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# Volume 2, Chapter 22 **Noise and** vibration





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# 22. Noise and vibration

### 22.1 Introduction

- 22.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the assessment of the likely significant effects of Rampion 2 with respect to noise and vibration at onshore receptors. It should be read in conjunction with the project description provided in **Chapter 4: The Proposed Development** and the relevant parts of the following chapters:
  - Chapter 19: Landscape and visual impact (environmental measures required to reduce noise effects during both the construction phase and operational phase potentially resulting in visual effects for sensitive receptors);
  - Chapter 23: Terrestrial ecology and nature conservation (all phases of the Proposed Development potentially resulting in noise and vibration effects on ecological resources);
  - Chapter 24: Transport (the noise assessments rely on traffic flows to predict changes in traffic noise level); and
  - Chapter 26: Historic environment (the historic environment is considered a sensitive resource that could potentially be affected by noise and vibration from the Proposed Development).
- 22.1.2 This chapter describes:
  - the legislation, planning policy and other documentation that has informed the assessment (Section 22.2: Relevant legislation, policy and other information and guidance);
  - the outcome of consultation engagement that has been undertaken to date, including how matters relating to noise and vibration within the Scoping Opinion received in August 2020 have been addressed (Section 22.3: Consultation and engagement);
  - the scope of the assessment for noise and vibration (Section 22.4: Scope of the assessment);
  - the methods used for the baseline data gathering (Section 22.5: Methodology for baseline data gathering);
  - the overall baseline (Section 22.6: Baseline conditions);
  - embedded environmental measures relevant to noise and vibration and the relevant maximum design scenario (Section 22.8: Methodology for PEIR assessment);
  - the assessment methods used for the PEIR (Section 22.9: Methodology for PEIR assessment);
  - the assessment of noise and vibration effects (Section 22.9 22.11: Preliminary assessment and Section 22.12: Preliminary assessment: Cumulative effects);

- consideration of transboundary effects (Section 22.13: Transboundary effects);
- consideration of inter-related effects (Section 22.14: Inter-related effects);
- a summary of residual effects for noise and vibration (Section 22.15: Summary of residual effects); and
- an outline of further work to be undertaken for the Environmental Statement (ES) (Section 22.16: Further work to be undertaken for ES).
- a glossary of terms and abbreviations is provided in **Section 22.17: Glossary** of terms and abbreviations; and
- a references list is provided in Section 22.18: References.
- 22.1.3 The chapter is also supported by the following appendix:
  - Appendix 22.1: Noise and vibration appendix, Volume 4.

# 22.2 Relevant legislation, policy and other information and guidance

#### Introduction

22.2.1 This section identifies the legislation, policy and other documentation that has informed the assessment of effects with respect to noise and vibration. Further information on policies relevant to the Environmental Impact Statement (EIA) and their status is provided in **Chapter 2: Policy and legislative context** of this PEIR.

#### Legislation and national planning policy

**Table 22-1** lists the legislation relevant to the assessment of the effects on noise and vibration receptors.

#### Table 22-1 Legislation relevant to noise and vibration

Legislation description	Relevance to assessment
Environmental Protection Act 1990	
This Act sets out the duty for local authorities to investigate and, where identified, take abatement action against noise nuisance. The Act provides the definition of 'Best Practical Means' (BPM) to minimise noise (including vibration), the basis for defence against noise abatement action taken by local authorities (section 80). The Act also provides for individuals to seek for abatement action to be taken by a magistrate's court against noise nuisance (Section 82).	This Act has been used to inform embedded noise control measures, see <b>Table 22-11</b> .

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Legislation description	Relevance to assessment		
Control of Pollution Act 1974			
This Act provides the definition of BPM to minimise noise (including vibration), the basis for defence against noise abatement action taken by a local authority (section 60). The Act also provides for, i) persons responsible to seek prior consent for works on construction sites including BPM steps to minimise noise and, ii) the basis for defining codes of practice (applies to BS 5228: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration).	This Act has been used to inform embedded noise control measures for construction, see <b>Table</b> <b>22-11</b> .		
Environmental Noise (England) Regulations 2006, as amended			
The regulations require regular noise mapping and the production of Noise Action Plans for the management of noise.	These regulations provide the legal means by which 'Quiet Areas' are defined and protected.		
Noise Insulation Regulations 1975, as amended			
Sets out the eligibility criteria for noise insulation from upgraded highways schemes.	These regulations are utilised for criteria regarding construction traffic noise (although not used for the purposes of eligibility).		

22.2.3 **Table 22-2** lists the national planning policy relevant to the assessment of the effects on noise and vibration receptors.

#### Table 22-2 National planning policy relevant to noise and vibration

Policy description	Relevance to assessment	
National Policy Statement for Energy (NPS EN-1) (Department of Energy and Climate Change, 2011)		
Paragraph 5.11.1: "Excessive noise can have wide-	Section 22.8 describes how a	

ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality. The Government's policy on noise is set out in the Noise Policy Statement for England. It promotes good health and good quality of life through effective **Section 22.8** describes how a set of the criteria for the assessment has been developed which has enabled the Proposed Development to be assessed against the principal aims of the Noise Policy Statement for England (NPSE).

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Policy description	Relevance to assessment
noise management. Similar considerations apply to vibration, which can also cause damage to buildings".	
Paragraph 5.11.2: "Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the IPC in accordance with the Biodiversity and Geological Conservation section of this NPS".	Consideration of noise impacts on ecological receptors is provided in Chapter 23: Terrestrial ecology and nature conservation.
<ul> <li>Paragraph 5.11.3: "Factors that will determine the likely noise impact include:</li> <li>the inherent operational noise from the proposed development, and its characteristics;</li> <li>the proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces);</li> <li>the proximity of the proposed development to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality; and</li> <li>the proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife."</li> </ul>	<ul> <li>Consideration of these factors have been accounted for within this chapter or will be in the ES:</li> <li>Operational noise characteristics will be considered in the ES; and</li> <li>Construction noise predictions have utilised distances between noise sources and noise sensitive receptors / areas.</li> <li>Consideration of noise impacts on ecological receptors is provided in Chapter 23.</li> </ul>
<ul> <li>Paragraph 5.11.4: "Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:</li> <li>a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;</li> <li>identification of noise sensitive premises and noise sensitive areas that may be affected;</li> <li>the characteristics of the existing noise environment;</li> <li>a prediction of how the noise environment will change with the proposed development;</li> <li>in the shorter term such as during the construction period;</li> <li>in the longer term during the operating life of the infrastructure; at particular times of the day, evening and night as appropriate.</li> </ul>	The factors included within this paragraph are either covered within the assessment in this Chapter or will be reported within the ES.

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**Relevance to assessment** 

<ul> <li>an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and</li> <li>measures to be employed in mitigating noise. The nature and extent of the noise assessment should be proportionate to the likely noise impact."</li> </ul>	
Paragraph 5.11.5: "The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered."	The construction noise assessment within this chapter covers all ancillary activities that might result in a significant adverse noise effect.
Paragraph 5.11.6: "Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. [] For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies".	The standards and guidance used to assess the Proposed Development are set out in this section. <b>Section 22.8</b> describes how these standards have been used to assess the impact of noise and vibration.
Paragraph 5.11.7: "The applicant should consult Environment Agency (EA) and Natural England (NE), or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account".	Consideration of noise impacts on ecological receptors is provided in <b>Chapter 23</b> .
Paragraph 5.11.8: "The project should demonstrate good design through selection of the quietest cost- effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission".	Embedded environmental measures for reducing noise and vibration are described in <b>Table 22-11</b> .
<ul> <li>Paragraph 5.11.9: "The IPC [now the Planning Inspectorate] should not be grant development consent unless it is satisfied that the proposals will meet the following aims:</li> <li>avoid significant adverse impacts on health and quality of life from noise;</li> <li>mitigate and minimise other adverse impacts on health and quality of life from noise; and</li> </ul>	<b>Section 22.8</b> describes how a set of assessment criteria have been developed which has enabled the Proposed Development to be assessed against the principal aims of the NPSE which are in accordance

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Policy description	Relevance to assessment
<ul> <li>where possible, contribute to improvements to health and quality of life through the effective management and control of noise".</li> </ul>	with the three aims set out in Paragraph 5.11.9 of NPS EN-1.
Paragraph 5.11.10: "When preparing the development consent order, the IPC [now the Planning Inspectorate] should consider including measurable requirements or specifying the mitigation measures to be put in place to ensure that noise levels do not exceed any limits specified in the development consent".	Embedded environmental measures for reducing noise and vibration are described in <b>Table 22-11</b> . The environmental measures set out in the ES will be specified to ensure that the noise levels do not exceed any limits specified in the Development Consent Order (DCO).
National Policy Statement for Renewable Energy In (Department of Energy and Climate Change, 2011)	frastructure (NPS EN-3)
NPS EN-3 for Renewable Energy sets out guidance and requirements for nationally significant energy infrastructure projects. Section 2.4.2 " <i>Proposals for</i> <i>renewable energy infrastructure should demonstrate</i> good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology."	The design of the Proposed Development is an iterative process that has sought to avoid sensitive features wherever possible. Embedded environmental measures are presented in <b>Table 22-11</b> .
Noise Policy Statement for England (NPSE) (Defra,	2010)
NPSE sets out the vision and aims for dealing with noise (except for workplace/occupational noise), which are consistent with the aims for noise as presented in NPS EN-1. NPSE requires that noise and vibration assessments identify impacts that would result in significant adverse impacts on health and quality of life from a proposed development. The aims of NPSE include: avoiding significant adverse impact on health and quality of life; mitigating adverse impacts on health and quality of life; and to contribute to the improvement of health and quality of life.	Section 22.8 describes how a set of assessment criteria have been developed which has enabled the Proposed Development to be assessed against the principal aims of the NPSE. Embedded environmental measures for reducing noise and vibration are described in Table 22-11.
National Planning Policy Framework (NPPF) (Minist and Local Government, 2019)	try of Housing Communities
The NPPF states that new development should contribute to and enhance the environment by preventing new and existing development from contributing to, or being put at unacceptable risk from,	Assessment of the noise and vibration impacts of the Proposed Development are presented in <b>Section 22.10</b> to <b>Section 22.11</b> . Embedded

Policy description	Relevance to assessment
or being adversely affected by unacceptable levels of noise pollution.	environmental measures for reducing noise and vibration impacts are described in <b>Table</b> <b>22-11</b> .
Noise Planning Practice Guidance (NPPG) (Ministry Local Government, 2019)	of Housing Communities and
The NPPG relates in terms of a noise hierarchy the levels of perception to noise exposure with expected	Section 22.8 describes how the noise and vibration assessment

levels of perception to noise exposure with expected outcomes and required actions.

#### Local planning policy

**Table 22-3** lists the local planning policy relevant to the assessment of the potential effects on noise and vibration receptors.

#### Table 22-3 Local planning policy relevant to noise and vibration

Policy description	Relevance to
	assessment

#### Adoption Arun Local Plan 2011 – 2031 (Arun District Council, 2018)

Policy QE DM1: "Developers proposing new noise generating development must seek advice from an early stage to determine the level of noise assessment required. Proposals will need to be supported by:

- a) Evidence to demonstrate that there are no suitable alternative locations for the development.
- b) A noise report which provides accurate information about the existing noise environment, and the likely impact of the proposed development upon the noise environment. The report must also demonstrate that the development meets appropriate national and local standards for noise, as set out in Annex 1 of the Planning Noise Advice Document: Sussex, and any mitigation measures required to ensure noise is managed to an acceptable level.
- c) Evidence to demonstrate that the development will not impact upon areas identified and valued for their tranquillity, including Gaps Between Settlements which are important to the enjoyment of Arun's countryside, its habitats and biodiversity."

In relation to point a), the discussion of alternatives is provided in Chapter 3: Alternatives.

follows the principles of the

NPPG.

In relation to point b), accurate information about the existing noise environment is detailed in **Section 22.6**. Further baseline information will be collected for the ES. **Section 22.2** outlines the national and local standards the report has considered.

In relation to point c), tranquillity is considered within the effects on human **Policy description** 

Relevance to

	assessment
	enjoyment of open spaces and footpaths (see <b>Table 22-12</b> ).
<ul> <li>Policy ECC DM1 Renewable Energy: "The Council will support proposals for appropriately located renewable energy development, and their ancillary development where they meet the following criteria:</li> <li>a) The proposal is located and designed to minimise adverse impacts to landscape, habitats, the historic environment and residential amenity including visual, noise and odour impacts."</li> </ul>	Embedded environmental measures for reducing noise and vibration during construction are described in <b>Table 22-</b> <b>11</b> . Assessment of the Proposed Development against this policy requirement in relation to the operational aspects will be provided once further details of design are available.
Horsham District Planning Framework (Horsham District Co	uncil, 2015)
Policy 24 Strategic Policy: Environmental Protection address noise and states " <i>developments will be expected to minimise exposure to and the emission of pollutants including noise</i> []"	Table 22-11demonstrates theembeddedenvironmental

Policy 33 Development principles addresses noise and states "developments shall be required to: [...]

2. Ensure that it is designed to avoid unacceptable harm to the amenity of occupiers/users of nearby property and land, for example overlooking or noise, whilst having regard to the sensitivities of surrounding development".

measures considered to minimise noise impacts.

#### Section 22.8 provides quidance on how noise will be assessed to identify potential noise impacts.

#### Planning Noise Advice document: Sussex (West Sussex County Council et al., 2015)

Provides advice for developers and their consultants when making planning applications which includes: guidance to developers on the level of information that will be required to be submitted with planning applications and seek to implement the aims of the NPSE (2010, paragraph 1.7)

Section 22.4 details the scope of the noise and vibration assessment.

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#### **Policy description**

# Relevance to assessment

- "Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life."

#### Mid Sussex District Plan 2014 – 2031 (Mid Sussex District Council, 2018)

DP26: Character and Design addresses noise and states "All applicants will be required to demonstrate that development [...] does not cause significant harm to the amenities of existing nearby residents and future occupants of new dwellings, including taking account of the impact on [...] noise air and light pollution"

DP29: Noise, Air and Light Pollution addresses noise and states "The environment, including nationally designated environmental sites, nationally protected landscapes, areas of nature conservation or geological interest, wildlife habitats, and the quality of people's life will be protected from unacceptable levels of noise, light and air pollution by only permitting development where:

Noise pollution:

 It is designed, located and controlled to minimise the impact of noise on health and quality of life, neighbouring properties and the surrounding area;

 If it is likely to generate significant levels of noise it incorporates appropriate noise attenuation measures.
 Noise sensitive development, such as residential, will not be permitted in close proximity to existing or proposed

development generating high levels of noise unless adequate sound insulation measures, as supported by a noise assessment are incorporated within the development." Section 22.9, Section 22.10 and Section 22.11 presents the potential noise effects from the Proposed Development.

Table 22-11demonstrates themeasures consideredto minimise noiseimpacts.

**Section 22.8** provides guidance on how noise will be assessed to identify potential noise impacts.

#### South Downs Local Plan 2014-2033 (South Downs National Park, 2019)

Paragraph 5.45 "The assessment of impacts on relative tranquillity is not the same as a noise assessment, and the assessment of zero noise impact for an application will not be taken necessarily as meaning that there would be a similar impact on relative tranquillity." Tranquillity is considered further within Chapter 19: Landscape and visual impact, Appendix 19.3: Landscape Assessment, Volume 4 and Appendix 19.4:

Policy description	Relevance to assessment
	Visual Assessment, Volume 4.
<ul> <li>SD7: Relative Tranquillity:</li> <li><i>"1. Development proposals will only be permitted where they conserve and enhance relative tranquillity and should consider the following impacts:</i></li> <li>a) Direct impacts that the proposals are likely to cause by changes in the visual and aural environment in the immediate vicinity of the proposals;</li> <li>b) Indirect impacts that may be caused within the National Park that are remote from the location of the proposals themselves such as vehicular movements; and</li> <li>c) Experience of users of the PRoW network and other publicly accessible locations.</li> <li>2. Development proposals in highly tranquil and intermediate tranquillity areas should conserve and enhance, and not cause harm to, relative tranquillity.</li> <li>3. Development proposals in poor tranquillity areas should take opportunities to enhance relative tranquillity where these exist."</li> </ul>	Tranquillity is considered further within Chapter 19: Landscape and visual impact, Appendix 19.3: Landscape Assessment, Volume 4 and Appendix 19.4: Visual Assessment, Volume 4.
SD54: Pollution and Air Quality <i>"1. Development proposals will be permitted provided that levels of air, noise, vibration, light, water, odour or other pollutants do not have a significant negative affect on people and the natural environment now or in the foreseeable future,</i>	The significance of noise and vibration effects are assessed within <b>Sections 22.9</b> to <b>22.15</b> within this

#### Other relevant information and guidance

taking into account cumulative impacts and any mitigation."

A summary of other relevant information and guidance relevant to the assessment undertaken for noise and vibration is provided in **Table 22-4**.

chapter.

