

YG-DCO-032-5.3.3H(B)

# Yorkshire Green Energy Enablement (GREEN) Project

**Volume 5**

**Document 5.3.3H(B) ES Chapter 3 Appendix 3H - Noise and Vibration  
Management Plan (Clean)**

**Final Issue B**

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**nationalgrid**

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# Contents

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<b>1.</b>	<b>Introduction</b>	<b>1</b>
1.1	Purpose of the report	1
1.2	Summary of the Project	1
1.3	Objectives of the NVMP	3
1.4	Identification of noise and vibration sensitive receptors (NVSRs)	4
1.5	Working hours	4
<b>2.</b>	<b>Construction noise and vibration management guidance</b>	<b>7</b>
2.1	Construction Thresholds (limits)	7
2.2	Noise and vibration control measures	9
2.3	Applications for consent under Section 61 of the Control of Pollution Act 1974 <sup>3</sup>	14
2.4	Public notifications and communications	16
2.5	Noise and vibration monitoring	17
2.6	Suitably Qualified Persons and Training	19
2.7	Auditing, reporting and NVMP revisions	20
2.8	Complaints procedure	20
<b>3.</b>	<b>Operational noise and vibration management guidance</b>	<b>23</b>
3.1	General Principals	23
3.2	Site operation	23
3.3	Noise control measures	24
<b>Annex 3H.1</b>	<b>Acoustic screening requirements</b>	<b>27</b>

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Table 2.1 – Construction noise thresholds	7
Table 2.2 – Construction vibration levels and effects	8
Table 3.1 – Noise management measures	26
Table 3H1.1 – Predicted construction noise levels with required acoustic screening	30

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<b>Date</b>	<b>Version</b>	<b>Status</b>	<b>Description/changes</b>
01/11/2022	A	Final	First Issue
29/01/2024	B	Final	Second issue, clarifying position that screening is required at XC522 construction worksite and at XC522T construction and demolition activities.

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# 1. Introduction

## 1.1 Purpose of the report

- 1.1.1 This Noise and Vibration Management Plan (NVMP) forms part of the Environmental Statement (ES) which accompanies an application for development consent ('the Application') by National Grid Electricity Transmission plc (National Grid) for powers to construct, operate and maintain the Yorkshire Green Energy Enablement Project (referred to as the Project or Yorkshire GREEN throughout the ES).
- 1.1.2 This NVMP incorporates the measures proposed and procedures for the management of noise and vibration arising from the construction and operation of the Project in accordance with the Code of Construction Practice (CoCP), **Appendix 3B** to the ES (**Volume 5, Document 5.3.3B**).
- 1.1.3 This NVMP describes the noise and vibration control measures and monitoring proposals for all above and below ground works associated with the construction and operation of the Project. The Project is expected to have a life span of more than 80 years. If decommissioning is required at this point in time, then activities and effects associated with the decommissioning phase are expected to be of a similar level to those during the construction phase works, albeit with a lesser duration. Therefore, the measures proposed for the construction phase will similarly be applicable to the decommissioning phase, but a written scheme of decommissioning will be prepared and submitted for approval by the relevant planning authority in advance of decommissioning commencing (as secured by Requirement 16 of the draft DCO (**Volume 3, Document 3.1**) this would include matters relating to noise and vibration if required.

## 1.2 Summary of the Project

- 1.2.1 The Project is located within the administrative boundaries of Hambleton District Council, City of York Council, Harrogate Borough Council, Selby District Council, Leeds City Council and North Yorkshire County Council<sup>1</sup>, as shown on **Figure 1.1, Volume 5, Document 5.2.1**.
- 1.2.2 National Grid owns and operates the high voltage electricity transmission system in England and Wales and has a statutory duty to promote competition in the supply of electricity. It is obliged to offer to connect to the system to anyone who applies for a connection.
- 1.2.3 The Project is divided into six sections for ease of reference as indicated in **Figure 1.2, Volume 5, Document 5.4.1**. The Project will comprise both new infrastructure and works to existing transmission infrastructure and facilities as follows.

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<sup>1</sup> The local authorities' boundaries and titles are correct at the time of submission November 2022. North Yorkshire County Council, Hambleton District Council, Selby District Council, Ryedale District Council, Scarborough Borough Council, Harrogate Borough Council, Craven District Council and Richmondshire District Council are expected to form a new single council (North Yorkshire Council) on 1 April 2023 as a result of Local Government Reorganisation.

- Section A (Osballdwick Substation): Minor works at the existing Osballdwick Substation comprising the installation of a new circuit breaker and isolator along with associated cabling, removal and replacement of one gantry and works to one existing pylon. All substation works would be within existing operational land.
- Section B (North west of York Area): Works would comprise:
  - reconductoring of 2.4km of the 400kV Norton to Osballdwick (2TW/YR) overhead line and replacement of one pylon on this overhead line;
  - the new 400kV YN overhead line (2.8km), north of the proposed Overton Substation;
  - the new Shipton North and South 400kV cable sealing end compounds (CSECs) and 230m of cabling to facilitate the connection of the new YN 400kV overhead line with the existing Norton to Osballdwick YR overhead line;
  - a new substation (Overton 400kV/275kV Substation) approximately 1km south of Shipton by Beningbrough;
  - two new sections of 275kV overhead line which would connect into Overton Substation from the south (the 2.1km XC overhead line to the south-west and the 1.5km SP overhead line to the south-east);
  - works to 5km of the existing XCP Poppleton to Monk Fryston overhead line between Moor Monkton in the west and Skelton in the east comprising a mixture of decommissioning, replacement and realignment. To the south and south-east of Moor Monkton the existing overhead line would be realigned up to 230m south from the current overhead line and the closest pylon to Moor Monkton (340m south-east) would be permanently removed. A 2.35km section of this existing overhead line permanently removed between the East Coast Mainline (ECML) Railway and Woodhouse Farm to the north of Overton.
- Section C (Moor Monkton to Tadcaster): Works proposed to the existing 275kV Poppleton to Monk Fryston (XC) overhead line comprise replacing existing overhead line conductors, replacement of pylon fittings, strengthening of steelwork and works to pylon foundations.
- Section D (Tadcaster Area): Two new CSECs (Tadcaster East and West 275kV CSECs) and approximately 350m of cable would be installed approximately 3km south-west of Tadcaster and north-east of the A64/A659 junction where two existing overhead lines meet. One pylon on the existing 275kV Tadcaster Tee to Knaresborough (XD) overhead line would be replaced.
- Section E (Tadcaster to Monk Fryston): Works proposed to the existing 275kV Poppleton to Monk Fryston (XC) overhead line would comprise replacing existing overhead line conductors, replacement of pylon fittings, strengthening of steelwork and works to pylon foundations.
- Section F (Monk Fryston Area): A new substation would be constructed to the east of the existing Monk Fryston Substation which is located approximately 2km south-west of the village of Monk Fryston and located off Rawfield Lane, south of the A63. A 1.45km section of the 275kV Poppleton to Monk Fryston (XC) overhead line to the west of the existing Monk Fryston Substation and south of Pollums House Farm would be realigned to connect to the proposed Monk Fryston Substation. East of the existing Monk Fryston Substation the existing 4YS 400kV Monk Fryston to Eggborough overhead line, which currently connects to the

existing substation, would be reconfigured to connect to the proposed Monk Fryston Substation.

