The Great Grid Upgrade

North Humber to High Marnham

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North Humber to High Marnham

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Document 7.7 Outline Noise and Vibration Management Plan

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nationalgrid

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Executive Summary

National Grid Electricity Transmission plc (National Grid) is developing the North Humber to High Marnham Project (the Project), a proposed new 400 kV electricity transmission connection between East Riding of Yorkshire and Nottinghamshire. The Project would reinforce the national electricity transmission network, enabling the connection of new low carbon energy generation and supporting the delivery of the UK Government's clean power and net zero ambitions. The Project is a Nationally Significant Infrastructure Project (NSIP) for which development consent is being sought through a Development Consent Order (DCO) under the Planning Act 2008 (HM Government, 2008). It is recognised as a critical reinforcement to provide the network capacity required to meet future electricity demand and support the transition to a low-carbon energy system.

This Outline Noise and Vibration Management Plan (Outline NVMP) provides the overarching general principles, controls and arrangements that will be applied to the North Humber to High Marnham Project (the Project) with regard to the management of noise and vibration during construction.

This Outline NVMP seeks to protect noise and vibration sensitive receptors (NSRs) from the effects of construction noise and vibration.

This Outline NVMP considers the impact of noise and vibration, and the control and management measures that will be employed to mitigate the risks by reducing and minimising adverse effects.

This Outline NVMP will be updated to a detailed Final Noise and Vibration Management Plan (NVMP) by the Main Works Contractor(s). This updated NVMP will include specific noise and vibration control and management measures which will be determined by the Main Works Contractor(s) following their detailed assessments. The Final NVMP may be updated throughout the construction phase as new information becomes available.

A number of additional documents have been prepared alongside this Outline NVMP:

- **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration**: This details the assessment of noise and vibration effects due to the Project on NSRs.
- **Application Document 7.2 Outline Code of Construction Practice**: Contains standard approaches, roles and responsibilities and actions to be implemented on construction sites, intended to manage the Project during the construction phase.
- **Application Document 7.3 Register of Environmental Actions and Commitments**: Provides a record of all commitments made by National Grid during the iterative development of the Project design. It includes embedded measures, which are typically intrinsic to the design submitted as part of the application for development consent, and control and management measures. It also includes the additional mitigation measures that have been identified through the technical assessments reported in Environmental Statement Chapters 6 to 20 (**Application Document 6.6 to 6.20**).

1. Introduction

1.1 Overview

1.1.1 National Grid Electricity Transmission plc (National Grid) owns and operates the high voltage electricity transmission network across England and Wales. National Grid holds the Transmission Licence for England and Wales and has a statutory duty to develop and maintain an efficient, coordinated and economical system of electricity transmission, as set out in the Electricity Act 1989 (HM Government, 1989).

1.1.2 National Grid is promoting the North Humber to High Marnham Project (the Project), a Nationally Significant Infrastructure Project for which development consent is being sought via a Development Consent Order (DCO) under the Planning Act 2008 (HM Government, 2008).

1.1.3 This Outline Noise and Vibration Management Plan (Outline NVMP) has been prepared as part of the DCO application and accompanies the Environmental Statement (ES). It sets out the proposed approach to managing construction noise and vibration effects on noise and vibration sensitive receptors (NSRs) and provides the framework for the preparation of a detailed Final Noise and Vibration Management Plan (NVMP) by the appointed Main Works Contractor(s).

1.1.4 It forms part of a suite of outline construction management plans referenced in the applicable Requirement within **Application Document 3.1 Draft Development Consent Order (DCO)**.

1.2 Purpose of the Outline NVMP

1.2.1 The purpose of this Outline NVMP is to provide the overarching general principles, controls, and arrangements that will be applied to the Project to manage noise and vibration during construction.

1.2.2 This Outline NVMP seeks to protect NSRs including residential NSRs (both domestic and recreational such as hotels, guest houses, holiday parks, campsites, and other tourism related uses), schools, healthcare facilities, offices, heritage, and ecological NSRs from the effects of construction noise and vibration. Additionally, it seeks to protect buildings and structures, (including riverbanks, and canals) from potential structural damage to due vibration.

1.2.3 This Outline NVMP considers the impact of noise and vibration, and the control measures that will be employed to mitigate the risks by reducing and minimising adverse effects. These will be supported through monitoring procedures to identify both elevated noise and vibration levels and to review complaints, should they arise. The complaints management procedure, including management responsibilities, is also addressed.

1.2.4 This Outline NVMP aims to assist in complying with the following legislation:

- Environmental Protection Act 1990 (HM Government, 1990); and
- Control of Pollution Act 1974 (CoPA) (HM Government, 1974).

1.2.5 This Outline NVMP aims to assist compliance with the above legislation through the following appropriate guidance:

- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise (BS 5228-1) (BSI, 2014a);
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration (BS 5228-2) (BSI, 2014b); and
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration (BS 7385-2) (BSI, 1993).

