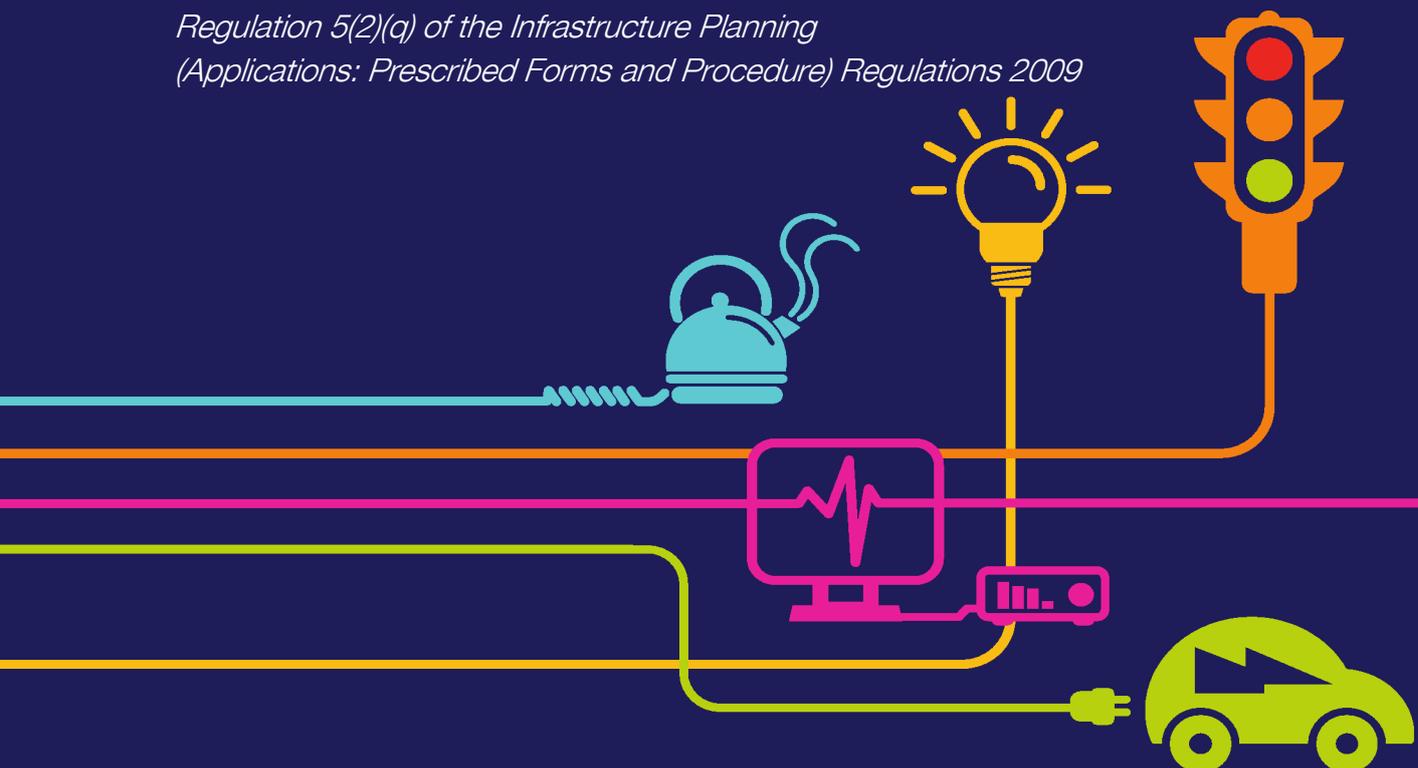


DOCUMENT 7.9

Noise and Vibration Management Plan – Parts A & B

National Grid (North Wales Connection Project)

*Regulation 5(2)(g) of the Infrastructure Planning
(Applications: Prescribed Forms and Procedure) Regulations 2009*



national**grid**

North Wales Connection Project

Volume 7

Document 7.9 Noise and Vibration Management Plan – Parts A & B

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Part A – General Principles, Controls and Arrangements

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1 Introduction

1.1 INTRODUCTION

- 1.1.1 This Noise and Vibration Management Plan (NVMP) incorporates the measures proposed and procedures for the management of noise and vibration arising from the construction of the North Wales Connection Project (hereinafter referred to as the 'Proposed Development') in accordance with section 4 of the Construction Environmental Management Plan (CEMP) (**Document 7.4**).
- 1.1.2 This NVMP describes the noise and vibration control measures and monitoring proposals for all above and below ground works associated with the construction of the Proposed Development. This document is separated into two parts:
- Part A - General Principles, Controls and Arrangements (this part of the document); and
 - Part B – Work Site and Activity Specific Controls and Arrangements.
- 1.1.3 Part A, as stated, provides the overarching general principles, controls and arrangements that will be applied to the Proposed Development subject to any amendments that may be agreed through the Development Consent Order (DCO) process. Part B is separated into the main elements of the Proposed Development on a more site or route section basis. This part will remain mostly unpopulated at this stage but it will set the basis for further development by the contractor responsible for each element of the Proposed Development. Isle of Anglesey County Council (IACC) and Gwynedd Council will be consulted, as appropriate, relative to the required works within their authority to agree appropriate controls, noise limits etc. relative to each work site or Proposed Development element.
- 1.1.4 For large and particularly linear projects, this approach provides more certainty that specific controls and arrangements will be applied to each work site or project element rather than generic, overarching non site specific controls. This also allows the existing, pre-construction ambient noise levels to be taken into account for each work site or project element

so more specific noise limits can be applied to protect the amenity of these areas.

- 1.1.5 This NVMP seeks to protect noise and vibration sensitive receptors (NSVRs) including residential noise sensitive receptors NVSRs (both permanent and recreational); hotels, guest houses, holiday parks, campsites and other tourism related uses; heritage NVSRs (such as Plas Newydd); other noise sensitive NVSRs (schools, hospitals), and ecological areas and NVSRs including marine NVSRs within the Menai Strait. This NVMP does not consider or address operational noise.
- 1.1.6 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.
- 1.1.7 This NVMP provides further detail on the principles for noise and vibration management as outlined in the following documents contained within the DCO application:
- Environmental Statement: Chapter 15 Construction Noise and Vibration (**Document 5.15**);
 - Statement of Statutory Nuisance (**Document 5.25**); and
 - Construction Environmental Management Plan (**Document 7.4**).
- 1.1.8 This Plan aims to assist in complying with the following legislation through the appropriate guidance also provided below:
- Environmental Protection Act 1990 (as amended) (Ref 4.2.9.1);
 - Control of Pollution Act 1974 (CoPA 1974) (Ref 4.2.9.2); and
 - British Standard (BS) 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites', Part 1: Noise (BS 5228-1:2009+A1:2014) (Ref 4.2.9.3), and Part 2: Vibration (BS 5228-2:2009+A1:2014) (Ref 4.2.9.4).
- 1.1.9 Section (s.) 71, Part III of the CoPA 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 5228-1:2009+A1:2014 is one such approved code as ratified by the Welsh Assembly. This is Part 1 which is on noise; Part 2 in on vibration.

