South East Strategic Reservoir Option

Preliminary Environmental Information Report

Chapter 14 - Noise and vibration

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14 Noise and vibration

14.1 Introduction

14.1.1 This chapter of the Preliminary Environmental Information (PEI) Report provides the preliminary assessment of likely significant effects on noise and vibration from the construction and operation of the proposed SESRO Project (the Project, as detailed in Chapter 2: Project description).

14.1.2 Within this chapter, aspect-specific sections are included on:

- Legislation, policy and guidance (Section 14.2)
- Consultation, engagement and scoping (Section 14.3)
- Assessment methodology (Section 14.4)
- Study area (Section 14.5)
- Baseline conditions (Section 14.6)
- Project parameters, assumptions and limitations (Section 14.7)
- Embedded design mitigation and standard good practice (14.8)
- Preliminary assessment of likely significant effects (Section 14.9) and
- Next steps (Section 14.10)

14.1.3 This chapter assesses the potential for noise and vibration effects from the construction and operation of the Project. Potential effects on receptors are considered, including residential, educational and medical properties, public areas and ecological receptors.

14.1.4 This chapter should be read in conjunction with Chapter 2: Project description and other chapters of key relevance, namely:

- Chapter 6: Aquatic ecology which considers noise and vibration effects upon aquatic ecological receptors, including protected species.
- Chapter 7: Terrestrial ecology which considers noise and vibration effects on terrestrial ecological receptors including designated sites and protected species.
- Chapter 8: Historic environment which considers the effects of noise and vibration on the setting of historic receptors such as listed buildings.
- Chapter 9: Landscape and visual, which considers tranquility.
- Chapter 10: Geology and soils which considers the ground and soil conditions that could interact with groundborne vibration effects.
- Chapter 12: Traffic and transport which considers potential traffic and transport effects, which could result in noise and vibration effects on sensitive receptors, such as residential properties and people.
- Chapter 15: Socio-economics and communities which considers noise and vibration effects on residential and community properties, public rights of way (PRoW), walkers, cyclists and horse riders (WCH) and economic receptors.
- Chapter 16: Human health which considers (amongst other things) noise effects on human health.

14.1.5 This chapter is supported by the following figures and appendices:

- Figure 14.1: Noise and vibration study area, baseline features and measurement locations
- Appendix 14.1: Preliminary assessment of effects for noise and vibration

14.1.6 This PEI Report does not constitute a draft Environmental Statement (ES). Assessments reported within this PEI Report chapter are considered a reasonable 'worst case' as a precautionary approach has been taken where design, construction or baseline information is being developed. Nevertheless, the preliminary assessment is considered sufficiently robust to enable consultees to understand the likely significant environmental effects of the Project, based on current design information and understanding of the baseline environment. Gaps in information identified within the PEI Report will be considered and addressed as part of the assessment during the production of the ES, as noted in Section 14.10: Next steps.

14.1.7 Where initial likely significant effects are identified at this stage, these may ultimately be determined as not significant in the ES once data gaps are addressed, and the design and mitigation are further developed. The ES will be submitted with the Development Consent Order (DCO) application and will provide the final assessment of likely significant effects; this will be informed by the ongoing Environmental Impact Assessment (EIA) process and ongoing consultation and engagement.

14.2 Legislation, policy and guidance

14.2.1 Table 14.1 lists the legislation, policy and guidance relevant to the Noise and vibration assessment for the Project and specifies where in the PEI Report information is provided in relation to these. A full policy compliance assessment will be presented within the Planning Statement as part of the DCO application.

14.2.2 National Policy Statements (NPS) form the principal policy for developments progressing through the Planning Act 2008 process. The NPS for Water Resources Infrastructure (NPSWRI) is the primary NPS for the Project. In addition, the Secretary of State must also have regard to any other matters which they think are both important and relevant to the decision and this could include regional and local planning policies.

14.2.3 The Project is located mainly within the Vale of White Horse District, with the exception of the far eastern extent on the eastern bank of the River Thames, which falls within the South Oxfordshire District. The Project is wholly within the county of Oxfordshire. The regional and local planning policies most relevant to the assessment within this chapter are included in Table 14.1.

Table 14.1 Relevant legislation, policy and guidance for noise and vibration

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
Legislation		
Environmental Protection Act (EPA) 1990 Part III.	The Project has scoped in noise and vibration effects during	14.8: Embedded design mitigation

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
The Act made provision for the improved control of pollution arising from certain industrial and other processes. Part III *Statutory Nuisances and Clean Air* identifies that *'noise[1] emitted from premises so as to be prejudicial to health or a nuisance'* constitute 'Statutory Nuisances'. Furthermore, subject to conditions, '*in respect of a statutory nuisance it shall be a defence to prove that the best practicable means were used to prevent, or to counteract the effects of, the nuisance.'*	construction and operation, which have the potential to be prejudicial to health or a nuisance. The Noise and vibration assessment must robustly assess the Project to ensure that future activities can be defended against any statutory nuisance claims, through selection of appropriate mitigation and demonstrating that best practicable means is employed at all times to minimise noise.	and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
The Control of Pollution Act (CoPA) 1974 The Act made provision for implementing Council Directive 96/61/EC and for otherwise preventing and controlling pollution. Section 60 provides powers to a local authority to issue a notice imposing noise and vibration control requirements on any work of engineering construction. Control measures may include limiting working hours, specifying methods, or noise limits. Any control measures will, amongst other things, need to ensure that '*best practicable means are employed to minimise noise[2]'* and a Section 61 application is submitted to the relevant local authority.	The Project has scoped in noise and vibration effects during construction, which are subject to the requirements of CoPA. The construction Noise and vibration assessment must robustly assess the Project to ensure that control measures incorporated demonstrate that best practicable means are employed to minimise noise.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
Planning Act 2008 The Planning Act is designed to streamline the approval process for major infrastructure projects and ensure that noise and vibration impacts are systematically evaluated and mitigated.	The Project has the potential to cause noise and vibration effects during construction and operation. Noise needs to be considered as the Project may create additional noise or would be sensitive to the prevailing acoustic environment.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of

[1] As stated in Section 79 (7) - 'noise' includes vibration.
[2] As states in Section 73 (1) - 'noise' includes vibration.

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
	The construction and operational Noise and vibration assessment must robustly assess the Project and ensure that appropriate control measures are employed.	likely significant effects.
The Environmental Noise (England) Regulations 2006 The regulations enact the requirements for noise action planning to promote good health and good quality of life through the effective management of noise.	The Noise and vibration assessment should consider the effective management of noise and vibration during both the construction and operational phases.	Section 14.8: Embedded design mitigation and standard good practice, Section14.9: Preliminary assessment of likely significant effects.
Land Compensation Act 1973 The Act provides a statutory basis for compensation for property owners and tenants affected by public works. Part I '*Compensation for Physical Factors'* describes that compensation may be claimed when the value of a property is reduced because of pollution or disturbance from the use of an infrastructure projects.	The Project has the potential to generate noise impacts during the construction phase. In accordance with Part I of the Act, where the value of a property is reduced as a result of physical factors arising from infrastructure projects, compensation may be claimed, provided that all reasonable and practicable mitigation measures have been implemented.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
Noise Insulation Regulations 1975 These regulations define the conditions under which dwellings are eligible for noise insulation to control internal noise levels due to road traffic noise from new, altered or amended highways.	The Project has the potential to generate noise and vibration impacts during operational phase due to new, altered or amended highways. An assessment must be undertaken within 6 months of the opening of the new, altered or amended highway to identify any properties likely to exceed the noise insulation criteria.	No detailed information available at this stage to identify properties that noise insulation would be offered to. An estimation of the envisaged qualifying properties will be identified at the ES.

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
National Policy Statement for Water Resources Infrastructure (NPSWRI, 2025)		
NPSWRI Section 4.11 states excessive noise and vibration can negatively impact on human health, biodiversity, and the amenity area, with government policies promoting effective management to ensure good health and quality of life.	The Project has scoped in noise and vibration effects during construction and operation which have the potential to affect health and quality of life. This chapter of the PEI Report considers potential likely significant noise effects on human health and quality of life and the mitigation measures to manage these potential effects.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
Other national policy		
The Noise Policy Statement for England (NPSE) 2010 (Defra, 2010) The policy sets out the long-term vision of government noise policy, to promote good health and a good quality of life through the management of noise. The policy aims to manage and control environmental, neighbour, and neighbourhood noise to avoid significant adverse impacts on health and quality of life, mitigate and minimise adverse impacts, and contribute to improvements where possible.	The Project has scoped in noise and vibration effects during construction and operation. Consistent with the aims set out in the NPSE, this chapter of the PEI Report considers potential likely significant noise effects on human health and quality of life and the mitigation measures to manage these potential effects, which include standard good practice. Please note that the aim of NPSE to 'contribute to improvements' will be considered at the ES stage once the design becomes more developed.	Section 14.4: Assessment methodology, Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (MHCLG), 2024) outlines the UK Government's planning policies for England, emphasising sustainable housing delivery and local plan preparation. Paragraph 187 of the NPPF requires that '*Planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing*	The Project has scoped in noise and vibration effects during construction and operation. This chapter of the PEI Report considers potential likely significant noise effects as required by the NPPF, and the mitigation measures to manage these potential effects.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of … noise pollution…' Paragraph 198 of the NPPF requires that '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitive of the site or the wider area to impacts that could arise from the development. In doing so that they should mitigate and reduce to a minimum potential adverse impacts results from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.'* The NPPF also links to the requirements defined in NPSE (as described above).		
Planning Practice Guidance - Noise (Ministry of Housing, Communities and Local Government (MHCLG), 2019) provides advice on how planning can manage potential noise impacts in new developments, emphasizing the importance of mitigating and minimizing adverse noise effects on health and quality of life. The guidance also introduces a hierarchy of noise effects that local planning authorities should consider in both plan-making and decision-taking: • Whether or not a significant adverse effect is occurring or likely to occur. • Whether or not an adverse effect is occurring or likely to occur. • Whether or not a good standard of amenity can be achieved.	The Project has scoped in noise and vibration effects during construction and operation. This chapter of the PEI Report considers potential likely significant noise effects on human health and quality of life and the mitigation measures to manage these potential effects.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
Defra Noise Action Plan: Roads (Defra, 2019a) outlines strategies to manage and reduce environmental noise from major sources of noise such as road and aircraft, aiming to protect public health and improve quality of life through effective noise management.	The Project has scoped in noise and vibration effects during construction and operation. This chapter of the PEI Report considers potential likely significant noise effects on human health and quality of life and the mitigation measures to manage these potential effects. This includes any anticipated changes to that environment from noise action plan activities that are permitted but not yet commenced.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
Regional and local policy		
Oxfordshire's Strategic Vision for Long-term Sustainable Development (Future Oxfordshire Partnership, 2021) The strategy facilitates collaborative efforts to manage economic, housing and infrastructure development. It includes goals to manage and mitigate noise and vibration impacts from development activities, aiming to enhance public health and quality of life.	The Project has scoped in likely significant noise and vibration effects during construction and operation. This chapter of the PEI Report considers potential likely significant noise effects on human health and quality of life and the mitigation measures to manage these potential effects.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
Vale of White Horse District Council Local Plan 2031: Part 2: Additional Sites and Detailed Policies (Adopted October 2019) outlines policies and additional site allocations to complement the Part 1 of the Local Plan includes policies to manage and mitigate noise and vibration impacts from new developments, ensuring they do not adversely affect residents' health and quality of life.	The Project has scoped in likely significant noise and vibration effects during construction and operation. This chapter of the PEI Report considers Development Policy 25: Noise Pollution to ensure that, where the Project may create additional noise, the impact of noise will not cause an unacceptable effect on amenity.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
South Oxfordshire Local Plan 2011 - 2035, adopted in December 2020. Sets out the future for development in South Oxfordshire up to 2035 and includes policies to manage and mitigate noise and vibration impacts from new developments, ensuring they do not adversely affect residents' health and quality of life.	The Project has scoped in likely significant noise and vibration effects during construction and operation. This chapter of the PEI Report considers Policy DES6: this policy aims to ensure that the Project does not adversely affect residents' health and quality of life	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
	through effective noise and vibration mitigation measures.	likely significant effects.
Guidance		
The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment' (IEMA,2014). IEMA (2014) provides a framework for assessing the significance of noise effects in environmental impact assessments. It provides guidance on baseline noise surveys, impact prediction, evaluation of significance, and stakeholder engagement.	This chapter of the PEI Report references the guidance from IEMA, when defining the baseline, the assessment methodology, and assessment criteria for construction and operational noise and vibration sources.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
The Association of Noise Consultants, Guidelines, measurement & assessment of groundborne noise & vibration (Association of Noise Consultants (ANC), 2012). ANC (2012) offers technical guidance on the measurement and assessment of groundborne noise and vibration from construction activities. It outlines the appropriate methodologies, instrumentation, and criteria for evaluating potential impacts on sensitive receptors.	Consideration has been given to the guidance from ANC when defining the baseline, assessment methodology, and assessment criteria associated with construction and operational activities that generate potential groundborne noise and vibration effects. These include, tunnelling activities, earthwork compaction, and movement of trains. At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of vibration.	Section 14.8: Embedded design mitigation and standard good practice, Section 14.9: Preliminary assessment of likely significant effects.
Construction Noise - A good practice guide to the preparation, submission and management of Section 61 consents (ANC, 2021). ANC (2021) provides practical guidance for managing construction noise through the Section 61 consent process under the Control of Pollution Act 1974. It promotes proactive noise management, stakeholder communication, and effective mitigation planning.	The Project has scoped in noise and vibration effects during construction. Consideration has been given to the guidance from ANC when defining mitigation measures to manage potential noise and vibration effects.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
International Organisation for Standardisation (ISO) 9613-2 Acoustics - Attenuation of sound during	The Project has scoped in noise effects during operation. The noise levels for industrial noise sources	Section 14.9: Preliminary assessment of