- 1.2.4 Further detail about the Project is provided in **Chapter 3: Description of the Project (Volume 5, Document 5.2.3)**.
- 1.2.5 The development authorised by the Development Consent Order (DCO) must be undertaken in accordance with this NVMP pursuant to **Requirement 5 of the DCO**.

### 1.3 Objectives of the NVMP

- 1.3.1 This NVMP provides the overarching general principles, controls and arrangements that will be applied to the Project subject to any amendments that may be agreed through the DCO process.
- 1.3.2 This NVMP seeks to protect noise and vibration sensitive receptors (NVSRs) including residential NVSRs (both domestic and recreational such as hotels, guest houses, holiday parks, campsites and other tourism related uses), heritage NVSRs, other NVSRs such as offices, schools and hospitals, and ecological NVSRs.
- 1.3.3 This 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 levels and review complaints should they arise. The complaints management procedure, including management responsibilities, is also addressed.
- 1.3.4 This NVMP aims to assist in complying with the following legislation through the appropriate guidance:
- Environmental Protection Act 1990<sup>2</sup> (EPA 90);
  - Control of Pollution Act 1974<sup>3</sup> (CoPA 74); and
  - BS 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1: Noise*<sup>4</sup> and *Part 2: Vibration*<sup>5</sup>.
- 1.3.5 Section 71, Part III, of CoPA 74 refers to the preparation and approval of codes of practice for minimising noise which would also apply to vibration. The current, June 2014, version of BS 5228:2009+A1:2014 is one such approved code, with Part 1<sup>4</sup> covering noise; Part 2<sup>5</sup> covering vibration.
- 1.3.6 The Principal Contractor will be responsible for the further development of this NVMP if required, its implementation, and delivery of the measures outlined herein as applicable to each work area. This will be secured through contractual agreements and monitored by National Grid. The NVMP will be reviewed as necessary by the Contractor, 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

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<sup>2</sup> UK Government (1990). The Environmental Protection Act 1990. (online) Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents/made> (Accessed 16 August 2022).

<sup>3</sup> UK Government (1974). The Control of Pollution Act 1974. (online) Available at: <https://www.legislation.gov.uk/ukpga/1974/40/contents/made> (Accessed 16 August 2022).

<sup>4</sup> British Standards Institute (2014). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1 – noise. BSI, London.

<sup>5</sup> British Standards Institute (2014). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2 – vibration. BSI, London.

already considered) that could be affected by construction noise and vibration emissions to the environment.

1.3.7 If rapid action is required to solve a noise or vibration problem and that action may contravene something written in this NVMP, typically the Local Authority would prefer the mitigating action is undertaken first. This NVMP can be revised in reasonable time after the event.

1.3.8 The remainder of this NVMP sets out measures relating to:

- construction noise and vibration thresholds;
- working hours;
- general noise and vibration control measures in accordance with best practicable means (BPM) principles;
- CoPA 74 Section 61 applications for 'Prior consent for work on construction sites';
- public notifications and complaints handling;
- noise insulation and temporary re-housing;
- vibration action levels;
- noise and vibration monitoring;
- suitably qualified persons and training;
- auditing and reporting;
- complaints procedure;
- operation, including:
  - general principles;
  - site operation; and
  - noise control measures.

## 1.4 Identification of noise and vibration sensitive receptors (NVSRs)

1.4.1 In order to identify exceedances, the closest noise and vibration sensitive receptors (NVSRs) need to be known. The process taken to identify the NVSRs and the list of NVSRs are provided in **Chapter 14 Noise and Vibration of the Environmental Statement (ES) (Volume 5, Document 5.2.14)**.

## 1.5 Working hours

1.5.1 The control of working hours is a fundamental means of controlling noise and vibration impacts on receptors. In general, it is preferred for works that generate significant levels of noise or vibration to take place during times when people are less sensitive to noise or vibration, i.e. generally accepted to be weekday daytimes and Saturday mornings, rather than outside of these hours when people expect a quieter environment and, hence, are more sensitive to noise or vibration. This leads to attitudinal reactions, whereby there is greater tolerance to the adverse effects of a project, if it is considered generally beneficial to the local area, or there is national need or benefit from the project.



- 1.5.2 The construction working hours for the Project are set out in Requirement 7 of Schedule 3 of the draft DCO (**Volume 3, Document 3.1**) and summarised below. Proposed core construction working hours are as follows:
- 07:00 – 19:00 Mondays – Fridays;
  - 08:00 – 17:00 Saturdays, Sundays, and bank holidays;
  - piling works are restricted to 08:00 and 17:00 Mondays to Fridays and 09:00 – 14:00 on Saturdays; and
  - the core working hours referred to above exclude start up and close down activities of up to one hour either side of the core working hours.
- 1.5.3 Some activities may require working outside of the core working hours, for example the installation of overhead lines crossing the ECML railway, major roads and other infrastructure to minimise daytime closures of these transport links. Works which may take place outside of the core working hours as detailed in the draft DCO are:
- the jointing of underground cables with the exception of cable cutting which will only take place during core working hours;
  - the installation and removal of conductors, pilot wires and associated protective netting across highways, railway lines or watercourses;
  - the completion of operations commenced during the core working hours which cannot safely be stopped, such as decommissioning of redundant pylons;
  - any highway works requested by the relevant highway authority to be undertaken on a Saturday or a Sunday or outside the core working hours;
  - oil processing of transformers or reactors in substation sites;
  - the testing or commissioning of any electrical plant installed as part of the authorised development;
  - the completion of works delayed or held up by severe weather conditions which disrupted or interrupted normal construction activities; and
  - security monitoring.
- 1.5.4 Works will be undertaken in accordance with DCO requirement 5. The contractor will carry out the works in such a way as to limit any adverse noise and vibration impact of the construction activities through the implementation of BPM for all works.

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## 2. Construction noise and vibration management guidance

### 2.1 Construction Thresholds (limits)

#### Noise

- 2.1.1 Construction noise thresholds (limits) at NVSRs have been identified based on the guidance contained within BS 5228-1:2009+A1:2014<sup>4</sup>, as outlined in the ES **Chapter 14 Noise and Vibration (Volume 5, Document 5.2.14)**.
- 2.1.2 Construction noise thresholds are based on those provided within Annex E of BS 5228-1:2009+A1:2014. Method 1, The ABC Method:
- “Table E.1 shows an example of the threshold of potential significant effect at dwellings when the site noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the site noise level. If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.”*
- 2.1.3 The assessment of construction noise throughout the Project, with respect to the ABC method is presented in **Appendix 14B (Volume 5, Document 5.3.14B)** and **Appendix 14C (Volume 5, Document 5.3.14C)** of the Environmental Statement.
- 2.1.4 **Table 2.1** provides the noise thresholds for receptors of medium sensitivity, i.e. residential buildings, hotels, religious buildings, educational buildings and health or community buildings. These thresholds apply for works of greater than one month, or thirty days within a six-month period. This is on the basis that the receptors in the Project area are all Category A.

