A57 Link Roads

TR010034

6.3 Environmental Statement

Chapter 11 Noise and Vibration

APFP Regulation 5(2)(a)

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

December 2021

Infrastructure Planning

Planning Act 2008

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

A57 Link Roads

Development Consent Order 202[x]

6.3 ENVIRONMENTAL STATEMENT

CHAPTER 11 – NOISE AND VIBRATION

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Table of contents

Chapter Pages

Tables

11. Noise and Vibration

11.1 Introduction

11.1.1 This chapter provides the environmental noise and vibration assessment of the Scheme, consisting of information relating to the baseline conditions, identification of sensitive receptors, the expected noise and vibration impacts from the construction and operation phases of the Scheme and the mitigation measures that may be required to avoid significant effects. A commentary describing how noise and vibration impacts from the Scheme affect human health are provided in the Population and Human Health chapter (Chapter 12) (APP-068).

11.2 Legislation and Policy Context

11.2.1 A Current noise policy in England is based on the Noise Policy Statement for England (NPSE)[1], which through the effective management and control of environmental noise within the context of Government policy on sustainable development, aims to:

- avoid significant adverse impacts on health and quality of life
- mitigate and minimise other adverse impacts on health and quality of life
- contribute to improvements to health and quality of life, where possible.

11.2.2 These aims are reflected in the National Planning Policy Framework (NPPF)[2] and are further echoed in the National Policy Statement for National Networks (NPS NN)[3] and Planning Practice Guidance concerning noise[4].

11.2.3 The Explanatory Note to the NPSE assists in the definition of the terms 'significant adverse' and 'adverse' with the following concepts:

- NOEL - no observed effect level. 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
- LOAEL - lowest observed adverse effect level. This is the level above which adverse effects on health and quality of life can be detected
- SOAEL - significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur.

11.2.4 Government policy and guidance do not state values for the NOEL, LOAEL and SOAEL, rather, it considers that they are likely to be different for different noise sources, for different receptors and at different times and should be defined on a strategic or project basis taking into account the specific features of that area, source or project. The concepts of NOEL, LOAEL and SOAEL apply to the assessment of noise and vibration in the construction and operation phases of the Scheme.

[1] Department for Environment and Rural Affairs (2010). Noise Policy Statement for England. London: Defra
[2] Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework. London: MHCLG
[3] Department for Transport (2014). National Policy Statement for National Networks. London: TSO
[4] Department for Communities and Local Government (2014). Planning Practice Guidance: Noise. Available at: http://planningguidance.planningportal.gov.uk/

11.2.5 The legislation and policies considered in undertaking this assessment are detailed in Table 11.1.

Table 11.1: Legislation, regulatory and policy framework for noise and vibration

Legislation / Regulation	Summary of Requirements
National	
National Policy Statement for National Networks (NPSNN)	The NPSNN states the following factors as determinants of the likely noise impact: • construction noise and the inherent operational noise from the proposed development and its characteristics; • the proximity of the proposed development to noise sensitive premises (including residential properties, schools, and hospitals) and noise sensitive areas (including certain parks and open spaces); • the proximity of the proposed development to quiet places and other areas that are particularly valued for their tranquillity, acoustic environment, or landscape quality such as National Parks, the Broads, or Areas of Outstanding Natural Beauty; and • the proximity of the proposed development to designated sites where noise may have an adverse impact on the special features of interest, protected species, or other wildlife.
National Planning Policy Framework (NPPF) 2021~~9~~	Paragraph ~~180~~ 185 states that decisions on development should aim to: • ensure that new development is appropriate for its location, taking into account the likely effects (and cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site and wider area impacts that could arise from the development; • mitigate and reduce to a minimum, other adverse impacts resulting from new development, and avoid noise giving rise to significant adverse effects on health and quality of life; and • identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
Planning Practice Guidance: Noise 2019~~4~~	This guidance provides advice on how planning can manage potential noise impacts in new development. Noise should not be considered in isolation and should instead be viewed in relation to social, economic, and environmental context.
Environmental Noise (England) Regulations 2006	This regulation is relevant to the operational phase of the Scheme. The regulations implement the European Environmental Noise Directive (END) in England. Developments must take into account Noise Action Plans.
Noise Policy Statement for England (NPSE) 2010	Within the context of Government policy on sustainable development: • Avoid significant adverse effects as a result of the Scheme; • Mitigate and minimise adverse impacts as a result of the Scheme; and • Contribute to the enhancement of the acoustic environment, where possible.

Legislation / Regulation	Summary of Requirements
	The Explanatory Note to the NPSE assists in the definition of 'significant adverse' and 'adverse' with reference to NOEL, LOAEL and SOAEL values. The Government policy and guidance do not state values for the NOEL, LOAEL and SOAEL, rather, it considers that they are different for different noise sources, for different receptors and at different times and should be defined on a strategic or project basis taking into account the specific features of that area, source or project. NPSE also states that sustainable development is a core principle underpinning all government policy. The goal is pursued in ways that protect and enhance the physical and natural environment, and that use resources and energy as efficiently as possible.
Land Compensation Act 1973	This Act is relevant to the operational phase of the Scheme. Part I Compensation is available for depreciation caused by the use of public works.
Infrastructure Act 2015	Section 5(2) of the Infrastructure Act and the Highways England Licence seek to minimise the environmental impacts of projects, protect and enhance the quality of the surrounding environment and conform to the principles of sustainable development.
Road Investment Strategy (RIS) 2: 2020-2025 [5]	The Department for Transport RIS for the second Road Period, 2020-2025, aims to mitigate noise at 7,500 households in NIAs through a combination of offering noise insulation to affected households, constructing noise barriers and the use of quieter road surfaces. This activity will be funded from the Environment and Wellbeing designated fund. The Highways England Licence states that Highways England should ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money.
Control of Pollution Act 1974 (as amended)	This is relevant to the construction phase of the Scheme and includes: • Section 60 - Control of noise on construction sites; • Section 61 - Prior consent for work on construction sites; • Section 71 - Codes of practice for minimising noise; and • Section 72 - Best practicable means.
Environmental Protection Act 1990 (as amended)	This is relevant to the construction phase of the Scheme. Section 79 (1) (ga) noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street is a statutory nuisance; (NB if so should be inspected by the local authority) (9) interpretation of "best practicable means".
The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015	This is relevant to the construction phase of the Scheme and approves BS 5228:2009+A1:2014 Part 1 Noise and Part 2 Vibration for the purpose of giving guidance on appropriate methods for minimising noise and vibration.
Noise Insulation Regulations 1975 (as amended 1988)	Operational phase: • Regulation 3 imposes a duty on authorities to undertake or make a grant in respect of the cost of undertaking noise

[5] Department for Transport (2020). Road Investment Strategy 2: 2020-2025. Available at: https://www.gov.uk/government/publications/road-investment-strategy-2-ris2-2020-to-2025

Legislation / Regulation	Summary of Requirements
	insulation work in or to eligible buildings. This is subject to meeting certain criteria given in the Regulation; and • Regulation 4 provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings, subject to meeting certain criteria given in the Regulation. Construction phase: • Regulation 5 provides relevant authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings with respect to construction noise. This is subject to meeting certain criteria given in the Regulation.
The Highways Noise Payments and Movable Homes (England) Regulations 2000	This regulation is relevant to the operational phases of the Scheme. It provides highway authorities with a discretionary power to provide a noise payment where new roads are to be constructed or existing ones altered. The relevant Regulations set out the criteria which should be applied in assessing eligibility for making such payments.
Local	
Tameside Metropolitan Borough Council (Tameside MBC)	Unitary Development Plan, adopted 2004[6] • Policy E6 (d) and Policy S9 (d) requires that the layout, design, external appearance and operation of employment developments and retail/leisure developments result in no unacceptable impact on neighbouring properties through noise, vibration, traffic and other disturbances and that there is no unacceptable impact on residential amenity including consideration of hours of operation • Policy H10 (d) requires that the layout, design, and external appearance of proposed housing developments result in no unacceptable impact on the amenity of neighbouring properties through noise, loss of privacy, overshadowing, or traffic. Greater Manchester Spatial Framework Publication Plan 2020, Draft for Approval[7] • Policies GM-N4 (1k) and GM-N4 (3) states that the design and management of Greater Manchester's streets comprises a Streets for All approach including by mitigating the impacts or air and noise pollution and carbon emissions from road transport, and that any new infrastructure minimises the negative effects of vehicle traffic • Policy GM-N7 (14) requires that Construction Management Plans are produced for developments, where appropriate, to mitigate construction logistics and environmental impacts including air quality and noise on the surrounding area and encourage sustainable deliveries • There are several policies that relating to noise mitigation measures for developments on specific land allocations, for example, Policy GM Allocation 41: New Carrington. This policy requires that appropriate noise and air quality mitigation is incorporated, particularly along major transport corridors.

[6] Tameside Metropolitan Borough Council (2004). The Tameside Unitary Development Plan Written Statement, Adopted Plan November 2004. Available at: https://www.tameside.gov.uk/udp
[7] Greater Manchester Combined Authority (2020). Greater Manchester's Plan for Homes, Jobs and the Environment: Greater Manchester Spatial Framework Publication Plan 2020, Draft for Approval. Available at: https://www.tameside.gov.uk/GMSF

Legislation / Regulation	Summary of Requirements
	Other examples include Policy GM Allocation 29 (North of Irlam Station) which requires appropriate mitigation to address noise generated by the M62 motorway and rail line.
Derbyshire County Council	Local Transport Plan 2011-2026[89] • Minimising noise and vibration impacts is stated as a strategic environmental assessment objective. This is funded through Investment Protocol 15, which promotes the use of noise reducing road surfaces or other noise reducing interventions. • A Network Management Duty Plan will recognise the requirement to balance the desires of its communities, visitors and businesses with the need to deal with issues like reducing congestion, promoting public transport, making the network a safer place and reducing the effects of noise and air pollution.
High Peak Borough Council	High Peak Local Plan, adopted 2016[10] • Policy EQ6 states that all development should be well designed and of a high quality that responds positively to both its environment and the challenge of climate change, whilst also contributing to local distinctiveness and sense of place. One of the measures this will be achieved by is requiring that development achieves a satisfactory relationship to adjacent development and foes not cause unacceptable effects by reason of visual intrusion, overlooking, shadowing, overbearing effect, noise, light pollution or other adverse impacts on local character and amenity. • Policy EQ 10 states that the Council will protect people and the environment from unsafe, unhealthy, and polluted environments. This will be achieved by ensuring developments avoid potential adverse effects and only permitting developments that are deemed (individually or cumulatively) to result in pollution [including noise and vibration] if any remaining potential adverse effects are mitigated to an acceptable level by other environmental controls or measures included in the proposals. This may be achieved through the imposition of planning conditions or through a planning obligation, The Council will not permit any proposal that has an adverse effect on a European site.