1.2.6 BS 5228-1 and BS 5228-2 gained Approved Code of Practice status (in England) in 2015 under the powers conferred by Sections 71(1)(b), 71(2) and 71(3) of the CoPA, as enacted under The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015 (HM Government, 2015).

1.2.7 The Main Works Contractor(s) will be responsible for the further development of this Outline NVMP into a detailed Final NVMP, its implementation, and delivery of the measures outlined herein as applicable to each work area. This will be secured via commitment NV01 detailed in **Application Document 7.3 Register of Environmental Actions and Commitments**. The detailed Final NVMP will be reviewed as necessary by the Main Works Contractor(s), during the construction programme. Any such review should consider any new consented change of land use around the Project and any future consented developments (not already considered) that could be affected by construction noise and vibration emissions to the environment.

1.2.8 The construction noise and vibration assessments prepared by the Main Works Contractor(s), together with details of proposed mitigation measures, will be reviewed and approved by National Grid prior to the commencement of associated construction works.

1.2.9 If rapid action is required to solve a noise or vibration problem and that action may contradict something written in the detailed Final NVMP, typically it is preferable to undertake the mitigating action at the earliest opportunity. The detailed Final NVMP can then be revised in reasonable time after the event, and the local authority informed, if required.

1.2.10 The application for development consent includes environmental commitments under the following categories:

- Embedded mitigation measures: Those that are intrinsic to and built into the design of the Project; these are listed in **Application Document 7.3 Register of Environmental Actions and Commitments**. Embedded measures of relevance to construction noise and vibration are the route alignment and siting, which have been designed as far as practicable to avoid NSRs. This included wherever practicable avoiding settlements and residential areas, passing predominantly through rural areas, with the majority of nearby NSRs being isolated dwellings and small settlements.
- Control and management measures: These comprise management activities and techniques that will be implemented during construction and reinstatement to limit effects, through adherence to good site practices and ensuring legal compliance. Measures relevant to the control and management of noise and vibration impacts during construction have been included within **Application Document 7.2**

Outline Code of Construction Practice and **Application Document 7.3 Register of Environmental Actions and Commitments**.

- Additional mitigation measures: any additional site specific measures needed to avoid, reduce, or offset potential impacts that could otherwise result in negative effects considered significant in the context of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (HM Government, 2017). Mitigation measures have been identified by environmental topic specialists, considering the embedded design and control and management measures. These can be found in **Application Document 7.3 Register of Environmental Actions and Commitments**.

1.3 Structure of the Outline NVMP

1.3.1 The Outline NVMP structure is as follows:

- Section 1: Introduction
- Section 2: Project Details
- Section 3: Project Team Roles and Responsibilities
- Section 4: Construction Noise and Vibration Management
- Section 5: Implementation

2. Project Details

2.1 Outline Project Description

2.1.1 The Project is a new 400 kilovolt (kV) electricity transmission connection of approximately 90 kilometres (km) in overall length between two proposed new substations: the 400 kV Birkhill Wood Substation and 400 kV High Marnham Substation.

2.1.2 The proposed new substations are subject to separate planning applications. For more information, see **Application Document 5.4 Consents and Licences Required Under Other Legislation**.

2.1.3 The Project comprises:

- Approximately 90 km of new overhead line (Route Code 4AF) between the proposed new 400 kV Birkhill Wood Substation and 400 kV High Marnham Substation;
- Replacement and re-alignment of a section of the existing 400 kV overhead line (Route Code 4ZQ) between Brantingham and east of Broomfleet;
- Replacement and re-alignment of a section of the existing 400 kV overhead line (Route Code ZDA) between Ealand and west of Keadby;
- Line entry connections to a proposed new 400 kV Birkhill Wood Substation;
- Line entry connections to a proposed new 400 kV High Marnham Substation; and
- The Project would include other required works, for example, temporary diversions for works on existing overhead line routes, temporary access roads, highway works, temporary works compounds, work sites and ancillary works. The Project would also include utility diversions and drainage works. There would also be land required for environmental mitigation, offsetting, compensation and Biodiversity Net Gain (BNG).

2.1.4 A full description of the Project is provided in **Application Document 6.4 Environmental Statement Chapter 4 Description of the Project**.

2.1.5 Subject to gaining development consent, construction works would be expected to start in 2028 and be available for commercial load (operational) by the end of 2031, with reinstatement works continuing into 2033.

2.1.6 All pre commencement operations must be carried out in accordance with this document unless otherwise agreed with the relevant planning authority and implement all applicable environmental commitments and monitoring requirements identified in **Application Document 7.3 Register of Environmental Actions and Commitments**.

2.2 Identification of NSRs

2.2.1 NSRs identified as part of the ES are shown on **Application Document 6.16.F1 Environmental Statement Figure 16.1 Noise and Vibration Baseline**.

2.2.2 All NSRs where the ES assessment indicated potential significant adverse effects from construction noise and vibration, without mitigation, are detailed in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration**.

2.2.3 Further assessment of construction noise and vibration impacts, including identification of any additional NSRs (for example new dwellings constructed post-submission of the DCO application and prior to Project construction), and specification of mitigation in the form of best practicable means (BPM) is to be completed by the Main Works Contractor(s).