**Table 2.1 – Construction noise thresholds**

<b>Threshold value period (<math>L_{Aeq,T}</math>)</b>	<b>Threshold value, façade level (dB) Lower cut off value</b>
Monday – Friday 07:00 to 19:00 Saturdays 07:00 to 13:00	65dB $L_{Aeq,T}$ or >5dB above baseline ambient noise level, whichever is the greater
Monday – Friday 19:00 to 23:00 Saturdays 13:00 to 23:00 Sundays 07:00 to 23:00	55dB $L_{Aeq,T}$ or >5dB above baseline ambient noise level, whichever is the greater
Monday – Sunday 23:00 to 07:00	45dB $L_{Aeq,T}$ or >5dB above baseline ambient noise level, whichever is the greater

- 2.1.5 It should be noted that the noise levels presented within **Table 2.1** are Construction Noise Thresholds rather than limits. The exceedance of these levels may be appropriate if Best Practicable Means are being used, and/or if the works are carried out in accordance with a Section 61 agreement (see **Section 2.3** for further details).
- 2.1.6 Where measured noise levels are found to exceed the Construction Noise Thresholds or alternative levels authorised by a Section 61 agreement, the contractor responsible for the works will investigate the cause of the exceedance and take appropriate measures to prevent further exceedances.
- 2.1.7 In addition to the Construction Noise Threshold, the contractors will also implement a Construction Noise Trigger Level which is proposed to be 3dB lower than the Construction Noise Threshold for the corresponding working period. This will provide prior warning of a possible exceedance and allow action to be taken to moderate works prior to possible exceedance of the threshold.
- 2.1.8 Where monitoring is considered to be necessary (i.e. for activity where a significant noise effect is predicted at a medium- or high- sensitivity receptor, or as a result of extraordinary works requiring a Section 61), noise monitoring equipment may be deployed, to monitor noise from activities at the various work sites and corridors including access tracks.
- 2.1.9 Monitoring exceedance of trigger levels represents a proactive method of informing the relevant Construction Managers that noise emissions at NVSRs are approaching the Construction Noise Threshold and that the responsible contractor should immediately review the methods of working to ensure that noise exceedances do not occur.

### *Vibration*

- 2.1.10 Vibration sources associated with construction are generally those with high energy and impact such as percussive or vibratory piling, use of large breakers, vibratory rollers etc. This vibration generally attenuates rapidly within the ground and does not propagate to any significant distance relative to airborne noise.
- 2.1.11 BS 5228-2:2009+A1:2014<sup>5</sup> gives the guidance presented in **Table 2.2** for vibration.

**Table 2.2 – Construction vibration levels and effects**

<b>Vibration level (PPV, mms<sup>-1</sup>)</b>	<b>Effect</b>
0.3	Vibration might be just perceptible in residential environments.
1	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.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.
15	Onset of possible cosmetic damage to residential or light commercial buildings.

- 2.1.12 Construction levels from normal activity (e.g. excavator plant moving around a site) are not expected to exceed  $1 \text{ mms}^{-1}$  at any Vibration Sensitive receptor (VSR). If the design requires activity closer to sensitive receptors, vibration levels may need to be assessed and/or monitored through the Section 61 process, as agreed with the local authorities, and local VSRs would be informed at least 48 hours in advance.
- 2.1.13 Vibration levels from specific tasks (i.e. piling and compaction) above  $10 \text{ mms}^{-1}$  may also be tolerated for short periods of time, where the above requirements are met and BPM measures are adopted. Vibration levels above  $15 \text{ mms}^{-1}$  would not be acceptable but, are not predicted for any sensitive receptor.

For assessment purposes, impact piling has been assumed throughout the Project for the construction of foundations for pylons as a reasonable worst-case scenario in relation to vibration effects.

## 2.2 Noise and vibration control measures

### *General requirements*

- 2.2.1 General noise and vibration control measures are listed in BS 5228:2009+A1:2014<sup>4,5</sup> which is the primary guidance for the assessment and control of noise and vibration from construction works.

### *Best Practicable Means (BPM)*

- 2.2.2 BPM is defined in Section 72 of the Control of Pollution Act (CoPA) 1974<sup>3</sup> and Section 79 of the Environmental Protection Act (EPA) 1990<sup>2</sup> (as amended by the Noise and Statutory Nuisance Act 1993<sup>6</sup>) 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 financial implications.”*

- 2.2.3 National Grid will require its contractor to consider 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 programme which also has cost implications (though it should also be understood that the elongation of the duration of exposure of receptors to noise by amending methods to reduce noise levels may also be undesirable depending on the context); and
  - BPM as identified above, including:
    - 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 methods, location of equipment on site, control of working hours, the provision of acoustic screening at locations (and for specific activities) included in this document as **Annex 3H.1**, and the use of less intrusive audible warnings such as broadband vehicle reversing alarms to be used in sensitive areas.

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<sup>6</sup> UK Government (1993). Noise and Statutory Nuisance Act 1993. (online). Available at: <https://www.legislation.gov.uk/ukpga/1993/40/contents/made> (Accessed 16 February 2021).

2.2.4 The recommendations of BS 5228-1:2009+A1:2014<sup>4</sup> and BS 5228-2:2009+A1:2014<sup>5</sup> will be implemented together with the specific requirements of this management plan.

### *Noise control measures*

2.2.5 BPM of noise control will be applied during construction works to minimise noise (including vibration) at neighbouring residential properties and other sensitive NVSRs arising from construction activities.

2.2.6 The general principles of noise management are:

- control at source:
  - noise emissions limits for equipment brought to site;
  - method of directly controlling noise, e.g. by retrofitting controls to plant and machinery;
  - indirect methods of controlling noise, e.g. acoustic screens, hoardings etc; and
  - indirect method of controlling noise, e.g. benefits and practicality of using alternative construction methodology to achieve the objective e.g. vibratory piling techniques or hydro-demolition as opposed to more conventional but noisier techniques; selection of quieter tools/machines; application of quieter processes.
- controls across sites through:
  - administrative and legislative control;
  - control of working hours;
  - control of delivery areas and times;
  - careful choice of compound locations and locations of fixed and other plant within those compounds, i.e. generators, pumps, slurry plant etc.;
  - control of noise via contract specification of limits;
  - noise monitoring to check compliance with noise level limits, cessation of works until alternative method is found;
  - tool box talks and site inductions: many of the activities which generate noise and vibration can be mitigated to some degree by careful operation of machinery and use of tools; and
  - construction hours should be strictly enforced and any deviations other than those previously identified will only be with the consent of the local authorities.

### *Vibration control measures*

2.2.7 Vibration can be more difficult to control than noise and there are few generalisations which can be made about its control. However, vibration propagation is much more limited relative to noise, so effects of any significance rarely extend beyond ~50m of vibration generating activities, with the exception of impact piling which may extend beyond 50m dependent on the size of the pile and the magnitude of energy input through the associated hammer. Vibration can cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement. Potential vibration control measures are as follows:

- substitution – where reasonably practicable, plant and/or methods of work causing significant levels of vibration at NVSRs should be replaced by other less intrusive plant and/or methods of working;
- vibration isolation of plant at source – vibration from stationary plant (e.g. generators, pumps, compressors) can, in some instances, prove disturbing when located close to NVSRs or when operating on connected structures. In these instances, equipment should be relocated or isolated using resilient mountings; and
- controlling the spread of vibration – where reasonably practicable, vibrating equipment shall be located as far from NVSRs as possible.

2.2.8 It is recommended that vibration monitoring is undertaken at the edge of the River Ouse if impact or vibratory piling activities are required at pylon XC421, with structural surveys carried out on the river bank around the pylon before and after the piling works to determine if remedial works are required to maintain stability.

