HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.2.6 ES Volume B - Introduction to the environmental assessments B6 - Noise and vibration

PINS Reference Number: EN010007

Application Reference Number: 6.2.6

June 2018

Revision 1.0

Regulation Number: 5(2)(a)

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Horizon Internal DCRM Number: WN0902-JAC-PAC-CHT-00015

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6 Noise and vibration

6.1 Introduction

6.1.1 This chapter provides an introduction to the technical basis for the noise and vibration assessment for the Wylfa Newydd Project. It includes a summary of legislation, policy and guidance; key points arising in consultation that have guided the noise and vibration assessment; and assessment methodologies and criteria.

6.1.2 The document *A Noise Action Plan for Wales 2013-2018* [RD1], defines environmental noise by citing European Directive 2002/49/EC relating to the assessment and management of environmental noise:

"The Directive defines environmental noise as unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity."

6.1.3 The World Health Organization (WHO) supplies a similar definition in their *Guidelines for Community Noise* [RD2], but in addition a simpler one is provided in the same document, namely 'unwanted sound'.

6.1.4 Vibration is defined by the *Design Manual for Roads and Bridges* (DMRB) [RD3] as follows:

"…vibration is a low frequency disturbance producing physical movement in buildings and their occupants. Vibration can be transmitted through the air or through the ground."

6.1.5 Noise and vibration can have an effect on the environment and on the quality of life enjoyed by individuals and communities. They may in certain circumstances lead to effects on human, ecological and infrastructure receptors. Potential noise and vibration effects should, therefore, be taken into account when assessing development proposals.

6.1.6 The Development Consent Order (DCO) Environmental Statement presents the noise and vibration assessments for all relevant activities included in the Wylfa Newydd Project. A subset of these activities are also assessed, permitted and regulated by Natural Resources Wales (NRW) under the Environmental Permitting (England and Wales) Regulations 2016. The combustion activities in boilers and standby generators at the Power Station Site, fall under Schedule 1 of these Regulations, and noise is assessed by the application for the relevant Environmental Permit (EP). However, these sources are also assessed in the DCO Environmental Statement as one component of the Power Station Site operational noise assessment.

6.1.7 The methodology for assessment of noise and vibration effects is also considered by other topics within the DCO Environmental Statement, and other documents supporting the DCO application including:

- chapter B2 (socio-economics) (Application Reference Number: 6.2.2);
- chapter B4 (public access and recreation) (Application Reference Number: 6.2.4);

- chapter B9 (terrestrial and freshwater ecology) (Application Reference Number: 6.2.9);
- chapter B11 (cultural heritage) (Application Reference Number: 6.2.11);
- chapter B13 (marine environment) (Application Reference Number: 6.2.13);
- combined topic effects chapters in C7 (Application Reference Number: 6.3.7); D16 (Application Reference Number: 6.4.16); E12 (Application Reference Number: 6.5.12); F12 (Application Reference Number: 6.6.12); and G12 (Application Reference Number: 6.7.12);
- Welsh Language Impact Assessment (Application Reference Number: 8.21);
- Health Impact Assessment Report (Application Reference Number: 8.19); and
- Equality Impact Assessment (Application Reference Number: 8.22).

6.1.8 The assessment of noise and vibration effects on ecological receptors and heritage assets are presented in the marine environmental, terrestrial and freshwater ecology and cultural heritage chapters in volumes D to H (Application Reference Number: 6.4.9 to 6.8.11), and are not included in the noise and vibration chapters.

6.1.9 The assessment of effects for noise and vibration is included in the following chapters:

- chapter C5 (Application Reference Number: 6.3.5);
- chapter D6 (Application Reference Number: 6.4.6);
- chapter E6 (Application Reference Number: 6.5.6);
- chapter F6 (Application Reference Number: 6.6.6);
- chapter G6 (Application Reference Number: 6.7.6); and
- chapter H6 (Application Reference Number: 6.8.6).

6.2 Legislation, policy and guidance

6.2.1 The following legislation, policy and guidance have been used to inform the scope and content of the noise and vibration assessment; assist in the identification of potential effects and mitigation; and influence the design of the Wylfa Newydd Project to reduce the significance of effects.

Key legislation

6.2.2 The relevant legislation and how it relates to the noise and vibration assessment is set out in table B6-1.

Table B6-1 Summary of key legislation

Legislation	Description
Environmental Protection Act 1990 Part III	Part III defines statutory nuisance, and provides the principal controls over it for local authorities. Under the Act, local authorities have a duty to inspect their areas to detect nuisances, and when satisfied that a statutory nuisance exists or is likely to occur or recur, to serve an abatement notice on the responsible party. They also have a duty to investigate any complaint made by a person living within their area. Though businesses have a defence of *"best practicable means",* failure to comply with a valid notice is a criminal offence.
Control of Pollution Act 1974	This Act contains powers for local authorities to deal with noise and vibration from construction and demolition sites.
Noise Insulation Regulations 1975 (as amended 1988)	These regulations document the procedures to be used to assess the requirement to provide noise insulation to residential properties adjacent to new and altered public highway schemes.
Environmental Noise (Wales) Regulations 2006 (as amended 2009).	These regulations require the Welsh Government to produce strategic noise maps for road, rail and agglomerations, to determine likely population noise exposure scenarios and establish action plans to reduce noise levels where needed and preserve environmental noise quality where it is good.

Key policy

6.2.3 The relevant national and local plans and policies, and how these relate to the noise and vibration assessment, are described in table B6-2.

Table B6-2 Summary of key policy

Policy	Description
Overarching National Policy Statement for Energy (EN-1) [RD4]	This National Policy Statement (NPS), designated by the Secretary of State (SoS) in July 2011, sets out the overarching national policy for delivery of major energy infrastructure projects. In section 5.11, it sets out factors likely to influence effects from noise, the requirements of a noise assessment and general advice on mitigation measures. At paragraph 5.11.3 it recognises that the likely noise effects will be determined by the characteristics of the *"…inherent operational noise"* from the Power Station Site and the proximity of noise sensitive receptors.

Policy	Description
	Paragraphs 5.11.4 of NPS EN-1 sets out the requirements of a noise assessment, including: • a description of the noise sources, with particular attention to tonal, impulsive or low frequency characteristics, which should include ancillary activities such as increased road traffic movements; • identification of noise sensitive premises and areas; • characteristics of the existing noise environment; • a prediction of how the noise environment will change, including during construction and the operational period at various times of the day. Reference should be made to relevant British Standards and other guidance; • an assessment (using relevant British Standards and other guidance) of the effect of the predicted change in noise environment on the noise sensitive premises and areas; and • mitigation measures including (from paragraph 5.11.12): - engineering – controlling noise and vibration emissions at their source (for example by using quiet machinery) and preventing noise from travelling (for example by building noise barriers); - lay-out – ensuring adequate distances between noise or vibration sources and sensitive receptors and locating other buildings where there are natural or man-made landscape features to screen the noisiest parts of the development; - administrative – limiting the types of activities allowed, or the times of day (or year) that certain operations are allowed, or specifying acceptable noise limits; and - sound insulation measures to dwellings – only to be applied once all other forms of mitigation have been exhausted. EN-1 (paragraph 5.11.9) also states that the SoS should not grant development consent unless it is satisfied that the proposals will meet the following aims: • avoid significant adverse impacts on health and quality of life from noise; • mitigate and minimise other adverse impacts on health and quality of life from noise; and • where possible, contribute to improvements to health and quality of life through the effective management and control of noise.

Policy	Description
National Policy Statement for Nuclear Power Generation (EN-6) [RD5]	This NPS, designated by the SoS in July 2011, sets out national policy on new Nuclear Power Stations identified as potentially suitable for deployment by 2025. At paragraph 3.12.3, it acknowledges that the operation of a new Nuclear Power Station is unlikely to lead to significant noise and vibration effects. However, it does note that greater impacts may occur from construction and transport activities, or if cooling towers (especially forced draught towers) are required. Paragraph 3.12.3 of NPS EN-6 also states that "*With appropriate mitigation, the subsequent effect of these potential impacts on human health is unlikely to be significant*".
Planning Policy Wales (Edition 9) [RD6]	This document sets out the land use planning policies of the Welsh Government, forming a strategic framework to guide development. It acknowledges that noise can be a material planning consideration, sets an objective for noise policies to minimise noise emissions and reduce ambient noise levels to an acceptable standard, and recommends that development plan policies should ensure potentially noisy developments are located in areas where effects can be minimised.
A Noise Action Plan for Wales 2013–2018 [RD1]	This plan details environmental noise action plans required by European Regulations, and information on Wales-wide policies on noise not covered by those Regulations.
Technical Advice Note 11: Noise [RD7]	TAN11 seeks to minimise the adverse impact of noise without placing unreasonable restrictions on development. It states that noise-generating development should not cause an unacceptable degree of disturbance (para 8). It sets out mitigation measures which are also outlined in the Overarching NPS for Energy (EN-1). TAN 11 encourages early engagement with relevant authorities to discuss mitigation measures that can be incorporated into the design.
Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN 1) [RD8]	This TAN sets out measures, including noise and vibration limits, to reduce the effects from quarrying and similar activities. The earthworks included in the Wylfa Newydd Project have some similarities with quarrying activities.
Minerals Planning Guidance 11: The Control of Noise at Surface Mineral	This guidance provides advice on "how planning controls and good environmental practice can be used to keep noise emissions to environmentally acceptable levels." Some parts of this document have been

Policy	Description
Workings (MPG11) [RD9]	superseded by Minerals Technical Advice Note 1 (MTAN1), whilst other parts remain extant for Wales.
A*nglesey and Gwynedd Joint Local Development Plan 2011 - 2026 - Written Statement* [RD10]	The Joint Local Development Plan, adopted July 2017, covers the local authorities of the IACC and Gwynedd Council and forms the basis for land use planning in these areas. The Joint Local Development Plan covers the period 2011 to 2026.The policies of relevance to the noise assessment include: Policy PS 9 relates to Wylfa Newydd and Related Development. It sets out a number of criteria that the Council will take into consideration in preparing their Local Impact Reports, including that: The burden and disturbance borne by the community in hosting a major national or regional nuclear related infrastructure project should be recognised; and appropriate packages of community benefits provided by the developer will be sought to offset and compensate the community for the burden and disturbance imposed by hosting the project. Policy PCYFF 2 (Development Criteria) relates to planning applications and states consent will be refused where the proposed development would have an unacceptable adverse impact (refer to item 7) on the health, safety or amenity of occupiers of local residences, other land and property uses or characteristics of the locality due to increased • activity; • disturbance; • vibration; • noise; • dust; • fumes; • litter; • drainage; • light pollution; or • other forms of pollution or nuisance. Policy AMG 4 (Coastal Protection) highlights a need to ensure that proposals on the coast do not cause unacceptable harm to the area's biodiversity interests due to noise (amongst other factors).

Policy	Description
	Policy GWA 2 (Waste Management and Allocated Sites) is applicable to a range of waste facilities, including for low level radioactive waste. This Policy requires that such facilities should not result in unacceptable disturbance to local communities through noise or vibration. Policy MWYN 3 (Mineral Developments): Mineral Developments highlights a need for mineral exploration, working or extension to cause no unacceptable harm to the amenity or health of local residents in terms of noise and vibration.
New Nuclear Build at Wylfa: *Supplementary Planning Guidance* [RD11]	The purpose of this Supplementary Planning Guidance (SPG) is to provide advice on important local matters relating to the proposed Wylfa Newydd Project and its Associated Development and to set out the IACC's response to national and local policy and strategies in the context of the Wylfa Newydd Project. The SPG is designed to be consistent with considerations in the Joint Local Development Plan (discussed above). The SPG also highlights some of the readily identifiable potential impacts of the Wylfa Newydd Project and outlines potential mitigation and enhancement measures to ensure that significant adverse effects are avoided or are minimised where possible. The document sets out a number of 'guiding principles' to support the delivery of the defined visions and objectives. Guiding principle seven refers to associated development and potential noise effects and planning conditions that may be imposed to control them. Guiding principle 26 relates to the Power Station Site and includes a requirement for the developers to assess measures to reduce noise related effects.