2.3 Construction Workforce

Estimated Workforce

2.3.1 Over the six-year construction phase there would be a maximum peak year where approximately 626 Full Time Equivalent (FTE) employees would be working on the Project.

Estimated Construction Vehicles

2.3.2 National Grid has estimated the average daily trip generation for a peak year of 2029 for construction vehicles that are anticipated to be required to construct the Project. These estimates are provided in **Application Document 6.14 Environmental Statement Chapter 14 Traffic and Transport**.

2.4 Enabling Works, Access, and Site Preparation

2.4.1 In order for elements of the Project to be constructed, enabling works such as the establishment of temporary construction compounds, temporary bellmouths, and access tracks and drainage works are required. Details are provided in **Application Document 6.4 Environmental Statement Chapter 4 Description of the Project** and shown on **Application Document 6.4.F3 Environmental Statement Figure 4.3 Temporary Construction Works**.

3. Project Team Roles and Responsibilities

3.1 Project Responsibilities

3.1.1 Project team roles and responsibilities are outlined within **Application Document 7.2 Outline Code of Construction Practice**.

3.2 Information Training and Awareness

3.2.1 In accordance with control and management measures GG04 and NV17 of **Application Document 7.3 Register of Environmental Actions and Commitments**, all staff and operatives working on the Project will undergo a site-specific induction, which will include topics relevant to the NVMP.

3.2.2 Regular environmental toolbox talks will be provided by the Main Works Contractor(s). These will give targeted information about site-specific issues or activities taking place at that time.

4. Construction Noise and Vibration Management

4.1 Construction Noise and Vibration Assessment

ES Construction Noise and Vibration Assessment

4.1.1 The assessment of construction noise and vibration impacts is presented in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration**. The assessment was undertaken based on the methodologies described in BS 5228-1 (BSI, 2014a) and BS 5228-2 (BSI, 2014b) for noise and vibration, respectively. However, they present reasonable worse-case scenarios, based on available construction information. Additionally, the assessment excluded mitigation measures such as localised screening. The assessment therefore provides a reasonable worst-case output of likely impacts and highlighted potential construction noise and/or vibration 'hot-spots' requiring further consideration of mitigation and BPM during the planning and construction phases. Outline mitigation measures were identified at the hot-spots showing that significant adverse effects can be avoided. The identified hot-spots and outline mitigation measures are provided in section 4.3 of this Outline NVMP. The contractor will undertake detailed construction noise and vibration assessments, as outlined in the following sub-section.

Further Construction Noise and Vibration Assessment

4.1.2 As per commitment NV01 (as detailed in paragraph 4.3.2 below) of **Application Document 7.3 Register of Environmental Actions and Commitments**, the Main Works Contractor(s) will conduct detailed construction noise and vibration assessments based on their specific construction methodologies. The Main Works Contractor(s) will then identify the required site-specific mitigation measures and update the Outline NVMP into an NVMP accordingly to ensure the measures are implemented. The NVMP will be updated as required if further assessments are conducted and additional mitigation measures are identified during the works.

4.1.3 Noise and vibration impacts will be assessed by the Main Works Contractor(s) in accordance with applicable guidance, such as BS 5228-1 (BSI, 2014a) and BS 5228-2 (BSI, 2014b), as per the assessments undertaken in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration**.

4.1.4 Construction noise levels will be calculated at NSRs for the various construction activities in accordance with the methodology described in Annex F of BS 5228-1 and compared against the assessment thresholds. The thresholds are set relative to the lower noise thresholds (Category A) as detailed in Section E.3.2 of BS 5228-1 (the 'ABC' method). The Category A construction noise thresholds represent the lowest assessment criteria (typically used to assess impacts in rural areas) and are proposed to be used throughout the assessment as a worst-case unless a higher threshold can be justified.

4.1.5 The Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) for construction noise are established in accordance with Table 4.1.

Table 4.1 – Construction noise LOAEL and SOAEL

Time period	LOAEL	SOAEL
Weekdays 07:00 to 19:00, and Saturdays 07:00 to 13:00	50 dB[1] $L_{Aeq,T}$[2]	65 dB $L_{Aeq,T}$
Weekdays 19:00 to 23:00, Saturdays 13:00 to 23:00, and Sundays 07:00 to 23:00	50 dB $L_{Aeq,T}$	55 dB $L_{Aeq,T}$
Night-time 23:00 to 07:00	40 dB $L_{Aeq,T}$	45 dB $L_{Aeq,T}$

4.1.6 Construction vibration levels will be calculated at NSRs for the various construction activities in accordance with the methodology described in Annex E of BS 5228-2 (BSI, 2014b) and compared against the assessment thresholds.

4.1.7 Construction vibration effect threshold levels, including applicable LOAEL and SOAEL, are presented in Table 4.2 for vibration effects on people within buildings.