## Specific noise and vibration control measures

### *General*

2.2.9 The contractor will be required to follow standard good construction practice as outlined in BS 5228-1:2009+A1:2014<sup>4</sup> for noise and BS 5228-2:2009+A1:2014<sup>5</sup> for vibration.

2.2.10 This will include the following measures:

- general operations:
  - construction work will be undertaken in accordance with the Code of Construction Practice (CoCP) secured by Requirement 5 of the DCO **Volume 5, Document 5.3.3B**);
- plant selection:
  - plant with low noise emissions will be sourced from the outset;
  - electrical items of plant will be used instead of diesel plant where practicable;
- plant operation:
  - plant will be started up sequentially rather than all together;
  - plant and equipment will be shut down when not in use;
  - noisy activities will be staggered in time and space where feasible;
- HGV operation and deliveries/removal:
  - access tracks will be well maintained to prevent potholes occurring and will avoid steep gradients, where possible;
  - loading/unloading activities will be located away from residential properties and shielded from those properties, where practicable;
  - only designated access tracks will be used;
  - vehicles will not wait or queue on the public highway with engines idling;

- construction traffic movements will be undertaken in accordance with and will follow approved routes as provided in the Construction Traffic Management Plan (CTMP), **Appendix 3F (Volume 5, Document 5.3.3F)**;
- material handling:
  - materials will be handled in a manner that minimises noise;
  - drop heights of materials will be minimised, particular care is to be applied when dropping material into empty skips;
- mitigation:
  - the bunding (soil stockpiles) and fencing or screening proposed at any construction compounds will be effectively maintained to help to attenuate noise;
  - continuous noisy plant will be housed in acoustic enclosures, where practicable;
  - exhaust silencing and plant muffling equipment will be fitted and maintained in good working order;
  - acoustic screens or shrouding will be used to mitigate significant adverse impact from construction noise (see **Annex 3H.1** for where and when these are needed);
  - semi-static equipment will be sited and orientated as far as is reasonably practicable away from occupied buildings and, where feasible, will be fitted with suitable enclosures;
  - mobile construction plant will be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings to provide additional screening from noise sensitive receptors;
  - static plant known to generate significant levels of vibration will be fitted with vibration dampening features;
  - each item of plant used will be selected so as to comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701;
  - consideration will be given to the recommendations set out in Annex B of BS 5228-1:2009+A1:2014<sup>4</sup> noise sources, remedies and their effectiveness;
  - consideration will be given to the recommendations set out in Section 8 of BS 5228-2:2009+A1:2014<sup>5</sup> control of vibration;
  - equipment will be well-maintained and, where possible, will be used in the mode of operation that minimises noise; and
- administration:
  - all appropriate personnel will be instructed on BPM measures to reduce noise and vibration as part of their induction training and follow up ‘toolbox’ talks.

### *Site areas*

- 2.2.11 All construction work activities will be undertaken within the designated construction site boundaries including areas designed to accommodate stockpiles and access tracks.



## *Reversing*

- 2.2.12 The contractor will manage the noise from reversing alarms by means of the following:
- the site layouts will be designed to limit and, where reasonably practicable, avoid the need for the reversing of vehicles;
  - a banksman will be utilised, where possible, to assist avoidance of the need to use reversing alarms; and
  - where feasible, flashing warning lights and alarms incorporating one or more of the following features (or any other comparable system) will be employed on plant:
    - highly directional sounders;
    - broadband signals;
    - self-adjusting output sounders.
- 2.2.13 Reversing alarms will be set to the minimum output noise level required for health and safety compliance.

## *Training*

- 2.2.14 All site personnel will receive training appropriate to the nature of their roles and responsibility; the training will include specific information in relation to noise and vibration management. If their work activities are assessed as being particularly noise/vibration emission prone, all staff will receive induction training that will incorporate environmental awareness training, plus specific training in relation to noise and vibration.
- 2.2.15 On site toolbox training will enable site workers to understand how their actions will interact with the environment and potentially impact upon NVSRs close to their work areas.

## *Exceptional works*

- 2.2.16 Where construction works need redesign during the programme and different methods are needed to be employed than currently assessed, this work will be subject to additional noise and vibration risk assessments and permitted through the Section 61 (CoPA 74) process, if exceedance of the thresholds is predicted.

## *Vibration*

- 2.2.17 Adverse vibration levels are only predicted at Monk Fryston Travellers' encampment, and only if impact piling is proposed for foundations on pylon XC522.
- 2.2.18 The geotechnical desk study has indicated likely suitable bearing-strata at a shallow depth at pylon XC522, similar to pylon XC523 where intrusive ground investigations have been carried out.
- 2.2.19 It is considered that a standard pad-and-column foundation is the most likely and suitable solution for XC522 (subject to ground investigation), and that any piling other than mini bored piles would be difficult. As such adverse vibration levels are not expected at this receptor.
- 2.2.20 Although construction vibration at River Ouse is predicted to lead to a maximum peak particle velocity of approximately  $5 \text{ mms}^{-1}$ , should impact or vibratory piling techniques

be carried out in the construction of pylon XC421, then monitoring of the vibration will be carried out at the riverbank to ensure levels do not exceed  $15 \text{ mms}^{-1}$ .

2.2.21 Where necessary, mitigation to reduce vibration levels (in particular, those associated with piling) at receptors near construction works should include consideration of:

- use of alternative methods;
- removal of obstructions;
- provision of cut-off trenches;
- reduction of energy input per blow;
- reduction of resistance to penetration, including pre-boring for driven piles; mudding in for rotary bored piles; and adding water to the bore hole for impact bored piles;
- excavation under support fluid;
- avoidance of shear leg contact with sensitive structures;
- removal of the plug when using casing vibrators;
- bottom-driving; and
- use of variable moment vibrators.

2.2.22 Further information on these measures is provided in BS 5228-2:2009+A1:2014<sup>5</sup> on vibration.

## 2.3 Applications for consent under Section 61 of the Control of Pollution Act 1974<sup>3</sup>

### *Introduction*

2.3.1 Currently, working hours have been agreed and no significant residual impacts are predicted. However, in exceptional circumstances, such as where changes to the construction methodology results in work needing to be conducted outside agreed hours and such work is predicted to give rise to significant noise effects at sensitive receptors, a Section 61 application may be required.

2.3.2 If this is the case, prior to the commencement of any works, meetings would be sought, where required, with the local authorities to discuss the works applicable to their authority and the programme to agree what works within the programme will benefit from the Section 61 Prior Consent process. However, prior to this and in general terms, the contractor will be required to submit applications for Section 61 consents, variations and dispensations under CoPA 74 for all construction activities that may generate a significant noise and/or vibration effect at a sensitive receptor including piling and activities to be undertaken outside of construction working hours for the Project set out in **Requirement 7** of the DCO (**Volume 3, Document 3.1**), unless otherwise agreed with the relevant local authority. The full process and procedures to control construction noise under CoPA 74 are provided in BS 5228-1:2009+A1:2014<sup>4</sup> for noise at Figure A1 on page 28 of that document.

2.3.3 Activities that typically do not require a Section 61 consent include those which do not have significant noise and vibration effects and those that would occur during standard construction working hours for the Project. In cases where there is a change of working

method or procedure that would result in a significant noise impact, a revised noise and vibration assessment will be undertaken and made available upon request to the relevant planning authorities.