1.1.10 This NVMP has been prepared by National Grid and is secured through Requirement 6 of the draft DCO (**Document 2.1**).

1.1.11 The main works contractors will be responsible for the further development of this Plan, its implementation and delivery of the measures outlined herein as applicable to each work area. This will be secured through the contractual agreements and monitored by National Grid.

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

- noise and vibration thresholds;
- working hours;
- general noise and vibration control measures in accordance with best practicable means (BPM) principles;
- CoPA s.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; and
- auditing and reporting.

1.2 THE PROPOSED DEVELOPMENT

1.2.1 The Proposed Development would provide a new 400 kilovolt (kV) connection between the existing substations at Wylfa and Pentir and includes the following principal components:

- extension to the existing substation at Wylfa;
- sections of new 400 kV overhead line (OHL) and pylons between Wylfa substation and the Braint Tunnel Head House (THH) and Cable Sealing End Compound (CSEC) on Anglesey including modifications to parts of the existing 400 kV OHL between Wylfa and Pentir;
- Braint THH/CSEC on Anglesey;

- tunnel under the Menai Strait between the Braint THH and the Tŷ Fodol THH;
- Tŷ Fodol THH/CESC in Gwynedd;
- new section of 400 kV OHL between Tŷ Fodol THH/ CSEC and Pentir Substation;
- extension to the existing substation at Pentir; and
- temporary construction compounds, access tracks, construction working areas, localised widening of the public highway and third party works that are required to construct the infrastructure listed above.

1.2.2 The Proposed Development is situated within the administrative areas of IACC and Gwynedd Council, to whom applications under the s.61 of CoPA will be made as appropriate. A consistent approach will be applied to both local authorities, where possible, through consultation and agreement on a project wide basis.

1.2.3 In terms of the construction requirements of the Proposed Development, these consists of the following principal components:

- overhead line installation following the construction of new pylons;
- substation and connection works;
- shaft construction and tunnelling works including formation of the tunnel lining and fit out with cables etc.;
- tunnel constructed either by slurry tunnel boring machine (TBM) or Earth Pressure Balance TBM (EPBM) or drill and blast (D&B);
- use of the temporary construction railway (TCR) for transport of materials, men and spoil (spoil for EPBM and D&B tunnelling methods only);
- tunnel head house construction and fit out; and
- temporary construction compounds, access tracks, construction working areas and third party works that are required to construct the infrastructure listed above.

1.3 CONSTRUCTION NOISE THRESHOLDS (LIMITS)

- 1.3.1 Construction noise thresholds (limits) at noise and/or vibration sensitive receptors (NVSRs) have been identified based on the guidance contained within BS 5228-1:2009+A1:2014, as outlined in the ES Chapter 15 Construction Noise and Vibration (**Document 5.15**) and summarised in Tables 1.1 and 1.2.
- 1.3.2 Due to the differences in timescales for construction works, it has been necessary to provide separate thresholds which are dependent upon the duration of works. On this basis, the following durations have been considered:
- **Short-term works** – Greater than one month or more, or 30 days within a six month period, unless works of a shorter duration are likely to result in significant impact. Less than six months or 180 days over a longer period. Note: works of less than one month or 30 days are considered not significant due to the short duration unless levels are of such magnitude or temporal distribution (evening or night-time) that they need further consideration as they could lead to significant effects.
 - **Long term works** - Greater than six months or 180 days over a longer period.

Short-term Works

- 1.3.3 Construction noise thresholds for short-term works are based on those provided in Example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014. This indicates that:

'Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.'

- 1.3.4 Table 2.1 provides 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.

Table 1.1: Construction Noise Threshold for Short-Term Works

Threshold value period (L_{Aeq})	Threshold value, façade level in decibels (dB) (Lower cut off value)
Daytime (07:00 to 19:00 hrs) weekdays and Saturdays (07:00 to 13:00 hrs)	65 dB L_{Aeq} or >5 dB above baseline ambient noise level, whichever is the greater
Evenings (19:00 to 23:00 hrs weekdays). Weekends (13:00 to 23:00 hrs Saturdays and 07:00 to 23:00 hrs Sundays)	55 dB L_{Aeq} or >5 dB above baseline ambient noise level, whichever is the greater
Night-time (23:00 to 07:00 hrs)	45 dB L_{Aeq} or >5 dB above baseline ambient noise level, whichever is the greater

Long term works

- 1.3.5 Where construction works will continue for a period of greater than six months, lower noise limits will apply relative to those that apply to short-term works. These limits are taken from the Minerals Technical Advice Note (Wales) for Aggregates (MTAN1) (Ref 4.2.9.5), which provides an appropriate level of protection for NSRs from extended earthworks and construction-type noise. MTAN1 states:

“Noise limits –noise limits should relate to the background noise levels, subject to a maximum daytime noise limit of 55 dB(A) where background noise levels exceed 45 dB(A). 55 dB(A) is the lower limit of the daytime noise levels where serious annoyance is caused. Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels [$L_{A90,T}$] plus 10 dB(A). Night-time working limits should not exceed 42 dB(A) at noise sensitive properties. Daytime working is defined as 0700-1900 hours and night-time as 1900-0700 hours. Noise limits should be set in terms of $L_{Aeq,T}$ over a 1-hour measuring period. L_{Aeq} is the noise index used to describe the “average” level of noise that varies with time (T) and should be measured “free-field” that is, at least 3.5 metres away from a façade to prevent reflection of noise by any façade that faces the noise source. During temporary and short-term operations higher levels may be reasonable but should not exceed 67dB(A) for periods of up to 8 weeks in a year at specified noise sensitive properties.”