11.3 Assessment Methodology

Consultation and scoping responses

11.3.1 Details of consultation undertaken to inform the Noise and vibration assessment are presented in the Introduction chapter (Chapter 1 (APP-060)) (Table 1-6) and the Consultation Report (~~TR010034/APP/5.1~~APP-026 – APP-052).

11.3.2 An overview of the Planning Inspectorate's Scoping Opinion on the proposed scope of the Noise and vibration assessment is provided in Appendix 4.1 (~~document reference TR010034/APP/6.5~~APP-152). Any additional consultation

[8] Derbyshire County Council (2011). Derbyshire Local Transport Plan 2011-2026, Main Document. Available at: https://www.derbyshire.gov.uk/transport-roads/transport-plans/ltp3/local-transport-plan-three.aspx
[9] Derbyshire County Council (2011). Derbyshire Local Transport Plan 2011-2026, Supplementary document investment protocol to 2016 https://www.derbyshire.gov.uk/transport-roads/transport-plans/ltp3/inv-protocol/investment-protocol.aspx
[10] High Peak Borough Council (2016). High Peak Local Plan Adopted April 2016. Available at: https://www.highpeak.gov.uk/article/646/The-Adopted-Local-Plan-2016

responses or changes to assessment methodology due to the latest DMRB standards or design changes are also detailed in Appendix 4.43 (~~TR010034/APP/6.5~~APP-154).

Construction

11.3.3 The construction noise and vibration assessment was undertaken using three study areas, with each study area focussed on a specific source of noise or vibration. Multiple study areas are beneficial due to the variance in distance attenuation for each source of noise and vibration, and the study areas allow a proportionate approach to be taken. This approach is in line with guidance provided in the DMRB LA 111 on setting study areas for construction noise and vibration assessments.

11.3.4 The size of all study areas was determined based on the guidance provided in the DMRB LA 111 and included receptors where impacts could occur and where there was a reasonable stakeholder expectation that assessments would be undertaken. The study areas have considered the PINS Scoping Opinion, which responses to are available in Appendix 4.1 (~~TR010034/APP/6.5~~APP-152). The study areas for the construction phase assessments are shown in Figure 11.3 (~~TR010034/APP/6.4~~APP-142).

Construction Noise

11.3.5 The construction activity noise calculations were undertaken in accordance with guidance in BS 5228:2009 +A1:2014 'Code of practice for noise and vibration control on construction and open sites, Part 1: Noise'[11] and assessed with reference to guidance in the Design Manual for Roads and Vibration (DMRB) LA 111 'Noise and Vibration' (2020)[12], which provides specific guidance on the appraisal of construction phase impacts from road schemes.

11.3.6 Construction phase information provided by the appointed Principal Contractor was used to identify noise-generating activities that could affect noise sensitive receptors in proximity to the Scheme. These activities included the construction and operation of a site compound north of A57 Hyde Road as well as construction activities for specific design elements.

11.3.7 The noise levels in dB $L_{Aeq,T}$ for each construction activity were calculated at a reference distance of 10 m from the activity, taking into account the type and quantity of construction plant expected to be in use and their anticipated usage patterns (also referred to as 'on-time'). The resultant noise levels at a selection of representative noise sensitive receptors were then predicted by correcting the activity noise levels for distance and for screening provided by mitigation measures using the equations provided in Annex F of the Standard. The selected receptors were chosen based on their distance from the Scheme and to provide a sufficient geographical coverage of potential impacts. Each of the assessment locations represents a number of properties in its vicinity.

11.3.8 To consider the potential construction noise impacts at any locations not covered by the selected noise sensitive receptors, construction noise levels were also predicted at a range of distances up to 300 m from each construction activity.

[11] British Standards Institution (2014). BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise. London: BSI.
[12] Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020). Design Manual for Roads and Bridges, LA 111 Noise and Vibration. Revision 2.

11.3.9 In accordance with BS 5228 Part 1 and DMRB LA 111, the construction noise assessment criteria were determined with reference to the existing noise climate at each receptor. The baseline noise levels were ascertained using the following data sources:

- Baseline noise survey data, as discussed in Section 11.6 and Appendix 11.1 (~~TR010034/APP/6.5~~APP-140); and
- Strategic noise maps (L_{den}) for road traffic noise (Defra, 2019)[13], as shown in Figure 11.1 (~~TR010034/APP/6.4~~APP-140). The strategic noise maps featuring L_{den} noise contours were chosen as the basis for supplementary baseline data as they offered greater coverage than $L_{Aeq,16hr}$ contours. As the strategic noise map data provided noise contours in 5 dB intervals, further processing was required to estimate the baseline noise levels at key locations. In these instances, daytime ($L_{Aeq,16h}$) and night-time (L_{night}) noise levels were obtained using the Transport Research Laboratory document 'Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping' (2002)[14].

11.3.10 The lowest observed adverse effect level (LOAEL), which represents the lowest noise level at which the detectable onset of an adverse effect can occur, was set to be equal to the baseline noise levels as per the DMRB LA 111. The value of the LOAEL/baseline noise level was then used to select an appropriate significant observed adverse effect level (SOAEL); a value that if exceeded has the potential to result in a significant effect depending on duration and context.

11.3.11 The corresponding SOAEL values for each of the selected representative noise sensitive receptors were determined using the ABC method outlined in BS 5228-1 (and reproduced in the DMRB LA 111). The ABC method requires the baseline noise level (the LOAEL) to be rounded to the nearest 5 dB and compared against the Category A values shown in Table 11.2 for the time period of interest. The SOAEL is selected depending on whether the rounded baseline noise level is below, equal to, or higher than the values shown in Category A, or higher than the values shown in Category C, as explained in the notes in Table 11.2.

[13] Department for Environment, Food and Rural Affairs (2019). Noise Exposure data – Round 3. Datasets available at: Noise Exposure data - Round 3 - data.gov.uk
[14] Abbott, P.G and Nelson, P.M (2002). Converting the UK Traffic Noise Index $L_{A10,18hr}$ to EU Noise Indices for Noise Mapping. Project Report PR/SE/451/02. Crowthorne: TRL

Table 11.2: The ABC method stated in BS 5228 Part 1

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq,T}$)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (2300 – 0700)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (0700-1900) and Saturdays (0700 - 1300)	65	70	75

Note 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.

Note 3 Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 1900-2300 weekdays, 1300-2300 Saturdays and 0700-2300 Sundays

Table Source: British Standards Institution (2014). BS 5228 Part 1, Table E.1.

11.3.12 Once the LOAEL and SOAEL values were identified, the magnitude of any potential noise impact was then assessed using the information shown in Table 11.3. Minor magnitudes of impact are considered to represent the threshold of perceptibility.

Table 11.3: Magnitude of impact and construction noise descriptions

Magnitude of Impact	Construction Activity Noise Level ($L_{Aeq,T}$)
Major	Above or equal to SOAEL +5 dB
Moderate	Above or equal to SOAEL and below SOAEL +5 dB
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Table Source: Highways England et al (2020). DMRB LA 111 'Noise and Vibration', Table 3.16.

11.3.13 Guidance from the DMRB LA 111 states that a significant effect potentially occurs where a moderate or major construction noise magnitude of impact is predicted for a duration exceeding:

- 10 or more days in any 15 consecutive days or nights
- A total number of days exceeding 40 in any 6 consecutive months

11.3.14 A detailed construction programme is unavailable at the time of writing. Information has been provided that shows planned activities and an approximate timeframe as to when the majority of these would be accomplished. The works are broadly planned to be carried out in five distinct phases of work.

11.3.15 The construction noise assessment has therefore taken a risk-based approach, identifying the potential range of construction noise levels from various noise-generating activities in each construction phase. The appointed Principal Contractor has indicated that construction activities capable of generating noise will not be carried out concurrently in noise sensitive areas. An indication of activity durations has been supplied by the appointed Principal Contractor to assist with the determination of significance in the event of SOAEL exceedance.

11.3.16 To avoid the potential underprediction of noise levels it has been assumed that all activities within a given phase of construction would happen at their closest point to each assessment location. For example, if an activity consists of three plant that generate noise in the course of their work, a noise level is calculated for all three plant combined and assessed at the shortest distance planned between that activity and the assessment location. It is noted that when the works would take place away from the closest distance to receptors noise levels would be lower than the predicted levels shown. This has been taken into consideration when determining the impact significance at each assessment location.

Construction Vibration

11.3.17 The main construction activities that can result in potentially significant levels of vibration are piling, earth compaction, and other works requiring the use of a vibratory roller. Where instances of these works were identified from the construction programme, construction vibration calculations were undertaken in accordance with guidance in BS 5228 ‘Code of practice for noise and vibration control on construction and open sites, Part 2: Vibration'[15].

11.3.18 The resulting peak particle velocity (PPV) in mm/s calculated at sensitive receptors was assessed against significance thresholds for construction vibration shown in the DMRB LA 111. The LOAEL and SOAEL values for construction vibration are shown in Table 11.4 along with their perceptibility according to BS 5228 Part 2. The LOAEL and SOAEL values are the same for all time periods.

Table 11.4: Construction Vibration LOAEL and SOAEL threshold for all receptors

Threshold level	Vibration level (PPV) [1]	Effect [2]
LOAEL	0.3 mm/s	Vibration might be just perceptible in residential environments
SOAEL	1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation is given to residents

[1] Threshold levels for LOAEL and SOAEL stated in the DMRB LA 111, Table 3.31.
[2] Vibration perceptibility stated in BS 5228 Part 2, Table B.1.

11.3.19 With reference to the LOAEL and SOAEL values shown in Table 11.4, the predicted construction vibration levels at sensitive receptors were assigned an

[15] British Standards Institution (2014). BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 2: Vibration. London: BSI.

impact magnitude based on guidance in the DMRB LA 111. The impact magnitude categories are described in Table 11.5.

Table 11.5: Magnitude of impact of vibration levels

Magnitude of Impact	Vibration level
Major	Above or equal to 10 mm/s PPV
Moderate	Above or equal to SOAEL and below 10 mm/s PPV
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Table Source: Highways England et al (2020). DMRB LA 111 'Noise and Vibration', Table 3.33.

11.3.20 A significant effect attributed to construction vibration is likely where it is determined that a major or moderate magnitude of impact would occur for either:

- 10 or more days or nights in any 15 consecutive days or nights
- A total number of days exceeding 40 in any 6 consecutive months

11.3.21 Where high levels of vibration are predicted, the values in Table 11.6 are used to determine the potential for cosmetic damage to buildings.

Table 11.6: Guidance on the effects of vibration levels perceptible to buildings

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
1. Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
2. Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Notes 1. Values referred to are at the base of the building 2. For building type 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded		

Table Source: British Standards Institution (2014). BS 5228 Part 2, Annex B, Table B.2.

