HyNet North West Hydrogen Pipeline

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Chapter 10

Noise and Vibration

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Contents

10. Noise and vibration

10.1 Introduction

10.1.1 The Draft ES has been produced to fulfil the Applicant's consultation duties and enable consultees to develop an informed view of the likely significant effects of the Project.

10.1.2 This chapter presents the assessment of the likely significant effects of the Project with respect to noise and vibration based on the information obtained to date. Following consultation, the assessment will be updated for the Final ES that will accompany the DCO application for the Project.

10.1.3 This chapter should be read in conjunction with the project description provided in **Chapter 2: The Project** and with respect to relevant parts of the following chapters:

- **Chapter 5: Biodiversity;**
- **Chapter 6: Historic Environment;**
- **Chapter 8: Landscape and Visual**
- **Chapter 11: Traffic and Transport;** and
- **Chapter 14: Land Use**

10.1.4 This chapter describes:

- the legislation, policy and technical guidance that has informed the assessment (**Section 10.2**);
- consultation and engagement that has been undertaken and how comments from consultees relating to noise and vibration have been addressed (**Section 10.3**);
- the methods used for baseline data gathering (**Section 10.4**);
- overall baseline, including existing and future baseline (**Section 10.5**);
- embedded environmental measures relevant to noise and vibration (**Section 10.6**);
- the scope of the assessment for noise and vibration (**Section 10.7**);
- the methodology applied for the assessment (**Section 10.8**);
- the assessment of noise and vibration effects (**Section 10.9**);
- the assessment of cumulative (inter-project) effects (**Section 10.10**);
- a summary of the significance conclusions (**Section 10.11**);
- The identification of additional measures for mitigation (**Section 10.12**) and

- Next steps (**Section 10.13**).

10.1.5 This chapter is supported by the following appendices:

- **Appendix 10A: Summary of EIA Scoping Opinion and S42 Consultation responses for noise and vibration**
- **Appendix 10B: Baseline Noise Survey Report**
- **Appendix 10C: Construction Traffic data.**

Project overview

10.1.6 The Project includes the construction and operation of approximately 100km of new pipeline to distribute hydrogen to industry in the North West. A number of Hydrogen Above Ground Installations (HAGIs), including Block Valve Installations (BVIs) are required to control the flow and pressure of hydrogen at key points along the proposed pipeline.

10.1.7 The Project connects the Hydrogen Production Plant at the Stanlow site, as the source of hydrogen, for onward distribution to the network. The pipeline transports hydrogen to the Central Hub at the centre of the network, which then serves as the connection and onward distribution point to the North, East and South corridors, which would extend to St. Helens, Partington and Northwich respectively. Branching off from each main corridor would be pipeline spurs connecting hydrogen customers to the main pipeline. Infrastructure has also been included which supports the potential blending of hydrogen with methane in the existing gas network. The Project would also link to underground hydrogen storage facilities in Cheshire used to balance supply and demand through the network.

10.1.8 The presently anticipated maximum extent of land in which the Project may take place, which is assessed in this Draft ES, is defined by the 'Draft Order Limits', land within which is hereafter referred to as 'land within the Draft Order Limits'.

10.1.9 A proportionate degree of flexibility has been incorporated into the project design so that unforeseen issues that may be encountered following consent can be sufficiently mitigated. For example, previously unidentified poor ground conditions may require a pipeline section to be re-routed slightly for geotechnical reasons. Therefore, to allow for this, new infrastructure would be constructed within specified Limits of Deviation (LoD) which identify a maximum distance or measurement of variation within which the works must be constructed; further detail is provided on LoD in **Chapter 2: The Project**.

Limitations and assumptions

10.1.10 The information provided in this Draft ES chapter is subject to variation due to detailed design evolution following the appointment of the Engineering, Procurement and Construction (EPC) Contractor.

10.1.11 In particular, details regarding construction schedules and operational plant will be refined. The construction assessment for the Draft ES includes assumptions which

have been made for construction noise based upon information within **Chapter 2: The Project**.

10.1.12 The equipment list and schedules are indicative with the potential for amendments to be made during detailed design. However, to reflect these uncertainties, an evaluation of worst-case noise effects are presented within the Draft ES by establishing an assessment envelope. Any reasonable changes to the construction design should therefore be covered in terms of effect by the worst-case scenario. Furthermore, a commitment is proposed to ensure that the noise and vibration assessments are revisited following appointment of the EPC contractor to ensure that following detailed design, the noise and vibration effects are equal to or better than those assessed within this chapter.

10.1.13 A construction vibration assessment has not yet been undertaken as the equipment list is still to be finalised and will be presented in the Final ES.

10.1.14 The construction noise buffers are based upon a simple (hard-ground) propagation calculation and do not include for local ground effects, screening or topography. Therefore, these are very much worst case buffer distances, with the buffer distances for night-time period likely to be overestimated.

10.1.15 The construction noise assessment has been updated since the PEIR with the current trenchless crossings schedule. However, the building mapping used to identify the noise sensitive receptors where impacts are likely to be experienced does not identify the nature of buildings, therefore, the assessment likely includes non-sensitive buildings and includes them as a sensitive receptor. This assessment therefore overstates the construction noise effects in arriving at conclusions.

10.1.16 Open cut trenching has been assumed to be very temporary in nature as it affects any single receptor. A maximum length of time of 10 days in a rolling period of 15 days has been assumed.

10.1.17 Data on the proposed types of HGVs using the link roads is not yet finalised and so a worst-case sound power of 105 dB(A) has been applied to all vehicles (from Ref. 59 of Table D.3 of BS 5228-1:2008+A1:2014[1]).

10.1.18 The operational noise assessment has not been undertaken at this stage as source data is still being finalised. Whilst operational effects cannot currently be quantified, comments have been made where likely operational noise features are known (i.e. where there is, and is not, expected to be operational noise) to allow more comprehensive consultation feedback. Assessment of operational noise effects will be included in the Final ES.

10.1.19 Operational vibration will be negligible away from the pipeline and HAGIs, as vibration is detrimental to the operation of the infrastructure. The worst case operational vibration will be below the Lowest Adverse Observable Effect Level (LOAEL) at all sensitive receptors.

[1] British Standards Institute (2014) BS 5228: Code of Practice for noise and vibration control on construction and open sites. Part 1: Noise. London. BSI

10.2 Relevant Legislation, Planning Policy and Technical Guidance

10.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to noise and vibration. Further information on policies relevant to the Project is provided in **Chapter 4: Legislation and Policy Overview**.

Legislation

10.2.2 A summary of the relevant legislation is given in **Table 10.1**.

Table 10.1 Legislation relevant to the noise and vibration assessment

Legislation	Legislative context
Environmental Protection Act 1990[2] (as amended)	This Act sets out the duty for local authorities to investigate and, where identified, take abatement action against noise nuisance. The Act provides the definition of 'Best Practicable Means' (BPM) to minimise noise (including vibration), the basis for defence against noise abatement action taken by local authorities (Section 80). The Act also provides for individuals to seek for abatement action to be taken by a magistrate's court against noise nuisance (Section 82).
Control of Pollution Act 1974[3]	This Act provides the definition of BPM to minimise noise (including vibration), the basis for defence against noise abatement action taken by a local authority (Section 60). The Act also provides for, i) persons responsible to seek prior consent for works on construction sites including BPM steps to minimise noise and, ii) the basis for defining codes of practice for noise and vibration.
The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015[4]	This order, enacted under the Control of Pollution Act 1974, details that BS 5228: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration) are the approved codes of practice for noise and vibration at construction and open sites under the act.

[2] UK Government (1990). The Environmental Protection Act 1990 (Online). Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents/made (Accessed 22 July 2024).
[3] UK Government (1974). The Control of Pollution Act 1974 (Online). Available at https://www.legislation.gov.uk/ukpga/1974/40/contents/made (Accessed 22 July 2024).
[4] UK Government (2015). The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015 (Online). Available at https://www.legislation.gov.uk/uksi/2015/227/contents (Accessed 22 July 2024).

Legislation	Legislative context
The Planning Act 2008[5]	In respect of noise nuisance, the Act confers the defence of statutory authority against proceedings for nuisance unless there is a provision in a granted Development Consent Order (DCO) to the contrary.
Environmental Noise (England) Regulations 2006, as amended[6]	The regulations require regular noise mapping and the production of Noise Action Plans for the management of noise. These regulations also provide the legal means by which 'Quiet Areas' and noise 'Important Areas' are defined and protected.
Noise Insulation Regulations 1975, as amended[7]	Sets out the eligibility criteria for noise insulation from upgraded highways schemes. These regulations are also utilised for criteria regarding construction traffic noise (although not used for the purposes of eligibility).

Planning policy

10.2.3 There are a number of national policies that may be relevant to the Project. Under Section 105 of the Planning Act 2008 the Secretary of State will decide how much weight to give to the National Policy Statements. Those relevant to the Project are the overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4).

10.2.4 Other national and local policies may also provide additional guidance on this environmental topic and could be considered material to the consideration of this Project. Policy potentially relevant to the Project and to this environmental topic is summarised within **Table 10.2.**

[5] UK Government (2008). Planning Act 2008 (Online). Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents/made (Accessed 22 July 2024).
[6] UK Government (2006). The Environmental Noise (England) Regulations 2006 (Online). Available at: https://www.legislation.gov.uk/uksi/2006/2238/contents/made (Accessed 22 July 2024).
[7] UK Government (1975). The Noise Insulation Regulations 1975 (Online). Available at: https://www.legislation.gov.uk/uksi/1975/1763/contents/made (Accessed 22 July 2024).

Table 10.2 Planning policy relevant to the noise and vibration assessment

Policy	Policy context
National planning policy	
Overarching National Policy Statement for Energy (EN-1), 2023[8]	Where noise impacts are likely to arise from the proposed development, the applicant should include: • A description of noise generating aspects of the proposal; • Identification of noise sensitive receptors possibly affected; • The characteristics of the existing noise environment; • A prediction of how the noise environment will change – in the short and long term, and throughout the day; • An assessment of effects on noise sensitive receptors; • An assessment of underwater or subterranean noise, where applicable; and • Steps taken to mitigate adverse effects. The nature and extent of the noise assessment should be proportionate to the likely noise impact. Applicants should consider the noise impact of ancillary activities associated with the development. Applicants should also assess operational noise in respect to human receptors, according to the relevant British Standards. The applicant should consult the EA and/or the SNCB, and other relevant bodies, such the MMO or NRW, as necessary, and in particular regarding assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be considered. In the marine environment, applicants should consider noise impacts on protected species, as well as other noise sensitive receptors, both at the individual project level and in-combination with other marine activities. • Applicants should submit a detailed impact assessment and mitigation plan as part of any development plan, including the use of noise mitigation and noise abatement technologies during construction and operation.

[8] Overarching National Policy for Energy Infrastructure (EN-1) November 2023. DESNZ. Available from: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf (accessed June 2024).

Policy	Policy context
National Policy Statement for Oil and Gas Supply and Storage (EN-4), November 2023[9]	Attention should be paid to Section 5.12 of EN-1. Applicants need to identify all the noise and vibration sensitive receptors likely to be affected during the pre-construction and construction phases. Applicants should also consider any associated pipeline maintenance or protection that may be additionally required. As well as noise and vibration receptors, applicants also need to assess all potential noise and vibration impacts, such as those from HGV movements, site clearance, tunnelling, and pipelaying and welding, etc. The commissioning of a new pipeline can involve extensive periods of drying after hydrotesting, using air compressors and noise mitigation may be required for this type of activity. Above ground installations associated with new gas pipelines should be located outside of protected landscape areas wherever possible.
National Planning Policy Framework (NPPF), December 2023[10]	Provides overarching policy on the prevention of adverse effects from noise, requiring the avoidance of significant adverse impacts on health and the quality of life. It states in paragraph 191 that, *'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 sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:* a) *'mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'* (Cross-referencing the Noise Policy Statement for England)...and…. b) *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

[9] National Policy Statement for natural gas supply infrastructure and gas and oil pipelines (EN-4) November 2023. DESNZ. Available from: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf (accessed June 2024).
[10] DLUHC (2023) National Planning Policy Framework (NPPF). Available from: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf (Accessed May 2024).