Key guidance

6.2.4 The noise and vibration assessment has been undertaken in line with a number of key technical guidance documents. These guidance documents are widely used across the UK and represent standard good practice for the assessment for the various consenting regimes. These are summarised in table B6-3.

Table B6-3 Summary of key guidance

Guidance	Description
British Standards	
BS4142:2014 Methods for rating and assessing industrial and commercial sound [RD12]	Methodology for rating and assessing the effects of new or existing sound sources on people. It uses outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
BS5228-1:2009+ A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise [RD13]	This Code of Practice provides guidance on the assessment and control of noise on construction sites, along with guidance on acceptable noise levels.
BS5228-2:2009+ A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration [RD14]	This Code of Practice provides guidance on the assessment and control of vibration on construction sites, along with guidance on acceptable vibration levels.
BS6472:2008 Guide to evaluation of human exposure to vibration in buildings [RD15]	Sets out guidelines for assessing blast-induced and non-blast-induced vibrations in two separate parts.
BS7445:2003 Description and measurement of environmental noise [RD16]	Contains guidance of relevance to the description and measurement of environmental noise.
BS8233:2014 Guidance on sound insulation and noise reduction for buildings [RD17]	Includes guideline values for noise levels within domestic homes and other building uses.
BS EN 12354-3:2000 Building acoustics: estimation of acoustic performance of buildings from the performance of elements. Airborne sound insulation	Specifies a calculation model to estimate the sound insulation or the sound-pressure level difference of a facade.

Guidance	Description
against outdoor sound [RD18]	
BS EN 12354-4:2000 – Building acoustics: estimation of acoustic performance of buildings from the performance of elements. Transmission of indoor sound to the outside [RD19]	Describes a calculation model for the sound power level radiated by the envelope of a building due to airborne sound inside that building.
Other guidance documents	
Acoustic design of schools: performance standards. Building Bulletin 93 [RD20]	These standards define suitable indoor ambient noise levels for a number of different educational activities and environments.
Acoustics of Schools: a design guide. [RD21]	Accompanies Building Bulletin 93 [RD20] and provides professional guidance and recommendations on achieving suitable indoor and external ambient noise levels.
Calculation of Road Traffic Noise [RD22]	The Calculation of Road Traffic Noise (CRTN) document presents a methodology for the prediction of road traffic noise from road traffic flow and other data.
Design Manual for Roads and Bridges (DMRB) [RD3]	DMRB contains advice on the assessment of noise and vibration from road traffic, particularly that from new/altered roads.
Guidelines for Community Noise [RD2]	This guidance provides guideline noise levels for community noise in specific environments, e.g. outdoor living areas and outside bedrooms.
Night Noise Guidelines for Europe [RD23]	Reviews health effects associated with exposure to night-time noise and recommends noise guideline values.
Guidelines for Environmental Noise Impact Assessment [RD24]	These Guidelines set out key principles and advice on noise impact assessments, but acknowledge that impact assessment methodologies should be specific to each project.
Horizontal Guidance for Noise Part 2 - Noise Assessment and Control [RD25]	Contains guidance issued by the Environment Agency on noise assessment for environmental permits and to assist in determining the 'best available technique' for an installation. Confirmed by NRW as applicable to the Wylfa Newydd Project.

Guidance	Description
Noise impact assessment – information requirements [RD26]	Sets out the information requirements for environmental permit applications that include noise modelling or spreadsheet calculations. Confirmed by NRW as applicable to the Wylfa Newydd Project.
ISO 9613-2:1996. Acoustics – Attenuation of sound propagation outdoors – Part 2: General method of calculation [RD27]	ISO 9613 is established as the primary standard used in the UK and much of Europe for the calculation of environmental sound propagation.
Procedure for the assessment of low frequency noise complaints. Revision 1 [RD28]	Aims to assist Environmental Health practitioners to distinguish cases of complaint where a low frequency environmental sound could account for the reported disturbance.

6.3 Consultation

This section provides a topic-specific account of scoping, statutory and non-statutory consultation undertaken to support the assessment. For a full overview of the environmental consultation activities undertaken for the Wylfa Newydd Project, refer to chapter A6 (EIA Scoping Report and Addendum) (Application Reference Number: 6.1.6) and chapter A7 (Consultation with environmental stakeholders) (Application Reference Number: 6.1.7).

Planning Inspectorate Scoping Opinion

6.3.2 In March 2016, Horizon submitted an updated Wylfa Newydd Project EIA Scoping Report to the Planning Inspectorate. In May 2017, Horizon submitted an Addendum to the March 2016 Wylfa Newydd Project Environmental Impact Assessment (EIA) Scoping Report to the Planning Inspectorate. Following a period of consultation with stakeholders, a further Scoping Opinion was received from the Secretary of State (via the Planning Inspectorate) on 14 June 2017.

6.3.3 The Wylfa Newydd Project EIA Scoping Report, Addendum and the subsequent Scoping Opinions inform the approach to the assessment. Table B6-4 provides an account of how comments raised by stakeholders in the Scoping Opinion have been considered in the noise and vibration assessment.

Table B6-4 Key issues raised through Scoping

Key issue raised	Action taken
2016	
SoS	
"Management Plans relied upon in the assessment should be sufficiently advanced at the point of the DCO application so as to provide confidence to the efficacy and should not be presented in generic, non-project-specific or outline terms".	Assessments are made on a parameter approach and mitigation included that includes a best practice as set out in the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6) and Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference Number: 8.13). Construction and Environmental Management Plans will be prepared by contractors engaged on the Project, detailing the practical means by which the requirements in the CoCP (Application Reference Number: 8.6) and CoOP (Application Reference Number: 8.13) would be met.
"The ES [Environmental Statement] should make it clear which elements of the assessment detailed in the technical note are for the proposed development and also detail how the significance of noise and vibration impacts will be determined in EIA terms".	The Technical Note referred to is presented as appendix B6-2 (Noise and Vibration Modelling and Assessment Methodology Report) (Application Reference Number: 6.2.21). References to specific sections of this document are contained within section 6.4 of this chapter.
"Details of potential vibration sources have been provided within Section 5.1 of appendix D of the Scoping Report; the Secretary of State considers that it would be useful for such detail of the construction works to be included within the ES chapter. Similarly, detail of other construction methods should be provided within the ES".	Details of noise and vibration sources, including those associated with construction, which are specific to each development, are contained within the 'design basis and activities' sections of the following noise and vibration chapters C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6) and H6 (Application Reference Number: 6.8.6).

Key issue raised	Action taken
“The ES should clearly present receptor locations and sensitivities, using figures where appropriate for static receptors”.	The general approach to identifying study areas and receptors and their sensitivities is presented in section 6.4 of this chapter. Receptor locations specific to each development are described in the study area section of the following noise and vibration chapters C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6) and H6 (Application Reference Number: 6.8.6). Where appropriate, supporting figures are provided.
“Details of the baseline monitoring surveys, along with their results, should also be included within the ES to ensure they are included within the application documents”.	The methods used during baseline monitoring surveys are summarised in section 6.4 of this chapter, and detailed in appendix B6-1 (baseline noise monitoring) (Application Reference Number: 6.2.20). Baseline survey results are summarised in the ‘baseline environment’ section of each noise and vibration chapters in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6). The results are presented in full as appendix B6-1 (Application Reference Number: 6.2.20).
“The ES should provide details of the baseline vibration environment and a justification for the choice of monitoring location”.	Information is provided within section 6.4 of this chapter.
“The potential noise and vibration impacts on marine ecological receptors should be assessed within the ES”.	The marine environment chapter, D13 (Application Reference Number: 6.4.13), considers noise and vibration effects on marine receptors, and is supported by appendix D13-9 (underwater noise baseline and modelling) (Application Reference Number: 6.4.91) which presents the results of

Key issue raised	Action taken
	specialised underwater noise modelling. Appendix D13-13 (noise at marine ecological receptors) (Application Reference Number: 6.4.95) provides further assessment specifically for terns.
"The Secretary of State notes that since these surveys the existing Wylfa Power Station has ceased operation; this is acknowledged in appendix D of the Scoping Report which states that if additional monitoring is not possible, the future baseline can be estimated by modelling the existing power station noise emissions and subtracting them from the existing measure baseline. This approach to determining the future baseline should be agreed with IACC and NRW."	Consultation with the IACC and NRW regarding baseline conditions after the Existing Power Station has ceased generation is summarised in table B6-9.
"The Scoping Report does not identify whether any baseline noise monitoring surveys have been undertaken at the [Off-Site Power Station Facilities] (i.e. the AECC, ESL and the MEEG). The Applicant should ensure they have sufficient data to characterise the baseline noise and vibration environment in these locations to enable a robust assessment to be undertaken."	Monitoring has been undertaken at locations representative of receptors potentially affected by the Off-Site Power Station Facilities. The IACC and NRW were consulted before and after the survey as detailed in tables B6-5 and B6-10 to ensure sufficient data were obtained. This is summarised in chapter E6 (Application Reference Number: 6.5.6) and presented in detail in appendix B6-1 (Application Reference Number: 6.2.20).
"Section 9.2.2 of the Scoping Report refers to various mitigation measures that will be considered in the design of the proposed development including engineering, lay-out, administrative and sound insulation measures. Where these measures are employed, they should be detailed in the ES."	Embedded and good practice mitigation is detailed in the 'design basis and activities' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6). Additional mitigation is also presented in each chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6) where required.
"The Secretary of State notes that an earth bund is proposed at the perimeter of the Power Station Site adjacent to Tregele (Section	This bund, referred to as Mound B, is embedded mitigation secured by means of the Phasing Strategy (Application

Key issue raised	Action taken
3.5.1 of appendix D of the Scoping Report), which is to be taken into account within the noise modelling. The Applicant should ensure that this bund is shown on relevant figures within the ES and secured either as mitigation and/or a works number within the DCO".	Reference Number: 8.29) and is described in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).
"The Secretary of State welcomes the production of Environmental Management Plans and recommends that a draft version of the plan is provided with the DCO application and is adequately secured therein."	Overarching mitigation and monitoring commitments for the Wylfa Newydd Project are set out in Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13). Construction and Environmental Management Plans will be prepared by contractors engaged on the Project in line with the Wylfa Newydd CoCP and relevant sub-CoCPs (Application Reference Number: 8.6 to 8.12).
"Consideration should be given to monitoring noise complaints during construction and when the development is operational."	Complaint monitoring and response protocols are presented in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13).
"The Secretary of State welcomes the proposal within Section 10 of appendix D of the Scoping Report to assess cumulative effects. The Secretary of State notes the existing power station will be decommissioned and the implications of these activities taking place concurrently with construction and/or operation of the proposed development should be considered. The Applicant should also ensure they consider the cumulative effects of the enabling works and associated development in addition to other plans or projects, which should be agreed with IACC and NRW."	Cumulative effects are discussed in volume I (Application Reference Numbers: 6.9.1 to 6.9.5).
IACC	

Key issue raised	Action taken
The IACC encouraged the preparation and implementation of an environmental management plan, and advised that the inclusion of a web-based real time environmental management system would be considered as best practicable means. Such a system could include noise and vibration monitoring, and access to such a system by both Horizon and IACC would be beneficial.	Overarching mitigation and monitoring commitments for the Wylfa Newydd Project are set out in Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13). Construction and Environmental Management Plans will be prepared by contractors engaged on the Project in line with the Wylfa Newydd CoCP and relevant sub-CoCPs (Application Reference Number: 8.6 to 8.12).
NRW	
“NRW advise that the ES in support of the DCO should fully assess both construction and operational impacts of noise and vibration on ecological receptors and on the special qualities of the Anglesey Area of Outstanding Natural Beauty (AONB).” “…NRW does not comment on assessment of impacts on human receptors with respect to noise and vibration with regard to the ES in support of the DCO…”	Details on how noise and vibration effects on ecological receptors have been assessed are presented in the terrestrial and freshwater ecology chapter B9 (Application Reference Number: 6.2.9) and marine environment chapter B13 (Application Reference Number: 6.2.13). The noise and vibration effects on the AONB are considered in chapter D16 combined topic effects (Application Reference Number: 6.4.16).
2017	
SoS	
"The SoS welcomes that monitoring locations and survey methodology for the park and ride facility and the A5025 off-line highway improvement were agreed with IACC. The locations should be identified within the ES, preferably depicted on a figure, and the survey methodology described. The SoS notes that the most recent survey at the A5025 was undertaken in 2015; the Applicant should ensure that these surveys remain valid and is advised to confirm this is the case within the ES."	Monitoring locations listed in table G6-2 and shown in figures G6-1 to G6-3 (Application Reference Number: 6.7.48). Survey methodology and statement regarding the continuing validity of the survey results are provided in section 6.4 of this chapter.