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors (ISO, 2024). ISO 9613-2 (2024) provides an engineering method for predicting the attenuation of sound during propagation in outdoor environments. It allows for the prediction of noise from various sources (e.g. road traffic, industrial sources, construction activities). Part 2 specifically addresses the method to predict the equivalent continuous A-weighted sound pressure level at a given distance from the noise source.	may be in part predicted using this methodology. At the PEI stage the design is not sufficiently developed to include a detailed assessment of noise from industrial sources (such as waste treatment works, pumps and valves).	likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
International Organisation for Standardisation (ISO) 14837-1:2005 - Mechanical vibration - Ground-borne noise and vibration arising from rail systems - Part 1- General Guidance (ISO, 2005). ISO 14837-1 (2005) offers general principles for assessing ground-borne noise and vibration from rail-related construction activities. It outlines measurement techniques, prediction methods, and mitigation strategies for the various characteristics of the source (e.g. train, wheel, rail, ground condition for transmission, foundations of receiving building).	The Project has scoped in vibration effects from rail sources during construction and operation. This chapter of the PEI Report considers the guidance from ISO 14837-1 (2005). At the PEI stage the design is not sufficiently developed to include a quantitative assessment of rail vibration.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
Ground Vibration Caused by Civil Engineering Works (B. M. New, 1986). New (1986) provides empirical data and practical insights into various sources of ground vibration generated by civil engineering activities (such as traffic, piling, tunnelling).	The Project has scoped in vibration effects during construction. This chapter of the PEI Report uses guidance from New (1986) to define scoping distances for road traffic vibration.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
Professional Practice Guidance (ProPG): Planning and Noise (Association of Noise Consultants (ANC), Institute of Acoustics, Chartered Institute of Environmental Health, 2017). ProPG (2017) provides a structured approach to assessing and managing noise in the	The Project has scoped in noise and vibration effects during construction and operation. This chapter of the PEI Report considers the guidance from ProPG (2017).	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
planning process in England. It promotes good acoustic design, outlines the factors that should be considered for planning applications, and describes how to determine the extent of potential noise impacts and effects. It primarily focuses on the effects on new residential developments that will be exposed to noise from transport sources.		and standard good practice.
Transport and Road Research Laboratory (TRRL) - Traffic Induced Vibration in Buildings - Research Report 246 (TRRL 1986). TRRL Report 246 (1986) summarises research findings on the effects of traffic-induced vibration on buildings and sensitive equipment. It also presents methods for predicting the degree of disturbance likely to be caused by both airborne and groundborne vibration, and describes possible methods for reducing traffic vibration nuisance.	The Project has scoped in vibration effects during construction. This chapter of the PEI Report considers the guidance from TRRL Report 246 (1986). At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of vibration.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
Groundborne vibration caused by mechanised construction works, TRL Report 429 (Transport Research Laboratory, 2000). TRL Report 429 (2000) provides data and predictive models for assessing groundborne vibration caused by mechanised construction works, including vibratory compaction, piling, dynamic compaction, and mechanised tunnelling, to minimise environmental impacts and avoid unnecessary cost increases.	The Project has scoped in vibration effects during construction. This chapter of the PEI Report considers the guidance from TRL Report 429 (2000). Furthermore, the prediction methodology is referenced in BS5228-2 (see below). At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of vibration.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. BS 5228-1 provides a code of practice for noise and vibration control on construction and open sites. Part 1 specifically addresses noise control measures. This standard outlines methods for predicting and measuring	The Project has scoped in noise effects during construction. This chapter of the PEI Report considers the guidance in standard BS 5228-1 (2014) when defining prediction methodology, assessment criteria, and source information.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
noise levels, strategies for mitigating noise impacts, and guidelines for community relations and noise management on construction sites.	At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of noise.	and standard good practice.
BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration. BS 5228-2 provides a code of practice for noise and vibration control on construction and open sites. Part 2 specifically addresses vibration control measures. This standard outlines methods for predicting and measuring vibration levels, strategies for mitigating vibration impacts, and guidelines for managing vibration on construction sites.	The Project has scoped in vibration effects during construction. This chapter considers the guidance in standard BS 5228-2 (2014) when defining prediction methodology, assessment criteria, and source information. At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of vibration.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BS 4142 provides methods for rating and assessing sound of an industrial and commercial nature. This standard outlines procedures for measuring and evaluating sound levels, assessing the impact of industrial and commercial noise on nearby residential areas, and determining appropriate noise control measures.	The Project has scoped in noise effects during operation. This chapter of the PEI Report follows the guidance in the standard BS 4142 (2019) for the assessment of fixed mechanical and electrical installations. At the PEI stage the operational assumptions are not sufficiently developed to include a quantitative assessment of noise from fixed mechanical and electrical installations.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. BS 8233 provides guidance on sound insulation and noise reduction for buildings. This standard covers methods for measuring and assessing noise levels, design criteria for noise control, and recommendations for sound insulation in various types of buildings.	The Project has scoped in noise effects during construction and operation. This chapter of the PEI Report considers the guidance in the standard BS 8233 (2014), to inform the assessment criteria and effectiveness of potential mitigation measures. At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of noise.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
BS 7385-2:1993 Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration. BS 7385 provides guidance on evaluating and measuring vibration in buildings. It specifically addresses the levels of vibration that could potentially cause damage to building structures. This standard outlines factors influencing the vibration response of buildings and describes the basic procedures for conducting measurements.	The Project has scoped in vibration effects during construction and operation. This chapter of the PEI Report considers the guidance in the standard BS 7385-2 (1993) to inform the assessment method and criteria for considering vibration effects on buildings. At the PEI stage the construction assumptions are not sufficiently developed to include a quantitative assessment of vibration.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
Design Manual for Roads and Bridges (DMRB): Sustainability and Environment LA 111 Revision 2 Noise and vibration. DMRB LA 111 provides guidelines for assessing and managing noise and vibration impacts associated with road construction and maintenance projects. It includes methodologies for noise and vibration assessment, criteria for determining significance, and strategies for mitigation.	The Project has scoped in noise and vibration effects resulting from road traffic movements during construction and operation. This chapter of the PEI Report considers the guidance from DMRB LA 111 in setting assessment criteria, and prediction methodology.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
Health Technical Memorandum (HTM) 08-01: Acoustics. HTM 08-01 provides acoustic design criteria for healthcare facilities. It outlines the impact of sound on health, methods for managing noise, and guidelines for creating acoustically optimised environments in healthcare settings.	The Project has scoped noise and vibration effects during construction and operation which may affect healthcare facilities. This chapter of the PEI Report considers the guidance from HTM 08-01 in setting screening criteria and, where effects are identified at healthcare facilities, potential mitigation measures.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
Acoustic design of schools: performance standards, Building Bulletin 93 (Education Funding Agency and Department for Education, 2015). Building Bulletin 93 sets out the minimum performance standards for the acoustics of educational buildings, providing guidelines for achieving suitable acoustic conditions in	The Project has scoped in noise and vibration effects during construction and operation which may affect educational facilities. This chapter of the PEI Report considers the guidance from BB93 in setting screening criteria, and should effects be identified at	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.

Legislation, policy or guidance description	Relevance to assessment	Where in the PEI Report is information provided to address this
educational environments. This includes criteria for indoor ambient noise levels, sound insulation, and reverberation control.	educational facilities, potential mitigation measures.	
Calculation of Road Traffic Noise (CRTN) (Department of Transport and Welsh Office 1988). Calculation of Road Traffic Noise provides a standardised method for predicting road traffic noise levels in the UK. It includes guidance on calculating noise levels based on traffic flow, speed, road surface and distance to receptors. This methodology is widely used in environmental noise assessments for infrastructure projects.	The Project has scoped in noise and vibration effects resulting from road traffic movements during construction and operation. This chapter of the PEI Report considers the guidance from CRTN in setting the prediction methodology for road traffic noise.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
World Health Organization Night Noise Guidelines for Europe (WHO NNG) (World Health Organization 2009). The Night Noise Guidelines for Europe establish health-based thresholds for night-time noise exposure, identifying levels above which adverse health effects may occur. They are relevant to assessing potential sleep disturbance and long-term health impacts from night-time construction or operational noise.	The Project has scoped in noise and vibration effects during construction and operation which could occur during the night-time. This chapter of the PEI Report considers the guidance from WHO NNG in assessing night-time effects.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.
World Health Organization Environmental Noise Guidelines for the European Region (WHO ENG) (World Health Organization 2018). The Environmental Noise Guidelines for the European Region provides recommendations for protecting public health from environmental noise, including thresholds for road traffic, rail, aircraft and leisure noise and details how to evaluate noise impacts on human health, informing mitigation measures.	The Project has scoped in noise and vibration effects resulting from road and rail movements during construction and operation. This chapter of the PEI Report considers the guidance from WHO in assessing noise impacts and informing mitigation measures.	Section 14.9: Preliminary assessment of likely significant effects, Section 14.8: Embedded design mitigation and standard good practice.

14.3 Consultation, engagement and scoping

14.3.1 Feedback from consultation and engagement is used to define the assessment approach and to ensure that appropriate baseline information is used. Feedback is also used to drive the design of the Project to avoid, prevent and reduce any likely environmental effects. In

particular, feedback from key stakeholders has informed the Project's proposed mitigation measures. Specific mitigation measures relevant to the Noise and vibration assessment are summarised in Section 14.8 of this chapter. Engagement is ongoing and will continue to inform the EIA and design process.

Scoping Opinion

14.3.2 The EIA Scoping Report (Thames Water, 2024) was issued to the Planning Inspectorate (PINS) on 28 August 2024. PINS provided its EIA Scoping Opinion (The Planning Inspectorate, 2024) on 8 October 2024, which included feedback from consultation bodies that it formally consulted.

14.3.3 Table 14.2 captures the key Scoping Opinion comments received from PINS and other key comments received from consultation bodies relevant to the Noise and vibration assessment, along with the Applicant's response to these at this stage of the assessment. Key activities to inform the final assessment that will be undertaken between the PEI Report and ES are covered in section 14.10 Next steps. The full consultee comments on the EIA Scoping Report and responses to these will be provided in the ES.

