential	Approximately 43 dwellings, including select dwellings on Barwick Street, Forster Avenue, Hawkins Road and Oliver Street.
R34	Residential	Hesledon Moor Central Residential	Approximately 62 dwellings, including select dwellings on Barwick Street, Forster Avenue, Hawkins Road and Oliver Street.
R35	Residential	Hesledon Moor North Residential	Approximately 57 dwellings, including select dwellings on Barwick Street, Forster Avenue, Hawkins Road and Oliver Street.
R36	Non-Residential	Cold Hesledon Industrial Estate South	Select units to the south of Cold Hesledon Industrial Estate.

- 6.4.5.4 Defra's Round 4 Strategic Noise Action Planning identified a NIA within the Onshore Noise and Vibration Study Areas. NIA 10079 is identified within the MHPGC Project PEIR Red Line Boundary: Onshore and dwellings within or close to this NIA are highly sensitive to further increases in road traffic noise. These receptors are identified within Receptor groups R01 and R02 in **Table 6.7** above.

Baseline noise environment

- 6.4.5.5 The following section sets out the baseline environmental characteristics of the Onshore Noise and Vibration Study Areas. Further details in relation to the baseline, including the site-specific noise surveys, are set out within **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.
- 6.4.5.6 The results of the baseline noise surveys at the majority of measurement locations were consistent with a semi-rural setting. Baseline noise levels were otherwise influenced by road traffic, including that associated with the A19 and B1432 which intersect the central area of the MHPGC Project PEIR Red Line Boundary: Onshore, or other anthropogenic noise sources when measurements were made closer to built-up areas. A summary of the baseline noise levels identified as part of the site-specific surveys (the locations of which are identified within Figure 6.4) and adopted for each receptor location within **Table 6.8**.
- 6.4.5.7 The preliminary construction noise assessment has been informed by the relative existing ambient noise levels (dB $L_{Aeq,T}$). This parameter is a measure of the overall average sound level typically experienced by nearby noise sensitive receptors. The ambient noise level includes noise from all audible sources in the area, including local road traffic and other day to day activities.

Table 6.8: Summary of ambient noise measurements adopted at each noise sensitive receptor

Receptor group ID	Receptor name	Measurement location ID	Ambient noise level, dB L _{Aeq,T} (free-field conditions)	
			Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
R01	Cold Hesledon South Residential	ST4	68	54
R02	Cold Helsedon North Residential	ST4	68	54
R03	Cold Hesledon East Residential	ST5	53	41
R04	Hillcroft Residential	ST6	57	49
R05	Spectrum Business Park South West	ST6	57	39
R06	Spectrum Business Park South	ST6	57	39
R07	Spectrum Business Park Central and North	ST6	57	39
R08	Kinley Hill Farm	ST7	52	32
R09	Kinley Hill Tower	ST7	52	32
R10	Kinley Hill Farm Residential	ST7	52	32
R11	Hawthorn Dene Residential	ST7	52	32
R12	Hawthorn North Residential	ST9	50	39
R13	Hawthorn Central Residential	ST9	50	39
R14	St Michael and All Angels Church	ST9	50	39
R15	Hawthorn South East Residential	ST9	50	39
R16	Hawthorn North West Residential	ST8	58	44
R17	Hawthorn West Residential	ST8	58	44
R18	Hawthorn South West Residential	ST8	58	44
R19	East Batter Law Farm Residential	ST8	58	44
R20	West Batter Law Farm Residential	LT3	52	45
R21	Little Coop House Farm Residential	ST2	42	42
R22	Great Co-op House Farm Residential	ST1	61	44
R23	Carr's Farm Residential	ST1	61	44
R24	South Hetton (Windermere Road) Residential	LT1	43	34
R25	South Hetton East Residential	LT1	43	34
R26	South Hetton South East Residential	LT1	43	34
R27	South Hetton Welfare Park	LT1	43	34
R28	South Hetton Independent Methodist Church	ST10	51	38
R29	South Hetton (Clarence Gate) Residential	ST10	51	38

Receptor group ID	Receptor name	Measurement location ID	Ambient noise level, dB $L_{Aeq,T}$ (free-field conditions)	
			Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
R30	Jade Business Park Phase 1 Units 4 to 7	LT1	43	34
R31	Jade Business Park Phase 1 Units 1 to 3	LT1	43	34
R32	Murton South Residential	LT2	47	38
R33	Hesledon Moor South Residential	LT2	47	38
R34	Hesledon Moor Central Residential	LT2	47	38
R35	Hesledon Moor North Residential	LT2	47	38
R36	Cold Hesledon Industrial Estate South	ST3	59	43

6.4.6 Future baseline conditions

- 6.4.6.1 During the 35-year operational lifetime of the MHPGC Project, the onshore noise and vibration baseline would be expected to evolve both on a natural basis and in response to other anthropogenic activities. The Infrastructure Planning (EIA) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included. Therefore, an assessment of future baseline conditions, in the absence of the MHPGC Project, has been undertaken and is described within this section.
- 6.4.6.2 In the absence of the MHPGC Project, the future onshore noise and vibration baseline is expected to evolve gradually over the operational assessment period. The principal influence is likely to be changes in road traffic flows associated with background growth, committed development and changes in land use within the wider area. While advancements in vehicle technology, including increased uptake of electric vehicles, may result in reductions in engine noise at lower speeds and tyre-road interaction, tyre noise is expected to remain the dominant source at higher speeds, limiting the potential for substantial long-term reductions in road traffic noise.
- 6.4.6.3 Climatic factors may also influence sound propagation under certain meteorological conditions. The effects of climate change on the baseline noise environment are currently uncertain and therefore not readily quantifiable. However, they are not expected to result in a material change to long-term baseline conditions.
- 6.4.6.4 Overall, the future baseline is anticipated to be similar to the existing baseline, with incremental changes reflecting wider regional growth trends.

6.5 Impact assessment methodology

6.5.1 Overview

- 6.5.1.1 **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the preliminary environmental information. This section describes the technical methods used to determine the sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the preliminary onshore noise and vibration assessment. The methodologies for assessing sensitivity, magnitude and significance for onshore noise and vibration are described in more detail below.
- 6.5.1.2 At PEIR Stage a qualitative assessment of the operational stage noise associated with the LSS Option Areas has been included. The type, quantity and location of fixed plant associated with the LSS is to continue to be refined as the design of the MHPGC Project develops. The operational

stage assessment methodology, magnitude of noise impacts and impact criteria to be adopted for the quantitative assessment to be presented at ES Stage has therefore been identified within this PEIR for when information becomes available.

- 6.5.1.3 The decommissioning stage of the onshore LSS construction will be similar to the construction stage but with the key activities carried out in the inverted sequence. It is likely that the decommissioning activities will generally be similar to or result in less noise and vibration effects than the construction activities. As such, the effect of decommissioning will be represented by considering the construction stage activities.

Construction (and decommissioning) noise

- 6.5.1.4 Construction noise calculations have been completed for the key construction activities associated with the Landfall, onshore export and AC connection cable corridors, construction compounds, the Blue LSS Option Area and the Green LSS Option Area at the nearest NSRs. The assessment of construction noise is based on comparing predicted construction noise levels during the construction stage, to threshold level criteria selected accounting for the ambient noise levels at receptors.
- 6.5.1.5 The assessment of construction and decommissioning noise has included the following steps:
- Identify the nearest NSRs to the construction activity;
 - Select a representative sample of the identified NSRs for assessment, ensuring a good geographic spread across the local area;
 - Set noise threshold level criteria based on the guidance contained in BS 5228-1, namely, the thresholds detailed in the ABC method;
 - Identify the key construction activities, source noise levels for the associated plant for use in the prediction of construction noise and core construction working hours;
 - Undertake construction noise predictions for the key construction activities of the MDS to derive indicative distances within which the ABC thresholds may be exceeded at NSRs during daytime, evening and night-time periods for each activity;
 - Compare the location of the NSRs with the respective ABC threshold distances and determine the resulting impact magnitude and significance of effect.
- 6.5.1.6 The construction noise and vibration assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. At the ES stage, construction noise predictions will be carried out at the closest selected NSRs and, where necessary, consideration given to available noise mitigation measures in the event of any exceedance of the noise threshold level criteria.

Construction (and decommissioning) vibration

- 6.5.1.7 The assessment of construction vibration has been undertaken based on the guidance contained within BS 5228-2. Drawing upon the historic ground-borne vibration measurement data, and vibration prediction methods contained within this Standard, a series of typical set-back distances have been determined, at which different degrees of human exposure to ground-borne vibration arise. Set-back distances have been determined for a sample of different vibration generating construction operations. The distances of vibration sensitive receptors have then been compared against the derived set-back distances to determine whether resulting effects would be significant or not.

Construction (and decommissioning) road traffic noise

- 6.5.1.8 The assessment of construction (and decommissioning) phase traffic noise has been undertaken based on the scheme traffic data for a reasonable maximum design scenario during the peak construction year of 2033. Further details can be found in **Volume 3, Chapter 5: Traffic and Transport, of the PEIR**.
- 6.5.1.9 Construction traffic noise predictions have been undertaken in accordance with the CRTN calculation methodology. The noise levels for the 'with' and 'without' construction traffic scenarios have been compared to provide the change in traffic noise as a result of the construction works.

The difference between the 'with' and 'without' scenarios has been assessed using short-term criteria within DMRB LA111.

6.5.1.10 Basic Noise Level (BNL) calculations have been carried out in general accordance with CRTN, being undertaken for a notional receptor location 10m from the edge of the carriageway of each road considered. A notional receptor has been used because the change in traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant. Traffic noise calculations have been undertaken to establish the change in the daytime $L_{A10,18hr}$ noise level for the peak number of daily trips for each construction route.

6.5.1.11 For roads with low flow, the Noise Advisory Council method has been used to predict the BNL.

Operational Noise

6.5.1.12 The qualitative assessment of the operational stage noise associated with the LSS Option Areas has included the following steps:

- Identify the nearest NSRs to the LSS Option Areas;
- Select a representative sample of the identified NSRs for assessment, ensuring a good geographic spread across the local area;
- Set the representative background sound level for the identified NSRs based on the guidance contained in BS 4142;
- Identify the operational noise sources of plant associated with the LSS and their associated source noise levels.

6.5.1.13 At the ES Stage, a 3D noise model will be created using Datakustik CadnaA noise modelling software to predict the sound levels from the onshore substations at the nearest NSRs. The software allows for complex conditions / scenarios to be considered and implements the prediction algorithms in ISO 9613-2 (ISO, 2024), which contains methods for calculating sound attenuation during outdoor propagation. The impact of the predicted noise levels will then be assessed in accordance with BS 4142.

6.5.1.14 The quantitative assessment of operational noise will include the following steps:

- Identify the nearest NSRs to the LSS Option Areas;
- Select a representative sample of the identified NSRs for assessment, ensuring a good geographic spread across the local area;
- Identify the operational noise sources of plant associated with the LSS and their associated source noise levels;
- Compare the predicted specific and rating noise levels for the MDS at the closest selected NSRs for the maximum design scenario;
- Assess the predicted operational noise levels in accordance with BS 4142 and taking account of context. Where appropriate, the consideration of context may include a comparison of the Rating Level against the Noise Rating (NR) Curve Criteria as set out in BS 8233 (BSI, 2014);
- Assess the operational noise impact magnitude criteria and determine the resulting impact magnitude and significance of effect;
- Give consideration to available noise mitigation measures to minimise significant effects.

6.5.2 Receptor sensitivity

6.5.2.1 Drawing on the noise and vibration sensitive receptors set out within **Table 6.7**, the receptors that are considered in the PEIR assessment have been grouped based on professional experience of similar developments. The receptor groups, along with the definitions of receptor sensitivity used in the assessment, are outlined in **Table 6.9**. Where receptors are assessed within a different Chapter of this PEIR, this is also indicated below.

Table 6.9: Identified receptors requiring assessment for noise and vibration

Group	Receptors include within group	Receptor group ID	Receptor Sensitivity	Chapter assessed
Residential	Residences, including private gardens where appropriate. The main residential communities nearest to the Noise and Vibration Study Areas include Murton, Hawthorne and South Hetton.	R01 – R04, R09 – R13, R15 – R26, R29, R32 – R35	High	This chapter
Community Services	Schools (during daytime periods), places of worship	R14, R28	High	This chapter
Commercial	Offices, retail, entertainment venues and eateries, leisure facilities.	R05 – R09, R27, R30 – R31, R36	Medium	This chapter

6.5.3 Magnitude of impact

6.5.3.1 The magnitude of each assessed impact has been established in accordance with relevant industry guidance, as described below.

Noise due to construction (and decommissioning) activity

6.5.3.2 Impact criteria in relation to construction and decommissioning related noise have been determined in accordance with the guidance in Annex E of BS 5228-1:2009+A1:2014 (BSI, 2014a) and DMRB LA 111 (DMRB, 2020).

6.5.3.3 Construction and decommissioning activity noise thresholds have been set for noise sensitive receptors using the 'ABC Method' as set out in Annex E of BS 5228-1:2009+A1:2014 (BSI, 2014a). This approach sets thresholds for the onset of potentially significant adverse effects depending on the existing ambient noise levels as observed during baseline noise surveys. Receptors with lower relative representative existing ambient noise levels (Category A) have a lower threshold for the onset of potentially significant adverse effects when compared to receptors with intermediate (Category B), and higher existing ambient noise levels (Category C). The criteria by which the ABC Method categories are defined are set out within **Table 6.10**, reproduced from Table E.1 of BS 5228-1:2009+A1:2014 (BSI, 2014a).

Table 6.10: Construction and decommissioning noise threshold values based on the ABC Method

Assessment category and threshold value period ($L_{Aeq,T}$)	Threshold value $L_{Aeq,T}$ (dB) (façade)		
	Category A ^(A)	Category B ^(B)	Category C ^(C)
Night-time (23:00 to 07:00)	45	50	55
Evenings and weekends ^(D)	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise. NOTE 3 Applied to residential receptors only.			
(A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. (B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. (C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. (D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.			

- 6.5.3.4 The magnitude of construction (and decommissioning) related activity noise impacts has been assessed based on the difference between the predicted construction noise level and appropriate threshold values the LOAEL and SOAEL reproduced from the criteria in Table 3.16 of DMRB LA111 (DMRB, 2020). It should be noted that baseline ambient noise levels (LOAEL) vary across the Onshore Construction Noise Study Area, therefore appropriate threshold values (SOAEL) will also vary between assessment locations.
- 6.5.3.5 The LOAEL and SOAEL are defined in **Table 6.11**, and the impact criteria are presented in **Table 6.12**.

Table 6.11: LOAEL and SOAEL criteria for construction and decommissioning noise for each NSR, Facade

Time Period	LOAEL	SOAEL
Weekdays (0700-1900 hours)	Baseline sound levels, $L_{Aeq,T}$	Threshold values as determined in accordance with Table E.1 BS 5228-1:2009+A1:2014 (see Table 6.9).
Saturdays (0700-1300 hours)		
Evenings (1900-2300 hours)		
Saturdays (1300-2300 hours)		
Sundays (0700-2300 hours)		
Night (2300-0700 hours)		

Table 6.12: Impact magnitude criteria for construction and decommissioning activity noise

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

- 6.5.3.6 Further details in relation to the construction and decommissioning noise criteria are set out within **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**.

Vibration due to construction (and decommissioning) activity

- 6.5.3.7 BS 5228-2:2009+A1:2014 (BSI, 2014b) states that for the majority of people, vibration levels between 0.14mm/s and 0.3mm/s PPV (LOAEL) are just perceptible. A vibration level of 1.0mm/s peak particle velocity (PPV) (SOAEL) is sufficient to cause complaint, but tolerable with prior warning, whereas a level of 10mm/s is intolerable in all building environments for anything more than a very brief exposure. Accounting for the type of receptors nearest to the works, a high magnitude of impact has been defined as a vibration level of 10mm/s or more, on the assumption that regular occurrences of this vibration level in residential environments would be intolerable.
- 6.5.3.8 Vibration levels due to construction activity exceeding 15mm/s PPV has the potential to result in minor cosmetic damage in light/unreinforced buildings. It is not considered that the activities anticipated during either the construction or decommissioning phase would result in vibration to this extent, and therefore an assessment of potential building damage due to vibration has not been undertaken.
- 6.5.3.9 **Table 6.13** sets out the magnitude criteria by which vibration related impacts as a result of construction and decommissioning activities have been assessed.

Table 6.13: Impact magnitude criteria for construction and decommissioning activity vibration

Magnitude of impact	Construction activity vibration level, Peak Particle Velocity (PPV)	Vibration level
Negligible	<0.3mm/s	Below LOAEL

Magnitude of impact	Construction activity vibration level, Peak Particle Velocity (PPV)	Vibration level
LOAEL		
Low	$\geq 0.3\text{mm/s}$ and $< 1.0\text{mm/s}$	Above or equal to LOAEL, below SOAEL
SOAEL		
Medium	$\geq 1.0\text{mm/s}$ and $< 10.0\text{mm/s}$	Above or equal to SOAEL
High	$\geq 10.0\text{mm/s}$	Above SOAEL

Road traffic noise during construction (and decommissioning)

- 6.5.3.10 Construction and decommissioning traffic noise impacts along public roads has been estimated by calculating the change in basic noise level (BNL) along the road links temporarily affected as a result of the MHPGC Project. The BNL for each road link was calculated following the methodology set out in CRTN (Department of Transport, 1988).
- 6.5.3.11 The BNL, and any associated change in road traffic noise along a road link, is representative of road traffic noise impacts at receptors located within a 10m reference distance of that road link, where traffic movements along from that single link is the dominant source of road traffic noise. Where the change is 1.0 dB $L_{A10,18\text{hour}}$ or more as a result of the MHPGC Project, such that the road is an 'affected road', the level of road traffic noise will be evaluated in further detail as part of the ES, accounting for all roads in the vicinity of the respective receptor.
- 6.5.3.12 The change in road traffic noise level for each road link within the Onshore Construction Road Traffic Noise Study Area has then been determined. The magnitude of construction and decommissioning traffic noise related impact has been assessed based on the criteria from Table 3.17 of DMRB LA111 (DMRB, 2020) as reproduced in **Table 6.14**.

Table 6.14: Impact magnitude criteria for road traffic noise during construction (and decommissioning)

Magnitude of Impact	Change in Basic Noise Level of closest public road during construction traffic (dB)
High	≥ 5.0
Medium	≥ 3.0 and < 5.0
Low	≥ 1.0 and < 3.0
Negligible	< 1.0

- 6.5.3.13 HGV traffic is assumed to be evenly distributed throughout the working day for each compound (between 0700 to 1900 Monday to Friday, and 0700 to 1300 on Saturdays) therefore, only daytime assessment criteria are considered. The daytime SOAEL for construction road traffic noise has been based on the threshold level (a façade level of $L_{A10, 18\text{hr}}$) at which the Noise Insulation Regulations 1975 (as amended) requires provision of sound insulation. The LOAEL for daytime is based on the onset of the lowest observed community noise effects during the day (i.e. annoyance which is a free-field level of $L_{Aeq,16\text{hr}}$) following from the WHO Guidelines for Community Noise (WHO, 1999). To allow comparison of the two threshold levels, the daytime SOAEL threshold has been converted from a façade to a free-field level (i.e. -3dB correction) and then converted from the traffic noise index $L_{A10,18\text{hr}}$ to the WHO indices (i.e. -2dB correction). The LOAEL and SOAEL are defined in Table 6.15.

Table 6.15: LOAEL and SOAEL criteria for construction (and decommissioning) road traffic noise, Free-field

Time Period	LOAEL	SOAEL
Daytime (0700 to 2300)	50 dB $L_{Aeq,16\text{hour}}$	63 $L_{Aeq,16\text{hour}}$

Operational noise

- 6.5.3.14 A qualitative assessment of the operational stage noise associated with the LSS Option Areas has been included in the PEIR Assessment. A quantitative assessment of operational noise levels from the LSS will be carried out at the ES Stage in accordance with the calculation procedures set out in BS 4142:2014+A1:2019 (BSI, 2019). This will include a comparison of the expected rating level of operational noise at each receptor with the existing representative background sound levels at the same location.
- 6.5.3.15 The determination of the rating level requires consideration of the likely character of operational noise at the receptor. The rating level includes a correction for acoustic features (tonality, impulsivity, intermittency etc.) which can attract more attention to an operational noise source when compared to a typical broadband or anonymous sound source. The predicted sound level, together with the acoustic character correction provides the 'rating level' at each noise sensitive receptor within the Onshore Operational Noise Study Area.
- 6.5.3.16 Predicted rating levels will be compared to background sound levels for different parts of the day and night. The magnitude of impact will be classified in accordance with BS 4142:2014+A1:2019 (BSI, 2019) and taking into account context, as set out in **Volume 3, Annex 6.3: Onshore Noise and Vibration Operational Technical Report, of the PEIR**, and presented within **Table 6.16**.

Table 6.16: Impact magnitude criteria for operational noise

Magnitude of impact	Difference = $L_{Ar,Tr} - L_{A90,Tr}$ (dB)	Adverse Effect Level	BS 4142:2014+A1:2019 description
High	$\geq 10\text{dB}$	Likely at SOAEL, depending on context	A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context
Medium	$5 \leq \text{to} < 10\text{dB}$	Between LOAEL and SOAEL, depending on context	A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
Low	$0 \leq \text{to} < 5\text{dB}$		
Negligible	$< 0\text{dB}$	Below LOAEL	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Non-residential Receptors

- 6.5.3.17 The magnitude of impact criteria within **Table 6.16** do not apply to non-residential receptors (since this is beyond the scope of BS 5228-1 and BS 4142). For non-residential receptors, the construction and operational noise effect will be qualified as potentially significant if noise levels are above a threshold. These threshold values, which are represented in **Table 6.17** are based on WHO, 1999 recommended limits for different premises.

Table 6.17: Significance screening criteria for non-residential receptors

Setting	Noise level (outdoors, free field)	
	Day (0700-2300), dB $L_{Aeq,16hr}$	Night (2300-0700), dB $L_{Aeq,8hr}$
Places of meeting for religious worship	50dB	n/a
Hospitals and hotels	50dB	40dB
Offices	55dB	n/a
External amenity space	55dB	n/a

- 6.5.3.18 Construction and operational noise impact magnitude criteria for non-residential receptors will be presented at the ES Stage on a case-by-case basis accounting for the expected operational noise level and the sensitivity of the receptor.

6.5.4 Scale of effect and significance

- 6.5.4.1 The point at which a noise and vibration impact results in a significant effect varies depending on the following factors:
- Type of effect that could occur;
 - Sensitivity of the receptor;
 - Magnitude of the impact (i.e. the noise level, the vibration level, or the magnitude of the change in noise level);
 - Type of the noise and vibration source;
 - Time of day in which the impact occurs;
 - Duration of the impact;
 - Existing conditions at the receptor.
- 6.5.4.2 The scale of each effect due to onshore noise and vibration is initially determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this preliminary assessment is presented in **Table 6.18**. Where appropriate the scale of effect is then adjusted for context, as discussed below.
- 6.5.4.3 Following the classification of an effect using this methodology, a clear statement is made as to whether the effect is significant or not significant. Major and moderate effects are considered to be significant, whilst minor and negligible effects are considered to be not significant. However, professional judgement will also be applied taking consideration of the factors set out in paragraph 6.5.4.1 when determining whether these effects are significant in EIA terms.
- 6.5.4.4 Typical definitions for the classification of effects and relevant to this assessment are shown in **Table 6.18** and **Table 6.19**.

Table 6.18: Matrix used for the assessment of the significance of effect

Sensitivity of receptor	Magnitude of impact			
	Negligible	Low	Medium	High
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

Table 6.19: Scale of effect and significance definitions

Scale of Effect	Definition	Significance of effect in EIA terms
Major	A large and detrimental change to a valuable/sensitive receptor, likely exceeding an accepted threshold. A large and beneficial change, resulting in enhancements in baseline conditions, transitioning from previously poor conditions to new legal compliance, or making a major contribution to national goals. These effects may represent key factors in the decision-making process. Potentially associated with sites and features of national importance or likely to be important considerations at a regional scale. Major effects may relate to features that are unique and irreplaceable.	Significant

Scale of Effect	Definition	Significance of effect in EIA terms
Moderate	A medium scale change that, although not beyond an accepted threshold, is still considered to be generally unacceptable, unless offset by significant positive benefits of the project. If adverse, these effects are likely to be important at a regional or local scale and on their own could influence on decision making. A positive moderate effect is a medium scale change that improves baseline conditions sufficiently to contribute to guideline targets.	Significant
Minor	A minor adverse change that remains within legal and planning policy limits. A minor positive change that is unlikely to significantly impact the overall balance of considerations. These effects might be raised as local issues and could be relevant to the detailed design of a project, but they are unlikely to be critical in the decision-making process.	Not significant
Negligible	A very small change that is so inconsequential it can be considered acceptable to disregard. These effects fall below perceptible limits, lie within normal variations, or fall within the margin of forecasting error. They are unlikely to influence decision-making.	Not significant

6.5.5 Assumptions and limitations of the assessment

- 6.5.5.1 This preliminary assessment is based on the development assumptions and MDS, the relevant details of which are presented in **Table 6.21**. The following assumptions and limitations have been applied to the assessment of effects due to construction phase noise and vibration. These assumptions are considered reasonable for the purposes of the preliminary assessment and reflect the level of information available at this stage of the MHPGC Project.
- 6.5.5.2 Any measurement of existing ambient or background sound levels are subject to a degree of uncertainty as environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a short sample of the ambient levels. Every effort was made to ensure that measurements were undertaken in such a way to provide a representative sample of conditions, such as:
- avoiding periods of adverse weather conditions (rain, wind speeds above five m/s) and/or if adverse weather conditions take place during any sound level measurements, the contaminated data are omitted from the dataset;
 - avoiding school holidays and other such periods / events which are known to often result in atypical sound levels.
- 6.5.5.3 The construction noise assessment is based on an indicative plant list, which reflects typical plant expected to be required for the proposed works. At the PEIR stage, detailed contractor methodologies and final plant inventories are not yet available. This is typical for a project of this nature and the assumed plant has therefore been selected to be representative and, where appropriate, conservative.
- 6.5.5.4 Construction working hours have been assumed in accordance with the proposed MHPGC Project commitments set out within **Section 6.7**. Construction works are assumed to occur during daytime hours only, with the exception of trenchless technique cable installations which is assumed to also take place during evening and night-time periods.
- 6.5.5.5 The assessment assumes that all construction plant associated with a given activity is located at the closest point to receptors within the maximum extent of the works area. This represents a worst-case scenario and provides a conservative estimate of potential noise impacts. Distance banding has been defined separately for the following MHPGC Project components: landfill; onshore export cable and AC connection cable corridors; construction compounds; and the LSS.

- 6.5.5.6 At attended measurement locations, the ABC Category adopted for the daytime period has also been applied for the evening and weekend period. This is considered a suitable approximation for the assessment.
- 6.5.5.7 Potential construction vibration impacts have been assessed for those activities considered most likely to generate the highest levels of ground-borne vibration. These activities comprise vibratory compaction associated with earthworks along the onshore export cable corridor, AC connection cable corridor, and within the selected LSS Option Area, together with vibratory piling associated with the construction of the LSS foundations only. Construction vibration levels have been predicted in accordance with the procedures set out in BS 5228:2009+A1:2014, using the empirical prediction methods provided in Annex E. Predicted vibration levels are expressed in terms of PPV, mm/s and represent the PPV with a 33% probability of being exceeded during start-up and steady-state operation. No vibratory piling activities have been assumed outside of the LSS, with vibratory compaction assumed to occur across all relevant construction areas.

6.6 Key parameters for assessment

6.6.1 Scope of the assessment

- 6.6.1.1 The approach to assessment was presented in the MHPGC Project Scoping Report and has been refined in consultation with consultees as detailed in **Section 6.3** and through the MHPGC Project Scoping Opinions.
- 6.6.1.2 Effects that are not considered likely to be of moderate/major significance been scoped out of the assessment and these impacts will not be considered further. The impacts considered as part of the assessment include:
- Construction phase
 - Noise and vibration impacts due to construction activities associated with the Landfall;
 - Noise and vibration impacts due to construction activities (open trench) associated with the onshore export cable and AC connection cable corridors;
 - Noise and vibration impacts due to construction activities (trenchless technique) associated with the onshore export cables and AC connection cables;
 - Noise and vibration impacts due to construction activities associated within the LSS;
 - The impact of noise generated by additional vehicle movements on the local highway network.
 - O&M phase
 - Noise impacts due to the operation and maintenance of the LSS.
 - Decommissioning phase
 - Noise and vibration impacts due to decommissioning activities associated with the LSS;
 - The impact of noise generated by additional vehicle movements on the local highway network;
- 6.6.1.3 A summary of the effects scoped out of the assessment is presented in **Table 6.20**.

Table 6.20: Impacts scoped out of the assessment

Impact	Justification for scoping out of the assessment
Construction phase	
Vibration from traffic required during construction	As stated in DMRB LA111 (DMRB, 2020) "a maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects". This is also applicable to vibration from construction traffic on the local road network.

Impact	Justification for scoping out of the assessment
O&M phase	
Vibration impacts due to the operation and maintenance of the LSS	Drawing on experience from comparable substation sites and other electrical infrastructure in the UK, operational LSS plant (e.g., transformers, shunt reactors, cooling fans and ancillary rotating equipment) is not a material source of ground borne vibration beyond the immediate equipment plinths. It is therefore considered that any operational vibration from the LSS would be well below human perception thresholds and far below levels associated with building response or damage as contextualised by BS 6472-1 and BS 7385-2.
Noise and vibration from operation and maintenance of the onshore export cables and AC connection cables	The onshore export cables and AC connection cables are not anticipated to be a substantial source of noise or vibration during operation. Site inspections and maintenance activities are not expected to result in high levels of noise or vibration and would be intermittent and short-term in nature.
Noise from traffic associated with activities during the O&M phase	As set out in Volume 3, Chapter 5: Traffic and Transport, of the PEIR , the operational traffic is anticipated to be limited and therefore unlikely to result in significant effects. O&M of the onshore components of the MHPGC Project may involve remote monitoring, but regular visits and routine inspections will also occur. As maintenance will be undertaken only as required and potential corrective activities will be limited, it is anticipated that the MHPGC Project O&M phase will generate a small number of additional two-way vehicle movements due to infrequent staff trips and occasional maintenance activities, unlikely to result in significant effects.
Vibration from traffic associated with activities during the O&M phase	As stated in DMRB LA111 (DMRB, 2020) <i>"a maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects"</i> .
Decommissioning phase	
Noise and vibration from the decommissioning of the onshore export cable and AC connection cable and landfall	It is assumed that, should decommissioning take place, the underground cables would be left in place and no removal works (and associated noise or vibration) would occur.
Vibration from traffic required during decommissioning	As stated in DMRB LA111 (DMRB, 2020) <i>"a maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects"</i> . This is also applicable to vibration from decommissioning traffic on the local road network.