Policy	Policy context
Noise Policy Statement for England (NPSE), March 2010[11]	Sets out the long-term vision of Government noise policy, i.e. in Paragraph 1.6 to *'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.'* The NPSE vision is supported by aims to effectively manage and control environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development by avoiding significant adverse impacts, mitigating and minimising adverse impacts and contributing to the improvement of health and quality of life. In paragraph 2.20, the policy describes the toxicology concepts to identify "significant adverse" and "adverse" impact in line with the three aims of NPSE: • No Observed Effect Level (NOEL): This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; • Lowest Observed Adverse Effect Level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected. Extending these concepts for the purpose of this NPSE leads to the concept of a Significant Observed Adverse Effect Level (SOAEL); and • SOAEL; This is the level above which significant adverse effects on health and quality of life occur. Where an impact lies between LOAEL and SOAEL all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur. In paragraph 2.22, the NPSE notes that *"it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

[11] Department for Environment, Food and Rural Affairs (DEFRA) (2010). Noise Policy Statement for England.

Policy	Policy context
Planning Practice Guidance-Noise (PPG-N), 2019[12]	Provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. It references the toxicological hierarchy of noise stating that noise above the SOAEL should be avoided and includes an additional level of Unacceptable Adverse Effect level (UAEL), upon which noise should be prevented from occurring. PPG-N also references a list of policy, standards and guidance document and notes that whilst numerical criteria are included, *'These values are not to be regarded as fixed thresholds and as outcomes that have to be achieved in every circumstance.'*
Local Planning Policy	
St Helen's Council[13]	Although the Design Supplementary Planning Document references noise in respect of design of new communities, no planning document associated with St Helen's Council has policies specific to noise and vibration in the context of this Project.
Cheshire West and Chester Council Adopted Development Plan, 29 January 2015	The Adopted Plan encompasses a set of local planning policy documents, the relevant documents for noise are included below.
Cheshire West and Chester Council Local Plan (Part One): Strategic Policies, January 2015[14]	Policy SOC 5 on health and wellbeing states that: *'Development that gives rise to significant adverse impacts on health and quality of life (e.g., soil, noise, water, air or light pollution, and land instability, etc) including residential amenity, will not be allowed.'* Policy ENV 7 on alternative energy supplies states that *'The Local Plan will support renewable and low carbon energy proposals where there are no unacceptable impacts on […] Noise, air, water, highways or health.'*

[12] Ministry of Housing, Communities & Local Government (2019). Planning Practice Guidance. Noise.
[13] St Helens Borough Council (2024) Design SPD. Available from: https://www.sthelens.gov.uk/media/8238/Design-Supplementary-Planning-Document/pdf/Design_SPD_April_2024.pdf?m=1714134638210 (Accessed May 2024).
[14] Cheshire West And Chester Council (2015) Local Plan (Part One) Strategic Policies. Available from: https://consult.cheshirewestandchester.gov.uk/kse/event/24907/section/3252243 (Accessed May 2024).

Policy	Policy context
Cheshire West and Chester Council Local Plan (Part Two): Land Allocation and Detailed Policies, January 2015[15]	Provides further detail on the assessment and management of noise in relation to Policy DM30 – Noise: ***'13.13** […] In considering the impact of noise, regard should be had to the World Health Organisation Guidelines for Community Noise and the latest British Standards (or their recognised replacement) for both internal and external noise levels. In line with Local Plan (Part One) policy SOC 5, the protection of health (mental and physiological) and prevention of interference with speech communication is a consideration in assessing planning applications. As such, the relaxation of indoor criteria is not considered appropriate, and generally internal levels can be achieved through design and insulation measures.'* ***'13.17** Noise from construction or demolition works as part of a development can be intrusive or disruptive to local businesses and/or noise sensitive land uses and regard should be had to the latest British Standard, or its recognised replacement. In all instances where alternative working methods exist, the minimisation of noise and vibration shall be a prime consideration in the choice of technique and equipment used. For this reason, construction or demolition activities should be restricted to daytime periods and have fixed start and finish times i.e. 08.00 to 18.00 hours Monday to Friday, and 08.00 to 18.00 hours on Saturdays, with no works being permitted on Sundays or Bank Holidays, unless it can be clearly demonstrated that they will not cause unacceptable disturbance to noise sensitive receptors. The location of any site compound must be submitted to and approved by the Council's Environmental Protection team, to ensure that it is appropriately situated in order to minimise the noise impact on neighbouring residential uses.'*
Cheshire West and Chester Council, Supplementary Planning Document: Oil and Gas Exploration, Production and	Supplementing the policies in the Local Plan, providing advice for applicants, and decision makers. The document refers back to Local Plan Strategic Policies in addition to identifying noise as a "key issue" in Paragraph 5.5: *'Where development is proposed, a noise impact assessment should be submitted. The Council's Environmental Protection team have identified that the starting point is that onshore oil and gas development should not result in an unacceptable rise in background noise levels as measured as an $L_{90dB(A)}$ at the nearest sensitive receptors. The noise impact assessment should demonstrate that the noise levels as a result of the development shall*

[15] Cheshire West and Chester Council (2019) Local Plan (Part Two) Land Allocations and Detailed Policies. Available from: https://consult.cheshirewestandchester.gov.uk/kse/event/34617/section/5428432 (Accessed May 2024).

Policy	Policy context
Distribution, May 2017[16]	*be 5dB(A) or more below the measured background level at the nearest facade of the residential property when measured as a rating level in accordance with British Standard BS4142:2014. In the event that the appropriate level cannot be achieved without mitigation, applicants should carry out detailed investigations and submit appropriate levels of mitigation, including details of the noise output, and the provision of purpose designed attenuation for all noise generative plant and equipment.'* The document also requires the noise impacts from flaring or venting to be taken into account and minimised. Within 5.28, the document considers cumulative impact arising from the interactions between minerals, waste and other developments, stating '*The potential cumulative impacts of oil and gas developments (including both simultaneous and sequential development) and the way they relate to existing developments must be addressed to an acceptable standard as part of a planning application. Applicants must consider the interaction with other existing developments in the area such as housing, and impacts on existing surrounding uses and planned development.'*
Cheshire East Council Local Plan Strategy, 27 July 2017[17]	The Cheshire East Local Plan Strategy 2010-2030 was adopted on 27 July 2017. It sets out the overall vision and planning strategy for development in the borough and contains planning policies to ensure that new development addresses the economic, environmental and social needs of the area, including the protection from noise impacts. Policy SE 8 "Renewable and Low Carbon Energy" states "2. Weight will be given to the wider environmental, economic and social benefits arising from renewable and low carbon energy schemes, whilst considering the anticipated adverse impacts, individually and cumulatively upon:[…] ii. Residential amenity including […] noise… 3. Appropriate mitigation measures to address any effects identified and considered (for all low carbon and renewable schemes) will be required prior to any development proceeding."
Cheshire East Council, Site Allocations and	The SADPD l forms the second part of the Council's local plan, providing further detailed planning policies and site allocations to support the strategic policies and sites contained in the Local Plan Strategy.

[16] Cheshire West and Chester Council (2017) Oil and Gas Exploration, Production and Distribution SPD. Available from: https://consult.cheshirewestandchester.gov.uk/kse/event/29390/section/ (Accessed May 2024).
[17] Cheshire East Council (2017) Local Plan Strategy 2010-2030. Available from: https://www.cheshireeast.gov.uk/pdf/planning/local-plan/local-plan-strategy-web-version-1.pdf (Accessed May 2024).

Policy	Policy context
Development Policies Document (SADPD) December 2022[18]	
Cheshire East Council, Environmental Protection Supplementary Planning Document Consultation Draft October 2021[19]	This document adds further detail to the policies in the development plan and is used to provide guidance for development on specific sites, or on particular issues. It also provides details regarding NPSE levels of adverse effect, what should be included in a NIA and references specific standards for different types of development (included where relevant within this chapter), examples on mitigation techniques, standard construction hours. It states: *"6.11 In the context of government policy, Cheshire East Council requires that developments aim for: 1. A noise level between the No Observed Effect Level (this is the level of noise exposure below which no effect at all on health or quality of life can be detected) and the Lowest Observed Adverse Effect Level (this is the level of noise exposure above which adverse effects on health and quality of life can be detected). Conditions may be attached to achieve this level. If point 1 cannot be achieved, then: 2. If the assessment results in a level between the Lowest Observed Adverse Effect Level and the Significant Observed Adverse Effect Level (this is the level of noise exposure above which significant adverse effects on health and quality of life occur), mitigation will be necessary to reduce the level and thus conditions will be attached to achieve this reduced level. If points 1 & 2 cannot be achieved, then: 3. If the assessment results in a Significant Observed Adverse Effect Level after mitigation, the application will be recommended for refusal.* *6.23 Noise from construction or demolition work can be intrusive and disruptive to local business and noise sensitive land uses. For this reason, construction/demolition activity should be restricted to daytime periods and have clearly defined start and finish times. It is usually recommended that all noisy works (audible beyond the site boundary) are restricted to the following: 08.00 to 18.00 Monday - Friday 09.00 to*

[18] Cheshire East Council (2022) Site Allocations and Development Policies Document. Available from: https://www.cheshireeast.gov.uk/planning/spatial-planning/cheshire_east_local_plan/site-allocations-and-policies/sadpd-examination/documents/examination-library/adopted-sadpd.pdf (Accessed May 2022).)
[19] Cheshire East Council (2024) Environmental Protection SPD. Available from: https://www.cheshireeast.gov.uk/pdf/planning/spatial-planning/spds/environmental-protection-supplementary-planning-document.pdf (Accessed June 2024).

Policy	Policy context
	14.00 on Saturday No work to be undertaken on Sunday or Bank Holidays"
Halton Borough Council Local Plan 2014 – 2037, Revised Core Strategy Policies and Delivery and Allocations Publication Document, 2017[20]	Provides high level policy guidance on the identification of impacts on the environment, including noise pollution and requirement for mitigation. Policy GR5: "Renewable and Low Carbon Energy 1" states "*Development proposals for renewable energy developments will need to take into account, and minimise where appropriate, the potential environmental effects of the development on:* *a. Residential / workplace amenity* *[…] d. The natural and built environments* *e. Any heritage assets and their settings* *[…] h. The amenities of sensitive neighbouring uses (including by virtue of noise, dust, odour or traffic)"*
Halton Borough Delivery and Allocations Local Plan (incorporating Partial Review of the Core Strategy): Proposed Submission Draft, May 2019[21]	Sets out the planning policies and land allocations to guide decisions on the location, scale and type of development and changes in the way land and buildings are used. Includes policy HE7 which states: "*Where risks for pollution and nuisance are identified, planning permission will be granted for development providing: […] b. Noise nuisance is not likely to cause a significant increase in ambient noise levels for either day or night time conditions."*
Warrington Borough Council Local Plan - 2021-22 - 2038-39 - Adopted	The noise pollution section focuses on consideration for noise and acoustic mitigation during early stages of design, having regard for layout, siting and internal features. Development proposals generating noise which is likely to create significantly adverse impacts on health and quality of life and which cannot be mitigated and/or controlled

[20] Halton Borough Council (2017). Revised Core Strategy Policies and Delivery and Allocations Publication Document (Online). Available at: https://moderngov.halton.gov.uk/documents/s47370/DALP%2028June17.pdf.pdf (Accessed 29 July 2024).