2.3.4 The potential for significant noise and/or vibration effects, and therefore the trigger for the need to submit a Section 61 application to the relevant local authority, is defined against the following criteria:

- driven piling operations within 50m of a residential property;
- vibratory compaction of access track or similar within 20m of a residential property;
- any works outside of construction working hours for the Project within 250m of a residential property;
- cable trench within 15m of a residential property; and
- breaking out of foundations within 35m of a residential property.

2.3.5 The contractor will be required to demonstrate that BPM, as defined under Section 72 of CoPA 74, are employed at all times for all activities, to minimise noise and vibration effects.

2.3.6 Where a Section 61 consent is to be sought, before starting any construction activities which may cause significant noise and/or vibration, the contractor will, or as agreed with the local authority, prepare and submit to that local authority information which will include:

- an outline of the proposed construction methods, types and numbers of plant to be used;
- definition of the working hours required and, where these differ from the working hours (detailed in Requirement 7 of the draft DCO), a justification of the hours sought;
- a work programme which identifies the location and duration of each significant noise and/or vibration generating activity;
- the sound power levels, or sound pressure level at 10m, for each item of plant for each relevant activity;
- appropriate (in terms of noise/vibration level, duration and working hours) justification that the method and plant proposed demonstrates that BPM has been employed to control noise and vibration impacts;
- predicted noise and vibration levels at specified locations supported by calculations following the methodology in BS 5228-1:2009+A1:2014<sup>4</sup> for noise and BS 5228-2:2009+A1:2014<sup>5</sup> for vibration and the likely effects of these levels on affected NVSRs 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.; and
- proposals for the notification of receptors affected by works.

- 2.3.7 The number, extent (geographically and in terms of construction activities) and duration of Section 61 applications will be the subject of timely consultation between the contractors and each relevant local authority.
- 2.3.8 Lead in times will be agreed with the local authorities 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 local authorities are required to inform the applicant of their decision within 28 days of the final application being received. If this does not occur, then there is an appeals process.
- 2.3.9 Agreement of proposed measures will be sought from the relevant local authority through Section 61 consent, dispensation or variation applications.

#### *Unscheduled overruns*

- 2.3.10 In the event that planned works, not covered by a consent (either a full Section 61 application or dispensation/variation), extend beyond the approved working hours or general agreed construction period, and/or continue due to unforeseen circumstances that would affect safety or engineering practicability, the relevant local authority will be kept informed of the nature, time, location and reasons for the overrun as soon as possible, and records kept by the site management.
- 2.3.11 The relevant local authority will be requested to provide a telephone number and nominate an office to receive such notifications. Overruns and the reasons for these will be reviewed by National Grid, its contractor and the relevant local authority, with the aim of reducing the potential for further unplanned overruns if these are likely to result in significant noise or vibration effects.
- 2.3.12 In the case of work required in response to an emergency (or which, if not completed, would be damaging or unsafe), the relevant local authority will be advised as soon as is reasonably practicable of the reasons for, and likely duration of, such works.

## **2.4 Public notifications and communications**

#### *Public notifications*

- 2.4.1 No significant residual impacts are predicted. However should changes to the construction methodology that are predicted to result in significant noise impact, occupiers of properties where the significant noise impact may be experienced will be informed by the contractors at least 4 weeks in advance of the works taking place, including the duration and likely noise and vibration effects. In the case of works required in response to an emergency, the relevant local authority, local residents and any other potentially affected stakeholders will be advised as soon as reasonably practicable that emergency works are taking place. Potentially affected residents will also be notified of the helpline number for the Project.
- 2.4.2 **Section 2.2** of the CoCP (**Volume 5, Document 5.3.3B**) sets out an overview of community engagement and provision of public information to local residents and occupiers about the works and for the handling of complaints.

## *Communications*

- 2.4.3 As described in the CoCP (**Volume 5, Document 5.3.3B**), a communications team will be appointed to provide dedicated community relations and external communication support.
- 2.4.4 National Grid is committed to ensuring that the local community are provided with information regarding relevant construction activities. Information relating to the Project is, and would continue to be, readily available on the Project website which has been established by National Grid. This would include the Project programme, progress updates, and contact details for the Project so that members of the public or businesses can request information or make an enquiry relating to the construction activities.
- 2.4.5 A community relations team will staff a Project email account and telephone helpline to manage enquiries from the general public and local businesses. Contact details will be widely promoted and displayed at appropriate locations around the site hoarding.
- 2.4.6 A Communications Log will be maintained to record all communications with members of the public and other interested parties including general enquiries and complaints. These will be reported to National Grid by the community relations team. Records of communication will be kept and uploaded to the document control system. This will be available to interested parties and stakeholders upon receipt of a reasonable request. All enquiries, whether a query or a complaint, will be dealt with in a timely manner.

## **2.5 Noise and vibration monitoring**

### *Introduction*

- 2.5.1 The need for monitoring, and any potential monitoring locations, would be identified in any Section 61 applications, and will be the subject of discussion between the contractor, National Grid and the relevant local authority prior to agreement of any Section 61 application.
- 2.5.2 Noise monitoring may also be undertaken to determine where and when screening is required, particularly in relation to the substation works at Monk Fryston and Overton.
- 2.5.3 Monitoring will be carried out in accordance with the requirements set out in this Section. Meetings will be sought to be held with the local authorities, to review and agree the general requirements for monitoring if these have not already been agreed through the DCO process.
- 2.5.4 It is not currently proposed that routine vibration monitoring would be undertaken during the construction period except at SEL19 should impact piling be required and only for the duration for such piling.
- 2.5.5 In the event that complaints regarding noise and/or vibration are received, measurements will be undertaken either at the complainant's property or at a suitable known reference distance from the works so that any additional attenuation factors can be determined in accordance with the procedures in BS 5228:2009+A1:2014<sup>4,5</sup>. Measurements, if required, will also be undertaken in accordance with these and other appropriate standards.
- 2.5.6 Where noise or vibration monitoring is to be implemented, it should as a minimum be in accordance with the procedures described in this Section.

### *Noise monitoring*

- 2.5.7 Noise monitoring carried out either through pre-agreed schemes of monitoring or in response to complaints shall be undertaken using the following procedures.
- 2.5.8 During the activity working hours, noise levels should be measured at either free-field or façade positions of the most affected façade of any occupied dwelling or other building used for residential purposes. If the location is free-field, then the levels will be corrected to façade by the addition of 3dB.
- 2.5.9 The total ambient noise level,  $L_{Aeq,T}$ <sup>7</sup> from all sources when measured between 1.2m and 2m above the ground at the monitoring locations shall either not exceed the appropriate level given in **Table 2.1**, or not exceed the appropriate level as agreed through the Section 61 process with the relevant local authority.

### *Vibration monitoring*

- 2.5.10 The contractor will normally limit vibration levels arising from site activities at any residential building to a peak particle velocity (PPV) of  $1.0 \text{ mms}^{-1}$  in the vertical direction.
- 2.5.11 Where works that may induce high levels of vibration, monitoring will be undertaken at the external foundations of the nearest representative NVSRs. The monitoring will be undertaken in accordance with Section 9, page 22 of BS 5228-2:2009+A1:2014<sup>5</sup> on vibration.
- 2.5.12 The contractor will liaise with the River and Canal Trust and the Environment Agency to determine a suitable monitoring location for the River Ouse riverbank stability. Monitoring is required to ensure that PPV levels of  $15 \text{ mms}^{-1}$  are not exceeded at the riverbank if impact or vibratory piling is undertaken in the construction of pylon XC421, and for the duration of such piling works.