6.6.2 Maximum design scenario

- 6.6.2.1 The MDS for each impact identified in **Section 6.6.1** has been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The MDS presented in **Table 6.21** have been selected from the parameters provided in **Volume 1, Chapter 2: Project Description, of the PEIR** and methodology outlined in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.

Table 6.21: MDS relevant for the PEIR assessment of potential effects arising from onshore noise and vibration

Impact	Maximum Design Scenario	Explanation
Construction		
Landfall		
Increased levels of noise from construction activities at the landfall	Duration of landfall Construction: 3.5 years Duration of drilling activity: 300 days Number of trenchless drill entry points: 4 bores	The impact is assessed over the full duration of landfall construction and a period of continuous (24 hour) working for the duration of trenchless techniques and dewatering (24 hours) of the TJBs.
Increased levels of vibration from construction activities at the landfall	Number of main compounds: 1 Dimension of main compound: 48,000m ² Number of secondary compounds: 1 Dimension of secondary compound: 900m ² Number of Transition Joint Bays (TJBs): 2 Location of TJBs: Within 150m of landfall trenchless drill entry point Working Area for TJB (construction): 750m ² Depth of TJB: 2.5m Number of access tracks: 2 from A192 Construction access track widths: 10m Working hours are 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturday, with shoulder mobilisation hours and continuous working required for trenchless techniques. Trenchless techniques: HDD or Direct Pipe	The Maximum Design Scenario assumes the noise generating equipment located in closest proximity of the landfall construction compound and the receptors identified in Section 6.4.5 . The assessment therefore will consider worst-case construction noise levels. An indicative construction plant list has been used and typical noise levels obtained from the guidance in BS 5228-1. Source noise levels for directional drilling are assumed to be representative of HDD or Direct Pipe. Dynamic compaction using vibratory rollers will be required for the installation of haul roads, access routes, and the construction of the compounds at landfall.
The impact of noise generated by additional vehicle movements on the local highway network from the construction of the Landfall	Movements and workforce – Blue LSS Scenario Number of access tracks: 2. Located from the A192 to landfall compound Abnormal loads: HGV low loader with extendable trailer (70t maximum load) - movement order required. 6 AILs Total daily construction traffic movements (HGV): 93 Total daily construction traffic movements (Vehicles): 101 Number of employees working on site: 48 Movements and workforce – Green LSS Scenario Number of access tracks: 2. Located from the A192 to landfall compound Abnormal loads: HGV low loader with extendable trailer (70t maximum load) - movement order required. 6 AILs	The assessment has been undertaken for construction scenario that results in the greatest peaks of construction traffic flows on affected road links during the peak construction year of 2033 for each LSS Option Area. The assessment therefore will consider the construction scenario that may result in the greatest change in road traffic noise for each LSS Option Area.

Impact		Maximum Design Scenario	Explanation
	Total daily construction traffic movements (HGV): 93 Total daily construction traffic movements (Vehicles): 101 Number of employees working on site: 48		
Onshore Export Cable and AC Connection Cable			
Increased levels of noise from construction activities of the Onshore Export Cable and AC Connection Cable	General Construction period for Onshore Export Cable: 3.5 years Working hours are 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturday, with shoulder mobilisation hours and continuous working required for trenchless techniques. Dimensions of trench for grid connection export cable (HVAC) – Blue LSS Number of export cables: 24 Length of cable route: 4,260m Number of cable trenches: 4 Width of cable corridor (temporary including permanent): 100m Onshore cable area (temporary): 426,000m ² Trench width at top per circuit: 4.8m Trench width at base per circuit: 2.8m Trench depth per circuit: 1.8m Depth of stabilised backfill: 450mm Number of cable route joint bays: 32 Number of link boxes: 32 Volume of material excavated per joint bay: 2,264m ³ (total = 18,112m ³ , assuming 4 circuits are jointed in a single excavation) Construction land take for joint bay (surface area): 1,472m ² (total = 11,776m ²) Volume of material excavated per link box: 12.5m ³ Construction land take for link box: 100m ² (total = 3200m ²) Volume of material excavated (link boxes): 400m ³ Dimensions of trench for onshore export cable (HVDC) – Blue LSS Number of export cables: 4 Length of cable route: 4.83km Width of cable corridor (temporary inc. permanent): 40m Number of cable trenches: 2		The assessment has been undertaken for the Maximum Design Scenario and assumes the noise generating equipment located in closest proximity of the landfall construction compound and the receptors identified in Section 6.4.5 . The Onshore Export Cable and AC Connection Cable parameters defined in this MDS are those required to construct the MHPGC Project, including the Blue LSS option. The Blue LSS option constitutes the worst-case due to the larger cable corridor width and thus size of working area required, when compared to the Green LSS Option. The impact is assessed over the full duration of export cable construction and a period of continuous (24 hour) working for the duration of trenchless techniques and dewatering (24 hours). An indicative construction plant list has been used and typical noise levels obtained from the guidance in BS 5228-1. The number of trenchless technique drill compounds is based on the maximum number of known trenchless techniques as part of the onshore cable route, and confirmed in CoT51 in Volume 1, Annex 4.1 Draft Commitments Register of the PEIR . The following features will be crossed using trenchless techniques: - A, B and Classified unnumbered roads (known as C roads) (including the A19 and B1432); - all railway lines (including the section of railway line which runs between Seaham and Horden); - the Durham Coast SSSI and SAC; - Hesledon Moor East SSSI.
Increased levels of vibration from construction activities of the Onshore Export Cable and AC Connection Cable			

Impact	Maximum Design Scenario	Explanation
	Onshore cable area (temporary): 293,200m² Trench width at top: 6.85m Trench width at base: 4m Cable trench depth: 1.8m Depth of stabilised backfill: 450mm Trenchless depth (excluding landfall): 30m Number of cable route joint bays: 12 Volume of material excavated per joint bay: 700m³ Construction land take per joint bay (surface area): 600m² Volume of material excavated per monitoring box: 18m³ Volume of material excavated (for monitoring boxes): 216m³ Construction land take per monitoring box: 64m² Construction land take for all monitoring boxes: 768m² Width of haul road (excluding passing bays): 8m Trenchless techniques The following features will be crossed using trenchless techniques: - A, B and Classified unnumbered roads (known as C roads) (including the A19 and B1432); - all railway lines (including the section of railway line which runs between Seaham and Horden); - the Durham Coast SSSI and SAC; - Hesledon Moor East SSSI. Trenchless drill methodology: HDD, micro-tunnelling (auger bore or direct pipe). Number of trenchless drill compounds: 6 (3 entry and 3 exit trenchless drill compounds) Dimensions of trenchless drill compounds: 6,000m² Total trenchless drill compound area: 36,000m² Trenchless depth (excluding landfall): 30m Infrastructure Number of haul roads: 1 Haul road widths: 8m Number of main compounds: 2	Additional trenchless technique crossings may be proposed as the MHPGC Project develops project refinements for the application for development consent.

Impact		Maximum Design Scenario	Explanation
		Area of main compound: 7ha Total area of both main compounds: 14ha Number of secondary construction compounds: 6 Dimensions per secondary construction compound: 10,000m ² Total area of secondary construction compounds: 6ha.	
The impact of noise generated by additional vehicle movements on the local highway network from the construction of the Onshore Export Cable		Movements – Green LSS Scenario Abnormal loads (Number): 450 Abnormal loads (Type): Cable drums on tractor trailers - low loaded lorry's may be suitable for transport also. Total daily construction traffic movements (HGV): 83 Total daily construction traffic movements (Vehicles): 90	The assessment has been undertaken for the construction scenario that results in the greatest peaks of construction traffic flows on affected road links during the peak construction year of 2033.
Land Substation			
Increased levels of noise from construction activities of the LSS		Construction period for LSS: 4.5 years Area of temporary construction footprint: 7ha	Two locations are assessed in this PEIR chapter for either of the LSS options, one for Option 1: Blue and one for Option 2: Green. In each location, the AIS and GIS LSS options are assessed.
Increased levels of vibration from construction activities of the LSS		Area of temporary works (laydown and storage): 3.5ha Access Temporary width of access including passing bays: 15m Number of temporary accesses: 2 Reinstatement of temporary land: 4 months	
The impact of noise generated by additional vehicle movements on the local highway network from the LSS construction		Movements – Green LSS Scenario Abnormal loads (Number): 18 Abnormal loads (Type): Cable drums on tractor trailers - low loaded lorry's may be suitable for transport also. Total daily construction traffic movements (HGV): 100 Total daily construction traffic movements (Vehicles): 300	The assessment has been undertaken for the construction scenario that results in the greatest peaks of construction traffic flows on affected road links during the peak construction year of 2033.
Operation and Maintenance			
Increased level of noise from the O&M of the LSS		Typical duration of operation: 35 years Area of permanent footprint: 6.5ha Impermeable permanent area: 3.5ha Number of permanent accesses: 2 Permanent access width: 15m	The assessment will be undertaken for the relevant NSRs identified in Section 6.4.5 . Two locations are assessed in this PEIR chapter for the LSS options, one for Option 1: Blue and one for Option 2: Green. In each location, the noise levels likely to be generated by the AIS and GIS LSS options

Impact		Maximum Design Scenario	Explanation
	Permanent access points: 2 Activities anticipated during operation: Monthly day visit inspections; Quarterly detailed inspections/ non-intrusive work; Annual turnaround/shutdown. Both Gas Insulated Switchgear (GIS) and Air Insulated Switchgear (AIS) options remain under consideration for the LSS, for which AIS represents the MDS. Key types of equipment associated with the LSS may include: • Super Grid Transformers (inc. Coolers); • Shunt Reactors (inc. Coolers); • Dynamic reactive power compensator (DRC) phase reactors (inc. Coolers); • Mechanically switched reactors; • Harmonic filters; • Auxiliary transformers; • DRC and control building heating, ventilation, and air-conditioning units.	are assessed at the nearest NSRs using typical noise levels obtained from the guidance BS4 142.	
Decommissioning			
Landfall			
Decommissioning of the Landfall cables and associated earthworks resulting in potential impacts on noise and vibration	Leave cables in place, to minimise/ avoid environmental disturbance. Leaving the cables in place has little or no environmental impact whilst recovering them would disturb the local environment.	Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction). The MDS during decommissioning is the removal of the above-ground infrastructure as this presents greatest noise and vibration disturbance.	
Onshore Export Cable			
Decommissioning of the Onshore cable (including watercourse crossings) and associated earthworks resulting in a potential impact noise and vibration	Leave cables in place, to minimise/ avoid environmental disturbance. Leaving the cables in place has little or no environmental impact whilst recovering them would disturb the local environment.		
Land Substation			
Decommissioning of the LSS and associated earthworks resulting in a potential impact noise and vibration	Deconstruction in the inverted sequence of installation, after the LSS has been decommissioned. All equipment and materials including foundations will be demolished and disposed of, in accordance with the latest relevant guidance. The site will be reinstated.		

6.7 Commitments adopted as part of the MHPGC Project

- 6.7.1.1 As set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** and **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**, several measures have been adopted as part of the MHPGC Project to reduce the potential for impacts on onshore noise and vibration.
- 6.7.1.2 Embedded mitigation includes the following measures as identified in the Institute of Sustainability and Environmental Professionals (ISEP), formerly Institute of Environmental Management and Assessment (IEMA), Guide to Shaping Quality Development (IEMA, 2015):
- Primary mitigation - measures included as part of the project design. ISEP (formerly IEMA) describes these as *"modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken"*. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and marine licence, or both;
 - Tertiary mitigation - ISEP (formerly IEMA) describes these as *"actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects"*.
- 6.7.1.3 Embedded primary mitigation measures have been taken into account as part of the initial assessment presented in **Section 6.8** (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures that the Applicant is committed to are considered in the assessment of effects.
- 6.7.1.4 At the ES Stage where an assessment identifies likely significant adverse effects, secondary mitigation measures will be applied in line with the national policy objectives relating to noise. ISEP (formerly IEMA) describes secondary mitigation as *"actions that will require further activity in order to achieve the anticipated outcome"*. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. These are measures that aim to avoid significant adverse effects and minimise residual adverse effects.
- 6.7.1.5 Based on the preliminary assessment within this chapter of the PEIR, the primary and tertiary mitigation measures relevant to onshore noise and vibration are outlined in **Table 6.22**. The method of securing these commitments is also presented in **Section 6.8**.

Table 6.22: Embedded commitments relevant to onshore noise and vibration implemented as part of the MHPGC Project

Commitment number	Measure adopted	How the measure will be secured
CoT03	Core working hours for the construction of the landfall and onshore components of the MHPGC Project will be as follows: - Monday to Friday: 07:00–19:00 hours; - Saturday: 07:00–13:00 hours; - Up to one hour before and after core working hours for mobilisation (“mobilisation period”), i.e. 06:00–20:00 weekdays and 06:00–14:00 Saturdays; In circumstances outside of core working practices, specific works may need to be undertaken outside the core working hours. Advance notice of such works will be provided to the relevant planning authority. This will be set out in the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. A Detailed CoCP will be developed substantially in accordance with the Outline CoCP.	Will be secured via DCO Schedule &/or Requirement
CoT05	An Operational Noise Management Plan will be developed post-consent prior to entering the operation and maintenance phase. It will detail methods of reducing and managing operational noise to comply with the noise limits established by the assessment, will be prepared and submitted for approval prior to the commencement of operations. It will include limits on noise from operation of the Onshore Land Substation (LSS) associated with the MHPGC Project and an indication of the physical mitigation measures expected to be required and how compliance with these limits would be monitored.	Will be secured via DCO Schedule &/or Requirement
CoT16	An Onshore Decommissioning Plan will be developed prior to decommissioning. It will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention, protection of soils and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.	Will be secured via DCO Schedule &/or Requirement
CoT17	Where practicable, the siting of the temporary and permanent footprint of the MHPGC Project will avoid areas of Flood Risk Zone 2 and 3, sensitive historic, cultural, ecological and other environmental receptors, both statutory and non-statutory, during the site selection process for the MHPGC Project.	Will be secured via DCO Schedule &/or Requirement

Commitment number	Measure adopted	How the measure will be secured
CoT18	An Outline Code of Construction Practice (CoCP) will be prepared and submitted with the application for development consent. A Detailed CoCP will be developed substantially in accordance with the Outline CoCP. The Outline CoCP will include (but is not limited to) measures to maintain and address: • flood protection and control measures; • water environment and drainage; • noise and vibration management measures; • air quality and dust management; • pollution prevention and management; • geology and ground conditions; • soil and materials management; • land use, tourism and recreational assets; • waste management.	The Outline CoCP would be secured as a requirement of the DCO.
CoT26	An Outline Construction Noise and Vibration Management Plan will form part of the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. It will include measures to mitigate noise from construction activities associated with the MHPGC Project. A Detailed Construction Noise and Vibration Management Plan will be developed substantially in accordance with the Outline Construction Noise and Vibration Management Plan. Bespoke method statement(s) will be developed, where required, to ensure suitable noise limits can be met on specific sensitive noise receptors.	Will be secured via DCO Schedule &/or Requirement
CoT41	An Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the application for development consent. A Detailed CTMP will be developed substantially in accordance with the Outline CTMP prior to construction. The Detailed CTMP will set out measures to include (but not limited to): • managing the numbers, timing and routeing of HGVs during the construction phase; • managing the movement of construction worker traffic during the construction phase; • details of any traffic management measures necessary to ensure the safe passage of construction traffic via the local highway network; • details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.	Will be secured via DCO Schedule &/or Requirement

6.8 Assessment of impacts and effects

6.8.1 Overview

- 6.8.1.1 This section presents a preliminary assessment of the effects of onshore noise and vibration arising from the construction and decommissioning phases of the MHPGC Project at residential receptors. The impacts and effects presented within this section account for the MDS, the parameters of which are presented in **Table 6.21**.
- 6.8.1.2 The assessment of effects the effects of onshore noise and vibration arising from the construction and decommissioning phases of the MHPGC Project at non-residential receptors will be presented at the ES Stage.

6.8.2 Construction phase

Overview of construction noise impacts

- 6.8.2.1 In accordance with the MDS as set out within **Section 6.6**, key construction activities with the potential to result in significant noise effects are anticipated to take place within the Landfall, onshore export and AC connection cable corridor and LSS Option Areas. The following key construction activities have formed the basis of the preliminary assessment:
- Haul road construction.
 - Erection of construction compound(s);
 - Operation of construction compound(s);
 - Trenchless technique cable installation (which may include HDD);
 - Open cut trenching cable installation;
 - LSS construction.
- 6.8.2.2 There is uncertainty at this stage of the design as to the location of construction related activities and residential NSRs identified within, and adjacent to, the Landfall, the onshore export cable corridor and the LSS Option Areas. A worst-case assumption has been made that construction activities would occur at the closest reasonable point to each residential NSRs considered, though in practice this represents a precautionary approach which likely overstates the potential noise impacts.
- 6.8.2.3 As set out in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**, a preliminary assessment of noise from construction activities anticipated to take place has been carried out based on an indicative plant list. Distance bandings have been determined with these activities located at the boundary of the maximum extent of the works area to determine distances at which noise sensitive receptors are likely to experience noise levels that could exceed threshold values ($L_{Aeq,T}$ (dB)) set out in **baseline ambient** noise levels (LOAEL) vary across the Onshore Construction Noise Study Area, therefore appropriate threshold values (SOAEL) will also vary between assessment locations.
- 6.8.2.4 The LOAEL and SOAEL are defined in **Table 6.11**, and the impact criteria are presented in **Table 6.12**.

Table 6.11: LOAEL and SOAEL criteria for construction and decommissioning noise for each NSR, Facade

Time Period	LOAEL	SOAEL
Weekdays (0700-1900 hours)	Baseline sound levels, $L_{Aeq,T}$	Threshold values as determined in accordance with Table E.1 BS 5228-1:2009+A1:2014 (see Table 6.9).
Saturdays (0700-1300 hours)		
Evenings (1900-2300 hours)		
Saturdays (1300-2300 hours)		
Sundays (0700-2300 hours)		
Night (2300-0700 hours)		

- 6.8.2.5 Table 6.12 The preliminary assessment has accounted for the commitments adopted as part of the MHPGC Project set out within **Section 6.6.2**.
- 6.8.2.6 Receptor group distances have then been used to determine the potential noise impacts associated with the key construction activities and the magnitude of impact is then determined. In the absence of receptor specific predictions the range in magnitude of impact which may be experienced has been reported. Where the residential receptors are located within the indicative threshold distance for their respective ABC Category, there is the potential for a medium to high impact magnitude to be experienced, i.e. an effect ranging between Moderate to Major adverse significance which is significant in EIA terms. In turn, if the residential receptor is located outside of the indicative threshold distances there is the potential for a Negligible to Low impact magnitude to be experienced, i.e. an effect ranging between Minor to Moderate adverse significance which is not significant in EIA terms.
- 6.8.2.7 Further details on the preliminary construction noise assessment are presented in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**. The impact assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur.
- 6.8.2.8 As set out within Section 6.7, an Outline Construction Noise and Vibration Management Plan (CoT26) will be prepared and submitted as part of the DCO application and form part of the Outline CoCP (CoT18), along with an Outline CTMP (CoT41). These documents will be submitted for approval prior to the commencement of operations.

Noise due to construction activities associated with the Landfall

Landfall Receptor sensitivity

- 6.8.2.9 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Noise Study Area from the Landfall have been classed as **high** sensitivity.

Magnitude of impact

- 6.8.2.10 During core working hours, the preliminary construction noise assessment indicates that when works are at their closest distance to the following residential NSR, the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R04 Hillcroft Residential.

- 6.8.2.11 Outside of core working hours, the preliminary construction noise assessment indicates that when the trenchless crossing installation works are at their closest distance to the following residential NSR, the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R04 Hillcroft Residential.

Significance of effect

- 6.8.2.12 Where the threshold criteria may be exceeded the impact magnitude would be medium to high. The sensitivity of the Hillcroft Residential (R04) receptor is classified as High. Therefore, there is a temporary effect of Moderate to Major Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.13 Significant effects, short term, direct and temporary in nature, have been identified in relation to Hillcroft Residential (R04), primarily due to its location within the area identified for Landfall. In the absence of certainty as to the specific location of construction activities, based on the worst-case precautionary assessment undertaken, it is predicted that noise levels at Hillcroft Residential (R04) could exceed SOAEL and thereby would have potential to experience significant effects.
- 6.8.2.14 The construction noise assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. Where significant noise effects cannot be avoided through practicable design refinement, enhanced acoustic mitigation would be implemented, as necessary, for plant associated with continuous construction activities, which may include trenchless technique cable installation. Such measures may include additional screening,

enclosures and/or plant selection, with the aim of reducing noise impacts at source. These secondary mitigation measures would set out within the outline Construction Noise and Vibration Management Plan which will be an appendix to the CoCP to be secured as a DCO requirement (CoT26).

- 6.8.2.15 In the case of receptor R04, it is likely that the residual effects would be significant (moderate adverse to major adverse) due to noise associated with construction within the Landfall. On a precautionary basis, the preliminary assessment concludes potential significant residual effects.

Noise due to construction activities associated with the onshore cable corridor

Receptor sensitivity

- 6.8.2.16 In accordance with the sensitivity criteria set out in **Table 6.9** residential NSRs within the Onshore Construction Noise Study Area for the onshore cable corridor have been classed as **high** sensitivity.

Magnitude of impact

- 6.8.2.17 During core working hours, the preliminary construction noise assessment indicates that when works are at their closest distance to the following residential NSRs the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R04 Hillcroft Residential;
- R09 Kinley Hill Tower;
- R10 Kinley Hill Farm Residential;
- R11 Hawthorn Dene Residential;
- R12 Hawthorn North Residential;
- R15 Hawthorn South East Residential;
- R21 Little Coop House Farm Residential;
- R22 Great Co-op House Farm Residential;
- R24 South Hetton (Windermere Road) Residential;
- R25 South Hetton East Residential;
- R33 Hesledon Moor South Residential;
- R34 Hesledon Moor Central Residential;
- R35 Hesledon Moor North Residential.

- 6.8.2.18 Outside of core working hours, the threshold criteria is reduced to take account increased sensitivity of residential NSRs during the evening and night-time periods. The preliminary construction noise assessment indicates that when the trenchless techniques cable installation works are at their closest distance to the following residential NSRs the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R01 Cold Hesledon South Residential;
- R02 Cold Helsedon North Residential;
- R03 Cold Hesledon East Residential;
- R04 Hillcroft Residential;
- R09 Kinley Hill Tower;
- R10 Kinley Hill Farm Residential;
- R11 Hawthorn Dene Residential;
- R12 Hawthorn North Residential;
- R13 Hawthorn Central Residential;
- R15 Hawthorn South East Residential;
- R16 Hawthorn North West Residential;
- R17 Hawthorn West Residential;
- R18 Hawthorn South West Residential;
- R21 Little Coop House Farm Residential;
- R22 Great Co-op House Farm Residential;
- R23 Carr's Farm Residential;
- R24 South Hetton (Windermere Road) Residential;
- R25 South Hetton East Residential;
- R26 South Hetton South East Residential;

- R29 South Hetton (Clarence Gate) Residential;
- R32 Murton South Residential;
- R33 Hesledon Moor South Residential;
- R34 Hesledon Moor Central Residential;
- R35 Hesledon Moor North Residential.

Significance of effect

- 6.8.2.19 Where the construction noise threshold criteria for residential NSRs may be exceeded during the daytime, evening and/or night-time periods, the impact magnitude would be medium to high. The sensitivity of the residential NSRs is classified as High. Therefore, there is temporary effect of Moderate to Major Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.20 Significant effects, short term and temporary in nature, have been identified in relation to a series of receptors (as set out in paragraph 6.8.2.17 and paragraph 6.8.2.18), predominantly due to their respective location within the MHPGC Project PEIR Red Line Boundary: Onshore or within up to approximately 200m.
- 6.8.2.21 The construction noise assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. If significant predicted noise related effects cannot otherwise be avoided through design refinement were considered practicable, enhanced acoustic mitigation would be implemented, as necessary. Such measures may include additional screening, enclosures and/or plant selection, with the aim of reducing noise impacts at source. These secondary mitigation measures would set out within the CoCP to be secured as a DCO requirement.
- 6.8.2.22 On the basis of the implementation of secondary mitigation measures, it is considered that the magnitude of construction noise related impacts within the area which relates to the majority of the open cut installation of the onshore export cable activities predicted during daytime hours could be reduced such that, while temporary, short term adverse effects may remain, residual effects would be minor adverse to negligible. However, it is likely that the residual effects would be significant (moderate adverse to major adverse) due to noise associated with the trenchless technique cable installation works within the onshore export cable corridor. On a precautionary basis, the preliminary assessment concludes potential significant residual effects.

Noise due to construction activities associated with the Blue Option LSS Area

Receptor sensitivity

- 6.8.2.23 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Noise Study Area of the Blue LSS Option Area have been classed as **high** sensitivity.
- 6.8.2.24 There are no residential NSRs within the Onshore Construction Noise Study Area for the Green Option LSS Area. Therefore, no further consideration of construction noise associated with Green Option LSS Area presented in this report.

Magnitude of impact

- 6.8.2.25 The preliminary construction noise assessment indicates that when works are at their closest distance to the following residential NSRs the daytime threshold criteria would not be exceeded, i.e. an impact magnitude of negligible to low.

Significance of effect

- 6.8.2.26 For the Blue LSS Option Area the impact magnitude would be negligible to low. The sensitivity of the residential NSRs is classified as High. Therefore, there is temporary effect of Minor Adverse significance, which is not Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.27 Significant effects are not predicted for the Blue LSS Option Area and therefore no further additional mitigation and monitoring are proposed.

- 6.8.2.28 Therefore, the residual effect of noise impacts due to construction activities associated with the Blue LSS Option Area, commencing from the construction phase, are considered to be minor adverse, which are not significant in EIA terms.

Overview of construction vibration impacts

- 6.8.2.29 In accordance with the MDS as set out within **Section 6.6**, reasonable worst case construction activities with potential to result in significant vibration effects are anticipated to take place within the Landfall, onshore export and AC connection cable corridor and LSS Option Areas. The following activities have formed the basis of the preliminary assessment:

- Vibratory compaction (steady state);
- Vibratory compaction (start up and run down);
- HGV movements;
- Excavation.

- 6.8.2.30 At this stage, the spatial extent of vibration generating activities have not been defined and vibration sensitive receptors are currently identified within, and adjacent to, the area where Landfall would be located, the onshore export and AC connection cable corridor and the LSS Option Areas. Ground-borne vibration calculations have therefore been performed for construction activities typically required for similar developments. The calculations are based on the empirical prediction procedures presented within BS 5228-2. A reasonable worst case assumption has been made that construction activities would occur at the closest practicable location to each residential vibration sensitive receptor considered.

- 6.8.2.31 Further details on the preliminary construction vibration assessment are presented in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**. The assessment of construction vibration at non-residential NSRs will be presented at the ES Stage.

Vibration due to construction activities associated with the Landfall

Receptor sensitivity

- 6.8.2.32 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Vibration Study Area of the Landfall have been classed as high sensitivity.

Magnitude of impact

- 6.8.2.33 The preliminary construction vibration assessment indicates that when works are at their closest distance to Hillcroft Residential (R04) the impact magnitude would be medium.

Significance of effect

- 6.8.2.34 The impact magnitude for Hillcroft Residential (R04) would be medium. The sensitivity of the residential NSRs is classified as High. Therefore, there is a temporary effect of Moderate Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.35 No additional bespoke mitigation is proposed at the PEIR stage for construction vibration. The construction vibration assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. If significant predicted vibration related effects cannot otherwise be avoided through design refinement were considered practicable, enhanced acoustic mitigation would be implemented, as necessary.

Vibration due to construction activities associated with the onshore cable corridor

Receptor sensitivity

- 6.8.2.36 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Vibration Study Area of the onshore cable corridor have been classed as high sensitivity.

Magnitude of impact

6.8.2.37 The preliminary construction vibration assessment indicates that when works are at their closest distance to the following residential NSRs the impact magnitude would be medium:

- R09 Kinley Hill Tower;
- R10 Kniley Hill Farm Residential;
- R11 Hathorn Dene Residential;
- R15 Hawthorn South East Residential;
- R19 East Batter Law Farm Residential;
- R20 West Batter Law Farm Residential;
- R21 Little Coop House Farm Residential;
- R24 South Hetton East Residential;
- R25 South Hetton (Windermere Road) Residential;
- R33 Hesledon Moor South located approximately;
- R34 Hesledon Moor Central located approximately.

6.8.2.38 The preliminary construction vibration assessment indicates that when works are at their closest distance to the following residential NSRs the impact magnitude would be low:

- R02 Cold Helsedon North Residential;
- R22 Great Co-op House Farm Residential;
- R25 South Hetton East Residential.

Significance of effect

6.8.2.39 The impact magnitude ranges between low to medium. The sensitivity of the residential NSRs is classified as High. Therefore, there is temporary effect of Minor to Moderate Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

6.8.2.40 No additional bespoke mitigation is proposed at the PEIR stage for construction vibration. The construction vibration assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. If significant predicted vibration related effects cannot otherwise be avoided through design refinement were considered practicable, enhanced acoustic mitigation would be implemented, as necessary.

6.8.2.41 It was noted that R09 (Kinley Hill Tower) which features a listed building is located within the MHPGC Project PEIR Red Line Boundary: Onshore. Cosmetic damage from vibration related construction effects can be avoided by maintaining a distance of 10m or more from the worst-case vibration activities. This is not expected therefore; a **moderate adverse** effect is predicted which is Significant in EIA terms.

Vibration impacts due to construction activities associated with the LSS

Receptor sensitivity

6.8.2.42 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within Onshore Construction Vibration Study Area of the Blue Option Area have been classed as high sensitivity.

6.8.2.43 There are no residential NSRs within the Onshore Construction Vibration Study Area for the Green Option LSS Area. Therefore the assessment of the potential for significant vibration effects relating to construction activities associated with the Green LSS Option Area has not been considered further.

Magnitude of impact

6.8.2.44 The preliminary construction vibration assessment indicates that when Blue LSS Option Area works are at their closest distance to the residential NSR of Cold Helsedon North Residential (R02) the impact magnitude would be low.

Significance of effect

- 6.8.2.45 The impact magnitude for Cold Helsedon North Residential (R02) would be low. The sensitivity of the residential NSRs is classified as High. Therefore, there is a temporary effect of Minor Adverse significance, which is not Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.46 Significant effects are not predicted and therefore no further additional mitigation and monitoring are proposed. Therefore, the effect of vibration impacts due to construction activities associated with the Blue LSS Option Area are considered to be minor adverse, which are not significant in EIA terms.