- 1.3.6 From MTAN1 guidance on noise limits, the following threshold criteria are adopted for longer term construction works (see Table 1.2). This decreases the acceptable daytime freefield noise limit to 55 dB L_{Aeq} . For the evening and night periods, the MTAN1 guidance sets a fixed limit of 42 dB L_{Aeq} . As the works would be for a shorter duration than minerals working (which is typically 20 years or more), adjustments to the limits have not been made for background noise levels, i.e. the $L_{A90} + 10$ dB daytime criterion has not been applied where L_{A90} levels are lower than 45 dB L_{A90} .
- 1.3.7 The corresponding noise thresholds are provided in Table 1.2 below. Note that freefield levels are quoted in MTAN1, so thresholds are 3 dB above these levels as it is convention to use façade levels for construction noise.

Table 1.2: Construction Noise Threshold for Longer Term Works	
Threshold value period (L_{Aeq})	Threshold value, façade level in decibels (dB) <i>(Lower cut off value)</i>
Daytime (07:00 to 19:00 hrs) weekdays and Saturdays (07:00 to 13:00 hrs)	58 dB L_{Aeq} or >5 dB above baseline ambient noise level, whichever is the greater
Weekends (13:00 to 19:00 hrs Saturdays and 07:00 to 19:00 hrs Sundays)	55 dB L_{Aeq} or >5 dB above baseline ambient noise level, whichever is the greater
Evening and night-time (19:00 to 07:00 hrs)	45 dB L_{Aeq} or >5 dB above baseline ambient noise level, whichever is the greater

1.4 NOISE LIMITS FOR SURFACE WORKS

- 1.4.1 It should be noted that the noise levels presented within Table 1.1 are Construction Noise Thresholds rather than limits. The Construction Noise Thresholds presented within Table 1.2 above are considered to be noise limits for works of six months duration or longer. Noise levels may be permitted up to 75 dB $L_{Aeq,1hr}$ for specific works of shorter duration where BPM have been demonstrated through the S.61 process, agreed with the local authorities and local noise sensitive receptors have been informed at least 48 hours in advance.

- 1.4.2 Noise levels above 75 dB $L_{Aeq,1hr}$ may also be permitted where the above requirements are met and BPM measures are adopted.
- 1.4.3 Where measured noise levels exceed the agreed Construction Noise Thresholds outlined above, the contractor responsible for the works will investigate the cause of the exceedance and take appropriate measures to prevent further exceedances.
- 1.4.4 In addition to the Construction Noise Threshold, the contractors will also implement a Construction Noise Trigger Level which is proposed to be 3 dB 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.
- 1.4.5 Noise monitoring equipment will be deployed at locations agreed in advance with the local authorities, where this monitoring is considered to be necessary, to monitor noise from activities at the various work sites and corridors including access tracks. The trigger level exceedance represents a proactive means of informing the project 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.

1.5 NOISE THRESHOLDS FOR SUBSURFACE WORKS AND SURFACE BLASTING

- 1.5.1 The noise sources associated with subsurface works that could result in groundborne noise effects are drilling and blasting of the shafts, the passage of the tunnel boring machine (TBM) or drill and blast (D&B) and the use of the temporary construction railway (TCR). Effects associated with the passage of the TBM or D&B will be temporary, as affecting any one receptor, as the face traverses. Groundborne noise limits would not generally be set for this as it is temporary, over a matter of days and with limited mitigation options, but the occupants would be advised of the effects in advance to assist with the mitigation of effect and provided with contact numbers for any queries or complaints.
- 1.5.2 Based upon the above, the thresholds provided in Table 1.3 below primarily relate to groundborne noise arising from the passage of the TCR. BPM will be employed with regard to the design, installation and maintenance of the TCR to ensure that, preferably, noise levels within NVSRs will not exceed 35 dB L_{pASmax} , and the higher level of 45 dB L_{pASmax} will not be exceeded.

Table 1.3: Groundborne Noise Effect Levels for Permanent Residential Buildings

	L_{pASmax} dB
Lowest Observed Adverse Effect Level	35
Significant Observed Adverse Effect Level	45

1.5.3 The subsurface works could also affect the NVSRs listed in Table 1.4 below. Whilst only a few, if any, of these NVSRs are present along the likely alignment, BPM will be employed with regard to the design, installation and maintenance of the TCR to ensure that, preferably, noise levels within NVSRs will not exceed the stated values for each receptor type. Advance monitoring in relation to these NVSRs and residential NVSRs is discussed in section 9 of the NVMP.

Table 1.4: Ground-borne Impact Levels for Non-residential Buildings

Examples	L_{pASmax} dB
Large auditoria and concert halls	25
Sound recording and broadcast studios, theatres and small auditoria	30
Places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls	35
Offices, schools, colleges, hospitals, hotels and libraries	40

1.5.4 With regard to air overpressure from blasting, levels can be very variable due to meteorological conditions and hence planning conditions to control air overpressure are difficult to enforce, as stated in MTAN1. BS 6472-2:2008 indicates that levels from quarries are generally around 120 dB (Lin) at nearby NVSRs and this will be the target value for this in relation to the blasting of the shafts.

1.5.5 No building damage to normally constructed structures would be expected at this level given that this is some 30 dB below levels at which poorly mounted windows can crack.

1.6 VIBRATION THRESHOLDS FOR SURFACE AND SUBSURFACE WORKS

- 1.6.1 This section covers vibration from both surface and underground works. For surface works, 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 distance relative to airborne noise. Given this and the likely distance to NVSRs, significant vibration effects are not anticipated. However, limits are discussed and provided below.
- 1.6.2 For subsurface works, vibration that is perceptible on the surface is most unlikely to occur, under normal circumstances, from drilling or either TBM type; however, it could arise from blasting which is obviously high energy and impact. Vibration levels from blasting can, however, be mitigated by design where NVSRs are very close if it is determined that significant levels could occur. The potential for this would depend upon surface cover, charge weight per delay and overall charge weight. Where the cover above the tunnel is thick, levels on surface will be lower than when it is thinner.
- 1.6.3 Assuming the TCR is well maintained to ensure low levels of discontinuity between rail joints, perceptible vibration on surface is not expected.
- 1.6.4 For vibration, BS 5228-2:2009+A1:2014 gives the following guidance (see Table 1.5):

Table 1.5: Construction Vibration Threshold	
Vibration level	Effect
0.3 mm.s ⁻¹	Vibration might be just perceptible in residential environments.
1.0 mm.s ⁻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 mm.s ⁻¹	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments
15 mm.s ⁻¹	Onset of possible cosmetic damage to residential or light commercial buildings.