Table 4.2 – Construction vibration effect levels on people within buildings

Vibration level mm/s PPV[3]	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments (LOAEL).
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents (SOAEL).
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

4.1.8 With regards to construction noise and vibration, significant effects are deemed to occur where the SOAEL is exceeded for a period of at least 10 days in any 15 consecutive days or 40 days in any consecutive six-month period, based on guidance from BS 5228-1 (BSI, 2014a) and Design Manual for Roads and Bridges LA 111 (Highways England, 2020).

4.1.9 In the case of potential structural damage, an impact magnitude scale is not deemed appropriate. Rather, the assessment presented in the **Application Document 6.16**

[1] Decibel

[2] A-weighted equivalent continuous noise level over the time period 'T'. An average noise level.

[3] Millimetres per second peak particle velocity

Environmental Statement Chapter 16 Noise and Vibration considers whether there is a likelihood of potential damage or not. As such, a fixed threshold has been used.

4.1.10 BS 5228-2 (BSI, 2014b) notes that the probability of damage tends towards zero at 12.5 mm/s PPV. Buildings and structures where the predicted vibration level is above or approaching this value, without mitigation, will be highlighted such that measures can be put in place by the Main Works Contractor(s) to reduce and manage vibration levels. The specific threshold may be reviewed for specific structures as deemed appropriate. Temporal criteria are not appropriate and not applicable for vibration levels potentially causing building damage.

4.2 General Measures

4.2.1 General noise and vibration control measures are listed in BS 5228-1 (BSI, 2014a) and BS 5228-2 (BSI, 2014b), which are the primary guidance documents for the assessment and control of noise and vibration from construction works.

Best Practicable Means (BPM)

4.2.2 Best practicable means (BPM) is defined in Section 72 of the CoPA (HM Government, 1974) and Section 79 of the Environmental Protection Act 1990 (HM Government, 1990) as those measures which are:

'…*reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications.*'

4.2.3 National Grid will require its Main Works Contractor(s) to consider construction noise and vibration mitigation in the following order:

- Design of the works in terms of techniques and plant: Methods/approaches with lower noise and vibration consequences should be selected over those with higher consequences unless there are significant penalties in terms of cost, health, safety, or environmental impact, or delays to the programme which also have cost implications (though it should also be understood that the elongation of the duration of exposure of NSRs to noise by amending methods to reduce noise levels may also be undesirable, depending on the context).
- BPM as identified above, including but not limited to:
  - Noise and vibration control at source, for example the selection of quiet and low vibration equipment;
  - Use of equipment with proprietary acoustic treatments (such as enclosure of generator equipment);
  - Review of construction methodology to consider quieter or less vibratory methods;
  - Location of equipment on-site;
  - Temporal restrictions;
  - The provision of acoustic screening at locations (and for specific activities); and
  - The use of less intrusive audible warnings such as broadband vehicle reversing alarms to be used in sensitive areas.

4.3 Mitigation Measures

Control and Management Measures

4.3.1 Control and management measures comprise management activities and techniques that will be implemented during construction and reinstatement to limit effects, through adherence to good site practices and ensuring legal compliance.

4.3.2 Measures relevant to the control and management of impacts during construction have been included within **Application Document 7.3 Register of Environmental Actions and Commitments**. The following commitments have been made by the Project which are applicable to construction noise and vibration:

- GG01, GG02, GG03, GG04, GG09, GG10, GG12, GG13, GG27, GG28; and
- NV01 to NV22.

Outline Mitigation Measures Identified in the ES

Construction noise

4.3.3 The assessment presented in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration** identified potential significant adverse effects, without mitigation, at seven NSRs during daytime and weekend/bank holiday works.

4.3.4 The potential significant adverse effects from construction noise identified in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration**, without mitigation, are due to the construction activities shown in Table 4.3.

Table 4.3 – Potential Significant Adverse Effects from Construction Noise Identified at ES Stage

Works Activity	Site Location(s)	Affected Receptor IDs
Access works	Bridge and access (cumulative) construction works at the Market Weighton Canal	R_1952
Pylon construction	Pylon 4AF70	R_2041
	Pylon 4AF148	R_4734
		R_4732
		R_4733
Third-party works	National Grid Electricity Distribution works near Fledborough	R_6847
		R_6846

4.3.5 There are also potential significant adverse effects from the construction of haul roads and highways works at a further 43 NSRs, without mitigation. However, the duration of such works at any one location is not expected to exceed the temporal

criteria for significant adverse effects. BPM would still be applied at these locations to reduce adverse effects.

4.3.6 The NSRs where there is the potential for significant effects from construction noise are also shown on **Application Document 6.16.F2 Environmental Statement Figure 16.2 Construction Noise Assessment Outputs**.

4.3.7 National Grid has committed to undertake additional mitigation to reduce the significant effects to a non-significant level. Additional temporary noise mitigation measures will be put in place to reduce noise levels from construction plant and machinery at the identified locations, unless a detailed assessment is undertaken at a later stage that demonstrates that no significant noise impacts would occur to nearby NSRs.