Road traffic noise during construction

- 6.8.2.47 The introduction of additional vehicles onto the local highway network has the potential to change road traffic noise levels at noise sensitive receptors located along or within close proximity to these roads.
- 6.8.2.48 An indicative assessment of construction road traffic noise has been undertaken using road traffic data as set out within **Volume 3, Chapter 5: Traffic and Transport, of the PEIR**. Further details on the preliminary construction road traffic noise assessment are presented in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**.

Receptor sensitivity

- 6.8.2.49 The NSRs are existing dwellings within 50m of the local road network. In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within Onshore Construction Road Traffic Noise Study Area have been classed as high sensitivity.

Magnitude of impact

- 6.8.2.50 The results of the preliminary assessment show the access road links to Jade Business Park experience the highest noise level changes which, during peak construction, range between +2.2dB and +3.7dB. There are no residential properties within 50m of the access road links.
- 6.8.2.51 For the remaining road links the noise level changes during peak construction, range between +0.0dB and +0.7dB, i.e. an impact magnitude of Negligible.

Significance of effects

- 6.8.2.52 The worst-case impact magnitude is defined as Negligible and the sensitivity of the receptors are classified as High. Therefore, there is indirect, temporary, effect of Negligible significance, which is Not Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.53 Based on the implementation of embedded commitments, no additional bespoke mitigation is proposed at the PEIR stage for construction road traffic noise.

6.8.3 O&M phase

Noise impacts due to the operation and maintenance of the LSS

LSS Plant Strategy

- 6.8.3.1 Detailed information on the plant strategy and layout is not available at the current design stage. However, the LSS plant likely to be installed may include the following:
- Earth switch: It is considered that this plant item would not be loud;
 - Lightning arrester or surge arrestor: It is understood that this plant item would not be loud;
 - Voltage transformer: It is understood that this plant item would not be loud;
 - Current transformer: It is understood that this plant item would not be loud;
 - Circuit breaker: It is understood that this plant item could be loud but would only be for a matter of seconds and very infrequently;
 - Disconnect or electrical isolator: It is understood that this plant item would not be loud.
 - Electrical busbar: It is understood that this plant item would not be loud;

- Power transformer: It is understood that this plant item is potentially loud and will be considered further within the ES that will accompany the application for development consent;
- Static VAR Compensator: It is understood that this plant item is potentially loud and will be considered further within the ES that will accompany the application for development consent;
- Harmonic Filter Bank: It is understood that this plant item is potentially loud and will be considered further at the within the ES that will accompany the application for development consent;
- Shunt Reactor: It is understood that this plant item is potentially loud and will be considered further within the ES that will accompany the application for development consent;
- Terminal tower / line-cable interface mast: It is understood that this plant item would not be loud.

6.8.3.2 It is likely that most plant items will operate continuously 24 hours a day whilst other plant items will operate intermittently depending on demand. In the absence of detailed design information, the MDS is formed on the assumption that all plant items operate continuously 24 hours a day.

6.8.3.3 At the ES Stage, the operational plant layout, equipment specification, façade treatments, building designs and external controls of the final LSS Option Area will be defined. A 3D noise model will be created using Datakustik CadnaA noise modelling software to predict the operational noise levels from the LSS at representative NSRs within the Onshore Operational Noise Study Area. The predicted operational noise levels, i.e. the specific sound levels, will then be assessed in accordance with BS 4142.

6.8.3.4 A BS 4142 assessment requires consideration of the character of the industrial sound, i.e. the rating level. The rating level is determined by applying a correction to the specific sound level for acoustic features (tonality, impulsivity, intermittency etc.) which can attract more attention to an industrial sound source when compared to a typical broadband or anonymous sound source.

6.8.3.5 At this stage, it is assumed that industrial noise from the MHPGC Project during O&M is steady and continuous in nature. However, based on professional judgement, it is anticipated that industrial noise from the MHPGC Project during O&M will be highly tonal within the LSS due to the typical acoustic characteristics of its components, including transformers, cooling fans, and other electrical equipment.

6.8.3.6 For the purpose of this qualitative assessment, it is assumed that the tonality of industrial noise from the MHPGC Project during O&M may be highly perceptible at the NSRs within the Operational Noise Study Area. Therefore, it is likely that a acoustic character correction of +6dB will be applied to the predicted specific sound levels. This is considered representative of a reasonable worst-case.

Receptor sensitivity

6.8.3.7 Residential NSRs identified within the Onshore Operational Noise Study Areas of the LSS Option Areas have the potential to experience significant noise related effects during the operation and maintenance of the LSS. The residential NSRs are set out within **Table 6.23** and in accordance with the sensitivity criteria set out in **Table 6.9** have been classed as high sensitivity.

6.8.3.8 A summary of the baseline sound levels at the residential NSRs is also presented in **Table 6.23**. Further details on baseline in relation to onshore noise and vibration is outlined within **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.

Table 6.23: Noise sensitive receptors in relation to noise impacts due to the operation and maintenance of the LSS

ID Receptor group ID	Receptor name	Distance from the LSS Boundary (m)	Measurement location ID	Background sound level, dB L _{A90,15min} (free-field conditions)	
				Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Blue LSS Option Area					
R01	Cold Hesledon South Residential	140	LT3 ¹	37	35
R02	Cold Hesledon North Residential	75	LT3 ¹	37	35
R03	Cold Hesledon East Residential	375	LT3 ¹	37	35
R33	Hesledon Moor South Residential	430	LT2	35	27
R34	Hesledon Moor Central Residential	560	LT2	35	27
R19	East Batter Law Farm Residential	420	LT3	37	35
Green LSS Option Area					
R24	South Hetton (Windermere Road) Residential	445	LT1	34	25
R35	Hesledon Moor North Residential	545	LT2	35	27

¹ For the purpose of the qualitative assessment, the long-term measurement location of LT3 has been adopted for R01 to R03. However it should be noted that these residential NSRs are located closer to the A19 than the adopted measurement location and therefore are likely to experience higher background sound levels.

Magnitude of impact

- 6.8.3.9 Taking into consideration the distances between the LSS Option Areas and the nearest residential NSRs, the low representative background sound level at each NSR particularly during the night-time and the acoustic character of the noise generated by the LSS, it is considered that the operational noise rating level (with acoustic character penalty) would exceed background by a substantial margin at the nearest residential NSRs for both LSS options. On this basis effects are likely to range between low to high magnitudes.
- 6.8.3.10 As set out within Section 6.7, an Operational Noise Management Plan, will be prepared and submitted as part of the DCO application and submitted for approval prior to the commencement of operations (CoT05). It will include limits on noise from operation of the onshore LSS associated with the MHPGC Project and an indication of the physical mitigation measures expected to be required and how compliance with these limits would be monitored.
- 6.8.3.11 At the ES Stage, the measures to be secured through the Operational Noise Management Plan will be developed as the design of the MHPGC Project is further defined. For example through specific plant selection, confirmed manufacturer noise data and mitigation integrated into the design (e.g., equipment optimisation, layout refinement, enclosures/barriers and façade treatments).

Significance of effects

- 6.8.3.12 The impact magnitude is likely to range between low and high. The sensitivity of the residential NSRs is classified as High. Therefore, there is a permanent effect of Minor to Major Adverse significance, which, at worst, is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.3.13 Through the good acoustic design process and with suitable mitigation incorporated into the design, it is expected that the potential noise impacts will reduce significantly. However, there is the potential for residual significant effects at the closest receptors to the chosen LSS option, particularly at night.

6.8.3.14 The design will incorporate noise control measures including:

- Strategic plant layout and orientation to maximise separation to the nearest NSRs;
- Housing of higher-noise plant within sound-insulated buildings;
- Selection of inherently low-noise equipment;
- Fixed physical controls such as acoustic enclosures, barriers and/or bunds where practicable.

6.8.3.15 The measures will be developed and secured through the Operational Noise Management Plan and detailed design. Once the LSS design is finalised, including with specific plant selection, confirmed manufacturer noise data and mitigation integrated into the design (e.g., equipment optimisation, layout refinement, enclosures/barriers and façade treatments), operational noise levels are expected to reduce and, for most receptors, are likely to be at a low/medium magnitude of impact.

6.8.4 Decommissioning phase

Noise due to decommissioning activities associated with the LSS

6.8.4.1 NSRs within the Onshore Decommissioning Noise Study Area of the Blue LSS Option Area are likely to experience noise related impacts as result of decommissioning of the LSS as they are the construction of the LSS as set out in **Section 6.8.2**, i.e. an impact magnitude of negligible to low. The sensitivity of the residential NSRs is classified as High. Therefore, there is direct, temporary, residual effect of Minor Adverse significance, which is not Significant in EIA terms.

6.8.4.2 There are no residential NSRs within the Onshore Decommissioning Noise Study Area for the Green Option LSS Area. Therefore, the assessment of the potential for significant noise effects relating to decommissioning activities associated with the Green LSS Option Area has not been considered further.

Vibration due to decommissioning activities associated with the LSS

6.8.4.3 Sensitive receptors within the Onshore Decommissioning Vibration Study Area of the Blue LSS Option Area are likely to experience vibration related impacts as result of decommissioning of the LSS as they are the construction of the LSS as set out in **Section 6.8.2**, i.e. an impact magnitude of low. The sensitivity of the residential NSRs is classified as High. Therefore, there is direct, temporary, residual effect of Minor Adverse significance, which is not Significant in EIA terms.

6.8.4.4 There are no residential NSRs within the Onshore Decommissioning Vibration Study Area for the Green Option LSS Area. Therefore, the assessment of the potential for significant vibration effects relating to decommissioning activities associated with the Green LSS Option Area has not been considered further.

Road traffic noise during decommissioning

6.8.4.5 In line with the MDS approach adopted throughout this chapter, road traffic noise during decommissioning is assumed to operate within the parameters identified for construction, using the same assessment method (CRTN with DMRB LA111 short-term change criteria) and broadly the same access routes, but with traffic flows and durations anticipated to be comparable to or lower than the peak construction month.

6.8.4.6 On this basis, the predicted changes in Basic Noise Level on public roads during decommissioning would not exceed those reported for construction; therefore, the magnitude of impact is expected to be the same as, or lower than, the construction case (i.e. Negligible across the strategic and local network), and the associated effects would remain negligible and not significant in EIA terms.

6.8.4.7 This conclusion is consistent with the overarching assumption that decommissioning will require no greater amount or duration of activity than assessed for construction and will be delivered under the same embedded controls.

6.8.5 Future monitoring

6.8.5.1 An Outline Construction Noise and Vibration Management Plan will be prepared as part of the Outline CoCP (CoT26) and submitted as part of the application for the development consent. The

detailed CoCP(s) will be developed in accordance with the Outline CoCP. These documents will include measures to mitigate, and monitor (where necessary) noise and vibration from construction activities associated with the MHPGC Project. The Outline CoCP would be secured as a requirement of the DCO (CoT18).

- 6.8.5.2 An Operational Noise Management Plan for the LSS will be prepared and submitted for approval prior to the commencement of operations (CoT05). The Plan will identify the noise limits for the operation of the LSS and the measures for how these limits would be achieved and how compliance would be monitored. This will be secured as a requirement of the DCO (CoT5).

6.9 Cumulative effects

6.9.1 Methodology

- 6.9.1.1 The Morven Programme comprises four distinct projects: Morven North, Morven South, Morven Hawthorn Pit Grid Connection Project (MHPGC Project), and Morven Branxton Area Grid Connection Project (MBAGC Project). As the largest Zone of Influence (ZOI) for the onshore CEA does not overlap with Morven North, Morven South or MBAGC, the onshore Cumulative Effects Assessment (CEA) has been undertaken to assess the MHPGC Project alone with relevant projects, plans and activities using a tiered approach. The CEA has been undertaken in accordance with the methodology described in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.
- 6.9.1.2 The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 1, Annex 4.4: Cumulative Screening and Location Plan, of the PEIR). Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.
- 6.9.1.3 In undertaking the CEA for MHPGC Project, it should be noted that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside MHPGC Project. Therefore, a tiered approach has been adopted, whereby all third-party projects and plans considered have been allocated into 'tiers' reflecting their current stage within the planning and development process. This provides a framework for placing relative weight upon the potential for each project/plan included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the project/plan's parameters. The tiered approach utilised within the MHPGC Project CEA employs the following tiers:
- Tier 1 assessment – Existing developments either built (operational) or under construction¹; approved developments awaiting implementation; and permitted/submitted application(s), but not yet determined, plus Morven North and Morven South;
 - Tier 2 assessment – All plans/projects assessed under Tier 1, plus plans/projects where a scoping report has been submitted and is in the public domain;
 - Tier 3 assessment – All plans/projects assessed under Tier 1 and 2, plus MBAGC Project, and plans/projects that are reasonably foreseeable (e.g. projects identified in development plans, projects in other plans and programmes, offshore renewable energy projects that have a Crown Estate Scotland Lease Option Agreement).
- 6.9.1.4 The ZOI adopted for the CEA for onshore noise and vibration assessment are as follows:
- The Onshore Construction (and decommissioning) Noise Study Area, an area extending 600m from the MHPGC Project PEIR Red Line Boundary: Onshore;
 - The Onshore Construction (and decommissioning) Vibration Study Area, an area extending 200m from the MHPGC Project PEIR Red Line Boundary: Onshore;
 - The Onshore Construction Road Traffic Noise Study Area, an area extending 50m from the kerb line of the local road network where construction traffic (i.e. With development scenario) would result in a change in basic noise level (BNL) of 1dB or more, when compared to the baseline scenario (i.e. Without development scenario);

¹ Note that existing developments are included in Tier 1 CEA long list but are generally screened out of the CEA assessments, aside from the following exceptions:

1) Existing developments which were not present at the time of baseline characterisation, where a potential cumulative impact-receptor pathway has been identified.

2) Existing developments are screened into tier 1 assessments for specific topics where there is a large conceptual, temporal and spatial overlap between project impacts. In these instances, the potential for ongoing effects through cumulative impact-receptor pathways throughout project lifetime, across the development phases, means that they are considered within quantitative assessment for these topic CEAs (e.g., offshore ornithology assessments consider the cumulative effects of operational offshore wind farms).

- The Onshore Operational Noise Study Area, an area extending 1000m from the LSS Option Areas.

6.9.1.5 The specific projects and plans screened into the CEA for noise and vibration are outlined in **Table 6.24**.

6.9.1.6 All potential impacts from the MHPGC Project alone assessment have been scoped into to the CEA (listed in **Table 6.24**).

6.9.1.7 Similarly, some of the potential impacts considered within the MHPGC Project alone assessment are specific to a particular phase of development (e.g. construction, O&M or decommissioning). Where cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with MHPGC Project during certain phases of development, impacts associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

Table 6.24: List of other projects and plans considered within the Cumulative Effects Assessment for Noise and Vibration

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Overlap with MHPGC Project
Tier 1					
DCC3 - Land West of Units 1-3 Admiralty Way Seaham, Erection of a petrol filling station and drive thru' coffee outlet (Class E)	Consented	0km	Erection of a petrol filling station and drive thru' coffee outlet (Class E), along with access, car parking, drive thru' lane, external seating area, refuse stores, hard and soft landscaping and associated works.	Under construction	The noise sensitive receptors of the Project, i.e. static caravan site, are within the applicable ZOI for construction noise.
DCC4 - EGL1 Visitor Centre	In Planning - Application submitted	0km	Full planning application for a temporary visitor centre at the EGL1 site compound for a period of up to 5 years	Detail not available	Project is within the applicable ZOI for construction noise, construction vibration and operational noise.
DCC5 - EGL1 Visitor Centre	Consented	0km	Commencement of Development for the creation of a solar farm	Detail not available	Project is within the applicable ZOI for construction noise.
DCC6 – Seaham Garden Village - 1500 dwellings	Consented	0km	Garden village of up to 1500 dwellings, integrated community health and wellbeing village, commercial and leisure uses, business innovation hub, primary school, public open space, community allotments and associated infrastructure, including new pedestrian and vehicular access from A182.	Under construction, due to be complete 2030	Project is within the applicable ZOI for construction noise, construction vibration and operational noise (Blue LSS Option Area only).

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Overlap with MHPGC Project
DCC7 - Phase 2 Jade Business Park	Consented	0km	Application for reserved matters comprising the construction of 3 industrial units with associated access, parking, landscaping and drainage (Phase 2) pursuant to outline planning permission DM/21/002901/OUT (B2/B8 industrial development).	Detail not available	Project is within the applicable ZOI for construction noise and operational noise.
DCC9 - Temporary installation of a battery energy storage system	In Planning - Application submitted	0km	Temporary installation of a battery energy storage system, along with ancillary infrastructure, acoustic and security fencing, access, landscaping provision and ecological enhancements.	Detail not available	Project is within the applicable ZOI for construction noise and operational noise.
DCC10 - Battery Energy Storage System	In Planning - Application submitted	0km	The construction and installation of a Battery Energy Storage System, associated infrastructure, landscaping, fencing, access tracks, biodiversity net gain and underground cable corridor.	12 month construction programme	Project is within the applicable ZOI for construction noise and operational noise.
DCC11 - Eastern Green Link 1, Converter Station	Consented	0km	Reserved Matters application (all matters, being details of the permanent access, appearance, landscaping, layout and scale) for the erection of a converter station, and the laying out of replacement public open space on land to the west and south of Jade Business Park	Under construction, works to be complete in 2029	Project is within the applicable ZOI for operational noise.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Overlap with MHPGC Project
			pursuant to DM/22/01663/OUT		
DCC12 - 81 homes and a convenience store	In Planning - Application submitted	0km	Erection of 81 no. homes, a convenience store (use class E) and associated infrastructure and landscaping	Detail not available	Project is within the applicable ZOI for construction noise and operational noise.
DCC13 - 149 homes, Land East of Seaham Garden Village	In Planning - Application submitted	0km	Demolition of existing farm buildings and dwellings and erection of 149 dwellings (use class C3) with vehicle access, open space, landscaping, SUDS, and associated infrastructure works	Detail not available	Project is within the applicable ZOI for construction noise and construction vibration.
DCC146 - BESS, Hawthorn Grid Site Murton	Consented	0km	BESS, Hawthorn Grid Site Murton	Under construction	Project is within the applicable ZOI for operational noise.
Tier 3					
DCC14 - Land North West Of Hallfield Farm Solar Farm	Pre-application	0km	Screening Opinion request for the construction, operation and decommissioning of a Battery Energy Storage System (BESS) with a storage capacity of up to 300 megawatts (MW).	Details not available.	Project is within the applicable ZOI for operational noise.

6.9.2 Maximum Design Scenario –Cumulative Effects Assessment

- 6.9.2.1 The MDS identified in Table 6.21 has been selected as having the potential to result in the greatest potential effect on an identified receptor or receptor group in relation to the CEA. The MDSs have been based on the MHPGC Project alone assessment MDS (**Table 6.21**), as well as publicly available information on other third-party projects and plans that have been screened into the CEA (**Table 6.24**).

6.10 Cumulative Effects Assessment

6.10.1 Overview

- 6.10.1.1 A description of the significance of cumulative effects upon noise and vibration sensitive receptors arising from each identified impact is given below. The CEA for MHPGC Project is presented in **Table 6.25**.

6.10.2 Construction Phase

Noise impacts due to construction activities

- 6.10.2.1 There is potential for cumulative noise effects as a result of the MHPGC Project and other projects that are under construction and/or in operation. If the construction period of activities within the Landfall, onshore export and AC connection cable corridor and LSS Option Areas of the MHPGC Project for the MHPGC Project and cumulative projects overlap, then there is the potential for noise sensitive receptors within the ZOI to be affected by cumulative noise generated during construction. In addition, the cumulative projects have the potential to introduce noise sensitive receptors which will require consideration as part of the construction phase assessment.
- 6.10.2.2 The summary of the Cumulative Effects Assessment is presented in **Table 6.25**.

Table 6.25: MHPGC Project CEA for construction noise

	Cumulative Effects Assessment
Construction phase	
Magnitude of impact	<u>Tier 1</u> Tier 1 cumulative projects overlap with the MHPGC Project PEIR Red Line Boundary: Onshore or are within the ZOI (as set out in paragraph 6.9.1.4). At the time of writing, timescales for the construction phases of the Tier 1 projects are currently unknown. To ensure a conservative assessment, it has been assumed that Tier 1 project construction timescales overlap with the MHPGC Project construction period of 2033 to 2037. It has been assumed that the Tier 1 construction phase works would only overlap with the MHPGC Project during core working hours, i.e. the weekday daytime period. Cumulative impacts from construction noise are expected to have a local spatial extent, temporary, short-term duration. Tier 1 projects DCC4, DCC5, DCC7, DCC9, DCC10 and DCC11 are non-residential in nature. DCC3 (static caravan), DCC6, DCC12 and DCC13 proposals are residential developments and in turn have the potential to introduce noise sensitive receptors which may require consideration in the construction phase assessment once constructed. A preliminary construction noise assessment for the MHPGC Project has been undertaken. Taking into account the distances between the Tier 1 cumulative projects and the nearest NSRs, it is considered that if the construction phase activities of the MHPGC Project and Tier 1 projects were to overlap the cumulative impacts are likely to be no greater than that presented in the preliminary assessment for the MHPGC. When works within the landfall and onshore export and AC connection cable corridor of the MHPGC Project overlap with the Tier 1 projects DCC3, DCC6 and DCC13, the daytime threshold criteria may be exceeded at the future residents of these projects, i.e. an impact magnitude of medium to high. <u>Tier 2 and Tier 3</u> No relevant cumulative projects have been identified.
Sensitivity of receptor	Residential receptors within the ZOI are classed as high sensitivity.
Significance of effect	At most residential receptors within the ZOI, the magnitude of the cumulative impact is deemed to be negligible to low, and the sensitivity of the receptor is High. The cumulative effect will therefore be of minor adverse significance (not significant). Where the BS 5228 threshold criteria may be exceeded the impact magnitude would be medium to high. The sensitivity of the residential receptors is classified as High. Therefore, the cumulative effect is temporary, short-term effect of Moderate to Major Adverse significance, which is Significant in EIA terms.
Further mitigation and residual significance	The ongoing design process will consider the results of the preliminary noise assessment for the MHPGC Project when refining the potential location and programmed sequence of works within the landfall, onshore export and AC connection cable corridor and LSS. Potential significant cumulative effects will be evaluated in more detail in the ES.

Road traffic noise during construction

- 6.10.2.3 There is potential for cumulative construction traffic, associated with the MHPGC Project and any cumulative projects, that could be potentially constructed within the 4.5 year of the MHPGC Project construction period. If the construction period for the MHPGC Project and cumulative projects overlaps, then there is the potential for additional vehicles on the local highway network to change road traffic noise levels at noise sensitive receptors located along or within close proximity to these roads.
- 6.10.2.4 An indicative assessment of construction road traffic noise has been undertaken using road traffic data as set out within Volume 3, Chapter 5: Traffic and Transport, of the PEIR. The specific projects and plans screened into the CEA for Traffic and Transport are outline in Table 5.35 of Volume 3, Chapter 5: Traffic and Transport, of the PEIR.
- 6.10.2.5 The results of the preliminary assessment shows the worst-case impact magnitude is defined as Negligible. The sensitivity of the receptors are classified as High. Therefore, there is indirect, temporary, residual effect of Minor significance, which is Not Significant in EIA terms.

6.10.3 O&M Phase**Noise impacts due to the operation and maintenance of the LSS**

- 6.10.3.1 There is potential for noise generated by the operation of the LSS of the MHPGC Project and any cumulative projects of an industrial nature to result in cumulative effects at noise sensitive receptors. In addition, the cumulative projects have the potential to introduce noise sensitive receptors which will require consideration as part of the operation phase assessment.
- 6.10.3.2 At the ES stage the operational plant layout, equipment specification, façade treatments and building designs will be refined and an assessment of significance and residual effects of the MHPGC Project will be carried out. In turn, an assessment of operational noise levels of the MHPGC and cumulative projects will also be carried out at the ES Stage. The Proposed Developments requiring further detailed assessment include:
- DCC7 - Phase 2 Jade Business Park;
 - DCC9 - Temporary installation of a battery energy storage system;
 - DCC10 - Battery Energy Storage System;
 - DCC11 – Eastern Green Link 1, Converter Station;
 - DCC146 - BESS, Hawthorn Grid Site Murton
 - DCC14 - Land North West Of Hallfield Farm Solar Farm (should sufficient information be available to assess this potential development as it is currently at pre-application stage).
- 6.10.3.3 There are no cumulative traffic impacts anticipated during O&M phase. The assessment of road traffic noise from the O&M phase of the MHPGC Project has been scoped out.

6.10.4 Decommissioning phase**Noise due to decommissioning activities associated with the LSS**

- 6.10.4.1 The MHPGC Project cables will be left in place, to minimise/ avoid environmental disturbance. Noise sensitive receptors within the Zol of the Blue LSS Option Area or the Green LSS Option Area and likely to experience noise related impacts as result of decommissioning of the LSS as they are the construction of the LSS, i.e.an impact magnitude of negligible to low. The sensitivity of the receptors are classified as High. Therefore, there is direct, temporary, residual effect of Minor significance, which is Not Significant in EIA terms.
- 6.10.4.2 There are no cumulative traffic impacts anticipated during decommissioning phase. In-combination impacts during decommissioning are unlikely given the nature of the projects and the expected decommissioning period.

6.10.5 Proposed monitoring

- 6.10.5.1 An Outline Construction Noise and Vibration Management Plan for the MHPGC will be prepared as part of the outline CoCP (CoT26) and submitted as part of the application for the development consent. An Operational Noise Management Plan for the LSS of the MHPGC Project will also be prepared and submitted for approval prior to the commencement of operations (CoT5).

6.11 Transboundary effects

- 6.11.1.1 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to onshore noise and vibration from the construction, O&M and decommissioning phases of the MHPGC Project upon interests of other states has been assessed as part of the PEIR.
- 6.11.1.2 The potential transboundary impacts are screened within **Volume 1, Annex 4.2: Transboundary Screening, of the PEIR**. There are no identified pathways through which either direct or indirect impacts could result in significant transboundary effects on the onshore noise and vibration of a European Economic Area (EEA).

6.12 Inter-related effects

- 6.12.1.1 Inter-related effects are the combined impact of multiple aspects of the MHPGC Project on a single receptor. These are as follows:
- **Project lifetime effects:** Assessment of the scope for effects that occur throughout more than one phase of the MHPGC Project (construction, O&M and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases;
 - **Receptor led effects:** Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.
- 6.12.1.2 For Noise and Vibration, the following potential impacts have been considered within the inter-related assessment:
- potential project lifetime effects for noise impacts from construction, operation and decommissioning, noise impacts from additional vehicle movements during construction and decommissioning, vibration impacts during construction and decommissioning;
 - potential for receptor-led effects where increased traffic movements, air-quality effects, visual change and associated human-health effects overlap spatially and temporally with the noise and vibration sensitive receptors.
- 6.12.1.3 Inter-related effects are assessed **within Volume 4, Chapter 5: Inter-related Effects, of the PEIR** with no likely significant inter-related effects anticipated.

6.13 Summary

6.13.1 Summary of effects

- 6.13.1.1 This chapter has assessed the potential impacts on onshore noise and vibration from the construction, O&M and decommissioning phases of the MHPGC Project.
- 6.13.1.2 **Table 6.26** presents a summary of impacts and confirms the residual effects.

6.13.2 Summary of secondary mitigation and monitoring

- 6.13.2.1 The MHPGC Project includes secondary mitigation to avoid, reduce and control noise and vibration effects.
- 6.13.2.2 These secondary mitigation measures help to avoid and reduce potential noise and vibration effects during construction through defined controls, specifications, and monitoring. The approach

will be reviewed and, where necessary, refined in the ES as the design progresses and outstanding inputs are confirmed (e.g. final plant selections and link-specific traffic data).

6.13.2.3 **Table 6.26** presents a summary of the secondary mitigation and monitoring proposed.

Table 6.26: Summary of potential impacts and residual effects

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Mitigation and monitoring	Residual effect
Construction phase					
Construction noise: Landfall	High (R04 Hillcroft Residential)	Medium to High at R04.	Moderate to Major adverse (significant) at R04.	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation measures and monitoring where necessary.	Potential significant residual effects where BS 5228 thresholds are exceeded (moderate–major adverse).
Construction noise: onshore export and AC connection cable corridor	High (residential)	Works during core hours: Medium to High at R04, R09 to R12, R15, R21, R22, R24, R25 and R33 to and R35. Outside core working hours: Medium to High at R01 to R04, R09 to R13, R15 to R18, R21 to R26, R29 and R32 to R35.	Moderate to Major adverse (significant) at R01 to R04, R09 to R13, R15 to R18, R21 to R26, R29 and R32 to R35.	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation measures and monitoring where necessary.	Potential significant residual effects where BS 5228 duration thresholds are exceeded (moderate–major adverse).
Construction noise: Blue LSS Option Area	High (residential)	Negligible to Low at R01 and R02.	Minor Adverse (not significant) at R01 and R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Construction vibration: Landfall	High (R04 Hillcroft Residential)	Medium at R04	Moderate adverse (significant) at R04	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation	Potential significant residual effects where works are in close proximity of the residential receptors.

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Mitigation and monitoring	Residual effect
				measures and monitoring for residential receptors.	
Construction vibration: onshore export cable corridor	High (residential)	Low at R02, R22 and R25. Medium at R09 to R11, R15, R19 to R21, R24, R25, R33 and R34.	Minor adverse (not significant) at R02, R22 and R25. Moderate adverse (significant) at R09 to R11, R15, R19 to R21, R24, R25, R33 and R34.	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation measures and monitoring for residential receptors and listed buildings (R09) where necessary.	Potential significant residual effects where works are in close proximity of the residential receptors.
Construction vibration: Blue LSS Option Area	High (residential)	Negligible to Low at R02.	Minor Adverse (not significant) at R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Construction road traffic noise (both Blue and Green LSS Option Areas during peak construction year of 2033)	High (residential)	Negligible	Minor (not significant)	No additional secondary measures proposed at PEIR stage	Minor adverse (not significant)
Operational phase					
Operational plant noise: LSS	High (residential)	Assessment not included at PEIR Stage	Assessment not included at PEIR Stage	Plant/equipment specification to meet limits. Layout optimisation. Localised enclosures/barriers for dominant items. Building/façade acoustic treatments where proportionate. Commissioning and compliance monitoring	ES to confirm following design/specification refinement and confirmation of rating levels vs background
Decommissioning phase					

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Mitigation and monitoring	Residual effect
Decommissioning noise: Blue LSS Option Area	High (residential)	Negligible to Low at R01 and R02.	Minor Adverse (not significant) at R01 and R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Decommissioning vibration: Blue LSS Option Area	High (residential)	Negligible to Low at R02.	Minor Adverse (not significant) at R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Decommissioning road traffic noise	High (residential)	Negligible	Minor (not significant)	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)

6.14 Further work to be undertaken for the ES

6.14.1 Introduction

6.14.1.1 Further work that will be undertaken to support the noise and vibration assessment and presented within the ES is set out below.