#### Table 22-4 Guidance and Standards relevant to noise and vibration

Standard/guidance description	Relevance to assessment
British Standards	
British Standard (BS) 7445:2003 Description and measurement of environmental noise (British Standard Institute, 2003)	BS 7445:2003 provides the framework within which environmental noise should be quantified. Part 1 provides a guide to quantities and procedures and Part 2 a guide to the acquisition of data pertinent to land use. Part 3 provides a

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Standard/guidance description	Relevance to assessment
	guide to the application of noise limits. The standard also refers to BS EN 61672 'Electroacoustics: Sound Level Meters Specifications' (2013) which prescribes the equipment necessary for such measurements.
BS 5228-1:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise (British Standard Institute, 2014a)	Provides a recommended scope for construction and demolition noise assessment. Annex E gives example threshold values for potential significant effects at noise sensitive receptors based upon the results of ambient sound monitoring.
BS 5228-2:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration (British Standard Institute, 2014b)	Provides guidance on the assessment of ground-borne vibration associated with activities such as demolition and construction.
BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound (British Standard Institute, 2019)	Describes methods for rating and assessing sound of an industrial nature, such as from factories, industrial premises or fixed installations affecting people who might be inside or outside a dwelling.
Road Noise Standards	
Calculation of Road Traffic Noise (CRTN) (Department of Transport Welsh Office, 1988)	Provides a calculation methodology for road traffic noise.
Design Manual for Roads and Bridges LA111: Noise and Vibration (DMRB) (Standards for Highways, 2020)	Presents a methodology for determining impacts on noise sensitive receptors from changes in road traffic noise due to road projects.
Wind Farm Noise Guidance	
ETSU-R-97 The Assessment and Rating of Noise from Wind Farms (The Working Group on Noise from Wind Turbines, 1996)	ETSU-R-97 is used for the assessment of onshore wind farms; however it is also the most appropriate guidance for assessing noise from offshore wind turbine generators (WTGs) on onshore receptors.
A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (Institute of Acoustics, 2013)	Best practice guidance on undertaking measurements, noise modelling and assessments for wind farm noise.



Standard/guidance description	Relevance to assessment
Other Guidance or studies from Auth	orities, Institutes and Universities
BS 4142:2014+A1:2019: Technical Note (Association of Noise Consultants, 2020)	Provision of guidance and clarifications for British Standard.
Proposed criteria for the assessment of low frequency noise disturbance (Moorhouse et al., 2011)	Informs approach to low frequency noise on the substation.
Guidelines for Environmental Noise Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2014)	Presents guidelines on how the assessment of noise effects should be presented within the EIA process. The IEMA guidelines cover aspects such as: scoping, baseline, prediction and example definitions of significance criteria.
Tranquillity Study (South Downs National Park Authority, 2017)	Defines Tranquillity, sets out the procedure for scoring Tranquillity and associated mapping. This does not have a criteria for assessing the effect of noise and vibration on Tranquillity.
International Guidance and Standard	s
ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation (International Standards Organisation, 1996)	Defines a method for calculating the attenuation of sound during propagation outdoors, in order to predict the levels of environmental noise at distances from a source.
Guidelines for Community Noise (World Health Organisation, 1999)	Provides guidelines and recommendations for protecting health, giving internal and external guideline limits.
Night Noise Guidelines for Europe (World Health Organisation, 2009)	Provides guidelines and recommendations for health protection during the night-time period.
Environmental Noise Guidelines for the European Region (World Health Organisation, 2018)	Analysis of exposure – response relationship related to specific noise sources and provision of guidelines for levels to protect human health.

# 22.3 Consultation and engagement

#### **Overview**

22.3.1 This section describes the outcome of the Scoping Opinion in relation to noise and vibration assessment and also provides details of the ongoing informal

consultation that has been undertaken with stakeholders. An overview of engagement undertaken can be found in **Section 1.5** of **Chapter 1: Introduction**.

22.3.2 Given the restrictions which have been in place due to the COVID-19 pandemic during this period, all consultation has taken the form of conference calls.

#### **Scoping opinion**

- 22.3.3 Rampion Extension Development Limited (RED) submitted a Scoping Report (RED, 2020) and request for a Scoping Opinion to the Secretary of State (administered by the Planning Inspectorate (PINS)) on 2 July 2020. A Scoping Opinion was received on 11 August 2020. The Scoping Report set out the proposed noise and vibration assessment methodologies, outline of the baseline data collected to date and proposed, and the scope of the assessment. **Table 22-5** sets out the comments received in Section 5 of the PINS Scoping Opinion 'Aspect based scoping tables – Onshore' and how these have been addressed in this PEIR. A full list of the PINS Scoping Opinion comments and responses is provided in **Appendix 5.1: Response to the Scoping Opinion, Volume 4**. Regard has also been given to other stakeholder comments that were received in relation to the Scoping Report.
- 22.3.4 The information provided in the PEIR is preliminary and therefore not all the Scoping Opinion comments have been able to be addressed at this stage, however all comments will be addressed within the ES.

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
5.4.1	Based on the anticipated low levels of site traffic during operation and maintenance, the Inspectorate is content that there will be no significant noise emissions associated with the onshore cable or substation maintenance in terms of additional site traffic during operation.	Acknowledged. Noise emissions associated with site traffic during operation and maintenance is scoped out of the assessment due to the very low numbers of vehicles expected for operation and maintenance.
5.4.2	The Inspectorate agrees that noise effects of the offshore substation would not have significant effects for any onshore receptors. The Inspectorate is satisfied that the scope of the underwater noise assessment is sufficient to consider offshore substation noise effects on offshore and marine receptors where significant effects are likely to occur.	Acknowledged. The noise effects from the operation of the offshore substations on onshore receptors are therefore scoped out of the noise assessment in this chapter due to the large distances between noise source and receptor. The

#### Table 22-5 PINS Scoping Opinion responses – noise and vibration

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PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
		underwater noise assessment is included in Chapter 11: Marine mammals.
5.4.3	The Inspectorate agrees that vibration effects to onshore receptors as a result of the offshore substations and wind turbine generators can be scoped out of further assessment.	Acknowledged. The vibration effects to onshore receptors as a result of offshore substations and WTGs are scoped out of the assessment in this chapter due to the large distances between vibration source and receptor.
5.4.3	The Inspectorate does not agree that vibration effects from the onshore substation can be scoped out as insufficient justification has been provided at this time to support this approach (including operational design parameters of the proposed substation). The ES should assess these matters where significant effects are likely to occur.	The assessment of vibration from the onshore substation will be reviewed at the ES stage, when the further detail of the onshore substation is available. However, it may not be possible to provide a quantitative assessment of vibration from the onshore substation as it will likely be negligible even very close to the equipment and therefore significant effects unlikely to occur.
5.4.4	The Scoping Report has scoped out noise and vibration disturbance during decommissioning works on the basis that the effects of decommissioning will be lower than those experienced during construction. The Inspectorate does not agree that this can be scoped out at this stage as the noise and vibration effects and subsequent mitigation have not been quantified for the construction phase. Although the noise and vibration disturbance during decommissioning works are likely to be similar or potentially lower than	A decommissioning assessment is included in <b>Section 22.11</b> .

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PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	during construction, the ES should assess these matters where significant effects are likely to occur.	
5.4.5	Paragraph 6.5.31 of the Scoping Report states that 'Once the locations of the Proposed development have been decided upon, the existing data will be reviewed to ascertain its potential use in the assessment.' The Inspectorate expects a project specific baseline survey, with the assessment methodology and choice of noise receptors agreed with the relevant local planning authorities. The Applicant's attention is directed to the Joint Guidance produced by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IoA) 'Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments during the current COVID-19 Pandemic.'	A baseline noise survey will be developed with the methodology and noise receptors agreed with the relevant local planning authorities beforehand. The baseline noise survey will be carried out in 2021 after restrictions associated with the COVID-19 pandemic have been removed. The results of the baseline noise survey will be incorporated into the ES. Should COVID-19 pandemic restrictions be reimposed or not fully lifted, a baseline survey will still be undertaken, but with regard to the latest guidance on noise surveys during lockdown and with consideration on how the restrictions have affected the survey. The methodology would be agreed with the relevant local planning authorities beforehand.
5.4.6	Paragraph 6.5.4 of the Scoping Report states that the spatial scope of the construction noise assessment would be "a 1 km buffer zone around the cable route potential centreline and substation boundary". The Inspectorate expects further explanation and justification to be provided in the ES to support the study area used for the assessment with reference to specific receptors or groups of receptors.	Further explanation and justification has been provided in <b>Section 22.4</b> .

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PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
5.4.7	Information should be provided on the types of vehicles and plant to be used during the construction phase. The assessment should consider a 'worst case' for receptors, i.e. that within the application site the vehicles and plant are located at the closest possible point to a receptor.	Information on the types of vehicles and plant to be used, along with percentage on times are provided in <b>Appendix</b> <b>22.1, Volume 4</b> .
5.4.8	The Inspectorate notes that there is little reference to other receptor types that may be sensitive to noise and vibration, such as ecological receptors. The Inspectorate welcomes consideration of noise impacts on nature conservation areas and other ecological receptors (e.g. protected species). The noise assessment should cross-refer to the findings of other relevant aspect chapters, such as terrestrial ecology and offshore ornithology. The ES should clearly explain any assumptions made regarding the assessment of likely significant effects arising from noise and vibration on sensitive ecological receptors.	The assessments of noise and vibration on offshore ornithology, terrestrial ecology and heritage receptors are provided in Chapter 12: Offshore ornithology, Chapter 23 and Chapter 26 respectively.
5.4.9	The Scoping Report sets out that a COCP and decommissioning plan will be developed as part of the DCO application. No mention is made however of a noise mitigation plan. The Inspectorate expects that such a plan or specific noise mitigation measures would be set out and secured through the COCP or otherwise where they are relied upon in the assessment of significance of residual effects.	Noise measures will be included within the Code of Construction Practice (COCP).

## **Evidence Plan Process (EPP)**

#### Overview

22.3.5 The EPP has been set up to provide a formal, non-legally binding, independently chaired forum to agree the scope of the EIA and HRA, and the evidence required to support the DCO Application.

#### October 2020

<sup>22.3.6</sup> For noise and vibration, further engagement has been undertaken via the EPP Expert Topic Group (ETG) 'Traffic, Air Quality, Noise, Health and Socio-

economics' meeting held by conference call on 27 October 2020. The conference call was attended by the following stakeholders:

- West Sussex Country Council (WSCC);
- South Downs National Park Authority (SDNPA);
- Highways England (HE);
- Arun District Council (ADC);
- East Sussex County Council (ESCC); and
- Mid Sussex District Council (MSDC).
- 22.3.7 The noise and vibration section of the ETG meeting covered the scope of the noise and vibration assessment, the proposed methodology and the key responses from the PINS Scoping Opinion (detailed in **Table 22-4**). This included discussion relating to site and traffic noise associated with the decommissioning phase.
- 22.3.8 It was requested by WSCC that the proposed baseline noise survey approach is consulted with the local authorities and it was agreed that this would be discussed with relevant local authorities.
- 22.3.9 MSDC raised concerns with the potential low frequency noise element at the onshore substation and how the tonal element will be dealt with in relation to BS 4142: 2014 + A1:2019 *Methods for rating and assessing industrial and commercial sound* (British Standard Institute, 2019). It was discussed that BS 4142 takes into account tonal noise and this will be considered in the assessment process. It was discussed that potentially the rating correction system in BS 4142 could be used to provide protection against low frequency noise (this is no longer considered appropriate as discussed in **Section 22.8**).
- 22.3.10 MSDC also asked whether the noise baseline captured during the Rampion 1 project would be used for the onshore substation noise assessment. It was decided that this would be dependent on the final location of the Rampion 2 onshore substation, however, Rampion 1 historical noise baseline will be used in conjunction with the baseline noise data collected as part of the noise assessment in the ES. This approach allows for a more robust development of a representative baseline at noise sensitive receptors. A comparison between both baseline surveys will ensure consistency between levels whilst considering any new influential noise sources influencing the baseline.

#### March 2021

- A second ETG meeting was held for Traffic, Air Quality, Noise and Socioeconomics on 16 March 2021 with the same key stakeholders as the meeting in October 2020. The purpose of the meeting was to provide a progress update since the ETG meeting in October 2020, to provide an update in methodologies and outline the next steps. The main points from the meeting were as follows:
  - confirmation that the baseline noise survey would be undertaken after the COVID-19 pandemic lockdown was lifted;

- that the existing noise associated with the Rampion 1 and existing National Grid Bolney substations would form part of the baseline for the assessment for the proposed onshore substation, however existing substation noise would also be considered in terms of context for the assessment results;
- low frequency noise would be considered in relation to *Proposed criteria for the* assessment of low frequency noise disturbance (Moorhouse et al., 2011);
- confirmation that the noise survey and approach to low frequency noise from the onshore substation would be consulted with relevant local authority; and
- a request was made to consider a baseline survey for residences near to the main temporary construction compounds.

#### Informal consultation and further engagement

#### Overview

22.3.12 Informal consultation has been ongoing with stakeholders in relation to noise and vibration. A summary of the informal consultation undertaken between the completion of the Scoping Report and up to and including March 2021 is outlined in this section.

#### Mid Sussex District Council (MSDC)

- 22.3.13 Initial consultation via conference call with MSDC was undertaken on 18 May 2020 to discuss methods and identify any potential key issues with the noise and vibration associated with the construction, and operation and maintenance of the onshore elements of the Proposed Development. The key comments from MSDC were as follows:
  - issues on Rampion 1 were mainly focused on onshore substation construction and electrical hum;
  - the standard criterion from MSDC is for a specific noise level to be 5dB below background as a starting point. MSDC is flexible on this criterion where it can be demonstrated that all reasonable measures have been taken;
  - due to an unrepresentative baseline conditions during COVID-19 pandemic lockdown, it was suggested that a similar approach to establishing the background noise levels is followed to what was done for Rampion 1, where it was considered 'very low' in the previous iteration of BS4142 (British Standard Institute, 2019), and therefore, to use 35 dB as a noise rating limit;
  - low frequency noise issues from the existing National Grid Bolney substation were raised and the protecting of local residences from low frequency was highlighted as important; and
  - complaints were received relating to the night-time and weekend periods during the construction phase and these elements of works were more numerous than expected from the Rampion 1 ES.

#### Informal consultation - January 2021 / February 2021

- 22.3.14 RED carried out an Informal Consultation exercise for a period of four weeks from 14 January 2021 to 11 February 2021. This Informal Consultation exercise aimed to engage with a range of stakeholders including the prescribed and nonprescribed consultation bodies, local authorities, Parish Councils and general public with a view to introducing the Proposed Development and seeking early feedback on the emerging designs.
- 22.3.15 The key themes emerging from Informal Consultation in January 2021 relating to noise and vibration are:
  - concerns over the location of the Wineham Lane onshore substation search areas and their proximity to nearby properties in relation to noise in particular;
  - concerns over the use of Wineham Lane for construction traffic;
  - traffic management during construction;
  - details around construction programming and phasing;
  - onshore substation design and potential screening; and
  - limiting working hours onshore for noisy equipment.
- 22.3.16 Further detail about the results of the Informal Consultation exercise can be found in the **Informal Consultation Analysis**.

#### 22.4 Scope of the assessment

#### Overview

22.4.1 This section sets out the scope of the PEIR assessment for noise and vibration. This scope has been developed as the Rampion 2 design has evolved and responds to feedback received to date as set out in **Table 22-5**. As outlined in the Planning Inspectorate's (PINS) Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Version 7, the Planning Inspectorate, 2020), information presented in the PEIR is preliminary, therefore this scope will be reviewed and may be refined as Rampion 2 evolves and as a result of ongoing consultation.

#### Spatial scope and study area

22.4.2 The spatial scope of the noise and vibration assessment is defined as per the PEIR Assessment Boundary with a 1.5km buffer zone around the indicative onshore cable corridor centreline and the boundary of the onshore substation search areas. The study area also includes 100m around the access routes and 10m around roads affected by changes in road traffic from construction. The study area, as presented in **Figure 22.1a-d**, **Volume 3** is considered sufficient to include any impacts that might be possible from the worst-case noise emissions from the Proposed Development at the most sensitive times (for instance horizontal directional drilling (HDD) at night). This study area also includes a buffer for potential movement of the onshore cable corridor within the PEIR Assessment Boundary.

- 22.4.3 For both the PEIR and the ES, this study area will be used to identify key noise and vibration sensitive receptors for noise and vibration predictions and assessment on the basis of proximity and sensitivity.
- 22.4.4 The study area for scoping operational noise from the offshore WTGs and substations is set at 20km from the PEIR Assessment Boundary to cover onshore noise sensitive receptors on the coastal front from Selsey to Seaford in addition to developments considered for the cumulative assessment.
- <sup>22.4.5</sup> The study area, shown in **Figure 22.1a-d**, **Volume 3**, will be reviewed and amended in response to such matters as refinement of the onshore and offshore components, the identification of additional impact pathways and in response where appropriate to feedback from consultation.

#### **Temporal scope**

- 22.4.6 The temporal scope of the assessment of noise and vibration is the entire lifetime Rampion 2 which therefore covers the construction, operation and maintenance and decommissioning phases.
- 22.4.7 Construction noise and vibration for onshore elements of the Proposed Development are assessed at a point in time when the maximum plant is on use on site. Where there are different phases to the works, the maximum plant for each phase is taken into consideration in the assessment. Noise from construction traffic is assessed during the peak year of construction.
- 22.4.8 The operation and maintenance phase assessment is based on a point in time where the onshore substation and wind farm are operating to their maximum capacity (albeit the wind farm is assessed under a specific wind speed as a screening assessment and potential further wind speeds dependent on the result of that screening).
- 22.4.9 The decommissioning phase assessment is largely covered by comparing it with the construction as they are assumed to be very close in terms of noise and vibration emissions. Any significant differences relate to points in time when the maximum plant is used on site (traffic assumed to be the same).
- 22.4.10 Whilst the assessments focus on points in time, consideration is given to the duration of the effect as relevant to the different phases and activities within those phases (e.g. some construction effects last for only days whilst some might last for weeks).

#### **Potential receptors**

<sup>22.4.11</sup> The spatial and temporal scope of the assessment enables the identification of onshore receptors which may experience a change as a result of Rampion 2. Due to the size of the study area (**Figure 22.1a-d**, **Volume 3**), receptors that are considered in the PEIR assessment are grouped and are outlined in **Table 22-6**. Where receptors are assessed within a different aspect assessment in this PEIR, this is also indicated below.