11.3.22 Assessment criteria for underground services are provided in BS 5228 Part 2 (Annex B.4.4). The maximum PPVs stated in BS 5228 are:

- 30 mm/s PPV for intermittent or transient vibration (for example, piling)
- 15 mm/s PPV for continuous vibratory activities (for example, compaction).

11.3.23 BS 5228 advises that the assessment criteria should be applied at the nearest point to the source or activity. Even a PPV of 30 mm/s gives rise to a dynamic stress which is equivalent to approximately 5% only of the allowable working stress in typical concrete and even less in iron or steel.

11.3.24 BS 5228 states that in the event of encountering elderly and dilapidated brickwork sewers, the base data should be reduced by 20% to 50%. For most metal and reinforced concrete service pipes, however, the maximum PPVs

stated above are expected to be quite tolerable. There is often some difficulty in assessing the true condition of underground pipes, culverts, and sewers. Among the factors which could mean that such services are in a state of incipient failure are poorly formed joints, hard spots, badly prepared trench bases, distortion due to settlement or heave, or unstable surrounding ground caused by previous or existing leaks.

Diversion traffic

11.3.25 In line with the proportionate approach offered in the DMRB LA 111, a 25 m study area has been generated from all roads that are subject to diverted traffic following planned road closures. These roads have been identified using the Traffic Management Plan drafted by the Principal Contractor.

11.3.26 A property count has been conducted to identify how many properties may be subject to disturbance as per the DMRB LA 111.

Construction traffic

11.3.27 Changes in 'basic noise level' (BNL) due to construction traffic were calculated for roads within the construction traffic study area using the methodology found in the 'Calculation of Road Traffic Noise', 1988 (CRTN).

11.3.28 Pivoted traffic data used in this assessment contains the following components:

- 18-hour annual average weekday traffic (AAWT) flow;
- 18-hour average speed (kph); and
- Percentage HGV content of total 18-hour AAWT flow.

11.3.29 The impact magnitude of changes in noise due to construction traffic on receptors provided in the DMRB LA 111 is shown in Table 11.7 below.

Table 11.7: Magnitude of construction traffic impact

Magnitude of Impact	Change in Construction Traffic Noise Level ($L_{A10,18h}$)
Major	Greater than or equal to 5 dB
Moderate	Greater than or equal to 3 dB and less than 5 dB
Minor	Greater than or equal to 1 dB and less than 3 dB
Negligible	Less than 1 dB

Table Source: Highways England et al (2020). DMRB LA 111 ‘Noise and Vibration’, Table 3.17.

11.3.30 In accordance with the DMRB LA 111, potential noise impacts from construction traffic were considered to constitute a significant effect where a major or moderate magnitude of impact was predicted for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights, or
- A total number of days exceeding 40 in any 6 consecutive months.

11.3.31 Following the review of construction traffic data supplied by the appointed Principal Contractor, no roads were found to have the potential to increase the BNL by an amount greater than or equal to 1dB. Consequently, all changes in noise level across the planned construction routes are negligible and no construction traffic study area is required.

Operation

Noise

Scope of assessment

11.3.32 The Scheme has the potential to affect road traffic noise levels at noise sensitive receptors caused by changes to the following:

- Road alignment (vertical and horizontal), including the addition of new or bypassed roads
- Sound generation (traffic flow, speed, gradient and road surface type)
- Sound propagation (ground absorption, screening, reflection, and scattering).

11.3.33 The Scheme's proposals do not include the introduction or alteration of any other sources of environmental noise. The operation phase noise assessment was therefore focussed on impacts from road traffic noise only.

11.3.34 The operation phase road traffic noise study area was defined in accordance with the DMRB LA 111, which suggests that the study area should encompass the following:

- The area within 600 m of new road links or road links physically changed or bypassed by the Scheme
- The area within 50 m of other road links with potential to experience a short-term change of more than 1 dB as a result of the Scheme
- Areas where there is a reasonable stakeholder expectation that an operation phase road traffic noise assessment would be undertaken.

11.3.35 The study areas have been created with consideration given to the Planning Inspectorate Scoping Opinion, to which responses are available in Appendix 4.1 (~~TR010034/APP/6.5~~APP-152). The study areas for the operational assessment is shown in Figures 11.4 (APP-133) and 11.5 (~~TR010034/APP/6.4~~APP-134). The results for within 600 m of the Scheme and outside of 600 m of the Scheme are presented separately in this report to allow for the identification of impacts that are considered to be a direct result of the Scheme and impacts that are considered to be as a result of traffic changes on the wider network. The assessed traffic network spans from M60 J24 in the west, to M62 J23 in the north, to M1 J35 in the east, and finally to the conjunction of the A623 and A625 at Calver. This is to facilitate NPS NN adherence.

Road traffic noise modelling

11.3.36 The operational assessment followed the procedures described in the DMRB LA 111. A three-dimensional noise model was built using NoiseMap v5.2.4 software to predict daytime and night-time road traffic noise levels at noise sensitive receptors in the study area for the following traffic scenarios:

- Do Minimum (without the Scheme) in the opening year (DM 2025 or DMOY)
- Do Something (with the Scheme) in the opening year (DS 2025 or DSOY)
- Do Minimum in the future year (DM 2040 or DMFY))
- Do Something in the future year (DS 2040 or DSFY)

11.3.37 The road traffic noise levels ($L_{A10,18h}$) were predicted in accordance with the Calculation of Road Traffic Noise (CRTN) (DoT and Welsh Office, 1988) and the DMRB LA 111. The predicted noise levels did not take into account the power transmission type used within the traffic fleet because this factor is not considered by the standard approved assessment methodology. As tyre-road noise is the dominant component of vehicular noise when vehicles are travelling at 30-50 kph or higher, quieter engines associated with electric or hybrid vehicles would not typically affect road traffic noise levels in the study area.

11.3.38 The noise modelling was undertaken using traffic projections from strategic traffic modelling (~~TR010034/APP/7.4~~APP-185) to permit the degree of accuracy required for this assessment. The traffic data comprised 18-hour average annual weekly traffic flows for each traffic link in the study area and wider area, and the corresponding pivoted traffic speed and fleet composition for each traffic link.

11.3.39 The noise modelling software predicted the road traffic noise levels at sensitive receptors by implementing the calculation procedure detailed in the CRTN, which involves calculating the Basic Noise Level at 10 m from the kerb using the traffic parameters described above and predicting noise level at receptors by taking into account topography, ground absorption, reflections and screening from intervening structures.

11.3.40 The topographical model was built from Scheme drawings at locations near the scheme and complete coverage of Ordnance Survey Terrain 5 data at locations further away from the Scheme.

11.3.41 Ordnance Survey base mapping and AddressBase Plus data were used to establish the relevant noise sensitive receptors within the appropriate calculation area. This included residential receptors and non-residential receptors, such as schools, medical facilities, and places of worship. Locations highlighted from stakeholder consultation were also included in the assessment.

11.3.42 Locations highlighted as potentially requiring noise mitigation were previously identified in the Preliminary Environmental Information Report (PEIR)[16], which was published ahead of the statutory consultation event in November – December 2020. The locations earmarked for potential mitigation were provided to the design team and formed the basis for preliminary mitigation measures to be considered. Different configurations of noise mitigation were trialled in the detailed model (as distinct from the spatially course PEIR noise model) to inform the finalised noise mitigation placement for this assessment. Further information regarding mitigation measures designed into the Scheme is provided in Section 11.8 'Design, mitigation and enhancement measures'.

Assessment criteria

11.3.43 The predicted road traffic noise levels from each traffic scenario were assessed against the LOAEL and SOAEL threshold levels shown in Table 11.8 in order to establish the impact significance in policy terms (i.e. compliance with the NPSE). Exceedances of the LOAEL indicate adverse effects and SOAEL exceedances correspond to significant effects in policy terms.

[16] PW Integrated Template (citizenspace.com)

Table 11.8: Operational noise LOAEL and SOAEL thresholds for all building receptors

Time Period	LOAEL	SOAEL
Day (0600-0000)	55 dB $L_{A10,18hr}$ facade	68 dB $L_{A10,18hr}$ facade
Night (2300-0700)	40 dB $L_{night,outside}$ (free-field)	55 dB $L_{night,outside}$ (free-field)

Table Source: Highways England et al (2020). DMRB LA 111 'Noise and Vibration', Table 3.49.1.

11.3.44 Whilst it is noted that LOAEL and SOAEL values are set for building receptors in DMRB LA 111, the same criteria have also been used for open spaces in this assessment, in line with DMRB LA 111.

11.3.45 The impact significance in EIA terms was determined by calculating the changes in noise associated with the Scheme. In accordance with the DMRB LA 111, short-term and long-term impacts were identified using the following comparisons:

- Short-term impacts with the Scheme - Do Something Opening Year (2025) compared to Do Minimum Opening Year (2025). This comparison represents the change in noise due to the Scheme in the opening year
- Long-term impacts without the Scheme - Do Minimum Future Year (2040) compared with Do Minimum Opening Year (2025). This comparison represents the change in noise due to traffic growth which would occur if the scheme were not built
- Long-term impacts with the Scheme - Do Something Future Year (2040) compared to Do Minimum Opening Year (2025). This comparison represents the change in noise due to the Scheme over the 15-year period after opening.

11.3.46 The impact magnitude for short-term and long-term noise changes has been reported in accordance with the DMRB LA 111, detailing the number of noise sensitive receptors predicted to experience changes in noise levels corresponding to specified noise bands stated in the guidance. The magnitude of a noise change is perceived differently dependent on whether it is a sudden change or a change over a longer period of time. In the short-term (e.g. on Scheme opening), a change in road traffic noise of 1 dB is the smallest that is considered to cause a minor impact and is the smallest change that is considered perceptible. In the long-term, a 3 dB change is considered the minimum required to be considered perceptible. The impact magnitudes defined in the DMRB LA 111 are shown in Table 11.9.

Table 11.9: Magnitude of noise change in the short-term and long-term

Noise Change, dB $L_{A10,18hr}$ or L_{night}	Magnitude of Change	
	Short-term (Opening Year)	Long-term (Future Year)
0	No Change	No Change
0.1 to 0.9	Negligible	Negligible
1.0 to 2.9	Minor	Negligible
3.0 to 4.9	Moderate	Minor
5.0 to 9.9	Major	Moderate
≥ 10	Major	Major

Table Source: Highways England et al (2020). DMRB LA 111 'Noise and Vibration', Tables 3.54a and Table 3.54b.

11.3.47 The DMRB LA 111 states that moderate and major increases are considered to be initially significant, whilst minor increases are not. The impact significance is finalised taking into consideration the presence of SOAEL exceedances and other contextual factors shown in Table 11.10.