[21] Halton Borough Council (2022) Halton Delivery and Allocations Local Plan. Available from: https://www3.halton.gov.uk/Documents/planning/planning%20policy/newdalp/DALP%20Adopted.pdf (Accessed May 2024).

Policy	Policy context
December 2023[22]	through the use of conditions or through pre-existing effective legislative regimes, will not be permitted
Trafford Council Local Plan Core Strategy, January 2012[23]	Once adopted, the Local Plan will replace the following Development Plan documents: • The Trafford Core Strategy (adopted January 2012) and • The Revised Trafford Unitary Development Plan (adopted June 2006). Policy L5 on climate change states that: *"Development that has potential to cause adverse pollution (of air, light, water, ground), noise or vibration will not be permitted."* Policy 7 on design, protecting amenity states: *"In relation to matters of amenity protection, development must:* *• Be compatible with the surrounding area; and* *• Not prejudice the amenity of the future occupiers of the development and/or occupants of adjacent properties by reason of overbearing, overshadowing, overlooking, visual intrusion, noise and/or disturbance, odour or in any other way."*

Technical guidance

10.2.5 A summary of the technical guidance for noise and vibration is given in **Table 10.3**.

Table 10.3 Technical guidance relevant to the noise and vibration assessment

Technical guidance document	Context
BS 4142:2014 + A1:2019 Methods for rating and assessing	Describes methods for rating and assessing sound of an industrial nature, such as from factories, industrial premises or fixed installations affecting people who might be inside or outside a dwelling.

[22] Warrington Borough Council (2023) Warrington Local Plan 2021/22 – 2038/39. Available from: https://www.warrington.gov.uk/sites/default/files/2023-12/Warrington%20local%20plan%20-%202021-22%20-%202038-39%20-%20Adopted%20December%202023.pdf (Accessed May 2024).
[23] Trafford Council (2012) Trafford Local Plan Core Strategy. Available from: https://www.trafford.gov.uk/planning/strategic-planning/docs/core-strategy-adopted-final.pdf (Accessed May 2024).

Technical guidance document	Context
industrial and commercial sound [24]	
BS 5228-1:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise[25]	Provides a recommended scope, calculation procedure, example mitigation and assessment methodologies for construction and demolition noise. Annex E gives example threshold values for significant effects at noise sensitive receptors based upon the results of ambient sound monitoring and absolute levels.
BS 5228-2:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration[26]	Provides a recommended scope, calculation procedure, example mitigation and assessment methodologies for ground-borne vibration associated with activities such as demolition and construction. Annex B.2 provides guidance of the effect of vibration levels on people.
British Standard (BS) 7445:2003 Description and measurement of environmental noise[27]	BS 7445:2003 provides the framework within which environmental noise should be quantified. Part 1 provides a guide to quantities and procedures, Part 2 a guide to the acquisition of data pertinent to land use and Part 3 provides a guide to the application of noise limits. The standard also refers to BS EN 61672 'Electroacoustics: Sound Level Meters Specifications' (2013), which prescribes the equipment necessary for such measurements.
Calculation of Road Traffic Noise (CRTN)[28]	Provides a calculation methodology for road traffic noise.
Design Manual for Roads and Bridges	Presents a methodology for determining impacts on noise sensitive receptors from changes in road traffic noise due to road projects.

[24] British Standards Institute (2019). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI; London.
[25] British Standards Institute (2014). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1 - Noise. BSI; London.
[26] British Standards Institute (2014). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2 - Vibration. BSI; London.
[27] British Standards Institute (1988). BS 7445-1:2003 Description and measurement of environmental noise. Part 1: Basic quantities and procedures. BSI; London.
[28] Department for Transport (DfT) (1998). Calculation of Road Traffic Noise. HMSO; London.

Technical guidance document	Context
LA111: Noise and Vibration (DMRB)[29]	
BS 4142:2014 +A1:2019 Technical Note[30]	Provision of guidance and clarifications for British Standard.
Guidelines for Environmental Noise Impact Assessment[31]	Presents guidelines on how the assessment of noise effects should be presented within the EIA process. The IEMA guidelines cover aspects such as: scoping, baseline, prediction and example definitions of significance criteria.
ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation[32]	Defines a method for calculating the attenuation of sound during propagation outdoors, to predict the levels of environmental noise at distance. There has been an updated 2024 version published, but SoundPlan modelling software not yet updated to accommodate this change.
Guidelines for Community Noise[33]	Provides guidelines and recommendations for protecting health, giving internal and external guideline values.
Night Noise Guidelines for Europe[34]	Provides guidelines and recommendations for health protection during the night-time period.

[29] Highways England (2019). Design Manual for Roads and Bridges, LA 111 – Noise and Vibration (Revision 2) (Online). Available at: https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364 (Accessed September 2024).
[30] Association of Noise Consultants (2020). BS 4142:2014 + A1:2019 Technical Note. (Online). Available at: https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2020/07/ANC-BS-4142-Guide-March-2020.pdf (Accessed September 2024).
[31] Institute of Environmental Management and Assessment (2014). Guidelines for Environmental Noise Impact Assessment. IEMA; London.
[32] International Organization for Standardization (1996). ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors: Part 2 General Method of Calculation. ISO; London.
[33] World Health Organization (1999). Guidelines for community noise. WHO; Geneva.
[34] World Health Organization (2009). Night noise guidelines for Europe. WHO; Copenhagen.

Technical guidance document	Context
Environmental Noise Guidelines for the European Region[35]	Analysis of exposure – response relationship related to specific noise sources and provision of guidelines for levels to protect human health.

10.3 Consultation and engagement

Overview

10.3.1 The assessment has been informed by consultation responses and statutory and technical engagement. An overview of the approach to consultation is provided in **Section 3.7** of **Chapter 3: Approach to preparing the Draft ES**.

Scoping Opinion

10.3.2 A Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 08 March 2022. A summary of the relevant responses received in the Scoping Opinion in relation to noise and vibration and confirmation of how these have been addressed within the assessment is presented in **Appendix 10A**.

Statutory Consultation

10.3.3 Statutory consultation took place between 12 September and 10 November 2022 in accordance with the Planning Act 2008. Prescribed and non-prescribed consultees and members of the public were consulted. Various methods of consultation and engagement were used in accordance with the Statement of Community Consultation (SoCC) including letters, website, public exhibitions, publicity and advertising in newspapers and webinar briefings.

10.3.4 The Applicant prepared a Preliminary Environmental Information Report (PEIR) which was publicised at this consultation stage. The Applicant sought feedback on the environmental information presented in that report. Feedback received during statutory consultation was considered by the Applicant and incorporated, where relevant into the design of the Project and its assessment and is presented in this Draft ES.

10.3.5 A summary of the relevant responses received in relation to statutory consultation, together with any subsequent discussions held with regard to noise and vibration

[35] World Health Organization (2018). Environmental Noise Guidelines for the European Region. (Online). Available at: https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf (Accessed September 2024).

and confirmation of how these have been considered within the assessment to date is also presented in **Appendix 10A**.

10.3.6 Technical engagement with consultees in relation to noise and vibration is ongoing.

10.4 Data gathering methodology

Study area

10.4.1 The project GIS viewer was used to view open-source mapping to identify noise sensitive receptors (NSRs) closest to the proposed HAGIs with noise generating plant and within a study area of 500m from these installations. A list of examples of the receptors considered as NSRs (and vibration sensitive receptors) within the assessment is presented in **Table 10.7.**

10.4.2 Baseline sound monitoring was conducted across 11 locations using long-term unattended surveys. These were considered to be representative of the NSRs closest to the proposed HAGIs and will be used to inform the operational noise assessment in the Final ES.

Desk study

10.4.3 A summary of sources of data used in the generation of this chapter, together with the nature of that data is outlined in **Table 10.4**.

Table 10.4 Data sources used to inform the noise and vibration assessment

Source	Date	Summary
Cadent	January 2023	Indicative construction plant lists and % on-times for use in construction noise assessment
WSP	July 2024	Traffic flows as provided by the appointed Transport Consultant for use in the construction traffic assessment.
BS 5228-1/2: 2009+A1:2014 (British Standard Institute, 2014a and 2014b)	December 2020	Plant noise data for construction noise and vibration predictions
GIS information	August 2024	Project mapping incorporating ordnance survey base mapping.

Survey work

10.4.4 A summary of the baseline sound monitoring locations is presented in **Table 10.5.** The monitoring locations are shown in figures within **Appendix 10B Baseline noise survey report.**

Table 10.5 Baseline sound monitoring locations

Project Element	Monitoring Position	Location	X and Y Coordinates	Survey Duration
Stanlow HPP HAGI	ST1	Cryers Lane, Elton, Chester	**X**:345022 **Y**:374641	23/03/2023 11:30 - 30/03/2023 12:15
Rocksavage HAGI	RS1	Weaver Sailing Club, Frodsham	**X**:352818 **Y**:378811	23/03/2023 13:30 - 30/03/2023 13:15
North of Central Hub HAGI	CH1	Marsh Lane, Dutton, Warrington	**X**: 360266 **Y**: 378417	23/03/2023 14:30 - 30/03/2023 14:00
East of Central Hub HAGI	CH2	Marsh Lane, Dutton, Warrington	**X**: 360551 **Y**: 377975	20/04/2023 14:17 - 26/04/2023 10:17
South of Higher Walton HAGI	HW1	Bellhouse Lane, Warrington	**X:** 358493 **Y:** 385276	27/04/2023 10:22 - 02/05/2023 14:22
East of Higher Walton HAGI	HW2	Mill Lane, Walton, Warrington	**X:** 359162 **Y**: 385405	20/04/2023 12:56 - 26/04/2023 09:56

Project Element	Monitoring Position	Location	X and Y Coordinates	Survey Duration
East of Runcorn HAGI	RC1	Cholmondeley Road, Runcorn	**X**: 352493 **Y**: 380277	20/04/2023 15:08 - 26/04/2023 09:23
South of Warburton HAGI	WB1	Barns Lane, Dunham Massey	**X:** 372325 **Y**: 388438	20/04/2023 11:00 - 26/04/2023 13:00
North of Inovyn Hydrogen Storage Facility HAGI	IV1	A530, Northwich	**X**: 369498 **Y**: 369989	20/04/2023 12:00 - 26/04/2023 11:15
North of Partington HAGI	PT1	Common Lane, Carrington	**X**: 373085 **Y**: 391787	27/04/2023 11:39 - 02/05/2023 12:54
South of Partington HAGI	PT2	Heath Farm Lane, Partington	**X**: 372649 **Y**: 391031	27/04/2023 12:12 - 02/05/2023 13:27

10.4.5 Sound levels were measured using integrating averaging sound level meters (SLMs) conforming to Class 1 as defined by BS EN 61672-1:2013[36]. The SLMs were field calibrated before and at the end of each survey period by applying an acoustic calibrator, to the microphone to check the sensitivity of the measuring equipment. No significant drift in calibration levels was noted upon collection at any location.

10.4.6 At each location a SLM was deployed to measure for intervals of 15 minutes in accordance with BS 4142:2014 + A1:2019, which states: 8.1.3 Ensure that the measurement time interval is sufficient to obtain a representative value of the

[36] British Standards Institution (2023) BS 61672 – Electroacoustics. Sound level meters. Parts 1 to 3. London: BSi.

background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15-minute intervals, which can be continuous or disaggregated'.

10.4.7 The SLM was set up in accordance with BS 4142:2014 + A1:2019 and BS 7445-1:2003. The microphones were mounted to a height of approximately 1.5m above ground level and no less than 3.5m from any reflecting surface other than the ground.

10.4.8 A meteorological station was deployed in conjunction with the noise monitoring equipment, also set to 15-minute intervals, so the data were concurrent and available for data analysis. The meteorological station monitored local wind speeds and direction, precipitation, and air temperature during the ambient and background sound monitoring surveys. The results of the meteorological surveys were used in the analysis of the ambient and background sound data to ensure that only data collected under appropriate weather conditions was used in defining the baseline sound levels. This approach is advocated within BS 4142:2014 + A1:2019 and BS 5228-1:2009 + A1:2014.