Key issue raised	Action taken
“The dates of noise surveys at the park and ride facility have not been provided within the Scoping Report addendum. The Applicant should ensure that the surveys are up-to-date, relevant and provide necessary detail within the ES.”	Dates of long-term and short-term monitoring at the proposed Park and Ride are detailed in section 6.3.2 of chapter F6 (Application Reference Number: 6.6.6). The methods used during baseline monitoring surveys are summarised in section 6.4 of this chapter, and detailed in appendix B6-1 (Application Reference Number: 6.2.20). Baseline survey results are summarised in the ‘baseline environment’ section of each noise and vibration chapter. The results are presented in full as appendix B6-1 (Application Reference Number: 6.2.20).
“The Scoping Report addendum notes that the Design Manual for Roads and Bridges (DMRB) identifies that vibration from road traffic can affect both buildings and disturb the occupiers. It requests to scope out an assessment of vibration for the off-line highways improvements. The SoS agrees with this approach for the operational phase however for clarity, the SoS considers that vibration should be considered during the construction phase."	It is confirmed that vibration effects during construction are considered in chapter G6 (Application Reference Number: 6.7.6).
“The SoS notes that no information has been provided in relation to ecological receptors and therefore does not consider that noise impacts on ecological receptors can be scoped out at this stage. Appropriate cross reference should therefore be made to the Terrestrial and Freshwater Ecology chapter of the ES."	An assessment of potential effects of noise disturbance on sensitive ecological receptors is included in each relevant chapter in volumes D to H (Application Reference Number: 6.4.9 to 6.8.9) with appropriate cross referencing to the relevant noise chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6).
“The ES should consider the potential for noise and vibration impacts during the construction phase on the inhabitants of the accommodation campus. The Applicant is directed to the comments of the IACC in this regard."	The site suitability of the Site Campus is considered in chapter D6, Section 6.5 (Application Reference Number: 6.4.6).

Key issue raised	Action taken
IACC	
“The Council would also wish to seek early clarity upon the detailed mitigation measures proposed for residential properties and businesses. These were previously alluded to in the voluntary Local Noise Mitigation Plan as part of the PAC 2 consultation, although such specific mitigation measures were absent. Such mitigation measures should not just be confined to noise and vibration, rather they should view environmental issues holistically and iteratively (i.e. noise; air quality; artificial light; and odour, etc.) and the impacts these will have.”	The IACC has been consulted, and their views on mitigation measures were considered, during the development of the Local Noise Mitigation Strategy (LNMS) in August 2017, this is included within the Wylfa Newydd CoCP (Application Reference Number 8.6).
The Council requested information about the noise and vibration levels likely to affect residents of the on-site campus, and would welcome the opportunity to comment on aspects of the building design.	The site suitability of the Site Campus is considered in chapter D6, Section 6.5 (Application Reference Number: 6.4.6). The IACC Environmental Health Officer (EHO) was consulted on the latest design information for the Site Campus.
NRW	
“The ES must assess the impacts on ecological receptors as a result of noise and vibration generated during the construction, operation and decommissioning of the Associated Development.”	Assessments of noise and vibration on ecological receptors are presented in the terrestrial and freshwater ecology chapters E9 (Application Reference Number: 6.5.9); F9 (Application Reference Number: 6.6.9); G9 (Application Reference Number: 6.7.9); H9 (Application Reference Number: 6.8.9).

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Statutory Consultation

Pre-Application Consultation Stage One

6.3.4 The aim of Pre-Application Consultation Stage One, undertaken in late 2014, was to share information available at the time with Horizon's key consultees and stakeholders, in order to consider feedback in ongoing design development. Table B6-5 outlines how key issues raised during Pre-Application Consultation Stage One have been considered in the assessment.

Table B6-5 Key issues raised during Pre-Application Consultation Stage One

Key issue raised	Action taken
The most frequently raised issue was construction noise and vibration, including from traffic using the local roads (existing roads and proposed A5025 improvements). Concerns about operational noise (especially at night), and potential effects on ecological receptors were also raised.	Construction noise and vibration is considered within the development specific noise and vibration chapters D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6), and H6 (Application Reference Number: 6.8.6), whilst C5 assesses noise and vibration from traffic generated by the whole Wylfa Newydd Project (Application Reference Number: 6.3.5). Operational noise at each development site, including any at night, is assessed within the same noise and vibration chapters in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6). Noise and vibration effects on ecological receptors are considered by the terrestrial and freshwater ecology chapters for each development in volumes D to H (Application Reference Number: 6.4.9 to 6.8.9), and by the marine environment chapter, D13 (Application Reference Number: 6.4.13), for the Wylfa Newydd Development Area.
Comments from the IACC centred on baseline noise monitoring and the	These comments have been discussed directly with IACC and incorporated in the baseline

Key issue raised	Action taken
assessment of noise from specific sources.	monitoring plans, modelling and assessment methodology documents which post-date the Stage One Pre-Application Consultation documentation.
The baseline monitoring, construction and operational assessment methodologies put forward by the first Preliminary Environmental Information (PEI) Report were accepted by NRW.	None required.

Pre-Application Consultation Stage Two

6.3.5 In September 2016, Horizon shared a Preliminary Environmental Information Report as part of Pre-Application Consultation Stage Two. This presented preliminary details of the predicted environmental effects and mitigation measures for any adverse effects identified. Table B6-6 outlines how key issues raised during Pre-Application Consultation Stage Two have been considered in the assessment.

Table B6-6 Key issues raised during Pre-Application Consultation Stage Two

Key issue raised	Action taken
IACC	
"The IACC would wish to see the results of the noise modelling in order to better understand the potential for significant effects."	Noise modelling results were not available at the time of Pre-Application Consultation Stage Two, but are now included within the 'Assessment of effects' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6).
"Noise modelling should also include consideration of underwater noise."	This is presented in chapter D13 (Application Reference Number: 6.4.13).
"The IACC will require more information on the methods to be employed to excavate rock including the anticipated number and frequency of blasting."	This information is provided in chapter D6 (Application Reference Number: 6.4.6).
"The IACC has concerns over the high number of residential properties experiencing major adverse effects during the construction phase. The IACC considers that insufficient information is provided to enable it to understand the magnitude of the effects, in particular the length of time and frequency over which the effects would be experienced."	The construction noise assessment for the Wylfa Newydd Development Area is presented in chapter D6 (Application Reference Number: 6.4.6). The construction noise assessment considers four scenarios throughout the construction programme which are considered to represent worst cases, and assigns effects at receptors based on the greatest magnitude of change expected for any scenario. The duration of all identified construction noise and vibration effects will be three months or longer.
"Confirmation that suitable analysis methods have been used to analyse baseline data (e.g. BS4142:2014 for L_{A90}s) to determine the mean and modal background noise levels, should be provided."	Appendix B6-1 (Application Reference Number: 6.2.20) details the data analysis undertaken.

Key issue raised	Action taken
"Additionally, the Council will require Horizon to apply for Control of Pollution Act 1974 Section 61 Consent Notices prior to commencing construction activities to ensure best practice is maintained."	This is recognised and included as good practice mitigation in the 'Design basis and activities' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6).
"Owing to the vast scale and variety of construction works being proposed the ability to monitor such effects on a 'real time' basis as they occur shall be fundamental to mitigation. In view of the above, the ability to inform local communities, by offering 'real time' web-based monitoring data should be an intrinsic part of any Environmental Management Plan proposed by Horizon Nuclear Power."	The requirement for noise monitoring is recognised and included as good practice mitigation in the 'Design basis and activities' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6), and within the Wylfa Newydd CoCP (Application Reference Number: 8.6). Each chapter and sub-CoCP describes a level of monitoring which is proportional to the activities proposed. The required structure of Section 61 applications presented in the Wylfa Newydd CoCP (Application Reference Number: 8.6) also includes a section for noise monitoring proposals. The approach to communication of monitoring results to the public will be developed in the contractors' Construction and Environmental Management Plans and is set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6).
"Similarly, the engagement of the local community in various liaison groups is paramount when looking at best practice for mitigation measures owing to the numerous environmental aspects associated with this development."	Formation of a Community Liaison Group is described in the good practice mitigation in the 'Design basis and activities' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6) and in the Wylfa Newydd CoCP (Application Reference Number: 8.6).
NRW	

Key issue raised	Action taken
NRW requested that detailed information on the project design, assessment approaches and results, including references and modelling files where necessary, may need to be provided.	Relevant design details are provided in the 'design basis and activities' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6). Other model files will be made available on request.
NRW requested more information about design measures taken to address transformer noise.	These are provided in chapter D6 (Application Reference Number: 6.4.6).
NRW requested justification for the use of the 2014 baseline as since then the Existing Power Station has ceased generation.	This was discussed with NRW on 16 May 2017. Further information is provided in table B6-10 and section 6.4 of this chapter.
The National Trust	
The National Trust requested additional information be provided specific to noise and vibration (including air overpressure) at their properties in the area.	The assessment does not aim to identify noise or vibration effects at an individual property level, but to provide an assessment of the effects on receptor groups within the local community. Due to the number of properties in the local area, it would not be appropriate to discuss the likely noise and vibration effects at every individual property. Chapter D6 (Application Reference Number: 6.4.6) includes construction and operational noise contour plots overlaid onto Ordnance Survey (OS) mapping, which will enable readers to understand the likely approximate noise levels that specific locations may experience. Information on air overpressure is presented in chapter D6 (Application Reference Number: 6.4.6).
The National Trust requested that construction and operational noise monitoring schemes are proposed for discussion.	As detailed by the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13), noise and vibration monitoring is proposed. The

Key issue raised	Action taken
	details regarding the precise locations, durations and frequency of such monitoring would be agreed with the IACC prior to the works taking place.
The National Trust requested consideration of vibration effects on Felin Gafnan Corn Mill.	This is discussed in the cultural heritage chapter D11 (Application Reference Number: 6.4.11).
National Trust requested further detail on mitigation of blasting effects is required relating to residential receptors and the marine environment.	Good practice mitigation to be applied to blasting activities is discussed at a high level in chapter D6 (Application Reference Number: 6.4.6) and further details are included in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). Assessment of vibration levels at dwellings due to blasting, and details of specific mitigation measures for those blasts will be included in the relevant Section 61 applications for the works.

Pre-Application Consultation Stage Three

6.3.6 Table B6-7 outlines how key issues raised during Pre-Application Consultation Stage Three have been considered in the assessment.