Table 14.2 Key Scoping feedback for noise and vibration

Stakeholder	Scoping comment	Applicant response
PINS	3.7.1 - The Scoping Report proposes that the assessment of noise and vibration effects on ecological receptors will be considered in ES Chapter 7: Aquatic Ecology and Chapter 8: Terrestrial Ecology; while impacts to historic receptors would be considered in ES Chapter 10: Historic Environment. The Inspectorate is content with this approach. The Noise and Vibration ES Chapter should provide clear cross-referencing to the sections where the relevant impacts are considered.	The Noise and vibration chapter of the PEI Report assesses potential impacts on residential and non-residential human receptors. The chapter provides clear cross-referencing to other aspect chapters where other relevant effects are considered, including Chapter 6: Aquatic ecology, Chapter 7: Terrestrial ecology and Chapter 8: Historic environment.
PINS	3.7.2 - The Scoping Report proposes to scope out vibration from pumping station and intake/outfall structures - operation on the basis that significant vibration effects associated with pumps and intake/outfall structures are considered unlikely with the adoption of good practice design and vibration isolation methods. Paragraph 12.6.11 of the Scoping Report supports this by explaining that pumps will be located on large concrete bases with suitable	The operational Noise and vibration assessment for fixed plant, including the pumping station, and intake/outfall structures, has remained scoped out on the same basis as that described in the Scoping Report. Chapter 2: Project description provides detailed information regarding the pumping station and intake/outfall structures. Appropriate measures to avoid noise impacts through good design have been documented within Appendix 2.2: Draft commitments register and

Stakeholder	Scoping comment	Applicant response
	isolation and the pumps and other equipment at the inlet towers would be located within the reservoir and over 1 kilometre (km) from the nearest vibration sensitive properties. On the basis that the ES confirms and explains how these, or equivalent measures would be secured to demonstrate that significant effects are unlikely to occur, the Inspectorate agrees to scope this matter out.	factored into the assessment, these will be confirmed in the ES.
PINS	3.7.7 - The Scoping Report proposes to scope out noise from overhead powerlines - operation on the basis that 132kV voltage overhead power lines would be expected to lead to minimal noise emissions. There is limited potential for noise emissions from conductors on overhead lines under certain meteorological conditions, however the distance from receptors and the overhead power lines are currently unclear. The ES should either include evidence to confirm that noise generated by 132kV voltage overhead cables would not result in significant effects on sensitive receptors or provide an assessment of likely significant effects.	The operational noise from 132kV voltage overhead power line diversions has been assessed to determine likely significant effects. Further information can be found in Chapter 2: Project description. Where appropriate, mitigation measures have been identified in Section 14.8.
PINS	3.7.8 - Section 12.6 of the Scoping Report sets out the sensitive receptors to be considered in the noise and vibration assessment. The ES should also include flood assets as receptors sensitive to changes in vibration as there is a risk that flood assets could be impacted by construction works that likely to cause vibration including piling and tunnelling. The ES should include an assessment of significant effects from construction vibration on the identified flood assets and specify any mitigation measures and monitoring required. Consideration should also be given to settlement	No existing flood defence assets have been identified within/close to the draft Order limits and therefore no effects are anticipated. Measures to avoid noise and vibration impacts through good design and other means have been documented within Appendix 2.2: Draft commitments register.

Stakeholder	Scoping comment	Applicant response
	when boring the tunnel, especially near flood assets."	
Vale of White Horse	The decision to rule [out] operational noise from the pumping station and intake/outfall structures is based on assumed adoption of good design practice, without clearly identifying details of those good design measures. To rule these noise sources out without the mitigation measures being clearly specified appears unreasonable. It is a legitimate expectation that EIA shall identify and specify such mitigation. The decision to rule out noise from operation of valves is also based on assumptions on the siting of the valves. However, the scoping report states that no details are available regarding the presence or location of the valves. To rule these noise sources out with no details being available also appears unreasonable. The ES should identify their location and specify any mitigation.	The operational Noise and vibration assessment for fixed plant, including the pumping station, valves and intake/outfall structures, has remained scoped out. Mitigation measures set out in Paragraph 12.6.11 of the Scoping Report[1] remain in place for the PEI Report. Chapter 2: Project description provides detailed information regarding the pumping station, intake/outfall structures and valves. Appropriate measures to avoid noise impacts through good design have been documented within Appendix 2.2: Draft commitments register and factored into the assessment.
National Grid	Noise is a by-product of National Grid's operations and is carefully assessed during the planning and construction of any of our equipment. Developers should consider the noise emitted from National Grid's sites or overhead lines when planning any developments, particularly housing. Low- frequency hum from substations can, in some circumstances, be heard up to 1km or more from the site, so it is essential that developers find adequate solutions for this in their	The operational noise from 132kV voltage overhead power line diversions has been assessed to determine likely significant effects. Further information can be found in Chapter 2: Project description. Where appropriate, mitigation measures have been identified in Section 14.8.

[1] The Scoping Report, Paragraph 12.6.11 states that '*As the pumps will be located on large concrete bases with suitable isolation, any vibration transmitted into the ground is likely to be negligible and at orders of magnitude lower than would be expected to give rise to nuisance or damage to properties. Pumps and other equipment at the inlet towers within the reservoir have the potential to generate noise emissions. However, these towers are located within the reservoir and over 1km from the nearest noise sensitive properties therefore, no significant effects are anticipated*'

Stakeholder	Scoping comment	Applicant response
	design. Further information about likely noise levels can be provided by National Grid.	
Oxfordshire County Council	In addition to the noise and vibration effects from construction noted, such effects on users of the public rights of way network should be included. It is welcomed that all noise and vibration effects from construction are scoped into the report. This is especially important due to the long-term nature of the works. It is also noted that a range of sensitive receptors have been identified for the purposes of the noise and vibration assessment. The applicant should also consider the users of public rights of way within their assessment.	External amenity areas and public open spaces, including Public Rights of Way, are considered sensitive receptors and noise and vibration effects on them have been assessed in the PEI Report.
Abingdon Town Council	The Thames Intake / Outfall construction will generate noise and vibration and is very close to major residential areas of South Abingdon. The Council would ask that this is scoped in, especially the impact of a Tunnel Boring Machine running 24 hours a day, as during the Cross rail construction there were instances of pauses to allow for securing property that had started to be adversely affected. Assessment is also needed on whether these vibrations in South Abingdon could cause damage to property and what is the maximum transmission distance from the route as we have a very high number of historic buildings in the town.	The construction Noise and vibration assessments have been undertaken to determine likely significant effects and likelihood of damage to sensitive receptors, including historic buildings and residential receptors located in the areas of South Abingdon. Where appropriate, mitigation measures to avoid likely significant effects have been identified in Section 14.8.
Sutton Courtenay Parish Council	The local construction impacts of noise, dust, air pollution and traffic disruption. This should include clarity on the rail and road access to the reservoir site, an assessment of the amount of freight to be imported and the quantity of construction-related	The construction Noise and vibration assessments have been undertaken to determine likely significant effects on sensitive receptors located in the areas of Sutton Courtenay Parish Council. Where appropriate, mitigation measures to avoid likely

Stakeholder	Scoping comment	Applicant response
	traffic and its impact on the already overloaded local transport network.	significant effects have been identified in Section 14.8,. The assessment in relation to traffic is provided in Chapter 12: Traffic and transport. The assessment for air quality is provided in Chapter 13: Air quality.

Non-statutory public consultation

14.3.4 Non-statutory public consultation on the emerging proposals for the Project was undertaken with stakeholders and local communities in Summer 2024. Formal responses to this non-statutory consultation feedback have been provided within the 'Statement of Response' (Thames Water, 2025). Any feedback relevant to the Noise and vibration assessment has been taken into account where appropriate.

Ongoing engagement

14.3.5 This section summarises the ongoing technical engagement for noise and vibration with key stakeholders since EIA scoping.

14.3.6 Table 14.3 provides a summary of the ongoing technical engagement for noise and vibration, including the issues raised and outcomes for the assessment.

Table 14.3 Key ongoing engagement for noise and vibration

Stakeholder	Topics	Outcome
South Oxfordshire District Council and Vale of White Horse District Council	South Oxfordshire and Vale of White Horse District Council have requested that they are consulted on baseline noise monitoring locations	Limited additional engagement has been undertaken since the Scoping Report, however, proposed baseline monitoring locations as included in the scoping document are presented in Figure 14.1: Noise and vibration study area, baseline features and measurement locations. Additional engagement will be undertaken with South Oxfordshire and Vale of White Horse District Council to discuss these locations prior to surveys taking place.
South Oxfordshire District Council and Vale of White Horse District Council	Assessment of effects to on-site temporary worker accommodation was originally proposed to be scoped in however is now proposed to be scoped out of the PEI report as it is an internal project design consideration. Local Authorities to be consulted to seek approval.	Additional engagement will be undertaken with South Oxfordshire and Vale of White Horse District Council to discuss this approach.

14.3.7 Important comments and actions arising from the South Oxfordshire District Council and Vale of White Horse District Council Environmental Protection Team during the Technical Liaison Group (TLG) meeting on 25 March 2024 are presented in Table 14.4.

Table 14.4 Scoping engagement key comments and actions

Consultee	Comment	Response / action taken
South Oxfordshire District Council and Vale of White Horse District Council	Proposed baseline noise monitoring locations to be included in the survey will be provided to South Oxfordshire District Council and Vale of White Horse District Council.	The proposed baseline noise monitoring locations are presented in Figure 14.1: Noise and vibration study area, baseline features and measurement locations. Prior to the survey being undertaken a meeting shall be held to discuss and agree the baseline noise monitoring locations with consultees.
	Noise and vibration mitigation measures to be outlined in the EIA Scoping Report, with details proportionate to the current design stage.	Potential construction and operational noise and vibration controls are discussed in Section 14.8 and in Appendix 2.2: Draft commitments Register.

14.4 Assessment methodology

14.4.1 The project-wide approach to the assessment methodology is set out in Chapter 4: Approach to the environmental assessment. This has informed the approach used in this Noise and vibration assessment.

14.4.2 This section outlines the methodology followed to assess the likely significant effects of the Project in relation to noise and vibration for this preliminary assessment, including:

- Effects scoped in to the assessment
- Study area
- Criteria for determining likely significant effects
- Assessment of cumulative effects
- Next steps

Scope of the assessment

14.4.3 The scope of the assessment has been informed by the EIA Scoping process, including the EIA Scoping Report (Thames Water, 2024) and Scoping Opinion (The Planning Inspectorate, 2024), combined with subsequent changes to the Project design and an enhanced understanding of the baseline environment.

14.4.4 Effects that are scoped in for the Noise and vibration assessment relevant to the construction phase are:

- On-site construction airborne noise
- On-site construction vibration

- On-site construction underwater noise
- Off-site construction road traffic noise and vibration
- Off-site railway noise and vibration
- Construction groundborne noise and vibration - At this stage no noise and vibration receptors have been identified within the study area that are sufficiently close to proposed works. As a result, no assessment of construction groundborne noise and vibration has been undertaken for the PEI Report; this will be reviewed at ES stage

14.4.5 Effects that are scoped in for the Noise and vibration assessment relevant to the operation phase are:

- Operational road traffic noise
- Operational noise from fixed installation (pumping station(s), intake/outfall structure, diverted 132kW overhead powerlines, etc.)

14.4.6 All construction matters are scoped in. Matters that are scoped out of the Noise and vibration assessment are documented within Appendix 4.1: Matters scoped out of the EIA, along with justification for this scoping approach. The operational matters scoped out are:

- Operational vibration from pumping station and intake/outfall structures
- Noise from the operation of valves during operation
- Operational noise and vibration from the flow of water within the underground pipeline
- Noise during emergency conditions in operation
- Noise from transformer substations in operation

14.4.7 Other chapters of this PEI Report draw on information presented in the Noise and vibration assessment. Disturbance to other species from noise and vibration are assessed separately within Chapter 6: Aquatic ecology and Chapter 7: Terrestrial ecology. Potential vibration to heritage assets is assessed in Chapter 8: Historic environment.

Study area

14.4.8 Separate study areas are defined for each effect type. This accounts for different sources, propagation, and receptor sensitivity. The study areas for noise and vibration have been defined following the standards and guidance listed in Section 14.2: Legislation, policy and guidance. This includes defining a distance to identify potentially affected receptors, performing predictions and expanding the distance until it is reasonably determined that all potentially affected receptors based on the defined effect criteria have been captured within the study area.