6.14.2 Consultation and engagement

6.14.2.1 Further consultation and engagement will be undertaken to inform the noise and vibration assessment and presented within the ES. This will include further consultation with DCC Environment Protection Team on the quantitative assessment of the LSS Option Areas and final selection.

6.14.3 Baseline

6.14.3.1 Should the Blue LSS Option Area be selected as the final LSS location, a noise survey at a location representing the nearest residential receptors to the west of the A19, i.e. R01 to R03, will be undertaken. This will be a minimum of 7 days of noise monitoring encompassing a typical weekday and weekend period.

6.14.3.2 A noise survey at locations representative of the ecological receptors will also be undertaken. It is likely that unattended continuous monitoring would be undertaken for a minimum of 7-days.

6.14.4 Assessment

6.14.4.1 New information may be made available to any of the assessments necessitating amendments. The following assessments will be either updated with new information anticipated for the ES or undertaken where they have not for this PEIR:

- updated onshore construction assessment on a receptor-by-receptors basis in accordance with BS 5228-1;
- updated vibration assessment associated with the construction of the onshore substation in accordance with BS 5228-2;
- updated construction road traffic road noise assessment;
- onshore operational noise assessment of the final LSS in accordance with BS 4142;
- updated CEA, including a quantitative operational noise assessment.

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Annexes

Annex number	Annex title
Volume 3, Annex 6.1	Onshore Noise and Vibration Baseline Technical Report
Volume 3, Annex 6.2	Onshore Noise and Vibration Construction Technical Report

Glossary

Term	Meaning
Alternating current (AC) connection cables	AC cables that will connect the proposed onshore land substation to the National Grid Hawthorn Pit Substation.
AC connection cable corridor	The corridor within which the AC connection cables will be located, from the onshore land substation to the National Grid Hawthorn Pit Substation.
Ambient sound level	The total sound pressure level in a given position from all surrounding sources of noise, both near and far. Normally expressed as an equivalent continuous A-weighted sound pressure level, dB $L_{Aeq,T}$.
A-weighting	The process of weighting the observed sound pressure level at each frequency band, to approximate the sensitivity of the human ear to sounds of different frequencies. A-weighted sound pressure levels are expressed as dB(A) or dB L_{Ap} .
Commitments	Measures (embedded mitigation & secondary) to be adopted during the construction, operation and maintenance, and decommissioning phases of the Morven Hawthorn Pit Grid Connection (MHPGC) Project.
Cumulative effect	For each environmental topic, the baseline environment will be characterised, and the likely significant effect will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic and are based on the maximum spatial extent.
Cumulative effects assessment	Assessment of the likely effects arising from the MHPFC Project alongside the likely effects arising from other proposed developments on the same receptor or resource.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in sound pressure level between two sounds is given by $20 \log_{10}$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20 \mu\text{Pa}$.
Embedded mitigation	Measures included as part of the project design. Includes both primary and tertiary mitigation.
Environmental Impact Assessment (EIA)	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.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Free-field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Frequency	The number of oscillations per second of a vibrating particle in a medium, measured in Hertz (Hz) or cycles per second.
Inter-related effects	Effects that may arise from the interactions between different EIA topic effects considered within the alone assessment, potentially leading to more significant effects than if they were to be considered in isolation.
Landfall	The area in which the offshore export cables make landfall (come onshore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between the trenchless technique exit pits and the transition joint bay (TJB) inclusive of all construction works.
$L_{A90,T}$	The A-weighted sound pressure level exceeded during 90% of the time interval, T. Typically used to quantify the background sound level at a specified position.

Term	Meaning
$L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level over a time interval, T. This is an energy-average sound pressure level over the specified time period.
$L_{AFmax,T}$	The maximum A-weight sound pressure level during a specified time interval, T. Measured with “fast” time-weighting (which approximates the time-response of the human ear).
$L_{Ar,Tr}$ (Rating level)	A-weighted rating level of the specific sound source over the reference time period T_r , as defined in BS 4142:2014+A1:2019. Calculated from the specific sound level $L_{Aeq,Tr}$ with the addition of any character corrections (e.g., tonality, impulsivity, intermittency, other characteristics). Used to assess impact by comparison with $L_{A90,T}$ at the same receptor and period.
$L_{A90,T}$ (Background sound level)	A-weighted background sound level over the reference time period T: the level exceeded for 90% of the time. Determined from measurements and selected as representative of the underlying sound environment, excluding atypical events, in line with BS 4142 guidance. Used as the reference for comparison with $L_{Ar,Tr}$ at the same receptor and period.
L_r (Residual sound level)	The equivalent continuous A-weighted sound pressure level of the ambient sound remaining at a specified position when the specific sound source (the sound source being assessed) does not contribute to the ambient sound.
L_s (Specific sound level)	The equivalent continuous A-weighted sound pressure level at a specified position due to the specific sound source (the sound source being assessed).
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact.
Maximum design scenario (MDS)	The realistic, worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the MHPGC Project.
MHPGC Project Environmental Statement (ES)	The document presenting the results of the Environmental Impact Assessment process.
MHPGC Project Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
MHPGC Project Scoping Report	A Scoping Report for the MHPGC Project, scoping the likely significant effects of the project on the environment, was submitted and accepted by Planning Inspectorate (PINS) and submitted to the Scottish Ministers, via the Marine Directorate – Licencing Operations Team (MD-LOT) in February 2025.
MHPGC Project Scoping Opinions	Separate scoping opinions received from PINS (on behalf of the Secretary of State) and MD-LOT (on behalf of the Scottish Ministers) in response to the MHPGC Project Scoping Report. The MHPGC Project Scoping Opinions contain the range of issues that PINS, and MD-LOT in consultation with statutory stakeholders, have identified should be considered within the EIA process.
MHPGC Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s) (OSP), landfall, onshore export cables, the onshore land substation (LSS) and AC connection cables.
MHPGC Project PEIR Red Line Boundary: Onshore	Spatial extent used to define the environmental assessment within the PEIR. The area within which all onshore components of the MHPGC Project will be located landward of MHWS, including areas required on a temporary basis during construction and/or decommissioning (e.g. construction compounds).

Term	Meaning
Morven North Offshore Wind Array Project (hereafter 'Morven North')	The Morven North Offshore Wind Array Project which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven North Boundary.
Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project	Morven North and Morven South comprises the Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project, collectively.
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit, County Durham, which the AC connection cables will connect into from the LSS.
Noise	The terms noise and sound are often used interchangeably. Noise usually refers to unwanted or disturbing sounds that interfere with normal hearing and can be unpleasant or harmful. It is often characterised by irregularities in the sound waves and is considered a form of sound pollution.
Noise Important Area (NIA)	Noise Important Areas are locations identified as containing the 1% of the population in England that are exposed to the highest level of road traffic noise. These locations have been determined through strategic noise mapping undertaken by the Department for the Environment, Food and Rural Affairs, with the intention of identifying potential actions that could be taken to reduce noise.
Octave band	A sound made up of more than one frequency can be described using a frequency spectrum, which shows the relative magnitude of the different frequencies within it. The possible range of frequencies is continuous, but can be split up into discrete bands, often an octave or third-octave in width. Each octave band is referred to by its centre frequency, generally 63Hz, 125Hz, 250Hz, 500Hz, 1kHz etc.
Onshore export cable corridor	The proposed corridor within which onshore export cables and associated infrastructure will be laid and located, from the TJB to the LSS.
Onshore export cables	High Voltage Direct Current (HVDC) cables which bring electricity from the TJB to the onshore land substation.
Onshore Land Substation (LSS)	A purpose-built site comprising a compound containing the electrical components for converting the HVDC to HVAC power. The LSS site associated with the MHPGC Project adjusts the power quality and power factor to meet the requirements of power supply being fed to the National Grid Hawthorn Pit Substation.
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for NSIPs in England. PINS manages the application process, oversees consultation and examination, and makes a recommendation to the relevant Secretary of State on whether consent should be granted.
Primary mitigation	Measures included as part of the location or design of the MHPGC Project made during the pre-application phase that are an inherent part of the MHPGC Project and do not require additional action to be taken. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the MHPGC Project, the parameters and associated commitments secured by the DCO and marine licence, or both.
Residual effects	Effects that continue to exist after mitigation has been applied.
Secondary mitigation	Actions that will require further activity to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the ES. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. For secondary mitigation measures, both pre-mitigation and residual effects are presented.

Term	Meaning
Sound	The terms noise and sound are often used interchangeably. Sound is a broad term that refers to any auditory experience created by vibrations that travel through a medium such as air, water, or solids to the ear.
Sound absorption	The reduction of sound energy by transmission through an absorbing medium such as an “acoustically soft” material or surface which results in a reduced reflection of incident sound.
Sound power level	A logarithmic measurement that quantifies the total sound power of a source emitted in all directions relative to a reference sound power ($W_{ref} = 1 \text{ pW}$ or 10^{-12} W). Equal to $10 \log_{10} (W / W_{ref})$ and expressed in decibels.
Sound pressure level (SPL)	Sound Pressure Level is a measure of the pressure variation caused by a sound wave relative to a reference pressure, typically $20 \mu\text{Pa}$ (the threshold of human hearing). It is expressed in decibels (dB) and describes how loud a sound is at a specific point. Root Mean Square Sound Pressure Level is the Sound Pressure Level calculated using the Root Mean Square of the sound pressure over a given time period. It provides a measure of the effective or average sound pressure, smoothing out rapid fluctuations to represent perceived loudness more accurately.
Tertiary mitigation	Actions that would occur with or without input from the EIA process feeding into the design. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects.
Onshore Noise and Vibration Study Areas	For each environmental topic, the baseline environment will be characterised, and the likely significant effect will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic and are based on the maximum spatial extent across which likely significant effects of the MHPGC Project may be experienced by the relevant receptors (i.e. Zone of Influence (Zoi)).
Transboundary effects	Assessment of likely significant effects resulting from MHPGC Project on the interests of another European Economic Area (EEA) state(s).
Transboundary impact	Potential impacts resulting from MHPGC Project and affecting another European Economic Area (EEA) state.

Acronyms

Acronym	Meaning
AAWT	Annual Average Weekday Traffic
AIS	Air Insulated Switchgear
AC	Alternating Current
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
CEA	Cumulative Effect Assessment
CNVMP	Construction Noise and Vibration Management Plan
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
CTMP	Construction Traffic Management Plan
DCC	Durham County Council

Acronym	Meaning
DCO	Development Consent Order
DRC	Dynamic reactive power compensator
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DMRB	Design Manual for Roads and Bridges
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
EWG	Expert Working Group
GIS	Gas Insulated Switchgear
JSJV	Jacobs Systra Joint Venture
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicles
HVDC	High Voltage Direct Current
ISO	International Organization for Standardization
IEMA	Institute of Environmental Management and Assessment
ISEP	Institute of Sustainability and Environmental Professionals
LOAEL	Lowest Observed Adverse Effect Level
LSS	onshore land substation
MDS	Maximum Design Scenario
MHPGC	Morven Hawthorn Pit Grid Connection
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NIA	Noise Important Areas
NML	Noise Monitoring Locations
NOAEL	No Observed Adverse Effect Level
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NPSE	Noise Policy Statement England
NR	Noise Rating
NSR	Noise Sensitive Receptors
O&M	Operations and Maintenance
ONMP	Operational Noise Management Plan
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PPGN	Planning Practice Guidance for Noise
PPV	Peak Particle Velocity

Acronym	Meaning
SCC	Sunderland City Council
SOAEL	Significant Observed Adverse Effect Level
SoS	Secretary of State
TJB	Transition Joint Bay
WHO	World Health Organisation

Units

Unit	Meaning
dB	Decibel (dB) is a logarithmic scale for describing how loud a sound is—the higher the number, the louder it sounds. A rule of thumb is a 10 dB increase is often heard as roughly twice as loud.
dB(A)	A-weighted decibel, which applies a frequency weighting to reflect the sensitivity of the human ear; commonly used for environmental noise assessment.
Hz	Hertz (Hz) is a unit of frequency, describing the number of sound or vibration cycles per second.
hr	Hours, used in sound level parameters.
m	Metres (m), used to describe distances between noise or vibration sources and receptors.
s	Seconds (s) are used to describe measurement durations or event lengths.
min	Minutes (min) are commonly used to define noise measurement or assessment periods.
mm/s	Millimetres per second (mm/s) is the standard unit for vibration velocity and is used to assess building damage and human response to vibration.
PPV	Peak Particle Velocity (PPV) is the maximum vibration velocity recorded during a vibration event, typically expressed in mm/s.

6 Onshore Noise and Vibration

6.1 Introduction

- 6.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary findings of the Environmental Impact Assessment (EIA) work undertaken to date for the Morven Hawthorn Pit Grid Connection Project (hereafter 'MHPGC Project'), as described in **Volume 1, Chapter 2: Project Description, of the PEIR**.
- 6.1.1.2 The chapter considers the potential impacts and likely significant effects in terms of onshore noise and vibration that could result from the construction, operation and maintenance (O&M) and decommissioning phases of the MHPGC Project. Specifically, it relates to the MHPGC Project PEIR Red Line Boundary: Onshore and the onshore elements of the MHPGC Project landward of Mean High Water Springs (MHWS) at landfall to the National Grid Hawthorn Pit Substation in England.
- 6.1.1.3 This chapter describes the methodology, datasets that have informed the preliminary assessment, baseline conditions, including future baseline, mitigation measures and assesses the preliminary residual likely significant effects on onshore noise and vibration that could result from the MHPGC Project.
- 6.1.1.4 The assessment is informed by the following chapters:
- **Volume 1, Chapter 2: Project Description, of the PEIR;**
 - **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR;**
 - **Volume 1, Chapter 5: Policy and Legislation, of the PEIR;**
 - **Volume 3, Chapter 5: Traffic and Transport, of the PEIR;**
 - **Volume 4, Chapter 5: Inter-related Effects, of the PEIR.**
- 6.1.1.5 The chapter also draws on information contained within the following annexes:
- **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR;**
 - **Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR;**
 - **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR;**
 - **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR.**
- 6.1.1.6 This PEIR will offer a comprehensive overview of the MHPGC Project's potential environmental impacts and mitigation measures, presenting essential data to stakeholders for review and feedback. The PEIR will also be informed by the ongoing pre-application consultation process.
- 6.1.1.7 Following statutory consultation, comments will be reviewed and considered, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate (PINS) for development consent.

6.2 Legislative and policy context

6.2.1 Overview

- 6.2.1.1 The full relevant legislation and policy context for the MHPGC Project has been detailed in **Volume 1, Chapter 5: Policy and Legislation, of the PEIR**. This section sets out the legislation and planning policy that is relevant to the preliminary onshore noise and vibration assessment.

6.2.2 Legislation

The Environmental Noise (England) Regulations, 2006

- 6.2.2.1 The Environmental Noise (England) Regulations 2006 set out requirements for Noise Action Planning to promote good health and good quality of life.
- 6.2.2.2 Regulation 15(1)(a) and (aa) of The Environmental Noise (England) Regulations 2006 is amended by The Environment (Amendment etc.) (EU Exit) Regulations 2019 which states Noise Action Plans must:

- Aim to prevent and reduce environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health;
- Aim to preserve environmental noise quality where it is good.

Control of Pollution Act 1974

- 6.2.2.3 The Control of Pollution Act 1974 offers protection against disturbance to residents that might be affected by construction activity.
- 6.2.2.4 Section 60 enables a Local Authority to serve a notice on a person (this includes a company) who is carrying out, or who is planning to carry out, works of construction, demolition, roadworks, railway maintenance etc. in order to control the noise from those operations.
- 6.2.2.5 Section 61 also enables such a person to apply to the Local Authority for consent in respect of such works. The Act introduces the concept of using 'Best Practicable Means' (BPM) to control the impact of noise, where significant impacts are likely to occur. BPM refers to the selection of plant, techniques and equipment to reduce noise whilst considering local conditions, current state of technical knowledge and the financial implications. Factors such as timing, duration, location and opportunities for acoustic screening or separation are employed; to ensure that impacts are controlled in so far as is reasonably practicable. The demonstrable use of BPM can also be used as a defence to enforcement action under nuisance legislation.
- 6.2.2.6 Section 71 sets out the Secretary of State's powers to issue codes of practice for the purpose of providing practical guidance on the minimisation of noise, including noise arising from the use of plant or machinery on construction sites and other works to which Section 60 applies. Section 71 also allows the Secretary of State to approve, by order, any code of practice issued by another body, and to approve any revision of an existing code.
- 6.2.2.7 Section 72 defines "BPM" as measures that are reasonably practicable for minimising noise, taking account of local conditions, the current state of technical knowledge and the financial implications of adopting particular methods. The definition includes the design, installation and maintenance of plant and machinery, as well as the design, construction and maintenance of buildings, structures, and acoustic works used to reduce noise while ensuring compatibility with legal duties, safety, and emergency circumstances.

Land Compensation Act 1973

- 6.2.2.8 Part 1 of the Land Compensation Act 1973 entitles property or landowners to apply for compensation if the value of an interest in land is depreciated by physical factors brought about by the use of new or (in certain situations) altered public works, including any works or land provided or used in the exercise of statutory powers. These physical factors include noise and vibration.

Environmental Protection Act 1990

- 6.2.2.9 Section 79 of the Environmental Protection Act 1990 declares several items as statutory nuisances. Under the Environmental Protection Act, the local authority is required to periodically inspect its area to detect any nuisance and, where a complaint of a statutory nuisance is made by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint. If a statutory nuisance exists, the local authority is obliged to serve an abatement notice.

The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015

- 6.2.2.10 Section 71 of the Control of Pollution Act 1974 provides that the Secretary of State may issue codes of practice for the purpose of providing practical guidance on the minimisation of noise and may, by order, approve any code of practice issued or revised for that purpose. The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015 gives formal approval to British Standard (BS) 5228-1:2009+A1:2014 (BSI, 2014) and BS 5228-2:2009+A1:2014 (BSI, 2014) as codes of practice for England. By virtue of this approval, Parts 1 and 2 of BS 5228 constitute approved codes of practice for the purposes of Section 71 of the Control of Pollution Act 1974.

6.2.3 National policy context

National Policy Statements

- 6.2.3.1 National Policy Statements (NPS) set out the primary policy framework for a Development Consent Order (DCO) under which the MHPGC Project will be considered. This framework includes guidelines, requirements and criteria that the MHPGC Project must meet to obtain consent and proceed with development.
- 6.2.3.2 **Table 6.1** provides details of the NPS relevant to onshore noise and vibration and how and where they are covered in the PEIR:
- Overarching NPS for energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2025a);
 - NPS for renewable energy infrastructure (EN-3) (DESNZ, 2025b);
 - NPS for electricity networks infrastructure (EN-5) (DESNZ, 2025c).

Table 6.1: Summary of the NPS provisions relevant to onshore noise and vibration

Summary of relevant NPS provisions	How and where considered in the PEIR
NPS EN-1	
Paragraphs 4.4.1-4.4.8 of EN-1 sets out the need to assess the effects of a proposed project on humans and states the “ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate”.	The assessment presented in Section 6.8 has informed the assessment of potential impacts of the MHPGC Project in relation to human health. The preliminary human health assessment is set out within Volume 4, Chapter 2: Human Health, of the PEIR .
Paragraphs 4.7.1-4.7.15 of EN-1 set out criteria for good design for energy infrastructure, which includes the siting and use of appropriate technologies can help mitigate adverse impacts such as noise, applied during the early stages of the project lifecycle.	The design of the MHPGC Project will continue to consider noise and vibration sensitive receptors during the site selection process, where practicable.
Paragraphs 4.12.1-4.12.8 of EN-1 state that “ <i>Issues relating to discharges or emissions from a proposed project, and which lead to other direct or indirect impacts on terrestrial, freshwater, marine, onshore, and offshore environments, or which include noise and vibration may be subject to separate regulation under the pollution control framework or other consenting and licensing regimes, for example local planning consent or marine licences. Wherever appropriate, applicants should submit applications for Environmental Permits and other necessary consents at the same time as applying to the Secretary of State for development consent.</i> ”	Details of the consultation to date are set out within Section 6.3 of this chapter. The preliminary assessment has identified noise and vibration generating activities during the construction, O&M and decommissioning phases of the MHPGC Project, albeit on the basis of a Maximum Design Scenario (MDS). Embedded mitigation measures, inherently designed to ensure compliance with applicable regulatory limits, are set out within this chapter, in Section 6.7 .
Section 5.12 sets out the expected scope of a noise assessment. Paragraph 5.12.1 of EN-1 states that “ <i>Excessive noise can have wide-ranging impacts on the quality of human life and health...</i> ” and “ <i>can also have an impact n the environment</i> ”. Paragraph 5.12.2 of EN-1 states that similar considerations should also apply to vibration “ <i>which can also cause damage to buildings</i> ”. Paragraph 5.12.6 states that “ <i>All reasonable steps taken to mitigate and minimise potential adverse effects</i> ”.	This chapter of the PEIR provides a preliminary assessment of the potential onshore noise and vibration impacts on human receptors, buildings, and the wider environment. This preliminary assessment identifies sensitive receptors and characterises baseline conditions (Section 6.4) and evaluates potential effects using appropriate significance criteria as informed by relevant guidance. Commitments adopted as part of the MHPGC Project, including those measures developed to reduce potential adverse noise and vibration related effects are set out in Section 6.7 .

Summary of relevant NPS provisions	How and where considered in the PEIR
Paragraph 5.12.9 of EN-1 states that <i>"Operational noise with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance."</i>	The assessment of operational noise has been carried out in accordance with BS 4142:2014+A1:2019. This is best practice and the recognised guidance for the assessment of operational noise impacts and effects.
Paragraph 5.12.12 of EN-1 states that <i>"Applicants should submit a detailed impact assessment and mitigation plan, including the use of noise mitigation and noise abatement technologies during construction and operation."</i>	Commitments adopted as part of the MHPGC Project, including a series of mitigation measures to be applied during the construction and O&M phases, are set out within Section 6.7 of this chapter.
NPS EN-3	
Paragraph 3.5.2 of EN-3 states that <i>"Proposals for renewable energy infrastructure should demonstrate good design, particularly ... in the design of the project to mitigate impacts such as noise..."</i>	Commitments adopted as part of the MHPGC Project, including a series of mitigation measures to be applied during the construction, O&M and decommissioning phases, are set out within Section 6.7 of this chapter.
Paragraph 3.9.38 of EN-3 states that <i>"Where the project is likely to have noise and vibration impacts the applicant must undertake an assessment as required in Section 5.12 of EN-1."</i>	This chapter of the PEIR provides a preliminary assessment of the potential onshore noise and vibration impacts, as set out in Section 6.8 of this report. Commitments adopted as part of the MHPGC Project, including mitigation in response to onshore noise and vibration related impacts, are set out within Section 6.7 of this chapter. Further measures may be implemented where potential significant noise and vibration effects are predicted in the course of further work for the ES (Section 6.14) that cannot otherwise be practicably mitigated.
NPS EN-5	
Paragraph 2.9.19 of EN-5 states that <i>"In brief, the Horlock Rules state that applicants should: keep the visual, noise and other environmental effects to a reasonably practicable minimum."</i>	Commitments adopted as part of the MHPGC Project, including mitigation in response to onshore noise and vibration related impacts, are set out within Section 6.7 of this chapter. This includes the avoidance of impacts where practicable through the siting of infrastructure away from sensitive environmental receptors.
Paragraph 2.9.39 of EN-5 states that <i>"For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory."</i>	The assessment has been completed in accordance with BS 4142:2014+A1:2019. This is best practice and the recognised guidance for the assessment of operational noise impacts and effects on human receptors.

National Planning Policy Framework

- 6.2.3.3 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2026) has the potential to be considered important and relevant to the Secretary of State (SoS) consideration of the MHPGC Project. **Table 6.2** provides details of the elements of the NPPF that are relevant to onshore noise and vibration and how and where they are covered in the PEIR or will be covered within the ES.

Table 6.2: Summary of NPPF requirements relevant to onshore noise and vibration

NPPF section	How and where this is considered in the PEIR
Paragraph 198 of the NPPF states that: <i>“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:</i> (a) <i>mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;</i> (b) <i>identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...”</i>	Owing to the nature of the design of the MHPGC Project, where appropriate, the preliminary onshore noise and vibration assessment has been conducted against a series of precautionary, worst case reasonable assumptions. Commitments adopted as part of the MHPGC Project, including mitigation in response to onshore noise and vibration related impacts, are set out within Section 6.7 of this chapter.

Noise Policy Statement for England

- 6.2.3.4 The Noise Policy Statement for England (NPSE) (Department for Environment, Food and Rural Affairs (Defra), 2010) sets out the long term vision of Government noise policy which is to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.
- 6.2.3.5 The NPSE outlines the following three aims for the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:
- Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life;
 - Where possible, contribute to the improvement of health and quality of life.
- 6.2.3.6 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation (WHO). These are:
- No Observed Effect Level (NOEL): the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
 - Lowest Observed Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected.
- 6.2.3.7 The NPSE extends these to the concept of a significant observed adverse effect level:
- Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.
- 6.2.3.8 It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to vary for different sources, receptors and at different time of the day.

Planning Practice Guidance

- 6.2.3.9 The Planning Practice Guidance: Noise (PPGN) (Ministry of Housing, Communities & Local Government, 2019) supports the policies set out in the NPPF and includes guidance on noise.
- 6.2.3.10 The PPGN provides guidance on how to determine the noise impact in terms of whether a significant adverse effect is likely to occur and/or whether a good standard of amenity can be achieved.
- 6.2.3.11 In line with the NPSE, the PPGN applies the concepts from toxicology of effect levels, with the same definitions as stated above. A noise exposure hierarchy is then defined within the PPGN, as

reproduced in **Table 6.3**. This provides guidance as to the need to avoid and prevent the occurrence of significant adverse effects due to noise, based on the likely average response.

Table 6.3: Planning Practice Guidance noise exposure hierarchy

Response	Examples of outcome	Increasing effect level	Action
NOEL			
Not noticeable	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Lowest Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL			
Noticeable and disruptive	Noticeable and disruptive	Noticeable and disruptive	Noticeable and disruptive
Noticeable and very disruptive	Noticeable and very disruptive	Noticeable and very disruptive	Noticeable and very disruptive

6.2.4 Local policy context

6.2.4.1 The MHPGC Project lies within the jurisdiction of Durham County Council (DCC). The following local policy that is relevant to onshore noise and vibration and has informed the assessment of preliminary effects in this chapter, their relevance to the MHPGC Project is outlined in **Table 6.4**.

- County Durham Plan (Durham County Council, 2020).

Table 6.4: Local policy relevant to onshore noise and vibration

Policy description	How and where considered in the PEIR
County Durham Plan	
Policy 31: Amenity and Pollution requires proposals that have the potential to lead to unacceptable levels of noise and vibration, either individually or cumulatively, to identify mitigation to reduce the impact on the environment, amenity of people or human health, to an acceptable level.	Commitments adopted as part of the MHPGC Project, including mitigation where there is considered to be potential for unacceptable levels of onshore noise and vibration individually and cumulatively, are set out within Section 6.6.2. Owing to the nature of the design of the MHPGC Project, the preliminary onshore noise and vibration assessment has been conducted against a series of precautionary, worst case reasonable assumptions.

6.3 Consultation and engagement

6.3.1 Scoping

- 6.3.1.1 A Scoping Report for the MHPGC Project was issued to the Planning Inspectorate (PINS) and Marine Directorate – Licencing Operations Team (MD-LOT) in February 2025 (RPS, 2025). Following consultation with the appropriate statutory bodies, PINS (on behalf of the SoS) and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025; MD-LOT, 2025, respectively).
- 6.3.1.2 **Table 6.5** sets out the key comments raised during the scoping process specific to onshore noise and vibration, with details of how these comments have been addressed within the PEIR.

Table 6.5: Summary of scoping responses relevant to onshore noise and vibration

Comment	How and where considered in the PEIR
PINS	
ID 4.6.1: The Scoping Report proposes to scope out an assessment of noise and vibration from underground cables during operation. The Inspectorate agrees that noise and vibration from the operation of the underground cable is unlikely to result in significant effects and is content that this matter can be scoped out of further assessment.	Noise and vibration effects associated with the operation of the onshore export cables and AC connection cables have been scoped out, as agreed with PINS, on the basis that no significant effects are likely to arise from the operation of the associated underground cables.
ID 4.6.2: In the decommissioning scenario where the underground cables are left in-situ, the Inspectorate is content that this matter can be scoped out of further assessment. Should there be a possibility that the underground cables will be removed during decommissioning then an assessment will be required in the ES.	An assessment of noise and vibration effects in relation to decommissioning activities associated with the onshore export cables and AC connection cables has been scoped out, as agreed with PINS, on the basis that underground cables would be left in situ.
ID 4.6.3: Vibration from the O&M of the Substation - Limited justification is presented for the proposed scoping out of this matter in the Scoping Report. The Inspectorate does not agree to scope this matter out given the uncertainties regarding the chosen location of the converter station and the proximity to sensitive receptors. The Scoping Report provides limited information regarding anticipated operational vibration levels. The ES should provide an assessment of operational vibration or information demonstrating the absence of likely significant effects, with evidence of any agreement with relevant consultation bodies.	Drawing on experience from comparable substation sites and other electrical infrastructure in the UK, operational LSS plant (e.g., transformers, shunt reactors, cooling fans and ancillary rotating equipment) is not a material source of ground borne vibration beyond the immediate equipment plinths. Such plant is typically: • Static electrical equipment with limited rotating machinery, generally fitted with balancing and resilient/anti-vibration mountings as standard good practice; • Installed on substantial foundations that further damp vibration transmission into the ground; • Operated continuously in a steady state rather than in impulsive modes that would increase vibration risk. There are no residential receptors within 75m of the Blue LSS Option Area and 100m of the Green LSS Option Area (see Section 6.8.3). It is considered that any operational vibration from the LSS would be well below human perception thresholds and far below levels associated with building response or damage as contextualised by BS 6472-1 (BSI, 2009) and BS 7385-2 (BSI, 1993). On this basis, and as agreed with stakeholders (Noise and Vibration EWG, 14.07.26) (see Table 6.6), an assessment of operational vibration has been scoped out.

Comment	How and where considered in the PEIR
ID 4.6.4: The Inspectorate agrees to scope this matter out [traffic noise and vibration on the existing road network during the operational phase] on the basis that operational traffic movements are likely to be infrequent and unlikely to give rise to significant effects.	Traffic noise and vibration related effects during the O&M phase have been scoped out, as agreed with PINS, on the basis that operational traffic movements are expected to be infrequent and therefore unlikely to result in significant effects.
ID 4.6.5: Several receptors have been identified, however the distance of the receptors from the proposed development and study areas has not been stated. A plan showing the locations of these identified receptors should be included in the ES.	Noise and vibration sensitive receptors and relevant study areas are set out within Figure 6.1, Figure 6.2, Figure 6.3 and Figure 6.4 . The distance of relevant receptors from the MHPGC Project and LSS Option Areas is set out within Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR .

6.3.2 Further consultation and engagement

- 6.3.2.1 Following the MHPGC Project Scoping Report, a series of further consultation and engagement activities with key stakeholders has been undertaken. A technical note titled Morven Hawthorn Pit Grid Connection Project Noise and Vibration Survey Approach was issued to Expert Working Group (EWG) members in September 2025. The main purpose of this technical note was to seek agreement on the environmental noise survey scope and methodology. The note presented the identified Noise Sensitive Receptors (NSRs), proposed survey methodology (attended and unattended measurements), noise monitoring locations (NMLs) (including NSRs considered to be represented), survey duration and timing. Stakeholder responses are summarised in **Table 6.6**.
- 6.3.2.2 The first meeting of the Traffic and Transport & Noise and Vibration EWG was held in December 2025. A second Noise and Vibration EWG was held in July 2026. The key points of discussion are summarised in **Table 6.6**.

Table 6.6: Summary of further consultation and engagement

Date	Consultee and response type	Comment	How and where considered in the PEIR
19.09.2025	DCC, email correspondence	Environmental Health and Consumer Protection Officers reviewed the Noise and Vibration Survey Approach Technical Note and agreed with the proposed baseline survey scope, identified NSRs and stated NMLs, methodology, timing and durations.	The environmental noise survey results are summarised in Section 6.4 of this chapter and presented in detail within Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR . The methodology and approach agreed with stakeholders has been followed.
09.12.2025	Traffic and Transport and Noise and Vibration EWG Meeting. Attendees: National Highways, Jacobs Systra Joint Venture (JSJV) and Sunderland City Council (SCC) Apologies: DCC, Environment Agency, Sustrans NE	In relation to onshore noise and vibration, the EWG meeting covered a number of topics, including the following: • Scoping Opinion comments; • The scope of the baseline noise survey and progress update; • The Onshore Noise and Vibration Study Areas; • The onshore noise and vibration assessment scope, including the assessment methodology for construction noise and vibration; • Initial mitigation and commitments. No written response to or comment on the meeting minutes or content	Scoping responses relevant to onshore noise and vibration and how they have been addressed in the PEIR are presented in Section 6.3.1 . Details of the scope of the baseline noise survey are provided in Section 6.4.4 and Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR . The Onshore Noise and Vibration Study Areas are defined in Section 6.4.2 . The methodology and scope of onshore noise and vibration assessment is set out in Section 6.5 and Section 6.6 respectively. The assessment of construction noise and vibration impacts are set out in

Date	Consultee and response type	Comment	How and where considered in the PEIR
		presented was received from EWG members following the EWG meeting.	Section 6.8 and Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR. Commitments adopted by the MHPGC Project relevant to onshore noise and vibration are set out in Section 6.7 .
14.07.2026	Noise and Vibration EWG Meeting. Attendees: DCC Environment Protection Team	The EWG meeting covered a number of topics, including the following: - An update on the findings of the baseline noise survey; - The onshore noise and vibration assessment scope, including clarification of the proposed Study Areas, assessment methodology and criteria; - The approach to the assessment of vibration from O&M of the LSS; - Initial mitigation and commitments. Following the EWG Meeting, on the 10 August 2026 DCC provided a written response confirming agreement with the proposed assessment scope and methodology summarised in the meeting minutes.	Details of the baseline noise survey are provided in Section 6.4.4 and Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR. The Onshore Noise and Vibration Study Areas are defined in Section 6.4.2 , and the methodology and scope of onshore noise and vibration methodology is set out in Section 6.5 and Section 6.6 respectively. The assessment of construction noise and vibration impacts are set out in Section 6.8 and Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR. Commitments adopted by the MHPGC Project relevant to onshore noise and vibration are set out in Section 6.7 .

6.4 Baseline Characterisation

6.4.1 Overview

6.4.1.1 **Volume 1, Chapter 2: Project Description, of the PEIR** sets out the description of the MHPGC Project and **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the preliminary environmental information.

6.4.1.2 This section describes the methods and data sources used to characterise the baseline in relation to onshore noise and vibration within the relevant study areas and describes the existing baseline characteristics at sensitive receptors.

6.4.2 Onshore Noise and Vibration Study Areas

6.4.2.1 For the purposes of identifying potential onshore noise and vibration sensitive receptors, a series of Onshore Noise and Vibration Study Areas have been defined from the MHPGC Project PEIR Red Line Boundary: Onshore out to the following distances:

- The Onshore Construction Noise Study Area (as set out within **Figure 6.1**), an area extending 300m from the MHPGC Project PEIR Red Line Boundary: Onshore. As stated within the Design Manual for Roads and Bridges (DMRB) LA 111: Noise and Vibration guidance, “a study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors” (DMRB, 2020). In addition, BS 5228-1 states that over distances of 300 m noise predictions should be treated with caution especially where a soft ground correction factor has been applied, because of the increasing importance of meteorological effects;
- The Onshore Construction Vibration Study Area (as set out within **Figure 6.1**), an area extending 100m from the MHPGC Project PEIR Red Line Boundary: Onshore. As stated within

the DMRB LA111 guidance, “a study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors” (DMRB, 2020);

- The Onshore Construction Road Traffic Noise Study Area (as set out within **Figure 6.2**), an area extending 50m from the kerb line of the local road network where construction traffic (i.e. With development scenario) would result in a change in basic noise level (BNL) of 1dB or more, when compared to the baseline scenario (i.e. Without development scenario), in accordance with DMRB LA 111 (DMRB, 2020);
- The Onshore Operational Noise Study Area (as set out within **Figure 6.3**), an area extending 600m from the Blue LSS Option Area and Green LSS Option Area, based on professional judgement, drawing on experience of projects of a similar scale and nature.

6.4.2.2 Given the nature of activities undertaken during the decommissioning phase are likely to be less intensive and of a reduced scale when compared to construction, associated noise related effects are anticipated to be of a similar, if not, lower scale than those predicted during construction. The Onshore Construction Noise Study Area, Onshore Construction Vibration Study Area and Construction Road Traffic Noise Study Area have therefore also been used for the decommissioning phase preliminary assessment.

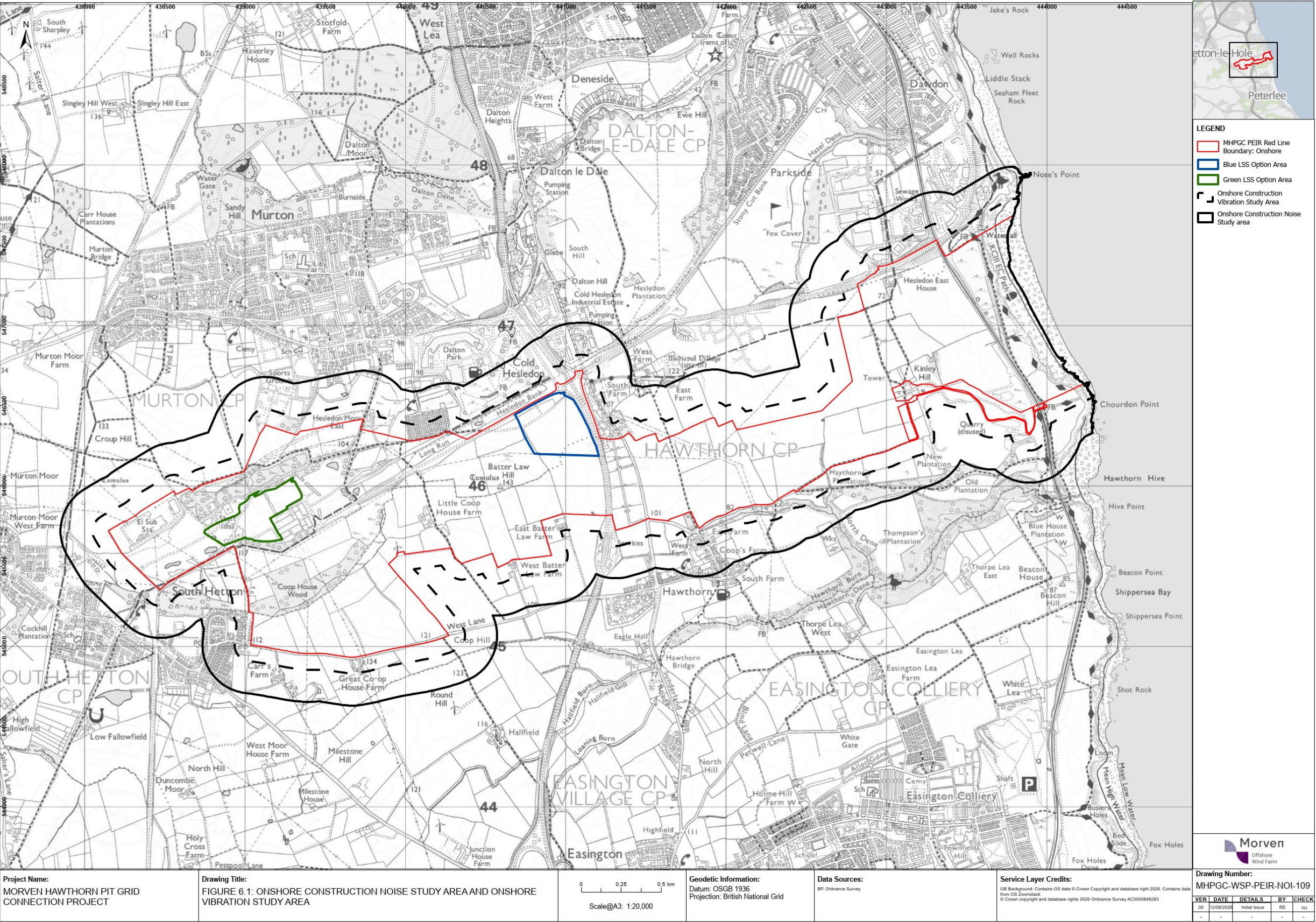


Figure 6.1: Onshore Construction Noise Study Area and Onshore Construction Vibration Study Area

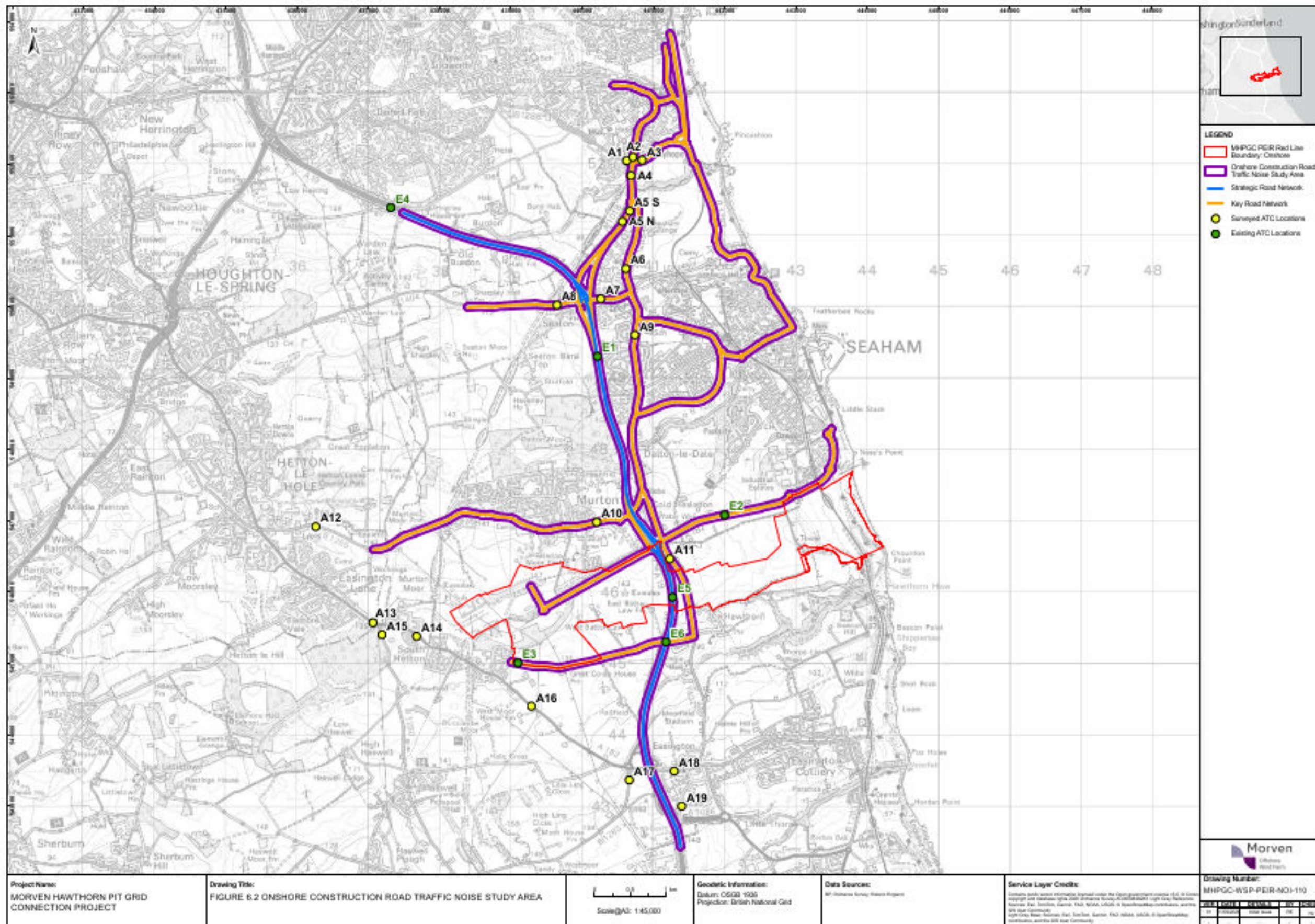


Figure 6.2: Onshore Construction Road Traffic Noise Study Area



6.4.3 Relevant guidance

- 6.4.3.1 The preliminary assessment has been carried out in accordance with the following guidance documents.

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

- 6.4.3.2 BS 5228-1:2009+A1:2014 (BSI, 2014a) provides a methodology for predicting and assessing noise levels generated by fixed and mobile plant used for a range of typical construction activities. The standard includes a database of noise levels at a reference distance of 10m from the source and a simple noise propagation model that can be used to make allowance for effects such as source-receiver distances, ground properties, and utilisation time. The standard then provides several examples of determining the significance of effects due to noise associated with construction works.

- 6.4.3.3 As per the Scoping Report, impact magnitudes and effect levels for each receptor have been determined by applying the method set out in Annex E.3.2 of BS 5228-1 (The ABC Method) and are set out within **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**.

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

- 6.4.3.4 BS 5228-2:2009+A1:2014 (BSI, 2014b) sets out guidance on the prediction and assessment of vibration levels from construction. It provides guidance on assessing the likelihood of adverse comments due to human perception of tactile vibration, with vibration impacts expressed in terms of the Peak Particle Velocity (PPV), mm·s⁻¹. It provides recommendations for controlling or mitigating vibration impacts and includes a database of measured vibration levels during piling activities.

Calculation of Road Traffic Noise (CRTN)

- 6.4.3.5 CRTN (Department of Transport, 1988) sets out a method for calculating road traffic noise levels from Annual Average Weekday Traffic (AAWT) flows as well as a method for measurement of road traffic noise levels. It is recognised as the accepted standard for predicting noise levels from road traffic in the UK. The calculation method uses several input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles (HGVs), road surfacing, gradient, screening by barriers and relative height difference and distance between source and receiver. Road traffic noise levels are expressed in terms of the UK road traffic noise index, dB LA10,18hour (06:00-00:00).

Design Manual for Roads and Bridges (DMRB) LA111: Noise and Vibration

- 6.4.3.6 DMRB LA111: Noise and Vibration (DMRB, 2020) provides guidance on the assessment of noise and vibration impacts arising from major road projects and is an industry recognised framework commonly referenced for the traffic noise effects of other major infrastructure schemes. The assessment is initially based on predicted changes in road traffic noise level in the short-term. The evaluation of significance then includes consideration of context and absolute noise and vibration levels relative to defined LOAEL and SOAEL values, as defined in the NPSE (Defra, 2010)).

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

- 6.4.3.7 BS 4142:2014+A1:2019 (BSI, 2019) provides a method for rating industrial and commercial sound and assessing resulting impacts upon people. The method is applicable to the assessment of operational noise from fixed plant installations such as the LSS.
- 6.4.3.8 The basis of BS 4142:2014+A1:2019 is a comparison between the existing background sound level at residential locations and the expected rating level of the industrial / commercial sound from the source under consideration. The rating level includes a correction to account for sound features more likely to attract attention to the sound source (such as tonality, or impulsivity).

- 6.4.3.9 An initial estimate of impact is determined from the difference between the background sound level and the rating level. Where the rating level does not exceed the background sound level, this indicates the sound source would have a low impact, subject to context. In determining significance, BS 4142:2014+A1:2019 then requires context and relevant site-specific information to be considered, such as the absolute level of industrial / commercial noise, the character and level of the residual sound, the sensitivity of the receptor and whether the residential receptor includes measures that secure good acoustic conditions indoors.

ISO 9613-2:2024 Attenuation of sound during propagation outdoors. Part 2: Engineering method for the prediction of sound pressure levels outdoors

- 6.4.3.10 International Organization for Standardization (ISO) 9613-2:2024 (ISO, 2024) provides a standard method for predicting the attenuation of sound during propagation outdoors, allowing for factors such as distance, ground and air absorption, and obstacles such as buildings, walls, etc. This allows sound pressure levels to be estimated at nearby receptors accounting for these factors. This method has been applied, via a sound propagation model developed in the Datakustik CadnaA software package, for the assessment of operational noise within **Section 6.8**.

6.4.4 Baseline data sources

Desk study

- 6.4.4.1 Baseline information in relation to the identification of noise and vibration related receptors was collated through a detailed desk review to identify receptors likely to be sensitive to noise and/or vibration and existing and proposed sources of noise and/or vibration as a result of the MHPGC Project. The following data was reviewed and assessed:

- Satellite imagery to identify the nearest NSRs and vibration receptors;
- Ordnance Survey mapping of the study areas;
- Strategic Noise Mapping from the Round 4 Noise Action Planning for England and the associated Noise Important Areas (NIA) (Defra, 2024).

- 6.4.4.2 Professional judgement has been applied as to the likely presence of existing sources of noise and/or vibration, such as the local road and rail network and existing commercial or industrial uses. The findings of the desk study informed the selection of monitoring locations and the scope of the baseline survey.

Site-specific baseline noise surveys

- 6.4.4.3 The existing noise baseline has been determined through site-specific surveys undertaken in October 2025 to inform the PEIR. Noise measurements were undertaken in accordance with the requirements of BS 7445-1:2003 (BSI, 2003). The measurement locations were presented and discussed with the EWG during the December 2025 and July 2026 meetings.
- 6.4.4.4 The surveys comprise a mix of long-term unattended and short-term attended noise measurements at a total of 13 locations (as set out in **Figure 6.4**) considered to be representative of the existing residential receptors within the Onshore Noise and Vibration Study Areas. The baseline noise measurement locations were agreed with DCC as set out in **Section 6.3.2** of this chapter and were considered representative of the nearest noise sensitive receptors.
- 6.4.4.5 Full details of the survey methodology are set out in **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.

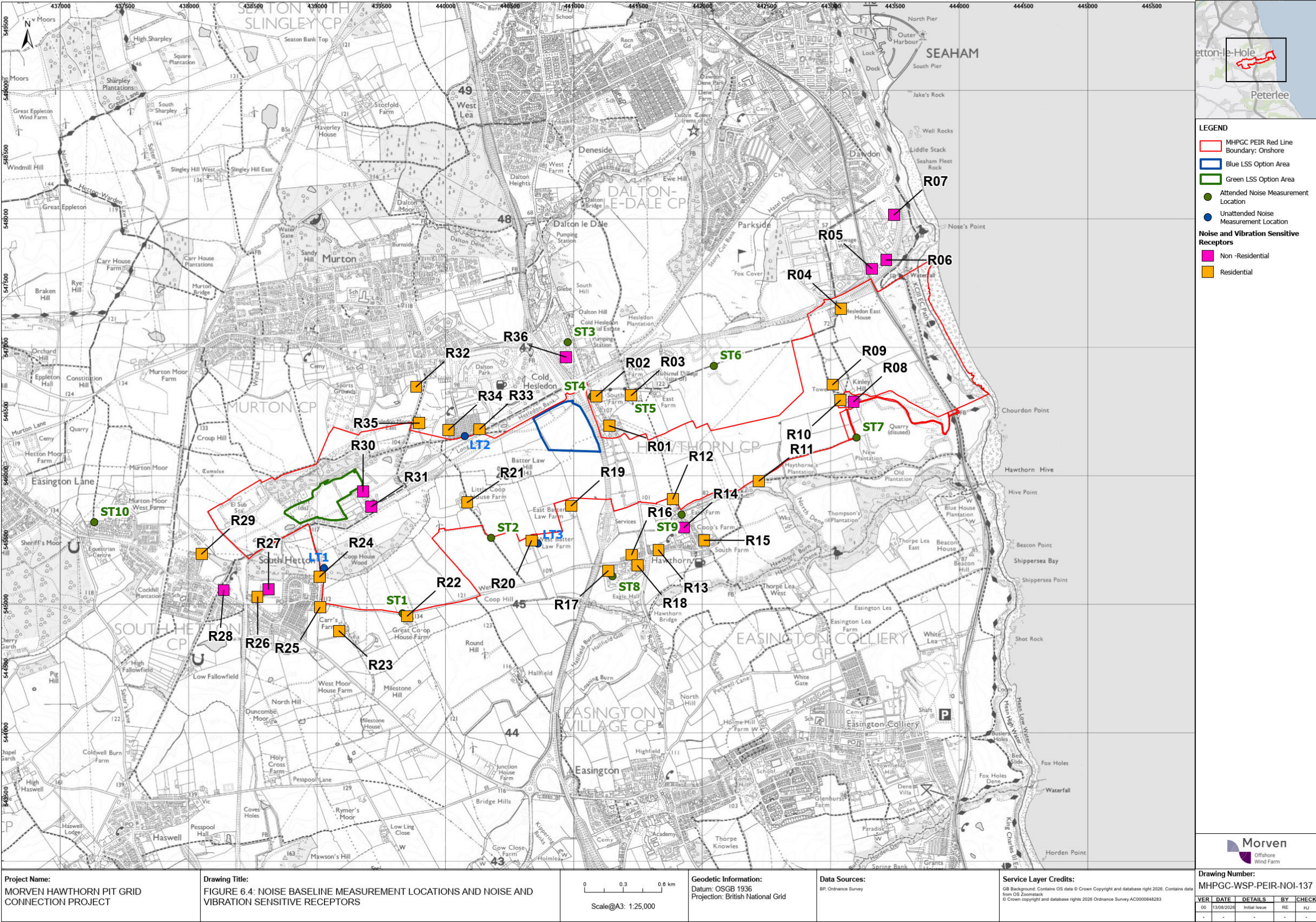


Figure 6.4: Noise Baseline Measurement Locations and Noise and Vibration Sensitive Receptors

6.4.5 Overview of baseline environment

6.4.5.1 The baseline noise climate at NSRs within the Onshore Construction Noise Study Area and Onshore Operational Noise Study Area was characterised and quantified during site-specific baseline noise surveys undertaken in October 2025. Measurement of baseline vibration levels at sensitive receptors within the Onshore Construction Vibration Study Area has not been undertaken. The full details of the survey and results are presented in **Volume 3, Annex 6.1 Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.

Noise and vibration sensitive receptors

6.4.5.2 Residential and non-residential sensitive receptors within the Onshore Construction Noise Study Area, the Onshore Construction Vibration Study Area and the Onshore Operational Noise Study Area have been considered when assessing potential impacts associated with noise and vibration as a result of the construction, O&M and decommissioning of the MHPGC Project.

6.4.5.3 The locations of the noise and vibration sensitive receptors are set out within **Table 6.7** and shown in **Figure 6.4**. Individual noise sensitive receptors within the Onshore Noise and Vibration Study Areas which are in close proximity, of the same use class and considered likely to be similarly affected by the MHPGC Project, have been grouped.

Table 6.7: Noise and vibration sensitive receptors within the Onshore Noise and Vibration Study Areas

Recept or group ID	Receptor type	Receptor name	Receptor description
R01	Residential	Cold Hesledon South Residential	Approximately 5 dwellings on Stockton Road
R02	Residential	Cold Helsedon North Residential	Approximately 4 dwellings on Stockton Road
R03	Residential	Cold Hesledon East Residential	Approximately 4 dwellings including Olde Ramsey's Barn, Rosewood Cottage, Saddleback Cottage and Tamworth Cottage
R04	Residential	Hillcroft Residential	Approximately 2 dwellings south of Fox Cover Industrial Estate
R05	Non-Residential	Spectrum Business Park South West	Lighthouse View Workspace (offices) within the south west area of Spectrum Business Park
R06	Non-Residential	Spectrum Business Park South	Fit240 24 hour gym and an office unit within the south area of Spectrum Business Park
R07	Non-Residential	Spectrum Business Park Central and North	Approximately 13 units of varying uses, including offices, within the central and north area of Spectrum Business Park
R08	Non-Residential	Kinley Hill Farm	Kinley Hill Farm Equestrian Riding School
R09	Residential	Kinley Hill Tower	Kinley Hill Tower Grade II Listed Building and self-service holiday accommodation
R10	Residential	Kinley Hill Farm Residential	Approximately 1 dwelling at Kinley Hill Farm
R11	Residential	Hawthorn Dene Residential	Approximately 3 dwellings to the west of Hawthorn Dene
R12	Residential	Hawthorn North Residential	Approximately 8 dwellings within the north of Hawthorn. This includes select dwellings in and around St Michael's Rise.
R13	Residential	Hawthorn Central Residential	Approximately 66 dwellings within the central area of Hawthorn. This includes select dwellings in and around the area of High West Lane, Stockton Road and West Lane.

Recept or group ID	Receptor type	Receptor name	Receptor description
R14	Non-Residential	St Michael and All Angels Church	St Michael and All Angels Church
R15	Residential	Hawthorn South East Residential	Approximately 32 dwellings within the south east area of Hawthorn. This includes select dwellings in and around Belmont Avenue and West Lane.
R16	Residential	Hawthorn North West Residential	Approximately 24 dwellings within the north west area of Hawthorn. This includes select dwellings on High West Lane and Stockton Road.
R17	Residential	Hawthorn West Residential	Approximately 12 dwellings within the west area of Hawthorn. This includes select properties on Western Park.
R18	Residential	Hawthorn South West Residential	Approximately 31 dwellings within the west area of Hawthorn. This includes select dwellings on Western Park.
R19	Residential	East Batter Law Farm Residential	Approximately 2 dwellings at East Batter Law Farm.
R20	Residential	West Batter Law Farm Residential	Approximately 3 dwellings at West Batter Law Farm.
R21	Residential	Little Coop House Farm Residential	Approximately 1 dwelling at Little Coop House Farm.
R22	Residential	Great Co-op House Farm Residential	Approximately 1 dwelling at Great Co-op House Farm.
R23	Residential	Carr's Farm Residential	Approximately 2 dwellings at Carr's Farm.
R24	Residential	South Hetton (Windermere Road) Residential	Approximately 28 dwellings on Windermere Road to the north east of South Hetton, including at Woodlands Caravan Storage.
R25	Residential	South Hetton East Residential	Approximately 82 dwellings to the east of South Hetton. This includes select dwellings in and around the area of Coronation Square, Hawthorn Cottages, Grasmere Terrace and West Lane.
R26	Residential	South Hetton South East Residential	Approximately 171 dwellings within the east area of South Hetton. This includes select dwellings in and around the area of Bevin Square, West Lane, Jamieson Street, Phalp Street, Palmer Street and Brydon Crescent.
R27	Non-Residential	South Hetton Welfare Park	Bowling green and associated buildings at South Hetton Welfare Park.
R28	Non-Residential	South Hetton Independent Methodist Church	South Hetton Independent Methodist Church.
R29	Residential	South Hetton (Clarence Gate) Residential	Approximately 21 dwellings on Clarence Gate within the central area of South Hetton.
R30	Non-Residential	Jade Business Park Phase 1 Units 4 to 7	Jade Business Park Phase 1 Units 4 to 7.
R31	Non-Residential	Jade Business Park Phase 1 Units 1 to 3	Jade Business Park Phase 1 Units 1 to 3.
R32	Residential	Murton South Residential	Approximately 16 dwellings to the south of Murton, including on Fairfield Grove.

Recept or group ID	Receptor type	Receptor name	Receptor description
R33	Residential	Hesledon Moor South Residential	Approximately 43 dwellings, including select dwellings on Barwick Street, Forster Avenue, Hawkins Road and Oliver Street.
R34	Residential	Hesledon Moor Central Residential	Approximately 62 dwellings, including select dwellings on Barwick Street, Forster Avenue, Hawkins Road and Oliver Street.
R35	Residential	Hesledon Moor North Residential	Approximately 57 dwellings, including select dwellings on Barwick Street, Forster Avenue, Hawkins Road and Oliver Street.
R36	Non-Residential	Cold Hesledon Industrial Estate South	Select units to the south of Cold Hesledon Industrial Estate.

- 6.4.5.4 Defra's Round 4 Strategic Noise Action Planning identified a NIA within the Onshore Noise and Vibration Study Areas. NIA 10079 is identified within the MHPGC Project PEIR Red Line Boundary: Onshore and dwellings within or close to this NIA are highly sensitive to further increases in road traffic noise. These receptors are identified within Receptor groups R01 and R02 in **Table 6.7** above.

Baseline noise environment

- 6.4.5.5 The following section sets out the baseline environmental characteristics of the Onshore Noise and Vibration Study Areas. Further details in relation to the baseline, including the site-specific noise surveys, are set out within **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.
- 6.4.5.6 The results of the baseline noise surveys at the majority of measurement locations were consistent with a semi-rural setting. Baseline noise levels were otherwise influenced by road traffic, including that associated with the A19 and B1432 which intersect the central area of the MHPGC Project PEIR Red Line Boundary: Onshore, or other anthropogenic noise sources when measurements were made closer to built-up areas. A summary of the baseline noise levels identified as part of the site-specific surveys (the locations of which are identified within Figure 6.4) and adopted for each receptor location within **Table 6.8**.
- 6.4.5.7 The preliminary construction noise assessment has been informed by the relative existing ambient noise levels (dB $L_{Aeq,T}$). This parameter is a measure of the overall average sound level typically experienced by nearby noise sensitive receptors. The ambient noise level includes noise from all audible sources in the area, including local road traffic and other day to day activities.