Table 11.10: Factors influencing the significance of road traffic noise

Description	Influence on significance judgement
Noise level change (the magnitude of change is close to the minor/moderate boundary)	Noise level changes within 1 dB of the top of the minor range can indicate that it is more appropriate to determine a likely significant effect. Noise level changes within 1 dB of the bottom of a moderate range can indicate that it is more appropriate to consider a change is not a likely significant effect.
Differing magnitude of impact in the long-term to magnitude of impact in the short-term	1) Where the long-term impact is predicted to be greater than the short-term impact, it can be appropriate to conclude that a minor change in the short-term is a likely significant effect. Where the long-term impact is predicted to be less than the short-term it can be appropriate to conclude that a moderate or major change in the short-term is not significant. 2) A similar change in the long-term and non-project noise change can indicate that the change is not due to the project and not an indication of a likely significant effect.
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	1) A noise change where all Do Something absolute noise levels are below SOAEL requires no modification of the initial assessment. 2) Where any Do Something absolute noise levels are above the SOAEL, a noise change in the short-term of 1.0dB or over results in a likely significant effect.
Location of noise sensitive parts of a receptor	1) If the sensitive parts of a receptor are protected from the noise source, it can be appropriate to conclude a moderate or major magnitude change in the short-term and/or long-term is not a likely significant effect. 2) Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short-term and/or long-term is a likely significant effect.

Description	Influence on significance judgement
	3) It is only necessary to look in detail at individual receptors in terms of this circumstance where the decision on whether the noise change gives rise to a significant environmental effect is marginal.
Acoustic context	If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short-term and/or long-term is a likely significant effect.
Likely perception of change by residents	1) If the project results in obvious changes to the landscape or setting of a receptor, it is likely that noise level changes will be more acutely perceived by the noise sensitive receptors. In these cases, it can be appropriate to conclude that a minor change in the short term and/or long term is a likely significant effect. 2) Conversely, if the project results in no obvious changes for the landscape, particularly if the road is not visible from the receptor, it can be appropriate to conclude that a moderate change in the short term and/or long term is not a likely significant effect.

Table Source: Highways England et al (2020). DMRB LA 111 'Noise and Vibration', Table 3.60.

11.3.48 The application of the contextual factors means that a significant adverse effect can occur if the predicted road traffic noise levels with the Scheme exceed the SOAEL and are shown to increase by at least 1 dB in the short-term.

11.3.49 In this assessment, an adverse effect is deemed to occur at a noise sensitive receptor if the predicted noise levels equal or exceed the LOAEL and a perceptible change to the road traffic noise levels occur.

11.3.50 Potential claimants for noise insulation under the Noise Insulation Regulations 1975 were identified from the predicted noise levels. Noise sensitive receptors that may potentially qualify for noise insulation are dwellings that experience road traffic noise levels greater than or equal to 68 dB $L_{A10,18h}$ and are shown to experience an increase of at least 1 dB due to the Scheme, and are situated within 300 m of the new or altered road.

11.3.51 Potential qualification for noise insulation has not been used to inform residual impacts or reduce the potential significance of impacts.

Vibration

11.3.52 DMRB LA 111 states that operation phase vibration from road traffic is scoped out of the assessment methodology for appraising road schemes. This is based on the Applicant's design requirement for smooth road surfacing and research indicating that groundborne vibration impacts from road traffic are linked to discontinuities of the road surface (Watts, 1987, 1990)[17] [18]. Examples of discontinuities include road surface defects (such as potholes) and assets interfacing with the road (drains, manhole covers) that vehicles may travel over.

11.3.53 Groundborne vibration was highlighted as a concern by the Planning Inspectorate in their Scoping Opinion based on an older design in 2017 and the use of a now superseded version of the DMRB. Following consultation between the Applicant and the Planning Inspectorate on operation phase vibration

[17] Watts, G.R. (1987). Traffic-induced ground-borne vibrations in dwellings. Research Report 102. Crowthorne: TRRL
[18] Watts, G.R. (1990). Traffic-induced vibrations in buildings. Research Report 246. Crowthorne: TRRL

assessments, it is understood that the Planning Inspectorate is satisfied that an operational vibration assessment can be scoped out. Consequently, an assessment of groundborne vibration has not been carried out.

11.4 Assessment Assumptions and Limitations

Construction

Construction Noise

11.4.1 The construction noise assessment was based on information provided by the appointed Principal Contractor and reflects the best information available at the time of assessment. The plant lists, construction methods, phase or construction programme may change during the Detailed Design of the Scheme, which may affect predicted noise levels at sensitive receptors. A list of plant designated for each construction activity is contained within Appendix 11.2 (~~TR010034/APP/6.5~~APP-175). Indicative timescales for the majority of activities is also included in Appendix 11.2.

11.4.2 The assumptions used in the construction noise assessment are stated below:

- An outline list of activities that are programmed for each construction phase was provided by the appointed Principal Contractor, along with indicative plant lists corresponding to some of those activities. Plant lists for the remaining construction activities were compiled based on professional judgement and previous project experience to provide a realistic worst-case assessment of construction noise levels
- The on-time for each item of plant were set based on the following:
  - 100% for an item that would be in continuous use
  - 75% for an item that would be in use most of the time
  - 50% for an item that would be in use some of the time
  - 25% for an item that would be in use only occasionally
- No night-time construction works are planned for the Scheme during the entire construction programme except for traffic management
- Daytime activities assume a 12 hour working day (e.g. 07:00 to 19:00)
- All calculations assume hard ground attenuation and screening from temporary environmental noise barriers,
- The screening effect from any existing structures or buildings within the study area was not considered
- All calculations are free-field noise levels and do not include a façade correction

11.4.3 At the current Preliminary Design stage, the Principal Contractor has indicated that construction activities capable of generating noise will not be carried out concurrently in noise sensitive areas. An indication of durations for activities predicted to exceed LOAEL has been supplied by the appointed Principal Contractor and is available in Appendix 11.3 (~~TR010034/APP/6.5~~APP-176).

Consequently, an assessment of the magnitudes of impact and significance can be made per construction activity using this, the best information available.

11.4.4 The results of the construction noise calculations provide a reasonable worst-case assessment of construction noise levels by assuming that all plant for each activity is operating at the closest point to the sensitive receptors. In reality, much of the work for each activity would occur at greater distances as the construction works are not fixed at one location for the duration of the build.

Construction Vibration

11.4.5 The construction vibration assessment was based on information provided by the appointed Principal Contractor and reflect the best information available at the time of assessment. Vibration-generating activities and items of plant were identified following discussions with the appointed Principal Contractor and the receipt of their indicative plant lists. The construction vibration assessment is based on the following assumptions:

- Rotary bored piling at Mottram Underpass is the preferred (and strongly recommended) method of piling, with percussive piling used as a fall back if ground conditions mandate it. For example, a geological fault line is present in the vicinity of Mottram Underpass which may influence the final selection of the piling method
- Vibration levels resulting from percussive piling are provided in this assessment for context. The scaling factor for driven piling is assumed to be 1.5 (e.g. piles are driven through stiff cohesive soil/compact fill)
- All percussive piling assumes 85kJ hammer energy
- Only steady-state vibratory rolling is considered
- The scaling factor for vibratory rolling is assumed to have a 5% chance of exceedance
- A Bomag 120 or similar vibratory roller is assumed for all vibratory rolling.

11.4.6 The results of the construction vibration calculations provide a worst-case assessment of construction vibration levels by assuming that the vibration-generating plant is operating at the planned closest point to the sensitive receptors. The worst-case vibration levels would be temporary as the construction works are not fixed in one location for the duration of the build. The risks inherent to the vibration assessment are confined to:

- The suitability of the construction vibration calculation formulae listed in BS 5228 that are required by the DMRB LA 111
- The accuracy of guidance levels regarding rotary bored piling within BS 5228
- The accuracy of the manufacturers data regarding the Bomag 120.

11.4.7 Lower levels of vibration would occur when the vibration-generating activities take place at greater distances from the sensitive receptor.

Construction Traffic

11.4.8 Construction traffic movements have been assessed using information from the Scheme's traffic model and construction traffic flow data provided by the appointed Principal Contractor. This data (see Appendix 11.2,

~~TR010034/APP/6.5~~APP-175) comprised of route information, the number of single movements to be conducted (i.e. one way trips to site), and the duration of the planned movements to and from site. The planned number of movements was doubled to account for return journeys. Construction traffic movement types are confined to either:

- Movements to and from site of heavy vehicles on the existing road network; or
- Movements of vehicles 'off network' within the Development Consent Order (DCO) boundary.

11.4.9 Construction traffic movements on the existing road network have been assessed using the methodology outlined in the DMRB LA 111 (2020). Movements of vehicles within the DCO boundary were included in the construction activity noise assessment.

Operation

Traffic Data

11.4.10 The results from the road traffic noise modelling were affected by limitations of the input data sources, specifically assumptions used in the strategic traffic model to derive traffic flow, speed, and fleet composition data. The traffic data for the Scheme was modelled using SATURN software and based on the project specific Trans-Pennine Upgrade traffic model. The noise assessment has used version 15.0 of the Core 2B traffic data.

11.4.11 The traffic model took into account additional traffic from the developments included in the committed development that were long and short listed for the cumulative effects assessment (refer to the Cumulative effects chapter (Chapter 15)). Further information on this is available in the Traffic Assessment (~~TR010034/APP/7.4~~APP-185).

11.4.12 Road surface corrections were applied to all roads in the noise model in accordance with Appendix A of the DMRB LA 111. The following road surface corrections were applied:

- -1 dB for all roads with a speed of less than or equal to 75 kph
- -0.5 dB for roads with speeds above 75 kph and the road surface material was hot rolled asphalt,
- -3.5 dB for roads with speeds above 75 kph and the surface material was a newly laid low noise road surfacing.

11.4.13 In line with the design of the Scheme, low noise road surfacing was assumed on all new roads introduced by the Scheme, namely the A57 Link Road, Mottram Moor junction and the Mottram Moor Link Road. Newly laid low noise road surfacing was assumed on the opening and future years of the Scheme on the basis that the road surfacing would be renewed by the future year. The constraints associated with low noise road surfacing were also accounted for, in that it is not possible to use this road surface on bridges. It is noted that underpasses and bridges considered within the noise model are each expected to have traffic with a speed that is below 75 km/h and consequently a universal surface correction would be applied.

11.4.14 For the Do Minimum scenarios, no low noise road surfacing was assumed on the existing A57 in the opening year or the future year. As the speeds on this road were below 75 kph in the Do Minimum and Do Something scenarios, the same road surfacing corrections were applied to all assessment scenarios.

Geographical Data

11.4.15 The heights and widths of the A57 Link Road, Mottram Moor junction and Mottram Moor Link Road were modelled based on Scheme drawings, including general arrangement plans (~~TR010034/APP/6.4~~APP-011). The layout of local roads was based on Ordnance Survey data sources.