Construction noise and vibration

14.4.9 On the basis of the guidance set out in BS 5228-1, the study area for the construction airborne noise assessment is defined as a minimum of 300 metres (m) from any construction activity. Due to the potential for effects beyond this distance, the assessment also considers any receptor where the construction noise levels from the Project are forecast to give rise to potential effects.

14.4.10 The study area for the construction groundborne Noise and vibration assessment is 100m from any construction activity, or the area within which vibration levels from the Project is forecast to give rise to potential effects, whichever was the greater.

Construction road traffic noise and vibration

14.4.11 The construction traffic noise study area was defined as 50m from the carriageway edge of public roads with the potential for an increase in basic noise level (BNL) of 1dB(A) or more. These routes were determined on review of the data which was generated by the Transport and Movement Assessment. The procedure for calculating a BNL is set out by the Calculation of Road Traffic Noise (CRTN) document and relates to a noise level at a reference location 10m from the carriageway edge.

14.4.12 For construction traffic vibration, the study area was based upon guidance presented by TRRL (British Steel & General Steels, 1986), which indicates that a 'Heavy lorry on a poor road surface' would result in groundborne vibration (GBV) levels of less than 1 millimetres per second (mm/s) (peak particle velocity (PPV)) at a distance of approximately 2m and approximately 0.3mm/s at a distance of approximately 4m. The study area was defined as 4m from the carriageway edge of any route used by heavy goods vehicles (HGV). Chapter 12: Traffic and transport identifies potential routes that could be used by HGVs to access the construction sites.

Construction rail movement noise and vibration

14.4.13 The Department of Transport Memorandum 'Calculation of Railway Noise' 1995, highlights that noise predictions for distances greater than 300m may lead to progressive and significant error, but that "'*calculations can be extended outside the quoted ranges for cases where reduced accuracy can be accepted (e.g. for predicting changes in noise levels…)*'.

14.4.14 The construction railway noise assessment is based upon the assessment of the change in noise levels from an existing railway and therefore, because of the potential for effects beyond this distance, the assessment will also consider any receptor where the existing railway noise is the dominant noise source, and changes in railway movement may give rise to potential effects.

Operational noise

14.4.15 There is no current authoritative guidance on how far a noise study area should extend from operational noise sources. The study area required for operational noise sources largely depends upon when a source is operational (day or night-time) and the noise emission level from the source (a low noise emission level would have result in a smaller study area, than for a higher noise emission level).

14.4.16 It is anticipated that the most common receptor type with the potential to be affected by operational noise is residential. The study area includes, at least, the nearest residential receptors to the operational noise sources.

Operational road traffic noise

14.4.17 For operational traffic noise from any new or altered highway, DMRB LA 111 (Highways England, 2020) recommends a study area of 600m from the edge of the carriageway. Whereas, on the wider road network, LA 111 recommends a study area of 50m from the carriageway with the potential for an increase in BNL of 1dB(A) or more resulting from the introduction of a development. These recommendations for the study area from the roads were adopted.

14.4.18 No significant works to major roads or highways located outside the draft Order limits are anticipated as part of the Project and therefore the operational traffic noise study area of 300m from the draft Order limits is expected to capture all potential effects.

Methodology

Baseline

Data collection

14.4.19 Baseline data collection has been undertaken to obtain information for the study areas.

14.4.20 Ordnance Survey (OS) address point data, site visits and feedback from local authorities have been used to determine the location of noise sensitive receptors.

14.4.21 Strategic noise mapping (Extrium, 2025) has been accessed to attain the baseline levels of airborne noise from road, rail and aircraft. Noise surveys are used to attain baseline noise levels at sensitive locations and locations where strategic noise mapping data does not provide sufficient information.

Site surveys

14.4.22 Baseline noise surveys to support the strategic mapping data for the identified noise sensitive receptor areas close to the Project have not yet been completed. At this stage the assessment is based upon the most conservative assessment criteria. Surveys are ongoing and further detail will be provided to inform the ES. The baseline noise monitoring locations are shown in Figure 14.1: Noise and vibration study area, baseline features and measurement locations.

14.4.23 At this stage the Applicant has assumed that no existing appreciable level of vibration exists at any sensitive receptors within the study area. On this basis the PEI assessment is based upon the absolute vibration criteria at all receptors. If a vibration effect is identified at a receptor where there is a likelihood of an appreciable level of existing vibration (i.e. close the existing railway lines), baseline vibration surveys will be undertaken to inform the main ES assessment. Therefore, no baseline vibration surveys have been undertaken for the PEI Report.

Future baseline

14.4.24 The assessment has considered the likely evolution of the baseline without the implementation of the Project. The future baseline for the Noise and vibration assessment includes the following:

- Any relevant other developments expected to be operational prior to or during the construction and operation of the Project, including new noise or vibration sensitive receptors introduced by these developments.
- Any reasonably foreseeable changes to major sources of environmental noise including road, rail and aircraft.

14.4.25 The following data sources have been accessed to inform the future baseline with respect to noise and vibration:

- Reference to Chapter 20: Cumulative effects for the methodology used to prepare the list of other developments relevant to the future baseline
- Reference to Chapter 12: Traffic and transport for road traffic projections
- Civil Aviation Authority (CAA) Airspace change portal (31 July 2025)
- Defra Noise Action Plans (31 July 2025)

14.4.26 The construction traffic assessment has been based on the peak year of construction traffic (2036) that will occur for the Project.

Criteria for the assessment of significance

14.4.27 The methodology for assessing effects is based on the principle that the environmental effects of the Project, in relation to a receptor, are determined by identifying the receptor's sensitivity, and assessing the magnitude of impact the Project would have on the receptor. These two elements are then combined using professional judgement to identify the significance of effect.

14.4.28 Due to the assessment assumptions and limitations set out under paragraph 14.7.3, it has not been possible to confidently categorise the significance of each effect for this preliminary assessment of effects for noise and vibration. Instead, professional judgement has been used to determine whether effects are likely to be significant or not, and where appropriate, adopting a precautionary determination that effects are likely to be significant, where design, construction or baseline information that informs the assessment is still being developed. For ES a detailed assessment will be undertaken to identify impact category, compare the predicted levels to the relevant LOAEL and SOAEL values, and determine the likely significance of effects.

Assessment of sensitivity

14.4.29 For this assessment, a categorisation scale has not been used to determine receptor sensitivity. Instead, DMRB LA 111 (Highways England, 2020) and the IEMA 'Guidelines for Environmental Noise Impact Assessment' (IEMA, 2014) guidance state the levels of noise and vibration values above which certain types of receptors are likely to be sensitive to noise and vibration effects. These thresholds have therefore been used to screen into the assessment all relevant sensitive receptors, with significance of effect then being determined by the extent of increased noise and vibration that these receptors are subject to.

Magnitude of impact

14.4.30 This section defines the criteria for determining the magnitude of impact at residential receptors, and the threshold noise and vibration values used for screening non-residential receptors into the assessment of effects. To determine if an effect upon screened in receptors is considered significant, the factors identified in the 'significance of effect' section have been considered (see paragraphs 14.4.60 to 14.4.63).

14.4.31 The NPSE 2010 (Defra, 2010) introduced the concept of Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) values for noise. For the assessment of the Project, the aims of NPSE have been applied to both noise and vibration. The NPSE describes a LOAEL as the level above which adverse effects on health and quality of life could be detected, while a SOAEL is the level above which significant

adverse effects on health and quality of life occur. The NSPE 2010 also defines a No Observed Effect Level (NOEL), which is the level below which no effect could be detected.

Construction airborne noise

14.4.32 At this stage the construction assumptions for the Project are not sufficiently developed to undertake a quantitative assessment of construction airborne noise. Therefore, the qualitative assessment of these effects summarised in Section 14.9: Preliminary assessment of likely significant effects and Appendix 14.1: Preliminary assessment of effects for noise and vibration is based upon professional experience of construction airborne noise on similar schemes. The assessment took account of the proximity of receptors to proposed on-site works, the likely expected duration of the works (based on assumptions set out in Section 14.7: Project parameters, assumptions and limitations), the time of day when the works might occur (i.e. daytime or night-time) and the proximity of receptors to existing noise sources, such as the A34. All receptors within the study area were screened into the assessment.

14.4.33 The qualitative assessment of construction airborne noise for this preliminary assessment of effects has considered the qualitative criteria and thresholds detailed in Table 14.5 and Table 14.6 below; these will be used alongside modelling to inform the assessment for the ES.

14.4.34 Table 14.5 uses the example thresholds for potential significant effects at residential receptors from Table E.1 of BS 5228-1 (BSI, 2014a). Where required at the main ES stage, these noise thresholds would be adopted as the LOAEL values for the assessment of construction noise at residential properties. The Category C threshold values, or the ambient noise level, whichever is the higher, would be adopted as the SOAEL values for the ES assessment of construction noise at residential properties. During the day, evening or night, construction noise adverse effects on a receptor would be identified where the effect of the Project is greater than the relevant assessment category value.

Table 14.5 Construction airborne noise – threshold levels for LOAEL at residential receptors that would be applied at ES stage

Reference period	Threshold value dB $L_{Aeq,T}$ (façade) for LOAEL		
	Category A [A]	Category B [B]	Category C [C]
Weekday daytime (07:00-19:00) Saturdays (07:00-13:00)	65	70	75
Weekday evenings (19:00-23:00) Saturdays (13:00-23:00) Sundays (07:00-23:00)	55	60	65
Night-time (23:00-07:00)	45	50	55
NOTES Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.			

Reference period	Threshold value dB $L_{Aeq,T}$ (façade) for LOAEL		
	Category A (A)	Category B (B)	Category C (C)
Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values. Note 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total LAeq, T noise level for the period increases by more than 3dB due to site noise.			

14.4.35 The screening values that would be used to determine effects for typical categories of non-residential receptors at ES stage are set out in Table 14.6. Should other receptor types or unusual local circumstances be identified, reference would be made to noise criteria from the standards and guidance in Section 14.2: Legislation, policy and guidance.

Table 14.6 Construction airborne noise – screening criteria that would be applied at ES stage to determine if effects are likely on non-residential receptors

Receptor Type	Effect (Screening) criteria		Sources
	Day 07:00-23:00	Night 23:00-07:00	
Schools and colleges	50dB(1) $L_{Aeq,T}$ and a change of >3dB	-	BS 8233, EFA Acoustics Performance Standards, HTM 08 01, WHO Guidelines
Outdoor teaching spaces	55dB $L_{Aeq,T}$, with at least one area suitable for outdoor teaching where noise levels are below 50dB $L_{Aeq,T}$(2)	-	
Hospitals	50dB(1) $L_{Aeq,T}$ and a change of >3dB	45dB(3) $L_{Aeq,T}$ and a change of >3dB	
Hotels, care homes, nursing homes, places of worship and community facilities	As per the approach adopted for residential properties(4)		BS 5228-1
External Amenity Areas / Public open spaces	Total noise exceeds existing ambient ($L_{Aeq,T}$) by 5dB or more(5)	-	BS 5228-1

NOTES

1. Based on an internal level of 35dB $L_{Aeq,T}$ consistent with Education Funding Agency (EFA) and BS 8233. Equivalent external level assuming 15dB reduction for a partially open window.
2. Based on the $L_{Aeq,30min}$ noise criteria presented in the Institute of Acoustics / Association of Noise Consultants: Acoustics of Schools design guide.
3. Based on an internal level of 20dB $L_{Aeq,T}$ consistent with BS 8233, WHO guidelines. Equivalent external level assuming 15dB reduction for a partially open window.
4. BS 5228-1 states that the evaluation criteria are generally applicable to residential properties, hotels and hostels, buildings in religious use and buildings in health and/or community use. The SOAEL value for buildings in educational use shall be defined as set out in note (1).
5. BS 5228-1 advise that for public open space, the effect might be deemed to cause significant effect if the total noise exceeds the ambient noise ($L_{Aeq,T}$) by 5dB or more for a period of one-month or more. However, the extent of the area effected relative to effect causes a significant effect.