- 1.6.5 From this, where construction vibration levels from normal activity are expected to exceed 1.0 mm.s^{-1} at any NVSR, vibration levels may be permitted for specific works where BPM have been demonstrated through the s.61 process, as agreed with the local authorities, and local NVSRs have been informed at least 48 hours in advance.
- 1.6.6 Vibration levels above 10 mm.s^{-1} may also be permitted where the above requirements are met and BPM measures are adopted. Vibration levels above 15 mm.s^{-1} would not be acceptable.
- 1.6.7 Advance monitoring in relation to NVSRs and likely vibration effects, particularly if the D&B option is selected, is discussed in section 9 of this Plan.
- 1.6.8 For blasting, the maximum level of ground vibration should not exceed a peak particle velocity (PPV) of 6 mm.s^{-1} in 95% of all blasts measured over a six month period and no individual blast should exceed a PPV of 10 mm.s^{-1} .

2 Working Hours

2.1 WORKING HOURS

- 2.1.1 The control of working hours is a fundamental means of controlling noise and vibration impacts on people. 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, i.e. generally accepted to be weekday daytimes and Saturday mornings, rather than outside of these hours when people expect a quieter environment and are hence more sensitive to noise. This also brings 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.
- 2.1.2 The construction working hours for the Proposed Development are set out in Requirement 8 of the draft DCO (**Document 2.1**).
- 2.1.3 Works will be undertaken in accordance with Requirement 8 of the draft DCO (**Document 2.1**). 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.

3 Noise and Vibration Control Measures

3.1 GENERAL REQUIREMENTS

3.1.1 General noise and vibration control measures are listed in British Standard 5228:2009+A1:2014 which is the primary guidance for the assessment and control of noise and vibration from construction works.

Best Practicable Means

3.1.2 BPM is defined in s. 72 of the Control of Pollution Act 1974 and s. 79 of the Environmental Protection Act 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 financial implications”.

3.1.3 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 either cost or delays to programme which also has cost implications.
- BPM as identified above, including:
 - noise and vibration control at source: for example the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive audible warnings such as broadband vehicle reversing alarms;
 - screening: design and use of acoustic screening measures where practicable and necessary, to include site hoardings, acoustic barriers, acoustic enclosures, acoustic housing for plant and temporary stockpiles. Such measures can be particularly appropriate for stationary or near-stationary plant. Barriers will be located as close to the plant as possible.

3.1.4 The recommendations of BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014, will be implemented, together with the specific requirements of this management plan.

Noise Control Measures

3.1.5 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.

3.1.6 The general principles of noise management are given below:

- 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 all 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.;
 - physically screening at the work sites where this will be effective;
 - 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;
- advance noise and vibration monitoring for the tunnelling to better quantify levels and where additional mitigation may be required such as slowing the TBM or reducing blast weights for D&B;
- 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;
- temporary noise screens to reduce noise from particularly noisy activities and the height of perimeter hoarding will be extended where this would assist in reducing noise emissions;
- construction hours should be strictly enforced and any deviations other than those previously identified will only be with the consent of the local authorities; and
- the construction compounds at Braint and Tŷ Fodol will include significant physical mitigation measures to reduce impacts from the 24 hour working.

Vibration Control Measures

3.1.7 Vibration can be more difficult to control than noise and there are few generalizations which can be made about its control. However, its propagation is much more limited relative to noise so effects of any significance rarely extend beyond ~ 50 m of vibration generating activities. Vibration can cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement. Various potential control measures are described below.

- 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.

- Controlling the spread of vibration - Where reasonably practicable, vibrating equipment shall be located as far from NVSRs as possible.

Shaft Construction (blasting element) and Tunnelling – Air Overpressure, Groundborne Noise and Vibration Control Measures

3.1.8 These aspects are primarily associated with the construction of the tunnel, which requires shaft access at both ends and these are of significant depth, and then either boring by TBM or D&B. These activities bring in sources and effects unlike normal construction activity carried out on the surface.

3.1.9 The shafts will initially be excavated by normal construction techniques involving excavators etc. but then, following the securing of the caisson, blasting will be used to excavate to shaft total depth (TD). This can result in air overpressure and vibration; controls for the former are described below and vibration is not expected to propagate off site. However, controls that apply to drill and blast would also apply to blasting of the shaft.

3.1.10 The tunnel will be constructed using one of three options:

- slurry TBM where spoil is pumped to surface and processed – this would be from one direction from shaft to shaft; or
- EPBM where spoil is conveyed into wagons of the TCR, taken to the shaft base and craned out for processing – this would be from one direction from shaft to shaft; or
- D&B where the tunnel will be blasted and the spoil loaded into wagons as per the EPBM method but with a wider range of particle sizes – this would be from both shafts with a meeting point offset from the Menai Strait, i.e. with ground above not water.

3.1.11 For all three options, a TCR will be used but this won't transport spoil with the slurry TBM as it will be pumped. Otherwise, the TCR will be used for spoil, materials and transport of personnel to and from the face.

3.1.12 From the above, the main sources that may require control are:

- blasting of the shaft and chambers particularly as this phase commences;
- D&B when there are NVSRs within approximately 100 m above; and
- operation of the TCR.

3.1.13 Control measures for these are described below.

3.2 SPECIFIC NOISE AND VIBRATION CONTROL MEASURES

General

3.2.1 The contractor will be required to follow standard good construction practice as outlined in BS 5228-1:2009+A1:2014 for noise and BS 5228-2:2009+A1:2014 for vibration.

3.2.2 This will include the following measures:

- construction work will be undertaken in accordance with Requirement 8 of the draft DCO (**Document 2.1**);
- plant with the low noise emissions will be sourced from the outset;
- electrical items of plant will be used instead of diesel plant where possible particularly in sensitive locations – mains electrical supply will be provided to the tunnel construction compounds at Braint and Tŷ Fodol;
- plant will be started up sequentially rather than all together;
- 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;
- drop heights of materials will be minimised;
- 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 will be used where appropriate and necessary to mitigate noise;
- 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 (Ref 4.2.9.7);
- consideration will be given to the recommendations set out in Annex B of Part 1 of BS 5228-1:2009+A1:2014 noise sources, remedies and their effectiveness;
- consideration will be given to the recommendations set out in Section 8 of Part 2 of BS 5228-2:2009+A1:2014 control of vibration;
- equipment will be well-maintained and, where possible, will be used in the mode of operation that minimises noise;
- plant and equipment will be shut down when not in use;
- 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;
- materials will be handled in a manner that minimises noise;
- 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 Outline Construction Traffic Management Plan (OCTMP) **(Document 7.5)**;
- all appropriate personnel will be instructed on BPM measures to reduce noise and vibration as part of their induction training, and followed up by 'tool box' talks;
- noisy activities will be staggered in time and space where feasible; and
- only designated access tracks will be used.