Table 6.8: Summary of ambient noise measurements adopted at each noise sensitive receptor

Receptor group ID	Receptor name	Measurement location ID	Ambient noise level, dB L _{Aeq,T} (free-field conditions)	
			Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
R01	Cold Hesledon South Residential	ST4	68	54
R02	Cold Helsedon North Residential	ST4	68	54
R03	Cold Hesledon East Residential	ST5	53	41
R04	Hillcroft Residential	ST6	57	49
R05	Spectrum Business Park South West	ST6	57	39
R06	Spectrum Business Park South	ST6	57	39
R07	Spectrum Business Park Central and North	ST6	57	39
R08	Kinley Hill Farm	ST7	52	32
R09	Kinley Hill Tower	ST7	52	32
R10	Kinley Hill Farm Residential	ST7	52	32
R11	Hawthorn Dene Residential	ST7	52	32
R12	Hawthorn North Residential	ST9	50	39
R13	Hawthorn Central Residential	ST9	50	39
R14	St Michael and All Angels Church	ST9	50	39
R15	Hawthorn South East Residential	ST9	50	39
R16	Hawthorn North West Residential	ST8	58	44
R17	Hawthorn West Residential	ST8	58	44
R18	Hawthorn South West Residential	ST8	58	44
R19	East Batter Law Farm Residential	ST8	58	44
R20	West Batter Law Farm Residential	LT3	52	45
R21	Little Coop House Farm Residential	ST2	42	42
R22	Great Co-op House Farm Residential	ST1	61	44
R23	Carr's Farm Residential	ST1	61	44
R24	South Hetton (Windermere Road) Residential	LT1	43	34
R25	South Hetton East Residential	LT1	43	34
R26	South Hetton South East Residential	LT1	43	34
R27	South Hetton Welfare Park	LT1	43	34
R28	South Hetton Independent Methodist Church	ST10	51	38
R29	South Hetton (Clarence Gate) Residential	ST10	51	38

Receptor group ID	Receptor name	Measurement location ID	Ambient noise level, dB L _{Aeq,T} (free-field conditions)	
			Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
R30	Jade Business Park Phase 1 Units 4 to 7	LT1	43	34
R31	Jade Business Park Phase 1 Units 1 to 3	LT1	43	34
R32	Murton South Residential	LT2	47	38
R33	Hesledon Moor South Residential	LT2	47	38
R34	Hesledon Moor Central Residential	LT2	47	38
R35	Hesledon Moor North Residential	LT2	47	38
R36	Cold Hesledon Industrial Estate South	ST3	59	43

6.4.6 Future baseline conditions

- 6.4.6.1 During the 35-year operational lifetime of the MHPGC Project, the onshore noise and vibration baseline would be expected to evolve both on a natural basis and in response to other anthropogenic activities. The Infrastructure Planning (EIA) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included. Therefore, an assessment of future baseline conditions, in the absence of the MHPGC Project, has been undertaken and is described within this section.
- 6.4.6.2 In the absence of the MHPGC Project, the future onshore noise and vibration baseline is expected to evolve gradually over the operational assessment period. The principal influence is likely to be changes in road traffic flows associated with background growth, committed development and changes in land use within the wider area. While advancements in vehicle technology, including increased uptake of electric vehicles, may result in reductions in engine noise at lower speeds and tyre-road interaction, tyre noise is expected to remain the dominant source at higher speeds, limiting the potential for substantial long-term reductions in road traffic noise.
- 6.4.6.3 Climatic factors may also influence sound propagation under certain meteorological conditions. The effects of climate change on the baseline noise environment are currently uncertain and therefore not readily quantifiable. However, they are not expected to result in a material change to long-term baseline conditions.
- 6.4.6.4 Overall, the future baseline is anticipated to be similar to the existing baseline, with incremental changes reflecting wider regional growth trends.

6.5 Impact assessment methodology

6.5.1 Overview

- 6.5.1.1 **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the preliminary environmental information. This section describes the technical methods used to determine the sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the preliminary onshore noise and vibration assessment. The methodologies for assessing sensitivity, magnitude and significance for onshore noise and vibration are described in more detail below.
- 6.5.1.2 At PEIR Stage a qualitative assessment of the operational stage noise associated with the LSS Option Areas has been included. The type, quantity and location of fixed plant associated with the LSS is to continue to be refined as the design of the MHPGC Project develops. The operational

stage assessment methodology, magnitude of noise impacts and impact criteria to be adopted for the quantitative assessment to be presented at ES Stage has therefore been identified within this PEIR for when information becomes available.

- 6.5.1.3 The decommissioning stage of the onshore LSS construction will be similar to the construction stage but with the key activities carried out in the inverted sequence. It is likely that the decommissioning activities will generally be similar to or result in less noise and vibration effects than the construction activities. As such, the effect of decommissioning will be represented by considering the construction stage activities.

Construction (and decommissioning) noise

- 6.5.1.4 Construction noise calculations have been completed for the key construction activities associated with the Landfall, onshore export and AC connection cable corridors, construction compounds, the Blue LSS Option Area and the Green LSS Option Area at the nearest NSRs. The assessment of construction noise is based on comparing predicted construction noise levels during the construction stage, to threshold level criteria selected accounting for the ambient noise levels at receptors.
- 6.5.1.5 The assessment of construction and decommissioning noise has included the following steps:
- Identify the nearest NSRs to the construction activity;
 - Select a representative sample of the identified NSRs for assessment, ensuring a good geographic spread across the local area;
 - Set noise threshold level criteria based on the guidance contained in BS 5228-1, namely, the thresholds detailed in the ABC method;
 - Identify the key construction activities, source noise levels for the associated plant for use in the prediction of construction noise and core construction working hours;
 - Undertake construction noise predictions for the key construction activities of the MDS to derive indicative distances within which the ABC thresholds may be exceeded at NSRs during daytime, evening and night-time periods for each activity;
 - Compare the location of the NSRs with the respective ABC threshold distances and determine the resulting impact magnitude and significance of effect.
- 6.5.1.6 The construction noise and vibration assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. At the ES stage, construction noise predictions will be carried out at the closest selected NSRs and, where necessary, consideration given to available noise mitigation measures in the event of any exceedance of the noise threshold level criteria.

Construction (and decommissioning) vibration

- 6.5.1.7 The assessment of construction vibration has been undertaken based on the guidance contained within BS 5228-2. Drawing upon the historic ground-borne vibration measurement data, and vibration prediction methods contained within this Standard, a series of typical set-back distances have been determined, at which different degrees of human exposure to ground-borne vibration arise. Set-back distances have been determined for a sample of different vibration generating construction operations. The distances of vibration sensitive receptors have then been compared against the derived set-back distances to determine whether resulting effects would be significant or not.

Construction (and decommissioning) road traffic noise

- 6.5.1.8 The assessment of construction (and decommissioning) phase traffic noise has been undertaken based on the scheme traffic data for a reasonable maximum design scenario during the peak construction year of 2033. Further details can be found in **Volume 3, Chapter 5: Traffic and Transport, of the PEIR**.
- 6.5.1.9 Construction traffic noise predictions have been undertaken in accordance with the CRTN calculation methodology. The noise levels for the 'with' and 'without' construction traffic scenarios have been compared to provide the change in traffic noise as a result of the construction works.

The difference between the 'with' and 'without' scenarios has been assessed using short-term criteria within DMRB LA111.

6.5.1.10 Basic Noise Level (BNL) calculations have been carried out in general accordance with CRTN, being undertaken for a notional receptor location 10m from the edge of the carriageway of each road considered. A notional receptor has been used because the change in traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant. Traffic noise calculations have been undertaken to establish the change in the daytime $L_{A10,18hr}$ noise level for the peak number of daily trips for each construction route.

6.5.1.11 For roads with low flow, the Noise Advisory Council method has been used to predict the BNL.

Operational Noise

6.5.1.12 The qualitative assessment of the operational stage noise associated with the LSS Option Areas has included the following steps:

- Identify the nearest NSRs to the LSS Option Areas;
- Select a representative sample of the identified NSRs for assessment, ensuring a good geographic spread across the local area;
- Set the representative background sound level for the identified NSRs based on the guidance contained in BS 4142;
- Identify the operational noise sources of plant associated with the LSS and their associated source noise levels.

6.5.1.13 At the ES Stage, a 3D noise model will be created using Datakustik CadnaA noise modelling software to predict the sound levels from the onshore substations at the nearest NSRs. The software allows for complex conditions / scenarios to be considered and implements the prediction algorithms in ISO 9613-2 (ISO, 2024), which contains methods for calculating sound attenuation during outdoor propagation. The impact of the predicted noise levels will then be assessed in accordance with BS 4142.

6.5.1.14 The quantitative assessment of operational noise will include the following steps:

- Identify the nearest NSRs to the LSS Option Areas;
- Select a representative sample of the identified NSRs for assessment, ensuring a good geographic spread across the local area;
- Identify the operational noise sources of plant associated with the LSS and their associated source noise levels;
- Compare the predicted specific and rating noise levels for the MDS at the closest selected NSRs for the maximum design scenario;
- Assess the predicted operational noise levels in accordance with BS 4142 and taking account of context. Where appropriate, the consideration of context may include a comparison of the Rating Level against the Noise Rating (NR) Curve Criteria as set out in BS 8233 (BSI, 2014);
- Assess the operational noise impact magnitude criteria and determine the resulting impact magnitude and significance of effect;
- Give consideration to available noise mitigation measures to minimise significant effects.

6.5.2 Receptor sensitivity

6.5.2.1 Drawing on the noise and vibration sensitive receptors set out within **Table 6.7**, the receptors that are considered in the PEIR assessment have been grouped based on professional experience of similar developments. The receptor groups, along with the definitions of receptor sensitivity used in the assessment, are outlined in **Table 6.9**. Where receptors are assessed within a different Chapter of this PEIR, this is also indicated below.

Table 6.9: Identified receptors requiring assessment for noise and vibration

Group	Receptors include within group	Receptor group ID	Receptor Sensitivity	Chapter assessed
Residential	Residences, including private gardens where appropriate. The main residential communities nearest to the Noise and Vibration Study Areas include Murton, Hawthorne and South Hetton.	R01 – R04, R09 – R13, R15 – R26, R29, R32 – R35	High	This chapter
Community Services	Schools (during daytime periods), places of worship	R14, R28	High	This chapter
Commercial	Offices, retail, entertainment venues and eateries, leisure facilities.	R05 – R09, R27, R30 – R31, R36	Medium	This chapter

6.5.3 Magnitude of impact

6.5.3.1 The magnitude of each assessed impact has been established in accordance with relevant industry guidance, as described below.

Noise due to construction (and decommissioning) activity

6.5.3.2 Impact criteria in relation to construction and decommissioning related noise have been determined in accordance with the guidance in Annex E of BS 5228-1:2009+A1:2014 (BSI, 2014a) and DMRB LA 111 (DMRB, 2020).

6.5.3.3 Construction and decommissioning activity noise thresholds have been set for noise sensitive receptors using the 'ABC Method' as set out in Annex E of BS 5228-1:2009+A1:2014 (BSI, 2014a). This approach sets thresholds for the onset of potentially significant adverse effects depending on the existing ambient noise levels as observed during baseline noise surveys. Receptors with lower relative representative existing ambient noise levels (Category A) have a lower threshold for the onset of potentially significant adverse effects when compared to receptors with intermediate (Category B), and higher existing ambient noise levels (Category C). The criteria by which the ABC Method categories are defined are set out within **Table 6.10**, reproduced from Table E.1 of BS 5228-1:2009+A1:2014 (BSI, 2014a).

Table 6.10: Construction and decommissioning noise threshold values based on the ABC Method

Assessment category and threshold value period ($L_{Aeq,T}$)	Threshold value $L_{Aeq,T}$ (dB) (façade)		
	Category A ^(A)	Category B ^(B)	Category C ^(C)
Night-time (23:00 to 07:00)	45	50	55
Evenings and weekends ^(D)	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise. NOTE 3 Applied to residential receptors only.			
(A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. (B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. (C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. (D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.			

- 6.5.3.4 The magnitude of construction (and decommissioning) related activity noise impacts has been assessed based on the difference between the predicted construction noise level and appropriate threshold values the LOAEL and SOAEL reproduced from the criteria in Table 3.16 of DMRB LA111 (DMRB, 2020). It should be noted that baseline ambient noise levels (LOAEL) vary across the Onshore Construction Noise Study Area, therefore appropriate threshold values (SOAEL) will also vary between assessment locations.
- 6.5.3.5 The LOAEL and SOAEL are defined in **Table 6.11**, and the impact criteria are presented in **Table 6.12**.

Table 6.11: LOAEL and SOAEL criteria for construction and decommissioning noise for each NSR, Facade

Time Period	LOAEL	SOAEL
Weekdays (0700-1900 hours)	Baseline sound levels, $L_{Aeq,T}$	Threshold values as determined in accordance with Table E.1 BS 5228-1:2009+A1:2014 (see Table 6.9).
Saturdays (0700-1300 hours)		
Evenings (1900-2300 hours)		
Saturdays (1300-2300 hours)		
Sundays (0700-2300 hours)		
Night (2300-0700 hours)		

Table 6.12: Impact magnitude criteria for construction and decommissioning activity noise

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

- 6.5.3.6 Further details in relation to the construction and decommissioning noise criteria are set out within **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**.

Vibration due to construction (and decommissioning) activity

- 6.5.3.7 BS 5228-2:2009+A1:2014 (BSI, 2014b) states that for the majority of people, vibration levels between 0.14mm/s and 0.3mm/s PPV (LOAEL) are just perceptible. A vibration level of 1.0mm/s peak particle velocity (PPV) (SOAEL) is sufficient to cause complaint, but tolerable with prior warning, whereas a level of 10mm/s is intolerable in all building environments for anything more than a very brief exposure. Accounting for the type of receptors nearest to the works, a high magnitude of impact has been defined as a vibration level of 10mm/s or more, on the assumption that regular occurrences of this vibration level in residential environments would be intolerable.
- 6.5.3.8 Vibration levels due to construction activity exceeding 15mm/s PPV has the potential to result in minor cosmetic damage in light/unreinforced buildings. It is not considered that the activities anticipated during either the construction or decommissioning phase would result in vibration to this extent, and therefore an assessment of potential building damage due to vibration has not been undertaken.
- 6.5.3.9 **Table 6.13** sets out the magnitude criteria by which vibration related impacts as a result of construction and decommissioning activities have been assessed.

Table 6.13: Impact magnitude criteria for construction and decommissioning activity vibration

Magnitude of impact	Construction activity vibration level, Peak Particle Velocity (PPV)	Vibration level
Negligible	<0.3mm/s	Below LOAEL

Magnitude of impact	Construction activity vibration level, Peak Particle Velocity (PPV)	Vibration level
LOAEL		
Low	$\geq 0.3\text{mm/s}$ and $< 1.0\text{mm/s}$	Above or equal to LOAEL, below SOAEL
SOAEL		
Medium	$\geq 1.0\text{mm/s}$ and $< 10.0\text{mm/s}$	Above or equal to SOAEL
High	$\geq 10.0\text{mm/s}$	Above SOAEL

Road traffic noise during construction (and decommissioning)

- 6.5.3.10 Construction and decommissioning traffic noise impacts along public roads has been estimated by calculating the change in basic noise level (BNL) along the road links temporarily affected as a result of the MHPGC Project. The BNL for each road link was calculated following the methodology set out in CRTN (Department of Transport, 1988).
- 6.5.3.11 The BNL, and any associated change in road traffic noise along a road link, is representative of road traffic noise impacts at receptors located within a 10m reference distance of that road link, where traffic movements along from that single link is the dominant source of road traffic noise. Where the change is 1.0 dB $L_{A10,18\text{hour}}$ or more as a result of the MHPGC Project, such that the road is an 'affected road', the level of road traffic noise will be evaluated in further detail as part of the ES, accounting for all roads in the vicinity of the respective receptor.
- 6.5.3.12 The change in road traffic noise level for each road link within the Onshore Construction Road Traffic Noise Study Area has then been determined. The magnitude of construction and decommissioning traffic noise related impact has been assessed based on the criteria from Table 3.17 of DMRB LA111 (DMRB, 2020) as reproduced in **Table 6.14**.

Table 6.14: Impact magnitude criteria for road traffic noise during construction (and decommissioning)

Magnitude of Impact	Change in Basic Noise Level of closest public road during construction traffic (dB)
High	≥ 5.0
Medium	≥ 3.0 and < 5.0
Low	≥ 1.0 and < 3.0
Negligible	< 1.0

- 6.5.3.13 HGV traffic is assumed to be evenly distributed throughout the working day for each compound (between 0700 to 1900 Monday to Friday, and 0700 to 1300 on Saturdays) therefore, only daytime assessment criteria are considered. The daytime SOAEL for construction road traffic noise has been based on the threshold level (a façade level of $L_{A10, 18\text{hr}}$) at which the Noise Insulation Regulations 1975 (as amended) requires provision of sound insulation. The LOAEL for daytime is based on the onset of the lowest observed community noise effects during the day (i.e. annoyance which is a free-field level of $L_{Aeq,16\text{hr}}$) following from the WHO Guidelines for Community Noise (WHO, 1999). To allow comparison of the two threshold levels, the daytime SOAEL threshold has been converted from a façade to a free-field level (i.e. -3dB correction) and then converted from the traffic noise index $L_{A10,18\text{hr}}$ to the WHO indices (i.e. -2dB correction). The LOAEL and SOAEL are defined in Table 6.15.

Table 6.15: LOAEL and SOAEL criteria for construction (and decommissioning) road traffic noise, Free-field

Time Period	LOAEL	SOAEL
Daytime (0700 to 2300)	50 dB $L_{Aeq,16\text{hour}}$	63 $L_{Aeq,16\text{hour}}$

Operational noise

- 6.5.3.14 A qualitative assessment of the operational stage noise associated with the LSS Option Areas has been included in the PEIR Assessment. A quantitative assessment of operational noise levels from the LSS will be carried out at the ES Stage in accordance with the calculation procedures set out in BS 4142:2014+A1:2019 (BSI, 2019). This will include a comparison of the expected rating level of operational noise at each receptor with the existing representative background sound levels at the same location.
- 6.5.3.15 The determination of the rating level requires consideration of the likely character of operational noise at the receptor. The rating level includes a correction for acoustic features (tonality, impulsivity, intermittency etc.) which can attract more attention to an operational noise source when compared to a typical broadband or anonymous sound source. The predicted sound level, together with the acoustic character correction provides the 'rating level' at each noise sensitive receptor within the Onshore Operational Noise Study Area.
- 6.5.3.16 Predicted rating levels will be compared to background sound levels for different parts of the day and night. The magnitude of impact will be classified in accordance with BS 4142:2014+A1:2019 (BSI, 2019) and taking into account context, as set out in **Volume 3, Annex 6.3: Onshore Noise and Vibration Operational Technical Report, of the PEIR**, and presented within **Table 6.16**.

Table 6.16: Impact magnitude criteria for operational noise

Magnitude of impact	Difference = $L_{Ar,Tr} - L_{A90,Tr}$ (dB)	Adverse Effect Level	BS 4142:2014+A1:2019 description
High	$\geq 10\text{dB}$	Likely at SOAEL, depending on context	A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context
Medium	$5 \leq \text{to} < 10\text{dB}$	Between LOAEL and SOAEL, depending on context	A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
Low	$0 \leq \text{to} < 5\text{dB}$		
Negligible	$< 0\text{dB}$	Below LOAEL	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Non-residential Receptors

- 6.5.3.17 The magnitude of impact criteria within **Table 6.16** do not apply to non-residential receptors (since this is beyond the scope of BS 5228-1 and BS 4142). For non-residential receptors, the construction and operational noise effect will be qualified as potentially significant if noise levels are above a threshold. These threshold values, which are represented in **Table 6.17** are based on WHO, 1999 recommended limits for different premises.

Table 6.17: Significance screening criteria for non-residential receptors

Setting	Noise level (outdoors, free field)	
	Day (0700-2300), dB $L_{Aeq,16hr}$	Night (2300-0700), dB $L_{Aeq,8hr}$
Places of meeting for religious worship	50dB	n/a
Hospitals and hotels	50dB	40dB
Offices	55dB	n/a
External amenity space	55dB	n/a

- 6.5.3.18 Construction and operational noise impact magnitude criteria for non-residential receptors will be presented at the ES Stage on a case-by-case basis accounting for the expected operational noise level and the sensitivity of the receptor.

6.5.4 Scale of effect and significance

- 6.5.4.1 The point at which a noise and vibration impact results in a significant effect varies depending on the following factors:
- Type of effect that could occur;
 - Sensitivity of the receptor;
 - Magnitude of the impact (i.e. the noise level, the vibration level, or the magnitude of the change in noise level);
 - Type of the noise and vibration source;
 - Time of day in which the impact occurs;
 - Duration of the impact;
 - Existing conditions at the receptor.
- 6.5.4.2 The scale of each effect due to onshore noise and vibration is initially determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this preliminary assessment is presented in **Table 6.18**. Where appropriate the scale of effect is then adjusted for context, as discussed below.
- 6.5.4.3 Following the classification of an effect using this methodology, a clear statement is made as to whether the effect is significant or not significant. Major and moderate effects are considered to be significant, whilst minor and negligible effects are considered to be not significant. However, professional judgement will also be applied taking consideration of the factors set out in paragraph 6.5.4.1 when determining whether these effects are significant in EIA terms.
- 6.5.4.4 Typical definitions for the classification of effects and relevant to this assessment are shown in **Table 6.18** and **Table 6.19**.

Table 6.18: Matrix used for the assessment of the significance of effect

Sensitivity of receptor	Magnitude of impact			
	Negligible	Low	Medium	High
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

Table 6.19: Scale of effect and significance definitions

Scale of Effect	Definition	Significance of effect in EIA terms
Major	A large and detrimental change to a valuable/sensitive receptor, likely exceeding an accepted threshold. A large and beneficial change, resulting in enhancements in baseline conditions, transitioning from previously poor conditions to new legal compliance, or making a major contribution to national goals. These effects may represent key factors in the decision-making process. Potentially associated with sites and features of national importance or likely to be important considerations at a regional scale. Major effects may relate to features that are unique and irreplaceable.	Significant

Scale of Effect	Definition	Significance of effect in EIA terms
Moderate	A medium scale change that, although not beyond an accepted threshold, is still considered to be generally unacceptable, unless offset by significant positive benefits of the project. If adverse, these effects are likely to be important at a regional or local scale and on their own could influence on decision making. A positive moderate effect is a medium scale change that improves baseline conditions sufficiently to contribute to guideline targets.	Significant
Minor	A minor adverse change that remains within legal and planning policy limits. A minor positive change that is unlikely to significantly impact the overall balance of considerations. These effects might be raised as local issues and could be relevant to the detailed design of a project, but they are unlikely to be critical in the decision-making process.	Not significant
Negligible	A very small change that is so inconsequential it can be considered acceptable to disregard. These effects fall below perceptible limits, lie within normal variations, or fall within the margin of forecasting error. They are unlikely to influence decision-making.	Not significant

6.5.5 Assumptions and limitations of the assessment

- 6.5.5.1 This preliminary assessment is based on the development assumptions and MDS, the relevant details of which are presented in **Table 6.21**. The following assumptions and limitations have been applied to the assessment of effects due to construction phase noise and vibration. These assumptions are considered reasonable for the purposes of the preliminary assessment and reflect the level of information available at this stage of the MHPGC Project.
- 6.5.5.2 Any measurement of existing ambient or background sound levels are subject to a degree of uncertainty as environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a short sample of the ambient levels. Every effort was made to ensure that measurements were undertaken in such a way to provide a representative sample of conditions, such as:
- avoiding periods of adverse weather conditions (rain, wind speeds above five m/s) and/or if adverse weather conditions take place during any sound level measurements, the contaminated data are omitted from the dataset;
 - avoiding school holidays and other such periods / events which are known to often result in atypical sound levels.
- 6.5.5.3 The construction noise assessment is based on an indicative plant list, which reflects typical plant expected to be required for the proposed works. At the PEIR stage, detailed contractor methodologies and final plant inventories are not yet available. This is typical for a project of this nature and the assumed plant has therefore been selected to be representative and, where appropriate, conservative.
- 6.5.5.4 Construction working hours have been assumed in accordance with the proposed MHPGC Project commitments set out within **Section 6.7**. Construction works are assumed to occur during daytime hours only, with the exception of trenchless technique cable installations which is assumed to also take place during evening and night-time periods.
- 6.5.5.5 The assessment assumes that all construction plant associated with a given activity is located at the closest point to receptors within the maximum extent of the works area. This represents a worst-case scenario and provides a conservative estimate of potential noise impacts. Distance banding has been defined separately for the following MHPGC Project components: landfill; onshore export cable and AC connection cable corridors; construction compounds; and the LSS.

- 6.5.5.6 At attended measurement locations, the ABC Category adopted for the daytime period has also been applied for the evening and weekend period. This is considered a suitable approximation for the assessment.
- 6.5.5.7 Potential construction vibration impacts have been assessed for those activities considered most likely to generate the highest levels of ground-borne vibration. These activities comprise vibratory compaction associated with earthworks along the onshore export cable corridor, AC connection cable corridor, and within the selected LSS Option Area, together with vibratory piling associated with the construction of the LSS foundations only. Construction vibration levels have been predicted in accordance with the procedures set out in BS 5228:2009+A1:2014, using the empirical prediction methods provided in Annex E. Predicted vibration levels are expressed in terms of PPV, mm/s and represent the PPV with a 33% probability of being exceeded during start-up and steady-state operation. No vibratory piling activities have been assumed outside of the LSS, with vibratory compaction assumed to occur across all relevant construction areas.

6.6 Key parameters for assessment

6.6.1 Scope of the assessment

- 6.6.1.1 The approach to assessment was presented in the MHPGC Project Scoping Report and has been refined in consultation with consultees as detailed in **Section 6.3** and through the MHPGC Project Scoping Opinions.
- 6.6.1.2 Effects that are not considered likely to be of moderate/major significance been scoped out of the assessment and these impacts will not be considered further. The impacts considered as part of the assessment include:
- Construction phase
 - Noise and vibration impacts due to construction activities associated with the Landfall;
 - Noise and vibration impacts due to construction activities (open trench) associated with the onshore export cable and AC connection cable corridors;
 - Noise and vibration impacts due to construction activities (trenchless technique) associated with the onshore export cables and AC connection cables;
 - Noise and vibration impacts due to construction activities associated within the LSS;
 - The impact of noise generated by additional vehicle movements on the local highway network.
 - O&M phase
 - Noise impacts due to the operation and maintenance of the LSS.
 - Decommissioning phase
 - Noise and vibration impacts due to decommissioning activities associated with the LSS;
 - The impact of noise generated by additional vehicle movements on the local highway network;
- 6.6.1.3 A summary of the effects scoped out of the assessment is presented in **Table 6.20**.

Table 6.20: Impacts scoped out of the assessment

Impact	Justification for scoping out of the assessment
Construction phase	
Vibration from traffic required during construction	As stated in DMRB LA111 (DMRB, 2020) "a maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects". This is also applicable to vibration from construction traffic on the local road network.

Impact	Justification for scoping out of the assessment
O&M phase	
Vibration impacts due to the operation and maintenance of the LSS	Drawing on experience from comparable substation sites and other electrical infrastructure in the UK, operational LSS plant (e.g., transformers, shunt reactors, cooling fans and ancillary rotating equipment) is not a material source of ground borne vibration beyond the immediate equipment plinths. It is therefore considered that any operational vibration from the LSS would be well below human perception thresholds and far below levels associated with building response or damage as contextualised by BS 6472-1 and BS 7385-2.
Noise and vibration from operation and maintenance of the onshore export cables and AC connection cables	The onshore export cables and AC connection cables are not anticipated to be a substantial source of noise or vibration during operation. Site inspections and maintenance activities are not expected to result in high levels of noise or vibration and would be intermittent and short-term in nature.
Noise from traffic associated with activities during the O&M phase	As set out in Volume 3, Chapter 5: Traffic and Transport, of the PEIR , the operational traffic is anticipated to be limited and therefore unlikely to result in significant effects. O&M of the onshore components of the MHPGC Project may involve remote monitoring, but regular visits and routine inspections will also occur. As maintenance will be undertaken only as required and potential corrective activities will be limited, it is anticipated that the MHPGC Project O&M phase will generate a small number of additional two-way vehicle movements due to infrequent staff trips and occasional maintenance activities, unlikely to result in significant effects.
Vibration from traffic associated with activities during the O&M phase	As stated in DMRB LA111 (DMRB, 2020) <i>"a maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects"</i> .
Decommissioning phase	
Noise and vibration from the decommissioning of the onshore export cable and AC connection cable and landfall	It is assumed that, should decommissioning take place, the underground cables would be left in place and no removal works (and associated noise or vibration) would occur.
Vibration from traffic required during decommissioning	As stated in DMRB LA111 (DMRB, 2020) <i>"a maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects"</i> . This is also applicable to vibration from decommissioning traffic on the local road network.

6.6.2 Maximum design scenario

- 6.6.2.1 The MDS for each impact identified in **Section 6.6.1** has been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The MDS presented in **Table 6.21** have been selected from the parameters provided in **Volume 1, Chapter 2: Project Description, of the PEIR** and methodology outlined in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.

Table 6.21: MDS relevant for the PEIR assessment of potential effects arising from onshore noise and vibration

Impact	Maximum Design Scenario	Explanation
Construction		
Landfall		
Increased levels of noise from construction activities at the landfall	Duration of landfall Construction: 3.5 years Duration of drilling activity: 300 days Number of trenchless drill entry points: 4 bores	The impact is assessed over the full duration of landfall construction and a period of continuous (24 hour) working for the duration of trenchless techniques and dewatering (24 hours) of the TJBs.
Increased levels of vibration from construction activities at the landfall	Number of main compounds: 1 Dimension of main compound: 48,000m ² Number of secondary compounds: 1 Dimension of secondary compound: 900m ² Number of Transition Joint Bays (TJBs): 2 Location of TJBs: Within 150m of landfall trenchless drill entry point Working Area for TJB (construction): 750m ² Depth of TJB: 2.5m Number of access tracks: 2 from A192 Construction access track widths: 10m Working hours are 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturday, with shoulder mobilisation hours and continuous working required for trenchless techniques. Trenchless techniques: HDD or Direct Pipe	The Maximum Design Scenario assumes the noise generating equipment located in closest proximity of the landfall construction compound and the receptors identified in Section 6.4.5 . The assessment therefore will consider worst-case construction noise levels. An indicative construction plant list has been used and typical noise levels obtained from the guidance in BS 5228-1. Source noise levels for directional drilling are assumed to be representative of HDD or Direct Pipe. Dynamic compaction using vibratory rollers will be required for the installation of haul roads, access routes, and the construction of the compounds at landfall.
The impact of noise generated by additional vehicle movements on the local highway network from the construction of the Landfall	Movements and workforce – Blue LSS Scenario Number of access tracks: 2. Located from the A192 to landfall compound Abnormal loads: HGV low loader with extendable trailer (70t maximum load) - movement order required. 6 AILs Total daily construction traffic movements (HGV): 93 Total daily construction traffic movements (Vehicles): 101 Number of employees working on site: 48 Movements and workforce – Green LSS Scenario Number of access tracks: 2. Located from the A192 to landfall compound Abnormal loads: HGV low loader with extendable trailer (70t maximum load) - movement order required. 6 AILs	The assessment has been undertaken for construction scenario that results in the greatest peaks of construction traffic flows on affected road links during the peak construction year of 2033 for each LSS Option Area. The assessment therefore will consider the construction scenario that may result in the greatest change in road traffic noise for each LSS Option Area.