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Receptor group	Receptors included within group	Chapter assessed
Residential	Residences, including private gardens where appropriate.	This chapter
Community services	Schools (during daytime periods), hospitals, places of worship.	This chapter
Commercial	Offices, retail, entertainment venues and eateries, leisure facilities	This chapter
Terrestrial ecology	Designated sites including Special protection areas and Sites of Special Scientific Interest.	Chapter 23: Terrestrial ecology and nature conservation
Historic environment	Scheduled monuments, listed buildings	Chapter 26: Historic environment
Leisure areas	National parks, local nature reserves <sup>1</sup>	This chapter

#### Table 22-6 Receptors requiring assessment for noise and vibration

#### **Potential effects**

22.4.12 Potential effects on noise and vibration receptors that have been scoped in for assessment are summarised in **Table 22-7**. The effects take into consideration Scoping Opinion responses and have been amended accordingly.

Table 22-7	Potential	effects	on noise	and	vibration	receptors	scoped i	n for	further
assessment									

Receptor	Activity or impact	Potential effect
Construction		
Residential properties, educational, commercial, religious and medical premises, quiet or important outside leisure areas.	Activities from cable trenching and onshore substation construction resulting in noise from works and vibration from works if very close to sensitive receptors. Potential noise effects from	Potential for significant effect if the cable corridor is located very close to sensitive receptors levels of noise and vibration could potentially result in a medium magnitude of change. Potential for significant effect from piling noise and vibration

<sup>&</sup>lt;sup>1</sup> There are no 'Quiet Areas' within the Study Area as identified in Action Plans in accordance with Environmental Noise (England) Regulations 2006, as amended.

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Receptor	Activity or impact	Potential effect		
	offshore WTG piling (Construction).	at the onshore substation on sensitive receptors.		
		Potential for significant noise effect from piling for the offshore substation and turbines at onshore receptors dependent on the piling equipment used and location / duration / times of work.		
Residential properties, educational, commercial, religious and medical premises, quiet or important outside leisure areas.	Horizontal directional drilling resulting in noise disturbance especially if required 24 hours a day. Potential vibration effects if very close to sensitive receptors (Construction).	Potential for significant effect if the HDD sites are very close to sensitive receptors levels of noise and vibration could potentially result in a medium magnitude of change. In particular a requirement for 24 hour working could result in significant disturbance during the night-time.		
Residential properties, educational, commercial, religious and medical premises, quiet or important outside leisure areas.	Construction road traffic resulting in disturbance from increased traffic noise and vibration effects from poorly maintained roads (Construction).	Potential for significant effect should there be construction traffic on small roads with otherwise low flow traffic resulting in a potentially high magnitude of change in noise. HGV on poorly maintained roads could result in vibration levels of medium magnitude.		
Operation and maintenance				
Residential properties, educational, commercial, religious and medical premises, quiet or important outside leisure areas.	Noise disturbance as a result of the onshore substation (Operation and maintenance).	Potential for significant effect due to the proximity of the onshore substation and the quiet character of the existing noise environment will potentially result in large changes to the baseline noise environment.		
Residential properties, educational,	Noise disturbance from the operation of WTGs at	Potential for significant effect, however, it is unlikely that the		



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Receptor	Activity or impact	Potential effect
commercial, religious and medical premises, quiet or important outside leisure areas.	onshore sensitive receptors (Operation and maintenance).	offshore wind farm will exceed criteria to result in a significant effect given the distances to the shoreline. However, the number of potentially affected receptors necessitates consideration even with a low risk.
Decommissioning		
Residential properties, educational, commercial, religious and medical premises, quiet or important outside leisure areas.	Noise and vibration disturbance from removal of equipment and reinstating sites, including associated traffic noise and vibration effects (Decommissioning).	Although it is anticipated that the effects of decommissioning activities will be similar or lower than those experienced during construction, a decommissioning assessment is included to cover key differences with the construction which could result in a different effect level.

#### Activities or impacts scoped out of assessment

22.4.13 A number of potential effects have been scoped out from further assessment, resulting from a conclusion of no likely significant effect. These conclusions have been made based on the knowledge of the baseline environment, the nature of planned works and the wealth of evidence on the potential for impact from such developments more widely. The conclusions follow (in a site-based context) existing best practice. Each scoped out activity or impact is considered in turn below and an indication given of whether this has evolved since Scoping.

#### Table 22-8 Activities or impacts scoped out of assessment

Activity or impact	Rationale for scoping out
Operation	
Increases in noise from site traffic for substation and wind farm maintenance.	As outlined in <b>Table 22-5</b> , it has been agreed in with PINS (ID 5.4.1) that disturbance as a result of the maintenance of the onshore substation and wind farm can be scoped out of the EIA in the Scoping Opinion. Operational road traffic will be minimal and will only have a

Activity or impact	Rationale for scoping out
	negligible effect on existing road traffic flows, leading to no likely significant effect.
Noise disturbance as a result of the offshore substation.	As outlined in <b>Table 22-5</b> , it has been agreed in with PINS (ID 5.4.2) that disturbance as a result of the offshore substations can be scoped out of the EIA in the Scoping Opinion. Noise would not be audible as a result of the sound attenuation from the distance between the offshore substations and onshore receptors, leading to no likely significant effect.
Vibration disturbance from the operation of the onshore and offshore substations and offshore WTGs.	As outlined in <b>Table 22-5</b> , it has been agreed in with PINS (ID 5.4.3) that disturbance as a result of vibration from the offshore substations and WTGs can be scoped out of the EIA in the Scoping Opinion. All operational components of the Proposed Development are a sufficient distance that resulting vibration at sensitive receptors would not be perceptible, leading to no likely significant effect.
	It is acknowledged in <b>Table 22-5</b> that PINS did not agree that vibration from the onshore substation could be scoped out of the EIA. Vibration from the onshore substation is not assessed at PEIR but will be considered at the ES stage when further design information is available for the onshore substation.

# 22.5 Methodology for baseline data gathering

#### **Overview**

- 22.5.1 Baseline data collection has been undertaken to obtain information over the study areas described in **Section 22.4: Scope of the assessment**. The current baseline conditions presented in **Section 22.6: Baseline conditions** sets out data currently available information from the study area.
- <sup>22.5.2</sup> To-date, no site surveys have been undertaken due to COVID-19 pandemic restrictions, but they will be undertaken to inform the ES if the lifting of restrictions allows. In lieu of a baseline survey, predicted noise and vibration have been assessed against criteria in the form of absolute levels taken from industry standards and guidance.

#### **Desk study**

22.5.3 The data sources that have been collected and used to inform this noise and vibration assessment are summarised in **Table 22-9**.

#### Table 22-9 Data sources used to inform the noise and vibration PEIR assessment

Source	Date	Summary	Coverage of study area
Google Earth Pro. Version 7.3.2.5776 and Ordnance Survey (OS) Mapping	December 2020	Provides aerial photography resources	Entire study area
Rampion Offshore Wind Farm Environmental Statement, Section 27 (E.On/RSK Environmental Ltd, 2012)	December 2012	Existing baseline data collected during the Rampion 1 application	Sussex coastline for the offshore wind farm assessment. Onshore substation location dependent.
BS 5228-1/2: 2009+A1:2014 (British Standard Institute, 2014a and 2014b)	December 2020	Noise data for construction noise and vibration predictions	Project-wide

22.5.4 Existing monitoring data exists from the assessment of the existing Rampion 1 development consisting of attended noise measurements near to the existing Rampion 1 cable route and substation site. Once the locations of the Proposed Development have been decided upon, the existing data will be reviewed to ascertain its potential use in the assessment of Rampion 2.

#### **Existing baseline data**

- <sup>22.5.5</sup> For the ES assessment, existing data will be used to provide context for the assessment where practical.
- A series of noise measurements along the proposed cable route and around the proposed substation were undertaken for the Rampion 1 development by RSK Ltd. The onshore cable corridor for Rampion 2 is sufficiently distant from the Rampion 1 route that the data is not useable to inform the baseline environment for this assessment.
- 22.5.7 Existing Rampion 1 noise measurements will be reviewed should the selected onshore substation site be in close proximity to the existing Rampion 1 and Bolney substations (Wineham Lane North onshore substation search area). The existing data will be compared to newly measured baseline data to provide context of any changes in the noise environment since the Rampion 1 assessment. The main

contributors to the baseline noise environment at these locations will likely be road traffic, expected to be relatively unchanged since the Rampion 1 noise survey, and the existing National Grid Bolney substation.

- 22.5.8 Post-submission of the Rampion 1 DCO Application, noise monitoring supported with computer noise modelling was undertaken for the Rampion 1 substation in 2019. Should the selected Rampion 2 onshore substation search area be in close proximity to the existing Rampion 1 and existing National Grid Bolney substations, the associated data will be referenced to provide context to the assessment of industrial noise.
- 22.5.9 Noise from the existing Rampion 1 substation forms part of the noise baseline. When considering this in addition to the new onshore substation noise resulting from the Proposed Development, a greater impact is likely to occur at noise sensitive receptors where onshore substation noise from each development is audible. For this reason, existing onshore substation noise will be considered as part of the assessment to account for the greater impact that might occur at noise sensitive receptors.
- 22.5.10 The latest guidance for wind farm noise assessments from the Institute of Acoustics (2013) specifies that the scoping of the study area should include noise from other proposed and existing wind farms. However, noise from the Rampion 1 WTGs will not be possible to identify against the prevailing noise environment at the coast as it is unlikely to be audible. Therefore, the predictions of noise undertaken for the Rampion 1 assessment have been used to identify whether a cumulative effect of the Rampion 1 and Rampion 2 WTGs will necessitate further detailed assessment and survey work.

#### Planned baseline data collection

- 22.5.11 As the locations of the offshore and onshore components of the Proposed Development continue to be refined through ongoing design, a desk-based review will be taken to identify sensitive receptors and appropriate noise monitoring requirements. The identified approach will be agreed through consultation with the relevant local planning authorities.
- 22.5.12 Baseline monitoring will be undertaken after lockdown for the COVID-19 pandemic has ended, and the noise environment is expected to be representative of normal conditions. The survey will include road counts to check whether traffic levels would be considered normal and comment made as to how this would affect the baseline noise levels if traffic is substantially different from what would be expected.
- A sound monitoring survey for the onshore substation search area will be undertaken in accordance with the methodologies advocated within BS 7445-1:2003 *Description and measurement of environmental noise* (British Standards Institute, 2003) and BS 4142 (British Standards Institute, 2019). The sound monitoring survey will cover daytime and night-time for a period of at least five days including both weekdays and the weekend.
- <sup>22.5.14</sup> The need to establish the baseline conditions for the assessment of the operational offshore WTGs on onshore noise sensitive receptors would be considered once an initial 'screening assessment' has been undertaken as per the

guidance within the ETSU-R-97 'The Assessment and Rating of Noise from Wind farms (The Working Group on Noise from Wind Turbines, 1996). If this initial noise modelling exercise identifies a need for a more detailed assessment work, monitoring will be conducted as per guidance within the Institute of Acoustics (2013) *Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating Wind Turbine Noise* (GPG). This process will be conducted for the ES once further design progression has been achieved to enable predictions to be undertaken for the proposed wind farm.

- 22.5.15 It is not initially proposed to undertake a sound monitoring survey to inform the assessment of the construction of the onshore cable, or construction of the offshore WTGs, as the extents of the study area are such that the noise environment at receptors will vary widely. Instead, the lower cut-off values within BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites Part 1 Noise (British Standard Institute, 2014a) will be used as criteria as per Method 2 in Appendix E. Noise monitoring will be considered for receptors close to HDD sites that are located in a noise environment where the BS 522-1:2009+A1:"2014 criteria might be higher than the lower cut-off values.
- 22.5.16 In consideration to road traffic noise, data will be provided that incorporate the future baseline from a natural increase in vehicle movements and surrounding developments. Baseline measurements will be taken where either:
  - there are effected roads with existing very low traffic flows which therefore cannot be modelled in accordance with the *Calculation of Road Traffic Noise* (CRTN) (Department of Transport Welsh Office, 1988); or
  - it is suspected that existing baseline noise levels would change the determination of effect level (for instance, a high change in traffic levels on a low traffic road in an urban area).

#### **Data limitations**

- 22.5.17 At PEIR stage, there are the following information gaps that are expected to be resolved for the ES:
  - offshore piling sound power levels;
  - WTG sound power levels; and
  - final onshore substation location.
- 22.5.18 Given the number of variables for the above (location, positioning, layout, equipment, etc.), to make assumptions at PEIR stage would not provide useful information. This is in contrast to the construction of the onshore substation and onshore cable corridor, where indicative equipment is known but not location and so an indicative assessment can be undertaken. Therefore, an assessment of the above elements has not been included (with the exception of onshore substation construction). However, a methodology for the ES stage has been identified within this PEIR for when information becomes available and the ES will include the following assessments:
  - offshore piling noise;

- wind farm noise; and
- onshore substation operational noise.
- 22.5.19 The following data unknowns are unlikely to be resolved for the ES and precautionary assumptions have been, or will be for the ES, applied to provide a worst-case noise and vibration envelope to ensure the impact will be no higher than predicted:
  - onshore substation components as the details of operational plant will not be known until detailed design stage.
- 22.5.20 The following information will be updated for the ES, but interim data has been made available for the PEIR upon which to make an assessment including:
  - road traffic data;
  - onshore cable corridor alignment;
  - onshore substation construction; and
  - onshore construction compound locations.

#### 22.6 Baseline conditions

#### **Current baseline**

#### Overview

- 22.6.1 In order to fully understand the potential noise and vibration effects from the Proposed Development, determining the existing environmental conditions is an essential step of the EIA. At this PEIR stage, as specified in **Section 22.5**, determination of the existing noise and vibration baseline has been undertaken based on a desk-based study. For the ES, baseline noise surveys will be conducted, which will establish a clear understanding of the existing baseline.
- 22.6.2 The onshore elements of the Proposed Development encompass a substantial area, particularly during the construction phase and the established study area for the PEIR, based on the PIER Assessment Boundary, has been illustrated in Figure 22.1a-d, Volume 3. The following section provides an overview of the existing baseline conditions at locations likely to be affected by the Proposed Development for each phase of work and this overview has been based on Google Earth Pro. Version 7.3.2.5776 and OS Mapping.

#### Onshore cable corridor baseline

- As presented in **Figure 22.1a-d**, **Volume 3**, the onshore temporary cable corridor will pass through a large area, from landfall at Climping through to the proposed onshore substation and then onto the existing National Grid Bolney substation. Potential routes for the onshore temporary cable corridor and the substation search areas are presented in **Figure 4.12**, **Volume 3**.
- 22.6.4 The coastline is interspersed with villages largely backed by agricultural land with the A259 running east/west. Sound levels are likely influenced by road and rail

traffic and additional anthropogenic sources (gardening activities, conversation, music) closer to areas of habitation, as well as the sea on approaching the coast. Intermittent noise would also be anticipated locally from recreational flights associated with Shoreham airfield. Receptors close to the River Arun will experience boating noise, though this is likely to be of low sound level and irregular.

- 22.6.5 The largest settlement in the study area is Littlehampton. Sound levels here are principally likely to be influenced by local road traffic and rail traffic, as well as other anthropogenic sources.
- 22.6.6 Inland from the coast, the study area is predominantly rural, comprising a mosaic of arable and livestock farming land with blocks of commercial forestry. There are various isolated dwellings and some small villages throughout. Baseline sound levels are generally expected to be low and typical of a rural environment, being influenced by road traffic with additional anthropogenic sources closer to areas of habitation.
- 22.6.7 The noise environment will be similar around the proposed onshore substation search areas, except at Wineham Lane North onshore substation search area (which is adjacent to the Rampion 1 substation and Bolney substation) where substation noise may be audible.
- 22.6.8 Baseline vibration levels are likely to vary widely with localised temporary events, such as construction works. Levels of elevated vibration might be measurable adjacent to railways or poorly maintained roads. Otherwise, vibration levels are likely to be negligible for most of the study area.

#### Onshore substation location baseline

- 22.6.9 The final onshore substation location is yet to be defined, however onshore search areas within a radius of 5km of the existing National Grid Bolney substation have been determined and are illustrated in **Figure 4.12**, **Volume 3**. The two onshore substation search areas under consideration are as follows:
  - Bolney Road / Kent Street; and
  - Wineham Lane North.
- 22.6.10 The two onshore substation search areas encompass environments where a similar existing noise and vibration baseline is likely. As the area is rural, baseline sound levels are generally expected to be low and typical of a rural environment, being influenced by road traffic (mainly from Cowfold Road and local roads) with additional anthropogenic sources closer to areas of habitation. It is likely that substation noise from Rampion 1 and Bolney is audible also at Wineham Lane North onshore substation search area.

#### **Future baseline**

22.6.11 For the majority of the study area, it is reasonable to predict a consistent baseline in future years, with minimal changes based on the surrounding environment. Changes in car technology is likely to offset the small, expected sound level increases due to traffic growth. The approach within the Noise Policy Statement

for England is that noise should be minimised, avoided or mitigated to suitable levels, and adverse impact avoided where possible. For this reason, minimal change to the baseline is predicted as significant changes would likely be rejected through the planning process. The area where there is likely to be changes in the baseline is around the proposed A27 Arundel Bypass. This project is currently at the pre-application stage and details are limited. The future baseline section will be updated for the ES with more information on the A27 Arundel Bypass if this is available at the time of writing.