Construction groundborne noise and vibration

14.4.36 It is anticipated that construction groundborne noise and vibration[2] would be caused through construction of the proposed tunnels and other underground infrastructure features. At this stage no noise and vibration receptors have been identified within the study area that are sufficiently close to these proposed works. As a result, no assessment of construction groundborne noise and vibration has been undertaken for the PEI Report; the need for this will be reviewed as the design is developed for the ES.

14.4.37 If required at the main ES stage, the prediction and assessment of groundborne noise and vibration for the ES would be undertaken with reference to The Association of Noise Consultants publication, 'Measurement and Assessment of Groundborne Noise and Vibration' (Association of Noise Consultants (ANC), 2012).

14.4.38 The magnitude criteria for groundborne noise for the ES would be based upon current industry good practice, including assessments presented for projects such as High Speed 2. The LOAEL and SOAEL set out in Table 14.7 would be applicable to residential receptors.

Table 14.7 Construction groundborne noise LOAEL and SOAEL for residential receptors to be applied at ES stage if required

Time periods	LOAEL	SOAEL
All time periods	35dB L_{ASmax}	45dB L_{ASmax}

14.4.39 The following screening values will be applicable to determine sensitive non-residential receptors that would need to be included in the ES assessment of groundborne noise:

- Sound recording and broadcast studios – 30dB L_{ASmax}
- Places of meeting for religious worship, crematorium, courts, cinema, lecture theatres, museums and small auditoria or halls – 35dB L_{ASmax}
- Offices, schools, colleges, hospitals, hotels and libraries – 40dB L_{ASmax}

14.4.40 Where required at the main ES stage, vibration levels will be predicted at selected receptors within the study area based upon guidance presented in BS 5228-2, Table B.1, and Table 3.33 in DMRB LA 111 – noise and vibration Rev 2 (Highways England, 2020).

14.4.41 The vibration effect criteria (human response), reproduced from BS 5228-2, is presented in Table 14.8 and would be used during the ES to assess human response to vibration in occupied residential and occupied non-residential receptors, such as hotels, hospital wards, education dormitories, offices, schools and places of worship.

14.4.42 The criteria presented in this section includes minor corrections to those within the Scoping Report to bring it in line with the relevant guidance.

[2] See the following section for a discussion on construction vibration

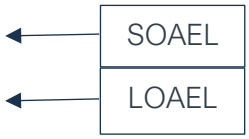
Table 14.8 Criteria on human response to vibration levels to be applied at ES stage if required

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

14.4.43 The construction vibration (human response) magnitude scale that would be applied at ES stage if required is presented in Table 14.9.

Table 14.9 Magnitude of impact and construction vibration (human response) descriptions to be applied at ES stage if required

Magnitude of impact	Construction vibration level (PPV)
Major	> 10mm/s
Moderate	> 1mm/s and ≤10mm/s
Minor	> 0.14mm/s and ≤1mm/s
Negligible	≤0.14mm/s



14.4.44 Table 14.10 defines construction vibration screening values / criteria to determine sensitive receptors, which are based upon conservative interpretation of the guidance from BS 7385-2 (BSI, 1993). The levels given represent guide values for the onset of cosmetic damage to buildings, as adopted for other similarly sized schemes and would be applied at ES stage if required.

[3] For residential receptors only

Table 14.10 Construction vibration screening values / criteria to prevent cosmetic damage[4] to buildings to be applied at ES stage if required

Category of building	PPVmm/s – at building foundation	
	Transient[5] vibration	Continuous[6] vibration
Potentially vulnerable buildings[7]	6	3
Structurally sound buildings (and toe of flood alleviation walls)	12	6

14.4.45 If required during the ES, predicted construction vibration levels will be used to assess disturbance to non-human species against criteria within Chapter 6: Aquatic ecology and Chapter 7: Terrestrial ecology.

Particularly vibration-sensitive equipment and processes – construction and operation

14.4.46 As noted in ISO 14837-1, there are no standard criteria for assessing the potential effect of vibration on sensitive equipment or processes. A risk assessment was undertaken for groundborne noise and vibration sensitive receptors within the study area based on the information provided by the building owner or equipment manufacturer. At this stage, no receptors which are considered to be particularly vibration-sensitive to equipment and processes have been identified in the study area. As a result, no assessment of groundborne vibration has been undertaken for the PEI Report; the need for this will be reviewed as the design is developed for the ES.

Construction underwater noise

14.4.47 At this stage the construction assumptions are not sufficiently developed to undertake a quantitative assessment.

14.4.48 Where required at the main ES stage, to estimate underwater noise levels likely to arise during the construction of the Project, a simple predictive noise modelling approach will be undertaken. The noise source most important to consider is impact piling due to the noise level and duration it will be present. The modelling approach would measure source data and perform empirical calculations of noise transmission loss and noise absorption loss around these sources.

14.4.49 As noted in paragraph 14.4.45, predicted construction vibration levels will be used to assess disturbance to non-human species against criteria presented within Chapter 6: Aquatic ecology and Chapter 7: Terrestrial ecology.

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[4] Cosmetic damage is defined in BS ISO 4866: 2010 (Mechanical vibration and shock - vibration of buildings - guidelines for the measurement of vibrations and evaluation of their effects on buildings) as '*The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction.'*

[5] Transient vibration relative to building response such as impulsive vibration from percussive piling.

[6] Continuous vibration relative to building response such as vibrating rollers.

[7] BS 7385 highlights that the criteria for aged buildings may need to be lower if the buildings are structurally unsound. The standard also notes that criteria should not be set lower simply because a building is important or historic (listed). Properties shall be considered structurally sound, unless stated otherwise.

Construction road and rail traffic noise on public routes

14.4.50 The magnitude of impact scale for noise from construction road and rail traffic at residential receptors, and the LOAEL and SOAEL values for residential properties, are set out in Table 14.11. These are based on Table E.1 in BS 5228-1:2009+A1:2014 (BSI, 2014a) and Table 3.16 and Table 3.17 in DMRB LA 111 - Noise and vibration, Rev 2 (Highways England, 2020). These criteria have been used in this preliminary assessment to inform our determination of magnitude of impact from construction road and rail noise.

Table 14.11 Magnitude of impact, and LOAEL and SOAEL for construction road and rail traffic noise

Magnitude of impact	Change in Basic Noise Level (BNL) resulting from construction traffic noise, dB $L_{A10,18hr\ façade}$		
	Where BNL is <55dB (LOAEL)	Where BNL is between LOAEL and SOAEL	Where BNL >68dB[8] (SOAEL)
Major	-	≥ 10.0dB	≥ 5.0dB
Moderate	-	≥ 5.0 and < 10.0	≥ 3.0 and < 5.0
Minor	-	≥ 3.0 and < 5.0	≥ 1.0 and < 3.0
Negligible	Any	< 3.0	<1.0

Construction railway noise and vibration

14.4.51 At this stage the construction assumptions are not sufficiently developed to undertake a quantitative assessment of construction railway noise and vibration, and the qualitative assessment presented in Section 14.9: Preliminary assessment of likely significant effects is based upon professional experience of similar schemes. The assessment took account of the proximity of receptors to proposed railway works, the likely expected duration of the works (based on assumptions set out in Section 14.7: Project parameters, assumptions and limitations), the time of day when the works might occur (i.e. daytime or night-time) and the proximity of receptors to existing noise sources. All receptors within the study area were screened into the assessment.

14.4.52 The approach to the assessment of construction noise and vibration resulting from rail movements is similar to that presented for construction road traffic. This was due to similar principles applying in terms of a linear noise source affecting sensitive receptors on an intermittent and temporary basis. Therefore, the receptor screening criteria within Table 14.11 would be applied for the ES stage assessment of construction railway noise.

14.4.53 Where required at the main ES stage, rail vibration predictions would be undertaken using a validated prediction model, which is compliant with the requirement of ISO 14837-1: 2005 (ISO, 2005) and is supplemented by precedent set by other major infrastructure schemes such as HS2. The criteria within Table 14.12, Table 14.13, Table 14.14, and Table 14.15 would be applied for the ES assessment when considering potential human response to vibration resulting from construction rail movements. The criteria would also be used when considering vibration from tunnelling activities.

[8] Equivalent to 66 dB $L_{Aeq,T}$

Table 14.12 Construction groundborne vibration, vibration dose value (VDV) criteria[9] for rail movements and tunnelling (human response) to be applied at ES stage – In the absence of appreciable existing levels of vibration - residential

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV	
	LOAEL	SOAEL
Residential	16h day: 0.2 $m/s^{1.75}$ 8h night: 0.1 $m/s^{1.75}$	16h day: 0.8 $m/s^{1.75}$ 8h night: 0.4 $m/s^{1.75}$

Table 14.13 Construction groundborne vibration, vibration dose value (VDV) criteria[9] for rail movements and tunnelling (human response) to be applied at ES stage – In the absence of appreciable existing levels of vibration – non-residential

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV
Hospice / care homes	16h day:0.2$m/s^{1.75}$ 8h night: 0.1$m/s^{1.75}$
Schools / activity centres / place of worship / offices	16h day: 0.4$m/s^{1.75}$
Industrial facilities	16h day: 0.8$m/s^{1.75}$

Table 14.14 Construction groundborne vibration, vibration does value (VDV) criteria[9] for rail movements and tunnelling (human response) to be applied at ES stage – In the presence of appreciable existing levels of vibration - residential

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), % increase or decrease in VDV	
	LOAEL	SOAEL
Residential	25%	100%

Table 14.15 Construction groundborne vibration VDV criteria[9] for rail movements and tunnelling (human response) to be applied at ES stage – in the presence of appreciable existing levels of vibration – non-residential

Category of building	Groundborne vibration effect levels(measured indoors near but not at the centre of floors), % increase or decrease in VDV
Hospice / care homes	25%
Schools / activity centres / place of worship / offices	40%
Industrial facilities	100%

[9] Source: HS2 (November 2013) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2.

Operational noise from fixed installations

14.4.54 At this stage the operational assumptions are not sufficiently developed to undertake a quantitative assessment of operational noise from fixed installations, and the qualitative assessment presented in Section 14.9: Preliminary assessment of likely significant effects is based upon professional experience of similar schemes. Fixed installations include, but are not limited to, noise from waste treatment works, pumps and valves, and the diverted 132kV overhead powerline. Suitable mitigation will be included within the Project to ensure that likely significant effects are avoided. It should be noted that at this stage no receptors have been identified within the study area of the diverted 132kV overhead powerlines.

14.4.55 If required for the ES, operational noise from fixed installations will be predicted using the ISO 9613 (ISO, 2024) calculation protocol. The magnitude scale that may be needed in the ES assessment of operational noise has been developed based upon guidance in BS 4142. The scale to be used for residential receptors, and those of a similar sensitivity, is presented in Table 14.16. Should other receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria such as those presented by BS 8233 and the WHO.

Table 14.16 Criteria for magnitude of impact of operational noise to be applied at ES stage

Magnitude of impact	Difference between background sound level ($L_{A90,T}$) and rating noise level ($L_{Ar,Tr}$) in accordance with BS 4142,dB(A)
Major	≥10dBA
Moderate	≥5 and <10dBA
Minor	≥0 and <5dBA
Negligible	>0 (i.e. less than background noise levels ($L_{A90,T}$)

14.4.56 LOAEL and SOAEL values have not been defined for operational noise.

Operational road traffic noise

14.4.57 Section 3 of DMRB LA 111 provides guidance on determining the magnitude of impacts for road traffic noise. Magnitude of impact is considered for both the short-term and long-term. This guidance has been applied to this preliminary assessment and will be used in the ES.

14.4.58 The classification of noise magnitude as set out in Table 14.17 is reproduced from Table 3.54a and Table 3.54b of LA 111.

Table 14.17 Magnitude of impact for all receptors (short-term and long-term[10]) – operational road traffic

Magnitude of impact	Short-term Noise Change (dB $L_{A10,18hr}$ or L_{night})	Long-term Noise Change (dB $L_{A10,18hr}$ or L_{night})
Major	≥ 5.0	≥ 10.0

[10] Table 3.54a and Table 3.54b of DMRB LA 111 (Highways England, 2020).