### *Exceedance actions*

- 2.5.13 In the event of a Construction Noise or Vibration Threshold Level exceedance, the responsible contractor would implement the following measures:
- notify National Grid of the exceedance;
  - immediately undertake an investigation of construction/demolition 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 activities, then the specific work activity suspected of causing the exceedances will be stopped as soon as it is safe to do so and the contractor will determine why the appropriate measures of this plan were not being implemented;
  - the remedial measures to ensure no repeat of the Construction Noise or Vibration Threshold Level exceedance will be determined;
  - work activities identified to have caused the exceedance will not be allowed to continue/resume until the agreed remedial measures have been implemented;
  - rectify any identified causes, and record actions;

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<sup>7</sup> The ambient noise level,  $L_{Aeq,T}$  at a noise monitoring location is the total  $L_{Aeq,T}$  from all noise sources in the vicinity (including the site) over the specified period.

- if the cause of the Construction Noise Threshold Level being breached is not related to site operations, record the outcome of the investigation once the investigation is completed; and
- report the above to the appropriate local authority according to any agreed protocol.

### *Repeated exceedances*

2.5.14 In the event of a series of repeated exceedances of the Construction Noise or Vibration Threshold Levels within a short period of time (for example, should three or more exceedances occur within consecutive monitoring periods) the following course of action will be taken by the contractor:

- identification of exceedances;
- following identification of an exceedance, determine whether the exceedances are directly attributable to the Project;
- inspection of all works currently being undertaken at the relevant construction site or area to determine if the noise and vibration control measures, as outlined within this NVMP, are being implemented appropriately;
- confirmation of the root cause of the exceedance within one hour. 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 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 contractor will determine why the appropriate measures of this NVMP were not 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 agreed remedial measures have been implemented; and
- within 48 hours of the exceedance of sequential exceedances, the contractor will conduct an investigation 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 contractor and provided to National Grid, this will be made available to the local authorities on request.

## **2.6 Suitably Qualified Persons and Training**

### **Suitably qualified persons and training**

2.6.1 The person(s) responsible for the development of Section 61 applications and variations, and for the associated noise and vibration calculations and/or monitoring, 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 of monitoring of noise and vibration;
- and that

- they hold a 'certificate of competence' from the IoA course, 'Environmental Noise Measurement' (or equivalent)

or,

- confirmation that they are, at minimum, an Associate Member of the Institute of Acoustics (IoA).

2.6.2 Any team leader associated with the above must be able to demonstrate all of the above and also be a full member of the IoA as a minimum.

## **2.7 Auditing, reporting and NVMP revisions**

### **Auditing and reporting**

2.7.1 Compliance with the requirements of this NVMP and statutory legislation will be monitored, by the Contractor, through routine inspections and audits.

#### *Periodic checks*

2.7.2 The environmental incident prevention arrangements will be inspected periodically, by the Contractor, to identify and address deterioration or inadequacies in the arrangements.

#### *Monthly reporting*

2.7.3 Performance in implementing this NVMP and the occurrence of real incidents will be reported monthly, by the Contractor, to National Grid's Project management team, together with the lessons learned for incident prevention and control. Reports will be made available to the local authorities upon request.

#### *Periodic audit*

2.7.4 On a periodic basis, National Grid will undertake an internal audit to monitor compliance with the requirements of this NVMP.

### **NVMP Revisions**

2.7.5 Where checks, audits or other observations generate improvements to this NVMP, they shall be submitted to National Grid to form an addendum. The addendum, subject to appropriate approval by National Grid, will be circulated to persons responsible for the implementation of the NVMP.

## **2.8 Complaints procedure**

2.8.1 Where a person from a community local to the works makes a complaint with respect to construction noise and/or vibration, it will be passed initially to the community relations team. The community relations team will liaise with the other members of the Project team to investigate the complaint and communicate this to the complainant. The complaint will be handled in accordance with the National Grid's service level agreements.

2.8.2 National Grid will acknowledge the complaint and will direct it to the relevant person for investigation.



- 2.8.3 Where practicable, appropriate and timely action will be undertaken by the Project construction team. Actions could include site specific noise monitoring (see **Section 2.5**), implementing additional noise control measures such as those listed in **Section 2.2**, halting the activity causing the complaint until a full investigation has been carried out, changing the method of working or plant being used, or providing mitigation in the form of screening.
- 2.8.4 Records of complaints, subsequent investigation and any related resolution, will be available, on request, to the relevant local authority.
- 2.8.5 If the complainant is unsatisfied with the final response, they will be provided with details on the escalation process.

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# 3. Operational noise and vibration management guidance

## 3.1 General Principals

- 3.1.1 Management of noise from overhead lines and substations is controlled by National Grid standard operating procedures.
- 3.1.2 As such, this Operational Noise and Vibration Management Plan is not prescriptive on specific methods to reduce noise and vibration, but provides an overview for the purposes of illustrating typical techniques to the relevant stakeholders in relation to the DCO submission.

## 3.2 Site operation

### Operational hours

- 3.2.1 Once operational, the Project will operate 24 hours a day, 365 days a year.

### Operational plant and processes

#### *Proposed 275kV and 400kV, and reconducted 275 kV, overhead lines*

- 3.2.2 For overhead lines, noise (where observed) is usually generated by a mechanism called corona discharge. Most transmission line conductors are designed to operate below the threshold at which corona discharge is predicted to occur in dry conditions with uncontaminated conductors, so usually operate quietly in dry weather conditions. Noise can, however, sometimes occur in dry conditions and is referred to as 'dry noise', usually described as a crackle.
- 3.2.3 The highest noise levels generated in operation for overhead lines generally occur during rainfall. Noise generated under these circumstances is referred to as 'wet noise' which is generally described as a crackle, but which can be accompanied by a tonal 'hum'.
- 3.2.4 Overhead lines will be inspected periodically, or on receipt of complaints of adverse noise levels. Where such adverse levels are observed, the source of the noise shall be investigated and, where practicable, rectified.

#### *Substations*

- 3.2.5 Substations contain new reactive plant such as Super Grid Transformers (SGTs), plus associated cooling systems, along with passive plant such as switchgear. Reactive plant can give rise to characteristic tonal noise, described as a 'hum'. The noise commonly has tonal components that are harmonics of the 100 Hz acoustic fundamental frequency which is twice the 50 Hz alternating current (AC) frequency at which the UK electricity supply system operates. Where sited close to noise sensitive receptors, reactive plant is commonly supplied with an enclosure designed to provide noise reduction.