Site Areas

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

Reversing

- 3.2.4 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 to assist avoidance of the need to use reversing alarms; and
- reversing alarms incorporating one or more of the features listed below or any other comparable system will be used: highly directional sounders, broad-band signals, self-adjusting output sounders and/or flashing warning lights.

- 3.2.5 Reversing alarms will be set to the minimum output noise level required for health and safety compliance.

Erection of Physical Barriers

- 3.2.6 Where deemed appropriate (through risk assessment), physical barriers will be erected around activities that are expected to generate particularly high noise levels to provide screening attenuation.

Training

- 3.2.7 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.

- 3.2.8 On site tool-box 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

- 3.2.9 Exceptional works, as identified by the Environmental Clerk of Works will be subject to additional noise and vibration risk assessments and permitted through the s.61 CoPA process.
- 3.2.10 Tunnelling, and works with possible impacts on terrestrial or marine ecological receptors, such as works near or under the Menai Strait, or other area where important or protected ecological species are present, will be subject to a separate risk assessment, method statement and permitting, if required.

Vibration

- 3.2.11 For piling activities, where practicable, piles should be installed by continuous flight auger or vibratory piling. Impact/hammer piling should only be used where it is demonstrated that no adverse noise or vibration impacts would result.
- 3.2.12 Where necessary, mitigation to reduce vibration levels (in particular, that 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.
- 3.2.13 Further information on these measures is provided in BS 5228-2:2009+A1:2014 on vibration.

Shaft Construction (blasting element) and Tunnelling – Air Overpressure, Groundborne Noise and Vibration Control Measures

Blasting of the Shaft

3.2.14 For blasting of the shaft and chambers if necessary, the main concerns would relate to:

- air overpressure – sound that propagates through the air direct from the blast; and
- groundborne vibration.

3.2.15 The following measures can control effects from the start but air overpressure would reduce due to the barrier effects of the sides of the shaft as the shaft got deeper; vibration is unlikely to propagate off site:

- notification of in advance of potentially affected NVSRs so occupants know when blasts will occur and what the effects may be;
- provision of a permanently manned contact number to report concerns etc.;
- good blast design from the outset;
- monitoring of air overpressure and vibration from the first blast to determine/confirm effects – this would be carried out with smaller charges to check initial effects – monitoring would be undertaken at representative receptors within 250 m of the shaft tops if present;
- if effects were found to be satisfactory, then blast weights could increase but effects would reduce downwards in any case;
- use of a blast mat to reduce air overpressure and other consequential effects – fly rock etc.; and
- effective stemming of the charge holes to maximise rock breakage and minimise air overpressure break out.

Passage of TBM or EPBM

3.2.16 For the slurry TBM or EPBM, there are no impulsive events as with D&B and it is more of a continual process as the machine passes under NVSRs over a period of a few days. With the depths likely, adverse effects are not anticipated. If there were concerns, these would relate to:

- a low level audible rumble increasing in loudness as the machine passes beneath the NVSRs followed by a decreases in loudness.

3.2.17 The following measures can control effects:

- notification in advance of potentially affected NVSRs so occupants know when blasts will occur and what the effects may be;
- provision of a permanently manned contact number for to report concerns etc.;
- monitoring of groundborne noise and vibration well in advance of the first NVSRs being passed to confirm and define effects; and
- slowing TBM speed if any reduction in levels is required although this would increase the passage time.

D&B Tunnelling

3.2.18 For D&B tunnelling within approximately 100 m of NVSRs, the main concerns would relate to:

- initial drilling of the shot holes; and
- firing of the charges.

3.2.19 The following measures will allow early assessment of potential effects and then reduction of these effects where necessary:

- notification in advance of potentially affected NVSRs so occupants know when blasts will occur and what the effects may be;
- provision of a permanently manned contact number to report concerns etc.;
- D&B monitoring prior to the face reaching approximately within 200 m of NVSRs – this will good definition of potential effects and implementation of control measures if required;
- working daytimes only when within approximately 100 m of NVSRs or only drilling and blasting during daytime hours;
- reducing blast rounds and hence charge weights; and
- reducing charge weights generally when blasting is going to occur within approximately 100 m of NVSRs.

4 Section 61 Consent Applications

4.1 INTRODUCTION

- 4.1.1 Prior to the commencement of any works, meetings will be held 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 s. 61 Prior Consent process. However, prior to this and in general terms, the contractor will be required to submit applications for s. 61 consents, variations and dispensations under the Control of Pollution Act 1974 (CoPA) for all construction activities that may generate a significant noise and/or vibration effect, including piling and activities to be undertaken outside of construction working hours for the Proposed Development set out in Requirement 8 of the draft DCO (**Document 2.1**), unless otherwise agreed with the relevant local authority. The full process and procedures to control construction noise under CoPA are provided in BS 5228-1:2009+A1:2014 for noise at Figure A1 on page 28 of that document.
- 4.1.2 Activities that typically do not require a s. 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 Proposed Development. In cases where there is a change of working method or procedure, or in the type of plant and equipment to be used from those provided in ES Chapter 15 Construction Noise and Vibration (**Document 5.15**), a revised noise and vibration assessment will be submitted to the local authorities for approval prior to works taking place.
- 4.1.3 The potential for significant noise and/or vibration effects, and therefore the trigger for the need to submit a s. 61 application to the relevant local authority, is defined against the following criteria:
- works at the tunnel construction compounds at Braint and Tŷ Fodol where 24 hour continuous working will be required for significant durations;
 - driven (sheet or column) piling operations within 50 m of a residential property;
 - vibratory compaction of access track or similar within 20 m of a residential property;

- any works outside of construction working hours for the Proposed Development within 250 m of a residential property;
- cable trench within 15 m of a residential property; and
- breaking out of foundations within 35 m of a residential property, if required anywhere.

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

4.1.5 Where a s. 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 8 of the draft DCO (**Document 2.1**)), a justification for the working 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 10 m, 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 for noise and BS 5228-2:2009+A1:2014 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.