Table B6-7 Key issues raised during Pre-Application Consultation Stage Three

Key issue raised	Action taken
IACC	
"Horizon clearly state that the numerous mitigation measures relative to noise and vibration; in and around the DCO and Associated Development areas will be addressed within the ES. Therefore, the Local Authority and its partners should be given an opportunity to comment on the ES before the DCO submission in order to ensure that any technical aspects within the mitigation proposals are robust and resilient in order to protect the amenity of both residential properties and businesses alike."	Along with other key stakeholders, the IACC were provided with draft Environmental Statement chapters B6 (Application Reference Number: 6.2.6), C5 (Application Reference Number: 6.3.5) and D6 (Application Reference Number: 6.4.6) in September 2017.
"The IACC would also wish to seek early clarity upon the detailed mitigation measures proposed for residential properties and businesses. These were previously alluded to in the 'Voluntary Local Noise Mitigation Plan' as part of the PAC 2 consultation, although such specific mitigation measures were absent. Such mitigation measures should not just be confined to noise and vibration, but should view environmental issues holistically and iteratively (i.e. noise, air quality, artificial light, odour, etc.) and the impacts these will have."	Consultation with the IACC regarding the LNMS was held via conference call and follow up email on 10 August 2017. Further details were provided in the draft Environmental Statement chapter C5 (Application Reference Number: 6.3.5) which was submitted to the IACC in September 2017. The LNMS is included in the Wylfa Newydd CoCP (Application Reference Number 8.6).
NRW	
"The key changes presented at Stage Three PAC with potential effects on the AONB include the location of more offsite facilities at Llanfaethlu - the site lies outside and adjacent to	The predicted noise levels associated with the activities at the Off-Site Power Station Facilities site are presented in chapter E6 (Application Reference Number:

Key issue raised	Action taken
the AONB boundary but could cause effects upon AONB tranquillity due to noise and activity."	6.5.6) of the Environmental Statement, with landscape effects on the AONB presented in landscape and visual chapter E10 (Application Reference Number: 6.5.10), Combined topic effects are presented in chapter E12 (Application Reference Number: 6.5.12).
"Off-Site Power Station Facilities: In relation to noise and vibration during construction and effects upon AONB tranquillity, the report considers good practice mitigation will avoid additional significant effects. NRW consider that the noise modelling will need to be completed in order to confirm any temporary and longer term effects upon AONB tranquillity."	Noise modelling reported in chapter E6 (Application Reference Number: 6.5.6) extends to the AONB. This noise modelling has informed the corresponding landscape and visual chapter E10 (Application Reference Number: 6.5.10).
The National Trust	
Table 2.1 confirms the construction period as starting at 2018 (SPC works) and ending in 2034 (Intermediate level waste store). Tourist visitors and the National Trust property Felin Gafnan will thus experience construction for a period of 16 years, and thus associated noise and amenity disturbance for that period of time.	Noise levels during the construction of the Power Station, and later during the construction of the Intermediate Level Waste Store are assessed in section 6.5 of chapter D6 of the Environmental Statement (Application Reference Number: 6.4.6). Construction noise is inherently variable. The noise effects experienced by visitors to the area, and at properties in the local area will be dependent on the nature and location of activities being undertaken at any point in time. It should be noted that for construction activities associated with the Power Station, there would be a period of time with no construction activities before the much smaller scale construction of the Intermediate Level Waste Store.

Consultation on Additional Land

6.3.7 In February 2018, Horizon undertook consultation on additional land that had not been consulted on previously. The additional land was required to:

- accommodate proposals to create or enhance wetland sites across Anglesey as Ecological Compensation Sites;
- create two new ecological mitigation areas, and minor changes to the connection to the national grid at the Wylfa Newydd Development Area; and
- update the order limits for the A5025 Off-Line Highway Improvements, and minor refinements to the boundaries of the Off-Site Power Station Facilities and Logistics Centre.

6.3.8 The feedback from the consultation has been reviewed and the following points were noted by the IACC with respect to the Ecological Compensation Sites:

- The potential effects of transporting the spoil off-site needs consideration with respect to noise emissions.
- Prolonged use of hand held power tools for scrub clearance in open countryside has the real potential to create a statutory noise nuisance. The sound levels produced by 2-stroke petrol engines used in chainsaws are often described by complainants as 'very loud and annoying; similar to off-road trials and motocross motorcycles'. Therefore, it is recommended that alternative clearance methods are adopted whenever reasonably practicable to minimise the usage of petrol powered hand held tools.

Noise and vibration assessments are provided in appendix D1-2 (Ecological Compensation Sites: Assessment of Environmental Effects) (Application Reference Number: 6.4.18) for each of the Ecological Compensation Sites.

Non-statutory consultation

Environmental Impact Assessment Progress Report

6.3.9 An EIA Progress Report was provided to the IACC and NRW in 2016 with updated information on the design development and associated environmental assessment. Table B6-8 outlines how key issues raised in feedback from these stakeholders have been considered in the assessment.

Table B6-8 Key issues raised in response to the EIA Progress Report

Key issue raised	Action taken
IACC	
The council recommends the implementation of a noise management plan for every stage of	The requirement for a noise management plan is recognised and included as good practice mitigation

Key issue raised	Action taken
the wider Project to cover the multiple locations that could be potentially affected over the entire timescale of the Project.	in the 'design basis and activities' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6) and by the Wylfa Newydd CoCP (Application Reference Number: 8.6).
The council is concerned that Horizon is as yet unable to provide measured noise emission data for the transformers which are to be used on the current Project. This information will be required and it will also be necessary to conduct noise modelling to evaluate the propagation of sound emanating from the proposed Super Grid Transformers and the auxiliary transformers. The council considers that Horizon should aim to implement substantial mitigation measures for the Super Grid Transformers, such that the severity of change within the noise climate during normal operations surrounding the entire site would be negligible.	The noise emission data for the transformers used in the operational noise model are presented in appendix D6-1 (noise model inputs and outputs) (Application Reference Number: 6.4.23). Details of the mitigation proposed and an assessment of the potential noise effects are included in chapter D6 (Application Reference Number: 6.4.6). It has not been possible to present measured noise emission data for the transformers, as there are no identical transformers operational in the UK. This has been discussed with IACC on 8 March 2017. Criteria for low frequency noise and for the assessment of operational noise were also discussed and agreed. Full details of the derivation of the assumed noise emissions are provided in appendix D6-1 (Application Reference Number: 6.4.23), presenting the conservative assumptions made. The good practice measures presented in chapter D6 (Application Reference Number: 6.4.6) and the Wylfa Newydd CoOP (Application Reference Number: 8.13) include for post installation monitoring.
NRW	
The EIA progress report states that the designs of many operational noise sources have not yet been finalised, and the applicant has made assumptions regarding the sound power levels and proposed mitigation	At this stage of the Wylfa Newydd Project, the specific makes and models of all plant have not been finalised. Where representative 'candidate' plant have been identified, manufacturer's noise emission data

Key issue raised	Action taken
of these sources. When at the permitting stage, we would expect detailed derivations of any assumptions made in the assessment.	has been used if available. However, where this is not possible, reference has been made to other published data sources, or the assessor's professional experience. Where noise levels have been derived from first principles, as for the transformers, information on their derivation is presented. All noise emission data used as model inputs are presented in appendices to each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6).
Disregarding the fact that Horizon does not yet have all the necessary information to provide a detailed impact assessment, the general methodology used in the EIA progress report operational noise assessment is satisfactory and follows the ISO 9613-2[1] calculation standard and the BS 4142[2] assessment methodologies expected of applicants. [1] ISO 9613-2: 1996. Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. [2] BS 4142:2014 - Methods for rating and assessing industrial and commercial sound.	These methodologies have been used in the Environmental Statement as set out in this chapter.
The applicant states in the EIA progress report that the dominant frequency of transformer noise is likely to be at 100Hz. The assessment of the impact of low frequency noise at receptors should be considered if relevant.	This has been considered by reference to the NANR45 [RD28] methodology and is presented in chapter D6 (Application Reference Number: 6.4.6).
The applicant has calculated noise breakout through building walls and roofs in accordance with BS EN 12354-4:2000. When completing a detailed audit of this work we expect the submission of these calculations.	This information is presented in appendix D6-1 (Application Reference Number: 6.4.23).

Key issue raised	Action taken
As shown in the EIA progress report, the proposed mitigation measures to the Super Grid Transformers significantly reduce the predicted impact at receptors. Detailed explanation of how the assumed mitigation values are to be achieved, will be expected to be provided. This also applies to all other assumed mitigation values.	Where detailed designs are sufficiently developed, this information is provided in the 'design basis and activities' or 'additional mitigation' sections of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6). However, where detailed designs have not progressed, examples based upon standard approaches and/or conservative assumptions have been presented to demonstrate that it is reasonable to assume that the mitigation measures will be effective. A programme of post-installation testing is referred to by the Wylfa Newydd CoOP (Application Reference Number: 8.13).
General comments - Any further baseline studies undertaken should be included in the noise impact assessment. Appendix 6.03 notes that with the cessation of electricity generation at the Existing Power Station, there will be a need to determine the future baseline.	All baseline noise monitoring results are presented as appendix B6-1 (Application Reference Number: 6.2.20). The baseline after cessation of generation by the Existing Power Station was discussed during a conference with NRW 16 May 2017. Further information is provided in table B6-10 and section 6.4 of this chapter.
As previously stated and acknowledged by the applicant, the Environment Agency Noise impact assessments information requirements note should be used as an additional check for submission completeness. [1] Noise impact assessments – Information requirements for permit applications that include computer modelling or spreadsheet calculations - Version 3, January 2016 (Environment Agency)	All model inputs are presented in appendices to the noise and vibration chapters; C5-1 (operational road traffic noise input and output) (Application Reference Number: 6.3.29), D6-1 (Application Reference Number: 6.4.23), E6-1 (noise model inputs and outputs) (Application Reference Number: 6.5.14), F6-1 (noise model inputs and outputs) (Application Reference Number: 6.6.14), G6-1 (construction noise model inputs and outputs) (Application Reference Number: 6.7.18), and H6-1 (noise model inputs

Key issue raised	Action taken
	and outputs) (Application Reference Number: 6.8.14). The model files relevant to the combustion EP application are submitted along with the combustion EP application. Other model files will be made available on request.

Draft Environmental Statement

6.3.10 During September 2017, draft Environmental Statement chapters were provided to statutory and key non-statutory stakeholders. Table B6-9 outlines key issues raised and how these have been addressed within the Environmental Statement.

Table B6-9 Key issues raised in response to the Draft Environmental Statement

Key issue raised	Action taken
IACC	
"The submission recognises that the temporary worker's accommodation is a noise sensitive receptor. Therefore, any proposed mitigation measures for the site campus must be extremely robust to ensure that workers' health and safety is not compromised due to inadequate building design resulting in unacceptable internal noise levels."	An assessment of noise on all sensitive receptors is presented in chapter D6 (Application Reference Number: 6.4.6) of this Environmental Statement. Volume 3 of the Design and Access Statement (Associated Development and Off-Site Power Station Facilities) (Application Reference Number: 8.2.3) presents design principles that includes acoustic mitigation measures for the Site Campus to achieve the requirements and guidance provided in British Standard (BS) 8233:2014 [RD17], Approved Document E of the Building Regulations and CIBSE Guide B4 noise and vibration control for building service systems.
"The submission refers to additional noise mitigation measures that may be required as a result of noise monitoring results. IACC requires clarification as to when the need for the additional measures would be triggered, how quickly they would be	Overarching mitigation and monitoring commitments for the Wylfa Newydd Project are set out in Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13). This

Key issue raised	Action taken
installed and how this would be monitored."	includes details of what would happen in the event of a threshold breach. Further specific details about actions in the event of threshold breaches would be identified, discussed and agreed with the IACC during the preparation and submission of Section 61 applications.
"Clarification is required as to how can the relevant mitigation measures bring benefit to receptors when the noise intrusion may well have ceased before they can be physically implemented."	Details of the benefits of mitigation measures for receptors is provided in the relevant noise and vibration chapters of the Environmental Statement (see C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6) and H6 (Application Reference Number: 6.8.6). Overarching mitigation and monitoring commitments are set out and secured in Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13) with further commitment set out in the relevant sub-CoCPs (Application Reference Numbers: 8.7 to 8.12). The need for the additional measures would be identified, discussed and agreed with the IACC during the preparation and submission of Section 61 applications.

Topic-specific stakeholder engagement

6.3.11 In addition to the three formal stages of consultation outlined above, topic-specific consultation has been undertaken with relevant stakeholders. Table B6-10 summarises the details of the consultation that has taken place with respect to the noise and vibration assessment.