10.4.9 Additional construction noise surveys will be undertaken when the pipeline LoD is finalised following Stage 3 statutory consultation. This will be reported in the Final ES. However, in lieu of these additional baseline noise surveys, predicted noise levels within this Draft ES have been assessed against criteria in the form of absolute levels taken from BS 5228-1:2009 + A1:2014. The Standard describes the 'ABC method' for assessing construction noise, demonstrating how assuming low existing noise levels below the absolute criteria at receptors can form the basis for a worst-case assessment (i.e. baseline noise survey data would only make criteria less stringent).

Data limitations

10.4.10 Adverse weather prevented a long term survey at Clock Face HAGI, therefore this site is scheduled for a resurvey in order to be able to design the HAGI appropriately. All other locations delivered suitable data. The datasets were all collected at a time where traffic profiles were considered representative.

10.4.11 Baseline noise surveys at receptors closest to the construction works have yet to be undertaken and will be completed for the Final ES where required. However, in the absence of this information, this is likely to result in an overestimation of effects where construction works are close to major roads and railways. This can increase the requirement for mitigation at these higher baseline noise receptors by 5 or 10 dB due to the relaxation in the construction noise assessment criteria accounting for higher baseline noise levels.

10.5 Overall Baseline

Current baseline

10.5.1 The land use in the noise Study Area, which also encompasses the vibration Study Area, is predominantly agricultural, however it does also include areas of high density development, both of an industrial and residential nature.

10.5.2 The baseline ambient noise levels at CH1, CH2 and WB1 were generally of a low magnitude and typical of rural areas.

10.5.3 The baseline ambient noise levels at ST1, RS1, HW1, HW2, RC1 and IV1 were higher due to the proximity of the locations to transport routes such as A5117, M56, Chester – Warrington railway line, A56, A557 and A530.

10.5.4 At some locations, RS1, HW1, PT1 and PT2 the baseline ambient noise levels were also affected by nearby leisure, commercial and industrial noise, such as sailing club, caravan storage facility, golf swing practice area, factory, and construction site.

10.5.5 The background sound levels and residual ambient levels are summarised in **Table 10.6**.

Table 10.6 Baseline Sound Survey Results

Project Element	Monitoring Position	Day (07:00-23:00)		Night (23:00-07:00)	
		Representative Background Level, L_{A90}	Residual Ambient Noise Level $L_{Aeq,T}$	Representative Background Level, L_{A90}	Residual Ambient Noise Level $L_{Aeq,T}$
Stanlow HPP HAGI	ST1	51	59	49	53
Rocksavage HAGI	RS1	51	57	43	51
North of Central Hub HAGI	CH1	37	48	29	39
East of Central Hub HAGI	CH2	37	49	35	43

Project Element	Monitoring Position	Day (07:00-23:00)		Night (23:00-07:00)	
		Representative Background Level, L_{A90}	Residual Ambient Noise Level $L_{Aeq,T}$	Representative Background Level, L_{A90}	Residual Ambient Noise Level $L_{Aeq,T}$
South of Higher Walton HAGI	HW1	38	57	34	51
East of Higher Walton HAGI	HW2	43	54	29	46
East of Runcorn HAGI	RC1	51	57	41	48
South of Warburton HAGI	WB1	39	48	29	36
North of Inovyn Hydrogen Storage Facility HAGI	IV1	46	54	32	49
North of Partington HAGI	PT1	42	51	32	36
South of Partington HAGI	PT2	37	48	29	36

Future baseline

10.5.6 The future baseline sound climate is not anticipated to change for the majority of areas through which the Project runs.

10.5.7 Where new industrial or residential development occurs within the small zone of influence of the Project, local sound levels would be expected to increase and/or change in character if these uses were new to the area.

10.5.8 There may be a small increase in noise levels, as a result of natural traffic growth, close to more major roads. A small decrease in sound levels in the medium to long term could occur near roads with traffic speeds below about 20km per hour as a result of a move to a higher proportion of electric cars.

10.6 Embedded environmental measures

10.6.1 As part of the project design process, a number of embedded environmental measures are proposed to reduce the potential for impacts on noise and vibration. Embedded environmental measures must be in place during construction. These measures are generally regarded as industry standard or best practice.

10.6.2 The Draft Outline CEMP (provided in **Appendix 3B** of this Draft ES) details the best practice methods to be adopted during the construction phase and will include measures to reduce noise and vibration impacts.

10.6.3 Construction traffic vibration has the potential to give rise to adverse impacts where heavy vehicles pass close to roadside residential receptors, on lightly trafficked roads that do not normally carry heavy vehicles. Impacts typically only occur where the road surface is in poor condition. Highway condition surveys will be undertaken before, during and after the construction phase and repairs conducted to any damage to highways, as a result of construction HGVs on the highways related to the Project, and secured via the Outline Construction Traffic Management Plan (CTMP; see **Appendix 11B**). This commitment is included within this chapter as it minimises the risk from vibration effects at residences from HGVs passing over holes in the road, close to residential receptors.

10.7 Scope of the assessment

10.7.1 The scope of the assessment has been refined as the project design has evolved and responds to feedback received to date as set out in **Section 10.3**.

Spatial scope

Spatial scope: construction

10.7.2 For construction site works, all NSRs within a 300m radius from any construction activity have been considered. All NSRs within the extent of identification of significant effects has also been considered where this is beyond 300m radius. This distance is based on the validity of the calculation procedure in BS 5228-1,

professional judgement, and other recent major infrastructure projects, such as HS2 and the HyNet Carbon Dioxide Pipeline Project, in which this spatial scope has been agreed. This is considered a robust spatial scope for the assessment.

10.7.3 For construction traffic noise, the spatial scope has been determined by **Appendix 10C Construction Traffic** where an increase or decrease in road traffic volumes or traffic types on road links generated by the construction of the Project warranted consideration as detailed within pages 21 and 22 of DMRB[13].

10.7.4 Reference may be made to potential receptors outside of the Study Areas defined above, such as receptors of special interest (such as designated tranquil areas or precision engineering premises). Where this is the case, those potential receptors will also be considered as part of the noise and vibration assessment.

Spatial scope: operation

10.7.5 The Study Areas for operation are limited to the areas around the HAGIs that are considered to have the potential to generate noise during operation. There will be no noise associated with the operation of the buried pipeline itself, as pipework and valves that are buried will not give rise to significant levels of noise above ground.

10.7.6 Operational BVIs do not have valve bodies or large stretches of exposed pipework above ground and so these have been scoped out.

10.7.7 The geography to which the Study Area extends has been defined depending on the type of plant expected at the installation. HAGIs including metering units and/or Pressure Reduction Units (PRUs) and/or pigging facilities have the potential for adverse noise impacts. A Study Area of 500m from these installations is proposed, based on scoping distances used for facilities for transportation of carbon dioxide, which have similar noise generating plant and plant layouts.

10.7.8 The activities associated with the operation of the Project do not generate significant off-site vibration levels. There is no rotating or reciprocating machinery to give rise to vibration associated with out-of-balance forces. Vibration from pipework that could be perceivable beyond the perimeter of the facilities is highly unlikely because of the necessity to minimise vibration in order to maintain pipe and valve integrity, which are critical in a hydrogen transport facility.

10.7.9 The operation of the Project does not generate significant levels of traffic. Therefore, operational traffic noise and vibration has been scoped out of assessment.

Temporal scope

10.7.10 The temporal scope of the assessment of noise and vibration is consistent with the period over which the Project would be carried out. Construction is currently proposed to commence with site establishment and pipeline construction between 2027 and 2029. Operation of the Project will commence in 2030, following commissioning.

Temporal scope: construction and commissioning

10.7.11 Site-based construction noise and vibration emissions for the Project have been assessed at a point and a time when the maximum plant is in use. For the linear pipe burying works, that same approach will be taken.

10.7.12 Where the pipes cross major roads, railways and other transport infrastructure, there will likely need to be overnight works during construction, to minimise daytime closures of these assets.

10.7.13 Works may take place 24 hours a day to support the construction of trenchless crossings, particularly in relation to pipe drying and testing operations.

10.7.14 For all other construction elements of the Project, as stated in **Chapter 2: The Project**, it is assumed that construction work would be limited to daytime hours but would take place six days per week. Construction noise and vibration for the relevant activities and time periods will be assessed in the Final ES.

10.7.15 Noise from road traffic associated with construction has been assessed using the peak traffic flow on each road link. This means that the worst case development traffic predictions have been assessed.

10.7.16 The assessments have been undertaken at single points in time, however, consideration is also given to the duration of the effects, that is to say that, the magnitude of effect also needs to consider the length of time that receptors will be exposed to noise or vibration. For example, some construction effects may last for days whereas some others may last for months.

Temporal scope: operation

10.7.17 As described in **Chapter 2: The Project**, The Project is planned to be operational by Q2 2030 for an initial period of circa 40 years.

10.7.18 During operation, the flow of gas through the HAGI infrastructure will be continuous and as such, sound levels produced by the HAGI will vary little, except when specific intrusive maintenance activities are occurring, e.g. pigging.

10.7.19 The only other operational noise would be associated with periodic attendance at site by personnel to carry out checks or maintenance, which would occur throughout the operational lifetime of the Project.

10.7.20 The HAGIs will generally be operated remotely from a central control room located off-site. The frequency of periodic maintenance undertaken on-site has yet to be determined but would typically include the following:

- Routine checks undertaken over approximately one hour per week.
- Maintenance undertaken over approximately one day, per year.
- Major maintenance undertaken over approximately one week, every two to five years.
- Pipeline inspection operations (‘pigging’) undertaken over approximately one week and undertaken every 1 to 5 years. Inspection operations involve an

internal examination of the pipe undertaken by a 'pig', an inline inspection tool, which travels inside the pipeline from one HAGI to the next.

- Infrequent breakdown or urgent visits with access on a 24 hours per day, 7 days per week basis, as required.

10.7.21 The above site visits would involve a limited number of staff, arriving at site in cars or vans. Heavy vehicles would generally only be required in the event of replacement of large items of equipment. On very rare occasions, equipment may need to be changed as a result of routine updating or failure.

10.7.22 Details of maintenance regime will be confirmed and approved as part of the DCO. Noise generation from such activities will be addressed through the selected mechanism.

Temporal scope: decommissioning

10.7.23 As described in **Chapter 2: The Project**, decommissioning of the Project would likely involve removing the hydrogen and leaving the pipeline in situ; thus avoiding removal and associated potential environmental effects. This would typically involve plugging the pipeline at intervals and stabilisation of major crossings including rail, road and watercourse crossings by grout filling where required. All above ground facilities including HAGIs and BVIs would be removed. The sequence of decommissioning these elements would be the reverse of the construction sequence (as described in **Section** of **Chapter 2: The Project**) and would likely involve the application of similar construction plant and methods.

10.7.24 Therefore, decommissioning will have a similar, but shorter overall temporal scope with respect to the construction of the Project. A separate Demolition Environmental Management Plan, which will include noise and vibration monitoring and mitigation requirements would be prepared and followed at this later stage.

Potential receptors

10.7.25 The principal noise and vibration receptors that have been identified as being potentially subject to effects are summarised in **Table 10.7**.

Table 10.7 Noise and vibration receptors subject to potential effects

Receptor	Reason for consideration
Residential – e.g. hotels, residences (including caravans and canalboat permanent moorings), including private gardens where appropriate	'Receptors within the Study Area of the Project have the potential to experience a change as a result of the Project and potentially adverse noise and/or vibration effects.