- 4.1.6 The number, extent (geographically and in terms of construction activities) and duration of s. 61 applications will be the subject of timely consultation between the contractors and each relevant local authority. Draft applications will be submitted to the local authorities for discussion and agreement well in advance of any initial works commencing at any work site. 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 its decision within 28 days of the final application being received. If this does not occur, then there is an appeals process.
- 4.1.7 Typical generic and more specific noise and vibration control measures to be employed are included in section 4 of this NVMP and will be adopted on all sites, where applicable.
- 4.1.8 Agreement of proposed measures will be sought from the relevant local authority through s. 61 consent, dispensation or variation applications (see section 4.3).
- 4.1.9 Notification of the start of works and the provision of advanced information to local stakeholders is a key part of mitigating the effect of noise and vibration.

4.2 IMPLEMENTATION

- 4.2.1 Subject to agreements reached as referred to in paragraph 5.1.1, before any works are undertaken which may generate significant noise and/or vibration effects, including any works outside of construction working hours for the Proposed Development, the contractor will submit an application to the relevant local authority for prior consent under s. 61 of the CoPA.
- 4.2.2 The s. 61 application/s will set out the specific method of working, the actual working hours required, and the specific standards and measures that will be used at identified locations to minimise noise and vibration.
- 4.2.3 The contractor will engage in early discussions with the relevant local authority with respect to the information to be provided prior to submitting any s. 61 applications. This will include a list of the activities/stages for which separate s. 61 applications will be required. This is to enable all parties to focus on and agree those activities that could give rise to noise

complaint and the most efficient approach to the s. 61 consent, dispensation or variation.

- 4.2.4 As required by the CoPA, BPM will be employed and demonstrated through programme, method and noise predictions in the s. 61 consent application/s to the relevant local authority.
- 4.2.5 Justification, detailed description and assessment will be provided for activities outside of construction working hours for the Proposed Development for noise.

4.3 DISPENSATIONS/VARIATIONS

- 4.3.1 In the event that works (for which a s. 61 consent has been applied or consented) have to be rescheduled or modified (e.g. method or working hours) for reasons not envisaged at the time of the s. 61 application submission, the contractor will apply for a dispensation or variation from the relevant local authority in advance of the start of those works and at the time specified within the CoPA. The dispensation will be sought by means of an application for a variation to the agreed matters, setting out the revised construction programme or method and the relevant noise calculations.
- 4.3.2 Where the rescheduling relates to work of a more urgent or critical nature (such as a key activity likely to delay another key activity or activities), the contractor will apply to the relevant local authority using the s. 61 process, where practicable. This change application will be issued up to seven days (but at least two working days) before the start of those works.
- 4.3.3 Where working outside of core hours has been accepted in a s. 61 consent (including dispensation or a variation), occupiers of nearby residential or other sensitive properties who are likely to be affected will be informed, as soon as reasonably practicable, by the contractor and the likely duration of planned works.
- 4.3.4 The contractor will be required to maintain an up to date log of all relevant agreed hours and controls on working. This will incorporate any changes to working hours or practices set out in the NVMP which have been agreed through the s. 61 process.

4.4 UNSCHEDULED OVERRUNS

- 4.4.1 In the event that planned works not covered by a consent (either full s. 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.

- 4.4.2 The relevant local authority 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 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.
- 4.4.3 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. In addition to this, other local stakeholders will also be notified.

5 Public Notifications and Communications

5.1 PUBLIC NOTIFICATIONS

- 5.1.1 Occupiers of properties within the study areas for each area of works, as defined in ES Chapter 15 Construction Noise and Vibration (**Document 5.15**), 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 contractor.
- 5.1.2 Section 2.3 of the CEMP (**Document 7.4**) sets out further procedures for community engagement and provision of public information to local residents and occupiers about the works and for the handling of complaints.

5.2 COMMUNICATIONS

- 5.2.1 As described in the CEMP (**Document 7.4**), a community relations agency will be appointed to provide dedicated community relations and external communication support.
- 5.2.2 Amongst other duties, the community relations team will be responsible for managing the interface between the project and the communities in which, or adjacent to, the works are being undertaken. In respect of this NVMP, the following procedures will be implemented:
- Local residents will be informed of the commencement and likely duration of the construction work activities through a letter drop. The letter will include a contact telephone number which will be manned at all times that construction activities are being undertaken;
 - If construction activities are likely to generate noise or vibration levels in excess of the Construction Noise Threshold Levels (refer to Tables 1.1, 1.2 and 1.3), s.61 agreement will be obtained from

the local authorities, as appropriate, and local residents informed of the works at least 48 hours prior to works commencing; and/or

- 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. Appropriate action will be taken by the contractors. The relevant local authority will be advised as appropriate.

6 Noise Insulation and Temporary Re-Housing Policy

6.1 NOISE INSULATION AND TEMPORARY RE-HOUSING

- 6.1.1 Annex E of BS 5228:2009-1+A1:2014 provides example criteria for the assessment of significance of construction noise including example noise levels to trigger the offer of noise insulation (NI) and temporary rehousing (TRH). Exceedances of threshold levels trigger a responsibility on the developer to provide NI or a scheme to facilitate TRH if levels exceed the noise insulation levels by 10 dB or more. This represents additional protection for a residential property in the event that it is not practical to mitigate construction noise on site, or reduce exposure magnitudes to tolerable levels.
- 6.1.2 NI should be provided if the trigger levels shown in Tables 6.1 are predicted to be exceeded for a period of ten or more days of working in any 15 consecutive days, or for a total number of days exceeding 40 in any six month period.
- 6.1.3 The necessary eligibility assessments will be undertaken as part of the s. 61 consent process as early as possible in the programme to allow implementation of NI or TRH.
- 6.1.4 Where noise levels at affected residential properties are expected to exceed the trigger levels for the periods defined below (Table 6.1) and where the temporal criteria is met, approved noise insulation, (or reimbursement of the reasonable costs thereof), or TRH of occupants, as appropriate, will be offered.
- 6.1.5 Affected parties will be notified in advance of the commencement of works which may cause the relevant trigger levels to be exceeded.
- 6.1.6 NI or TRH will be offered to qualifying parties when noise levels are predicted, or measured, to exceed:
- a) the relevant trigger levels as detailed in Table 6.1; or
 - b) where the current ambient noise level is greater than the noise insulation trigger level:

- i. the ambient noise level shall be used as the noise insulation trigger level; and
- ii. the ambient noise level +10 dB shall be used as the temporary rehousing trigger level.