## 22.7 Basis for PEIR Assessment

#### Maximum design scenario

- 22.7.1 Assessing using a parameter-based design envelope approach means that the assessment considers a maximum design scenario whilst allowing the flexibility to make improvements in the future in ways that cannot be predicted at the time of submission of the DCO Application. The assessment of the maximum adverse scenario for each receptor establishes the maximum potential adverse impact and as a result impacts of greater adverse significance would not arise should any other development scenario (as described in **Chapter 4: The Proposed Development**) to that assessed within this Chapter be taken forward in the final scheme design.
- 22.7.2 The maximum assessment assumptions that have been identified to be relevant to noise and vibration are outlined in **Table 22-10** below and are in line with the Project Design Envelope (**Chapter 4**).

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#### Table 22-10 Maximum assessment assumptions for impacts on noise and vibration

Project phase and activity / impact	Maximum assessment assumptions	Justification
Construction		
Temporary noise and vibration from the construction and operation of the construction compound	<ul> <li>Temporary construction compounds (not including HDD):</li> <li>seven potential locations for temporary construction compounds have been identified but likely that four will be taken forward to DCO;</li> <li>the size of the temporary construction compounds will be approximately 4ha;</li> <li>core working hours are Monday to Friday 07:00 to 19:00 hours and Saturday 08:00 to 13:00 hours; and</li> <li>the full equipment list, including sound power levels and percentage on-time are detailed in Appendix 22.1, Volume 4.</li> </ul>	The assumptions represent the maximum design scenario in terms of number of locations for proposed noise sources, the geographical extent and temporal extent.
Temporary noise and vibration effects from landfall and trenchless crossing (HDD)	<ul> <li>Landfall and trenchless crossings (HDD):</li> <li>continuous work may be required for HDD and therefore, the assessment has considered 24 hour working days; and</li> <li>the full equipment list, including sound power levels and percentage on-time are detailed in Appendix 22.1, Volume 4.</li> </ul>	The duration of HDD will depend on ground conditions. As this will not be known until exploratory testing, this assumption provides a worst-case scenario.



Project phase and activity / impact	Maximum assessment assumptions	Justification
Temporary noise and vibration effects from the construction of the onshore substation	<ul> <li>Onshore substation:</li> <li>work will commence during core working hours only;</li> <li>site works will not be within 60m of residences; and</li> <li>the full equipment list, including sound power levels and percentage on-time are detailed in Appendix 22.1, Volume 4.</li> </ul>	These assumptions cover for all notable work elements which could result in adverse noise or vibration effects.
Temporary noise and vibration effects from cable trenching works	<ul> <li>Onshore cable</li> <li>work will commence during core working hours only; and</li> <li>the full equipment list, including sound power levels and percentage on-time are detailed in Appendix 22.1, Volume 4.</li> </ul>	The assumptions are based on a reasonable approach to the construction works allowing for predictions to be undertaken.
Operation and maintenance	No design assumptions have been considered ay PEIR stage.	Full assessment will be undertaken for the Environmental Statement once detailed information is available.
Decommissioning	<ul> <li>Onshore substation and cable</li> <li>It is anticipated that onshore cables will be left buried <i>in-situ</i>.</li> </ul>	This is a worst-case approach as it is likely that many aspects of the decommissioning will be of a lesser noise and vibration effect.
- 22.7.3 The assessment of effects in this PEIR takes into consideration the optionality that exists for flexibility at this stage of the design of the Proposed Development (as outlined in **Chapter 5: Approach to the EIA**).
- 22.7.4 In order to form a preliminary noise and vibration assessment, without providing an unrealistic worst-case scenario, an approach has been taking to calculate stand-off distances. This will determine distances where different magnitude of changes could be identified in relation to different sources of noise and vibration.
- 22.7.5 By taking this assessment approach, an understanding of the potential significant effects associated with the Proposed Development can be provided in the form of distances. Comparison of these stand-off distances with the sensitivity of potential receptors can assist in determining whether a significant effect, from an EIA perspective is likely to occur from the activity.
- 22.7.6 The various options for the construction have been assessed. For the temporary construction compounds, access routes and HDD locations these have been assessed as per their identifying numbers. Onshore substation construction has been assessed using distances at which different magnitudes of impact would be experienced. For the onshore cable corridor, the maximum effects along the various options have been assessed. However, the impacts for all options of the onshore cable corridor are similar due to the proximity of nearest residential receptor to the onshore cable corridor being similar in each option.
- 22.7.7 Dependent on the approach taken as described above, the format of tables within this chapter are different; an explanation is provided before each table.

## **Embedded environmental measures**

- 22.7.8 As part of the Rampion 2 design process, several embedded environmental measures have been adopted to reduce the potential for impacts on noise and vibration. These embedded environmental measures will evolve over the development process as the EIA progresses and in response to consultation. They will be fed iteratively into the assessment process.
- 22.7.9 These measures typically include those that have been identified as good or standard practice and include actions that would be undertaken to meet existing legislation requirements. As there is a commitment to implementing these embedded environmental measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of Rampion 2 and are set out in this PEIR.
- **Table 22-11** sets out the relevant embedded environmental measures within the design and how these affect the noise and vibration assessment.

#### ID Environmental Project How the Relevance to noise measure proposed phase environmental and vibration measures will assessment measure introduced be secured C-10 No blasting is Scoping Outline Code of Blasting would result in temporary high anticipated to be Construction required and levels of noise and Practice trenchless crossings (COCP) and vibration. This will be undertaken by Development measure reduces the non-impact methods. **Consent Order** adverse impacts from (DCO) construction noise. requirement. C-22 Core working hours Scoping Outline COCP Core working hours for construction of the and DCO avoids the most onshore components sensitive times when requirement. will be 0700 to 1900 higher noise impacts Monday to Friday, would be anticipated. and 0800 to 1300 on Saturdays, apart from HDD activities are specific likely to be required circumstances to be outside of core working hours and set out and agreed in the Outline COCP. have been assessed as such. C-26 Where noisy activities Scoping Outline COCP This measure are planned and may reduces the adverse and DCO cause disturbance. requirement. impacts from the use of mufflers. construction noise. acoustic barriers and other suitable solutions will be applied. C-33 An Outline COCP will Scoping **Outline COCP** Noise mitigation and be adopted to and DCO best practice minimise temporary requirement. techniques in disturbance to minimising noise will residential properties. be secured via the recreational users COCP. and existing land users and will provide details of measures to protect environmental receptors.

#### Table 22-11 Relevant noise and vibration embedded environmental measures

ID	Environmental measure proposed	Project phase measure introduced	How the environmental measures will be secured	Relevance to noise and vibration assessment
C-160	Highways condition surveys will be undertaken before, during and after the construction phase and repairs conducted to any damage to highways as a result of Rampion 2 construction heavy goods vehicles (HGVs) on the highways included within the HGV Access Strategy.	PEIR	Proposed routing in agreed Outline Construction Traffic Management Plan (CTMP).	This measure aims to minimise the risk from vibration effects at residences from HGVs passing over holes in the road.

## 22.8 Methodology for PEIR assessment

## Introduction

- 22.8.1 The project-wide generic approach to assessment is set out in **Chapter 5**: **Approach to the EIA**. The assessment methodology for noise and vibration for the PEIR is consistent with that provided in the Scoping Report (RED, 2020) and no changes have been made since the scoping phase. A methodology is given for those assessments not yet undertaken due to existing data gaps as described in **Section 22.16** covering the operational offshore wind farm and substation assessments and offshore piling noise.
- 22.8.2 The noise and vibration assessment compares either current noise levels or acceptable threshold values at identified receptors with those noise levels that are predicted should Rampion 2 proceed. The results of this comparison are then assessed against a suite of criteria depending on the noise source. In addition, absolute levels of noise from the Proposed Development will be assessed in relation to adverse effect levels as described within the NPSE (Defra, 2010).

## **Baseline characterisation**

22.8.3 At PEIR stage, the assessment considers onshore construction elements of the Proposed Development only due to current data gaps with operational data. The operational aspects of the Proposed Development will be addressed in the ES. As discussed in **Section 22.6**, the baseline to be assessed against will take the form of threshold values for site noise, or in the case of road traffic noise, baseline

traffic data. These values are incorporated into the magnitude of change as provided in **Table 22-13**.

## **Assessment methods**

#### Construction phase assessment

- 22.8.4 Noise has been predicted within spreadsheets incorporating BS 5228-1 (British Standard Institute, 2014a) calculation methodology based on anticipated construction plant and methodologies. A full listing of the plant assumptions is included within Appendix 22.1, Volume 4. Where there are uncertainties in locations for the construction works, the distance at which assessment boundaries are reached from the noise sources are given. For instance, the distance at which the significant observed adverse effect level (SOAEL) will be exceeded from works at night. This has been undertaken for cable trenching and onshore substation construction.
- 22.8.5 At PEIR stage, construction road traffic noise has been initially predicted as a Basic Noise Level 10m from each road affected by traffic increases included within **Appendix 24.5: Traffic calculations, Volume 4.** Predictions have been undertaken using a spreadsheet incorporating CRTN (Department of Transport Welsh Office, 1988) method. This has been undertaken for a 'with' and 'without' construction traffic scenario which are then compared to provide the change in traffic noise as a result of the works. The difference between the 'with' and 'without' scenarios has been assessed using short-term criteria within the DMRB (Highways Agency, 2020) updated noise assessment section (Volume 11, Section 3, Part 7, LA111). Construction traffic on access routes have been assessed using the haul route calculation method within BS 5228-1 (British Standard Institute, 2014a) and assessed using criteria within that document. The difference from traffic on established roads is that haul roads cannot be compared to existing traffic levels (i.e. the haul roads do not exist).
- 22.8.6 For the ES, the construction road traffic noise assessment will be updated using baseline traffic predictions informed by up to date traffic counts where applicable. Computer noise modelling will be undertaken where upon review of the spreadsheet predictions, a significant effect may be identified based on noise from two or more roads. This ensures that the simpler spreadsheet calculation is not omitting a combined significant effect at any receptor locations.
- 22.8.7 Due to the uncertainties regarding ground conditions and final plant equipment during the construction phase, the assessment of vibration from likely sources, such as onshore piling equipment, has been undertaken qualitatively, but with consideration of empirical levels provided within BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 2 Vibration* (British Standard Institute, 2014b). BS 5228-2 also provides the criteria which has informed the identification of magnitude of impact. A quantitative assessment will be undertaken at the ES stage when defined locations of onshore piling rigs are identified.

#### Operation and maintenance phase assessment

- 22.8.8 The operation of the onshore substation has not been assessed for this PEIR as the specific location has not been chosen. For the ES an assessment of operational sound generated by the onshore substation will be undertaken using prediction methodology within ISO 9613-2 (International Standards Organisation, 1996) and assessed in accordance with BS 4142 (British Standard Institute, 2019). It is unlikely that details of the substation plant will be available prior to DCO Application and therefore a worst-case noise envelope will be included within a computer noise model for the identified onshore substation search area.
- 22.8.9 It will be assumed that a tonal penalty from the onshore substation low frequency 'hum' would be applied to form a rating correction, but that none of the other corrections would be required (i.e. impulsivity, intermittency or other sound characteristics). Given that the onshore substation will include design assumptions to minimise noise intrusion, it is not considered likely that a tonal correction of more than +4 dB will be required. This could be lower dependent on the specific noise level of the noise source.
- 22.8.10 Low frequency noise is specifically not considered as part of BS 4142 (British Standard Institute, 2019) and the standard refers to a report by Moorhouse et al. (2011), which concludes with a reference curve for assessing low frequency noise down to 10 Hz. The ANC technical guidance on BS 4142 (Association of Noise Consultants, 2020) clarifies that lower frequencies are not precluded from being part of a BS 4142 (British Standard Institute, 2019). It is considered that applying a rating correction for low frequency noise may not appropriately protect residential amenity and may unnecessarily affect mitigation design. The issue of low frequency noise will be considered further at ES stage for both noise modelling considerations and assessment of the onshore substation.
- 22.8.11 As outlined in Section 22.6, for the ES screening predictions<sup>2</sup> using computer noise modelling software will be undertaken to assess whether the proposed offshore wind farm would result in noise levels at residences of above LA90, 10 mins 35dB in conjunction with other wind farms (specifically Rampion 1) at a wind speed of 10m/s. If the predicted noise levels are at or below 35dB, no further assessment will be undertaken, and the results would be included within the ES. If the predicted noise levels are above 35dB, in addition to additional noise survey work required to ascertain the baseline at coastal residences, a full operational noise assessment will to be undertaken. Predictions would be in accordance with *ISO 9613-2:1996 Attenuation of sound during propagation outdoors Part 2: General method of calculation* (International Standards Organisation, 1996) as modified by ETSU-R-97 (The Working Group on Noise from Wind Turbines, 1996) and the GPG (Institute of Acoustics, 2013).
- <sup>22.8.12</sup> Vibration from the onshore substation will be considered qualitatively and against criteria within BS 5228-2 (British Standard Institute, 2014b), once further information of the site is available.

<sup>&</sup>lt;sup>2</sup> Standard practice as per ETSU-R-97: The Assessment and Rating of Noise from Wind Farms (1996)

#### Decommissioning assessment

22.8.13 The decommissioning assessment will be informed by the construction assessment as it will largely be similar to the noise and vibration from the construction but in reverse. It is not possible to predict what the future baseline will be, but the same threshold values are assumed for assessment purposes. The only difference that will be considered notable, and will therefore be included in this assessment, is the potential use of pneumatic hammering for breaking concrete at the onshore substation to break the concrete foundations (though concrete is likely to be left in situ).

#### Significance evaluation methodology

#### Overview

Based on the method presented in Chapter 5: Approach to the EIA, the criteria for defining sensitivity and magnitude can be found in Table 22-12 and Table 22-13. These criteria are defined and applied based on professional judgement, using recognised approaches to classification relevant to the receptor types, including BS 5228-1 (British Standard Institute, 2014a), BS 5228-2 (British Standard Institute, 2014b), BS 4142 (British Standard Institute, 2019) and DMRB (Highways Agency, 2020), all of which represent good practice for noise and vibration within EIA.

#### Sensitivity of receptor

22.8.15 Definitions of receptor sensitivity used in the assessment are provided in **Table 22-12**, with examples of receptors that would be assigned to each class.

Sensitivity	Description	Examples			
High	Where receptors will be particularly susceptible to noise or vibration disturbance.	<ul> <li>Designated areas of local or national importance which would be noise or vibration sensitive.</li> <li>Theatres/auditoria/studios.</li> <li>Schools during the daytime.</li> <li>Hospitals/residential care homes.</li> <li>Places of worship.</li> <li>South Downs National Park.</li> </ul>			
Medium	Receptors moderately sensitive to noise or vibration, where it may cause some distraction or disturbance.	<ul> <li>Residences, including private gardens where appropriate.</li> <li>Offices.</li> </ul>			

#### Table 22-12 Sensitivity of receptor / resource



Sensitivity	Description	Examples			
		<ul> <li>Outdoor leisure areas (not including designated quiet areas or those of regional or national. importance which would be noise or vibration sensitive).</li> </ul>			
Low	Receptors where distraction or disturbance from noise or vibration is minimal.	<ul> <li>Buildings not occupied during working hours.</li> <li>Factories and working environments with existing high noise levels.</li> <li>Sports grounds when spectator noise is a normal part of the event.</li> <li>Retail, entertainment venues and eateries.</li> </ul>			

#### Magnitude of change

- 22.8.16 Table 22-13 provides examples of how various magnitudes of change can be determined with respect to noise and vibration. The criteria and examples in Table 22-13 focus on negative changes, but positive changes may also occur and will be considered on a case-by-case basis as required.
- 22.8.17 Vibration from traffic is considered qualitatively rather than by numeric criteria and therefore does not have a delineated magnitude of change. In this case, the potential for impacts is based on professional judgement pertaining to proximity of receptors to construction traffic routes, likely pathway of vibration to the receptor and likely condition of road.
- 22.8.18 For non-residential receptors, the same magnitude of change will apply for temporary effects from construction noise, construction vibration and construction traffic as for residential. These are outlined in **Table 22-13**.

#### Table 22-13 Magnitude of change

Magnitude	Site Construction and Access Noise	Site Construction Vibration	Construction Traffic Noise	Operational Noise: Residential	Operational Noise: Non-Residential
High	Exceeds BS 5228-1 cut-off values* for one month or more by 10dB, or Trigger levels** by more than 9 days in a 15 day period by 10 dB.	x ≥ 10 mm/s Peak Particle Velocity (PPV)	Increase in traffic noise***, x ≥ 5 dB L <sub>A10, 18h</sub>	Plant noise rating level ( $L_{Ar,T}$ ) difference with background ( $L_{A90,T}$ ), x ≥ 10 dB	Change in noise level (L <sub>Aeq, T</sub> ) x ≥ 5 dB
Medium	Exceeds BS 5228-1 cut-off values for one month or more by 1 to 9 dB. or Triggers levels by more than 9 days in a 15 day period by 1 to 9 dB.	0.3 ≤ x < 10 mm/s PPV	3 ≤ x < 5 dB L <sub>A10,</sub> <sup>18h</sup>	5 ≤ x <10 dB	3 ≤ x < 5 dB
Low	Exceeds BS 5228-1 threshold values or trigger levels but less than temporal criteria of significance.	0.14 ≤ x < 0.3 mm/s PPV	1 ≤ x < 3 dB L <sub>A10,</sub> <sup>18h</sup>	0 ≤ x < 5 dB	1 ≤ x < 3 dB
Very Low	Is within < 10 dB below BS 5228- 1 threshold values or trigger levels.	0.1 ≤ x < 0.14 mm/s PPV	0 ≤ x < 1 dB L <sub>A10,</sub> <sup>18h</sup>	-10 ≤ x < 0 dB	0 ≤ x < 1 dB

\*65 dB day, 07:00 – 23:00 Monday to Friday, 07:00 – 13:00 Saturday. 45 dB night-time 23:00-07:00. Assumes evening work would also necessitate night-time work, which would be the constraining time period.