Receptor	Reason for consideration
Community services – e.g. schools (during daytime periods), medical establishments, places of worship	Users of the services, occurring within the Study Area of the Project, have the potential to experience adverse noise and/or vibration effects as a result of the Project.
Commercial – e.g. offices, retail, entertainment venues and eateries, leisure facilities	These sites, occurring within the Study Area of the Project, have the potential to experience adverse noise and/or vibration effects as a result of the Project.
Leisure areas – e.g. local nature reserves, Public Rights of Way, Canal towpaths.	These sites, occurring within the Study Area of the Project, have the potential to experience adverse noise and/or vibration effects as a result of the Project.
Terrestrial ecology – e.g. designated sites include Special Protection Areas and Sites of Special Scientific Interest	These sites and species have the potential to experience adverse noise and/or vibration effects as a result of the Project and are reported in **Chapter 5: Biodiversity**.
Historic environment – e.g. scheduled monuments, listed buildings	These sites and buildings have the potential to experience adverse noise and/or vibration effects as a result of the Project and are reported in **Chapter 6: Historic Environment**.

10.7.26 With respect to the information set out in **Section 10.10** potential receptors are identified based on their location relative to the Project components. The majority of potential receptors are residential dwellings.

10.7.27 Considering guidance set out in EN-1, residential receptors are ‘medium’ sensitivity with respect to noise and vibration. Receptors that are highly sensitive are those that include receptors within vulnerable subgroups, such as medical establishments

10.7.28 For construction noise, a significant impact, as determined in accordance with BS 5228 part 1, would also be a significant effect within this assessment. For operational noise a significant effect is concluded if the initial estimate of impact is confirmed as significantly adverse following the contextual assessment in BS 4142.

10.7.29 The nearest sensitive receptors to construction and operational elements of the Project have been identified within this chapter as being representative receptors. Representative receptors are receptors that are typically the most affected receptor, within a community of receptors. Such that where significant effects are avoided at the representative receptor, they are avoided at all receptors within the assessed community. Specific community receptors such as medical or

educational establishments within the Study Area will be assessed even if they are further away than the nearest residential receptors.

Likely significant effects

10.7.30 The effects on noise sensitive receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 10.8**

Table 10.8 Summary of effects scoped into the noise and vibration assessment

Activity	Likely significant effects	Receptor
Construction		
Activities from site construction works resulting in noise from works within 300m of sensitive receptors or vibration from works within 100m of sensitive receptors	Potential for significant effects from: Noise at trenchless crossing sites. Noise from various activities at temporary construction compounds. Noise and vibration due to impact or vibro-piling. Noise and vibration from vibratory ground compaction.	Residential properties, educational, religious and medical establishments, quiet or important outside leisure areas. Noise- or vibration-sensitive commercial premises
Construction traffic accessing specially constructed haul roads within 300m of noise-sensitive receptors or 100m from vibration-sensitive receptors	Potential for significant effects due to: Noise from construction traffic on haul roads where no baseline traffic flow previously. Vibration from HGVs travelling along haul roads.	Residential properties, educational, religious and medical establishments, quiet or important outside leisure areas. Noise- or vibration-sensitive commercial premises.
Construction road traffic, using public highways within 50m of sensitive receptors.	Potential for significant effects due to: Noise from construction traffic on roads with low baseline traffic flow. Vibration from HGVs travelling along poorly maintained roads.	Residential properties, educational, religious and medical establishments, quiet or important outside leisure areas. Noise- or vibration-sensitive commercial premises.
Emissions from the drying and hydrotesting	Potential for significant noise effects from commissioning testing using air compressors.	Residential properties, educational, religious and medical establishments, quiet or important outside leisure areas Noise- or

Activity	Likely significant effects	Receptor
		vibration-sensitive commercial premises.
Operation and Maintenance		
Emissions from the operation of the HAGIs (not including BVIs) within 500m of sensitive receptors.	Potential for significant effects due to the proximity of the HAGIs to sensitive receptors.	Residential properties, educational, religious and medical establishments, quiet or important outside leisure areas.
Decommissioning		
Removal of infrastructure resulting in noise within 300m and vibration within 100m of sensitive receptors	Potential for significant effects from the removal of the Project. Likely to be similar in magnitude and mitigation requirements to construction effects.	Residential properties, educational, religious and medical establishments, quiet or important outside leisure areas. Noise- or vibration-sensitive commercial premises

Elements scoped out of further assessment

10.7.31 The receptors/effects detailed in **Table 10.9** have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant. The following have been agreed by PINS and local authorities.

Table 10.9 Summary of effects scoped out of the noise and vibration assessment

Receptors/potential effects	Justification
Construction	
Pipe laying activities	Pipe laying is a short-term activity (see **Chapter 2: The Project**), using a limited amount of equipment at any one stage. The activity may cause temporary disturbance, but it is not considered to be the source of significant noise or vibration at any single receptor.
Adverse health effects	Given the level of construction works and temporary nature of the main element of the works, being the pipeline, noise levels from the construction is unlikely to be sufficiently high or for a duration to result in adverse health effects. The health of human receptors will be protected via the

Receptors/potential effects	Justification
	avoidance of noise levels above the SOAEL and controlled via a CEMP[37].
Operation and Maintenance	
Noise from BVIs	BVIs are not equipment that are capable of generating significant noise levels.
Effects due to vibration from operation of equipment at HAGIs	There is no oscillating machinery at any of the HAGIs. Plant and pipework are vibration-sensitive equipment and require vibration to be kept to a minimum through design and commissioning to ensure safe and efficient operation of the system. Vibration will be monitored throughout the operation of the HAGI, with the operator employing frequent condition monitoring with preventative and remedial maintenance applied as required.
Maintenance during operation	Based on the generally passive nature of maintenance activities in terms of noise generation with the short duration of activities, maintenance activities are scoped out of the assessment. However, there is a requirement to notify noise sensitive receptors in the vicinity of HAGIs when pigging activities are expected.
Road traffic for maintenance	Attendance at HAGIs by maintenance staff involves car or van visiting site. Frequency is weekly at most and therefore considered insufficient to give rise to a likely significant effect compared against baseline traffic flows.
Adverse health effects	Industrial type noise sources (i.e. those at certain HAGIs) become annoying before they reach a level sufficient to give rise to adverse health effects. Noise from industrial type sources will be controlled through design and provision of mitigation, to levels established through assessment in accordance with BS4142[24]. Health effects resulting from industrial type sources were not included in the 2018 WHO Environmental Noise Guidelines[35] *'…mainly*

[37] It is stated within 'Public Health England, (2017). Health and Environment Impact Assessment: A Briefing for Public Health Teams in England (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/629207/Health_and_environmental_impact_assessment.pdf (Accessed 18 September 2024)' that population and human health "*should only be scoped into an EIA where the likely health consequences of the project are considered to be significant*."

Receptors/potential effects	Justification
	due to the large heterogeneity and specific features of industrial noise, and the fact that exposure to industrial noise has a very localized character in the urban population'.

10.8 Assessment methodology

Introduction

10.8.1 Construction noise is assessed using the Draft Order Limits and construction plant details to determine affected sensitive receptors. A worst-case scenario has been assessed, both from the prediction approach, for instance assuming plant equipment is operational at the same time in a worst-case location (i.e. works assumed to be undertaken at the extent of the order limits) and assuming that all buildings in the relevant zone of influence are potentially receptors.

10.8.2 The assessment of noise from trench construction, trenchless crossings, compound construction/operation and HAGI construction have been undertaken by calculating a distance/buffer zone upon which a significant effect could occur. A review of likely sensitive receptors within this distance/buffer zone has then been conducted and effects assessed against the representative receptor.

10.8.3 The buffer zones have been given for daytime criteria (65 dB for activities of one month or more and 75 dB for less than one month). An assessment of night-time construction noise is presented for trenchless crossing works that are potentially constructed with HDD. Furthermore, within the proposed project construction hours, Saturday afternoon (i.e. after 13:00) is considered by the BS 5228-1:2008 +A1:2014. ABC method to fall within the 'evening and weekend' time criteria.

10.8.4 The operational assessment (to be provided in the Final ES) will use the baseline noise survey data to derive maximum sound levels that must not be exceeded at receptors, such that significant adverse effects are avoided at all receptors.

Construction Noise Predictions

10.8.5 The following tables provide the source information used to calculate the distance at which a likely significant effect would occur, for the aspects covered within this Draft ES. Construction site noise is predicted using the calculation methodology within Annex F of BS 5228-1:2008 +A1:2014. Noise from traffic on haul routes or temporary access not used for public highways is predicted using the haul route method of BS 5228-1:2008 +A1:2014. Construction plant assumptions are based upon information provided by the Applicant.

Open Cut Trenching

10.8.6 Open cut trenching throughout construction will be undertaken by sets of teams undertaking a single activity sequentially along a stretch of the route. The predictions have considered the longest period of active construction affecting any single receptor which would be the installation of 1km span of the route. It is assumed as a worst case that this would be undertaken for 10 days in a 15-day rolling period. The first team undertaking trenching (3 days), the second team installing the pipes (3-4 days) and the third team reinstating the land (3 days). The quantity of plant identified in **Table 10.10** is a total plant requirement of all construction gangs working on a section.

Table 10.10 Trenching Pipeline Equipment Assumptions

Activity	Quantity	Description	Percentage of working day that plant used (On-time)
Right of Way (RoW) Preparation	1	Dumper	100
	2	Bulldozer	100
	2	Excavator	100
	2	Tractors	100
	1	Hydraulic ram (fencing)	50
Pipe delivery & stringing of pipe on RoW	1	HGV's	10
	2	Excavator	50
	5	Tractor	20
Cold bending of pipe and welding and field joint coating	5	Welder generator on tracked vehicle	100
	5	Grinding machines	25
	10	Welding machines	100
	1	Cold bending machine – 70 t (diesel engine)	100
	1	Bulldozer to tow machine	10

Activity	Quantity	Description	Percentage of working day that plant used (On-time)
	2	Coating joint- shot blasting (compressor) machine mounted on tracked vehicle (day after welding and not considered in total)	100
Trench excavation	2	Trenching machines/mechanical excavators	100
	1	Trench support (hammer on machine – not piling Close sheet piling)	5
	1	Dewatering	25
Lower and lay	10	Excavators (including side boom tractors)	100
Backfilling	1	Excavators	100
	1	Compacting heads on excavators (vibrating pad)	100
	1	Padding machine (sorts material)	50
Restoration	1	Dumper	100
	2	Bulldozer	100
	2	Excavator	100
	2	Tractors	100
Land restoration / **reinstatement** (**not** within **the same month time period as** any **other activities)**	10	Tractors	25

Trenchless Crossing

10.8.7 There are many locations across the Project where trenchless crossings will be required so that the Pipeline can pass under a road, river or other infrastructure as outlined in **Chapter 2: The Project**. **Appendix 2B: Crossing Schedule** provides a list of all trenchless crossings and the intended construction techniques

10.8.8 Four types of trenchless crossings have been described: Horizontal Directional Drilling (HDD), Auger Bore, Microtunneling, and Direct Pipe. The equipment used in each trenchless method is similar in terms of noise output, and duration of use, with differences in the compound setup required.

10.8.9 A review of the trenchless crossing techniques was undertaken for the PEIR and HDD was considered the worst case on account of the possible requirement for above ground plant to be active during the night. Other methods have equipment within a pit, thereby providing screening to the equipment with a natural barrier, and allowing for the restriction of high noise activities, such as piling, within daytime hours only.

10.8.10 For Auger Bore, Microtunneling, and Direct Pipe methods, a trenched compound must be constructed. This has the potential to involve piling, which can be a large source of impulsive noise. However, piling is expected to be conducted for a short period and only during daytime hours. The need for piling will not be known until closer to the construction start date but will be confirmed prior to the start of construction and appropriate noise prevention implemented. Once constructed, the trench will provide a level of noise screening.