Magnitude of impact	Short-term Noise Change (dB $L_{A10,18hr}$ or L_{night})	Long-term Noise Change (dB $L_{A10,18hr}$ or L_{night})
Moderate	3.0 to 4.9	5.0 to 9.9
Minor	1.0 to 2.9	3.0 to 4.9
Negligible	Less than 1.0	Less than 3.0

14.4.59 NPSE provides further guidance on the effects of noise, introducing the observed adverse effect level categories. LOAEL and SOAEL considered for this assessment were defined in Table 14.18, which is reproduced from Table 3.49.1 of LA 111. These LOAEL and SOAEL are considered to apply to both dwellings and other noise sensitive receptors.

Table 14.18 LOAEL and SOAEL for residential receptors – operational road traffic

Time Period	LOAEL	SOAEL
Day (07:00 – 23:00)	55dB $L_{A10,18hr}$ (façade[11]) 50dB $L_{Aeq,\ 16h}$ (free-field[12])	68dB $L_{A10,18hr}$ (façade) 63dB $L_{Aeq,\ 16h}$ (free-field)
Night (23:00 – 07:00)	40dB $L_{night,outside}$ (free-field)	55dB $L_{night,outside}$ (free-field)

Significance of effect

14.4.60 As noted in paragraph 14.4.28, professional judgement has been used to determine whether effects are likely to be significant or not, and where appropriate, adopting a precautionary determination that effects are likely to be significant. For the ES a detailed assessment will be undertaken to identify impact category, and to compare the predicted levels to the relevant LOAEL and SOAEL values for that effect.

14.4.61 Where the predicted noise or vibration level would be anticipated to exceed the relevant SOAEL values, then a likely significant adverse effect has been reported for each receptor affected.

14.4.62 For residential receptors, likely significant effects (beneficial or adverse) were also determined on a community basis where the anticipated level may exceed the relevant LOAEL but was less than the relevant SOAEL values by taking account of the following factors where appropriate:

- Type of effect being considered (e.g. annoyance)
- The magnitude of the impact (i.e. the calculated noise or vibration level compared to the relevant LOAEL and SOAEL values and available dose - response information)
- Change in vibration level, where relevant
- The assessment category (i.e. airborne noise, groundborne noise or vibration)
- The existing sound environment in terms of the absolute level and the character of the existing environment

[11] Sound level that is determined 1 metre (m) in front of a window or door in a façade.
[12] The sound level which is measured or calculated, in the open, without any reflections from nearby surfaces except the ground.

- The number and grouping of receptors subject to noise effect and noise change
- Any unique features of the Project or the receiving environment (for example, any particular protected features, areas of tranquility or absence of existing transport noise)
- The potential combined effects of noise and vibration
- The frequency and duration over which temporary construction effects may occur
- The effectiveness of mitigation through design or other means

14.4.63 For non-residential receptors, significant effects were determined on a receptor-by-receptor basis taking into account the following factors where appropriate:

- The use and sensitivity of the receptor
- The type of effect being considered
- Whether the anticipated magnitude of noise or vibration may exceed the screening criteria
- The design of the receptor affected
- The existing ambient sound and vibration levels in the receptor affected
- The potential combined effects of noise and vibration
- Any unique features of the Project's sound or vibration effects in the area being considered (which may require secondary acoustic indicators / criteria)
- The frequency and duration over which temporary construction effects may occur
- The effectiveness of mitigation through design or other means

Assessment of cumulative effects

14.4.64 The cumulative effects assessment approach for both inter- and intra-project cumulative effects is broadly set out in Chapter 20: Cumulative effects. However, for this aspect further detail on the assessment process for inter-project cumulative effects is set out below.

14.4.65 If other projects proceed at nearby sites concurrently, the magnitude of any adverse impacts could increase when noisy activities take place simultaneously. The potential for these cumulative construction noise effects was assessed qualitatively.

14.4.66 The construction and operational road traffic information used as the basis of the assessment includes the construction movements associated with nearby sites working concurrently, and future developments. Therefore, in general, cumulative effects of the traffic changes from the Project and other developments within the study area were incorporated into the main assessment. In cases where a 'reasonably foreseeable' scheme may have a material effect on the operation of the transport networks in the vicinity of the Project (such as Dalton Barracks), subject to scoping discussions with highway authorities, separate transport modelling scenarios with and without these development/s will be undertaken for the ES to identify the cumulative effects.

14.4.67 The outcomes of the inter-project cumulative effects assessment are reported in Chapter 20: Cumulative effects. The intra-project cumulative effects assessment is summarised within Chapter 20: Cumulative effects, and within Chapter 20 signposts are provided to the location of the intra-project cumulative effects assessment (where it has been possible to provide at this stage).

14.5 Study area

14.5.1 The study area is defined according to the sensitivity of the receiving environment and the potential effects of the Project. The methodology used to define the study area is outlined in Section 14.4: Assessment methodology above.

14.5.2 The study area has changed since the EIA scoping stage as a result of changes to the design and the associated draft Order limits. See Chapter 2: Project description for details of the project parameters and assumptions for the PEI Report.

14.5.3 The combined study area used for noise and vibration is 300m from the draft Order limits. This is shown in PEI Report Figure 14.1: Noise and vibration study area, baseline features and measurement locations. More detail on the standards and guidance that were used to define this study area can be found in Section 14.4: Assessment methodology above.

14.5.4 The study areas are within two Local Planning Authorities, South Oxfordshire District Council and Vale of White Horse District Council and cover the following main residential settlement areas: Marcham, Abingdon, Culham, Sutton Courtenay, Drayton[13], Steventon, Harwell, Rowstock, East Hendred, Ardington, Grove, East Hanney, West Hanney and Frilford.

14.6 Baseline conditions

14.6.1 To assess the significance of effects arising from the Project in relation to noise and vibration, it is necessary to identify and understand the baseline environment within the study area. This provides a reference state against which any potential noise and vibration effects can be assessed.

14.6.2 This section outlines the existing and expected future baseline noise and vibration conditions in the study area.

Existing baseline

14.6.3 This assessment has considered the known receptors within the study area. Key existing noise and vibration baseline features are shown in PEI Report Figure 14.1: Noise and vibration study area, baseline features and measurement locations.

14.6.4 A desk-based review of the area surrounding the site has been undertaken. The site is predominantly rural with the following main residential settlement areas within the study area: Marcham, Abingdon, Culham, Sutton Courtenay, Drayton, Steventon, Harwell, Rowstock, East Hendred, Ardington, Grove, East Hanney, West Hanney and Frilford (see Figure 14.1: Noise and vibration study area, baseline features and measurement locations).

14.6.5 The acoustic environment of the study area is primarily characterised by road traffic noise, particularly along the A34 to the east of the site, the A338 to the west of the site and Marcham Road and Frilford Road to the north of the site. Hanney Road and Steventon Road pass through the south side of the site and will also define the existing acoustic

[13] Drayton includes the properties referred to in the Scoping Report as part of the community of Oday Hill.

environment. Additional noise sources include trains along the Great Western Main Line that crosses through the south of the site, between Steventon/Milton and Grove.

14.6.6 Defra strategic noise maps for the area show that the majority of the site experiences road and rail traffic noise levels below 55dB$L_{Aeq,16hrs}$ during the daytime and below 50dB$L_{Aeq,8hrs}$ during the night-time. Areas closer to the main roads (within approx. 700m of the A34, and approx. 200m of the A338, Marcham Road and Frilford Road) and rail lines (within approx. 400m of the Great Western Main Line) experience higher noise levels.

14.6.7 Noise Action Planning Important Areas (NIAs) are defined under the terms of the Environmental Noise (England) Regulations 2006 as locations in England where the top 1% of the residential population that are affected by the highest noise levels from individual transport sources - such as road and rail - are located. The NIAs were defined based on results of strategic noise mapping undertaken by Defra.

14.6.8 The following NIAs have been identified within the proposed study area as for road noise as part of the Round 3 Defra strategic noise mapping (see Figure 14.1: Noise and vibration study area, baseline features and measurement locations):

- Defra Important Area, NIA ID 13238
- Defra Important Area, NIA ID 13240
- Defra Important Area, NIA ID 14722

14.6.9 The following NIA has been identified within the proposed study area for rail noise as part of the Round 3 Defra strategic noise mapping (see Figure 14.1: Noise and vibration study area, baseline features and measurement locations): Defra Important Area, NIA ID RI_1342.

14.6.10 The vibration baseline is assumed to have no existing appreciable levels of vibration at any sensitive receptors within the study area due to their distances to sources which would have the potential to generate significant levels of vibration. If a vibration effect is identified at a receptor where there is a likelihood of an appreciable level of existing vibration (i.e. close to the existing railway lines), baseline vibration surveys will be undertaken to inform the assessment in the ES.

Future baseline

14.6.11 As set out in Chapter 4: Approach to the environmental assessment, the preliminary assessment of effects considers the likely evolution of the baseline without the implementation of the Project. Where climate change may alter future noise and vibration baseline conditions and therefore likely significant effects, this is discussed as part of the In-combination climate impacts (ICCI) assessment, which brings together all climate related impacts on aspect assessments and is presented in Appendix 18.3: In-combination climate change impact assessment. Note that expected future noise and vibration baseline conditions resulting from future climate conditions are not discussed here but are instead covered in Chapter 18: Climate resilience. The future baseline will be represented by taking into account any expected changes in noise sources as a result of other committed development or infrastructure that would occur without the implementation of the Project by its opening date. No other changes in noise sources are expected. Only sensitive receptors that would be in existence prior to the opening year of the Project are included in the assessment in the future year.

14.6.12 The future baseline for noise and vibration has included all the future developments that have been scoped into the Traffic and Transport assessment, detailed in Chapter 12: Traffic and transport. The following additional developments have provisionally been identified as part of the future baseline and are of relevance to the Noise and vibration assessment:

- Housing allocations at Dalton Barracks Garden Village (CP4a and CP8b of VOWH/SOCD Local Plan 2031) adds new noise and vibration receptors and potential traffic modifications for future road traffic noise
- Housing allocations at Monks Farm, North Grove (P16/V0981/O and P23/V1198/S73) adds new noise and vibration receptors
- Housing allocations to the north-west of Grove (P20/V3113/O) adds new noise and vibration receptors
- Housing allocations at Grove Airfield (P12/V0299/O) adds new noise and vibration receptors and potential traffic modifications for future road traffic noise
- Housing allocations at Monks Farm, North Grove (P16/V0981/O and P23/V1198/S73) adds new noise and vibration receptors
- Williams Racing, Grove (P25/V0648/SCR) adds new or more noise and/or vibration sensitive receptor use
- Housing allocations to the Valley Park, Didcot (P14/V2873/O) adds new noise and vibration receptors
- Land for Grove Railway Station adds traffic modifications for future road traffic noise
- Land for Abingdon South Bypass adds traffic modifications for future road traffic noise
- Housing allocations to the south-east of Marcham (P20/V1388/O) adds new noise and vibration receptors

Noise and vibration receptors considered in the Preliminary Assessment

14.6.13 Table 14.19 shows the Noise and vibration receptors in the study area that have been considered in the preliminary assessment for the PEI Report. In some cases, individual receptors have been grouped where anticipated effects and mitigation are likely to be very similar. The table identifies the area ID and effect ID(s) relevant to each receptor. The effect IDs are unique identifiers of each effect assessed (discussed further in Appendix 14.1: Preliminary assessment of effects for Noise and vibration), whilst the area ID relates to the spatial extent of the receptor assessed. Figure 14.1: Noise and vibration study area, baseline features and measurement locations shows the locations of receptors that have been spatially defined for the preliminary assessment for the PEI Report, with relevant Area IDs noted. Further data gathering to inform the ES will inform any revisions to the defined spatial extents of receptors.