4.3.8 Examples of construction noise mitigation measures, based on guidance from BS 5228-1 (BSI, 2014a), are provided in Table 4.4 with the attenuation values that these typically achieve.

Table 4.4 – Examples of construction noise mitigation measures

Example mitigation	Likely attenuation
Screening	5 dB where activities are partially obscured and 10 dB where activities are totally obscured
Specified use of quieter plant	5 to 10 dB
Suitable material handling methods. Do not drop materials from excessive heights	Up to 15 dB
Alternative construction methods	Up to 20 dB
Use of an acoustic shed with adequate ventilation around trenchless crossing machinery	Up to 15 dB
Use of temporal restrictions	Avoiding temporal significance criteria being exceeded

4.3.9 The Main Works Contractor(s) will conduct detailed construction noise assessments, as per commitment NV01 of **Application Document 7.3 Register of Environmental Actions and Commitments**, to determine whether there are likely to be any new or different significant adverse effects at NSRs and therefore whether additional measures, including site-specific BPM, may be required.

Construction noise effects on public right of way (PRoW) users, canal users and horses

4.3.10 There are potential effects from construction noise on users of PRoWs, canal users and horses.

4.3.11 With regards to users of PRoWs and canals, effects would be temporary and short lived as users traverse close to construction works and reduce as they leave the area close to works. Whilst effects of this type would not be significant, BPM (such as localised screening) will still be incorporated into the works, where feasible and

appropriate, to reduce effects. This is secured via various commitments in **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above).

4.3.12 This is particularly pertinent for areas where there are horses, or where horses may be expected to be traversing, such as bridle paths. Where construction works are located close to areas where horses are located, or where they may be expected to regularly traverse, the Main Works Contractor(s) will follow British Horse Society guidance Advice on Construction Sites and Horses (The British Horse Society, 2024), as per commitment NV21 of **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above).

4.3.13 With the implementation of appropriate mitigation measures, construction noise effects on PRoW users, canal users and horses would not be expected to be significant.

Construction vibration

Construction vibration effects on people within buildings

4.3.14 The assessment presented in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration** identified potential significant adverse effects, without mitigation, at seven NSRs due to construction vibration.

4.3.15 The potential significant adverse effects from construction vibration identified in **Application Document 6.16 Environmental Statement Chapter 16 Noise and Vibration**, without mitigation, are due to the construction activities shown in Table 4.5.

Table 4.5 – Potential Significant Adverse Effects from Construction Vibration Identified at Environmental Assessment Stage

Works Activity	Site Location(s)	Affected Receptor IDs
Pylon construction (assuming percussive piling)	Pylon 4AF70	R_2041
	Pylon 4AF148	R_4734
		R_4732
		R_4733
Haul road/highways construction (assuming vibratory compaction)	Access off Outgate, Ealand to pylon ZDA116	R_3247
	Access to railway crossing protection and third-party works near Fledborough	R_6847
		R_6846

4.3.16 In the case of vibratory compaction, the duration of the works (typically less than a day) would not be expected to be sufficient to cause significant adverse effects. However, piling for pylon foundations may be of sufficient duration to lead to significant adverse effects if the vibration level threshold is exceeded.

4.3.17 The NSRs where there are significant effects from construction vibration are also shown on **Application Document 6.16.F3 Environmental Statement Figure 16.3 Construction Vibration Assessment Outputs**.

4.3.18 National Grid has committed to undertake additional mitigation to reduce any likely significant effects to a non-significant level. Additional temporary vibration mitigation measures will be put in place to reduce vibration levels from construction plant and machinery at the identified locations, unless a detailed assessment is undertaken at a later stage that demonstrates that no significant vibration impacts would occur to nearby NSRs.

4.3.19 Examples of construction vibration mitigation measures, based on guidance from BS 5228-2 (BSI, 2014b), are provided in Table 4.6 with the attenuation values that these typically achieve.

Table 4.6 – Example construction vibration mitigation measures

Example mitigation	Likely attenuation
Alternative construction methods (e.g. non-percussive/vibratory methods)	Would not generate notable levels of vibration, therefore removing impact.
Reducing energy per blow/cycle	Depends on the energy reduction but could be set relative to the impact thresholds. Reducing energy per blow/cycle, may increase the duration of activities and this should be balanced against level to reduce potential effects.
Pre-boring for piled foundations	Dependent on ground conditions, but can reduce the resistance to penetration and reduce vibration levels.
Use of temporal restrictions	Avoiding temporal significance criteria being exceeded

4.3.20 The Main Works Contractor(s) will conduct detailed construction vibration assessments, as per commitment NV01 of **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above), to determine whether there are likely to be any new or different significant adverse effects at NSRs and therefore whether additional measures, including site-specific BPM, may be required.

Construction vibration effects on buildings and structures

4.3.21 No buildings or structures (including riverbanks and canals) have been identified where there is the potential for damage from vibratory construction activities. This will be reviewed by the Main Works Contractor(s) as part of their detailed assessments, as per commitment NV01 of **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above) and specific mitigation measures will be identified to reduce any potential effects.