- 3.2.6 Switchgear (circuit breakers and isolators) within substations can operate for two purposes, as an emergency operation where it protects the system from faults (unplanned), or to de energise parts of the system for maintenance (planned). The noise from switchgear is mechanical in nature and only occurs during a switching event with the noise generally described as a ‘click’, it is not tonal in nature. Typically, the total number of switching events is less than 100 in a year, although events tend to occur in ‘clusters’, with a few events on one day then nothing for months. Given the rare occurrence of switchgear events, this has not been covered by this NVMP.
- 3.2.7 The coolers for SGTs are designed to engage only at times of high load for the transformer. Such conditions usually occur only during exceptional events, for example extreme hot weather, combined with faults somewhere else on the system, requiring an SGT to carry a higher-than-normal load. These conditions would usually persist for a short duration and as such operations using the coolers can typically be regarded as an exceptional event. Noise from cooling systems is readily controlled using conventional and readily available noise control measures, as described in **Section 3.2** of this NVMP. Furthermore, the sound power levels stipulated for the cooler plant were measured on a previous, noisier, generation of equipment and are considered to be worst-case.
- 3.2.8 The substations will be populated by other equipment (for example, LVAC systems, control modules, amenities buildings etc.) that are not generally the source of significant levels of noise. Where such equipment is faulty, conditions may arise that lead to the generation of adverse noise at receptor locations. Such noise is unlikely to be significant and only adverse until the equipment is repaired. No specific management procedures are required to minimise noise from these items of equipment.
- 3.2.9 There will be a stand-by generator located at the substations. This will operate in emergency conditions. Maintenance and testing of the stand-by generator shall be undertaken predominantly during daytime hours to minimise disruption at nearby receptors.
- 3.2.10 Means of communication will be provided on signage on the substation gate.

### 3.3 Noise control measures

#### *Embedded noise and vibration control*

- 3.3.1 The proposed locations for the substations at Overton and Monk Fryston are in predominantly rural locations, with few residential NVSRs surrounding the sites. As per the National Grid *Generic Electricity Design Manual TS 2.10.07*<sup>8</sup>, the proposed SGTs at the Monk Fryston and Overton Substations will include acoustic enclosure. The enclosures will be specified to an insertion loss of 20dB at 100Hz which includes adjustments for internal reverberation build up, weaknesses in doors and access panels and transmission through openings (e.g. air vents) and protrusions (e.g. balancing fittings).
- 3.3.2 The implementation of the measures contained in this NVMP should ensure that noise levels arising from site activity are managed appropriately and that offsite noise levels will not give rise to any unacceptable impacts to nearby NVSRs.

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<sup>8</sup> National Grid (2017). TS 2.10.07 Generic Electricity Design Manual. National Grid; London.

### *Best Practicable Means (BPM)*

3.3.3 The site operator will ensure that the substations are operated in accordance with BPM at all times to minimise operational noise and vibration emissions.

3.3.4 BPM is defined by s72 of Control of Pollution Act 1974 as:

*‘In that expression “practicable” means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications.*

*The means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures.*

*The test of best practicable means is to apply only so far as compatible with any duty imposed by law, and in particular is to apply to statutory undertakers only so far as compatible with the duties imposed on them in their capacity of statutory undertakers.*

*The said test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances.*

*Subject to the preceding provisions of this section, regard shall be had, in construing references to “best practicable means”, to any relevant provision of a code of practice approved...’*

3.3.5 There are no approved codes of practice to refer to in this case and as such, the operational measures forming part of the BPM discussion are not explicit, but recommendations are referred to in **Table 3.1**.

### *Training*

3.3.6 All staff are to be made aware of the content of this NVMP and trained in the appropriate techniques to keep site noise and vibration to a minimum. Staff should be effectively supervised to ensure that best working practices are maintained with respect to noise or vibration reduction in accordance with BPM. All employees are to be advised on a regular basis of the following as part of their training:

- the proper use and maintenance of tools and equipment;
- the positioning of mobile plant on site to reduce the emission of noise to the neighbourhood and to site personnel;
- the avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment; and
- the protection of persons against noise.

### *Noise management*

3.3.7 **Table 3.1** sets out the noise management and control measures that will be used, by the site operator, to control noise emissions from the substations during their operation.

**Table 3.1 – Noise management measures**

<b>Source</b>	<b>Noise management and control methods to be implemented</b>
Monk Fryston and Overton Substations	SGTs provided with acoustic enclosures providing minimum insertion loss of 20dB at 100 Hz.
Repairs and maintenance	All buildings and plant (including stand-by plant) will be subject to a schedule of regular inspection and maintenance. Repairs/maintenance externally to site buildings/external plant must be undertaken with due regard for nearby NVSRs and, whenever possible, be undertaken during normal daytime working hours.
Overhead lines	Overhead lines will be inspected annually for defects

# Annex 3H.1

## Acoustic screening requirements

### Introduction

- H.1.1. The recommendations of the use of acoustic screening is based on the calculations made in **Appendix 14C (Volume 5, Document 5.3.14C)**, and the context of the duration of each construction activity discussed in the **ES Chapter 14: Noise and Vibration (Volume 5, Document 5.2.14)**.
- H.1.2. Where construction noise levels are predicted to exceed noise limits but have a duration below the temporal criteria (i.e. a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months), screening may be recommended but is not required. As such should activities in the “Required screening” section be demonstrably below the temporal threshold, these activities would have screening recommended, not required, and this screening location document shall be updated accordingly.
- H.1.3. The activity noise is based on worst-case levels assuming cumulative build-up from activities that overlap in the construction schedule, but may not actually give rise to accumulated noise. As such, should the Contractor determine that noise levels are likely to be below the criteria listed above, then screening will not be required.
- H.1.4. The requirement for screening is based on the exceedance of threshold noise levels and are based on the information available at this time.
- H.1.5. The Contractor may review the assumptions and determine whether the threshold levels are likely to be exceeded and prepare an alternative approach to screening in their updated **Noise and Vibration Management Plan (NVMP), Appendix 3H, Volume 5, Document 5.3.3H**.
- H.1.6. Furthermore, the requirement for barriers may be offset by delivering in combination with noise monitoring at residential receptors, such that temporary screening can be erected between noisy activity and receptors at the point where construction activity is likely to trigger the threshold levels.
- H.1.7. For avoidance of doubt, where “screening” is used, this can take many forms, such as acoustic shrouding of individual items of plant or activity, partial enclosures formed by temporary acoustic screens, or boundary fencing or bunding.
- H.1.8. Screening will generally be provided by Heras-style wire fencing with high surface density pads cable-tied to the fence forming a contiguous barrier.
- H.1.9. At selected locations detailed below, the screening will be formed by plywood site perimeter hoarding:
- The southern, western and eastern perimeters of Tadcaster Temporary Construction Compound (TCC),
  - The northern, western and eastern perimeter of Monk Fyston Substation Western TCC,
  - The northern perimeter of Overton Substation TCC,
  - The perimeter of the TCC west of Overton Road,

- The southern perimeter of Shipton Tee Substation Southern TCC.

H.1.10. In general:

- where predicted levels are above the threshold value, screening of equipment, or use of acoustic shrouding of the noisiest activities is required;
- where night time works are required and are within 350m of a residential receptor screening of equipment, or use of acoustic shrouding of the noisiest activities is required;
- where predicted levels are smaller than 10dB below the threshold value no screening is required or recommended for the activity.
- HDD areas are included on the basis that mud-pumps are required to be used overnight to prevent collapse of horizontal bores, however, if plant is not required at night, screening is not needed.
- It should be noted that although stringing is listed as an activity during the night time, the night time works will be drawing bonds over scaffold. This activity uses the same basic plant as stringing and so the noise from the activity has been assumed as such.