Table B6-10 Summary of topic-specific consultation

Date	Stakeholder	Title and format	Issues Arising	Action taken
1 September 2014	IACC and NRW	Meeting on baseline noise monitoring plan for the Wylfa Newydd Development Area.	A draft plan setting out the proposed noise monitoring locations and methodologies was discussed.	The draft plan was revised and finalised incorporating comments made at the meeting, see appendix B6-1 (Application Reference Number: 6.2.20).
30 October and 1 November 2014	IACC	Site meeting on baseline noise monitoring around the Wylfa Newydd Development Area.	Micro-siting of equipment.	Discussed and agreed with IACC EHO, see appendix B6-1 (Application Reference Number: 6.2.20).
24 November 2014	IACC and NRW	Meeting to discuss modelling and assessment methodologies.	A draft document setting out the preferred approach to the modelling and assessment of noise and vibration emissions generated by the Enabling Works, construction and operation of the Wylfa Newydd Project was circulated prior to the meeting.	The document was discussed in detail at the meeting and the IACC and NRW were provided with the opportunity to provide written comments, after which the document was finalised and issued, see appendix B6-2 (Application Reference Number: 6.2.21). IACC confirmed agreement with the methods in their response to the Scoping Report.
22 April 2015	IACC	Written correspondence on baseline noise monitoring plan for the A5025.	A draft plan was submitted.	Written comments received, and the plan updated, see appendix B6-1 (Application Reference Number: 6.2.20).

Date	Stakeholder	Title and format	Issues Arising	Action taken
1 and 15 June 2015	IACC	Site meeting on baseline noise monitoring along the A5025.	Micro-siting of equipment.	Discussed and agreed with IACC EHO, see appendix B6-1 (Application Reference Number: 6.2.20).
21 September 2015	The National Trust	Noise and Vibration Assessment Overview meeting.	Effects on National Trust tenants should be included in Environmental Statement.	Information incorporated into assessment and reporting, see chapter D6 (Application Reference Number: 6.4.6).
29 April and 12 May 2016	IACC	Email correspondence concerning baseline surveys.	Monitoring plans for a survey at proposed Park and Ride facility at Dalar Hir were agreed; The suitability of the 2015 measurements undertaken in Llanfaethlu for the Off-Site Power Station Facilities assessment was agreed.	IACC EHO invited to attend survey. Information incorporated into assessment and reporting, see appendix B6-1 (Application Reference Number: 6.2.20).
13 June 2016	IACC	DCO and A5025 Noise and Air Quality Scope.	Discussions included: • EIA PR comments; • noise criteria; • PEI Report 2 approach; • post Existing Power Station closure baseline; • Control of Pollution Act and environmental management; • traffic noise modelling; and	Information incorporated into assessment and reporting, see chapters C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6), and

Date	Stakeholder	Title and format	Issues Arising	Action taken
			• A5025 baseline monitoring and assessment.	H6 (Application Reference Number: 6.8.6).
21 July 2016	IACC	Conference call and follow up emails concerning monitoring during Site Preparation and Clearance works.	Agreed that monitoring could be short-term attended, and details to be set out in the Section 61 application for Site Preparation and Clearance.	Information incorporated into assessment and reporting, see Wylfa Newydd CoCP (Application Reference Number: 8.6).
8 March 2017	IACC	Conference call and follow up emails concerning approach to transformer noise assessment and mitigation.	Agreed that if measured data was not available to characterise transformer noise emissions, noise control criteria would be defined. Criteria for low frequency noise and for the assessment of operational noise were also discussed and agreed.	Information incorporated into assessment and reporting, see D6 (Application Reference Number: 6.4.6).
15 March 2017	IACC	Conference call and follow up emails concerning surface trial blasts.	EHO requested attendance at the trials.	IACC EHO attended, and was sent draft results report.
5 April 2017	IACC	Conference call to follow up on trial blasts and discuss survey requirements for Parc Cybi.	2002 data for Parc Cybi considered out of date.	Survey undertaken May 2017, see appendix B6-1 (Application Reference Number: 6.2.20).
25 April 2017	IACC	Conference call to discuss scenarios for road traffic noise modelling.	Scenarios agreed.	Information incorporated into assessment and reporting, see chapters C5 (Application Reference Number: 6.3.5).

Date	Stakeholder	Title and format	Issues Arising	Action taken
16 May 2017	NRW	Conference call to discuss draft EP noise report.	Of relevance to the DCO Environmental Statement, the issue of establishing baseline post Existing Power Station closure was discussed.	Additional Information incorporated into assessment and reporting, see D6 (Application Reference Number: 6.4.6).
10 August 2017	IACC	Conference call to discuss Local Noise Mitigation Scheme.	Criteria for noise insulation eligibility discussed.	Information incorporated into assessment and reporting, see Wylfa Newydd CoCP (Application Reference Number: 8.6).
16 November 2017	IACC	Meeting M136 Noise and Air Quality Consultation.	Discuss assessment results and mitigation.	Information incorporated into assessment and reporting, see chapters C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6), and H6 (Application Reference Number: 6.8.6).
29 December 2017	IACC	Email correspondence concerning Site Campus RIBA Stage 2 Acoustic Statement.	The acoustic criteria and recommendations outlined in this report should be considered in full as the design moves into RIBA Stage 3.	The site suitability assessment of the Site Campus is presented in chapter D6 (Application Reference Number: 6.4.6).

6.4 Topic-specific methodologies and assessment criteria

Introduction

6.4.2 The overarching approach to the EIA, including the approach to the assessment of cumulative effects, is provided in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1). This section outlines the specific methodology used to assess the effects of the Wylfa Newydd Project from noise and vibration. It outlines the methods and criteria used to:

- define the study area and identify topic receptors;
- establish the environmental baseline for topic receptors; and
- determine the value/sensitivity of receptors, the magnitude of change and significance of effect.

Assessment of parameters

6.4.3 As outlined in chapter B1 (Application Reference Number: 6.2.1), the approach adopted for the design of the WNDA Development, Off-Site Facilities and Associated Development is to set parameters, where necessary, for the extent of the development and key aspects of that development. The final design and construction methodology would be limited to these parameters and limits of deviation. As these parameters and limits of deviation vary between the various developments in the Wylfa Newydd Project they are considered on a site specific basis in chapter 6 within volumes D (Application Reference Number: 6.2.6), E (Application Reference Number: 6.5.6), F (Application Reference Number 6.6.6), G (Application Reference Number: 6.7.6) and H (Application Reference Number: 6.8.6).

Identification of study areas

6.4.4 The initial study areas for each development site are based upon buffer zones approximately 600m from their boundaries. There is no current authoritative guidance on how far a noise study area should extend from the construction activities or operational noise sources at each site. For the purposes of this Environmental Statement, the study areas for these types of noise sources have been identified using professional judgement with consideration for guidance within the *DMRB* [RD3] which uses a distance of 600m to define a calculation area.

6.4.5 Whilst construction and operational noise from some development sites may be audible at distances in excess of 600m, this topic study area is large enough to encompass the nearest noise-sensitive receptors, which would be used to classify the maximum magnitude of effect. Based on the noise impact assessment of receptors within 600m, consideration has been given to the likelihood of significant noise effects outside the topic study area, and the study area has been extended where relevant. For example, at the Wylfa

Newydd Development Area, the initial noise modelling indicated that construction noise effects would occur at greater distances than 600m and therefore the study area has been extended to include receptors up to 3.2km away.

6.4.6 For the purposes of assessing potential noise effects associated with road transport within chapter C5 (Application Reference Number: 6.3.5), the study area has been defined as a 600m buffer around the 'affected route', with reference to guidance in the DMRB [RD3]. Whilst it is acknowledged that guidance in the DMRB [RD3] is aimed at the assessment of new or altered roads, it is also considered relevant for the purposes of defining a study area to assess changes in traffic on existing roads. Roads are considered to be an affected route if there is the possibility of a change of 1dB $L_{A10\ 18hr}$ or more in the short-term or 3dB $L_{A10\ 18hr}$ or more in the long term (see glossary for definitions of dB and $L_{A10\ 18hr}$). It is acknowledged that the DMRB [RD3] states that a road in a rural area may have effects beyond 600m, hence the study area has been kept under review during the assessment process, to ensure that all potentially significant road noise effects are identified.

6.4.7 A study area for ship noise has also been considered. Due to the high mobility of both the noise sources and recreational receptors for ship noise, instead of defining a fixed study area, noise predictions for a single ship movement have been undertaken at representative stand-off distances. If the additional Wylfa Newydd Project-related ship traffic is considered likely to result in an increase of 25% or more in total ship movements within a designated shipping lane, then the change in overall ship noise has been estimated.

6.4.8 Vibration effects are commonly experienced over much lesser distances than noise effects. Hence the study areas described above will ensure that all potentially significant vibration effects are characterised.

6.4.9 The final study area for each development site is described in the 'study area' section of each noise and vibration chapter in volumes C to H (Application Reference Number: 6.3.5 to 6.8.6). Where study areas have been expanded to more than a 600m buffer, this is stated. Each chapter is accompanied by a figure in volumes C to H (Application Reference Number: 6.3.32 to 6.8.29) clearly presenting the study area.

Identification of receptors

6.4.10 The construction, operational and decommissioning noise and vibration assessments include consideration of the following sensitive receptors in the vicinity of the Wylfa Newydd Project and associated transportation routes.

- Human receptors – when present at dwellings, schools, hospitals, places of worship, recreational areas (land and sea-based), or other noise-sensitive locations.
- Ecological receptors – within land-based areas designated for protected species (fauna only) and in the marine environment. These are described and assessed in the terrestrial and freshwater ecology chapters for each

development in volumes D to H (Application Reference Number: 6.4.9 to 6.8.9), and the marine environment chapter D13 (Application Reference Number: 6.4.13).

- Infrastructure receptors – both historic, such as listed buildings and registered parks and gardens, and contemporary, such as the Existing Power Station, and statutory or other underground services. Heritage assets are described and assessed in the cultural heritage assessment chapters for each development site in volumes D to H (Application Reference number: 6.4.11 to 6.8.11).

Identification of baseline conditions

6.4.11 Environmental noise levels at a receptor can be influenced by a complex mix of man-made and natural noise sources, as well as the interaction of various physical factors which can affect how noise travels from the source to the receptor. This section sets out how the environmental baseline for noise and vibration was determined.

6.4.12 The noise and vibration assessments make reference to a number of different baseline scenarios. These are specific to each assessment, but fall within the following generalised categories:

- Existing baseline conditions – defined through the following:
  - measured baseline – determined by noise or vibration measurements at locations representative of conditions experienced by the identified sensitive receptors; and
  - modelled baseline – determined by calculation e.g. for road traffic noise this would be calculated based on the number of existing traffic movements along a road.
- Future baseline – conditions predicted to prevail at a specified date in the future in the absence of the Wylfa Newydd Project. Clearly, measurements of future baselines are not possible; hence, all future baselines are modelled.

6.4.13 Comparison of modelled assessment results with modelled baselines enables the change due to the development to be clearly established, whilst comparison of measured and modelled existing baselines enables the accuracy of the noise model to be determined. Modelled baselines are specific to particular noise sources, for example traffic noise, whilst measured baseline data allow the combined effect of the full range of environmental noise sources to be characterised.

Wylfa Newydd Development Area survey

6.4.14 The PEI Report published as part of Pre-Application Consultation Stage One presented a summary of baseline noise measurements undertaken on behalf of Horizon in the vicinity of the Wylfa Newydd Development Area in 2010. Two sets of subsequent measurements in the area were presented in the EIA

Progress Report; the first set was taken by the IACC in 2012, and the second set taken on behalf of Horizon in 2014.

6.4.15 An additional location was monitored in 2015 in response to a change in the access arrangements at one of the properties south of the Wylfa Newydd Development Area. Since the survey objective and methodology were the same as for the locations monitored in 2014, the term '2014 survey' should be understood to include the monitoring at this 2015 location. The validity of these measurements in forming the baseline was discussed and agreed with the IACC and NRW (see table B6-10).

6.4.16 Locations of all these baseline noise monitoring points are shown in figure B6-1 (Application Reference Number 6.2.22) and in appendix B6-1 (Application Reference Number: 6.2.20). Details of the monitoring locations and survey durations are summarised in table B6-11.