4.3.22 Where vibration levels, without mitigation, are predicted to be at a level that may cause damage to buildings or structures, the example mitigation measures outlined in Table 4.6 would be applicable to reduce vibration levels.

4.3.23 If construction vibration levels are predicted to approach or exceed the threshold for potential damage, even with mitigation (although this is considered unlikely), pre- and post-condition surveys would be undertaken of the building or structure, and any damage deemed to be caused by the works would be rectified, as per commitment NV04 of **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above).

Specific Mitigation Measures Identified by the Main Works Contractor(s)

4.3.24 Additional detailed assessments will be undertaken by the Main Works Contractor(s) based on their specific construction methodologies, as per commitment NV01 of **Application Document 7.3 Register of Environmental Actions and Commitments**.

4.3.25 The detailed Final NVMP will include any site-specific noise and vibration mitigation measures identified by the Main Works Contractor(s) following their detailed construction noise and vibration assessment.

Noise and Vibration Monitoring

4.3.26 It is not currently proposed that routine noise and/or vibration monitoring will be undertaken during construction. However, the need for monitoring, and any potential monitoring locations, will be identified by the Main Works Contractor(s), through liaison with the LPAs, or in any Section 61 applications for specific activities where required and will be the subject of discussion between the Main Works Contractor(s), National Grid, and the relevant LPA prior to agreement of any Section 61 application.

4.3.27 If complaints regarding noise and/or vibration are received, noise and/or vibration measurements may be undertaken, either at the complainant's property or at a suitable known reference distance, if appropriate.

4.3.28 Where applicable, monitoring will be carried out in accordance with the requirements set out in this section. Meetings will be sought with the relevant LPA, to review and agree on the general requirements for monitoring if these have not already been agreed through the DCO process.

4.3.29 Where noise or vibration monitoring is to be implemented, as a minimum it will be in accordance with the procedures described in this section.

Noise Monitoring

4.3.30 Noise monitoring, carried out either through pre-agreed schemes of monitoring or in response to complaints, will be conducted in accordance with the methodology described in Annex G of BS 5228-1 (BSI, 2014a).

4.3.31 The total ambient noise level, $L_{Aeq,T}$, from all construction plant associated with the Project when measured between 1.2 m and 1.5 m above the ground at the monitoring locations will not exceed the appropriate levels for durations exceeding any temporal thresholds that are agreed with the relevant LPA through the Section 61 process.

Vibration Monitoring

4.3.32 The Main Works Contractor(s) will normally limit vibration arising from site activities at any residential building to a level of 1.0 mm/s PPV as assessed at the ground floor at the nearest point of the structure to the works.

4.3.33 Where works may induce high levels of vibration, monitoring will be undertaken at the external foundations of the nearest representative NSR. The monitoring will be undertaken in accordance with Section 9 of BS 5228-2 (BSI, 2014b).

4.3.34 In relation to buildings and structures (including river banks, canals, and flood defences) where predicted vibration levels, taking account of mitigation, is predicted following the Main Works Contractor(s) detailed assessments (as secured by commitment NV01 of **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above)) to exceed or approach the threshold for potential for damage, monitoring is required to ensure that PPV levels of 12.5 mm/s PPV are not exceeded for any vibration-generating works, such as percussive or vibratory piling, or vibratory compaction. A lower trigger (typically 5 mm/s PPV) will be set such that warning is provided before exceeding 12.5 mm/s PPV.

4.3.35 Lower threshold values may be applicable to some structures if they are more sensitive to vibration. This would be determined by the Main Works Contractor(s) prior to starting works.

Exceedance Actions

4.3.36 During monitoring, in the event of a construction noise or vibration level exceedance, relative to any level and temporal criteria agreed with the relevant LPA, the responsible Main Works Contractor(s) will implement the following measures:

- Notify National Grid of the exceedance.
- As soon a reasonably feasible (considering aspects such as safety), undertake an investigation of construction activities on-site to ascertain if any work activities are being implemented contrary to specified noise or vibration control measures. If the exceedance is directly attributable to the Project, then the specific work activity suspected of causing the exceedances will be stopped as soon as it is safe to do so, and the Main Works Contractor(s) will determine why the appropriate measures of the NVMP were not being implemented.
- Remedial measures will be determined and implemented where appropriate to ensure no repeat of the Construction Noise or Vibration Threshold Level exceedance.
- Work activities identified to have caused the exceedance will not be allowed to continue/resume until the remedial measures have been implemented and agreed with Works Supervisor(s)and Environmental Manager(s).
- Record actions taken to identify and rectify the exceedance.
- If the cause of the Construction Noise or Vibration Threshold Level being breached is not related to site operations, record the outcome of the investigation once the investigation is completed.
- Report the above to the relevant LPA according to any agreed protocol.