\*\*75 dB daytime, 55 dB night-time.

\*\*\* Change in LA10, 18 h, construction traffic noise + baseline traffic noise minus baseline traffic noise in isolation.

## Significance of effect

22.8.19 The overall significance of effect rating is based on the evaluation of significance matrix presented in **Graphic 5.3 (Chapter 5: Approach to the EIA)**, as presented in **Table 22-14**, however there are a few minor changes from **Graphic 5.3**, notably only having three sensitivities of receptors rather than four.

#### Table 22-14 Significance of effect matrix for noise and vibration

Level of	Magnitude of change				
significance to sensitivity of receptor / resource	High likelihood	Medium	Low	Very Low	
High	Major (Significant)	Moderate / Major (Significant)	Minor / Moderate (Potentially significant)	Minor (Not significant)	
Medium	Moderate/Major (Significant)	Minor / Moderate (Potentially significant)	Minor (Not significant)	Negligible / Minor (Not significant)	
Low	Minor / Moderate (Potentially significant)	Minor (Not significant)	Negligible / Minor (Not significant)	Negligible (Not significant)	

- 22.8.20 The significance of effect matrix allows for the application of professional judgement in qualifying the effect with the rationale discussed. This will normally only be amendments of effect into adjacent descriptors (for example major to moderate) as shown in **Table 22-14**, but where necessary this could be a larger adjustment. Qualifying factors include timescales and absolute noise levels. Context is important in both the residential, as incorporated into BS4142 (British Standard Institute, 2019), and non-residential assessment of operational noise.
- 22.8.21 For residential receptors, context will mainly apply to the existing levels and type of industrial noise. Residents near an industrial area are likely to be less sensitive to onshore substation noise during the operational phase, which may also be masked by other existing industrial noise. Conversely, if an existing substation is the only source of industrial noise in an otherwise quiet rural area, residents could be more sensitive to any increase in onshore substation noise.
- 22.8.22 For non-residential receptors, the operational noise effect of changes will be qualified as potentially significant if noise levels from the Proposed Development are above a threshold value. These threshold values, which are presented in **Table 22-15**, are based on World Health Organisation (1999) recommended limits for different premises.

Setting	Noise level (outdoors, free field)			
	Day (07:00-23:00), LAeq, 16hr	Night (23:00-07:00), L <sub>Aeq,</sub> <sup>8hr</sup>		
Places of meeting for religious worship	50 dB	N/A		
Hospitals and hotels	50 dB	40 dB		
Schools, colleges and libraries	50 dB	N/A		
Offices	55 dB	N/A		
External amenity spaces	55 dB	N/A		

#### Table 22-15 Significance screening criteria for non-residential receptors

22.8.23 The criteria for the assessment of offshore WTGs are largely tailored towards residential receptors with very little margin between acceptability and unacceptability. As such, the assessment of WTG noise does not readily fit into the standard EIA practice described above. Therefore, exceedances of ETSU-R-97 (The Working Group on Noise from Wind Turbines, 1996) criteria at residential receptors from the offshore WTGs associated with the Proposed Development will be considered to result in a significant effect and will not be assessed via the sensitivity of receptor and magnitude of change process.

#### Assessment of adverse effect levels on health

- 22.8.24 Separate from the assessment of significance based on sensitivity and magnitude of change, an assessment of significance will be undertaken in relation to the NPSE (Defra, 2010) and the impacts on health. This will consider a set of absolute noise levels at which the following descriptions will apply:
  - LOAEL Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
  - SOAEL Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
- 22.8.25 The aims of the NPSE (Defra, 2010) are to avoid significant adverse impacts on health and quality of life from noise and to mitigate and minimise adverse impacts. As such, where the Proposed Development would result in notable increases in absolute noise level above the LOAEL (considered to be +3 dB), reasonable steps should be taken to mitigate and minimise the adverse effects of noise. Where the Proposed Development would result in notable increases in absolute noise levels above SOAEL (considered to be +1 dB), mitigation should be applied to avoid this increase, whilst taking into account the guiding principles of sustainable development.

- 22.8.26 The absolute noise levels to identify the LOAEL and SOAEL for the various noise sources within the Proposed Development have been taken from recent Nationally Significant Infrastructure Projects (NSIPs) successfully taken through the infrastructure planning process.
- 22.8.27 **Table 22-16** summarises the key noise exposure levels (LOAEL and SOAEL) at the different phases of the Proposed Development and according to the nature of source in the assessment for residential receptors.
- <sup>22.8.28</sup> Thresholds presented in Appendix E of BS 5228-1 (British Standard Institute, 2014a) have been used to derive the SOAEL and LOAEL for noise exposure during the construction phase. The evening (weekday evening (19:00-23:00) and Saturday (13:00-23:00) and Sunday (07:00-23:00)) threshold within BS 5228-1 is not considered within this assessment, as it is assumed that any evening works (or terms associated with the evening BS 5228-1 criteria) would be less likely to see higher magnitude of change than the night-time works, which would occur in conjunction and as part of out-of-hours working. It should be noted that the toxicological effects of noise relate to long-term exposure, therefore, it would not be appropriate to assess the very temporary noise impacts via the LOAEL and SOAEL thresholds (for example compound construction, onshore cable trenching and HDD sites).
- 22.8.29 The SOAEL and LOAEL for vibration from the construction phase activities are based upon criteria within BS 5228-2 (British Standard Institute, 2014b).
- 22.8.30 The daytime SOAEL for construction road traffic noise is based on the threshold level (converted from a façade level of LA10, 18hr) at which the Noise Insulation Regulations 1975 (as amended) requires provision of sound insulation. The World Health Organisation's (WHO) (2009) Night Noise Guidelines For Europe has been used to derive the SOAEL level for night-time, based on Europe Interim Target of 55 dB LAeq.8hr (measured outdoors) on the basis that residential receptors exposed to noise levels above this are subject to a significant effect. The LOAEL for daytime is based on the onset of the lowest observed community noise effects during the day (annoyance) following from the WHO Guidelines for Community Noise (World Health Organization, 1999). The night-time LOAEL for road traffic noise is based on the WHO night-time guidance (World Health Organization, 2009), which indicates road traffic noise could be identified as associated with adverse effects on sleep when levels exceed 45 dB LAeq.8hr.
- 22.8.31 As vibration from construction road traffic is considered qualitatively, a SOAEL and LOAEL have not been applied. Whether there is the potential for impacts is based on professional judgement pertaining to proximity of receptors to construction road traffic routes, likely pathway of vibration to the receptor and likely condition of road.
- 22.8.32 For operational noise sources, the LOAEL and SOAEL will be set considering the relevant guidance or standards: BS 4142 (British Standard Institute, 2019) for the onshore substation and ETSU-R-97 (The Working Group on Noise from Wind Turbines, 1996) of the wind farm (if assessed beyond screening). For these assessments, it is not possible to provide a reasonable absolute level without determining the baseline noise environment. Therefore, a LOAEL and SOAEL will be set once the baseline survey is undertaken and wind farm screening assessment is complete.



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Noise Source	Assessment Period, Metric	LOAEL and SOAEL Criteria (outside for noise and inside for vibration)
		Period Noise or Vibration Level (location)
Construction phase noise (fixed and mobile plant)	Weekday Daytime (07:00-19:00) L <sub>Aeq, 12hr</sub> Saturday morning (07:00-13:00) L <sub>Aeq, 8hr</sub>	LOAEL 65dB SOAEL 75dB (1m from building façade)
	Weekday evening (19:00-23:00) L <sub>Aeq, 1hr</sub> Saturday (13:00-23:00) L <sub>Aeq, 1hr</sub> Sunday (07:00-23:00) L <sub>Aeq, 1hr</sub>	LOAEL 55dB SOAEL 65dB (1m form building façade)
	Night-time (23:00-07:00) L <sub>Aeq,1hr</sub>	LOAEL 45dB SOAEL 55dB (1m form building façade)
Construction phase vibration (fixed and mobile plant)	All time periods	LOAEL 0.3 millimetres per second (mm/s) SOAEL 10mm/s
Construction phases road traffic noise	Daytime (07:00-23:00) LAeq, 16hr	LOAEL 50dB SOAEL 63dB (free field)
	Night-time (23:00-07:00) L <sub>Aeq, 8hr</sub>	LOAEL 45dB SOAEL 55dB (free field)
Operation and	Daytime (07:00-19:00)	LOAEL and SOAEL will be
phase noise emissions (residential)	Night-time (23:00-07:00)	noise surveys. Context is key in determination of significant effects, using the BS 4242:2014+A1:2019 and ETSU-R-97 as relevant.

## Table 22-16 LOAEL and SOAEL criteria for different noise sources

## 22.9 Preliminary assessment: Construction phase

## Introduction

- 22.9.1 This section reports the preliminary assessment of significance for temporary noise and vibration effects from the construction of the onshore elements of the Proposed Development.
- 22.9.2 The assessment methodology set out in **Section 22.8** has been applied to predict indicative noise and vibration levels arising from the Proposed Development.

## **Construction noise**

#### Overview

- 22.9.3 Separate assessments of temporary noise effects have been undertaken for the different elements of the construction phase, which include:
  - temporary noise effects from the construction, deconstruction and operation of the temporary construction compounds (this assessment assumes that the construction of each will be up to 8 weeks, and the deconstruction will be up to 8 weeks. Each temporary construction compound will be in use for up to 3.5 years);
  - temporary noise effects from the construction works at the landfall and trenchless crossings at specific sections of the cable route (durations varied between 2 to 7 weeks for trenchless crossings and 26 weeks for landfall);
  - temporary noise effects from onshore substation construction (up to 3 years);
  - temporary noise effects from onshore cable installation, with the trenching quickly passing receptors (likely to be inaudible after an estimated duration of approximately 10 days);
  - temporary noise effects from the construction and use of temporary and permanent accesses (this assessment assumes this is likely to be for a duration of under a month for construction of each access with the temporary accesses used ranging from a month to almost a year); and
  - temporary noise effects from construction road traffic noise (duration of roads used will be determined by the local requirements for access as the works progress).
- 22.9.4 The above effects have been assessed separately due to the difference in location, or where close to each other, the short duration of when the construction activities occur simultaneously within that area.
- 22.9.5 Noise levels at the sensitive receptors have been calculated according to the method presented within the BS 5228-1 (British Standard Institute, 2014a). Noise propagation is affected by a number of factors, including the distance between the source and receiver, influence from screening and the duration of the activity.



Temporary noise effects from the construction, operation and deconstruction of the temporary construction compounds

#### Overview

- 22.9.6 In support of the onshore construction activities, a number of temporary construction compounds will be set-up for welfare and logistics purposes. The construction, operation and deconstruction of the temporary compounds will result in temporary noise effects. The noise from the construction and deconstruction are assumed to be the same for the purposes of noise prediction.
- 22.9.7 There are currently seven temporary compound locations being considered as shown on Figure 22.1a-d, Volume 3, but only four will be taken forward to the ES stage and form part of the DCO Application. As the assessment considers the duration of potential noise effects from the temporary construction compounds, reference has been made to Table 4.20 of Chapter 4: The Proposed Development, which specifies the duration of the temporary construction compounds construction and operation. The construction of the temporary construction in use up to a maximum of 3.5 years and then the deconstruction lasting approximately 8 weeks.
- 22.9.8 As per the embedded environmental measures outlined in **Table 22-11** (commitment C-26), screening will be applied to block line of sight between noise sensitive receptors and the main noise emitters on the compound construction where this is necessary for avoiding significant noise effects.
- As per **Table 22-10**, it is assumed that these operations will commence during daytime working hours only (Monday to Friday (07:00 to 19:00 hours) and Saturday (08:00 to 13:00 hours). The predicted noise levels have been calculated at a selection of key receptors (some receptors being representative of a number of receptors) within 300m of the potential construction compound boundary. The results are presented in **Table 22-17**. As predictions have been undertaken for specific receptors and the durations for works are for at least one month, the results show a comparison of levels against the BS 5228 threshold values, exceedance of which would be a medium to high impact.

## Table 22-17 Noise predictions at noise sensitive receptors within 300m of each of the seven temporary construction compound locations

Receptors	Noise Level	(LAeq,1h dB)	BS 5228 threshold noise	Noise Level (L <sub>Aeq,1h</sub> dB) difference with threshold			
	Construction / deconstruction of Compound	Compound operational	level relating to a medium Impact	Construction / deconstruction of Compound	Compound operational		
West of River Arun Compound							
Clymping Pentanque Club	57	55	65	-8	-10		
Field Place, Church Lane	53	51	65	-12	-14		
Brookpit Lane	50	48	65	-15	-17		
Clymping C of E Primary School	50	48	65	-14	-16		
Future residential properties	51	49	65	-8	-10		
Crossbush Compound							
Calceto Lane	56	54	65	-9	-11		
Broomhurst	59	57	65	-6	-8		



Receptors	Noise Level	(L <sub>Aeq,1h</sub> dB)	BS 5228 threshold noise	Noise Level (L <sub>Aeq,1h</sub> dB) difference with threshold		
	Construction / deconstruction of Compound	Compound operational	level relating to a medium Impact	Construction / deconstruction of Compound	Compound operational	
Broomhurst Farm	54	52	65	-11	-13	
Washington Compound						
Greencommon House	49	47	65	-16	-18	
Down Cottage	51	49	65	-14	-16	
Green Farm Compoun	d					
Green Farm	51	49	65	-14	-16	
Rock Farm Compound	I					
No receptors within 300	m of Compound at Rocł	< Farm				
Oakendene Compound	t					
Coopers Cottage	55	53	65	-10	-12	
Moatfield Lane	49	47	65	-16	-18	
Passenger 1	56	54	65	-9	-11	



Receptors	Noise Level	(L <sub>Aeq,1h</sub> dB)	BS 5228 threshold noise	Noise Level (L <sub>Aeq,1h</sub> dB) difference with threshold		
	Construction / deconstruction of Compound	Compound operational	level relating to a medium Impact	Construction / deconstruction of Compound	Compound operational	
Kent Street Compo	und					
New Barn Farm	53	51	65	-12	-14	
Southlands Farm	54	52	65	-11	-13	
Wealden Barn	51	49	65	-14	-16	

## Magnitude of change

- <sup>22.9.10</sup> For all noise sensitive receptors identified, the daytime threshold before a potential significant effect is identified is 65 dB L<sub>Aeq, T</sub>. **Table 22-17** shows that this threshold is not exceeded for any of the receptors, with some predicted to be 10dB below threshold value. Therefore, the magnitude of the change on noise sensitive receptors relating to temporary noise effects from the construction / deconstruction and operation of the temporary construction compounds is considered to be **very low**.
- 22.9.11 The following non-residential noise sensitive receptors have been included in the assessment as they are located within 300m of a temporary construction compounds:
  - Clymping C of E Primary School;
  - St Mary's Church; and
  - St Mary's C of E Primary School.

#### Sensitivity of receptor

22.9.12 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and **high** for schools and places of worship in line with **Table 22-12**.

#### Significance of residual effect

22.9.13 The Rampion 2 commitments (as shown in **Table 22-11**) include C-22, C-26 and C-33 which will be adopted to minimise the disturbance to noise sensitive receptors.

For residential receptors, the magnitude of change is defined as **very low** and the sensitivity of the receptors are classified as **medium**. As this direct effect is temporary and of very low magnitude it is determined to be of **negligible significance** and **Not Significant** in EIA terms.

- 22.9.14 For non-residential receptors, the magnitude of change is defined as **very low** and the sensitivity of the receptors are classified as **high**. As this direct effect is temporary and of very low magnitude it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- <sup>22.9.15</sup> For both residential and non-residential receptors, the daytime LOAEL of 65dB LAeq, 16hr will not be exceeded at any of the identified noise sensitive receptors.

Temporary noise effects from the landfall works and trenchless crossings

#### Overview

22.9.16 The onshore temporary cable corridor will encounter areas where HDD will be required, tunnelling so that the onshore cable can pass under a road, river or other infrastructure as outlined in **Appendix 4.2: Crossing schedule, Volume 4**.

- As per **Table 22-10**, it is assumed as a worst-case scenario that these operations are unable to be temporarily halted and therefore, works will need to continue for 24 hours a day until completion. For this reason, the assessment has considered an assessment for both daytime and night-time periods.
- 22.9.18 **Table 22-18** presents the results of noise predictions from HDD activities (from the compound area) at the closest noise sensitive receptor to each trenchless crossing location as identified in **Appendix 4.2, Volume 4**. It is assumed that the noise from the exit pit would not result in significant effect based on the limited equipment required there and shorter timescale. As per the embedded environmental measures outlined in **Table 22-11** (C-26), screening will be applied to block line of sight between noise sensitive receptors and the main noise emitters on the HDD site where required to avoid significant noise effects. As predictions have been undertaken for specific receptors the results show a comparison of levels against the BS 5228 threshold values, exceedance of which would be a medium to high impact.