6.4.17 Since the Power Station would operate on a continuous basis, noise measurements were also undertaken on a continuous basis to ensure adequate characterisation of noise levels during the normal working day, evening, night-time and weekend periods. Environmental noise levels are inherently variable, being influenced by a number of man-made and natural factors. The survey periods were therefore selected to ensure that this variability was characterised. Full details of the equipment used and methodology employed during the survey are presented in appendix B6-1 (Application Reference Number: 6.2.20). The survey locations are also presented on figure D6-1 (Application Reference Number: 6.4.101).

Table B6-11 Wylfa Newydd Development Area baseline monitoring locations

Survey	Monitoring point reference	Location	Comments
Horizon 2010	A1	Felin Cafnan	Duration one to two weeks in July 2010. Existing Power Station operating two reactors.
	A2	Tyn Refail, Tregele	
	A3	Clovelly, A5025	
	A4	Park Lodge, west of Cemaes	
IACC 2012	B1	Clovelly, A5025	Duration two to three weeks in March–May 2012. Existing Power Station operational for the majority of survey, with reactor two shut down part way through survey at Cafnan.
	B2	Douglas Inn, Tregele	
	B3	Cafnan	
	C1	10 Maes Capel	

Survey	Monitoring point reference	Location	Comments
Horizon 2014	C2	Bron Wylfa, Ffordd Caergybi	Duration five to seven weeks in October and November 2014. Existing Power Station operating one reactor.
	C3	Ysgubor Ddegwm, Tregele	
	C4	Maes-y-Bugail (plus Sŵn-y-Môr for two weeks)	
	C5	Hafan (opposite Jam Factory)	
	C6	Tre'r-Gof-Isaf	
Horizon 2015	C7	Caerdegog Uchaf	Supplement to the 2014 survey. Duration of five weeks in October and November 2015. Existing Power Station operating one reactor. Monitoring at this location was undertaken at this point in time due to a change in access arrangements.

6.4.18 The IACC and NRW have agreed that no particular sources of vibration have been identified as likely to affect sensitive receptors for the existing baseline scenario (as stated in appendix B6-2 (Application Reference Number: 6.2.21)). A baseline vibration survey was therefore not considered necessary.

6.4.19 However, baseline vibration measurements have been undertaken during a trial blast exercise in 2013, carried out to obtain information about the ground vibration attenuation properties across the Wylfa Newydd Development Area, as part of the design process for rock winning at the site.

6.4.20 One vibration monitor, a 'Vibrock V901', was set up at a location within the Wylfa Newydd Development Area, with the purpose of measuring the background vibration levels experienced at that location. This instrument recorded peak particle velocity (PPV) continuously over the following periods:

- 21 October 2013 (15:53) to 30 October 2013 (24:00), and
- 7 November 2013 (09:49) to 10 November 2013 (15:40).

A5025 and Off-Site Power Station Facilities survey

6.4.21 In June 2015, a survey was undertaken to characterise existing noise levels at sensitive receptors in the vicinity of certain sections of the existing A5025

and the A5025 Off-line Highway Improvements, considered likely to experience perceptible changes in traffic noise. The noise monitoring locations included three in Llanfaethlu, which, it was agreed with the IACC, could be used to represent noise levels at receptors in proximity to the proposed Off-Site Power Station Facilities. The June 2015 survey is considered to remain valid as no potential substantial changes in traffic noise since 2015 have been identified. For reference, a 25% increase in traffic flows would equate to a 1dB(A) increase in traffic noise levels if all other factors remained unchanged.

6.4.22 The locations of these baseline noise monitoring points are shown in appendix B6-1 (Application Reference Number: 6.2.20) and described in table B6-12.

6.4.23 A combination of long-term (one to two weeks) and short-term (three hours, in accordance with the Shortened Measurement Procedure published in CRTN) measurements were used. Full details of the equipment used and methodology employed are presented in appendix B6-1 (Application Reference Number: 6.2.20).

Table B6-12 A5025 and Off-Site Power Station Facilities baseline monitoring locations

Survey location	Long term monitoring location	Short term monitoring location
R1. Valley	a) Glyn Villa	b) Ynys Wen Cemetery
R2. Llanynghenedl		a) Layby adjacent to converted chapel
R3. Llanfachraeth	a) Erw Goch Bach b) Dolydd c) Bryn Farm d) Field south-east of Ysgol Llanfachraeth	
R4. Llanfaethlu	a) Rhos Ty Mawr b) Bryn Gwyn	c) Layby north of Rhos Ty Mawr
R5. Llanrhuddlad		a) Layby north of westerly turning for Cylch-y-Garn
R6. Cefn Coch	a) Tyn Felin b) Rhandir	
R7. Tregele	a) Taldwrst	

6.4.24 With the exception of existing road traffic, no particular sources of vibration have been identified as likely to affect sensitive receptors for the existing baseline scenario. DMRB [RD3] states, "*Significant ground-borne vibrations may be generated by irregularities in the road surface."* As the relevant sections of the A5025 would have been resurfaced as part of the On-line Highway Improvements, irregularities in the road surface are considered unlikely and no traffic-induced vibration survey was considered necessary.

Park and Ride survey

6.4.25 Noise monitoring was undertaken at four locations in the vicinity of the proposed Park and Ride, during June and July 2016. Two of the monitoring locations were within the footprint of the proposed development, while the other two were in the vicinity of nearby sensitive properties. Long-term noise monitoring was undertaken at three locations, with short-term monitoring undertaken at the remaining location (within the development site boundary).

6.4.26 Full details of the equipment used and methodology employed are presented in appendix B6-1 (Application Reference Number: 6.2.20). The locations of these baseline noise monitoring points are also shown in appendix B6-1 (Application Reference Number: 6.2.20) and described in table B6-13.

Table B6-13 Park and Ride baseline noise monitoring locations

Monitoring point reference	Location	Comment
LT1	Open land at rear of residential property in Cefn Rhosydd	Long term – duration one week
LT2	Open land adjacent to Holyhead Road	Long term – duration one week
LT3	Rear of Gwyddfor Residential Home, Holyhead Road	Long term – duration one week
ST1	Open land adjacent to B5111	Short term – duration three hours

6.4.27 With the exception of existing road traffic, no particular sources of vibration have been identified as likely to affect sensitive receptors for the existing baseline scenario. With respect to vibration from road traffic, figure 3 from "*Transport and Road Research Laboratory Report No RR53 – Ground Vibration Caused by Civil Engineering Works*" [RD29] provides a summary of measurements taken by the Transport and Road Research Laboratory which indicates the relative effects of various construction related sources. This figure indicates that, for a heavy lorry on a poor road surface at 8m, a PPV of 0.1mm/s is expected. The DMRB [RD3] advises that should the level of vibration at a receptor be predicted to rise to above a level of 0.3mm/s, or an existing level above 0.3mm/s is predicted to increase, then this should be classed as an adverse impact from vibration. Due to the distances between

receptors in the vicinity of the Park and Ride and the road network used to access this site, a baseline vibration survey was not considered necessary.

Logistics Centre survey

6.4.28 Noise monitoring was undertaken at five locations in the vicinity of the proposed Logistics Centre, during May 2017. Long term monitoring was undertaken at one location within the footprint of the proposed development, while additional short term measurements were undertaken in the vicinity of nearby sensitive properties.

6.4.29 Full details of the equipment used and methodology employed are presented in appendix B6-1 (Application Reference Number: 6.2.20). The locations of these baseline noise monitoring points are also shown in appendix B6-1 (Application Reference Number: 6.2.20) and described in table B6-14.

Table B6-14 Logistics Centre baseline noise monitoring locations

Monitoring point reference	Location	Comment
PC1	Location of proposed Logistics Centre	Long term – duration one week
PC2	Adjacent to existing residential properties at Maes-Y-Delyn	Short term
PC3	Adjacent to existing residential properties at Kingsland Road	Short term
PC4	Adjacent to existing residential properties at Penrhyn Geiriol	Short term
PC5	Adjacent to Treaddur Bay caravan park	Short term

6.4.30 With the exception of existing road traffic, no particular sources of vibration have been identified as likely to affect sensitive receptors for the existing baseline scenario. Due to the distances between receptors in the vicinity of the Logistics Centre and the road network used to access this site, a baseline vibration survey was not considered necessary.

Technical methodology

6.4.31 This section sets out methods used to predict the changes in noise and vibration levels that would result from the Wylfa Newydd Project.

Noise modelling overview

6.4.32 Noise modelling is commonly undertaken either by spreadsheet-based techniques, or by commercially available computational noise modelling software packages. Both spreadsheets and software packages can implement recognised British and International Standard noise calculation methodologies. The software packages enable a greater number of noise

sources and receptors to be considered in a more efficient manner and are thus less labour intensive for large scale assessments. Hence, software packages are commonly used to evaluate the noise effects of complex projects such as the Wylfa Newydd Project.

6.4.33 The Computer Aided Noise Abatement (CadnaA) noise modelling software published by DataKustik GmbH, has been selected for the Wylfa Newydd Project due to its widespread use and proven track record. Its use was agreed with both the IACC and NRW during a meeting held on 1 September 2014. CadnaA version 2017 has been used to model both construction, operational, and traffic noise levels associated with the Wylfa Newydd Project at identified receptors.

6.4.34 The CadnaA software allows a three-dimensional environmental model to be constructed using digital mapping and topographic data (ground height contours). As part of this assessment, three-dimensional models have been constructed for each development site being assessed using data obtained from OS and topographic surveys undertaken on behalf of Horizon.

6.4.35 The noise modelling process is complex, but in simple terms it takes into account the data presented in table B6-15.

Table B6-15 Noise modelling parameters

Modelling Parameter	Details
Noise source location and height	Based on the OS digital data and development layout plans.
Noise emission data	Sound power levels or sound pressure levels and, where relevant, directivities (a measure of the directionality of the noise source). These data have been taken from published sources (including relevant British Standards), field measurements or data supplied by others e.g. manufacturers.
Noise source on-time	This reflects the operational hours and duration of intermittently operating construction noise sources.
Receptor locations and heights	Based on OS digital data. Receiver heights of 1.5m and 4.0m above ground level have been selected based on guidance contained in the *DMRB* [RD3], in order to represent the approximate height of a living room and a first-floor window. The selection of both heights should account for any variations in layout and presence of two-storey receptors. The predicted noise levels at the two different heights have been compared for each receptor, and the higher noise level used in the assessment. The noise

Modelling Parameter	Details
	contour plots presented in this assessment relate to the levels calculated at 4.0m. Noise levels commonly increased slightly with height, due to reduced barrier attenuation and reduced ground absorption effect.
Distance between noise source and receptor	Based on the development layout plans and OS digital data, see Volume A figure booklet (introduction to the project and approach to the EIA) (Application Reference Number: 6.1.10).
Ground contours	Derived from OS digital data, topographic surveys and development layout plans, including the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) for the Wylfa Newydd Development Area.
Building heights	From development plans, topographic surveys or assumptions e.g. a two-storey house is assumed to have a height of 5.7m above ground level.
Small building features (i.e. those with areas less than $10m^2$)	That relate to small outbuildings and other structures have been removed from the dataset to ensure that screening is only provided by large structures in the model.
Building and barrier sound absorption or reflection	Where required by the calculation standard, a correction is applied to sound being reflected by a building, barrier or other relevant obstacle.
Ground effect	Related to the type of ground cover between the source and the receptor; based on aerial photography, site observations, OS mapping and development layout plans. Acoustically porous ground (such as grassland or other ground surfaces suitable for growing vegetation) provides more attenuation than acoustically hard ground (such as concrete, water and paving). For propagation over terrain, mixed ground (corresponding to a ground absorption coefficient of 0.5) has been used for all calculations presented in this assessment. For propagation over water, hard ground (corresponding to a ground absorption coefficient of 0) has been used.