Repeated Exceedances

4.3.37 In the event of a series of repeated exceedances of the construction noise or vibration threshold levels (for example, regular exceedance of any agreed noise limits and temporal criteria at the same location over several weeks or months), the following course of action will be taken by the Main Works Contractor(s):

- Identify exceedances.
- Determine whether the exceedances are directly attributable to the Project.
- Inspect all works currently being undertaken at the relevant construction site or area to determine if the noise and vibration control measures, as outlined within the NVMP and/or Section 61 consents, are being implemented appropriately.
- Confirm the root cause of the exceedance. If the exceedance is identified to have been caused by a third party, details and location of third-party activities will be recorded and communicated to the third party, if appropriate. If the exceedance is directly attributable to the Project, then the specific work activity suspected of causing the exceedance will be stopped as soon as is safe to do so and the Main Works Contractor(s) will determine if the appropriate measures of the NVMP and/or Section 61 consent were being implemented. Remedial measures to ensure no repeat of the Construction Noise or Vibration Threshold Level exceedance will be identified and implemented. Work activities determined to have caused the Construction Noise or Vibration Threshold Level exceedance will not be allowed to continue/resume until the remedial measures have been implemented.
- Within 48 hours of the exceedance, the Main Works Contractor(s) will investigate to determine which activities and/or decisions resulted in the exceedances occurring. A report detailing the findings of the investigation will be compiled by the Main Works Contractor(s) and provided to National Grid. This will be made available to the relevant LPA on request.

4.4 Applications for Prior Consent Under Section 61 of the Control of Pollution Act 1974

Introduction

4.4.1 With the implementation of noise and vibration control measures such as those identified in Table 4.4 and Table 4.6, no significant residual effects are predicted based on the outcome of the construction noise assessment conducted as part of the ES. However, as noted above, the Main Works Contractor(s) will be required to prepare a construction noise and vibration assessment based on their proposed construction methodologies.

4.4.2 Where the results of the Main Works Contractor(s) assessment indicate the potential for significant effects at NSRs, or for working outside of core hours, a Section 61 application for prior consent under the CoPA (HM Government, 1974) may be required. If this is the case, the Main Works Contractor(s) will liaise with the relevant local planning authority (LPA) to discuss the works and determine whether the works would benefit from a Section 61 consent. Where applicable, the Main Works Contractor(s) will then prepare and apply for Section 61 consent under the CoPA

(HM Government, 1974) for the applicable construction activities through consultation with the relevant LPA.

4.4.3 Lead-in times will be agreed with the relevant LPA in advance of the applications being submitted and a format for the applications will be agreed prior to the first applications being made. This is to ensure appropriate information is provided in a timely manner. The relevant LPA is required to inform National Grid of its decision within 28 days of the final application being received. If this does not occur, there is an appeals process.

4.4.4 The Main Works Contractor(s) will be required to demonstrate that BPM, as defined under Section 72 of CoPA (HM Government, 1974), are employed at all times for all activities, to minimise noise and vibration effects.

4.4.5 Agreement of proposed measures will be sought from the relevant LPA through Section 61 consent, dispensation, or variation applications.

Application Procedure

4.4.6 The Section 61 application will generally include the following information, subject to consultation with the relevant LPA:

- An outline of the proposed construction methods, and the types and numbers of plant to be used;
- Definition of the working hours required and, where these differ from the core working hours, a justification of the hours sought;
- A programme of works which identifies the location and duration of each significant noise and/or vibration-generating activity;
- The sound power levels, or sound pressure level at 10 m, for each item of plant, for each relevant activity;
- Appropriate justification that the method and plant proposed demonstrates that BPM has been employed to control noise and vibration impacts;
- Predicted noise and/or vibration levels at specified NSRs supported by calculations following the methodology in BS 5228-1 (BSI, 2014a) for noise and BS 5228-2 (BSI, 2014b) for vibration and the likely effects of these levels on affected NSRs, and the likely durations of these effects;
- All steps to be employed to minimise noise and vibration during the works;
- Proposals for noise and vibration monitoring including frequency, locations relative to each work site, reporting proposals, etc. (see section 1); and
- Proposals for the notification of occupants/stakeholders affected by works.

Unscheduled Overruns

4.4.7 In the event that planned works, covered by consent (either a full Section 61 application or dispensation/variation), extend beyond the approved working hours or generally agreed construction period, and/or continue due to unforeseen circumstances that would affect safety or engineering practicability, the relevant LPA will be kept informed of the nature, time, location, and reasons for the overrun as soon as possible, and records will be kept by site management.

4.4.8 The relevant LPA will be requested to provide a telephone number and nominate an officer to receive such notifications. Overruns, and the reasons for these, will be reviewed by National Grid, its Main Works Contractor(s), and the relevant LPA, with the aim of reducing the potential for further unplanned overruns if these are likely to result in significant noise or vibration effects.

4.4.9 In the case of work required in response to an emergency (or which, if not completed, would be damaging or unsafe), the relevant LPA will be advised as soon as is reasonably practicable of the reasons for, and likely duration of, such works.

Suitably Qualified Persons

4.4.10 The person(s) responsible for the noise and vibration calculations and/or monitoring related to Section 61 applications and variations will need be able to demonstrate the following to be deemed competent:

- Appropriate training and education relevant to the management of construction noise and vibration;
- Experience of the Section 61 process and the prediction, assessment and monitoring of construction noise and vibration; and
- Confirmation that they are, at minimum, an Associate Member of the Institute (AMIOA) of Acoustics.