Table 14.19 Receptors assessed in the preliminary assessment

Receptor Name	Effect-ID(s)	Area-ID
Abingdon (North and West) and Caldecott communities	NV-144	EIA-610
Abingdon (South East) residential properties on South Key, West Key, Marina Way and Lambrick Way; Open green space around Abingdon Marina Park	NV-145	EIA-608
Bradfield Barn, Old Mans Lane, Grove	NV-174	EIA-604
Challow community	NV-172	EIA-597
Community moorings at Abingdon Marina Park	NV-146	EIA-609
Culham community	NV-148	EIA-581
Drayton (Central) community	NV-152	EIA-583
Drayton (North) residential properties on Holly Lane, Willow Way, Walnut Way and Chestnut Drive; Open green space at Holly Lane play area	NV-150	EIA-582
Drayton (South) community	NV-153	EIA-586
Drayton (West) residential properties on Lyford Close, Hilliat Fields, Fisher Close, Whitehorns Way, Lockway, and west of Steventon Road; Non-residential properties including Drayton Village Hall	NV-151	EIA-584
Drayton Park Golf Club	NV-154	EIA-585
East Hanney (East) residential properties on Arthurs Close, Herman Close, Hunter Avenue, Lamble Walk and Stallwood Row; Open green space at Holmes Park Play Area	NV-177	EIA-605
East Hanney (South) residential properties on Franklin Gardens, Pullen Field and Davies Meadow	NV-175	EIA-598
East Hanney (West) community	NV-176	EIA-599
East Hendred community	NV-164	EIA-592
Frilford community	NV-182	EIA-601
Garford community	NV-181	EIA-600
Grove (North) residential and non-residential properties to the north of Station Road, Grove	NV-186	EIA-624

Receptor Name	Effect-ID(s)	Area-ID
Grove (West) residential properties on Barley Way, Corn Lane, Straw Acre, Wheatfields and Townsend; Grove cemetery	NV-170	EIA-595
Grove community	NV-168	EIA-593
Harwell community	NV-161	EIA-621
Marcham community	NV-141	EIA-580
Milton community	NV-160	EIA-620
Noise and vibration study area	NV-183, NV-184, NV-188	EIA-622
Pinmarsh, Grove Park Drive, Wantage	NV-167	EIA-603
Residential Properties on Church Lane, Steventon	NV-159	EIA-615
Residential and non-residential properties in Ardington and Ardington Wick	NV-165	EIA-617
Residential and non-residential properties on Oday Hill, Stonehill Lane, Drayton	NV-149	EIA-614
Residential properties at Barrow Farm, Faringdon Road, Abingdon	NV-143	EIA-613
Residential properties at Bradfield Grove Farm, Cow Lane, Grove	NV-173	EIA-612
Residential properties in Grove Park and Lockinge, Wantage	NV-166	EIA-618
Residential properties off Circourt Road	NV-171	EIA-596
Residential properties on Featherbed Lane, East Hendred	NV-163	EIA-616
Residential properties on Mill Road, Abingdon	NV-147	EIA-602
Residential properties on Mill Road, Marcham	NV-142	EIA-611
Residential property at Venn Mill, Garford	NV-179	EIA-606
Rowstock community	NV-162	EIA-591
South Oxfordshire Crematorium	NV-180	EIA-265
Steventon (Central) community including non-residential property at St Michael's CoE primary school	NV-156	EIA-588

Receptor Name	Effect-ID(s)	Area-ID
Steventon (North) community	NV-155	EIA-587
Steventon (South) community	NV-158	EIA-589
Steventon (South) residential properties on Vicarage Road and The Causeway; Non-residential property at St Michael and All Angels' Church	NV-157	EIA-590
West Hanney community	NV-178	EIA-619
Williams Racing F1, Grove	NV-169	EIA-594

14.7 Project parameters, assumptions and limitations

14.7.1 Chapter 2: Project description relies on the use of relevant parameters and assumptions to allow flexibility in the final design of the Project, in accordance with the Rochdale envelope approach (PINS, 2018). The preliminary assessment for the Noise and vibration aspect uses the parameters and assumptions outlined in Chapter 2: Project description as well as additional parameters and assumptions specific to this aspect to ensure that the reasonable worst-case scenario is considered within this assessment.

Project parameters and assumptions specific to this aspect

14.7.2 Table 14.20 identifies the Project parameters, components and activities relevant to this assessment where assumptions specific to the preliminary Noise and vibration assessment have been generated.

Table 14.20 Project parameters and assumptions forming the basis of assessment

Project parameter / component / activity	Assumption (basis of assessment)
Baseline	
Baseline noise levels	The impact derived through the construction noise assessment is dependent on the existing background noise levels. A reasonable worst-case assumption has been taken for the PEI Report to estimate the existing baseline noise levels by assuming no appreciable levels of existing noise at receptors unless areas have sound exposure shown in the strategic noise maps. With no appreciable levels of existing noise, the receptors are assumed to fall under the most sensitive noise category for the construction assessment, which is a reasonable worst-case assumption. If a noise effect is identified at a receptor where there is a likelihood of an appreciable level of existing noise (e.g. close to existing roads), baseline noise surveys will be undertaken to inform the ES as recommended in the noise guidelines from IEMA.
Baseline vibration levels	The impact derived from the vibration assessment is dependent on the existing vibration levels. A reasonable worst-case assumption has been taken for the PEI Report by assuming that the receptors are not exposed to existing appreciable levels of vibration. The impact has therefore been considered based upon the absolute criteria derived from relevant standards and guidance and described in Section 14.4: Assessment methodology, which is a reasonable worst-case assumption. If a vibration effect is identified at a receptor where there is a likelihood of an appreciable level of existing vibration (e.g. close to existing railway lines), baseline vibration surveys will be undertaken to inform the ES.
Construction	
Location	Based on the descriptions provided in Chapter 2: Project description, construction activities occurring within the draft Order limits and within 300m of noise sensitive receptors are assumed to take place at a location which represents the typical nearest location to any noise sensitive receptor; this is a reasonable worst-case assumption.

Project parameter / component / activity	Assumption (basis of assessment)
Sound power data	The assessment considers sound power level data for construction plant sources from BS 5228, manufacturer and survey data where available. This includes Continuous Flight Auger (CFA) piling for constructing the pumping station buildings, reservoir towers, access roads and the road crossing over the Wilts and Berks Canal and vibro-hammer sheet piling for constructing the Inlet/Outlet structure.
Plant, location and percentage on-times	Information relating to plant, locations, and on-times is still being developed. At this time, equipment such as 125 tonne excavators, 75 tonne dump trucks and piling rigs are likely to be used. Due to the potential for such large and noisy equipment, noise sensitive receptors within the study area are assumed to be exposed to construction noise and therefore have potential to experience a significant adverse effect. The construction assessment considers the combined noise levels of all construction activity.
Electric plant	As a reasonable worst case, the construction noise assessment does not assume the use of novel electric plant (such as excavators) which are typically quieter than traditional diesel-powered plant.
Construction phase assessed	High-level details of the construction programme and sequencing are provided in Chapter 2: Project description. At this stage, the programme does not identify when specific noise generating activities are likely to occur. Therefore, the assessment has assumed that all works other than minor off-site highway works and utility works will occur for one month or more. On this basis all works, other than those excluded, may result in a potential significant effect.
Working hours	High-level details of the construction programme and sequencing are provided in Chapter 2: Project description. The assessment is based on all construction activities occurring during the daytime, apart from the construction activities described in Chapter 2 that are likely to occur during the daytime and/or nighttime.
Overhead line	There are no noise and vibration sensitive receptors within the study areas for the proposed overhead line. The overhead line diversion is shown on Figure 2.1: Project Overview Plan.
Groundborne noise or vibration	There are no noise and vibration sensitive receptors within the study areas for the proposed construction works that could cause groundborne noise or vibration effects.
C road traffic vibration	There are no noise and vibration sensitive receptors within the study areas for the proposed construction traffic works that could cause vibration effects.
Flood defence assets	There are no existing flood defence assets within/close to the draft Order limits. Shared flood defences proposed to be constructed prior to SESRO construction are considered in the cumulative effects assessment.
Construction noise mitigation	

Project parameter / component / activity	Assumption (basis of assessment)
Standard good practice noise mitigation	At this stage, it is assumed that fencing at the edge of the draft Order limits and compounds will not provide noise screening. Construction noise mitigation for the assessment is provided as part of Best Practicable Means (BPM) on site for the control and management of construction noise. This includes local noise screening of stationary equipment as necessary to reduce adverse noise impacts. See Appendix 2.2: Draft commitments register for further detail.
Operation	
Substations and transformers	The Noise and vibration assessment has assumed 12 electricity substations sited around the toe of the dam. Each substation is up to 15m long, 6m wide and 4m high. Transformers, within the substations, have been assumed to be operational 24 hours a day, 7 days a week.
Generators and other emergency equipment	It has been assumed that the emergency equipment, such as generators and pumps, will be tested periodically during the daytime and they will be sufficiently designed, operated and maintained to avoid potential significant adverse effects on sensitive receptors.
Fixed mechanical plant	For fixed noise sources, such as the pumping stations and substations, it is assumed that they will be sufficiently designed, operated and maintained to avoid potential significant adverse effects on sensitive receptors. It is assumed that the fixed mechanical plant associated with the visitor centre buildings will be operational during the daytime only and will be shut down when not required. There are no noise sensitive receptors within the study areas for the proposed diverted 132kV overhead powerline.
Water Sports Centre, Nature Education Centre, Recreational Lakes Centre	At this stage, large scale events are not envisaged at these locations and therefore have not been considered in the Noise and vibration assessment.
Occupational noise	Noise from ancillary sources such as car parks, recreational areas, or informal public use (e.g. children playing) is assumed to occur in designated areas that are located and designed, operated and maintained to avoid potential significant adverse noise effects on sensitive receptors.

Assessment assumptions and limitations

14.7.3 This section identifies the aspect-specific assumptions and limitations for the preliminary Noise and vibration assessment including those related to the availability of data to inform the assessment and assumptions used in the methodology. The project specific assumptions are informed by the interim design at the time of the PEI Report, professional judgements, and experience from comparable projects. The assessment of effects in this chapter is preliminary and will be revisited and updated in the ES in light of design and construction information available at that time and the design taken forward for submission. The preliminary assessments reported within this PEI Report chapter are considered a reasonable 'worst case' as a precautionary approach has been taken where design, construction or baseline information is incomplete. Nevertheless, the preliminary

assessment is considered sufficiently robust to enable consultees to understand the likely significant environmental effects of the Project, based on current design information and understanding of the baseline environment. Gaps in information identified within the PEI Report will be considered and addressed as part of the assessment during the production of the ES, as noted in Section 14.10: Next steps. Assumptions and limitations identified in relation to the preliminary Noise and vibration assessment include:

- Baseline noise surveys for the identified noise sensitive receptor areas close to the Project have not yet been completed. At this stage the assessment is based upon the most conservative assessment criteria. Further detail will be provided to inform the ES.
- The assessment of construction noise and vibration has been undertaken on the basis that all works will be conducted in accordance with the principles and procedures set out in the Code of Construction Practice (CoCP). The CoCP will include a commitment to prepare a Noise and Vibration Management Plan (NVMP) prior to the commencement of construction. The NVMP will define requirements for noise and vibration monitoring to ensure compliance with agreed threshold levels and to provide early warning of any exceedances.
- The application of Best Practicable Means (BPM) is assumed as standard good practice mitigation for the control of construction noise. This includes the use of low-noise emission plant and construction processes, as outlined in Annex B of BS 5228 (noise sources, remedies, and their effectiveness).
- Additional, project-specific mitigation measures will be considered and reported in the ES once further detail is available regarding the proposed construction programme and logistics.
- No specific operational noise mitigation measures have been proposed at this stage for the PEI Report. However, potential operational mitigation options will be evaluated as the design progresses and will be incorporated into the Project where appropriate. These will be reported in the ES.

14.8 Embedded design mitigation and standard good practice

14.8.1 As described within Chapter 4: Approach to the environmental assessment, identified embedded design (Primary) mitigation and standard good practice (Tertiary) measures are assumed to be applied within this preliminary assessment, to reduce the potential for environmental effects.

14.8.2 Embedded design mitigation identified for the Project at this stage are noted in Chapter 2: Project description. These, and standard good practice measures to be applied, are described in greater detail within Appendix 2.2: Draft commitments register.