6.4.36 CadnaA allows the calculation of noise levels at specific points (e.g. at selected receptors) or on a grid basis at a specified interval. Noise levels calculated on a grid basis are used to plot noise contours. These are

presented as figures within each noise and vibration chapter and should be interpreted as presenting indicative noise levels only, due to the potential inaccuracy inherent in any grid calculation that requires interpolation (estimation) between adjacent calculation points.

6.4.37 The approach detailed above is relevant to the prediction of outdoor noise levels, which is sufficient for the majority of noise assessment guidelines. However, indoor noise levels can also be of relevance and are required by certain guidelines. When required, indoor noise levels are predicted from the incident outdoor noise levels using spreadsheet techniques which implement standard acoustic formulae.

6.4.38 The specific calculation methodologies relevant to the modelling of each noise source are presented in appendix B6-2 (Application Reference Number: 6.2.21).

Vibration calculation methodologies

6.4.39 Spreadsheet techniques, implementing national or international calculation standards, are used for the modelling and prediction of vibration effects at the planning/permitting stage, due to the lower number of sources and receptors considered when compared to noise assessments.

6.4.40 The prediction of vibration propagation through the ground is complex and, for a detailed analysis, a large number of physical factors characterising the ground conditions and the different types of vibrational waves have to be taken into account. As a result of these factors, the accurate prediction of vibration propagation requires complex computational models populated with detailed input data, and this process is beyond the scope of a vibration assessment at this stage of the Wylfa Newydd Project. Simple empirical prediction methods have been used in conjunction with currently available basic data relating to equipment. These empirical prediction methods have a tendency to overestimate vibration levels and hence provide a conservative method of establishing potential vibration magnitude.

6.4.41 The vibration modelling outputs are predictions of vibration magnitudes at selected receptors. Contour plots are not considered necessary since vibration effects are not normally assessed at open ground, and since vibration effects extend over smaller distance than noise effects, a smaller number of receptors require assessment.

6.4.42 The specific calculation methodologies relevant to the modelling of each vibration source are presented in appendix B6-2 (Application Reference Number: 6.2.21).

Summary of noise and vibration modelling methods

6.4.43 The calculation methodologies, parameters, and relevant guidance documents for both noise and vibration are summarised below in table B6-16 for ease of reference.

6.4.44 In order to build the noise and vibration models it is necessary to make certain assumptions regarding the precise nature and location of the sources. They are therefore based on certain specific defined development layouts. The DCO application includes parameters, for example around operational buildings on the Power Station Site and landscape mounds on the Wylfa Newydd Development Area. In addition, parameters have also been defined for other aspects of the Associated Development and Off-Site Power Station Facilities. The influence of these parameters on the conclusions of the noise and vibration assessments are discussed in chapters C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6) and H6 (Application Reference Number: 6.8.6).

Table B6-16 Summary of calculation methodologies

Topic	Calculation Methodology	Parameter and units
Construction and earthworks noise	BS5228-1	dB $L_{Aeq\ T}$
Construction and earthworks vibration	BS5228-2	PPV (mm/s)
Power Station operations	ISO 9613-2 BS EN 12354-4	dB $L_{Aeq\ T}$
Road traffic noise	CRTN ISO 9613-2	dB $L_{A10\ T}$ dB $L_{Aeq\ T}$ dB L_{Amax}
Ship noise emissions	ISO 9613-2	dB $L_{Aeq\ T}$
Other noise sources	BS5228 ISO 9613-2	dB $L_{Aeq\ T}$
Cumulative effects	Logarithmic decibel addition	dB $L_{Aeq\ T}$
Site suitability	BS8233 and/or BS EN12354-3 for internal noise levels	dB $L_{Aeq\ T}$

Assessment of effects

6.4.45 The overarching approach to define significant environmental effects for the purposes of this Environmental Statement is set out in chapter B1 (Application Reference Number: 6.2.1).

6.4.46 A noise or vibration effect may be considered significant if, in the professional opinion of the assessor, it would meet at least one of the following:

- it leads to an exceedance of defined noise or vibration guidelines set out within the documents summarised in table B6-3;

- it is likely that the consenting authority will reasonably consider applying a planning condition, to set noise or vibration limits or to require specific mitigation to reduce or overcome the noise or vibration effect; and
- it is likely to be material to the ultimate decision about whether or not the consent application should be approved.

6.4.47 The noise and vibration assessments consider both the sensitivity of the receptors and the magnitude of the change, and have consideration for the following elements as appropriate:

- comparison of current and future baselines to understand how conditions may change in the absence of the development;
- comparison of future baseline and development scenarios at selected phases of each development which enable the change in conditions to be characterised; and
- comparison of the predicted noise and vibration levels with relevant source-specific and 'benchmark' levels taken from national and international guidelines.

6.4.48 The baselines, changes in noise levels and thresholds in relevant guidelines have all been taken into account in forming assessment criteria specific to each noise or vibration source at each development site.

Sensitivity of receptors

6.4.49 Chapter B1 (Application Reference Number: 6.2.1) describes a general process for assigning the 'value' of each receptor, and determining a degree of 'sensitivity' to the effect. The key receptors considered by the noise and vibration assessment are human, and hence it is not considered appropriate to differentiate these receptors by assigning a 'value'. However, it is recognised that people may have different sensitivities to noise and vibration effects, depending on where they are and what they are doing. The noise and vibration assessment therefore uses the term 'sensitivity' and does not refer to the term 'value'. Additional information concerning the value and/or sensitivity of ecological receptors is presented in the terrestrial and freshwater chapters and the marine environment chapter, D13 (Application Reference Number: 6.4.13), and of cultural heritage assets in the cultural heritage chapters for each development.

6.4.50 With respect to the sensitivity of human receptors, *TAN 11: Noise* [RD7] focuses on residential properties as being noise-sensitive; although it does cite developments such as offices, hospitals and schools as containing buildings and activities that are potentially noise-sensitive. IEMA's 2014 *Guidelines for Environmental Noise Impact Assessment* [RD24] detail additional noise-sensitive receptor types, including:

- places of worship;
- open-air amenities;
- cemeteries;

- farms and kennels;
- retail premises; and
- some commercial and industrial installations.

6.4.51 The *IEMA guidelines* [RD24] and *TAN11* [RD7] do not differentiate between these receptors in terms of the degree of sensitivity to noise; however, the 1999 *WHO guidelines* [RD2] introduce a concept of differentiation with respect to hospital patients. The WHO guidelines state that "…*patients have less ability to cope with stress*" and identifies people with particular diseases, medical problems and people in hospitals as 'vulnerable subgroups'. At the other end of the scale, occupants of many commercial and industrial premises would normally be considered to be of low sensitivity, recognising that these premises are often considerable sources of noise and vibration in themselves.

6.4.52 The generalised sensitivity scale set out in chapter B1 (Application Reference Number: 6.2.1) has been adapted for the purpose of the assessments presented in the noise and vibration chapters, using professional judgement to categorise noise-sensitive receptors, as presented in table B6-17.

Table B6-17 Human receptor sensitivities to noise effects

Sensitivity	Noise-specific criteria
High	Dwellings, hospitals, hotels and schools
Medium	Places of worship, open-air amenities used for recreation, community facilities and offices
Low	Commercial premises
Negligible	Industrial installations

6.4.53 The sensitivity of infrastructure receptors to vibration has been considered on a case-by-case basis. The majority of buildings have been assigned a sensitivity of medium or low. Further information on other types of infrastructure receptors is presented in appendix B6-2 (Application Reference Number: 6.2.21).

Magnitude of change

6.4.54 In identifying criteria for the magnitude of change for the noise and vibration topic it has been necessary to consider effects that can arise from exceeding absolute (or benchmark) noise or vibration criteria, as well as criteria that are based on the expected physical changes in ambient noise or vibration levels as a result of the Wylfa Newydd Project. The noise assessment is not constrained to looking solely at the magnitude of noise change to determine effect, hence it would be more accurate to refer to the 'magnitude of effect' rather than 'magnitude of change'. However, for consistency with other chapters, the term 'magnitude of change' has been retained in the noise and vibration chapters. This should not be read to imply that only changes in noise and vibration are being considered in isolation from benchmark noise or vibration levels.

6.4.55 The human response to noise and vibration is affected by many factors, including:

- the character of the noise or vibration;
- the time of day or week when it is present;
- the activities they are undertaking at the time (e.g. concentrating on work, relaxing or sleeping);
- the pre-existing noise level; and
- their expectations.

6.4.56 Table B6-2 summarises the most relevant guidance documents for assessing the effects of noise and vibration from specific sources. In some cases, the guideline levels recommended are based on the existing background levels (e.g. BS4142 [RD12]) whilst in other cases they are presented as absolute levels (e.g. the *WHO Guidelines for Community Noise* [RD2]. Some guidance documents (e.g. *MTAN1* [RD8] and *BS5228-1* [RD13]) use a combination of absolute thresholds and change in noise relative to the background levels. These guidance documents have been used to formulate development-specific magnitude scales for noise and vibration caused by Wylfa Newydd Project activities.

6.4.57 In terms of the amount of change in noise levels, this would only potentially become significant if the change is perceptible. Following guidance in *TAN11* [RD7], table B6-18 summarises typical responses to changes in fluctuating environmental noise levels. It is acknowledged that in certain circumstances a change of less than 3dB(A) may be perceptible. For example, DMRB [RD3], which presents guidance on the assessment of traffic noise, states that a 1dB(A) change in noise is the minimum which can be detected by the human ear in the short term. In addition, it is acknowledged that the perceptibility of a new noise source in the environment will be influenced by the acoustic characteristics of the noise (such as presence of tones and impulsivity), as well as the overall change in noise levels.

Table B6-18 Perception of changes in noise levels

Change in noise level (dB(A))	Response
<3	Difficult to perceive
3	Minimum perceptible under normal conditions
<10	Up to a doubling of perceived loudness
>10	Over a doubling of perceived loudness

6.4.58 The magnitude scale set out in chapter B1 (Application Reference Number: 6.2.1) has been adapted using professional judgement to enable the categorisation of magnitude of change for different noise and vibration sources. For the purposes of defining this magnitude scale, a change in noise level of 3dB(A) is considered to represent the threshold of perceptibility for assessments using the $L_{Aeq\ T}$ parameter. As stated above, changes of less

than 3dB(A) may be perceptible in some circumstances. However, establishing perceptibility due to characteristics of noise sources is a complex area of acoustics, and will be substantially influenced by an individual's hearing. The $L_{Aeq\ T}$ parameter is widely used for environmental noise assessments, and a change of 3dB(A) in the $L_{Aeq\ T}$ is considered likely to indicate a perceptible change for a considerable proportion of receptors. For the purposes of the traffic noise assessment, which uses the $L_{A10\ T}$ parameter, the guidance in DMRB [RD3] has been followed, i.e. a 1dB(A) change may be perceived in the short term, but a 3dB(A) change is the minimum perceived in the longer term.

6.4.59 As detailed by table B6-3, there are a number of guidance documents that detail guidelines on the assessment of noise and vibration from specific sources. These are detailed and discussed in full in appendix B6-2 (Application Reference Number: 6.2.21).

6.4.60 Table B6-18 presents the general magnitude scale for noise and vibration changes formulated for the purposes of this Environmental Statement. Whilst not specifically referred to in this table, the determination of magnitude has also taken into account the frequency of occurrence of the noise effect, as well as the time of day or night at which it occurs. For example, a particular noise level considered to result in a large magnitude if it is due to a noise source that operates frequently during the night would be considered to result in a lower magnitude if it occurs infrequently during the day.

6.4.61 Whilst there are many guidance documents which provide guideline noise levels for various noise or vibration sources or receptors, few address the topic of frequency of noise effects. With respect to individual noisy events at night, the WHO (1999) *Guidelines for Community Noise* [RD2] recommend that they do not exceed a certain criterion more than 10-15 times per night. With respect to noise from minerals workings, *MTAN1* [RD8] allows for a higher than normal noise limit to apply for up to eight weeks per year for certain works.

6.4.62 With these example guidelines in mind, the frequency and timing of noise and vibration effects are included in the professional judgement exercised in the assignment of magnitude and the determination of significance.