HDD Location	Drilling	Noise Level (L <sub>Aeq,1h</sub> dB)		BS 5228 threshold noise level relating to a medium Impact*		Noise Level (L <sub>Aeq,1h</sub> dB) difference with threshold	
	(weeks)	Predicte d noise level Day	Predicted noise level Night	Day	Night- time	Day	Night- time
Landfall	26	41	39	65	45	-24	-6
RDX-01, DTX-01, RDX-02	7.2	41	39	65	45	-24	-6
RVX-01, DTX-05, RLX-01	5.6	49	47	65	45	-16	2
RLX-02, DTX-08	3.2	48	46	75	55	-27	-9
RDX-03	1.6	58	56	75	55	-17	1
RDX-04, RDX-05	6.4	47	45	65	45	-18	0
RDX-WE01, RDX-WE02	6.4	51	49	65	45	-14	4
TRX-13	TBC**	35	33	65	45	-30	-12
RDX-06	3.2	45	43	75	55	-30	-12

## Table 22-18 Noise predictions at the closest noise sensitive receptors to the trenchless crossings

HDD	Drilling	Noise Level (L <sub>Aeq,1h</sub> dB)		BS 5228 threshold noise level relating to a medium Impact*		Noise Level (L <sub>Aeq,1h</sub> dB) difference with threshold	
Location	(weeks)	Predicte d noise level Day	Predicted noise level Night	Day	Night- time	Day	Night- time
RDX-07, RDX-08, STX-02	4.8	49	47	65	45	-16	2
RDX-09, TRX-17	2.4	48	46	75	55	-27	-9
RDX-B01	1.6	51	49	75	55	-24	-6
RDX-12, TRX-24	TBC**	50	48	65	45	-15	3
DTX-14, RVX-02	4	44	42	65	45	-31	-13
RDX-15	1.6	52	50	75	55	-23	-5
STX-BHL01	9	42	40	65	45	-23	-5
STX-OD03	9	48	46	65	45	-17	1

\*This will depend on the duration of the works, with 65dB being the threshold for daytime for works lasting for more than a month, and 75dB for lesser durations. For night the threshold level is 45dB for more than a month and 55dB for lesser durations.

\*\*Assumed to be longer than 4 weeks, thereby using the lower threshold value.

#### Magnitude of change

- 22.9.19 For the many HDD locations identified within **Table 22-18**, it can be seen that the noise levels at night at the nearest noise sensitive receptors will result in a **low** to **medium** magnitude of change.
- <sup>22.9.20</sup> For daytime working, the magnitude of change is defined as **very low** which is the only time period to consider for non-residential receptors.

#### Sensitivity of receptor

22.9.21 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and **high** for schools and places of worship in line with **Table 22-12**. There are no noise sensitive non-residential receptors that would be affected by the HDD works at night.

#### Significance of residual effect

22.9.22 The Rampion 2 commitments (as shown in **Table 22-11**) include C-26 and C-33 which will be adopted to minimise the disturbance of noise sensitive receptors.

- 22.9.23 For residential receptors, the highest magnitude of change is defined as **medium** and the sensitivity of the receptor is classified as **medium**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **not significant** in EIA terms.
- 22.9.24 For non-residential receptors, the magnitude of change is defined as **very low** and the sensitivity of the receptor is classified as **high**. The effect is direct, temporary and of **minor adverse significance**, which is **Not Significant** in EIA terms.
- 22.9.25 The daytime LOAEL of 65dB L<sub>Aeq, 16hr</sub> will not be exceeded at any of the identified noise sensitive receptors. During night-time the LOAEL of 45dB L<sub>Aeq, 8hr</sub> will be exceeded. However, it is considered that the screening (C-26) and best practice measures (to be detailed within C-33) applied to works would be sufficient to accord with the requirements of the Noise Policy Statement for England.

#### Temporary noise effects from onshore substation construction

#### Overview

22.9.26 At the PEIR stage, the final location for the onshore substation is yet to be determined and currently two onshore substation search areas are under consideration. For this reason, **Table 22-19** shows the distance at which noise levels associated with the magnitude of change is predicted from the different aspects of the onshore substation construction.

Phase	Activity	Distance (m) at which noise levels (L <sub>Aeq, T</sub> dB) would be exceeded (magnitude of change) at receptors			
		<65 dB (Very low)	>65 dB* (Low)	>65 dB** (medium)	>75 dB (High)
Site Preparation	Topsoil stripping	147	131	131	42
Groundwork	Pre-earthworks drainage	150	133	133	42
	Excavation and installation of cables, ducts and pipes	146	130	130	41
Civils	Trench excavation and concrete foundations	80	72	72	23

Table 22-19 Distance at which different magnitude of changes ( $L_{Aeq, T} dB$ ) would be experienced at sensitive noise receptors (m)

Phase	Activity	Distance (m) at which noise levels (L <sub>Aeq, T</sub> dB) would be exceeded (magnitude of change) at receptors			
		<65 dB (Very low)	>65 dB* (Low)	>65 dB** (medium)	>75 dB (High)
	Backfilling	201	179	179	57
	Pits, chambers, troughs, trays and ducting	158	141	141	44
Finishing	Topsoil replacement and landscape implementation	147	131	131	42

\* Exceeds BS 5228-1 threshold values or trigger levels by less than temporal criteria of significance.

\*\* Exceeds BS 5228-1 cut-off values for one month or more, or triggers levels by more than 9 days in a 15 day period by 1 to 9dB.

#### Magnitude of change

- 22.9.27 The daytime threshold before a potential significant effect is identified is 65dB L<sub>Aeq, T</sub> and the column labelled '**very low**' in **Table 22-19** presents the distances at which a noise sensitive receptor will need to be in order not to experience a potentially significant effect.
- 22.9.28 It is anticipated that the construction of the onshore substation could be in sufficient proximity to result in noise levels above 65 dB at residential receptors and this could last for one month in duration. It should be noted that the assumption has been made that construction work will not be closer than 60m from noise sensitive receptors and therefore noise levels will not exceed the SOAEL 75 dB LAeq, 12hr during the daytime. One residence is within 40m of the eastern boundary of the Bolney Road / Kent Street onshore substation search area, but construction works resulting in significant noise levels will not occur within 60m of this residence. For the above reason, a magnitude of change of **medium** is defined.

#### Sensitivity of receptor

22.9.29 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors. There are no noise sensitive non-residential receptors in close proximity to the onshore substation.

#### Significance of residual effect

- 22.9.30 The Rampion 2 commitments (as shown in **Table 22-11**) include C-22, C-26 and C-33 which will be adopted to minimise the disturbance of noise sensitive receptors.
- 22.9.31 For residential receptors, the magnitude of changes is defined as **medium** and the sensitivity of the receptor is classified as **medium**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- 22.9.32 The daytime SOAEL of 75dB L<sub>Aeq, 16hr</sub> will not be exceeded at any of the identified noise sensitive receptors. The LOAEL of 65dB L<sub>Aeq, 16hr</sub> will be exceeded, however, best practice measures (to be detailed as part of C-33) will be sufficient to accord with requirements within the Noise Policy Statement for England.

#### Temporary noise effects from onshore cable installation (trenched)

#### Overview

- 22.9.33 The onshore cable will extend for approximately 36km in length within a standard onshore temporary cable corridor of 50m (as outlined in **Table 4.17**, **Chapter 4**), with the final alignment to be further refined prior to the ES. The onshore temporary cable corridor will pass sensitive noise receptors resulting in temporary noise effects. It is currently anticipated that the entire works will move at a speed on 35m per day, constituting the entire cable trenching process along four lines of cable.
- As the exact location of the onshore cable route is not yet decided, **Table 22-20** shows the distances at which the noise levels associated with the magnitudes of change will be predicted from the different aspects of the works. However, as it is expected that the noise from onshore cable construction would be for a duration less than the temporal factor within BS 5228 for significant impact (less than 10 days), only a very low or low impact could be identified for these works. As per **Table 22-13** the magnitude of change is also determined based on the duration of construction activities.

Table 22-20 Distance at which different magnitude of change ( $L_{Aeq, T} dB$ ) would be experienced at sensitive noise receptors (m)

Activity	Distance (m) at which noise levels (L <sub>Aeq, ⊺</sub> dB) would be exceeded (magnitude of change) at receptors				
	>55 dB (Very low)	>65 dB (Low)	>75 dB (Low)	>85 dB (Low)	
Topsoil stripping	316	100	32	10	

Activity	Distance (m) at which noise levels (L <sub>Aeq, T</sub> dB) would be exceeded (magnitude of change) at receptors				
	>55 dB (Very low)	>65 dB (Low)	>75 dB (Low)	>85 dB (Low)	
Benching and grading of work area	501	158	50	16	
Joining and assembly	79	25	8	3	
Trench excavation	178	56	18	6	
Lower and lay	89	28	9	3	
Backfilling	501	158	50	16	

#### Magnitude of change

- 22.9.35 It is anticipated that the onshore temporary cable corridor will be in sufficient proximity to result in noise levels of above 75dB at sensitive noise receptor locations. However, it is anticipated that the worst-case noise levels when the works are close to a sensitive noise receptor (within 50m) will be for a maximum of two days. As such, the onshore cable corridor construction will result in a **low** magnitude of change at residential receptors. This **low** magnitude of change is also anticipated at the following noise sensitive non-residential receptors:
  - St Mary Magdalene's Church, Lyminster (high sensitivity);
  - Convent of Poor Clares, Arundel (high sensitivity);
  - St Mary's Parish Church, Washington (high sensitivity);
  - St Mary's Church Of England Primary School, Washington (high sensitivity); and
  - South Downs National Park (high sensitivity).

#### Sensitivity of receptor

22.9.36 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and **high** for schools and places of worship in line with **Table 22-12**.

#### Significance of residual effect

- 22.9.37 The Rampion 2 commitments (as shown in **Table 22-11)** include C-22, C-26 and C-33 which will be adopted to minimise the disturbance of noise sensitive receptors.
- 22.9.38 For residential receptors, the magnitude of change is defined as **low** and the sensitivity of the receptors are classified as **medium**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- 22.9.39 For non-residential receptors, the magnitude of change is defined as **low** and the sensitivity of the receptors are classified as **high**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **not significant** in EIA terms.
- 22.9.40 The noise levels predicted at human receptors are above the SOAEL identified in **Table 22-16**. However, these levels are for a very temporary period. The toxicological effects of noise as stated in WHO guidance, upon which the SOAEL is based, are relevant to a longer duration and therefore are not considered relevant.

#### Temporary noise effects from construction and use of temporary and permanent accesses

#### Overview

- 22.9.41 Access to the onshore temporary construction corridor will be afforded via construction accesses from existing roads. **Figure 4.10a-c**, **Volume 3** presents the locations of all the proposed access points along the onshore temporary cable corridor.
- 22.9.42 The construction of temporary and permanent accesses will result in temporary noise effects at noise sensitive receptors as the access works pass receptors within close proximity. It is anticipated that the worst-case noise levels when the works are very close to a sensitive noise receptor (within 20m) will be for a maximum of two days. The duration of construction is not yet known (individual accesses expected to be completed within one month of commencing work); this assessment will be updated once further information is available for the ES stage.
- **Table 22-21** presents the results of noise predictions from access construction at the closest noise sensitive receptor, providing both a noise level for the closest point and furthest point during the construction of an access (therefore providing the range of noise experienced by the sensitive noise receptor). Noise screening has not been included as it is considered impractical for the works (given the proximity to residences and likely speed at which the works will occur in one place), as per the embedded environmental measures outlined in **Table 22-11** commitment C-26 commitment. The sensitive noise receptors are split into residential and non-residential. The threshold level is not provided within the table as it is expected that notable noise levels (i.e. to result in significant effect) from access construction would be for a duration less than the temporal factor within BS 5228.



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Table 22-21	Noise	predictions	at the	closest	noise	sensitive	receptors	to the	constructio	n
of temporary	and pe	rmanent a	ccesse	S						

Access Reference	Closest receptor (a)	Approximate closest	Approximate farthest	Noise Level (L <sub>Aeq,1h</sub> dB)	
	along access route	to receptor (a)	receptor (a)	Works closest point to receptor	Works farthest point from receptor
Residential	receptors				
1b	Brookpits Cottage	25	335	75	47
1d	Junction of Crookthorn Lane and Brookpits Lane	70	700	64	39
2	Field Place (Cuckoo Camp)	40	870	70	37
3	Church Farm	65	870	65	37
4	Highfield	230	330	51	47
5	Brookside Caravan Park	10	670	85	40
6	Broomhurst	20	60	78	66
9	Farm off the junction of Crossbush Lane and Blakehurst Lane	30	525	73	42
10	Home Farm	10 <sup>3</sup>	310	85	48

<sup>3</sup> There could be works on Accesses 10, 11 and 12 closer than 10m to the residential receptors identified, however, at this closest distance it is likely that predictions do not accurately cater for the irregularities of working and the different elements of noise from

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Access Reference	Closest receptor (a)	Approximate closest	Approximate farthest	Noise Level (L <sub>Aeq,1h</sub> dB)	
	along access route	to receptor (a)	receptor (a)	Works closest point to receptor	Works farthest point from receptor
11	Residence on Barns Farm Lane	10	740	85	39
12	Rowell Estate (Storrington Road)	10	360	85	46
12a	Rock House	40	320	70	48
17a	Bushovel Cottages	150	190	56	53
17c	Buncton Manor Farm	140	170	57	55
21	Bloques	70	360	64	46
22	Bines Farm	125	300	58	48
23a	Residence on A281, Horsham	30	740	73	39
24	Residence on Shermanbury Road (B2116)	105	350	60	47
25	Residence on Partridge Green Road (B2116)	35	135	72	57
27a	Residence on A281	5	900	93	36

the construction equipment. For example, the equipment included within the predictions and which could be operating at different times could be far apart relative to the closest plant to the receptor. These very close works to receptors are also likely to be for very short durations of time. It is considered that the use of 10m reflects a realistic worst-case noise level at these nearest residences.

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Access Reference	Closest receptor (a)	Approximate closest distance (m)	Approximate farthest distance (m) to	Noise Level (L <sub>Aeq,1h</sub> dB)	
	along access route	to receptor (a)	receptor (a)	Works closest point to receptor	Works farthest point from receptor
	Partridge Green				
28	Southlands Farm	140	525	57	42
30a	Southlands Farm	110	220	59	52
Non-residen	itial receptors				
1b	Climping Park	50	220	68	52
1d	Clymping C of E Primary School	60	800	66	38
2	Climping Park	25	560	75	42
3	St Mary's Church	60	850	66	37
5	St Mary Magdalene's Church	340	730	47	39
6	Comfort Inn Arundel	150	250	56	50
9	Sussex Heritage Centre	230	770	51	38
12a	Rock Garden	20	190	78	53
21	Ashurst Village Hall	10	360	85	46
24	King George V Playing Fields	110	305	59	48

22.9.44 During use of the accesses, based on proposed traffic volumes, it is currently estimated that peak flows on all accesses will not exceed 3 HGVs per hour. This correlates to an L<sub>Aeq, 1 hour</sub> of 61dB at 5m from the haul route, below the threshold of significance in BS 5228-1 (British Standard Institute, 2014a).

#### Magnitude of change

22.9.45 The results presented in **Table 22-21** show that noise levels from the construction of temporary and permanent accesses at closest noise sensitive receptors will exceed the threshold values presented in **Table 22-13**. However, as it is likely that the noise thresholds will only be exceeded for 2 days maximum, the temporal criteria presented in **Table 22-13** will not be exceeded. For this reason, a **Iow** magnitude of change has been identified for both residential and non-residential noise sensitive receptors. The use of the access routes would result in a **very low** magnitude of change as noise thresholds are not predicted to be exceeded.

#### Sensitivity of receptor

22.9.46 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and **high** for schools and places of worship in line with **Table 22-12**.

#### Significance of residual effect

- 22.9.47 The Rampion 2 commitments (as shown in **Table 22-11**) include C-22, C-26 and C-33 which will be adopted to minimise the disturbance of noise sensitive receptors.
- 22.9.48 For residential receptors, the magnitude of change is defined as **low** for construction and **very low** for use of the accesses and the sensitivity of the receptors are classified as **medium**. As this direct effect is temporary it is determined to be of **minor adverse significance** during the construction of the accesses and **negligible significance** during use, both **Not Significant** in EIA terms.
- 22.9.49 For non-residential receptors, the magnitude of change is defined as **low** for construction and **very low** for use of the accesses and the sensitivity of the receptors are classified as **high**. As this direct effect is temporary it is determined to be of **minor adverse significance** during the construction of the accesses and during use, which would be **Not Significant** in EIA terms.
- 22.9.50 The noise levels predicted at human receptors are above the SOAEL identified in **Table 22-16**. However, these levels are for a very temporary period. The toxicological effects of noise as stated in WHO guidance, upon which the SOAEL is based, are relevant to a longer duration and therefore are not considered relevant.



#### Temporary noise effects from construction road traffic noise

#### Overview

22.9.51 Table 22-22 presents the results of the construction road traffic noise predictions, which have been calculated at 10m (in accordance with the CRTN (Department of Transport Welsh Office, 1988)) from the road based on 18-hour Annual Average Weekday Traffic (AAWT) worst-case road traffic provided in Chapter 24: Transport. Whilst the premises affected by road traffic will be at varying distances from the road, the assessment is mainly based on the difference between the future baseline scenario and the future 'with development' scenario as shown in Table 22-22.