10.8.11 It is assumed as a worst-case scenario that HDD operations are unable to be temporarily halted as this can allow the tunnel to collapse. Therefore, works will need to continue for 24 hours a day until completion. For this reason, the assessment considers both daytime and night-time periods.

10.8.12 The plant identified in **Table 10.11** has been assumed for the HDD entrance pit compound. The dominant feature during both time periods is the HDD drill.

10.8.13 The exit pit would not be considered a significant noise source, as this would likely have only intermittent excavator use and water pumping during the night. As the direction of the HDD is uncertain, entrance pits have been assumed at each end of each HDD location.

Table 10.11 Plant assumed for HDD trenchless crossings

Description	Quantity	Percentage of working day that plant used (On-time)
Daytime operations		
Excavator	2	10
Dump truck	1	10

Description	Quantity	Percentage of working day that plant used (On-time)
Mobile crane	1	10
HDD Drill rig	1	77
Water pump	1	100
Generator	1	100
Night-Time Operations		
HDD Drill Rig	1	100
Water pump	1	100
Generator	1	100

Compound Construction

Table 10.12 Compound Construction

Activity	Quantity	Description	Percentage of working day that plant used (On-time)
Site Clearance	2	Tracked excavators	80
	1	Dozer	80
	1	Wheeled loader	80
	1	40t ADT	80
	1	Water Pump	100
Construction of internal haul road and laydown areas	2	Tracked excavators	80
	1	Dozer	80
	1	Lorry	50
	1	Vibratory Roller	50
	2	40t ADT	80

Compound Operation

Table 10.13 Compound Operation

Description	Quantity	Percentage of working day that plant used (On-time)
Generators	2	50
Forklift	1	80
Mobile Crane	2	50
Miscellaneous tools	5	50

HAGI Construction

10.8.14 The HAGI construction has been divided into several activities. These activities are assumed to be undertaken sequentially so the levels will not combine cumulatively at any single receptor. For the purposes of the Draft ES the initial earthworks has been chosen for assessment as the worst case activity.

Table 10.14 HAGI Construction - Earthworks Activity

Description	Quantity	Percentage of working day that plant used (On-time)
Excavator	2	80
Backhoe Loader	2	80
Dozer	2	80
Dump truck	2	80

Access route construction

Table 10.15 Access Route Construction

Activity	Quantity	Description	Percentage of working day that plant used (On-time)
Site Clearance	2	Chainsaws	80
Construction of internal haul road and laydown areas	2	Tracked excavators	80
	1	Dozer	80
	1	Lorry	50
	1	Vibratory Roller	50
	1	Mobile Crane	50
	2	40t ADT	50

Access route operation

10.8.15 Predicted traffic use of each access route per day will be presented in full within the Final ES once these have been confirmed following Statutory Consultation. Daily $L_{Aeq, T}$ have been calculated at 10m from the edge of the carriageway using the method contained within section F.2.5.2 of BS5228:2014-1. The speed limit for the haul roads is 16 kph. All HGV traffic has been assumed to have a worst-case sound power of 105 dB(A).

Construction Traffic

10.8.16 Noise from traffic on public highways is predicted using the CRTN calculation methodology. The construction traffic numbers used in this assessment are presented in **Appendix 10C: Construction Traffic**. Assessment has been undertaken for a 'with' and 'without' construction traffic scenario, which are then compared to provide the change in traffic noise as a result of the construction phase works. The difference between the 'with' and 'without' scenarios has been assessed using short-term criteria reported within Table 3.54a of the DMRB (Highways Agency, 2020) updated noise assessment section (Volume 11, Section 3, Part 7, LA111).

10.8.17 The assessed road links' Basic Noise Levels ($L_{A10, 18\ hour}$) have been predicted using Annual Average Weekday Traffic (AAWT) 18-hour (00:00 – 06:00) flows, the percentage HGV of that flow, and the average speed on the link, for both the baseline and construction scenarios to provide a comparison.

10.8.18 The assessment of construction traffic noise on the public highway uses worst case traffic flows (**Chapter 11: Traffic and Transport**). The traffic information is assessed and compared against baseline flows to determine the predicted change in noise levels, at a standardised 10m distance from each affected road link. It is considered that this distance would adequately cover the most affected sensitive receptors to road changes, whether they were closer or further to the road than 10m (up to 50m) as the change in noise would be the same (on the basis of traffic road noise only).

Establishing baseline conditions

10.8.19 As set out in **Section 10.5** baseline noise surveys have taken place. For receptors where baseline levels have not been gathered, a worst-case scenario has been assumed of very low ambient and background levels. Additional baseline data may be collected ahead of the Final ES.

Establishing receptor sensitivity

10.8.20 The precise determination of the sensitivity of a receptor relies on professional judgement.

10.8.21 **Table 10.16** details the receptor sensitivities that have been ascribed according to experience of assessing similar facilities, and on professional judgement.

Table 10.*16* Establishing the sensitivity of receptors

Sensitivity	Examples
High	Vulnerable subgroups including hospitals and pre-schools, care homes, hospices, recording studios.
Medium	Dwellings (including caravans and residential moorings), schools, hotels.
Low	Areas used primarily for leisure activities, including Public Rights of Way, sites of historic or cultural importance.
Very Low	All other areas such as those used primarily for industrial, commercial or agricultural purposes.

Magnitude of Impact

10.8.22 Table 10.17 shows the magnitude of change (or impact) criteria applied through the noise and vibration assessment. The criteria in Table 10.17 focus on negative changes, but positive changes may also occur and will be considered on a case-by-case basis as required.

10.8.23 For non-residential receptors, the same magnitude of change will apply for temporary effects from construction noise, construction vibration and construction traffic as for residential.

Table 10.17 Magnitude of Change

Magnitude	Site Construction & Access Noise Site	Construction Vibration	Construction Traffic Noise	Operational Noise on Residential Receptors	Operational Noise on Non-Residential Receptors
High	Exceeds BS 5228-1 cut-off values* for one month or more by 10dB	x ≥ 10mm/s Peak Particle Velocity (PPV)	Increase in traffic noise***, x ≥ 5dB $L_{A10, 18h}$	Plant noise rating level ($L_{Ar,T}$) difference with background ($L_{A90,T}$), x ≥ 10 dB†	Change in noise level ($L_{Aeq, T}$) x ≥ 5dB
Medium	Exceeds trigger levels** for more than 9 days in a 15 day period.	0.3 ≤ x < 10mm/s PPV	3 ≤ x < 5dB $L_{A10, 18h}$	5 ≤ x <10dB †	3 ≤ x < 5dB
Low	Exceeds BS 5228-1 cut-off values for one month or more by 1 to 9 dB or Triggers levels by more than 9 days in a 15 day period by 1 to 9 dB.	0.14 ≤ x < 0.3mm/s PPV	1 ≤ x < 3dB $L_{A10, 18h}$	0 ≤ x < 5dB †	1 ≤ x < 3dB

Magnitude	Site Construction & Access Noise Site	Construction Vibration	Construction Traffic Noise	Operational Noise on Residential Receptors	Operational Noise on Non-Residential Receptors
Very Low	Exceeds BS 5228-1 threshold values or trigger levels but less than temporal criteria of significance.	0.1 ≤ x < 0.14mm/s PPV	0 ≤ x < 1dB $L_{A10,\ 18h}$	-10 ≤ x < 0dB †	0 ≤ x < 1dB

* 65 dB day, 07:00 – 23:00 Monday to Friday, 07:00 – 13:00 Saturday. 45 dB night-time 23:00-07:00. Assumes evening work would also necessitate night-time work, which would be the constraining time period.
** 75 dB daytime, 55 dB night-time.
*** Change in $L_{A10,\ 18\ h}$, construction traffic noise + baseline traffic noise minus baseline traffic noise in isolation.
† **D**epending on context, as described within BS 4142

Significance of Effect

10.8.24 The overall significance of effect rating is based on the evaluation of significance matrix presented in **Table 10.18**.

Table 10.*18* Significance of effect matrix for noise and vibration

Level of significance to sensitivity of receptor/ resource	**Magnitude of change**			
	High	**Medium**	**Low**	**Negligible**
High	Major (significant)	Moderate/ Major (significant)	Minor/Moderate (potentially significant)	Minor (not significant)
Medium	Moderate/ Major (significant)	Minor/ Moderate (potentially significant)	Minor (not significant)	Negligible/ Minor (not significant)
Low	Minor/ Moderate (potentially significant)	Minor (not significant)	Negligible/ Minor (not significant)	Negligible (not significant)
Very Low	Minor (not significant)	Negligible/ Minor (not significant)	Negligible (not significant)	No effect

10.8.25 Professional judgement will be applied to the results of the evaluation to qualify the resultant effect resulting from the sensitivity of receptor and magnitude of impact. This will normally only be amendments of effect into adjacent descriptors (for example major to moderate), but where necessary this could be a larger adjustment. Qualifying factors include timescales and absolute noise levels. Context is important in both the residential, as incorporated into BS 4142 (British Standard Institute, 2019), and non-residential assessment of operational noise.

10.8.26 For residential receptors, context will mainly apply to the existing levels and type of industrial noise. Residents near an industrial area are likely to be less sensitive to HAGI noise during the operational phase, which may also be masked by other existing industrial noise. Conversely, if, for example, an existing HAGI is the only source of industrial noise in an otherwise quiet rural area, residents could be more sensitive to any increase in noise.

Construction phase assessment methodology

10.8.27 Construction has the potential to give rise to significant noise effects.

10.8.28 Typical plant requirements for the most significant construction activities have been considered over the Draft Order Limits. Noise levels have been predicted to

determine distances where adverse impacts could occur, and additional mitigation required.

10.8.29 Threshold of significance limits for medium and high sensitivity receptors have been derived using Annex E of BS 5228-1. The standard provides an indication of the onset of significant effects, but directs the assessor *"to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect".*

10.8.30 Where works are expected to be undertaken in the same location for a duration of one month or more, the Category A limit of 65 dB $L_{Aeq,12\ hours}$ applies. Where works are for longer than 10 days, but less than a month, 75 dB $L_{Aeq,\ 12\ hours}$ has been applied as the limit. Where works are fewer than 10 days in a single location, it is considered that application of best practice measures will ensure that significant effects are avoided, but for this very short duration, levels should be kept below 75 dB $L_{Aeq,\ 12\ hours}$ where possible, and the nature and duration of the works communicated to the nearby affected sensitive receptors.

10.8.31 The potential for significant vibration effects from construction is limited to activities that are specifically vibratory, such as piling and vibro-compaction. These elements are unlikely to be specified ahead of detailed design and if required, the effects will need to be controlled such that significant vibration emissions are not experienced at sensitive receptors. The best mechanism for this is through the application of the CEMP.

10.8.32 The CEMP will include requirements for site-specific predictions, mitigation and monitoring to be undertaken. Notwithstanding this, construction vibration emissions will be managed in accordance with best practicable means to minimise any residual impacts.

Operational phase assessment methodology

10.8.33 BS 4142:2014 + A1:2019[24] provides a methodology and criteria for assessing new or existing industrial sound sources.

10.8.34 The standard considers the operational, specific sound at the (external) location of sensitive receptors. The background sound level (L_{A90}) without the development is subtracted to allow comparison of the new noise source at existing receptors.

10.8.35 Adjustment corrections for acoustic characteristic features are applied to the specific sound to determine the "rating level"

10.8.36 The assessment provides an initial estimate of the impact of the rating level. Typically, the greater the difference between the rating level and the background sound level, the greater the magnitude of the impact, thus:

- a difference of +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or

a significant impact. A low impact is defined when the rating level does not exceed the measured background sound level.

10.8.37 BS 4142:2014 + A1:2019[24] emphasises the requirement to fully understand the context in which the sound occurs and therefore context has been considered in the assessment process before determining the potential significant effect resulting from the impacts identified. For this reason, the semantic scale for magnitude of change, or values for the purposes of identifying LOAEL and SOAEL has been reported in detail in the assessment section of this chapter.