6.4.63 The assignment of a magnitude of change has been principally based on professional judgement, and takes into account identified embedded and good practice mitigation measures that would be put in place to reduce adverse noise and vibration effects. The general magnitude scale in table B6-19 has been presented to illustrate that when forming this professional judgement, source-specific and benchmark guidelines are taken into account, along with the predicted changes in baseline noise levels. It is acknowledged that situations may arise that result in a noise or vibration change appearing to meet more than one of the magnitude criteria. For example, a source-specific guideline may be met, whilst a benchmark criterion may be exceeded, and the change in noise levels is likely to be perceived. In each assessment of magnitude, professional judgement has been used to attach the relevant weight to each component criterion, and if guidelines are exceeded

professional judgement has been used to define small, moderate and large margins. Table B6-19 is supplemented with source and development site-specific definitions of magnitude, presented in appendix B6-2 (Application Reference Number: 6.2.21). The relevant source and development-specific magnitude scales are also presented at the start of the 'assessment of effects' section of each noise and vibration chapter for ease of reference.

Table B6-19 Magnitude scale for noise and vibration changes

Magnitude of change	Topic-specific criteria
Large	• exceedance of relevant source-specific and/or benchmark guideline noise or vibration levels by a large margin, for example 10 dB or more depending on the assessment; and/or • change in noise or vibration levels highly likely to be perceived.
Medium	• exceedance of relevant source-specific and/or benchmark guideline noise or vibration levels by a small margin; and/or • change in noise or vibration levels likely to be perceived.
Small	• compliance with relevant source-specific and/or benchmark guideline noise or vibration levels by a small margin; and/or • change in noise or vibration levels may be perceived.
Negligible	• compliance with relevant source-specific and/or benchmark guideline noise or vibration levels; and • change in noise or vibration levels unlikely to be perceived.

Assessment of significance

6.4.64 Where an effect is considered to meet one or more of the overarching significance criteria set out as bullet points at the start of the 'assessment of effects' section, then the sensitivity and magnitude scales defined above have been used to aid the determination of the level of significance in accordance with the significance matrix presented in chapter B1 (Application Reference Number: 6.2.1).

6.4.65 Where it is not immediately obvious whether or not an effect meets the overarching significance criteria (for example, where there may not be any relevant source-specific criteria applicable to certain receptors), the sensitivity and magnitude scales defined above and the significance matrix presented in chapter B1 (Application Reference Number: 6.2.1) have been used to guide the determination process.

6.4.66 A selection of other descriptors, drawn from those set out in chapter B1 (Application Reference Number: 6.2.1) has also been used to provide additional information on the identified significant effects. The descriptors

used by the noise and vibration assessment include beneficial or adverse, and short-term or long-term.

6.4.67 The guidance documents presented in table B6-3 have been used to define short and long term periods. These differ for different noise sources. Further information is provided in appendix B6-2 (Application Reference Number: 6.2.21).

6.4.68 It should be noted that all noise and vibration effects are considered to be reversible, since the noise or vibration source could ultimately be 'turned off'. For this reason, the descriptors 'permanent' and 'temporary' are not considered relevant to the noise and vibration assessment. In addition, noise and vibration effects are all considered to be of a local scale, since noise and vibration levels reduce substantially with increasing distance from the source.

DMRB assessment methodology for the A5025 Highway Improvements

6.4.69 The assessment methodology for noise associated with the A5025 Off-line Highway Improvements and project wide traffic noise effects has followed the guidance and methodology contained within in *DMRB* [RD3], volume 11, section 3, part 7. Further details of the methodology described in DMRB [RD3], the required data inputs, calculation methodologies and the criteria used to assess the magnitude and significance of the noise effects are presented in appendix B6-2 (Application Reference Number: 6.2.21) and chapter C5 (Application Reference Number: 6.3.5).

6.4.70 For assessments based on the DMRB guidance [RD3], the primary methodology to calculate the noise levels generated by road traffic is the *Calculation of Road Traffic Noise* (CRTN) [RD22], which requires certain criteria to be satisfied for the method to be valid. These are with regard to the number of vehicles, traffic composition, road gradient and vehicle speed. The traffic flow information for the key project access route of the A5025 Valley to Tregele satisfied these requirements for the daytime situation, enabling the daytime noise impacts to be calculated and assessed following the method set out in DMRB [RD3].

6.4.71 The implementation of the CRTN calculation technique was conducted using CadnaA noise prediction modelling software, from Datakustik; this is widely-used and understood software used throughout the industry, which automates many standard acoustic calculations.

6.4.72 Due to the rural nature of this section of the A5025, the numbers of vehicles using the road during the night-time period are low and hence the traffic flows during the night-time do not satisfy the minimum data requirements for the CRTN method to be valid; therefore an alternative method of calculation was developed to compute the noise levels generated by night-time road traffic on this section of the A5025.

6.4.73 The alternative calculation method was adapted from the Noise Advisory Council method published in the document *A guide to measurement and prediction of the equivalent continuous sound level* [RD30] and using the

vehicle speed classifications described by *Transport and Road Research Laboratory Report 752* [RD31]. The research undertaken for the Noise Advisory Council calculation method was later refined and developed into the CRTN method and is based upon similar principles. A technical description of the calculation method is outlined in appendix B6-2 section 7.3 (Application Reference Number: 6.2.21).

6.4.74 It should be noted that the development of the Noise Advisory Council calculation method implemented here, was overseen and checked by the author of the CRTN prediction method.

6.4.75 The Noise Advisory Council calculation method derived basic noise levels for each of the individual road links along the relevant section of the A5025. These basic noise levels were input as noise sources into CadnaA software to calculate the noise levels at identified receptors, which implemented the CRTN algorithms for environmental propagation.

6.4.76 The output of the night-time noise predictions was assessed using modified assessment criteria from DMRB. Further detail is provided in appendix B6-2 (Application Reference Number: 6.2.21).

6.4.77 An additional night-time assessment was conducted for maximum noise levels (L_{Amax}) which may be generated by vehicular traffic, which is not included in the DMRB method [RD3]. Further detail is provided in appendix B6-2 (Application Reference Number: 6.2.21).

6.4.78 The assessment method and criteria adopted for the night-time traffic noise is considered to be more cautious than the DMRB method [RD3] and is more relevant to this specific assessment situation.

Limitations

6.4.79 Best available information in relation to the plant and equipment used for the Wylfa Newydd Project has been used. It is likely that the plant finally selected by the various contractors will differ in some cases. However, it is considered unlikely that the significance of the noise and vibration effects would change substantively from what is predicted, given the precautionary approach taken as detailed earlier in this section and in the design basis and activities sections of the following noise and vibration chapters: C5 (Application Reference Number: 6.3.5), D6 (Application Reference Number: 6.4.6), E6 (Application Reference Number: 6.5.6), F6 (Application Reference Number: 6.6.6), G6 (Application Reference Number: 6.7.6) and H6 (Application Reference Number: 6.8.6).

6.4.80 The baseline noise survey methodology has been designed to capture a reasonably representative indication of the noise levels experienced at each location. However, in common with any survey with a discrete duration, the results are dependent on the conditions experienced during the survey; whilst extraneous factors have been taken into consideration (see appendix B6-1 (Application Reference Number: 6.2.20) for full details), the survey can only be considered a ‘representative sample’ of long-term conditions.

6.4.81 The noise prediction methodology contained in *BS5228-1* [RD13] often provides an overestimate of noise levels at distances beyond 50m, as it does not consider meteorological conditions or atmospheric absorption. At greater distances (over 50m) these factors will lead to an increase in sound attenuation that the methodology does not account for, and forms part of the precautionary approach undertaken.

6.4.82 It is not possible to predict blasting vibrations until blasting designs are complete. Therefore, this assessment has set out limit values for blasting vibration, which are considered to result in negligible or minor effects, and all blasts would be designed to be below these thresholds.

6.5 References

Table B6-20 Schedule of references

ID	Reference
RD1	Welsh Government. 2013. *A Noise Action Plan for Wales 2013-2018*. Cardiff: National Assembly for Wales.
RD2	Berglund, B., Lindvall, T. and Schwela, D.H. (on behalf World Health Organization). 1999. *Guidelines for Community Noise*. World Health Organization Regional Publications, European Series
RD3	Highways Agency. 2011. *Design Manual for Roads and Bridges Vol 11 Environmental Assessment* Section 3, Part 7 Noise and Vibration (HD213/11 – Revision 1)
RD4	Department of Energy and Climate Change. 2011. *Overarching National Policy Statement for Energy (EN-1).* London: The Stationary Office.
RD5	Department of Energy and Climate Change. 2011. *Statement for Nuclear Power Generation (EN-6).* London: The Stationary Office.
RD6	Welsh Government. 2016. *Planning Policy Wales* (Edition 9).
RD7	Welsh Assembly Government. 1997. *Technical Advice Note 11: Noise*.
RD8	Welsh Assembly Government. 2004. *Minerals Technical Advice Note (Wales) 1*: Aggregates (MTAN 1).
RD9	Department of the Environment and the Welsh Office. 1993. *Minerals Planning Guidance 11: The Control of Noise at Surface Mineral Workings* (MPG11).
RD10	Isle of Anglesey County Council and Gwynedd Council. 2017. *Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026 – Written Statement*.

ID	Reference
RD11	Isle of Anglesey County Council. 2014. *New Nuclear Build at Wylfa: Supplementary Planning Guidance.*
RD12	British Standards Institution (BSI). 2014. *BS4142:2014 Methods for rating and assessing industrial and commercial sound*. London, BSI
RD13	British Standards Institution. 2014. *BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise*. London, BSI
RD14	British Standards Institution. 2014. *BS5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration*. London, BSI
RD15	British Standards Institution. 2008. *BS6472:2008 Guide to evaluation of human exposure to vibration in buildings*. London, BSI
RD16	British Standards Institution. 2003. *BS7445:2003 Description and measurement of environmental noise*. London, BSI
RD17	British Standards Institution. 2014. *BS8233:2014 Guidance on sound insulation and noise reduction for buildings*. London, BSI
RD18	British Standards Institution. 2000. *BS EN 12354-3:2000 – Building acoustics: estimation of acoustic performance in buildings from the performance of elements: Airborne sound insulation against outdoor sound.* London, BSI
RD19	British Standards Institution. 2000. *BS EN 12354-4:2000 – Building acoustics: estimation of acoustic performance in buildings from the performance of elements: Transmission of indoor sound to the outside*. London, BSI
RD20	Department for Education and Education Funding Agency. 2015. *Acoustic design of schools: performance standards. Building bulletin 93*. London: The Stationery Office.
RD21	Institute of Acoustics and the Association of Noise Consultants. 2014. *Acoustics of Schools: a design guide*. St Albans
RD22	Department for Transport and the Welsh Office. 1988. *Calculation of Road Traffic Noise*. Cardiff: National Assembly for Wales
RD23	World Health Organization. 2009. *Night Noise Guidelines for Europe.*
RD24	Institute of Environmental Management and Assessment. 2014. *Guidelines for Environmental Noise Impact Assessment.*

ID	Reference
RD25	Environment Agency. 2002. *Horizontal Guidance for Noise Part 2 – Noise Assessment and Control*.
RD26	Environment Agency. 2015. *Noise impact assessment – information requirements.*
RD27	International Organization for Standardisation (ISO). 1996. *ISO 9613-2:1996. Acoustics – Attenuation of sound propagation outdoors* – Part 2: General method of calculation.
RD28	Salford University. 2005. *Procedure for the assessment of low frequency noise complaints.* Contract no. NANR45.
RD29	Transport and Road Research Laboratory (TRRL). 1986. Report No RR53 – *Ground Vibration Caused by Civil Engineering Works*.
RD30	Noise Advisory Council (NAC). 1978. *A guide to measurement and prediction of the equivalent continuous sound level*. London: The Stationary Office.
RD31	Transport and Road Research Laboratory (TRRL). 1977. *Report No 752 – Classifying Road Vehicles for the Prediction of Road Traffic Noise.* 19 pp.