4.4.11 Any team leader associated with the above must be able to demonstrate all the above and also be a full Member of the Institute of Acoustics (MIOA) as a minimum.

4.5 Community Engagement and Public Information

4.5.1 The Main Works Contractor(s) will implement a system for the provision of information to local residents and occupiers about the works. A community relations team will be appointed to provide dedicated community relations and external communication support during construction. The information to be provided to local residents will be specific to the works to be carried out, describing the nature of the works, the location and extent of the works, the duration of works, and the hours to be worked.

4.5.2 Local residents will be informed of the commencement and likely duration of the construction work activities through a letter drop. It is anticipated that the letter(s) will be tailored to a specific area and will reflect the works to be carried out and the duration of works. The letter will include a contact telephone number for public information. In addition, an emergency number will be displayed at the entrance to the compounds.

4.5.3 The name and contact details for the Project will be displayed at the entrance to the main site compound. This will include an emergency telephone number. In addition, details of the works, including contact details, will be provided to the relevant community groups, such as the local parish councils and landowners before work commences.

4.5.4 A free telephone Project helpline and Project website will be maintained and managed by the National Grid community relations team. The Project helpline and website information will be visible on boards placed in appropriate locations where they will be visible to the public, including the main site compound. The telephone

number and Project website details will be provided to the relevant LPA and other relevant parties.

4.5.5 The community relations team will record the details of any complaints and how these are to be investigated and appropriately managed. Further details about the complaints procedure can be found in **Application Document 7.2 Outline Code of Construction Practice**.

5. Implementation

5.1 Implementation of the NVMP

5.1.1 National Grid will put in place robust procedures to inform and supervise all those working on the Project, including its Main Works Contractor(s), to make sure the control measures set out in the detailed Final NVMP are adopted when undertaking the construction of works authorised by the DCO. The main responsibility for implementing these control measures will fall to the Main Works Contractor(s).

5.1.2 The Main Works Contractor(s) will brief all operatives on the specific details within the detailed Final NVMP prior to the commencement of works. The briefings will be delivered by a suitably trained member of the team such as the Works Supervisor(s) or Environmental Manager.

5.2 Site Checks and Reporting

5.2.1 Regular site checks will be carried out across the Project to monitor compliance with the detailed Final NVMP. The programme of site inspections will be controlled by the Environmental Manager who will draw on appropriate suitably experienced specialists for specific tasks.

5.2.2 Immediate actions, including, if necessary, 'stopping a job', will be taken should any incidents or non-conformance with the detailed Final NVMP be found during inspection.

5.2.3 Site checks and inspections will include checks against compliance with control and management measures and other commitments made by the Project.

5.3 Non-Compliance Procedure

5.3.1 The EnvCoW will generally be responsible for undertaking site audits to check compliance with the detailed Final NVMP. All incidents associated with the construction of the Project, including environmental incidents and non-conformance with the detailed Final NVMP, will be reported and by the site team (through the Works Supervisor(s)) and investigated by the Environmental Manager(s). Where the Main Works Contractor(s), suppliers or sub-contractors are not delivering the requirements, National Grid will review performance and will conduct further training and issue formal warnings as appropriate.

5.4 Community Liaison

5.4.1 In accordance with control and management measure GG28 detailed in **Application Document 7.3 Register of Environmental Actions and Commitments** (as detailed in paragraph 4.3.2 above), members of the community and local businesses will be kept informed regularly of the works through active community liaison. This will include notification of noisy works and/or activities anticipated to be conducted outside of core working hours. A contact number will be provided which members of

the public can use to raise any concerns or complaints about the Project. All construction-related complaints will be logged by the Main Works Contractor(s) in a complaints register, together with a record of the responses given and actions taken. Further details can be found in **Application Document 7.2 Outline Code of Construction Practice**.

5.5 Change Process

5.5.1 The NVMP is one of the plans listed within the applicable Requirement of Schedule 2 of **Application Document 3.1 Draft DCO**.

5.5.2 Where there is a need to update the detailed Final NVMP this would be managed through the process set out in Schedule 6 of the Planning Act 2008 (HM Government, 1989).

5.5.3 Therefore, the below process is limited to changes to the detailed Final NVMP.

NVMP Changes

5.5.4 It may be necessary to amend the details contained in the detailed Final NVMP as a result of the iterative discussion and engagement that will continue after the Final NVMP has been approved. The resulting changes would not alter any of the underlying commitments, mitigations and methodologies set out in the detailed Final NVMP. An example may be where a pre-construction survey identifies that a measure already committed to is no longer required in the NVMP. In every case, consideration will be given to any changes to the outcome of the assessment of environmental effects.

5.5.5 Where there is a proposed change to the detailed Final NVMP, National Grid will provide details to the relevant planning authority together with evidence of relevant stakeholder engagement.

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