#### Table 22-22 Noise predictions 10m from construction traffic routes

Road Name	Future year 2026 (FY) (no development) L <sub>A10, 18h</sub> at 10m	FY (with development) L <sub>A10, 18h</sub> at 10m	FY (with development) – FY (no development) difference (dB)
Church Lane	68.7	71.4	2.7
Ford Road	63.5	65.2	1.7
A27 West of Arundel	72.0	73.4	1.4
A259 West of Wick	69.4	71.4	2.0
A284 North of Wick	67.6	69.3	1.6
A284 Lyminster	69.9	71.4	1.5
A27, Arundel Station	73.4	74.7	1.3
A27, South of Crossbush	76.6	77.7	1.0
A27 High Salvington	70.0	71.5	1.5
A24/A27 Offington (Warren Road)	73.1	74.1	1.0
A24 Findon	72.4	73.1	0.7
A280 Long Furlong	70.5	72.1	1.6
A283 West of A24	71.9	72.9	1.0

Road Name	Future year 2026 (FY) (no development) L <sub>A10, 18h</sub> at 10m	FY (with development) LA10, 18h at 10m	FY (with development) – FY (no development) difference (dB)
A283 East of A24	68.1	68.9	0.8
Hole Street, Wiston	65.6	66.1	0.6
B2135, South of Ashurst	65.2	66.1	0.9
A283, Steyning	73.5	74.2	0.7
A24, South of A272	73.7	75.0	1.2
B2116 Partridge Green Road	64.4	66.5	2.1
A281, South Shermanbury	67.3	68.6	1.3
A281, South of Cowfold	64.3	65.2	0.9
A281, Cowfold Centre	70.0	71.5	1.5
A272, Station Road, Cowfold	68.7	70.2	1.5
A272, West of A23	70.6	71.8	1.2
A23, North of the A272	80.2	81.2	1.0
B2188, Sayers Common	66.3	67.6	1.3
B2116, Henfield Road, Albourne	61.4	63.0	1.6
A23, North of the A272	80.6	81.3	0.7
A27, West of A23	79.8	80.5	0.7
A27, East of A23	80.2	80.9	0.7
A259, West of Church Street	72.4	73.0	0.6

Road Name	Future year 2026 (FY) (no development) L <sub>A10, 18h</sub> at 10m	FY (with development) LA10, 18h at 10m	FY (with development) – FY (no development) difference (dB)
A259 East of Wick	72.2	72.7	0.5
A284 North of Arundel	70.1	70.6	0.5

<sup>22.9.52</sup> Road traffic flows on Wineham Lane, Ferry Road and Crossbush Road are not sufficiently high enough to undertake a calculation in accordance with CRTN (Department of Transport Welsh Office, 1988) and therefore, have not been assessed at PEIR stage. Noise levels at sensitive noise receptors adjacent to Ferry road will be dominated by noise from the traffic on the A259; itself assessed as having a low magnitude of change. The other smaller roads will be assessed with reference to noise measurements, either already taken, as is the case of Wineham Lane (i.e. Rampion 1 data), or to be taken for the ES stage (on Crossbush Road). This will be undertaken at ES stage.

#### Magnitude of change

<sup>22.9.53</sup> The results outlined in **Table 22-22** show that a magnitude of change of **low** has been predicted at receptors as an increase of more than 3dB hasn't been defined.

#### Sensitivity of receptor

22.9.54 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and **high** for places of worship, schools in line with **Table 22-12**.

#### Significance of residual effect

- 22.9.55 The Rampion 2 commitments (as shown in **Table 22-11**) include C-160 which will be adopted to minimise the disturbance of noise sensitive receptors.
- 22.9.56 For residential receptors, the magnitude of change is defined as **low** and the sensitivity of the receptors are classified as **medium**. The effect is direct, temporary and of **minor adverse significance**, which is **Not Significant** in EIA terms.
- 22.9.57 For non-residential receptors, the magnitude of change is defined as **low** and the sensitivity of the receptors are classified as **high**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- 22.9.58 The roads used for construction routes already have associated road traffic noise levels at adjacent noise sensitive receptors above the daytime SOAEL of 63dB. Notable increases above this level, as a result of road traffic levels associated with the Proposed Development, by more than 1dB could be considered an adverse effect on health. However, the worst-case road traffic associated with construction of the Proposed Development would be for a small duration (the traffic

assessment based on peak flows). Further information will be provided with the ES with average traffic flows to provide a more representative effect throughout the construction process.

## **Construction vibration**

#### Overview

- 22.9.59 Separate assessments of temporary vibration effects have been undertaken for different elements of the construction phase, which include:
  - temporary vibration effects from the construction of the construction compounds (the construction of each being up to 8 weeks and each in use for up to 3.5 years);
  - temporary vibration effects from the construction works at the landfall and trenchless crossings at specific sections of the cable route (durations varied between 2 to 7 weeks for major crossings and 26 weeks at landfall);
  - temporary vibration effects from onshore substation construction (up to 3 years);
  - temporary vibration effects from onshore cable installation (likely only to be perceivable over the period of a day); and
  - temporary vibration effects from construction road traffic (duration of roads used will be determined by the local requirements for access as the works progress).
- 22.9.60 The above effects have been assessed separately due to the difference in location, or where close to each other, the short duration of when the construction activities occur simultaneously within that area.
- 22.9.61 Vibration levels at the sensitive receptors have been calculated according to the method presented within the BS 5228-2 (British Standard Institute, 2014b) vibration propagation is affected by a number of factors, including the distance between the source and receiver, ground conditions and the nature of the vibration source.

#### Temporary vibration effects from the construction of the construction compounds

22.9.62 The construction and operation of the construction compounds are unlikely to result in temporary vibration effects as it is unlikely that any activities associated with vibration levels except in very close proximity to the plant will be required. For this reason, vibration has not been assessed.

Temporary vibration effects from the landworks and trenchless crossings

#### Overview

22.9.63 There is potential for vibration effects from the landfall and trenchless crossing works due to the HDD. Therefore, predictions have been undertaken, utilising the empirical equations outlined in the BS 5228-2 (British Standard Institute, 2014b). Predictions for sensitive receptors (likely to be residential receptors rather than



sensitive non-residential receptors) up to 100m have been assessed. The results are presented in **Table 22-23**.

HDD Location	Approximate distance to nearest receptor (m)	Peak Particle Velocity (PPV) threshold of low impact (mm/s)	Predicted PPV level (mm/s)
RDX-03	63	0.3	0.8
RDX-04	35	0.3	1.8
RDX-05	90	0.3	0.5
RDX-WE01	82	0.3	0.6
RDX-WN01	81	0.3	0.6
RDX-BL01	82	0.3	0.6

Table 22-23 Vibration predictions at the closest sensitive receptors to the HDD crossings

#### Magnitude of change

22.9.64 The results presented in **Table 22-23** show that an exceedance above the 0.3mm/s threshold of **low** magnitude of change will occur at all sensitive receptors within 100m of the HDD works, with the closest (only residential) experiencing an impact of **medium** magnitude of change.

#### Sensitivity of receptor

22.9.65 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and **high** for schools and places of worship in line with **Table 22-12**.

#### Significance of residual effect

- 22.9.66 The Rampion 2 commitments (as shown in **Table 22-11**) include C-22 and C-33 which will be adopted to minimise the disturbance to noise sensitive receptors.
- 22.9.67 For residential receptors, the magnitude of change is defined as **low** to **medium** and the sensitivity of the receptors are classified as **medium**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- <sup>22.9.68</sup> For non-residential receptors, the magnitude of change is defined as **low** and the sensitivity of the receptors are classified as **high**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- 22.9.69 An exceedance of 0.3mm/s "vibration might be just perceptible in residential environments" and an exceedance of 1.0mm/s "It is likely that vibration of this level

in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents" (British Standard Institute, 2014b).

<sup>22.9.70</sup> The LOAEL is predicted to be exceeded at receptor locations, the SOAEL is not. Best practical means will be applied via C-33 (**Table 22-11**) reducing the impact at sensitive receptors.

#### Temporary vibration effects from onshore substation construction

22.9.71 It is unlikely that any construction activities during the construction of the onshore substation will give rise to significant effects from vibration and for this reason, vibration has not been assessed.

#### Temporary vibration effects from construction road traffic

22.9.72 Whilst road traffic, even heavy construction road traffic, results in minimal vibration at roadside locations on a smooth surface, inconsistencies in the road surface can cause vibration which can be transmitted into neighbouring premises. Therefore, an embedded environmental measure (C-160) has been included (see **Table 22-11**) for roadways to be surveyed prior to construction and any holes or cracks to be appropriately patched to avoid vibration effects. Such road surface inconsistencies could have adverse vibration effects on residential receptors directly on the roadside on the following roads: Brookpits Lane, Ford Road, Lyminster Road, Crossbush Lane, Long Furlong, Holders Calbourne and the B2135. No vibration sensitive non-residential receptors have been identified directly adjacent to the road that would be affected by road traffic vibration.

#### Magnitude of change

22.9.73 With the commitment adhered to for checking and repairing of roads (C-160) the magnitude of change at all vibration sensitive receptors would be **very low**.

#### Sensitivity of receptor

22.9.74 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors in line with **Table 22-12**.

#### Significance of residual effect

- 22.9.75 The Rampion 2 commitments (as shown in **Table 22-11**) include C-160 which will be adopted to minimise the disturbance of vibration sensitive receptors.
- 22.9.76 For residential receptors, the magnitude of change is defined as very low and the sensitivity of the receptors are classified as medium. The effect is direct, temporary and of **negligible** significance, which is **Not Significant** in EIA terms.

# 22.10 Preliminary assessment: Operation and maintenance phase

- 22.10.1 The operation of the onshore substation and wind farm will be assessed at the ES stage once further design details are available. The approach to the assessment is discussed in **Section 22.8**.
- 22.10.2 Any noise effects from maintenance activities have been scoped out of requiring an assessment due to the low levels of noise anticipated from any negligible associated road traffic and limited maintenance activities at the onshore substation.

## 22.11 Preliminary assessment: Decommissioning phase

## **Overview**

- 22.11.1 The preliminary assessment for the decommissioning phase considers potential significant effects from onshore substations only. As per **paragraph 4.7.12** of **Chapter 4: The Proposed Development**, it is anticipated that the onshore electrical cables will be left in-situ with ends cuts, sealed and buried to minimise environmental effects associated with removal. For this reason, no decommissioning phase assessment has been made for the onshore cable route, as the electrical cables will be left in-situ.
- 22.11.2 It is assumed that the majority of the activities associated with the decommissioning phase of the onshore substation construction will be similar to the activities associated with the onshore substation construction phase. For this reason, the noise and vibration effect of decommissioning will be largely the same as construction. There will however be differences between the construction and decommissioning phases of the onshore substation, which will be:
  - no concrete pouring (and therefore no overnight concrete floating at the onshore substation location); and
  - if concrete within the onshore substation location are not left in situ they may require breaking before removal, using a pneumatic hammer. The use of this plant would be noisier than many of the plant aspects assessed within the construction phase, and therefore has been considered specifically in this section in relation to noise from the onshore substation.
- **Table 22-24** shows the distances at which the noise levels associated with the magnitudes of change will be predicted from the pneumatic hammering. It is assumed that the breaking of the concrete will not last more than a month, but might last for up to 9 consecutive days within any 15. For this reason, the magnitude of change is based on the trigger levels from **Table 22-13**.
# Table 22-24 Distance at which different magnitude of change ( $L_{Aeq, T} dB$ ) would be experienced at sensitive receptors (m)

Activity	Distance at which different magnitude of change (L <sub>Aeq, T</sub> dB) would be experienced at receptors (m) assuming noise levels fo a duration of between 10 and 30 days			
	Low (>65 dB)	Medium (>75 dB)	High (>85 dB)	
Concrete breaking	178	56	18	

#### Magnitude of change

22.11.4 As it is likely that the onshore substation will be offset from residential receptors (i.e. residences near to the Bolney Road / Kent Street onshore substation search area boundary in **paragraph 22.9.8** with works being more than 60 m from residences), it is likely that noise from the breaking of concrete during the decommissioning phase will not exceed the 75dB threshold. However, the decommissioning works in total would be expected to be for a duration of more than a month. Given the predicted levels from the construction activities, it is likely that the magnitude of change for decommissioning will be as per the construction phase, being **medium**.

#### Sensitivity of receptor

22.11.5 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors in line with **Table 22-12.** It is unlikely that any noise sensitive non-residential receptors will be located in close proximity to the onshore substations.

#### Significance of residual effect

- 22.11.6 The Rampion 2 commitments (as shown in **Table 22-11**) include C-22, C-26 and C-33 which will be adopted to minimise the disturbance to noise sensitive receptors.
- 22.11.7 For residential receptors, the magnitude of change is defined as **medium** and the sensitivity of the receptors are classified as **medium**. As this direct effect is temporary it is determined to be of **minor adverse significance** and **Not Significant** in EIA terms.
- 22.11.8 The daytime LOAEL of 65dB L<sub>Aeq, 16hr</sub> will not be exceeded at any of the identified noise sensitive receptors.

# 22.12 Preliminary assessment: Cumulative effects

## Approach

22.12.1 A preliminary cumulative effects assessment (CEA) has been undertaken for Rampion 2 which examines the result from the combined effects of Rampion 2

with other developments on the same single receptor or resource and the contribution of Rampion 2 to those impacts. The overall method followed when identifying and assessing potential cumulative effects in relation to the onshore environment, is set out in Chapter 5 and Appendix 5.3: Cumulative effects assessment detailed onshore search and screening criteria, Volume 4.

22.12.2 The onshore screening approach will follow PINS' Advice Note Seventeen (Planning Inspectorate, 2019) which is an accepted process for NSIPs and will follow the four-stage approach set out in the guidance.

### **Cumulative effects assessment**

- 22.12.3 For noise and vibration, a Zone of Influence (ZOI) has been applied for the CEA to ensure direct and indirect cumulative effects can be appropriately identified and assessed. Due to the temporary nature of the works along the onshore cable corridor, including the HDD, these aspects are not included in the ZOI (the onshore cable corridor noise is sufficiently temporary such that it would not significantly contribute to construction noise from other projects). The distance of the ZOI depends on the phase and element of the Proposed Development as follows:
  - construction phase 500m from the temporary construction compounds, landfall and onshore substation;
  - operation and maintenance phase (onshore substation) 1km from the onshore substation boundary; and
  - operation and maintenance phase (WTGs) 20km from the offshore WTGs.
- 22.12.4 The cable trenching and trenchless crossings would be sufficiently temporary that cumulative effects from other construction works would be very unlikely and therefore not considered.
- 22.12.5 Due to the distance of the wind farm piling to onshore receptors this would not likely have a cumulative effect with other onshore construction works. The offshore piling works are to be included in the ES construction noise assessment due to the duration of these works rather than because the anticipated noise level from piling would exceed BS 5228 threshold values. It is expected that piling noise levels would be sufficiently lower than the threshold levels such that there would be no contribution of the piling noise to exceedances of the BS 5228 threshold values from the construction of other developments.
- 22.12.6 There is no need to consider road traffic noise changes because the traffic modelling is inherently cumulative it includes future 'other development' and changes in road traffic this would create, in the model.
- 22.12.7 A development needs to be of a certain type, size and duration in order to be considered as potential to have a cumulative significant effect. For instance, a single WTG 5km from the noise and vibration study area would be considered very unlikely to result in a significant cumulative effect for noise.
- 22.12.8 A short list of other developments that may interact with the Rampion 2 ZOIs during their construction, operation or decommissioning is presented in Appendix 5.4: Cumulative effects assessment shortlisted developments, Volume 4 and

on Figure 5.4.2, Volume 4. This list has been generated by applying criteria set out in Chapter 5 and Appendix 5.3: Cumulative effects assessment detailed onshore search criteria, Volume 4 and has been collated up to the finalisation of the PEIR through desk study, consultation and engagement.

- 22.12.9 Only those developments in the list that fall within the noise and vibration ZOI have the potential to result in cumulative effects with the Proposed Development. The onshore noise and vibration ZOI is shown in **Figure 22.2**, **Volume 3**. All developments falling outside the noise and vibration ZOI are excluded from this assessment.
- 22.12.10 The following types of development have the potential to result in cumulative effects on noise and vibration:
  - any long term construction works expected to be undertaken within the ZOI at the same time as the Rampion 2 construction activities;
  - wind farms; and
  - infrastructure developments likely to have notable building service noise emissions.
- 22.12.11 On the basis of the above, the following specific developments contained within the list in **Appendix 5.4**, **Volume 4** are scoped into this CEA.

## Table 22-25 Developments to be considered as part of the CEA

ID (Figure 5.4.2)	Development type	Development	Status	Confidence in assessment	Tier	Level of detail of CEA to be adopted
22	Non-residential infrastructure Operation of concrete batching plant to include distribution of concrete from the facility.	Dudman Investments Limited (CM/56/19/PL)	Application approved (with conditions) 29/05/2020	Medium. Sufficient information to gain a qualitative understanding	1	If West of River Arun Compound A used, high level qualitative assessment due to only temporary effects expected
1	Transport	A27 Arundel Bypass Project	Pre- application, no scoping report yet submitted. Preferred alignment issued	Low. Currently little information available.	3	Likely to be high level consideration of potential construction effects.
n/a	Energy	Rampion 1	Built	High, based on prediction work already undertaken and	1	Use of Rampion 1 predicted levels to add to Rampion 2 predictions.

ID (Figure 5.4.2)	Development type	Development	Status	Confidence in assessment	Tier	Level of detail of CEA to be adopted
				wind farm operational		
28	Energy Generation of electricity through the use of Solar Photovoltaic panels and associated infrastructure.	British Solar Renewables (DM/15/0644)	Application approved 17/02/2017	High, based noise assessment undertaken for site	1	If substation search areas on Wineham Lane selected, the predicted noise from the site will be added to predicted noise from substation site.

- 22.12.12 The above cumulative effects are reliant on design confirmations still to be made as part of the Proposed Development. Once the chosen sites for temporary construction compounds and onshore substation and more detail of the WTG locations and expected noise levels are known, the cumulative effects will be assessed in accordance with the methodology within this chapter.
- 22.12.13 Baseline data and further information on other developments will continue to be collected prior to the finalisation of the ES and iteratively fed into the assessment. An updated cumulative effects assessment will be reported in the ES.