11.4.16 The resolution of the ground topography data imported into the road traffic noise model influences the results as it affects sound propagation. To minimise uncertainty and to improve the accuracy of the noise model, the ground topography close to the Scheme used very detailed topographical information from Scheme drawings and aerial survey data. Further away from the Scheme, where these data sources were unavailable, Ordnance Survey Terrain 5 data were used. This dataset provided equal height ground contours at 5 m height intervals and would therefore not take into account small variations in ground level between each contour interval.

11.4.17 The location of buildings in the study area was modelled using Ordnance Survey data and Scheme drawings. Most buildings were modelled as 6 m in height, with ancillary buildings such as garages having a height of 3 m. Noise level predictions were carried out at heights of 1.5 m and 4 m above ground level to represent the ground floor and first floor heights. Buildings that would be demolished by the Scheme were modelled in the Do Minimum scenarios and removed from the Do Something scenarios so that any existing screening of noise provided by these buildings would be included in the Do Minimum noise predictions.

11.4.18 AddressBase Plus data has been used to identify sensitive receptors within the study area and wider area. Each address point has a defined classification (such as ‘residential’, ‘medical’, ‘industrial’) within the data. Professional judgement was used to determine whether each of the defined classes is sensitive in the daytime and at night. The AddressBase Plus classes were used to derive an overall classification of ‘Dwelling’, ‘Other’ or ‘Not Sensitive’ for each point. It is therefore assumed that the AddressBase Plus dataset is up to date, identifies the correct buildings or addresses and has not mislabelled land use categories for addresses.

11.4.19 Where there are sensitive receptors that cover a large area, such as designated sites or parks, the level of impact was assessed based on the variation of and changes to noise levels throughout the site. This is because assessing at a single point location may over or under predict noise impacts in open spaces, depending on the location of such a point. It is noted that LOAEL and SOAEL values stated in the DMRB LA 111 are typically applicable to building facades, however open spaces have been also considered using the same criteria in line with LA 111. The sensitivity of all types of noise sensitive receptor was assumed to be high.

Calculation Method

11.4.20 The DMRB LA 111 requires an assessment of night-time noise levels (23:00 to 07:00) using the L_{night} noise index. These were calculated by the noise modelling software using "TRL Method 3", which calculates L_{night} based on the predicted daytime $L_{A10,18h}$ noise levels. As this approach considers a different diurnal traffic pattern on motorways and other types of roads, the noise model has selected the appropriate road type according to the information provided by the traffic model. TRL Method 3 assumes a fixed diurnal traffic pattern for these two road types, with a higher proportion of night-time heavy vehicles on motorways compared with other road types.

11.4.21 The parameters of the noise model were set so that all modelled sources of road traffic noise within 2 km of noise sensitive receptors in the study area were included in the noise predictions for each individual receptor. This ensures that noise contributions from the Scheme and the M67 are fully accounted for and that noise from these sources is not underpredicted.

11.5 Study Area

Construction

11.5.1 The study area for construction activity noise included all noise sensitive receptors located within 300 m of the Scheme's construction footprint. Based on the site geometry, a study area of this size enabled the effects of construction activities that generate the highest noise levels to be assessed over a wider area.

11.5.2 The study area for construction activity vibration included all vibration sensitive receptors located within 100 m of construction activities that have the potential to cause vibration.

11.5.3 The diversion routes study area was defined to include a 25m buffer from all carriageways that are subject to a diversion following night closures of other roads.

11.5.4 The construction traffic study area was defined to include all noise sensitive receptors located within 50 m from the kerb of public roads with the potential for an increase in basic noise level of 1 dB $L_{A10,18hr}$ or more as a result of the addition of construction traffic to existing traffic levels. Note that, as no changes greater than or equal to 1dB were calculated, no study area was generated.

Operation

11.5.5 The operation phase study area for detailed road traffic noise modelling is shown in Figure 11.4 (~~TR010034/APP/6.4~~APP-133), which focussed on noise sensitive receptors within 600 m of the Scheme and the bypassed section of the A57.

11.5.6 Road traffic noise impacts have also been considered in the wider area of the Scheme, outside of the operation phase study area for detailed noise modelling shown in Figure 11.4 (~~TR010034/APP/6.4~~APP-133). The wider area encompasses noise sensitive receptors more than 600 m from the Scheme including Tintwistle, Glossop, Snake Pass, the A628 to Langsett and the A616. These inclusions are the result of the Planning Inspectorate Scoping Opinion, public consultations, and areas with a potential for 1dB change in the short-term.

The traffic network forming the wider area assessment is shown in Figure 11.5 (~~TR010034/APP/6.4~~APP-134).

11.6 Baseline Conditions

Sensitive Receptors

11.6.1 The Scheme is located across a range of landscape and townscape character areas, including open moorland slopes, river valleys, and within and adjacent to some densely populated urban areas. The urban areas contain a number of residential properties as part of larger settlements on the urban edge of Manchester, with the Peak District National Park located just over 2km to the east.

11.6.2 The dominant source of noise in the proximity of the Scheme is road traffic noise. Noise emissions from vehicles traveling along (from east to west) the B6174, A6018, A57, and A628 heavily influence the noise climate of the area. Figures 11.1 (APP-130) and 11.2 (~~TR010034/APP/6.4~~APP-131) show the road traffic noise levels in proximity to the Scheme from strategic noise mapping undertaken by Defra.

11.6.3 Manchester Airport is located within 20 km of the Scheme and noise from aircraft contributes to ambient noise levels. Noise contours produced by Manchester Airport in 2019[19] indicate that daytime noise contributions from aviation were below 51 dB $L_{Aeq,16h}$ in the area surrounding the Scheme. Night-time aviation noise levels ranged between 45 and 48 dB L_{night} at Mottram-in-Longdendale and below 45 dB L_{night} elsewhere in proximity to the Scheme.

11.6.4 There are no railway lines within 1 km of the Scheme. No major sources of vibration were identified in proximity to the Scheme, although it is noted that routes in the wider area are widely used by HGVs and there is some local concern about HGV traffic causing vibration.

11.6.5 The subterranean United Utilities Mottram Longdendale Aqueduct is a major service that crosses the route and may be sensitive to vibration during construction.

11.6.6 Several locations of scientific and environmental interest are in the vicinity of the Scheme. Peak District National Park, at its closest point, falls approximately 2 km from the Scheme adjacent to Bottom's Reservoir near Tintwistle. At its closest point the Dark Peak Site of Special Scientific Interest (SSSI) falls approximately 2.3 km north east of the Scheme footprint. This locale also has 'Special Protection Area' (SPA) and 'Special Area of Conservation' (SAC) status, both of which run adjacent to A57 Snake Pass. The SPA is designated for birds, and potential for noise disturbance on the localised populations exists. A discussion of the impacts of noise on the relevant species is contained within the Biodiversity chapter (Chapter 8 of this ES).

11.6.7 The Hurst Clough Local Nature Reserve (LNR) can be found in the Hattersley and Broadbottom area. At its closest point Hurst Clough is approximately 350 m south of the Scheme footprint. Several examples of ancient woodland are within 600 m of the Scheme.

[19] Manchester Airport (2021). Environmental Management [online]. Noise contours accessible at: https://www.manchesterairport.co.uk/community/environmental-management/

11.6.8 Melandra Castle (Roman fort) lies approximately 400 m south of the Scheme, close to the Derbyshire border. It is designated as a heritage site at risk and as a Scheduled Monument. There are several listed buildings within 600 m of the Scheme, which are discussed in more detail in the Cultural Heritage chapter (Chapter 6).

11.6.9 There are existing residential receptors located close to the Scheme in several areas. These include in Hattersley immediately southwest of the Scheme footprint. The Scheme passes underneath Mottram-in-Longdendale before bisecting the existing A57 above ground on Mottram Moor. Residential receptors are also present at the north eastern and eastern extreme of the Scheme in Woolley Bridge and Hollingworth. Large areas of the Scheme footprint are sparsely populated with few noise sensitive receptors. A number of notable non-residential noise sensitive receptors are located in proximity to the Scheme, including healthcare facilities, education facilities, community facilities, public rights of way, cultural heritage assets and statutorily designated sites. The non-residential sensitive receptors located in proximity to the Scheme and the wider area of the Scheme are listed in Table 11.11.

Table 11.11: Non-residential sensitive receptors in proximity to the Scheme and in the wider area

Location	Receptor
Hyde	Enviro Lab, Hattersley Primary Care Centre, New Inn, Pharmacy at Hattersley Health Care Centre, St. James Roman Catholic Primary School
Mottram	Allotments, Arundale Primary and Nursery School, Awburn House Dental Practice, Community Hall, Cricket Ground And Premises, Doctors Surgery, Greater Manchester Police, Hattersley Children's Centre, Horeb Baptist Church, Library, Mottram C of E Primary School, Mottram Community Association, Mottram Wood, Parish Church Of St. Michael and All Angels, Playground, Woodland Adjacent to Hurstclough Brook North, United Utilities Mottram Longdendale Aqueduct
Hollingworth	Allotments, Co-operative Pharmacy, Gun Inn, Hollingworth Clinic, Hollingworth Liberal Club, Hollingworth Primary School, Longdendale High School, Longdendale Hollingworth Youth Club, New Inn, Organ Inn, The Old Chapel, Woodland
Glossop	Gamesley Community Centre, Gamesley Football Club, Pear Tree Inn, St. Charles Catholic Primary School, The Riverside Inn
Brookfield	Melandra Castle (Roman Fort)
Public Rights of Way	PROW 50, 51, 52, 57, 108, 88, 90 Trans-Pennine Trail (Hattersley, Woolley Bridge)
Wider area	Denton: Co-op Funeral Services, Doctors Surgery, M Gourley Veterinary Surgery, Millgate Healthcare Partnership, NHS Health Improvement, Red Lion Hotel, Rizwan Dispensing Chemist, The Bowling Green, The Last Orders Inn

Location	Receptor
	Glossop: Derbyshire Constabulary, Elim Pentecostal Church, Glossop Mountain Rescue Team, Glossop Victorian Swimming Pool, Glossopdale Community College, Harlequin Arts Academy, Station House Dental Practice, The Nursery Hyde: Clarence Hotel, Dragon Inn, St. Marys Church Hall, The Sunflower Children's Centre Tintwistle: Hall at Bowling Club

11.6.10 Five Noise Important Areas (NIAs) are in proximity of the Scheme. NIAs are defined by Defra and identify where the 1% of the population that are most affected by the highest noise levels from major roads and railways are located according to the results of strategic noise mapping. Round 3 strategic noise maps were published by Defra in 2019 under the terms of The Environmental Noise (England) Regulations 2006.