HAGIs

10.8.38 Operational noise from the HAGIs will be assessed against the baseline background levels at existing residential (including e.g. medical, education or religious establishments with some residential element) receptors in the Final ES.

10.8.39 This approach may not necessarily be appropriate for assessment of operational noise as perceived by users of leisure assets. Where such assets are further from the HAGI than the nearest residential receptor, these will benefit from the noise reductions required for the residential receptor. However, where leisure receptors are closer to the HAGI than residential receptors, an assessment of ambient noise increase will be carried out and submitted as part of the Final ES.

10.8.40 There are nine HAGI locations with the potential to generate noise: Central Hub, Hydrogen Production Plant, Rocksavage, Runcorn, Higher Walton, Clock Face, Warburton, Partington and Hydrogen Storage Facility; these are scoped into the assessment. Additionally, there are two BVIs, which are scoped out of the assessment.

Unexpected or emergency operations

10.8.41 To ensure operation of the HAGIs is not disrupted, several redundancy valves are designed into each HAGI location. These will operate in emergency conditions if the primary valve/s are out of service.

10.8.42 Maintenance and testing of all valves shall be undertaken predominantly during daytime hours to minimise disruption at nearby receptors. As the redundancy valves will only operate in emergency circumstances and for a short duration at any time, noise generation from these elements has not been assessed.

Determination of significance – operational HAGIs

10.8.43 **Table 10.19** below provides the indicative impact magnitude categories for assessing operational noise from the HAGIs, based on the results of the estimate of impact undertaken in accordance with BS 4142:2014 + A1:2019[24]. The final determination of impact magnitude depends on consideration of the context, as required by the method detailed in BS 4142:2014 + A1:2019[24].

Table 10.19 Indicative impact magnitude categories for assessing operational site noise

Indicative Impact Magnitude	Semantic Description of Difference between Rating Levels and Background Sound Levels
High	Rating levels significantly exceeding receptor background sound levels, depending on context.
Medium	Rating levels moderately exceeding receptor background sound levels, depending on context.
Low	Rating levels just exceeding receptor background sound levels, depending on context.
Negligible	Rating levels equal to, or lower than, background sound levels, depending on context.

10.8.44 The information provided in **Table 10.16** is used to determine the sensitivity of receptors, and the information in **Table 10.19** to determine the magnitude of impact. This will then be compared to the significance of effect matrix provided in **Table 10.18** to determine the significance of effect.

10.9 Assessment of noise and vibration effects

Construction phase

Temporary noise effects from the open cut trenching of the pipeline

Overview

10.9.1 The results of the screening distance predictions have determined that there are noise-sensitive receptors experiencing construction noise above the threshold of significance value of 65 dB(A). However, this level would not be exceeded for a duration of more than one month.

10.9.2 Where any noise-sensitive receptors are exposed to noise above the 75 dB(A) level, this will be for up to three days at a time and would not exceed the temporal criteria for the trigger level of 10 in a 15 day rolling period or 40 days in a six month period. Subsequently, the magnitude of impact would be low. The highest level of sensitivity affected would likely be residences considered to be of medium sensitivity. The resulting significance would be considered a **minor** temporary adverse effect and **not significant**.

Magnitude of change

10.9.3 Activities associated with open cut trenching only occur during daytime and weekend working hours only (Monday to Saturday (08:00 to 18:00 hours) and no

works Sundays or Bank Holidays. Values presented in **Table 10.20** present the distance from works at which significant effects are likely to occur.

Table 10.20 Distance away from construction that thresholds of significance for open cut trenching are exceeded

Activity	Distance (m) of 55 dB(A) (Saturday after 13:00)	Distance (m) of 65 dB(A) (Weekdays and Saturday AM)	Distance (m) of 75 dB(A)
Right of Way (RoW) Preparation	460	145	46
Pipe delivery and stringing of pipe on RoW	250	79	25
Cold bending of pipe and welding	410	129	41
Trench excavation	180	57	18
Lower and Lay	200	63	20
Backfilling	350	109	35
Restoration	450	142	45
Land restoration	280	89	28

10.9.4 Generally, the nature of the pipe installation through trenched means is a quick process. As described in **Chapter 2: The Project**, once a section is prepared the installation of fabricated sections can typically advance at 150m – 350m per day depending on diameter and local conditions. In more congested areas, and when pipe diameter and weights are larger, progress is slower but the advance is still in the order of tens of metres per day. Therefore, the duration of time that levels will be above the threshold of significance will be very short and will not be likely to give rise to significant effects.

Temporary noise effects from trenchless crossing works

Overview

10.9.5 **Table 10.21** presents the results of noise from HDD activities (from the compound area) based on buffer distances from the compound (assuming plant from **Table 10.11**) at which BS 5228 construction threshold values would be exceeded, resulting in medium to high impact. It should be considered that HDD represents a

worst case assessment for a trenchless crossing in the context of noise generation. There are different criteria for different time periods and therefore buffer zones dependent on the duration and timing of works.

Table 10.21 Distance away from construction that thresholds of significance for trenchless crossings are exceeded

Activity	Distance (m) of 45 dB(A)	Distance (m) of 55 dB(A)	Distance (m) of 65 dB(A)	Distance (m) of 75 dB(A)
	Note 1	Note 2	Note 3	Note 4
Entry Pit Compound	398	126	56	18
Note 1 Every day. night time 23:00 – 07:00				
Note 2 Weekdays 19:00 - 23:00, Sunday 07:00 - 23:00				
Note 3 Weekday Daytime, Saturday 07:00 - 13:00				
Note 4 Weekday Daytime, Saturday 07:00 - 13:00 for works of 10 – 30 days				

Magnitude of change

10.9.6 Due to the potential of the HDD to operate near to residential receptors during the night, details of the numbers of buildings potentially affected have been included within the assessment (i.e. number of buildings within the buffer zones of exceedance). For the purposes of assessment it is assumed the buildings all are noise-sensitive; some of them will be less sensitive agricultural or commercial premises used only during the daytime.

10.9.7 For each crossing the worst-case side of the crossing, has been assumed for the compound location, i.e. the location affecting the most buildings. The **Appendix 2B: Crossing Schedule** and Project GIS have been used to identify the impacts as below.

Table 10.22 Distance away from construction that thresholds of significance for trenchless crossings are exceeded

Project Section	Receptors within 45 dB(A) buffer	Receptors within 55 dB(A) buffer	Receptors within 65 dB(A) buffer	Receptors within 75 dB(A) buffer
North Corridor	363	45	8	3
East Corridor	19	33	11	1
South Corridor	139	68	11	0

Project Section	Receptors within 45 dB(A) buffer	Receptors within 55 dB(A) buffer	Receptors within 65 dB(A) buffer	Receptors within 75 dB(A) buffer
West Corridor	385	84	18	1
Clockface Spur	17	7	0	0
Rocksavage/ Runcorn Spur	0	6	2	1
Warrington Spur	140	29	5	0

10.9.8 The assessment shows that the trenchless crossing sites are predicted to exceed the night-time noise limit at several residential buildings should the works exceed one month. The majority of works lasting less than one month would also result in residences experiencing noise above night-time threshold levels. Daytime exceedances are substantially lower, but would also result in residences experiencing noise above the daytime threshold levels. Additional mitigation such as the screening of the trenchless crossing construction activities are therefore likely be required, see **Section 10.12** below. Such mitigation will be secured as a requirement of the DCO.

10.9.9 As HDD works are likely to continue for more than one month, and at night, the magnitude of impact would be medium. The highest level of sensitivity included would likely be dwellings considered to be of medium sensitivity, however this will be confirmed in the Final ES once the use of the properties is better known. The resulting significance would, in such a case, be considered a **moderate** temporary adverse effect and **significant**.

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

10.9.10 In support of the construction activities, a number of temporary construction compounds will be set-up for welfare and logistics purposes. The construction, operation and removal of the temporary compounds will result in temporary noise effects. The noise from the construction and removal are assumed to be the same for the purposes of noise prediction.

10.9.11 Assessment of compound set up shall be undertaken for the Final ES.

Temporary noise effects from the construction of the Hydrogen Above Ground Installations

10.9.12 HAGI construction would only be undertaken during daytime working hours only (Monday to Saturday (08:00 to 18:00 hours)).The predicted distance at which the threshold values of BS 5228 for works of over 1 month (65 dBA) would be breached is 40m. At all HAGI locations except Warburton, there are no residences or non-residential noise sensitive receptors within 40m of the proposed HAGI

locations. The only noise sensitive resources are those footpaths which pass near to the sites.

10.9.13 At the Warburton HAGI, there is a residential dwelling approximately 35m from the boundary of the HAGI; although significant effects would be unlikely as the works will predominantly be further than 40m from this receptor, there is the potential for adverse effects. A detailed assessment of construction noise at this receptor will be undertaken and reported within the Final ES.

10.9.14 The impact on the footpaths/rights of way, a resource of low sensitivity, would be of medium magnitude, resulting in a **minor** effect and **not significant**.

Access Construction

10.9.15 It is assumed that open cut trenching would commence during daytime working hours only (Monday to Saturday (08:00 to 18:00 hours). It is assumed that the access route construction would quickly move past noise sensitive receptors, and as such that the distances at which the BS 5228 threshold values would only be exceeded for one or two days. Therefore, exceedances in the threshold values would not meet the temporal requirements of 10 days in a 15 day rolling period.

10.9.16 On this basis the magnitude of impact would be very low. The highest level of sensitivity affected would be dwellings consider of medium sensitivity. The resulting significance would be considered a **minor** temporary adverse effect and **not significant**.

Access Use

10.9.17 The predicted daily noise level $L_{Aeq,10h}$ at 10m from each access route does not exceed 65 dB(A). This assumes heavy vehicles with a sound power level of 105 dB(A) traveling at an average speed of 16 kph (10 mph).

10.9.18 On this basis the magnitude of impact is considered to be low, as most receptors are located more than 10m from the proposed accesses and are considered medium or negligible sensitivity. The resulting significance would be considered a **minor** temporary adverse effect and **not significant**.

Temporary noise effects from construction road traffic noise

10.9.19 **Table 10.23** presents the results of the construction road traffic noise predictions, which have been calculated at 10m (in accordance with the CRTN (Department of Transport Welsh Office, 1988)) from the road based on 18-hour Annual Average Weekday Traffic (AAWT) worst-case road traffic provided in **Chapter 11: Traffic and Transport**. Whilst the receptors affected by road traffic will be at varying distances from the road, the assessment is mainly based on the difference between the future baseline scenario and the future 'with development' scenario as shown in **Table 10.23**.

10.9.20 The results of the transport assessment (provided in **Chapter 11: Traffic and Transport)** have been used as the basis for determining the change in noise levels arising on existing roads as a result of construction traffic. Road traffic noise calculations have been carried out in accordance with CRTN, being undertaken for

a notional receptor location 10m from the edge of the carriageway of each road considered. A notional receptor has been used because the change in traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant. Traffic noise calculations have been undertaken to establish the change in the daytime $L_{A10,18hr}$ noise level.

10.9.21 Predictions have been undertaken for the following scenarios:

- Scenario 1: 2028 Future Baseline Without Scheme; and
- Scenario 2: 2028 Future Baseline With Scheme.

10.9.22 These changes in road traffic noise have been determined by subtracting the noise level determined for Scenario 1, from that determined for Scenario 2. The assessment assumes the worst-case amount of construction traffic on every road link considered (identified as 'Road' in **Table 10.23**).

10.9.23 In undertaking these calculations, traffic speeds have been set to the applicable speed limit for each route considered. The predicted road traffic noise levels are shown in **Table 10.23** for each considered link. The changes in road traffic noise due to construction traffic are also shown in **Table 10.23** for each considered link.