# 22.13 Transboundary effects

22.13.1 Transboundary effects arise when impacts from a development within one European Economic Area (EEA) states affects the environment of another EEA state(s). A screening of transboundary effects has been carried out and is presented in Appendix B of the Scoping Report (RED, 2020).

# 22.14 Inter-related effects

- 22.14.1 The inter-related effects assessment considers likely significant effects from multiple impacts and activities from the construction, operation and decommissioning of Rampion 2 on the same receptor, or group of receptors.
- 22.14.2 The potential inter-related effects include:
  - Proposed Development lifetime effects: i.e., those arising throughout more than one phase of the Proposed Development (construction, operation and maintenance, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation; and
  - Receptor-led effects: assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor (or group). Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.
- 22.14.3 The potential inter-related effects that could arise in relation to noise and vibration are presented in **Table 22-26**. A description of the process to identify and assess these effects is presented in **Chapter 5**.

Project phase(s)	Nature of inter- related effect	Assessment alone	Inter-related effects assessment
Proposed Develo	pment lifetime effe	ects	
Construction, operation and maintenance,	Increases in noise and vibration due to	Effects within the scope of assessment	Due to the phasing and linear progression of the works, the worst-case noise from access

#### Table 22-26 Inter-related effects assessment for noise and vibration

Project phase(s)	Nature of inter- related effect	Assessment alone	Inter-related effects assessment
and decommissioning	activities during construction, operation and maintenance, and decommissioning	are considered not significant in EIA terms.	construction and use, temporary compound construction and use, cable trenching and HDD will not occur at the same time. There will be receptors that will experience noise for longer durations as a result of the combination of all these works. However, the construction sites which will experience noise effects for more than 1-2 months are sufficiently distant from one another such that the temporal effect will not be accentuated.
			Due to the distance between, the onshore substation and the offshore wind farm, there will be no inter-related effect from the operation and maintenance phase of the Proposed Development.
			On the basis that cables will be left in situ, it is not likely that there will be inter-related effects during decommissioning.
			Vibration effects become negligible at relatively short distances from sources (<100m), therefore, no inter- related effects will be likely between the different work activities.
			Consequently, no significant inter-related lifetime effects are anticipated.
Receptor-led effe	cts		
Receptors conside	red in the noise	The construction	phase has the highest likelihood

Receptors considered in the noise and vibration assessment include: residential receptors, community services, commercial, terrestrial The construction phase has the highest likelihood of receptor-led effects as several activities take place during this phase (refer to **Chapter 4**). Although receptor-led effects will likely be short

Project phase(s)	Nature of inter- related effect	Assessment alone	Inter-related effects assessment
ecology, historic er leisure areas (refer	nvironment and to <b>Table 22-6</b> ).	term and tempor completed in vic	ary depending on works being inity of a receptor.
There is potential for inter-related effects with air quality, transport and landscape and visual impact.		The implementation other embedded been considered assessments whe effects for noise transport.	tion of the Outline COCP and environmental measures have I within the individual aspect ich conclude Not Significant and vibration, air quality and
		Significant effect visual impact as Year 1 of the Pro ES, Year 1 and Y Development will visual impact. It measures at Yea potential effects,	ts remain for the landscape and pect as the PEIR is assessed at oposed Development only. In the Year 15 of the Proposed Il be assessed for landscape and is expected that environmental ar 15 will materially reduce compared to Year 1.
		Overall, some in may arise at som basis. However, measures are de and it is conside effects will excee the individual as vibration, air qua visual effects.	ter-related effects on residents ne locations on a temporary embedded environmental esigned to reduce these effects red unlikely that any inter-related ed the significance reported in pect chapters for noise and ality, transport or landscape and
		Operation and m vibration are exp site visits and ma expected to resu Significant in EIA produce Significat effects.	naintenance effects for noise and bected to be limited to occasional aintenance works. This is alt in effects that are Not A terms and they are unlikely to ant inter-related receptor-led
		The operation of farm will be asse further design de assessment of ir provided at ES s	the onshore substation and wind essed at the ES stage once etails are available. Therefore, an nter-related effects will also be stage.
		Decommissionin similar to the cor	g is expected to be broadly nstruction phase.

# 22.15 Summary of residual effects

**Table 22-27** presents a summary of the preliminary assessment of significant impacts, any relevant embedded environmental measures and residual effects on noise and vibration receptors. In each case, the impact and receptor combination is the one from the assessment which results in the highest adverse effect level.

Activity and impact	Magnitude of change	Receptor and sensitivity or value	Embedded environmental measures	Preliminary assessment of residual effect (significance)
Construction noise				
Temporary noise effects from the construction and operation of the construction compounds	Very Low	Medium (residential)/ High (non- residential)	C-22, C-26, C- 33	Negligible (Not Significant) (residential) Minor adverse (Not Significant (non- residential)
Temporary noise effects from the landfall works and trenchless crossings	Medium Very Low	Medium (residential)/ High (non- residential)	C-26, C-33	Minor adverse (Not Significant) (residential) Minor adverse (Not Significant) (non- residential)
Temporary noise effects from onshore substation construction	Medium	Medium (residential)	C-22, C-26, C- 33	Minor adverse (Not Significant)
Temporary noise effects from onshore cable installation	Low	Medium (residential)/ High (non- residential)	C-22, C-26, C- 33	Minor adverse (Not Significant) (residential) Minor adverse (Not Significant) (non- residential)
Temporary noise effects from	Very Low – Low	Medium (residential)/	C-22, C-26, C- 33	Negligible to Minor adverse (Not

 Table 22-27
 Summary of preliminary assessment of residual effects

Activity and impact	Magnitude of change	Receptor and sensitivity or value	Embedded environmental measures	Preliminary assessment of residual effect (significance)
construction and use of temporary and permanent accesses		High (non- residential)		Significant) (residential) Minor adverse (Not Significant) (non-
Temporary noise effects from Temporary noise effects from construction road traffic noise	Low	Medium (residential)/ High (non- residential)	C-160	Minor adverse (Not Significant) (residential) Minor adverse (Not Significant) (non- residential)
Construction vibra	tion			
Temporary vibration effects from the landworks and trenchless crossings	Low to Medium	Medium (residential)/ High (non- residential)	C-22, C-33	Minor adverse significance (Not Significant) (residential) Minor adverse significance (Not Significant) (non- residential)
Temporary vibration effects from construction road traffic	Very Low	Medium (residential)	C-160	Negligible (Not Significant)
Decommissioning noise				
Onshore substation decommissioning noise	Medium	Medium (residential)	C-22, C-26, C- 33	Minor significance (not significant)
Cumulative Effects Not included at PEIR stage				

Activity and impact	Magnitude of change	Receptor and sensitivity or value	Embedded environmental measures	Preliminary assessment of residual effect (significance)
Inter-related Effects	5			
Construction Noise	Medium	Medium (residential)/ High (non- residential)	C-22, C-26, C- 33	Minor significance (not significant)

# 22.16 Further work to be undertaken for the ES

### Introduction

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

## **Baseline**

- 22.16.2 Short-term 1-hour attended measurements will be undertaken during the daytime, evening and night-time during weekday periods. The measurements will be at receptor positions around HDD locations considered beneficial to identify whether the lowest threshold value within BS 5228-1 (British Standard Institute, 2014a) is not appropriate at HDD locations. This could potentially be the majority of HDD locations, as most are near A-roads where noise could be elevated, especially during the night-time.
- 22.16.3 Depending on the onshore temporary cable corridor routes chosen for construction road traffic, additional 3-hour measurements may be required during the daytime at the following locations where road traffic is considered very low according to CRTN (Department of Transport Welsh Office, 1988):
  - Crossbush; and
  - Warningcamp.
- A noise survey at locations representing the nearest residential receptors will be undertaken once the location of the onshore substation is known. This will be a minimum of 5 days of noise monitoring encompassing a weekday and weekend period. Comment will be made as to any potential implications of the COVID-19 pandemic conditions where relevant with discussion regarding road traffic numbers on nearby roads.
- 22.16.5 A full ETSU-R-97 noise survey will be undertaken if the noise modelling for the Rampion 2 WTGs shows that noise levels exceed 35dB at coastal residences at wind speeds of 10m/s.

#### Assessment

- 22.16.6 New information may be made available to any of the assessments necessitating amendments. The following assessments will be either updated with new information anticipated for the ES or undertaken where they have not for this PEIR:
  - piling assessment associated with the construction of the onshore substation in accordance with BS 5228 (British Standard Institute, 2014a and 2014b);
  - updated onshore substation construction assessment;
  - updated temporary compound construction and operation assessment;
  - updated HDD assessment where informed with baseline monitoring;
  - updated construction road traffic road noise assessment;
  - wind farm 'screening' assessment in accordance with ETSU-R-97 (The Working Group on Noise from Wind Turbines, 1996) (paragraph 22.5.18);
  - onshore operational substation assessment in accordance with BS4142 (British Standard Institute, 2019);
  - further consideration of tranquillity in conjunction with other aspects and discussions with relevant stakeholders; and
  - updated CEA, currently including a proposed compound site, wind farm and substation.

### **Consultation and engagement**

22.16.7 Further consultation and engagement that will be undertaken to inform the noise and vibration assessment and presented within the ES is set out in **Table 22-28**.

Consultee	Issues to be addressed	Relevance to assessment
Mid-Sussex District Council	Detailed survey method for onshore substation baseline identification	Informs the assessment of onshore substation noise in accordance with BS 4142 (British Standard Institute, 2019).
Horsham District Council	Detailed survey method for onshore substation baseline identification	Informs the assessment of onshore substation noise in accordance with BS 4142 (British Standard Institute, 2019).

#### Table 22-28 Further consultation and engagement

Consultee	Issues to be addressed	Relevance to assessment
Arun District Council, Horsham District Council, Mid-Sussex District	Detailed survey method for HDD baseline identification where undertaken	Informs the assessment of HDD noise in accordance with BS 5228 (British Standard Institute, 2014a and 2014b).

### **Environmental measures**

<sup>22.16.8</sup> Further environmental measures that will be considered and presented within the ES are set out in **Table 22-29**.

#### Table 22-29 Further environmental measures

Receptor	Changes and effects	Environmental measures and influence on assessment
Residences surrounding the onshore substation	Increase in industrial noise	Environmental measures are likely to be required within the onshore substation design to minimise noise levels, which could include barriers, enclosures, limits on individual plant noise levels assisted with commitments to lower noise types.

# 22.17 Glossary of terms and abbreviations

Term (acronym)	Definition
ADC	Arun District Council
ANC	Association of Noise Consultants
Baseline	Refers to existing conditions as represented by latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of development.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the Proposed Development together with any known or foreseeable future changes that will take place before completion of the Proposed Development.
BPM	Best Practical Means

Term (acronym)	Definition
BS	British Standard
CCW	Countryside Council for Wales
Code of Construction Practice (COCP)	The code sets out the standards and procedures to which developers and contractors must adhere to when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors in constructing their projects.
Construction Effects	Used to describe both temporary effects that arise during the construction phases as well as permanent existence effects that arise from the physical existence of development (for example new buildings).
CRTN	Calculation of Road Traffic Noise
Cumulative effects	Additional changes caused by a Proposed Development in conjunction with other similar developments or as a combined effect of a set of developments.
Cumulative Effects Assessment (CEA)	Assessment of impacts as a result of the incremental changes caused by other past, present and reasonably foreseeable human activities and natural processes together with the Proposed Development.
Cumulative Zone of Influence	The area in which other future developments within the planning regime have the potential to have effects in conjunction with the Proposed Development.
dB	Decibel
DCLG	Department for Communities and Local Government
DECG	Department of Energy and Climate Change
Development Consent Order Application	An application for consent to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the Proposed Development.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
DEFRA	Department for Environment, Food & Rural Affairs

Term (acronym)	Definition		
Development Consent Order (DCO)	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.		
DMRB	Design Manual for Roads and Bridges		
EA	Environment Agency		
EEA	European Economic Area		
Embedded environmental measures	Equate to 'primary environmental measures' as defined by Institute of Environmental Management and Assessment (2016). They are measures to avoid or reduce environmental effects that are directly incorporated into the preferred masterplan for the Proposed Development.		
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').		
Environmental Measures	Measures which are proposed to prevent, reduce and where possible offset any significant adverse effects (or to avoid, reduce and if possible, remedy identified effects.		
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.		
ESCC	East Sussex County Council		
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.		
Formal consultation	Formal consultation refers to statutory consultation that is required under Section 42 and Section 47 of the Planning Act 2008 with the relevant consultation bodies and the public on the preliminary environmental information.		
Future baseline	Refers to the situation in future years without the Proposed Development.		
FY	Future Year		
GPG	Good Practice Guidance		
HE	Highways England		
HGV	Heavy Goods Vehicle		

Term (acronym)	Definition
Horizontal Directional Drill (HDD)	An engineering technique avoiding open trenches.
IEMA	Institute of Environmental Management and Assessment
Impact	The changes resulting from an action.
Indirect effects	Effects that result indirectly from the Proposed Development as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects.
	Often used to describe effects on landscape character that are not directly impacted by the Proposed Development such as effects on perceptual characteristics and qualities of the landscape.
Informal consultation	Informal consultation refers to the voluntary consultation that RED undertake in addition to the formal consultation requirements.
ΙοΑ	Institute of Acoustics
IPC	Infrastructure Planning Commission
Lа10,т	A-weighted sound level exceeded for 10% of the measurement period. It is widely used as a descriptor of road traffic noise.
Lа90,т	A-weighted sound level exceed for 90% of the measurement period. It is usually referred to as the background sound level.
LAeq,T	A-weighted equivalent continuous sound level and is the same sound level of a steady sound having the same energy as a fluctuating sound over the same period. It is considered the best general purpose index for environmental sound.
Likely Significant Effects	It is a requirement of Environmental Impact Assessment Regulations to determine the likely significant effects of the Proposed Development on the environment which should relate to the level of an effect and the type of effect.
LOAEL	Lowest Observed Adverse Effect Level
Magnitude (of change)	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short term or long term in duration'. Also known as the 'degree' or 'nature' of change.

Term (acronym)	Definition	
MSDC	Mid Sussex District Council	
Nationally Significant Infrastructure Project (NSIP)	Nationally Significant Infrastructure Projects are major infrastructure developments in England and Wales which are consented by DCO. These include proposals for renewable energy projects with an installed capacity greater than 100MW.	
NE	Natural England	
NPPF	National Planning Policy Framework	
NPPG	National Planning Practice Guidance	
NPS	National Policy Statement. NPS EN-1: National Policy Statement for Energy. NPS EN-3: National Policy Statement for Renewable Energy Infrastructure.	
NPSE	Noise Policy Statement for England	
NSR	Noise Sensitive Receptor	
NWG	Noise Working Group	
Onshore part of the PEIR Assessment Boundary	An area that encompasses all planned onshore infrastructure.	
os	Ordnance Survey	
PEIR Assessment Boundary	The PEIR Assessment Boundary combines the search areas for the offshore and onshore infrastructure associated with the Proposed Development. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas.	
Planning Inspectorate (PINS)	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.	
PPV	Peak Particle Velocity	
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary	

Term (acronym)	Definition
	conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
Proposed Development	The development that is subject to the application for development consent, as described in Chapter 4.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
RED	Rampion Extension Development Limited
Scoping Opinion	A Scoping Opinion is adopted by the Secretary of State for a Proposed Development.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process.
SDNPA	South Downs National Park Authority
Secretary of State	The body who makes the decision to grant development consent.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value associated to that receptor.
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Significant effects	It is a requirement of the EIA Regulations to determine the likely significant effects of the development on the environment which should relate to the level of an effect and the type of effect. Where possible significant effects should be mitigated.
	The significance of an effect gives an indication as to the degree of importance (based on the magnitude of the effect and the sensitivity of the receptor) that should be attached to the impact described.
	Whether or not an effect should be considered significant is not absolute and requires the application of professional judgement. Significant – 'noteworthy, of considerable amount or effect or importance, not insignificant or negligible'.

Term (acronym)	Definition		
	Those levels and types of landscape and visual effect likely to have a major or important / noteworthy or special effect of which a decision maker should take particular note.		
SOAEL	Significant Observed A	dverse Effect Level	
Sound Pressure Level	Is the change in the static pressure of any media as a sound wave passes through expressed in decibels to compress the wide range of pascals we hear into manageable numbers and is usually A-weighted to take into account the frequency response of our hearing mechanism. Typical sound levels are as follows:		
	Approximate Noise Levels dB(A)	Example	
	0	Threshold of hearing for normal young people.	
	20	Recording studio, ambient level.	
	40	Quiet residential neighbourhood, ambient level.	
	60	Department store, restaurant, speech levels.	
	80	Next to busy highway, shouting	
	100	Textile mill; press room with presses running; punch press and wood planers, at operator's position.	
	120	Ship's engine room; rock concert, in front and close to speakers.	
	140	Moon launch at 100m; artillery fire, gunner's position.	
Temporal Scope	The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur and are typically defined as either being temporary or permanent.		
Temporary or permanent effects	Effects may be considered as temporary or permanent. In the case of wind energy development the application is for a 30 year period after which the assessment assumes that decommissioning will occur and that the site will be restored. For these reasons the development is referred to as long term and reversible.		

Term (acronym)	Definition
The Applicant	Rampion Extension Development Limited (RED)
The Proposed Development / Rampion 2	The onshore and offshore infrastructure associated with the offshore wind farm comprising of installed capacity of up to 1200 MW, located in the English Channel in off the south coast of England.
WHO	World Health Organisation
WSCC	West Sussex County Council
WTG	Wind Turbine Generator
Zone of Influence (ZOI)	The area surrounding the Proposed Development which could result in likely significant effects.

# 22.18 References

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