11.6.11 The locations of the five NIAs identified are presented in Figure 11.1 (~~TR010034/APP/6.4~~APP-130) along with the locations of 'other noise sensitive receptors' and are described in Table 11.12. The locations of the NIAs in the wider study area of the Scheme are described in Table 11.13.

Table 11.12: Noise Important Areas in proximity to the Scheme

NIA ID	Location	Source of noise	Comment
7247	Mottram Road, Hyde	Road	Adjacent to the M67 westbound carriageway, approximately 750 m west of the Mottram roundabout
1574	Melyncourt Road, Hyde	Road	Adjacent to the M67 westbound carriageway and the M67 Junction 4 roundabout.
10992	Mottram-in-Longdendale (A57 Hyde Road, A57 Mottram Moor, A6018 Back Moor). Woolley Bridge (Woolley Lane)	Road	Covers properties adjacent to the A57 between John Kennedy Road and Cross Street, and the A6018 between Mottram Moor and Four Lanes
10993	Woolley Bridge (Woolley Lane, Brookfield)	Road	Adjacent to the A57 southbound carriageway
1575	Mottram-in-Longdendale (Roe Cross Road, Edge Lane)	Road	Adjacent to A6018 Roe Cross Lane at the junction with Edge Lane

Table 11.13: Noise Important Areas in the wider study area of the Scheme

NIA ID	Location	Source of noise	Comment
1731	Denton	Road	500 m length of both the A57 and M67 west of the Parish Church of Christ, Denton
10975	Denton	Road	An amalgam of areas covering the crossroads of the A57 and A6018, inclusive of a 900 m stretch of the M67 east of the A6018
10934	Woodhead Road, Tintwistle	Road	Properties adjacent to the A628 Woodhead Road close to the junction with Old Road
14511	A628, Torside	Road	Properties adjacent to the A628 in proximity to the Rhodeswood Reservoir and the Torside Reservoir
10931 and 10932	A628, Crowden	Road	Properties adjacent to the A628 in Crowden
10991	Mottram Road, Matley	Road	Covers A6018 for 300 m north west from the junction of Matley Lane
10994	Dinting Vale, Dinting	Road	Covers A57 Dinting Vale between Glossop Road and Dinting Vale
10995 and 10996	High Street West, Glossop	Road	Covers properties adjacent to the A57 High Street West between Primrose Lane and Queen Street, and between Shrewsbury Street and Smithy Fold

Baseline Noise Monitoring

11.6.12 Baseline noise monitoring surveys were carried out by the Applicant during June and July 2018[20] . The surveys were carried out in accordance with BS 7445 2003 'Description and measurement of environmental noise' (BS 7445) and followed the measurement protocol contained within the CRTN. This method requires the measurement of data between the hours of 06:00 and 00:00 to determine a dB $L_{A10,18hr}$ noise level.

11.6.13 Class 1 sound level meters were used during the surveys, namely a 01dB Fusion and Rion NL-52. The sound level meters were set up at a height of 1.5 m and left in situ for approximately seven days, with localised meteorological observations recorded by accompanying weather station. Favourable weather conditions in compliance with DMRB LA 111 were observed throughout the surveys.

11.6.14 All noise measurement locations are assumed to be measured in the open, without any reflections from nearby surfaces except the ground ("free-field" conditions). Observations on the prevailing noise climate were made during the

[20] Arcadis (2019). A57/A628 Transpennine Upgrade Programme, Preliminary Sources Study Report (FormerlyTR010034/APP/6.11.1)

set up and collection of the sound level meters. The noise monitoring locations (NML) are presented in Figure 11.1 (~~TR010034/APP/6.4~~APP-130) and are detailed as follows:

- NML 1 - Located in the rear garden of number 44 Hyde Road
- NML 2 - Located in the rear garden of number 24 Four Lanes
- NML 3 - Located in the rear garden of number 14 Edge Lane
- NML 4 - Located in the rear garden of number 41 Lodge Court
- NML 5 - Located in the rear garden of number 103 Mottram Moor
- NML 6 - Located in the rear garden of number 8 Carrhouse Lane
- NML 7 - Located approximately 12m from Tara Brook Farm in an adjoining land parcel
- NML 8 - Located in the rear garden of Carr House Farm
- NML 9 - Located in the rear garden of number 1 Tollemache Close

11.6.15 The measured sound levels at the nine monitoring locations are summarised in Table 11.14, with more detailed information provided in Appendix 11.1 (~~TR010034/APP/6.5~~APP-174).

Table 11.14: Summary of survey results from continuous noise monitoring locations

Noise Monitoring Location	Weekday Noise levels, dB		
	$L_{A10,18hr}$ (day)	$L_{Aeq,16h}$ (day)	$L_{Aeq,8h}$ (night)
NML 1: 44 Hyde Road	51.1	49.4	47.0
NML 2: 24 Four Lanes	48.2	49.1	42.9
NML 3: 14 Edge Lane	50.6	50.0	47.6
NML 4: 41 Lodge Court	48.8	48.1	46.1
NML 5: 103 Mottram Moor	55.9	53.7	51.9
NML 6: 8 Carrhouse Lane	49.5	54.4	46.7
NML 7: Tara Brook Farm	48.9	48.1	45.4
NML 8: Carr House Farm	46.6	46.2	42.8
NML 9: 1 Tollemache Close	49.2	49.7	50.9

Estimation of baseline conditions

11.6.16 To enable the construction assessment, key receptor locations have been identified as being representative of the communities surrounding the planned construction areas. Baseline noise levels have been identified at each of these key receptor locations using the following criteria, in order of preference:

- Baseline noise survey data
- Defra strategic noise mapping

11.6.17 Mapping showing the key receptor locations for the construction noise assessment can be found in Figure 11.6 (~~TR010034/APP/6.4~~APP-135). The addresses of the key receptor locations are provided in Table 11.15 below, along with the baseline noise levels identified for these properties. Where appropriate, baseline noise levels have been ascertained using either survey data or have been derived from Defra strategic noise mapping.

11.6.18 Where strategic noise mapping has been used, the lower value of the Defra noise contour banding has been considered to be the representative baseline. This ensures that a 'worst case' assessment takes place as the reference baseline value is as low as possible for subsequent comparison against construction noise levels. Where this data is used it has been processed using the Transport Research Laboratory document 'Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping' (2002).

Table 11.15: Key receptor locations identified for the construction assessment with baseline noise levels per period

ID	Address	Distance to Nearest Cons. Activity (Metres)	Estimated Baseline Noise Level ($L_{Aeq,T}$ dB)			Source of Baseline Noise Levels
			Daytime [A]	Evenings & Weekends [B]	Night [C]	
1	6 Melyncourt Road	14	71.2	69.7	67.4	Defra/TRL
2	60 Hyde Road	18	49.3	54.7	46.9	NML 1
3	8 Edge Lane	120	50.4	56.2	47.8	NML 3
4	8 Rushycroft	65	49.3	54.7	46.9	NML 1
5	3 Ash Close	16	49.8	47.1	46.9	NML 2
6	30 Four Lanes	12	59.1	56.0	50.8	Defra/TRL
7	23 Tollemache Road	129	50.6	50.8	49.9	NML 9
8	6 Old Road	35	53.9	50.7	45.9	Defra/TRL
9	23 Old Road	2	53.9	50.7	45.9	Defra/TRL
10	15 Old Road	5	59.1	56.0	50.8	Defra/TRL
11	43 Lodge Court	41	50.6	50.8	49.9	NML 9
12	3 Tollemache Close	2	50.6	50.8	49.9	NML 9
13	Mottram Old Hall	72	50.6	50.8	49.9	NML 9
14	37 Woolley Lane	180	48.6	47.2	46.8	NML 4
15	103 Mottram Moor	9	54.1	52.6	51.7	NML 5
16	Robin Hood Farm	43	53.8	53.8	46.1	NML 6
17	Meadow View	46	46.6	46.2	43.8	NML 8
18	Tara Brook Farm	60	48.4	48.0	45.5	NML 7
19	54 Woolley Bridge	13	69.4	66.5	60.6	Defra/TRL
20	18 Woolley Bridge	5	69.4	66.5	60.6	Defra/TRL
21	7 Springfield Close	88	53.9	50.7	45.9	Defra/TRL

ID	Address	Distance to Nearest Cons. Activity (Metres)	Estimated Baseline Noise Level ($L_{Aeq,T}$ dB)			Source of Baseline Noise Levels
			Daytime [A]	Evenings & Weekends [B]	Night [C]	
22	48 Lower Barn Road	164	48.4	48.0	45.5	NML 7
23	32 Four Lanes	1	59.1	56.0	50.8	Defra/TRL
24	34 Four Lanes	5	59.1	56.0	50.8	Defra/TRL

[A] Representative of Monday to Friday 07:00 to 19:00, Saturdays 07:00 to 13:00

[B] Representative of weekday evenings 19:00 to 23:00 and weekends (Saturday 13:00 to 23:00, Sunday 07:00 to 23:00)

[C] Representative of the night-time period, 23:00 to 07:00

11.7 Potential Impacts

Construction

11.7.1 Demolition and construction activities have potential to give rise to increases in local noise levels, if not effectively managed. The impact from construction noise levels at any given time during a construction phase is dependent on:

- the construction activities taking place near the sensitive receptor of interest,
- distance from the construction works,
- efficacy of embedded and essential mitigation measures, and
- time periods the works are carried out.

11.7.2 Although impacts from construction noise are temporary and cease once the works are completed, some sensitive receptors have the potential to experience high noise levels due to a number of different construction activities over multiple construction phases. This is most likely at 15 Old Road, 23 Old Road, and 3 Tollemache Close, where potentially significant adverse effects have been predicted during construction phases 1, 2, and 3, spanning approximately 18 months. These effects are attributed to demolition works, piling at Mottram Underpass, and work on the Mottram Underpass structure. A detailed construction programme will not be available until the Detailed Design stage to confirm the duration of the works. Presently, the only activity planned to be ongoing throughout all construction phases is the operation of the construction compound.

11.7.3 The construction works would take place during the daytime, with any periods of night-time working limited to traffic management activities. Partial road closures are limited to Old Hall Lane and Old Road leading to a long-term diversion to and along Roe Cross Road. Night-time works are confined to traffic management activities, therefore impacts from night-time working would be minimal throughout the construction of the Scheme.

11.7.4 The local highway network may experience changes in traffic flows and speeds during construction as a result of temporary traffic management measures implemented at the Hattersley roundabout, Mottram Moor, and Woolley Bridge. This could lead to increases or decreases in noise depending on the traffic flow

and speed during the periods the temporary traffic management measures are implemented, and also changes to the character of noise. If implemented during peak hours, queuing traffic may give rise to increased prominence of engine and exhaust noise compared to free-flowing conditions.