## Required acoustic screening

### *Locations*

H.1.11. Based on the modelled results presented in Appendix 14C (Volume 5, Document 5.3.14C), a screening strategy of noise contributing equipment is required in the following locations:

- proposed Overton Substation area;
- proposed Monk Fryston Substation area;
- proposed Overton Substation temporary construction compound areas;
- proposed Monk Fryston Substation temporary construction compound areas;
- Shipton Cable Sealing End Compounds (CSEC) temporary construction compound areas;
- Tadcaster CSECs temporary construction compound area;
- Horizontal Directional Drilling (HDD) working area in vicinity of Tadcaster TCC;
- construction of pylon ID XC424 working area;
- construction of pylon ID XC522 working area;
- construction/dismantling of temporary pylon ID XC522T working area;
- construction/dismantling of temporary pylon ID XCP005T working area; and
- construction/dismantling of temporary pylon ID XC481T working area.

### *Results*

H.1.12. As locations for construction equipment are not finalised and are worst case, for the purpose of determining mitigation efficacy, screening has been modelled assuming a 2m barrier surrounding the locations listed in paragraph 2.2.1. However, similar, if not



more effective reductions in noise can be achieved by more localised screening, or shrouding the plant and equipment of the highest noise contributors. The modelled results are presented in **Table 3H1.1**.

**Table 3H1.1 – Predicted construction noise levels with required acoustic screening**

Receiver	Daytime (core hours) level	Monday – Friday 07:00 – 19:00 Saturday 07:00 – 13:00 threshold limit difference	Monday – Friday 19:00 – 23:00 Saturday 13:00 – 23:00 Sunday 07:00 – 23:00 threshold limit difference	Night-time (outside of core hours) level	Monday – Sunday 23:00 – 07:00 threshold limit difference
HAM01	47	-18	-8	43	-2
HAM02	46	-19	-9	43	-3
HAM03	49	-16	-6	46	1
HAM04	51	-14	-4	46	1
HAM05	53	-12	-2	47	2
HAM06	51	-14	-4	36	-9
HAM07	51	-14	-4	45	0
HAM08	54	-11	-1	46	1
HAM09	53	-12	-2	44	-1
HAM10	48	-17	-7	44	-1
HAM11	53	-12	-2	46	1
HAR01	58	-7	3	54	9
HAR02	51	-14	-4	45	0

Receiver	Daytime (core hours) level	Monday – Friday 07:00 – 19:00 Saturday 07:00 – 13:00 threshold limit difference	Monday – Friday 19:00 – 23:00 Saturday 13:00 – 23:00 Sunday 07:00 – 23:00 threshold limit difference	Night-time (outside of core hours) level	Monday – Sunday 23:00 – 07:00 threshold limit difference
HAR03	57	-8	2	49	4
HAR04	52	-13	-3	52	7
HAR05	55	-10	0	56	11
HAR06	56	-9	1	32	-13
HAR07	50	-15	-5	31	-14
HAR08	53	-12	-2	54	9
SEL01	51	-14	-4	52	7
SEL02	46	-20	-10	41	-4
SEL03	54	-11	-1	38	-7
SEL04	48	-17	-7	42	-3
SEL05	50	-15	-5	47	2
SEL06	51	-14	-4	43	-2
SEL07	45	-20	-10	41	-4
SEL08	51	-14	-4	47	2

Receiver	Daytime (core hours) level	Monday – Friday 07:00 – 19:00 Saturday 07:00 – 13:00 threshold limit difference	Monday – Friday 19:00 – 23:00 Saturday 13:00 – 23:00 Sunday 07:00 – 23:00 threshold limit difference	Night-time (outside of core hours) level	Monday – Sunday 23:00 – 07:00 threshold limit difference
SEL09	62	-3	7	61	16
SEL10	52	-13	-3	52	7
SEL11	53	-12	-2	53	8
SEL12	45	-20	-10	47	2
SEL13	45	-21	-11	48	3
SEL14	37	-28	-18	37	-8
SEL15	48	-17	-7	37	-8
SEL16	81	16	26	49	4
SEL17	75	10	20	50	5
SEL18	47	-18	-8	34	-11
SEL19	58	-7	3	47	2
SEL20	53	-12	-2	38	-7
SEL21	51	-14	-4	36	-9
SEL22	52	-13	-3	36	-10

Receiver	Daytime (core hours) level	Monday – Friday 07:00 – 19:00 Saturday 07:00 – 13:00 threshold limit difference	Monday – Friday 19:00 – 23:00 Saturday 13:00 – 23:00 Sunday 07:00 – 23:00 threshold limit difference	Night-time (outside of core hours) level	Monday – Sunday 23:00 – 07:00 threshold limit difference
SEL23	45	-20	-10	33	-12
YOR01	51	-15	-5	38	-7
YOR02	49	-17	-7	37	-8
YOR03	57	-8	2	50	5
YOR04	53	-12	-2	49	4
YOR05	56	-9	1	54	9
YOR06	51	-14	-4	49	4
YOR07	54	-11	-1	54	9
YOR08	55	-10	0	50	5
YOR09	45	-20	-10	9	-36
YOR10	48	-17	-7	8	-37
YOR11	46	-19	-9	12	-33
YOR12	46	-19	-9	12	-33

- H.1.13. **Table 3H1.1** shows the majority of receptors, with the exception of SEL16, and SEL17, are below the Monday – Friday 07:00 – 19:00 and Saturday 07:00 – 13:00 threshold once screening is applied. As the receptors are of medium sensitivity, the residual effects are not significant.
- H.1.14. SEL16 and SEL17 experience construction levels much higher than the daytime 65dB threshold level (Table 14.17, Chapter 14, Volume 5, Document 5.2.14), even with screening. The screening will be required because of this high magnitude, but this is considered not significant in EIA terms, as the temporal threshold will be unlikely to be triggered by the worst-case activities.
- H.1.15. **Table 3H1.1** shows that the majority of receptors, with the exception of HAR01, HAR03, HAR06, SEL03, SEL09, SEL16, SEL17, SEL19, SEL20, YOR03 and YOR05 are below the Monday – Friday 19:00 – 23:00, Saturday 13:00 – 23:00 and Sunday 07:00 – 23:00 threshold.
- H.1.16. HAR01, HAR03, HAR06, SEL19, YOR03 and YOR05 experience small (less than 5dB) exceedances of the 55dB threshold, which equals a low magnitude of impact. It is therefore determined that for these receptors, the effects are not significant.
- H.1.17. SEL09 will experience a moderate (7dB) exceedance of the 55dB threshold, which is a medium magnitude of impact. For these receptors, effects are potentially significant.
- H.1.18. SEL16, and SEL17 experience construction levels much higher than the threshold level (more than 10dB), which equals a high magnitude of impact, but this is considered not significant in EIA terms, as the temporal threshold will be unlikely to be triggered by the worst-case activities
- H.1.19. **Table 3H1.1** shows that approximately half of receptors are predicted to experience exceedances of the 45dB threshold during the night-time (23:00 – 07:00 Monday – Sunday). Fourteen receptors experience small (less than 5dB) exceedances, and 11 receptors experience medium (5 – 10dB) exceedances, whilst 2 receptors experience high (greater than 10dB) exceedances. Those that experience small exceedances are deemed not significant, those that experience medium or high exceedances are deemed potentially significant but the duration of such activities will not exceed the temporal threshold and such are not significant.

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