Impact		Maximum Design Scenario	Explanation
	Total daily construction traffic movements (HGV): 93 Total daily construction traffic movements (Vehicles): 101 Number of employees working on site: 48		
Onshore Export Cable and AC Connection Cable			
Increased levels of noise from construction activities of the Onshore Export Cable and AC Connection Cable	General Construction period for Onshore Export Cable: 3.5 years Working hours are 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturday, with shoulder mobilisation hours and continuous working required for trenchless techniques. Dimensions of trench for grid connection export cable (HVAC) – Blue LSS Number of export cables: 24 Length of cable route: 4,260m Number of cable trenches: 4 Width of cable corridor (temporary including permanent): 100m Onshore cable area (temporary): 426,000m ² Trench width at top per circuit: 4.8m Trench width at base per circuit: 2.8m Trench depth per circuit: 1.8m Depth of stabilised backfill: 450mm Number of cable route joint bays: 32 Number of link boxes: 32 Volume of material excavated per joint bay: 2,264m ³ (total = 18,112m ³ , assuming 4 circuits are jointed in a single excavation) Construction land take for joint bay (surface area): 1,472m ² (total = 11,776m ²) Volume of material excavated per link box: 12.5m ³ Construction land take for link box: 100m ² (total = 3200m ²) Volume of material excavated (link boxes): 400m ³ Dimensions of trench for onshore export cable (HVDC) – Blue LSS Number of export cables: 4 Length of cable route: 4.83km Width of cable corridor (temporary inc. permanent): 40m Number of cable trenches: 2		The assessment has been undertaken for the Maximum Design Scenario and assumes the noise generating equipment located in closest proximity of the landfall construction compound and the receptors identified in Section 6.4.5. The Onshore Export Cable and AC Connection Cable parameters defined in this MDS are those required to construct the MHPGC Project, including the Blue LSS option. The Blue LSS option constitutes the worst-case due to the larger cable corridor width and thus size of working area required, when compared to the Green LSS Option. The impact is assessed over the full duration of export cable construction and a period of continuous (24 hour) working for the duration of trenchless techniques and dewatering (24 hours). An indicative construction plant list has been used and typical noise levels obtained from the guidance in BS 5228-1. The number of trenchless technique drill compounds is based on the maximum number of known trenchless techniques as part of the onshore cable route, and confirmed in CoT51 in Volume 1, Annex 4.1 Draft Commitments Register of the PEIR. The following features will be crossed using trenchless techniques: - A, B and Classified unnumbered roads (known as C roads) (including the A19 and B1432); - all railway lines (including the section of railway line which runs between Seaham and Horden); - the Durham Coast SSSI and SAC; - Hesledon Moor East SSSI.
Increased levels of vibration from construction activities of the Onshore Export Cable and AC Connection Cable			

Impact	Maximum Design Scenario	Explanation
	Onshore cable area (temporary): 293,200m² Trench width at top: 6.85m Trench width at base: 4m Cable trench depth: 1.8m Depth of stabilised backfill: 450mm Trenchless depth (excluding landfall): 30m Number of cable route joint bays: 12 Volume of material excavated per joint bay: 700m³ Construction land take per joint bay (surface area): 600m² Volume of material excavated per monitoring box: 18m³ Volume of material excavated (for monitoring boxes): 216m³ Construction land take per monitoring box: 64m² Construction land take for all monitoring boxes: 768m² Width of haul road (excluding passing bays): 8m Trenchless techniques The following features will be crossed using trenchless techniques: - A, B and Classified unnumbered roads (known as C roads) (including the A19 and B1432); - all railway lines (including the section of railway line which runs between Seaham and Horden); - the Durham Coast SSSI and SAC; - Hesledon Moor East SSSI. Trenchless drill methodology: HDD, micro-tunnelling (auger bore or direct pipe). Number of trenchless drill compounds: 6 (3 entry and 3 exit trenchless drill compounds) Dimensions of trenchless drill compounds: 6,000m² Total trenchless drill compound area: 36,000m² Trenchless depth (excluding landfall): 30m Infrastructure Number of haul roads: 1 Haul road widths: 8m Number of main compounds: 2	Additional trenchless technique crossings may be proposed as the MHPGC Project develops project refinements for the application for development consent.

Impact		Maximum Design Scenario	Explanation
		Area of main compound: 7ha Total area of both main compounds: 14ha Number of secondary construction compounds: 6 Dimensions per secondary construction compound: 10,000m ² Total area of secondary construction compounds: 6ha.	
The impact of noise generated by additional vehicle movements on the local highway network from the construction of the Onshore Export Cable		Movements – Green LSS Scenario Abnormal loads (Number): 450 Abnormal loads (Type): Cable drums on tractor trailers - low loaded lorry's may be suitable for transport also. Total daily construction traffic movements (HGV): 83 Total daily construction traffic movements (Vehicles): 90	The assessment has been undertaken for the construction scenario that results in the greatest peaks of construction traffic flows on affected road links during the peak construction year of 2033.
Land Substation			
Increased levels of noise from construction activities of the LSS		Construction period for LSS: 4.5 years Area of temporary construction footprint: 7ha	Two locations are assessed in this PEIR chapter for either of the LSS options, one for Option 1: Blue and one for Option 2: Green. In each location, the AIS and GIS LSS options are assessed.
Increased levels of vibration from construction activities of the LSS		Area of temporary works (laydown and storage): 3.5ha Access Temporary width of access including passing bays: 15m Number of temporary accesses: 2 Reinstatement of temporary land: 4 months	
The impact of noise generated by additional vehicle movements on the local highway network from the LSS construction		Movements – Green LSS Scenario Abnormal loads (Number): 18 Abnormal loads (Type): Cable drums on tractor trailers - low loaded lorry's may be suitable for transport also. Total daily construction traffic movements (HGV): 100 Total daily construction traffic movements (Vehicles): 300	The assessment has been undertaken for the construction scenario that results in the greatest peaks of construction traffic flows on affected road links during the peak construction year of 2033.
Operation and Maintenance			
Increased level of noise from the O&M of the LSS		Typical duration of operation: 35 years Area of permanent footprint: 6.5ha Impermeable permanent area: 3.5ha Number of permanent accesses: 2 Permanent access width: 15m	The assessment will be undertaken for the relevant NSRs identified in Section 6.4.5 . Two locations are assessed in this PEIR chapter for the LSS options, one for Option 1: Blue and one for Option 2: Green. In each location, the noise levels likely to be generated by the AIS and GIS LSS options

Impact		Maximum Design Scenario	Explanation
	Permanent access points: 2 Activities anticipated during operation: Monthly day visit inspections; Quarterly detailed inspections/ non-intrusive work; Annual turnaround/shutdown. Both Gas Insulated Switchgear (GIS) and Air Insulated Switchgear (AIS) options remain under consideration for the LSS, for which AIS represents the MDS. Key types of equipment associated with the LSS may include: • Super Grid Transformers (inc. Coolers); • Shunt Reactors (inc. Coolers); • Dynamic reactive power compensator (DRC) phase reactors (inc. Coolers); • Mechanically switched reactors; • Harmonic filters; • Auxiliary transformers; • DRC and control building heating, ventilation, and air-conditioning units.	are assessed at the nearest NSRs using typical noise levels obtained from the guidance BS4 142.	
Decommissioning			
Landfall			
Decommissioning of the Landfall cables and associated earthworks resulting in potential impacts on noise and vibration	Leave cables in place, to minimise/ avoid environmental disturbance. Leaving the cables in place has little or no environmental impact whilst recovering them would disturb the local environment.		Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction). The MDS during decommissioning is the removal of the above-ground infrastructure as this presents greatest noise and vibration disturbance.
Onshore Export Cable			
Decommissioning of the Onshore cable (including watercourse crossings) and associated earthworks resulting in a potential impact noise and vibration	Leave cables in place, to minimise/ avoid environmental disturbance. Leaving the cables in place has little or no environmental impact whilst recovering them would disturb the local environment.		
Land Substation			
Decommissioning of the LSS and associated earthworks resulting in a potential impact noise and vibration	Deconstruction in the inverted sequence of installation, after the LSS has been decommissioned. All equipment and materials including foundations will be demolished and disposed of, in accordance with the latest relevant guidance. The site will be reinstated.		

6.7 Commitments adopted as part of the MHPGC Project

- 6.7.1.1 As set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** and **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**, several measures have been adopted as part of the MHPGC Project to reduce the potential for impacts on onshore noise and vibration.
- 6.7.1.2 Embedded mitigation includes the following measures as identified in the Institute of Sustainability and Environmental Professionals (ISEP), formerly Institute of Environmental Management and Assessment (IEMA), Guide to Shaping Quality Development (IEMA, 2015):
- Primary mitigation - measures included as part of the project design. ISEP (formerly IEMA) describes these as *"modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken"*. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and marine licence, or both;
 - Tertiary mitigation - ISEP (formerly IEMA) describes these as *"actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects"*.
- 6.7.1.3 Embedded primary mitigation measures have been taken into account as part of the initial assessment presented in **Section 6.8** (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures that the Applicant is committed to are considered in the assessment of effects.
- 6.7.1.4 At the ES Stage where an assessment identifies likely significant adverse effects, secondary mitigation measures will be applied in line with the national policy objectives relating to noise. ISEP (formerly IEMA) describes secondary mitigation as *"actions that will require further activity in order to achieve the anticipated outcome"*. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. These are measures that aim to avoid significant adverse effects and minimise residual adverse effects.
- 6.7.1.5 Based on the preliminary assessment within this chapter of the PEIR, the primary and tertiary mitigation measures relevant to onshore noise and vibration are outlined in **Table 6.22**. The method of securing these commitments is also presented in **Section 6.8**.

Table 6.22: Embedded commitments relevant to onshore noise and vibration implemented as part of the MHPGC Project

Commitment number	Measure adopted	How the measure will be secured
CoT03	Core working hours for the construction of the landfall and onshore components of the MHPGC Project will be as follows: - Monday to Friday: 07:00–19:00 hours; - Saturday: 07:00–13:00 hours; - Up to one hour before and after core working hours for mobilisation (“mobilisation period”), i.e. 06:00–20:00 weekdays and 06:00–14:00 Saturdays; In circumstances outside of core working practices, specific works may need to be undertaken outside the core working hours. Advance notice of such works will be provided to the relevant planning authority. This will be set out in the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. A Detailed CoCP will be developed substantially in accordance with the Outline CoCP.	Will be secured via DCO Schedule &/or Requirement
CoT05	An Operational Noise Management Plan will be developed post-consent prior to entering the operation and maintenance phase. It will detail methods of reducing and managing operational noise to comply with the noise limits established by the assessment, will be prepared and submitted for approval prior to the commencement of operations. It will include limits on noise from operation of the Onshore Land Substation (LSS) associated with the MHPGC Project and an indication of the physical mitigation measures expected to be required and how compliance with these limits would be monitored.	Will be secured via DCO Schedule &/or Requirement
CoT16	An Onshore Decommissioning Plan will be developed prior to decommissioning. It will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention, protection of soils and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.	Will be secured via DCO Schedule &/or Requirement
CoT17	Where practicable, the siting of the temporary and permanent footprint of the MHPGC Project will avoid areas of Flood Risk Zone 2 and 3, sensitive historic, cultural, ecological and other environmental receptors, both statutory and non-statutory, during the site selection process for the MHPGC Project.	Will be secured via DCO Schedule &/or Requirement

Commitment number	Measure adopted	How the measure will be secured
CoT18	An Outline Code of Construction Practice (CoCP) will be prepared and submitted with the application for development consent. A Detailed CoCP will be developed substantially in accordance with the Outline CoCP. The Outline CoCP will include (but is not limited to) measures to maintain and address: • flood protection and control measures; • water environment and drainage; • noise and vibration management measures; • air quality and dust management; • pollution prevention and management; • geology and ground conditions; • soil and materials management; • land use, tourism and recreational assets; • waste management.	The Outline CoCP would be secured as a requirement of the DCO.
CoT26	An Outline Construction Noise and Vibration Management Plan will form part of the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. It will include measures to mitigate noise from construction activities associated with the MHPGC Project. A Detailed Construction Noise and Vibration Management Plan will be developed substantially in accordance with the Outline Construction Noise and Vibration Management Plan. Bespoke method statement(s) will be developed, where required, to ensure suitable noise limits can be met on specific sensitive noise receptors.	Will be secured via DCO Schedule &/or Requirement
CoT41	An Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the application for development consent. A Detailed CTMP will be developed substantially in accordance with the Outline CTMP prior to construction. The Detailed CTMP will set out measures to include (but not limited to): • managing the numbers, timing and routeing of HGVs during the construction phase; • managing the movement of construction worker traffic during the construction phase; • details of any traffic management measures necessary to ensure the safe passage of construction traffic via the local highway network; • details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.	Will be secured via DCO Schedule &/or Requirement

6.8 Assessment of impacts and effects

6.8.1 Overview

- 6.8.1.1 This section presents a preliminary assessment of the effects of onshore noise and vibration arising from the construction and decommissioning phases of the MHPGC Project at residential receptors. The impacts and effects presented within this section account for the MDS, the parameters of which are presented in **Table 6.21**.
- 6.8.1.2 The assessment of effects the effects of onshore noise and vibration arising from the construction and decommissioning phases of the MHPGC Project at non-residential receptors will be presented at the ES Stage.

6.8.2 Construction phase

Overview of construction noise impacts

- 6.8.2.1 In accordance with the MDS as set out within **Section 6.6**, key construction activities with the potential to result in significant noise effects are anticipated to take place within the Landfall, onshore export and AC connection cable corridor and LSS Option Areas. The following key construction activities have formed the basis of the preliminary assessment:
- Haul road construction.
 - Erection of construction compound(s);
 - Operation of construction compound(s);
 - Trenchless technique cable installation (which may include HDD);
 - Open cut trenching cable installation;
 - LSS construction.
- 6.8.2.2 There is uncertainty at this stage of the design as to the location of construction related activities and residential NSRs identified within, and adjacent to, the Landfall, the onshore export cable corridor and the LSS Option Areas. A worst-case assumption has been made that construction activities would occur at the closest reasonable point to each residential NSRs considered, though in practice this represents a precautionary approach which likely overstates the potential noise impacts.
- 6.8.2.3 As set out in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**, a preliminary assessment of noise from construction activities anticipated to take place has been carried out based on an indicative plant list. Distance bandings have been determined with these activities located at the boundary of the maximum extent of the works area to determine distances at which noise sensitive receptors are likely to experience noise levels that could exceed threshold values ($L_{Aeq,T}$ (dB)) set out in **baseline ambient** noise levels (LOAEL) vary across the Onshore Construction Noise Study Area, therefore appropriate threshold values (SOAEL) will also vary between assessment locations.
- 6.8.2.4 The LOAEL and SOAEL are defined in **Table 6.11**, and the impact criteria are presented in **Table 6.12**.

Table 6.11: LOAEL and SOAEL criteria for construction and decommissioning noise for each NSR, Facade

Time Period	LOAEL	SOAEL
Weekdays (0700-1900 hours)	Baseline sound levels, $L_{Aeq,T}$	Threshold values as determined in accordance with Table E.1 BS 5228-1:2009+A1:2014 (see Table 6.9).
Saturdays (0700-1300 hours)		
Evenings (1900-2300 hours)		
Saturdays (1300-2300 hours)		
Sundays (0700-2300 hours)		
Night (2300-0700 hours)		

- 6.8.2.5 Table 6.12 The preliminary assessment has accounted for the commitments adopted as part of the MHPGC Project set out within **Section 6.6.2**.
- 6.8.2.6 Receptor group distances have then been used to determine the potential noise impacts associated with the key construction activities and the magnitude of impact is then determined. In the absence of receptor specific predictions the range in magnitude of impact which may be experienced has been reported. Where the residential receptors are located within the indicative threshold distance for their respective ABC Category, there is the potential for a medium to high impact magnitude to be experienced, i.e. an effect ranging between Moderate to Major adverse significance which is significant in EIA terms. In turn, if the residential receptor is located outside of the indicative threshold distances there is the potential for a Negligible to Low impact magnitude to be experienced, i.e. an effect ranging between Minor to Moderate adverse significance which is not significant in EIA terms.
- 6.8.2.7 Further details on the preliminary construction noise assessment are presented in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**. The impact assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur.
- 6.8.2.8 As set out within Section 6.7, an Outline Construction Noise and Vibration Management Plan (CoT26) will be prepared and submitted as part of the DCO application and form part of the Outline CoCP (CoT18), along with an Outline CTMP (CoT41). These documents will be submitted for approval prior to the commencement of operations.

Noise due to construction activities associated with the Landfall

Landfall Receptor sensitivity

- 6.8.2.9 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Noise Study Area from the Landfall have been classed as **high** sensitivity.

Magnitude of impact

- 6.8.2.10 During core working hours, the preliminary construction noise assessment indicates that when works are at their closest distance to the following residential NSR, the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R04 Hillcroft Residential.

- 6.8.2.11 Outside of core working hours, the preliminary construction noise assessment indicates that when the trenchless crossing installation works are at their closest distance to the following residential NSR, the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R04 Hillcroft Residential.

Significance of effect

- 6.8.2.12 Where the threshold criteria may be exceeded the impact magnitude would be medium to high. The sensitivity of the Hillcroft Residential (R04) receptor is classified as High. Therefore, there is a temporary effect of Moderate to Major Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.13 Significant effects, short term, direct and temporary in nature, have been identified in relation to Hillcroft Residential (R04), primarily due to its location within the area identified for Landfall. In the absence of certainty as to the specific location of construction activities, based on the worst-case precautionary assessment undertaken, it is predicted that noise levels at Hillcroft Residential (R04) could exceed SOAEL and thereby would have potential to experience significant effects.
- 6.8.2.14 The construction noise assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. Where significant noise effects cannot be avoided through practicable design refinement, enhanced acoustic mitigation would be implemented, as necessary, for plant associated with continuous construction activities, which may include trenchless technique cable installation. Such measures may include additional screening,

enclosures and/or plant selection, with the aim of reducing noise impacts at source. These secondary mitigation measures would set out within the outline Construction Noise and Vibration Management Plan which will be an appendix to the CoCP to be secured as a DCO requirement (CoT26).

- 6.8.2.15 In the case of receptor R04, it is likely that the residual effects would be significant (moderate adverse to major adverse) due to noise associated with construction within the Landfall. On a precautionary basis, the preliminary assessment concludes potential significant residual effects.

Noise due to construction activities associated with the onshore cable corridor

Receptor sensitivity

- 6.8.2.16 In accordance with the sensitivity criteria set out in **Table 6.9** residential NSRs within the Onshore Construction Noise Study Area for the onshore cable corridor have been classed as **high** sensitivity.

Magnitude of impact

- 6.8.2.17 During core working hours, the preliminary construction noise assessment indicates that when works are at their closest distance to the following residential NSRs the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R04 Hillcroft Residential;
- R09 Kinley Hill Tower;
- R10 Kinley Hill Farm Residential;
- R11 Hawthorn Dene Residential;
- R12 Hawthorn North Residential;
- R15 Hawthorn South East Residential;
- R21 Little Coop House Farm Residential;
- R22 Great Co-op House Farm Residential;
- R24 South Hetton (Windermere Road) Residential;
- R25 South Hetton East Residential;
- R33 Hesledon Moor South Residential;
- R34 Hesledon Moor Central Residential;
- R35 Hesledon Moor North Residential.

- 6.8.2.18 Outside of core working hours, the threshold criteria is reduced to take account increased sensitivity of residential NSRs during the evening and night-time periods. The preliminary construction noise assessment indicates that when the trenchless techniques cable installation works are at their closest distance to the following residential NSRs the daytime threshold criteria may be exceeded, i.e. an impact magnitude of medium to high:

- R01 Cold Hesledon South Residential;
- R02 Cold Hesledon North Residential;
- R03 Cold Hesledon East Residential;
- R04 Hillcroft Residential;
- R09 Kinley Hill Tower;
- R10 Kinley Hill Farm Residential;
- R11 Hawthorn Dene Residential;
- R12 Hawthorn North Residential;
- R13 Hawthorn Central Residential;
- R15 Hawthorn South East Residential;
- R16 Hawthorn North West Residential;
- R17 Hawthorn West Residential;
- R18 Hawthorn South West Residential;
- R21 Little Coop House Farm Residential;
- R22 Great Co-op House Farm Residential;
- R23 Carr's Farm Residential;
- R24 South Hetton (Windermere Road) Residential;
- R25 South Hetton East Residential;
- R26 South Hetton South East Residential;

- R29 South Hetton (Clarence Gate) Residential;
- R32 Murton South Residential;
- R33 Hesledon Moor South Residential;
- R34 Hesledon Moor Central Residential;
- R35 Hesledon Moor North Residential.

Significance of effect

- 6.8.2.19 Where the construction noise threshold criteria for residential NSRs may be exceeded during the daytime, evening and/or night-time periods, the impact magnitude would be medium to high. The sensitivity of the residential NSRs is classified as High. Therefore, there is temporary effect of Moderate to Major Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.20 Significant effects, short term and temporary in nature, have been identified in relation to a series of receptors (as set out in paragraph 6.8.2.17 and paragraph 6.8.2.18), predominantly due to their respective location within the MHPGC Project PEIR Red Line Boundary: Onshore or within up to approximately 200m.
- 6.8.2.21 The construction noise assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. If significant predicted noise related effects cannot otherwise be avoided through design refinement were considered practicable, enhanced acoustic mitigation would be implemented, as necessary. Such measures may include additional screening, enclosures and/or plant selection, with the aim of reducing noise impacts at source. These secondary mitigation measures would set out within the CoCP to be secured as a DCO requirement.
- 6.8.2.22 On the basis of the implementation of secondary mitigation measures, it is considered that the magnitude of construction noise related impacts within the area which relates to the majority of the open cut installation of the onshore export cable activities predicted during daytime hours could be reduced such that, while temporary, short term adverse effects may remain, residual effects would be minor adverse to negligible. However, it is likely that the residual effects would be significant (moderate adverse to major adverse) due to noise associated with the trenchless technique cable installation works within the onshore export cable corridor. On a precautionary basis, the preliminary assessment concludes potential significant residual effects.

Noise due to construction activities associated with the Blue Option LSS Area

Receptor sensitivity

- 6.8.2.23 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Noise Study Area of the Blue LSS Option Area have been classed as **high** sensitivity.
- 6.8.2.24 There are no residential NSRs within the Onshore Construction Noise Study Area for the Green Option LSS Area. Therefore, no further consideration of construction noise associated with Green Option LSS Area presented in this report.

Magnitude of impact

- 6.8.2.25 The preliminary construction noise assessment indicates that when works are at their closest distance to the following residential NSRs the daytime threshold criteria would not be exceeded, i.e. an impact magnitude of negligible to low.

Significance of effect

- 6.8.2.26 For the Blue LSS Option Area the impact magnitude would be negligible to low. The sensitivity of the residential NSRs is classified as High. Therefore, there is temporary effect of Minor Adverse significance, which is not Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.27 Significant effects are not predicted for the Blue LSS Option Area and therefore no further additional mitigation and monitoring are proposed.

- 6.8.2.28 Therefore, the residual effect of noise impacts due to construction activities associated with the Blue LSS Option Area, commencing from the construction phase, are considered to be minor adverse, which are not significant in EIA terms.

Overview of construction vibration impacts

- 6.8.2.29 In accordance with the MDS as set out within **Section 6.6**, reasonable worst case construction activities with potential to result in significant vibration effects are anticipated to take place within the Landfall, onshore export and AC connection cable corridor and LSS Option Areas. The following activities have formed the basis of the preliminary assessment:
- Vibratory compaction (steady state);
 - Vibratory compaction (start up and run down);
 - HGV movements;
 - Excavation.
- 6.8.2.30 At this stage, the spatial extent of vibration generating activities have not been defined and vibration sensitive receptors are currently identified within, and adjacent to, the area where Landfall would be located, the onshore export and AC connection cable corridor and the LSS Option Areas. Ground-borne vibration calculations have therefore been performed for construction activities typically required for similar developments. The calculations are based on the empirical prediction procedures presented within BS 5228-2. A reasonable worst case assumption has been made that construction activities would occur at the closest practicable location to each residential vibration sensitive receptor considered.
- 6.8.2.31 Further details on the preliminary construction vibration assessment are presented in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**. The assessment of construction vibration at non-residential NSRs will be presented at the ES Stage.

Vibration due to construction activities associated with the Landfall

Receptor sensitivity

- 6.8.2.32 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Vibration Study Area of the Landfall have been classed as high sensitivity.

Magnitude of impact

- 6.8.2.33 The preliminary construction vibration assessment indicates that when works are at their closest distance to Hillcroft Residential (R04) the impact magnitude would be medium.

Significance of effect

- 6.8.2.34 The impact magnitude for Hillcroft Residential (R04) would be medium. The sensitivity of the residential NSRs is classified as High. Therefore, there is a temporary effect of Moderate Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.35 No additional bespoke mitigation is proposed at the PEIR stage for construction vibration. The construction vibration assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. If significant predicted vibration related effects cannot otherwise be avoided through design refinement were considered practicable, enhanced acoustic mitigation would be implemented, as necessary.

Vibration due to construction activities associated with the onshore cable corridor

Receptor sensitivity

- 6.8.2.36 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within the Onshore Construction Vibration Study Area of the onshore cable corridor have been classed as high sensitivity.

Magnitude of impact

6.8.2.37 The preliminary construction vibration assessment indicates that when works are at their closest distance to the following residential NSRs the impact magnitude would be medium:

- R09 Kinley Hill Tower;
- R10 Kniley Hill Farm Residential;
- R11 Hathorn Dene Residential;
- R15 Hawthorn South East Residential;
- R19 East Batter Law Farm Residential;
- R20 West Batter Law Farm Residential;
- R21 Little Coop House Farm Residential;
- R24 South Hetton East Residential;
- R25 South Hetton (Windermere Road) Residential;
- R33 Hesledon Moor South located approximately;
- R34 Hesledon Moor Central located approximately.

6.8.2.38 The preliminary construction vibration assessment indicates that when works are at their closest distance to the following residential NSRs the impact magnitude would be low:

- R02 Cold Helsedon North Residential;
- R22 Great Co-op House Farm Residential;
- R25 South Hetton East Residential.

Significance of effect

6.8.2.39 The impact magnitude ranges between low to medium. The sensitivity of the residential NSRs is classified as High. Therefore, there is temporary effect of Minor to Moderate Adverse significance, which is Significant in EIA terms.

Additional mitigation and residual effect

6.8.2.40 No additional bespoke mitigation is proposed at the PEIR stage for construction vibration. The construction vibration assessment will be updated during the EIA as the design of the MHPGC Project continues to develop, including in relation to potential refinement of the areas within which construction activities are anticipated to occur. If significant predicted vibration related effects cannot otherwise be avoided through design refinement were considered practicable, enhanced acoustic mitigation would be implemented, as necessary.

6.8.2.41 It was noted that R09 (Kinley Hill Tower) which features a listed building is located within the MHPGC Project PEIR Red Line Boundary: Onshore. Cosmetic damage from vibration related construction effects can be avoided by maintaining a distance of 10m or more from the worst-case vibration activities. This is not expected therefore; a **moderate adverse** effect is predicted which is Significant in EIA terms.

Vibration impacts due to construction activities associated with the LSS

Receptor sensitivity

6.8.2.42 In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within Onshore Construction Vibration Study Area of the Blue Option Area have been classed as high sensitivity.

6.8.2.43 There are no residential NSRs within the Onshore Construction Vibration Study Area for the Green Option LSS Area. Therefore the assessment of the potential for significant vibration effects relating to construction activities associated with the Green LSS Option Area has not been considered further.

Magnitude of impact

6.8.2.44 The preliminary construction vibration assessment indicates that when Blue LSS Option Area works are at their closest distance to the residential NSR of Cold Helsedon North Residential (R02) the impact magnitude would be low.

Significance of effect

- 6.8.2.45 The impact magnitude for Cold Helsedon North Residential (R02) would be low. The sensitivity of the residential NSRs is classified as High. Therefore, there is a temporary effect of Minor Adverse significance, which is not Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.46 Significant effects are not predicted and therefore no further additional mitigation and monitoring are proposed. Therefore, the effect of vibration impacts due to construction activities associated with the Blue LSS Option Area are considered to be minor adverse, which are not significant in EIA terms.

Road traffic noise during construction

- 6.8.2.47 The introduction of additional vehicles onto the local highway network has the potential to change road traffic noise levels at noise sensitive receptors located along or within close proximity to these roads.
- 6.8.2.48 An indicative assessment of construction road traffic noise has been undertaken using road traffic data as set out within **Volume 3, Chapter 5: Traffic and Transport, of the PEIR**. Further details on the preliminary construction road traffic noise assessment are presented in **Volume 3, Annex 6.2: Onshore Noise and Vibration Construction Technical Report, of the PEIR**.

Receptor sensitivity

- 6.8.2.49 The NSRs are existing dwellings within 50m of the local road network. In accordance with the sensitivity criteria set out in **Table 6.9**, residential NSRs within Onshore Construction Road Traffic Noise Study Area have been classed as high sensitivity.

Magnitude of impact

- 6.8.2.50 The results of the preliminary assessment show the access road links to Jade Business Park experience the highest noise level changes which, during peak construction, range between +2.2dB and +3.7dB. There are no residential properties within 50m of the access road links.
- 6.8.2.51 For the remaining road links the noise level changes during peak construction, range between +0.0dB and +0.7dB, i.e. an impact magnitude of Negligible.

Significance of effects

- 6.8.2.52 The worst-case impact magnitude is defined as Negligible and the sensitivity of the receptors are classified as High. Therefore, there is indirect, temporary, effect of Negligible significance, which is Not Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.2.53 Based on the implementation of embedded commitments, no additional bespoke mitigation is proposed at the PEIR stage for construction road traffic noise.