11.7.5 Additional vehicles travelling to and from the construction site transporting materials, plant, and labour have the potential to increase road traffic noise levels. Any impacts from additional traffic would be short-term, temporary, and limited to daytime hours.

11.7.6 The Scheme includes a construction compound located between the Hattersley Roundabout, Roe Cross Road, and Hyde Road that could affect local residents. The magnitude of the potential noise impact from the operation of the compound is dependent on its layout and proximity of noise sources to the residential properties overlooking the compound. The proposed operation of the compound includes provision of offices, equipment and vehicle storage, and welfare facilities, as shown in an indicative sketch of the compound provided by the Principal Contractor.

11.7.7 No materials processing (reusing excavated material to supply embankments) or noise-generating construction processes are currently proposed at the compound. All materials processing is intended to be conducted at the point of excavation. Deliveries would be received during daytime hours to minimise impacts.

11.7.8 Some of the construction activities for the Scheme incorporate plant, equipment, or processes that have the potential to cause groundborne vibration that may be perceptible at sensitive receptors. These activities include piling, vibratory soil compaction, and asphalt rolling. Higher levels of vibration are likely to generate complaints and concerns relating to the risk of building damage.

Operation

11.7.9 The overall operational noise impacts at any receptors are determined by;

- traffic parameters (flow, speed, and fleet composition),
- proximity to the Scheme,
- changes to the horizontal or vertical alignment of any road,
- road surfacing,
- the presence of intervening buildings or structures (including noise barriers),
- topography and
- ground type.

11.7.10 Changes to any of these factors can result in increases or decreases to road traffic noise levels at a noise sensitive receptor.

11.7.11 Once the Scheme is operational, the noise climate would be permanently affected by changes in vehicle activity, determined by the traffic flows, speeds and fleet composition on the local road network including the Scheme itself. Beneficial impacts could occur at Mottram-in-Longdendale (Hyde Road and Mottram Moor) and Hollingworth (Woolley Lane) due to the A57 Link Road diverting traffic away from these areas. Adverse effects could occur at residential streets in Mottram-in-Longdendale close to the route of the Scheme, such as

Four Lanes, Old Hall Lane, and Lodge Court. This is because the Scheme is a new noise source that is likely to affect the noise climate at these areas.

11.7.12 The operation phase impacts may change over time as traffic flows change in the years after the Scheme opens. This includes impacts from the presence of the A57 Link Road and Mottram Moor Link Road as well as potential cumulative effects of other developments that may affect traffic volumes on the local highway network.

11.8 Design, Mitigation and Enhancement Measures

Objectives

11.8.1 Design, mitigation, and enhancement measures are incorporated into the Scheme using the following order of priority, aligned with the aims of the NPSE:

1. Avoidance and prevention - measures to prevent the effect
2. Reduction - where avoidance is not possible, then measures are used to lessen the magnitude or significance of effects
3. Remediation - where it is not possible to avoid or reduce a significant adverse effect, measures are used to offset the effect

11.8.2 The following types of mitigation measures are defined in the DMRB LA 104[21]:

- Embedded mitigation: project design principles and best practice measures adopted to avoid or prevent adverse environmental effects and
- Essential mitigation: measures required to reduce and if possible offset likely significant adverse effects

11.8.3 The embedded and essential mitigation relevant to noise and vibration is summarised in Table 11.16.

Table 11.16: Embedded and essential mitigation measures

Phase	Mitigation measure	Classification
Construction	Environmental Management Plan with noise and vibration reduction measures for the construction phase, such as Best Practicable Means	Embedded
Construction	Traffic Management Plan for the construction phase	Embedded
Construction	Development and implementation of a Community Engagement Plan aiming to provide information about the Scheme to a wide audience	Embedded
Construction	Proactive stakeholder engagement during the construction phase focussed on specific locations that would be affected the most by construction works	Essential
Construction	Use of low vibration piling methods where reasonably practicable	Essential

[21] Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020). Design Manual for Roads and Bridges LA 104 Environmental assessment and monitoring. Revision 1.

Phase	Mitigation measure	Classification
Construction	Use of temporary environmental noise barriers and using lower working platform heights for works in cuttings to maximise the benefit of these noise barriers	Essential
Construction	Using low noise construction plant and undertaking one noise-generating activity at a time in proximity to noise sensitive areas	Essential
Construction	Temporary rehousing and/or noise insulation for qualifying dwellings	Essential
Operation	Design of the Scheme to minimise road traffic noise level, including alignment of Mottram Moor junction and arrangement of cuttings and embankments for the Mottram Moor Link Road and A57 Link Road	Embedded
Operation	Low noise road surfacing on the A57 Link Road and Mottram Moor Link Road (except bridges)	Embedded
Operation	Routine road maintenance	Embedded
Operation	Permanent environmental noise barriers located at the eastern and western portals of the Mottram Underpass, Mottram Moor junction, and along the A57 Link Road in proximity to Carrhouse Lane and Tara Brook Farm	Essential

11.8.4 Further information relating to the embedded mitigation measures is provided in The Scheme chapter (Chapter 2) of this Environmental Statement. The essential mitigation measures are detailed further in the following subsection.

Embedded mitigation

Construction

11.8.5 The appointed Principal Contractor would implement an Environmental Management Plan (EMP), which would be approved by the Local Authorities prior to the commencement of construction works. The EMP would outline the following:

- Environmental management and responsibilities
- Monitoring and auditing processes
- Procedures that would be used to complete different construction activities
- Complaints response procedures
- Community and stakeholder liaison processes.

11.8.6 A first iteration EMP (~~TR010034/APP/7.2~~APP-183) and ~~Record~~ Register of Environmental Actions and Commitments (REAC) (~~TR010034/APP/7.3~~APP-184) have been produced and submitted as standalone documents as part of the DCO submission.

11.8.7 A Traffic Management Plan (~~TR010034/APP/7.5~~APP-186) has been produced for the Scheme to manage road diversions during the construction phase.

11.8.8 The EMP (second iteration), to be produced at Detailed Design stage, shall include a Noise and Vibration Management Plan to control noise and vibration emissions from the construction works. The Noise and Vibration Management Plan shall incorporate good working practices and Best Practicable Means, including but not limited to the following measures where practicable:

- Use of vehicles, plant, and equipment that generate lower levels of noise or vibration should be selected over alternatives that produce higher levels of noise or vibration
- All vehicles and plant fitted with effective exhaust silencers which should be maintained in good and efficient working order
- All compressors and generators 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use
- All ancillary pneumatic percussive tools should be fitted with mufflers or suppressors as recommended by the manufacturers which should be kept in a good state of repair
- Machines in intermittent use shut down when not in use or throttled down to a minimum
- The site compound and static machines be sited as far as is practicable from noise sensitive buildings
- Plant with directional noise characteristics orientated to minimise noise at nearby properties
- Plant certified to meet the current EU legislation and should be not be louder than the noise levels provided in Annex C and D of BS 5228-1
- Temporary noise barriers or other noise containment measures installed to minimise construction noise levels
- The loading or unloading of vehicles and the movement of equipment or materials undertaken in a manner that minimises noise generation
- Cleaning of concrete mixers to not be undertaken by hammering the drums
- Minimise the need for reversing on site and ensure that broadband reversing alarms are fitted to construction vehicles
- When handling materials, care shown not to drop materials from excessive heights.

11.8.9 The Noise and Vibration Management Plan would also require the appointed Principal Contractor to consult with the Environmental Health Departments at the relevant Local Planning Authorities prior to the commencement of construction works. From this, guidance would be obtained on their requirements for managing and controlling noise and vibration from construction works, including communication preferences for updates during the construction phase.

11.8.10 The appointed Principal Contractor would have the option to apply for a Section 61 Prior Consent under the Control of Pollution Act 1974 for some or all of construction works, including daytime working and any of the limited activities taking place at night. This should be discussed when engaging with the Local Authorities prior to works commencing.

11.8.11 The appointed Principal Contractor is a member of the Considerate Constructors Scheme that is recognised by industry and the Government for encouraging firms to be sensitive to the environment.

11.8.12 Good stakeholder relations are often the most effective way to manage potential construction noise and vibration impacts on site. Implementation of a Community Engagement Plan would ensure that local residents and other affected parties are kept informed of the progress of the works, including when and where the noisiest activities would be taking place and how long they are expected to last. Communication mechanisms include newsletters, newspaper and radio announcements, and communications from the appointed Principal Contractor. The Applicant's website would include a webpage for the Scheme that is regularly updated to reflect the status of construction works, construction working hours, information about traffic diversions or road closures, mitigation measures that are implemented to reduce noise and vibration levels.

11.8.13 The appointed Principal Contractor would provide all local residents with a point of contact to discuss any queries relating to the construction works or to raise complaints. All noise complaints shall be effectively recorded, investigated, and addressed. Additionally, members of the public would be able to use the Highways England Customer Contact Centre to raise queries or complaints, which would be investigated and responded to as appropriate.

11.8.14 Even with appropriate mitigation in place, it may not be possible to eliminate all noise and vibration impacts. However, best practice, considerate working hours as well as frequent and open communications with stakeholders would help to reduce the residual impact of construction noise and vibration.

Operation

11.8.15 The design of the cuttings and embankments for the Mottram Moor Link Road provides an embedded mitigation measure for operational road traffic noise. Embankments are positioned either side of the deepest sections of the cutting to maximise screening of noise from the new road.

11.8.16 The alignment of Mottram Moor junction repositions the existing A57 Mottram Moor further away from noise sensitive receptors located within a Noise Important Area. The change in horizontal alignment of the existing A57 Mottram Moor in addition to the bypassing of Mottram-in-Longdendale reduces road traffic noise contributions from this road within the Noise Important Area (NIA 10992).

11.8.17 The Scheme includes low noise road surfacing on the A57 Link Road and the Mottram Moor Link Road (excluding bridges), which reduces noise generated from the interaction between tyres on moving vehicles and the road. In the absence of acoustic performance data for a specific product, a correction of -3.5 dB is assumed in line with DMRB LA 111. It is noted that there are road surface products on the market which could reduce tyre-road noise further.

11.8.18 The operational phase includes routine maintenance of road surfacing to ensure that road roughness is minimised and avoids generating additional or elevated levels of noise or vibration. Remedial works would be undertaken where defects to the road surfacing are identified.

Essential mitigation

Construction

11.8.19 In addition to the embedded mitigation measures stated in The Scheme chapter (Chapter 2 of this ES), a number of essential mitigation measures would be implemented in the construction phase. As part of the stakeholder engagement measures, the local residents likely to be affected the most by the construction phase of the Scheme would be identified and proactively engaged with. This would enable any emerging issues at these locations to be identified and for appropriate action to be taken.

11.8.20 Temporary noise barriers would be installed at key locations during the construction phase to reduce construction noise as far as possible. These locations include the boundary of the construction compound and work sites close to sensitive receptors. The appointed Principal Contractor has indicated the planned use of a 3 m bund along the perimeter of the compound.