Table 10.23 Predicted Road Traffic Noise Levels and Changes in Road Traffic Noise Levels Resulting From Construction Traffic $L_{A10,18hr}$, dB

Road			Noise Level $L_{A10,18h}$ dB		Noise Level Change dB (Scenario 2 – Scenario 1)
			Scenario 1	Scenario 2	
RW1	A5117	Between Common Lane and M56 J14	73.1	73.1	0.0
RW2	A557	Between A56 and Halton Station Road	72.7	73.1	0.4
RW3	A56	River Weaver Bridge	74.4	74.5	0.1
RW4	A533	Between A49 and Higher Lane	71.1	71.2	0.1
RW5	A533	Between Aston Lane and Redacre Road	71.3	71.4	0.1
RW6	A56	Between Proffits Lane and Woodhouses Lane	72.2	72.2	0.0
RW9	A56	Between Station Road and A533	69.0	69.3	0.3
RW10	A56	Frodsham Town Centre	69.8	69.8	0.0

Road			Noise Level $L_{A10,18h}$ dB		Noise Level Change dB (Scenario 2 – Scenario 1)
			Scenario 1	Scenario 2	
RW11	A5117	Between M56 and B5132	73.4	73.6	0.2
RN1	A56	Between M56 and A558	76.9	77.0	0.1
RN2	A56	Between A5060 and Mill Lane	76.0	76.1	0.1
RN6	A562	Between A5080 and Mowcroft Lane	72.8	72.9	0.1
RN7	A5080	Between A557 and South Lane	70.3	70.5	0.2
RN8	A557	Between M62 J13 and B5419	76.6	76.7	0.1
RN9	A57	Between B5149 and M62J7	73.2	73.4	0.2
RN10	A570	Between Chapel Lane and Eurolink	76.2	76.3	0.1
RN11	A570	Between Burtonhead Road and B5204	76.1	76.2	0.1
RN12	A570	Between Sherdley Road and Linkway East	76.7	76.8	0.1
RN13	Higher Lane	Between A533 and A49			
RN14	B5204	Between A570 and Rainhill Road	67.7	67.9	0.2
RN15	Runcorn Road	Between A56 and Moore Lane	67.0	67.5	0.5
RN16	Liverpool Road	Sanky Bridge	71.6	71.7	0.1
RN17	Knutsford Road	Between M6 and A56	73.4	73.5	0.1
RE1	A49	Between Grimsditch Lane and Street Lane	74.2	74.4	0.2

Road			Noise Level $L_{A10,18h}$ dB		Noise Level Change dB (Scenario 2 – Scenario 1)
			Scenario 1	Scenario 2	
RE2	A559	Between M56 J10 and Stockley Lane	71.0	71.3	0.3
RE3	A49	Between M56 J10 and Limes Lane	74.2	74.4	0.2
RE4	Arley Road	Between B5356 and Reedgate Lane	60.9	64.3	3.4
RE5	A50	Between West Lane and Crabtree Lane	71.1	71.3	0.2
RE6	A56	Between M56 J7 and Bow Green Road	74.0	74.0	0.0
RE7	A56	Between M56J7 and Reddy Lane	71.8	72.2	0.4
RE8	A6144	Between Isherwood Road and Banky Lane	74.2	74.5	0.3
RE9	Woodhouse Lane	Dunham Woodhouses	67.3	67.4	0.1
RE10	A6114	Partington	72.7	73.0	0.3
RE11	A6114	South of Partington	70.2	70.7	0.5
RE12	A56	Between M60 and A1644 (vicinity of Sibson Road)	75.9	75.9	0.0
SR1	A49	Between A533 and Willow Green Lane	74.9	75.1	0.2
SR2	A49	Between Station Road and B5144	73.8	74.0	0.2
SR3	B5153	West of Weaverham	67.4	68.0	0.6
SR4	A556	Between Whitegate Lane and School Lane	74.6	74.7	0.1
SR5	A533	Between Church Street and London Road	75.7	75.8	0.1

Road			Noise Level $L_{A10,18h}$ dB		Noise Level Change dB (Scenario 2 – Scenario 1)
			Scenario 1	Scenario 2	
SR6	A530	Between King Street and Davenham Road	73.8	74.0	0.2
SR7	A556	Between Penny's Lane and Birches Lane	77.2	77.3	0.1
SRNR1	M56	M56 Junction 12 (M56/A557)	85.0	85.0	0.0
SRNR2	M62	Between M62 J8 and J7	84.8	84.9	0.1
SRNR3	M6	M6 J21 between M6 Spur and M6 Spur	85.7	85.8	0.1
SRNR4	M56	Between J8 M56 and J9 M56/J20M6	83.2	83.2	0.0
SRNR5	M60	Between M60 J10 and J9	84.2	84.2	0.0
SRNR6	M60	Between M60 J6 and 5	85.1	85.1	0.0
SRNR7	M62	Between M62/M602/M60 and M62 J11	85.7	85.7	0.0
SRNR8	M56	Between J6 and J5 M56	85.3	85.4	0.1
SRNR9	M6	Between M6 J19 and M56 J9/M6J20	85.4	85.4	0.0
SRNR10	A556	Between Chapel Lane and M56 J8	79.7	79.7	0.0
SRNR11	M6	Between J19 and J18 (M6)	85.6	85.6	0.0
SRNR12	M56	Between M6 and Junction 10	85.3	85.3	0.0

10.9.24 The link subject to the highest noise level change of +3.4dB is Arley Road, between B5356 and Reedgate Lane (i.e. road link RE4). The use of the link for construction traffic on Arley Road is indicative of significant noise impacts at receptors alongside the route, however this is based on a very uncharacteristic number of HGV movements on an otherwise quiet road, which would only be experienced for up to 3 days. When the HGVs are averaged over the period that the link will be used to gain access to EH17 and EH18 (approximately 1 month),

the HGVs number 51 and the change in noise level would be +2.7dB. The noise level changes on these routes due to construction traffic remain less than +3dB and the magnitude of impact is minor in accordance with the nomenclature of DMRB. This results in a low magnitude of impact. The highest level of sensitivity affected would likely be residences considered to be of medium sensitivity. The resulting significance would be considered a **minor** temporary adverse effect and **not significant**.

10.9.25 For all remaining routes noise level changes range from 0.0dB to +0.6dB at worst and the magnitude of impact is negligible. The highest level of sensitivity affected would likely be residences considered to be of medium sensitivity. The resulting significance would be considered a negligible, temporary adverse effect and **not significant**.

Operational phase

Operational HAGI noise

10.9.26 The operational sound generated by the HAGI installations will be predicted through noise modelling and character corrections applied to specific sound level to derive rating levels. The rating levels will be compared against the measured background sound levels at receptors near to each HAGI and will be assessed with respect to BS 4142 + A1:2019 and significance outcomes. The operational phase assessment will be reported in the Final ES.

Consideration of context

10.9.27 Consideration will be given to the contextual aspects of the sound, in accordance with BS 4142:2014 + A1:2019, and the context of the specific sound level and nature of receptor may adjust the initial estimate of impact and thus, the determination of significance of potential impacts.

Decommissioning phase

10.9.28 Effects from the decommissioning phase will be similar to the construction. But, for a shorter duration. Significant noise and vibration effects would not be anticipated.

10.10 Assessment of cumulative (inter-project) effects

10.10.1 A Cumulative Effects Assessment (CEA) for the Project, which considers the combined impacts with other developments on the same single receptor or resource (inter-project effects), has not been completed at this stage, as the construction effects have not yet been quantified at any receptors and such an assessment will be dependent on the phasing and duration of various construction elements of the project relative to potentially cumulative development.

10.10.2 Likewise, cumulative operational noise will require the operational noise to be assessed before any assessment of cumulative effects can be made.

10.10.3 Construction noise and vibration, and operational noise will be assessed for cumulative effects within the Final ES.

10.11 In-combination climate change impact assessment

10.11.1 The In-combination Climate Change Impact (ICCI) assessment is reported in **Chapter 19: Intra-project Effects.**

10.11.2 The long-term influence of climate change may mean that ventilation for cooling will be required for longer periods of time and as such, receptors may experience more noise during the warmer months because of this. However, there are no direct in-combination impacts predicted for noise or vibration.

10.12 Significance conclusions

10.12.1 A summary of the results of the noise and vibration assessment is provided in **Table 10.24**.

Table 10.24 Summary of significance of effects

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale	Chapter section reference
Construction					
Noise from open cut trenching	Medium	Low	Minor (Not Significant)	High noise but very temporary disturbance	**Section 10.9**
Noise from trenchless crossing	Medium	Medium	Moderate (Significant)	High noise for a significant duration (i.e. 10 days in a 15 day rolling period or over a month dependant on the noise level)	**Section 10.9**
Noise from compound construction	Medium	Low	Minor (Not Significant)	Unlikely to be high enough volume to be significant	**Section 10.9**

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale	Chapter section reference
Noise from compound operation	Medium	Low	Minor (Not Significant)	Unlikely to be high enough volume to be significant	**Section 10.9**
Noise from HAGI construction	Low	Low	Minor (Not Significant)	Unlikely to be high enough volume to be significant and only affecting rights of way nearby	**Section 10.9**
Noise from access construction	Medium	Low	Minor (Not Significant)	Unlikely to be high enough volume to be significant	**Section 10.9**
Noise from access use	Medium	Low	Minor (Not Significant)	Unlikely to be high enough volume to be significant	**Section 10.9**
Noise from construction traffic	Medum	Low	Minor (Not Significant)	Residences on two rural roads will experience temporary road traffic noise increases, however on average unlikely to be high enough volume to be significant	**Section 10.9**

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in **Section 10.8** and is defined as very low, low, medium and high.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 10.8** and is defined as very low, low, medium and high.
3. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (potentially significant) or

minor/negligible (not significant), subject to the evaluation methodology outlined in **Section 10.8**.

10.13 Additional measures

10.13.1 The assessment set out above has concluded that it will be necessary to implement additional measures. These have been identified and would be in addition to those embedded measures outlined and assessed in **Section 10.6**. **Table 10.25** outlines how these additional measures will influence the noise and vibration assessment. The need to implement further additional measures will be revisited as part of the Final ES.

Table 10.25 Summary of the additional environmental measures

Receptor	Potential changes and effects	Additional measures	Compliance mechanism
Construction			
Residential receptors	Temporary construction noise effects associated with trenchless crossings	Mitigation of adverse effects will take the form of management procedures or engineered screening to reduce noise and vibration	Commitment secured via DCO
Operation			
Residential receptors	Temporary noise effects during 'Pigging'	In addition to the requirement to notify noise sensitive receptors in the vicinity of HAGIs when pigging activities are expected (as set out in **Table 10.9**), any significant changes to equipment, as required through routine updating of infrastructure (i.e. taking longer than 10 days and carried out overnight), shall be considered supplementary construction activity and accompanied by a s61 (COPA 1974) application	Commitment secured via DCO

Residual effects assessment

10.13.2 Worst case residual effects will potentially be adverse, but not significant. Mitigation will be applied on a case-by-case basis and secured through the CEMP. Mitigation of adverse effects will take the form of the application of best practice. Significant adverse effects may require additional consideration, such as management procedures or engineered screening to reduce noise and vibration to below the SOAEL. The assessment of residual effects will be revisited as part of the Final ES.

Next steps

10.13.3 A baseline sound level survey will be undertaken at a location representative of the residential receptors at Clock Face to inform the final assessment.

10.13.4 The assessment of the construction phase noise effects will be reviewed and updated when final information on construction activities is available. This will help to develop the environmental measures for the trenchless crossings.

10.13.5 Screening of the potential for construction phase vibration effects, and underwater noise and vibration effects, will be undertaken when final information on construction activities is available.

10.13.6 The assessment of the operational phase sound from the HAGIs will be assessed and reported in the Final ES.

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