6.8.3 O&M phase

Noise impacts due to the operation and maintenance of the LSS

LSS Plant Strategy

- 6.8.3.1 Detailed information on the plant strategy and layout is not available at the current design stage. However, the LSS plant likely to be installed may include the following:
- Earth switch: It is considered that this plant item would not be loud;
 - Lightning arrester or surge arrestor: It is understood that this plant item would not be loud;
 - Voltage transformer: It is understood that this plant item would not be loud;
 - Current transformer: It is understood that this plant item would not be loud;
 - Circuit breaker: It is understood that this plant item could be loud but would only be for a matter of seconds and very infrequently;
 - Disconnect or electrical isolator: It is understood that this plant item would not be loud.
 - Electrical busbar: It is understood that this plant item would not be loud;

- Power transformer: It is understood that this plant item is potentially loud and will be considered further within the ES that will accompany the application for development consent;
- Static VAR Compensator: It is understood that this plant item is potentially loud and will be considered further within the ES that will accompany the application for development consent;
- Harmonic Filter Bank: It is understood that this plant item is potentially loud and will be considered further at the within the ES that will accompany the application for development consent;
- Shunt Reactor: It is understood that this plant item is potentially loud and will be considered further within the ES that will accompany the application for development consent;
- Terminal tower / line-cable interface mast: It is understood that this plant item would not be loud.

6.8.3.2 It is likely that most plant items will operate continuously 24 hours a day whilst other plant items will operate intermittently depending on demand. In the absence of detailed design information, the MDS is formed on the assumption that all plant items operate continuously 24 hours a day.

6.8.3.3 At the ES Stage, the operational plant layout, equipment specification, façade treatments, building designs and external controls of the final LSS Option Area will be defined. A 3D noise model will be created using Datakustik CadnaA noise modelling software to predict the operational noise levels from the LSS at representative NSRs within the Onshore Operational Noise Study Area. The predicted operational noise levels, i.e. the specific sound levels, will then be assessed in accordance with BS 4142.

6.8.3.4 A BS 4142 assessment requires consideration of the character of the industrial sound, i.e. the rating level. The rating level is determined by applying a correction to the specific sound level for acoustic features (tonality, impulsivity, intermittency etc.) which can attract more attention to an industrial sound source when compared to a typical broadband or anonymous sound source.

6.8.3.5 At this stage, it is assumed that industrial noise from the MHPGC Project during O&M is steady and continuous in nature. However, based on professional judgement, it is anticipated that industrial noise from the MHPGC Project during O&M will be highly tonal within the LSS due to the typical acoustic characteristics of its components, including transformers, cooling fans, and other electrical equipment.

6.8.3.6 For the purpose of this qualitative assessment, it is assumed that the tonality of industrial noise from the MHPGC Project during O&M may be highly perceptible at the NSRs within the Operational Noise Study Area. Therefore, it is likely that a acoustic character correction of +6dB will be applied to the predicted specific sound levels. This is considered representative of a reasonable worst-case.

Receptor sensitivity

6.8.3.7 Residential NSRs identified within the Onshore Operational Noise Study Areas of the LSS Option Areas have the potential to experience significant noise related effects during the operation and maintenance of the LSS. The residential NSRs are set out within **Table 6.23** and in accordance with the sensitivity criteria set out in **Table 6.9** have been classed as high sensitivity.

6.8.3.8 A summary of the baseline sound levels at the residential NSRs is also presented in **Table 6.23**. Further details on baseline in relation to onshore noise and vibration is outlined within **Volume 3, Annex 6.1: Onshore Noise and Vibration Baseline Technical Report, of the PEIR**.

Table 6.23: Noise sensitive receptors in relation to noise impacts due to the operation and maintenance of the LSS

ID Receptor group ID	Receptor name	Distance from the LSS Boundary (m)	Measurement location ID	Background sound level, dB L _{A90,15min} (free-field conditions)	
				Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Blue LSS Option Area					
R01	Cold Hesledon South Residential	140	LT3 ¹	37	35
R02	Cold Hesledon North Residential	75	LT3 ¹	37	35
R03	Cold Hesledon East Residential	375	LT3 ¹	37	35
R33	Hesledon Moor South Residential	430	LT2	35	27
R34	Hesledon Moor Central Residential	560	LT2	35	27
R19	East Batter Law Farm Residential	420	LT3	37	35
Green LSS Option Area					
R24	South Hetton (Windermere Road) Residential	445	LT1	34	25
R35	Hesledon Moor North Residential	545	LT2	35	27

¹ For the purpose of the qualitative assessment, the long-term measurement location of LT3 has been adopted for R01 to R03. However it should be noted that these residential NSRs are located closer to the A19 than the adopted measurement location and therefore are likely to experience higher background sound levels.

Magnitude of impact

- 6.8.3.9 Taking into consideration the distances between the LSS Option Areas and the nearest residential NSRs, the low representative background sound level at each NSR particularly during the night-time and the acoustic character of the noise generated by the LSS, it is considered that the operational noise rating level (with acoustic character penalty) would exceed background by a substantial margin at the nearest residential NSRs for both LSS options. On this basis effects are likely to range between low to high magnitudes.
- 6.8.3.10 As set out within Section 6.7, an Operational Noise Management Plan, will be prepared and submitted as part of the DCO application and submitted for approval prior to the commencement of operations (CoT05). It will include limits on noise from operation of the onshore LSS associated with the MHPGC Project and an indication of the physical mitigation measures expected to be required and how compliance with these limits would be monitored.
- 6.8.3.11 At the ES Stage, the measures to be secured through the Operational Noise Management Plan will be developed as the design of the MHPGC Project is further defined. For example through specific plant selection, confirmed manufacturer noise data and mitigation integrated into the design (e.g., equipment optimisation, layout refinement, enclosures/barriers and façade treatments).

Significance of effects

- 6.8.3.12 The impact magnitude is likely to range between low and high. The sensitivity of the residential NSRs is classified as High. Therefore, there is a permanent effect of Minor to Major Adverse significance, which, at worst, is Significant in EIA terms.

Additional mitigation and residual effect

- 6.8.3.13 Through the good acoustic design process and with suitable mitigation incorporated into the design, it is expected that the potential noise impacts will reduce significantly. However, there is the potential for residual significant effects at the closest receptors to the chosen LSS option, particularly at night.

6.8.3.14 The design will incorporate noise control measures including:

- Strategic plant layout and orientation to maximise separation to the nearest NSRs;
- Housing of higher-noise plant within sound-insulated buildings;
- Selection of inherently low-noise equipment;
- Fixed physical controls such as acoustic enclosures, barriers and/or bunds where practicable.

6.8.3.15 The measures will be developed and secured through the Operational Noise Management Plan and detailed design. Once the LSS design is finalised, including with specific plant selection, confirmed manufacturer noise data and mitigation integrated into the design (e.g., equipment optimisation, layout refinement, enclosures/barriers and façade treatments), operational noise levels are expected to reduce and, for most receptors, are likely to be at a low/medium magnitude of impact.

6.8.4 Decommissioning phase

Noise due to decommissioning activities associated with the LSS

6.8.4.1 NSRs within the Onshore Decommissioning Noise Study Area of the Blue LSS Option Area are likely to experience noise related impacts as result of decommissioning of the LSS as they are the construction of the LSS as set out in **Section 6.8.2**, i.e. an impact magnitude of negligible to low. The sensitivity of the residential NSRs is classified as High. Therefore, there is direct, temporary, residual effect of Minor Adverse significance, which is not Significant in EIA terms.

6.8.4.2 There are no residential NSRs within the Onshore Decommissioning Noise Study Area for the Green Option LSS Area. Therefore, the assessment of the potential for significant noise effects relating to decommissioning activities associated with the Green LSS Option Area has not been considered further.

Vibration due to decommissioning activities associated with the LSS

6.8.4.3 Sensitive receptors within the Onshore Decommissioning Vibration Study Area of the Blue LSS Option Area are likely to experience vibration related impacts as result of decommissioning of the LSS as they are the construction of the LSS as set out in **Section 6.8.2**, i.e. an impact magnitude of low. The sensitivity of the residential NSRs is classified as High. Therefore, there is direct, temporary, residual effect of Minor Adverse significance, which is not Significant in EIA terms.

6.8.4.4 There are no residential NSRs within the Onshore Decommissioning Vibration Study Area for the Green Option LSS Area. Therefore, the assessment of the potential for significant vibration effects relating to decommissioning activities associated with the Green LSS Option Area has not been considered further.

Road traffic noise during decommissioning

6.8.4.5 In line with the MDS approach adopted throughout this chapter, road traffic noise during decommissioning is assumed to operate within the parameters identified for construction, using the same assessment method (CRTN with DMRB LA111 short-term change criteria) and broadly the same access routes, but with traffic flows and durations anticipated to be comparable to or lower than the peak construction month.

6.8.4.6 On this basis, the predicted changes in Basic Noise Level on public roads during decommissioning would not exceed those reported for construction; therefore, the magnitude of impact is expected to be the same as, or lower than, the construction case (i.e. Negligible across the strategic and local network), and the associated effects would remain negligible and not significant in EIA terms.

6.8.4.7 This conclusion is consistent with the overarching assumption that decommissioning will require no greater amount or duration of activity than assessed for construction and will be delivered under the same embedded controls.

6.8.5 Future monitoring

6.8.5.1 An Outline Construction Noise and Vibration Management Plan will be prepared as part of the Outline CoCP (CoT26) and submitted as part of the application for the development consent. The

detailed CoCP(s) will be developed in accordance with the Outline CoCP. These documents will include measures to mitigate, and monitor (where necessary) noise and vibration from construction activities associated with the MHPGC Project. The Outline CoCP would be secured as a requirement of the DCO (CoT18).

- 6.8.5.2 An Operational Noise Management Plan for the LSS will be prepared and submitted for approval prior to the commencement of operations (CoT05). The Plan will identify the noise limits for the operation of the LSS and the measures for how these limits would be achieved and how compliance would be monitored. This will be secured as a requirement of the DCO (CoT5).

6.9 Cumulative effects

6.9.1 Methodology

- 6.9.1.1 The Morven Programme comprises four distinct projects: Morven North, Morven South, Morven Hawthorn Pit Grid Connection Project (MHPGC Project), and Morven Branxton Area Grid Connection Project (MBAGC Project). As the largest Zone of Influence (ZOI) for the onshore CEA does not overlap with Morven North, Morven South or MBAGC, the onshore Cumulative Effects Assessment (CEA) has been undertaken to assess the MHPGC Project alone with relevant projects, plans and activities using a tiered approach. The CEA has been undertaken in accordance with the methodology described in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.
- 6.9.1.2 The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 1, Annex 4.4: Cumulative Screening and Location Plan, of the PEIR). Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.
- 6.9.1.3 In undertaking the CEA for MHPGC Project, it should be noted that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside MHPGC Project. Therefore, a tiered approach has been adopted, whereby all third-party projects and plans considered have been allocated into 'tiers' reflecting their current stage within the planning and development process. This provides a framework for placing relative weight upon the potential for each project/plan included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the project/plan's parameters. The tiered approach utilised within the MHPGC Project CEA employs the following tiers:
- Tier 1 assessment – Existing developments either built (operational) or under construction¹; approved developments awaiting implementation; and permitted/submitted application(s), but not yet determined, plus Morven North and Morven South;
 - Tier 2 assessment – All plans/projects assessed under Tier 1, plus plans/projects where a scoping report has been submitted and is in the public domain;
 - Tier 3 assessment – All plans/projects assessed under Tier 1 and 2, plus MBAGC Project, and plans/projects that are reasonably foreseeable (e.g. projects identified in development plans, projects in other plans and programmes, offshore renewable energy projects that have a Crown Estate Scotland Lease Option Agreement).
- 6.9.1.4 The ZOI adopted for the CEA for onshore noise and vibration assessment are as follows:
- The Onshore Construction (and decommissioning) Noise Study Area, an area extending 600m from the MHPGC Project PEIR Red Line Boundary: Onshore;
 - The Onshore Construction (and decommissioning) Vibration Study Area, an area extending 200m from the MHPGC Project PEIR Red Line Boundary: Onshore;
 - The Onshore Construction Road Traffic Noise Study Area, an area extending 50m from the kerb line of the local road network where construction traffic (i.e. With development scenario) would result in a change in basic noise level (BNL) of 1dB or more, when compared to the baseline scenario (i.e. Without development scenario);

¹ Note that existing developments are included in Tier 1 CEA long list but are generally screened out of the CEA assessments, aside from the following exceptions:

1) Existing developments which were not present at the time of baseline characterisation, where a potential cumulative impact-receptor pathway has been identified.

2) Existing developments are screened into tier 1 assessments for specific topics where there is a large conceptual, temporal and spatial overlap between project impacts. In these instances, the potential for ongoing effects through cumulative impact-receptor pathways throughout project lifetime, across the development phases, means that they are considered within quantitative assessment for these topic CEAs (e.g., offshore ornithology assessments consider the cumulative effects of operational offshore wind farms).

- The Onshore Operational Noise Study Area, an area extending 1000m from the LSS Option Areas.

6.9.1.5 The specific projects and plans screened into the CEA for noise and vibration are outlined in **Table 6.24**.

6.9.1.6 All potential impacts from the MHPGC Project alone assessment have been scoped into to the CEA (listed in **Table 6.24**).

6.9.1.7 Similarly, some of the potential impacts considered within the MHPGC Project alone assessment are specific to a particular phase of development (e.g. construction, O&M or decommissioning). Where cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with MHPGC Project during certain phases of development, impacts associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

Table 6.24: List of other projects and plans considered within the Cumulative Effects Assessment for Noise and Vibration

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Overlap with MHPGC Project
Tier 1					
DCC3 - Land West of Units 1-3 Admiralty Way Seaham, Erection of a petrol filling station and drive thru' coffee outlet (Class E)	Consented	0km	Erection of a petrol filling station and drive thru' coffee outlet (Class E), along with access, car parking, drive thru' lane, external seating area, refuse stores, hard and soft landscaping and associated works.	Under construction	The noise sensitive receptors of the Project, i.e. static caravan site, are within the applicable ZOI for construction noise.
DCC4 - EGL1 Visitor Centre	In Planning - Application submitted	0km	Full planning application for a temporary visitor centre at the EGL1 site compound for a period of up to 5 years	Detail not available	Project is within the applicable ZOI for construction noise, construction vibration and operational noise.
DCC5 - EGL1 Visitor Centre	Consented	0km	Commencement of Development for the creation of a solar farm	Detail not available	Project is within the applicable ZOI for construction noise.
DCC6 – Seaham Garden Village - 1500 dwellings	Consented	0km	Garden village of up to 1500 dwellings, integrated community health and wellbeing village, commercial and leisure uses, business innovation hub, primary school, public open space, community allotments and associated infrastructure, including new pedestrian and vehicular access from A182.	Under construction, due to be complete 2030	Project is within the applicable ZOI for construction noise, construction vibration and operational noise (Blue LSS Option Area only).

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Overlap with MHPGC Project
DCC7 - Phase 2 Jade Business Park	Consented	0km	Application for reserved matters comprising the construction of 3 industrial units with associated access, parking, landscaping and drainage (Phase 2) pursuant to outline planning permission DM/21/002901/OUT (B2/B8 industrial development).	Detail not available	Project is within the applicable ZOI for construction noise and operational noise.
DCC9 - Temporary installation of a battery energy storage system	In Planning - Application submitted	0km	Temporary installation of a battery energy storage system, along with ancillary infrastructure, acoustic and security fencing, access, landscaping provision and ecological enhancements.	Detail not available	Project is within the applicable ZOI for construction noise and operational noise.
DCC10 - Battery Energy Storage System	In Planning - Application submitted	0km	The construction and installation of a Battery Energy Storage System, associated infrastructure, landscaping, fencing, access tracks, biodiversity net gain and underground cable corridor.	12 month construction programme	Project is within the applicable ZOI for construction noise and operational noise.
DCC11 - Eastern Green Link 1, Converter Station	Consented	0km	Reserved Matters application (all matters, being details of the permanent access, appearance, landscaping, layout and scale) for the erection of a converter station, and the laying out of replacement public open space on land to the west and south of Jade Business Park	Under construction, works to be complete in 2029	Project is within the applicable ZOI for operational noise.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Overlap with MHPGC Project
			pursuant to DM/22/01663/OUT		
DCC12 - 81 homes and a convenience store	In Planning - Application submitted	0km	Erection of 81 no. homes, a convenience store (use class E) and associated infrastructure and landscaping	Detail not available	Project is within the applicable ZOI for construction noise and operational noise.
DCC13 - 149 homes, Land East of Seaham Garden Village	In Planning - Application submitted	0km	Demolition of existing farm buildings and dwellings and erection of 149 dwellings (use class C3) with vehicle access, open space, landscaping, SUDS, and associated infrastructure works	Detail not available	Project is within the applicable ZOI for construction noise and construction vibration.
DCC146 - BESS, Hawthorn Grid Site Murton	Consented	0km	BESS, Hawthorn Grid Site Murton	Under construction	Project is within the applicable ZOI for operational noise.
Tier 3					
DCC14 - Land North West Of Hallfield Farm Solar Farm	Pre-application	0km	Screening Opinion request for the construction, operation and decommissioning of a Battery Energy Storage System (BESS) with a storage capacity of up to 300 megawatts (MW).	Details not available.	Project is within the applicable ZOI for operational noise.

6.9.2 Maximum Design Scenario –Cumulative Effects Assessment

- 6.9.2.1 The MDS identified in Table 6.21 has been selected as having the potential to result in the greatest potential effect on an identified receptor or receptor group in relation to the CEA. The MDSs have been based on the MHPGC Project alone assessment MDS (**Table 6.21**), as well as publicly available information on other third-party projects and plans that have been screened into the CEA (**Table 6.24**).

6.10 Cumulative Effects Assessment

6.10.1 Overview

- 6.10.1.1 A description of the significance of cumulative effects upon noise and vibration sensitive receptors arising from each identified impact is given below. The CEA for MHPGC Project is presented in **Table 6.25**.

6.10.2 Construction Phase

Noise impacts due to construction activities

- 6.10.2.1 There is potential for cumulative noise effects as a result of the MHPGC Project and other projects that are under construction and/or in operation. If the construction period of activities within the Landfall, onshore export and AC connection cable corridor and LSS Option Areas of the MHPGC Project for the MHPGC Project and cumulative projects overlap, then there is the potential for noise sensitive receptors within the ZOI to be affected by cumulative noise generated during construction. In addition, the cumulative projects have the potential to introduce noise sensitive receptors which will require consideration as part of the construction phase assessment.
- 6.10.2.2 The summary of the Cumulative Effects Assessment is presented in **Table 6.25**.

Table 6.25: MHPGC Project CEA for construction noise

	Cumulative Effects Assessment
Construction phase	
Magnitude of impact	<u>Tier 1</u> Tier 1 cumulative projects overlap with the MHPGC Project PEIR Red Line Boundary: Onshore or are within the ZOI (as set out in paragraph 6.9.1.4). At the time of writing, timescales for the construction phases of the Tier 1 projects are currently unknown. To ensure a conservative assessment, it has been assumed that Tier 1 project construction timescales overlap with the MHPGC Project construction period of 2033 to 2037. It has been assumed that the Tier 1 construction phase works would only overlap with the MHPGC Project during core working hours, i.e. the weekday daytime period. Cumulative impacts from construction noise are expected to have a local spatial extent, temporary, short-term duration. Tier 1 projects DCC4, DCC5, DCC7, DCC9, DCC10 and DCC11 are non-residential in nature. DCC3 (static caravan), DCC6, DCC12 and DCC13 proposals are residential developments and in turn have the potential to introduce noise sensitive receptors which may require consideration in the construction phase assessment once constructed. A preliminary construction noise assessment for the MHPGC Project has been undertaken. Taking into account the distances between the Tier 1 cumulative projects and the nearest NSRs, it is considered that if the construction phase activities of the MHPGC Project and Tier 1 projects were to overlap the cumulative impacts are likely to be no greater than that presented in the preliminary assessment for the MHPGC. When works within the landfall and onshore export and AC connection cable corridor of the MHPGC Project overlap with the Tier 1 projects DCC3, DCC6 and DCC13, the daytime threshold criteria may be exceeded at the future residents of these projects, i.e. an impact magnitude of medium to high. <u>Tier 2 and Tier 3</u> No relevant cumulative projects have been identified.
Sensitivity of receptor	Residential receptors within the ZOI are classed as high sensitivity.
Significance of effect	At most residential receptors within the ZOI, the magnitude of the cumulative impact is deemed to be negligible to low, and the sensitivity of the receptor is High. The cumulative effect will therefore be of minor adverse significance (not significant). Where the BS 5228 threshold criteria may be exceeded the impact magnitude would be medium to high. The sensitivity of the residential receptors is classified as High. Therefore, the cumulative effect is temporary, short-term effect of Moderate to Major Adverse significance, which is Significant in EIA terms.
Further mitigation and residual significance	The ongoing design process will consider the results of the preliminary noise assessment for the MHPGC Project when refining the potential location and programmed sequence of works within the landfall, onshore export and AC connection cable corridor and LSS. Potential significant cumulative effects will be evaluated in more detail in the ES.

Road traffic noise during construction

- 6.10.2.3 There is potential for cumulative construction traffic, associated with the MHPGC Project and any cumulative projects, that could be potentially constructed within the 4.5 year of the MHPGC Project construction period. If the construction period for the MHPGC Project and cumulative projects overlaps, then there is the potential for additional vehicles on the local highway network to change road traffic noise levels at noise sensitive receptors located along or within close proximity to these roads.
- 6.10.2.4 An indicative assessment of construction road traffic noise has been undertaken using road traffic data as set out within Volume 3, Chapter 5: Traffic and Transport, of the PEIR. The specific projects and plans screened into the CEA for Traffic and Transport are outline in Table 5.35 of Volume 3, Chapter 5: Traffic and Transport, of the PEIR.
- 6.10.2.5 The results of the preliminary assessment shows the worst-case impact magnitude is defined as Negligible. The sensitivity of the receptors are classified as High. Therefore, there is indirect, temporary, residual effect of Minor significance, which is Not Significant in EIA terms.

6.10.3 O&M Phase

Noise impacts due to the operation and maintenance of the LSS

- 6.10.3.1 There is potential for noise generated by the operation of the LSS of the MHPGC Project and any cumulative projects of an industrial nature to result in cumulative effects at noise sensitive receptors. In addition, the cumulative projects have the potential to introduce noise sensitive receptors which will require consideration as part of the operation phase assessment.
- 6.10.3.2 At the ES stage the operational plant layout, equipment specification, façade treatments and building designs will be refined and an assessment of significance and residual effects of the MHPGC Project will be carried out. In turn, an assessment of operational noise levels of the MHPGC and cumulative projects will also be carried out at the ES Stage. The Proposed Developments requiring further detailed assessment include:
- DCC7 - Phase 2 Jade Business Park;
 - DCC9 - Temporary installation of a battery energy storage system;
 - DCC10 - Battery Energy Storage System;
 - DCC11 – Eastern Green Link 1, Converter Station;
 - DCC146 - BESS, Hawthorn Grid Site Murton
 - DCC14 - Land North West Of Hallfield Farm Solar Farm (should sufficient information be available to assess this potential development as it is currently at pre-application stage).
- 6.10.3.3 There are no cumulative traffic impacts anticipated during O&M phase. The assessment of road traffic noise from the O&M phase of the MHPGC Project has been scoped out.

6.10.4 Decommissioning phase

Noise due to decommissioning activities associated with the LSS

- 6.10.4.1 The MHPGC Project cables will be left in place, to minimise/ avoid environmental disturbance. Noise sensitive receptors within the Zol of the Blue LSS Option Area or the Green LSS Option Area and likely to experience noise related impacts as result of decommissioning of the LSS as they are the construction of the LSS, i.e.an impact magnitude of negligible to low. The sensitivity of the receptors are classified as High. Therefore, there is direct, temporary, residual effect of Minor significance, which is Not Significant in EIA terms.
- 6.10.4.2 There are no cumulative traffic impacts anticipated during decommissioning phase. In-combination impacts during decommissioning are unlikely given the nature of the projects and the expected decommissioning period.

6.10.5 Proposed monitoring

- 6.10.5.1 An Outline Construction Noise and Vibration Management Plan for the MHPGC will be prepared as part of the outline CoCP (CoT26) and submitted as part of the application for the development consent. An Operational Noise Management Plan for the LSS of the MHPGC Project will also be prepared and submitted for approval prior to the commencement of operations (CoT5).

6.11 Transboundary effects

- 6.11.1.1 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to onshore noise and vibration from the construction, O&M and decommissioning phases of the MHPGC Project upon interests of other states has been assessed as part of the PEIR.
- 6.11.1.2 The potential transboundary impacts are screened within **Volume 1, Annex 4.2: Transboundary Screening, of the PEIR**. There are no identified pathways through which either direct or indirect impacts could result in significant transboundary effects on the onshore noise and vibration of a European Economic Area (EEA).

6.12 Inter-related effects

- 6.12.1.1 Inter-related effects are the combined impact of multiple aspects of the MHPGC Project on a single receptor. These are as follows:
- **Project lifetime effects:** Assessment of the scope for effects that occur throughout more than one phase of the MHPGC Project (construction, O&M and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases;
 - **Receptor led effects:** Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.
- 6.12.1.2 For Noise and Vibration, the following potential impacts have been considered within the inter-related assessment:
- potential project lifetime effects for noise impacts from construction, operation and decommissioning, noise impacts from additional vehicle movements during construction and decommissioning, vibration impacts during construction and decommissioning;
 - potential for receptor-led effects where increased traffic movements, air-quality effects, visual change and associated human-health effects overlap spatially and temporally with the noise and vibration sensitive receptors.
- 6.12.1.3 Inter-related effects are assessed **within Volume 4, Chapter 5: Inter-related Effects, of the PEIR** with no likely significant inter-related effects anticipated.

6.13 Summary

6.13.1 Summary of effects

- 6.13.1.1 This chapter has assessed the potential impacts on onshore noise and vibration from the construction, O&M and decommissioning phases of the MHPGC Project.
- 6.13.1.2 **Table 6.26** presents a summary of impacts and confirms the residual effects.

6.13.2 Summary of secondary mitigation and monitoring

- 6.13.2.1 The MHPGC Project includes secondary mitigation to avoid, reduce and control noise and vibration effects.
- 6.13.2.2 These secondary mitigation measures help to avoid and reduce potential noise and vibration effects during construction through defined controls, specifications, and monitoring. The approach

will be reviewed and, where necessary, refined in the ES as the design progresses and outstanding inputs are confirmed (e.g. final plant selections and link-specific traffic data).

6.13.2.3 **Table 6.26** presents a summary of the secondary mitigation and monitoring proposed.

Table 6.26: Summary of potential impacts and residual effects

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Mitigation and monitoring	Residual effect
Construction phase					
Construction noise: Landfall	High (R04 Hillcroft Residential)	Medium to High at R04.	Moderate to Major adverse (significant) at R04.	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation measures and monitoring where necessary.	Potential significant residual effects where BS 5228 thresholds are exceeded (moderate–major adverse).
Construction noise: onshore export and AC connection cable corridor	High (residential)	Works during core hours: Medium to High at R04, R09 to R12, R15, R21, R22, R24, R25 and R33 to and R35. Outside core working hours: Medium to High at R01 to R04, R09 to R13, R15 to R18, R21 to R26, R29 and R32 to R35.	Moderate to Major adverse (significant) at R01 to R04, R09 to R13, R15 to R18, R21 to R26, R29 and R32 to R35.	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation measures and monitoring where necessary.	Potential significant residual effects where BS 5228 duration thresholds are exceeded (moderate–major adverse).
Construction noise: Blue LSS Option Area	High (residential)	Negligible to Low at R01 and R02.	Minor Adverse (not significant) at R01 and R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Construction vibration: Landfall	High (R04 Hillcroft Residential)	Medium at R04	Moderate adverse (significant) at R04	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation	Potential significant residual effects where works are in close proximity of the residential receptors.

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Mitigation and monitoring	Residual effect
				measures and monitoring for residential receptors.	
Construction vibration: onshore export cable corridor	High (residential)	Low at R02, R22 and R25. Medium at R09 to R11, R15, R19 to R21, R24, R25, R33 and R34.	Minor adverse (not significant) at R02, R22 and R25. Moderate adverse (significant) at R09 to R11, R15, R19 to R21, R24, R25, R33 and R34.	An Outline Construction Noise and Vibration Management Plan (CoT26) and Outline CoCP (CoT18) will be prepared and submitted as part of the DCO application. This will include details on secondary mitigation measures and monitoring for residential receptors and listed buildings (R09) where necessary.	Potential significant residual effects where works are in close proximity of the residential receptors.
Construction vibration: Blue LSS Option Area	High (residential)	Negligible to Low at R02.	Minor Adverse (not significant) at R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Construction road traffic noise (both Blue and Green LSS Option Areas during peak construction year of 2033)	High (residential)	Negligible	Minor (not significant)	No additional secondary measures proposed at PEIR stage	Minor adverse (not significant)
Operational phase					
Operational plant noise: LSS	High (residential)	Assessment not included at PEIR Stage	Assessment not included at PEIR Stage	Plant/equipment specification to meet limits. Layout optimisation. Localised enclosures/barriers for dominant items. Building/façade acoustic treatments where proportionate. Commissioning and compliance monitoring	ES to confirm following design/specification refinement and confirmation of rating levels vs background
Decommissioning phase					

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Mitigation and monitoring	Residual effect
Decommissioning noise: Blue LSS Option Area	High (residential)	Negligible to Low at R01 and R02.	Minor Adverse (not significant) at R01 and R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Decommissioning vibration: Blue LSS Option Area	High (residential)	Negligible to Low at R02.	Minor Adverse (not significant) at R02.	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)
Decommissioning road traffic noise	High (residential)	Negligible	Minor (not significant)	No additional secondary mitigation proposed at PEIR stage.	Minor adverse (not significant)

6.14 Further work to be undertaken for the ES

6.14.1 Introduction

6.14.1.1 Further work that will be undertaken to support the noise and vibration assessment and presented within the ES is set out below.

6.14.2 Consultation and engagement

6.14.2.1 Further consultation and engagement will be undertaken to inform the noise and vibration assessment and presented within the ES. This will include further consultation with DCC Environment Protection Team on the quantitative assessment of the LSS Option Areas and final selection.

6.14.3 Baseline

6.14.3.1 Should the Blue LSS Option Area be selected as the final LSS location, a noise survey at a location representing the nearest residential receptors to the west of the A19, i.e. R01 to R03, will be undertaken. This will be a minimum of 7 days of noise monitoring encompassing a typical weekday and weekend period.

6.14.3.2 A noise survey at locations representative of the ecological receptors will also be undertaken. It is likely that unattended continuous monitoring would be undertaken for a minimum of 7-days.

6.14.4 Assessment

6.14.4.1 New information may be made available to any of the assessments necessitating amendments. The following assessments will be either updated with new information anticipated for the ES or undertaken where they have not for this PEIR:

- updated onshore construction assessment on a receptor-by-receptors basis in accordance with BS 5228-1;
- updated vibration assessment associated with the construction of the onshore substation in accordance with BS 5228-2;
- updated construction road traffic road noise assessment;
- onshore operational noise assessment of the final LSS in accordance with BS 4142;
- updated CEA, including a quantitative operational noise assessment.

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