14.8.3 Table 14.21 and Table 14.22 list the embedded design mitigation and standard good practice measures applicable to the preliminary Noise and vibration assessment during construction and operation respectively, including the unique commitment IDs that relate to the Draft commitments register (where further detail on each can be referred to). The tables also state the purpose of each mitigation and the applicable securing mechanisms.

Table 14.21 Construction: Relevant embedded design mitigation and standard good practice measures, their purpose and the securing mechanisms

Embedded design mitigation or standard good practice measure (unique commitment ID)	Purpose of mitigation measure	Indicative securing mechanism
Apply measures including Best Practicable Means to reduce construction noise and vibration (SGP-25)	To avoid, mitigate and/or minimise adverse construction noise and vibration effects at receptors as far as practicable, and to ensure the Project will comply with legislation and the aims of national policy, as defined in Section 72 of the Control of Pollution Act 1974.	CoCP
Carry out construction works during standard working hours (where reasonably practicable) (SGP-26)	To avoid, mitigate and/or minimise adverse construction noise and vibration effects at receptors as far as practicable and to ensure the Project will comply with legislation and the aims of national policy.	CoCP

Table 14.22 Operation: Relevant embedded design mitigation and standard good practice measures, their purpose and the securing mechanisms

Embedded design mitigation or standard good practice measure (unique commitment ID)	Purpose of mitigation measure	Indicative securing mechanism
Mitigate noise emissions from reservoir infrastructure (ED-11)	To avoid, mitigate and/or minimise adverse operational noise effects at receptors as far as practicable and to ensure the Project will comply with legislation and the aims of national policy.	Under the terms of the DCO
Noise bunds (ED-44)	To avoid, mitigate and/or minimise adverse operational noise effects at receptors as far as practicable and to ensure the Project will comply with legislation and the aims of national policy. Creation of noise bunds can reduce road traffic noise levels.	Under the terms of the DCO

14.9 Preliminary assessment of likely significant effects

Introduction

14.9.1 This section summarises the findings of the preliminary assessment of effects for noise and vibration, focusing on key effects that are initially anticipated to be 'significant'. The judgement of significance has been made assuming that embedded design mitigation and standard good practice mitigation relevant to noise and vibration is applied (these are noted in Table 14.21 and provided in detail in Appendix 2.2: Draft commitments register). Nevertheless, the assessment assumes that additional mitigation that may reduce any

identified likely significant effects is not applied, as the viability, nature and extent of these are not confirmed at this stage in the EIA process. As a result, consideration of residual effects (those that remain after the implementation of *all* mitigation, including additional mitigation) has not been completed for this preliminary assessment; this will be undertaken in the ES. Additional mitigation that is being explored is presented in Section 14.10: Next steps.

14.9.2 As noted in paragraphs 14.1.6 and 14.1.7, assessments reported within this PEI Report chapter are considered a reasonable 'worst case' in line with the precautionary approach that has been taken. Where initial likely significant effects are identified at this stage, these may ultimately be determined as not significant in the ES once data gaps are addressed, and the design and mitigation are further developed. The next steps for the Noise and vibration assessment, including further exploration of relevant additional mitigation, are set out in Section 14.10: Next steps.

14.9.3 Appendix 14.1: Preliminary assessment of effects for noise and vibration, sets out the preliminary assessment of effects, receptor by receptor, for construction and operation phases respectively. The appendix is split into tables that list effects that are initially anticipated to be significant, and tables that list effects that are not anticipated to be significant. The tables identify the following for each effect:

- Receptor name, the Effect ID (a unique identifier for each effect)
- Project components and activities giving rise to the effect
- Relevant embedded mitigation and standard good practice mitigation (with unique Commitment ID, which relates to Appendix 2.2: Draft commitments register)
- Whether the effect is significant or not, and the direction of effect (adverse, beneficial or neutral), taking account of embedded design mitigation and standard good practice mitigation
- Description and duration of the effect
- Any additional mitigation and monitoring identified at this stage (with unique Additional Mitigation ID to enable cross reference to the measures noted in Section 14.10: Next steps)

Summary of significant construction effects

14.9.4 This section summarises the construction effects that are initially anticipated to be ‘significant’ through the preliminary assessment of effects for noise and vibration. It pulls out the key potential causes and receptors affected.

Key potential causes of effects

14.9.5 Chapter 2: Project description explains the construction components and activities for the Project. Key effects on noise and vibration receptors may result from the construction of the following:

- Site compounds, haul roads and temporary bridges or culverts
- Access roads
- The A34 Marcham Interchange and other highway improvements
- The Steventon to East Hanney Road diversion
- The intake/outfall structure on the River Thames
- The intermediate shaft and associated road upgrade

- The rail sidings and materials handling (RSMH) facility
- Modifications to the mainline to allow railway to allow exit west (switch and crossing)
- Site-wide utilities diversions and new supplies
- The western watercourse diversion (Cow Common Brook, Portobello Ditch, East Hanney Ditch and Landmead Ditch)

14.9.6 Various construction activities associated with these components could lead to effects on nearby receptors, including preparatory and enabling works, material excavation and handling, piling, materials stockpiling and off-site transport movements.

Key likely significant construction effects

14.9.7 As explained in Section 14.4: Assessment methodology, it has not been possible to confidently categorise significance of effects for this aspect of the PEI Report. Instead, effects on each receptor have either been determined as likely significant or likely non-significant on the basis of professional judgement for this preliminary assessment. These effects are typically expected to result from airborne noise causing a temporary disturbance to residential and non-residential receptors near construction areas. This is based on, amongst other things, the defined study area, the existing sound environment in terms of the absolute level and the character, the number and grouping of receptors potentially subject to noise effects, and the frequency and duration of the construction works.

14.9.8 Receptors that have been identified as having initial likely significant effects are:

- Abingdon:
  - residential properties on Mill Road, Barrow Farm, Faringdon Road
  - residential and non-residential properties on South Key, West Key, Marina Way, Lambrick Way and the open green space around Abingdon Marina Park
- Challow:
  - residential and non-residential properties on New Road, and Farringdon Road
- Culham:
  - residential and non-residential properties on The Green
- East Hanney:
  - residential properties on Franklin Gardens, Pullen Field and Davies Meadow
  - residential properties on Arthurs Close, Herman Close, Hunter Avenue, Lamble Walk, Stallwood Row and the open green space at Holmes Park Play Area
- Drayton:
  - residential and non-residential properties on Holly Lane, Willow Way, Walnut Way and Chestnut Drive; Open green space at Holly Lane play area
- Garford:
  - residential property at Venn Mill
- Grove:
  - residential properties off Circourt Road, Bradfield Grove Farm, Cow Lane, Bradfield Barn, and Old Mans Lane
  - residential and non-residential properties to the north of Station Road, Barley Way, Corn Lane, Straw Acre, Wheatfields and Townsend

  - Grove cemetery
- Marcham:
  - residential properties on Mill Road
- South Oxfordshire Crematorium
- Steventon:
  - Residential and non-residential properties on Prior Crescent, Fuller Way, Joyce Way, Ellway Road, Barnett Road, and on the northside of Hanney Road.

Summary of likely non-significant construction effects

14.9.9 This section summarises the justification for construction effects that are initially anticipated to be 'non-significant' through the preliminary assessment of effects for noise and vibration. In particular, it pulls out the key embedded design mitigation and standard good practice mitigation that will be applied and are anticipated to reduce adverse effects to be non-significant.

14.9.10 Receptors that have been identified as having initial likely non-significant effects are reported in Appendix 14.1: Preliminary assessment of effects for noise and vibration. These include residential, non-residential and community receptors.

14.9.11 Non-significant construction noise and vibration effects may result from the construction of any project components, including the following:

- Site compounds, haul routes and temporary bridges or culverts
- Access roads
- Site wide utilities diversions and new supplies
- River tunnel and shafts
- The intermediate shaft
- A34 Marcham Interchange and other highway improvements
- Intake/outfall structure
- Noise bunds
- Priority areas for biodiversity and planting
- Rail siding and material handling facility and modifications to the mainline
- Watercourse diversions

14.9.12 The effects associated with those works are typically considered on the basis of the study area, the existing sound environment, and the magnitude, frequency and duration of the construction impact.

14.9.13 Relevant standard good practice and embedded design mitigation include:

- Application of best practicable means to reduce construction noise and vibration
- Carry out construction works during standard working hours (where applicable)

Summary of likely significant operation effects

14.9.14 The preliminary assessment of effects for noise and vibration has concluded no likely significant effects during operation with the implementation of standard good practice and embedded design mitigation. Additional mitigation therefore is not anticipated to be required.

Summary of likely non-significant operation effects

14.9.15 This section summarises the justification for operation effects that are initially anticipated to be 'non-significant' through the preliminary assessment of effects for Noise and vibration. In particular, it pulls out the key embedded design mitigation and standard good practice mitigation that will be applied and are anticipated to reduce adverse effects to be non-significant.

14.9.16 Receptors that have been identified as having initial likely non-significant effects are reported in Appendix 14.1: Preliminary assessment of effects for noise and vibration. These include residential, non-residential and community receptors.

14.9.17 Non-significant operational noise and vibration effects may result from the operation of any project components, including the following:

- The pumping station
- Recreational lakes centre (including the visitor centre)
- Watersports centre
- Nature education centre

14.9.18 With the implementation of embedded design mitigation and standard good practice mitigation, no initial likely significant effects have been identified from noise and vibration relevant to the operation of the Project. This includes:

- Provision of noise bunds
- Mitigate noise emissions from reservoir infrastructure

14.10 Next steps

14.10.1 As part of next steps, the Project is proactively developing the design, refining the construction approach and continuing to define the environmental baseline, in conjunction with ongoing consultation and engagement. These activities will inform the EIA process and provide a robust evidence base for the ES. The aim is that where initial likely significant effects are identified at this stage, these may ultimately be determined as not significant in the ES once data gaps are addressed, and the design and mitigation proposals are further developed. Effects that remain after the implementation of all mitigation are referred to as 'residual effects'. These effects are not reported in the PEI Report as additional mitigation is not assumed to be implemented at this stage of the assessment. The assessment of the significance of residual effects after all mitigation is applied is a key outcome of the EIA process and will be reported within the ES, which will be submitted with the DCO application.

14.10.2 The next steps anticipated to be undertaken in relation to the Noise and vibration assessment prior to completion of the ES and submission of the DCO application are explained below.

Further exploration of additional mitigation

14.10.3 A key aspect of the next steps is to further explore additional mitigation that may reduce adverse effects that the preliminary assessment has initially identified as likely to be significant. Additional mitigation that has been identified for the Noise and vibration

assessment is noted against relevant likely significant effects in Appendix 14.1: Preliminary assessment of effects for Noise and vibration. All additional mitigation that has been identified in relation to the Noise and vibration assessment to date is listed below in Table 14.23 along with a description of what each measure entails. Each measure has a unique Additional Mitigation ID to enable cross reference between Appendix 14.1: Preliminary assessment of effects for Noise and vibration and Table 14.23. As noted previously above, the preliminary assessment presented in the PEI Report assumes that additional mitigation is not yet applied, as the precise nature and extent of any additional mitigation measures is not confirmed at this stage in the EIA process.

Table 14.23 Additional mitigation identified to date in relation to the Noise and vibration assessment

Additional mitigation ID	Additional mitigation name	Description of additional mitigation measure
AM-80	Additional measures to reduce noise and vibration	Further bespoke measures will be considered with the aim to reduce construction noise and vibration impacts where significant effects have been identified.

Other next steps

14.10.4 Other steps that are continuing or are planned to be undertaken to support the Noise and vibration assessment prior to completion of the ES and submission of the DCO application are noted below with an explanation of how these will inform the EIA process:

- Undertake detailed baseline noise surveys at identified nearby noise sensitive receptors to better understand the sensitivity of the receiving environment and to inform the evaluation of likely effects and the effectiveness of mitigation measures.
- Carry out a detailed construction Noise and vibration assessment following the methodology set out in Section 14.4: Assessment methodology, using the baseline data, responses to the PEI Report consultation, updated traffic data, and revised construction methods, construction programme, mitigation measures and assumptions. The assessment will enable robust prediction of impact, identification of likely significant effects, and effectiveness of additional mitigation measures.

References

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