6.1.7 Acceptance of the offer of NI or TRH would be voluntary.

Table 6.1 Significance threshold and noise limit for construction noise				
Time	Relevant time period	Averaging time, T	Noise insulation trigger level, dB $L_{Aeq,T}$	Temporary rehousing trigger levels, dB $L_{Aeq,T}$
Monday to Friday	07:00 – 08:00	1 hr	70	80
	08:00 – 18:00	10 hr	75	85
	18:00 – 19:00	1 hr	70	80
	19:00 – 22:00	3 hr	65	75
	22:00 – 07:00	1 hr	55	65
Saturday	07:00 – 08:00	1 hr	70	80
	08:00 – 13:00	5 hr	75	85
	13:00 – 14:00	1 hr	70	80
	14:00 – 22:00	3 hr	65	75
	22:00 – 07:00	1 hr	55	65
Sunday and Public Holidays	07:00 – 21:00	1 hr	65	75
	21:00 – 07:00	1 hr	55	65

Note 1) Equivalent continuous A-weighted noise level predicted or measured at a point 1 m in front of the most exposed windows or doors leading directly to a

habitable room (living room or bedroom) in an eligible dwelling, due to construction noise only.

6.1.8 Noise insulation (or the reasonable costs thereof against agreed bills) will be offered to owners, where applied for by owners or legal occupiers, if all of the following apply to a property lawfully occupied as a permanent dwelling:

- a) The predicted noise level exceeds the noise trigger level for NI at the property during at least ten days out of any period of fifteen consecutive days or alternatively during 40 days in any six month period.
- b) NI does not already exist that is of an equivalent standard to that which would be allowed for under the Noise Insulation Regulations 1975.
- c) The property complies with all other requirements of the Noise Insulation Regulations 1975, as amended 1988.

6.1.9 TRH (or the reasonable costs thereof) will be provided, where applied for by legal occupiers, if both of the following apply to a permanent dwelling:

- a) The predicted noise level exceeds the noise trigger level for temporary rehousing at that property for at least ten days out of any period of 15 consecutive days or alternatively 40 days in any six month period.
- b) The property complies with all other requirements of the Noise Insulation Regulations 1975, as amended 1988.

6.1.10 This NI and TRH Policy is primarily applicable to residential buildings; however non-residential buildings will be considered on a case by case basis where these are occupied by noise sensitive uses such as educational establishments.

7 Noise and Vibration Monitoring

7.1 INTRODUCTION

7.1.1 A regular programme of noise and monitoring will be implemented as a minimum in accordance with the requirements below. Prior to any works commencing, meetings would be held with the local authorities and other stakeholders to review and agree the general requirements for monitoring if these have not already been agreed through the DCO process.

7.1.2 It is not currently proposed that routine vibration monitoring would be undertaken during the construction period except where known vibration inducing activity may occur and NVSRs are relatively close approximately within 50 m of the source.

7.1.3 Notwithstanding the above, receptors around the tunnel construction compounds at Braint and Tŷ Fodol and along the tunnel alignment, once finalised, will require special focus and monitoring in relation to the following activities:

- Blasting of the shaft once this commences at the base of the Glacial Till or the weathered Tuff – monitoring of vibration will occur for initial blasts at the nearest representative receptors if any are present within 100 m of either shaft; monitoring of air overpressure at the nearest residential properties if any are present within 250 m of either shaft.
- D&B of the tunnel should this option be chosen – monitoring of vibration and groundborne noise prior to the tunnel face reaching within approximately 200 m of the affected receptors.

7.1.4 From the above, there are others sources associated with the tunnelling but these will either be temporary, as affecting any individual NVSR, or any effects can be prevented by design and maintenance. On this basis, monitoring should not routinely be required unless considered so by the local authorities; however, pre-notification of effects and their likely duration would be an essential requirement. Sources that fall into this category are as follows:

- Passage under NVSRs of the slurry TBM or the EPBM – this would continue for a numbers of days dependent upon the bore speed

and then not occur again; if indeed audible, this would be heard as a low rumble increasing slowly in magnitude before fading away.

- Use of the TCR – this would be used for all three tunnelling options and would be a rail mounted system. There may be a very low rumble as this passes under NVSRs but this would not normally be expected to be audible unless there were discontinuities in the tracks or between track sections. However, these can be prevented and good maintenance is a requirement of the CEMP.

7.1.5 Notwithstanding the above, monitoring of the TBM or EPBM and the TCR will be undertaken in advance of reaching NVSRs if either the local authorities or other stakeholders raise concerns through community forums.

7.1.6 The contractor will submit the proposed method, the frequency and the location of monitoring locations to the relevant local authority for agreement prior to commencing works. Noise baseline levels will be agreed prior to commencement of construction.

7.1.7 The need for such, and any potential monitoring locations, would be identified in any s. 61 applications, and will be the subject of discussion between the contractor, National Grid and the relevant local authority prior to agreement of any s. 61 application.

7.1.8 In the event that complaints regarding noise and/or vibration are received, measurements will also 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 Part 1, noise and Part 2, vibration; measurements, if required, will also be undertaken in accordance with these and other appropriate standards.

7.1.9 Where noise or vibration monitoring is to be implemented, it should as a minimum be in accordance with the following procedures.

7.2 NOISE MONITORING

7.2.1 During 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 3 dB.

- 7.2.2 The ambient noise level, L_{Aeq} (see Note ⁽¹⁾ below) from all sources when measured between 1.2 m and 2.0 m above the ground at the monitoring locations shall either not exceed the appropriate level given in the Table 1.1 for short-term works; not exceed the appropriate level given in the Table 1.2 for longer-term works; or not exceed the appropriate level as agreed through the s. 61 process with the relevant local authority.
- 7.2.3 Where existing, baseline ambient noise levels significantly contribute to the local noise environment, the measured overall noise levels shall not exceed the existing ambient level L_{Aeq} by more than 3 dB(see Note ⁽²⁾ below) at the monitoring location as measured over the same period.
- 7.2.4 The exceptions to the above are measurements of groundborne noise from tunnelling activity. Whilst these can sometimes be measured free-field, externally, this is not likely with the depth of tunnel likely. On this basis, measurements are likely to be required in buildings on the ground floor or in basements.

7.3 AIR OVERPRESSURE MONITORING

- 7.3.1 As previously described from MTAN1, air overpressure levels can be very variable and hence planning conditions to control air overpressure are difficult to enforce. BS 6472-2:2008 “Human Response to Vibration in Buildings” (Ref 4.2.9.8 and Ref 4.2.9.9) indicates that levels from quarries are generally found to be around 120 dB (Lin) at nearby NVSRs and this will be the target value for blasting for the shaft construction. Monitoring of the first blasts to identify the highest likely levels will be undertaken at representative receptors within 250 m of the top of the shafts.

7.4 VIBRATION MONITORING

- 7.4.1 The contractor will also normally limit vibration levels arising from site activities at any residential building to a peak particle velocity (PPVs) of 1.0 mm/second in the vertical direction.
- 7.4.2 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 on vibration.

¹ The ambient noise level, L_{Aeq} at a noise monitoring location is the total L_{Aeq} from all noise sources in the vicinity (including the site) over the specified period.

² The existing ambient noise level, L_{Aeq} , at a noise monitoring location is the total L_{Aeq} from all the noise sources in the vicinity over the specified period prior to the commencement of the Works.

7.5 EXCEEDANCE ACTIONS

7.5.1 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 Proposed Development activities, then the specific work activity suspected of causing the exceedances would be stopped as soon as it is safe to do so and 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 that were identified to have caused the exceedance would not be allowed to continue/resume until the agreed remedial measures have been implemented;
- rectify any identified causes, and record actions;
- 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
- the above would be reported to the appropriate local authority if that was the agreed protocol.

7.6 REPEATED EXCEEDANCES

7.6.1 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 would be carried out:

- identification of exceedances;
- identification within 30 minutes of receipt of the exceedance notifications to determine whether the exceedances are directly attributable to the Proposed Development;

- inspection of all works currently being undertaken at the relevant construction site or area to determine if the noise 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 was identified to have been caused by a third party, details and location of these activities would be recorded and communicated to the third party. If the exceedance is directly attributable to the Proposed Development then the specific work activity suspected of causing the exceedance would be stopped as soon as is safe to do so and it would be determined 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 would be determined. Work activities that were determined to have caused the Construction Noise or Vibration Threshold Level exceedance would not be allowed to continue/resume until the agreed remedial measures have been implemented; and
- within 48 hours of the exceedance of sequential exceedances, an investigation to determine which activities and/or decisions resulted in the exceedances occurring would be carried out. A report would be compiled detailing the findings of the investigation.

8 Suitably Qualified Persons and Training

8.1 SUITABLY QUALIFIED PERSONS AND TRAINING

- 8.1.1 The person(s) responsible for the development of s. 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:
- a) appropriate training and education relevant to the management of construction noise and vibration;
 - b) experience of the s. 61 process and of monitoring of noise and vibration including groundborne noise and air overpressure;
 - c) confirmation that the individual is, at minimum, an Associate Member of the Institute of Acoustics (IoA); and
 - d) holds a 'certificate of competence' from the IoA course, 'Environmental Noise Measurement' (or equivalent).
- 8.1.2 Any team leader associated with the above must be able to demonstrate all of the above but be a full member of the IoA as a minimum.

9 Auditing, Reporting and NVMP Revisions

9.1 AUDITING AND REPORTING

- 9.1.1 Compliance with the requirements of this NVMP and statutory legislation will be monitored through routine inspections and audits.

Periodic checks

- 9.1.2 The environmental incident preventions arrangements will be inspected periodically to identify and address deterioration or inadequacies in the arrangements.

Monthly reporting

- 9.1.3 Performance in implementing this NVMP and the occurrence of real incidents will be reported monthly to National Grid's project management team, together with the lessons learned for incident prevention and control. Reporting to the local authorities will be agreed with them in terms of frequency and format.

Periodic audit

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

9.2 NVMP REVISIONS

- 9.2.1 Where checks, audits or other observations generate improvements to this NVMP, they shall be submitted to the Environmental Manager to form an addendum. The addendum, subject to appropriate approval by National Grid, will be circulated to holders of the NVMP.

- 9.2.2 It is not permitted that changes significantly 'downgrade' any measures identified within this document without re-consultation of stakeholders.

10 References

4.2.9.1: The Stationery Office Limited. Environmental Protection Act, Chapter 43, Part III. 1990.

4.2.9.2: The Stationery Office Limited. Control of Pollution Act, Chapter 40, Part III. 1974.

4.2.9.3: British Standards Institution. BS5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Noise, London, 2014.

4.2.9.4: British Standards Institution. BS5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Vibration, London, 2014.

4.2.9.5: Minerals Planning Policy (Wales) Minerals Technical Advice Note (Wales) 1: AGGREGATES March 2004.

4.2.9.6: European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701.

4.2.9.7: Noise Insulation Regulations 1975, as amended 1988, The Stationery Office.

4.2.9.8: British Standards Institution. British Standard 6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting'.

4.2.9.9: British Standards Institution. British Standard 6472-2:2008 'Guide to evaluation of human exposure to vibration in buildings – Part 2 Blast-induced vibration'.

Part B – Work Site and Activity Specific Controls and Arrangements

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1 Introduction

1.1 INTRODUCTION

- 1.1.1 Part B provides an example of a work site and specific activity controls and arrangements. This part is unpopulated at this stage but provides an example for further development by the contractor responsible for each element of the Proposed Development. The example in section 2 would be produced as appropriate for each relevant Proposed Development element rather than a generic, overarching one for the whole Proposed Development. This will allow the existing, pre-construction ambient noise levels to be taken into account for each Proposed Development element as appropriate. Isle of Anglesey County Council (IACC) and Gwynedd Council will be consulted, as appropriate, relative to the required works within their authority to agree appropriate controls.

2 Example of specific activity controls and arrangements

2.1 INTRODUCTION AND LOCAL AUTHORITY

2.1.1 Text

2.2 DESCRIPTION OF WORKS AND PROGRAMME

2.2.1 Text

2.3 NOISE SENSITIVE RECEPTORS AND BASELINE SOUND LEVELS

2.3.1 Text

2.4 NOISE AND VIBRATION THRESHOLDS AND LIMITS

2.4.1 Text

2.5 WORKING HOURS

2.5.1 Text

2.6 NOISE AND VIBRATION CONTROL MEASURES

2.6.1 Text

2.7 WORKS TO BE SUBJECT TO SECTION 61 APPLICATIONS AND SUBMISSION PROGRAMME

2.7.1 Text

2.8 PUBLIC NOTIFICATIONS AND COMMUNICATIONS

2.8.1 Text

2.9 ELIGIBILITY OF NOISE INSULATION AND TEMPORARY HOUSING

2.9.1 Text

2.10 NOISE AND VIBRATION MONITORING

2.10.1 Text

2.11 SUITABLY QUALIFIED PERSONS AND TRAINING INCLUDING RESPONSIBLE SITE PERSONNEL

2.11.1 Text

2.12 AUDITING AND REPORTING

2.12.1 Text