11.8.21 Temporary noise barriers can reduce construction noise by 5-10 dB L_{Aeq} depending on the relative positions of the construction activities, the temporary noise barrier, and the sensitive receptor. According to BS 5228 Part 1, a 5 dB reduction can be achieved if the temporary noise barrier screens the construction activity or equipment so that it is just visible from the viewpoint of the noise sensitive receptor. Greater reductions of 10 dB can be achieved if the plant or activity is fully screened from the noise sensitive receptor.

11.8.22 To minimise construction noise level further, the appointed Principal Contractor would undertake the following additional measures:

- When working adjacent to residential areas, quieter engine-powered plant would be sourced. Construction plant with electric engines are new to the UK market - where possible, these would be used to remove the noise from diesel engines. Alternatively, plant using the most up to date diesel engines would be used
- Reduce the level of the working platform used to construction the Mottram Moor Link Road so that the cutting slopes provide additional screening of noise
- Undertaking only one noise-generating operation in sensitive areas at one time.

11.8.23 Where construction noise levels exceed certain threshold noise levels for a time period exceeding 10 days or more in a consecutive 15 day period or any 40 days in a consecutive 6 month period, the Applicant may be required to implement a noise insulation or temporary rehousing as last resort. Guidance on noise insulation and rehousing is provided in BS 5228 Part 1 Annex E.4, which provides examples of noise levels that could trigger the Applicant to implement these measures.

- Noise insulation may be triggered at the higher of a noise level of at least 5 dB above the pre-construction ambient noise levels or the levels presented in Table 11.17.

- Temporary re-housing may be triggered at the higher of a noise level of at least 10 dB above the pre-construction ambient noise levels or the levels presented in Table 11.17

Table 11.17: Examples of trigger levels for noise insulation and temporary rehousing

Time	Time period	Averaging time, T	Noise insulation trigger level ($L_{Aeq,T}$ dB)	Temporary rehousing trigger level ($L_{Aeq,T}$ dB)
Monday to Friday	07:00 – 08:00	1 hour	70	80
	08:00 – 18:00	10 hours	75	85
	18:00 – 19:00	1 hour	70	80
	19:00 – 22:00	3 hours	65	75
	22:00 – 07:00	1 hour	55	65
Saturday	07:00 – 08:00	1 hour	70	80
	08:00 – 13:00	5 hours	75	85
	13:00 – 14:00	1 hour	70	80
	14:00 – 22:00	3 hours	65	75
	22:00 – 07:00	1 hour	55	65
All noise levels are predicted at 1m in front of the most exposed of any windows and doors in any façade of any eligible dwelling				

Table Source: British Standards Institution (2014). BS 5228 Part 1, Table E2.

11.8.24 The need to implement noise insulation or temporary rehousing measures would be finalised during the Detailed Design stage when a detailed construction programme is available. This would enable the Principal Designer to confirm whether the thresholds in Table 11.17 would be exceeded for a period of time sufficient to trigger this action during any of the construction phases. This would also enable identification of the appropriate timescales for the duration of any temporary rehousing.

11.8.25 To mitigate vibration impacts during construction, equipment and processes that result in low vibration levels would be identified by during the Detailed Design stage. In particular, the piling methods would be selected carefully to minimise noise and vibration impacts at receptors. Although it is strongly recommended to use a rotary bored method at all piling locations, which results in low levels of vibration, it may not be possible due to the ground type or other engineering constraints. The piling methods that would be used for the Scheme would be confirmed during the Detailed Design stage.

11.8.26 Alternative piling methods such as vibratory piling or the Giken method would be considered at locations where methods producing the lowest levels of vibration are required. Methods that generate high levels of vibration such as percussive piling shall be avoided as far as practicable.

11.8.27 The implications of the use of specific mitigation measures on cost and construction timescales would be considered by the appointed Principal Contractor during the Detailed Design of the Scheme.

Operation

11.8.28 Permanent environmental noise barriers were included in the Scheme's design to reduce road traffic noise levels at five locations. Proposals for the environmental noise barriers were developed in consultation with other discipline specialists to avoid the noise barriers themselves creating significant effects, for example, in terms of landscape and visual impact, biodiversity and cultural heritage assets. During these discussions the practicality of the environmental noise barriers was appraised. Where competing requirements were identified, the design of the environmental noise barriers were adjusted so that all requirements could be met. For example, the positioning of each of the environmental noise barriers was adjusted to reflect engineering constraints.

11.8.29 All of the environmental noise barriers were designed and modelled as reflective noise barriers and are likely to have a finish similar to a close-boarded fence construction to avoid visual impacts. The specification and material of the noise barriers would be determined during the Detailed Design of the Scheme. Further discussion on the visual impact and location of barriers is provided in the Landscaping and visual effects chapter (Chapter 7 of this ES).

11.8.30 The locations, lengths and heights of the environmental noise barriers are described in Table 11.18 and are mapped in the Figure 2.4 Environmental Masterplan (~~TR010034/APP/6.4~~APP-074).

Table 11.18: Noise barriers

ID	Location	Approximate length	Height
1	The Mottram Moor Link Road west of the Mottram Underpass	Eastbound: ~~177~~ 180 m Westbound: ~~316~~ 307 m	2.5 m
2	The Mottram Moor Link Road east of the Mottram Underpass	Eastbound: ~~175~~ 173 m Westbound: ~~161~~ 133 m	Eastbound: 2.0 m Westbound: 2.5 m.
3	The Mottram Moor Link Road at Mottram Moor junction (within NIA 10992)	Northbound: ~~133~~ 125 m Southbound: 128 m	2.5 m
4	A57 Link Road in proximity to Carrhouse Lane	Westbound: ~~332~~ 333 m	2.5 m
5	A57 Link Road in proximity to Tara Brook Farm	Westbound: ~~329~~ 330 m	2.5 m

11.8.31 A monetisation exercise was undertaken to determine their likely benefit over the design life of the Scheme and to maximise their value for money. The decision to include noise barriers 1-5 in the Scheme was taken at project level taking into account cost/benefit, perceived benefit, practicality, and noise reduction analyses.

11.8.32 Inclusion of the noise barriers detailed in Table 11.18Table 11.18 in the Scheme's design results in perceptible noise reductions from the unmitigated scenario. The benefits of including the barriers are presented in Table 11.19:

Table 11.19: Benefits of including noise barriers

Effect	Location(s)
Property drops below the threshold for noise insulation	2 properties on Four Lanes 1 property near Mottram Moor Junction
Reduction from above SOAEL to below SOAEL on some facades	2 properties on Four Lanes 2 properties near Mottram Moor Junction
Reduction from above LOAEL to below LOAEL on some facades	24 properties in the vicinity of Four Lanes 9 around Tollemache Close and Old Hall Lane 10 properties near Mottram Moor Junction 2 properties on Carrhouse Lane Tara Brook Farm
Reductions in the highest $L_{A10,18hr}$ noise level by more than 3 dB	3 ~~3~~ 1 property~~ies~~ on Tollemache Close 1 property on Old Hall Lane 1 property on Tollemache Road Meadow View Tara Brook Farm
Reduction in the highest $L_{A10,18hr}$ noise level by 1 - 3 dB	14 properties on Four Lanes ~~4~~ 2 properties on Tollemache Close ~~5~~ 12 properties on Tollemache Road and Old Hall Lane 4 properties near Mottram Moor Junction
Reduction in the average $L_{A10,18hr}$ noise level by more than 3 dB	2 properties on Four Lanes ~~1 property on Tollemache Close~~ Meadow View
Reduction in the average $L_{A10,18hr}$ noise level by 1 – 3 dB	9 properties on Four Lanes ~~7~~ 6 properties in the vicinity Tollemache Close 5 properties near Mottram Moor Junction Tara Brook Farm
Reduction in short-term impact ($L_{A10,18hr}$) by more than 3 dB	4 properties on Four Lanes 3 properties ~~on~~ in the vicinity of Tollemache Close 2 properties near Mottram Moor Junction Meadow View Tara Brook Farm
Reduction in short-term impact ($L_{A10,18hr}$) by 1 – 3 dB	18 properties in vicinity of Four Lanes ~~10~~ 17 properties on Tollemache Road and Old Hall Lane ~~10~~ 3 properties on Tollemache Close 14 properties near Mottram Moor Junction
Reduction in long term impact ($L_{A10,18hr}$) by more than 3 dB	7 properties on Four Lanes ~~7~~ 3 properties in the vicinity of ~~on~~ Tollemache Close 3 properties near Mottram Moor Junction Meadow View Tara Brook Farm

Effect	Location(s)
Reduction in long term impact ($L_{A10,18hr}$) by 1 – 3 dB	22 properties in vicinity of Four Lanes ~~8~~ 3 properties on Tollemache Close ~~12~~ 10 properties on Old Hall Lane ~~5 properties on Lodge Court~~ 18 properties near Mottram Moor Junction

11.8.33 It is not possible to reduce noise levels at all receptors to below LOAEL or SOAEL due to most receptors facing directly onto roads and therefore noise barriers would be impractical due to access requirements. The majority of roads within the study area have speeds less than 75 kph and therefore the provision of low noise road surfacing would have minimal effect.

11.8.34 Barriers 1, 2 and 3 (see Table 11.18) are used to mitigate noise levels within Noise Important Area (10992).

11.8.35 The primary way the Scheme reduces noise in NIAs is through new roads that divert traffic away from NIA 10992, which covers the existing route of the A57 through Mottram-in-Longdendale (Hyde Road, Mottram Moor) and along Woolley Lane. The reduced traffic flows on the existing route of the A57 would result in lower noise levels and improvements to noise levels at properties within NIA 10992.

11.8.36 Even with the embedded and essential mitigation measures for the operational phase of the Scheme described above, significant adverse effects may still occur at some noise sensitive receptors. Residential properties at some locations may be eligible for noise insulation under the Noise Insulation Regulations 1975 (as amended) provided that the requirements for eligibility set out in the Regulations are met. In this case, the Applicant would offer to provide noise insulation for qualifying windows and doors in eligible dwellings or make a payment for these works to be undertaken.

11.9 Assessment of Likely Significant Effects

11.9.1 As discussed in the previous subsection, the Scheme incorporates several embedded and essential mitigation measures during its construction and operation phases, including the appointed Principal Contractor's commitment that construction activities capable of generating noise would not be carried out concurrently in noise sensitive areas. The effects of these mitigation measures are inherent in the assessment outcomes presented in this subsection unless otherwise stated. It is therefore considered that the reported assessment outcomes represent the residual effects of the Scheme.

Construction Noise

11.9.2 This part of the assessment identifies the noise levels predicted to be experienced at key receptor locations throughout the construction period.

11.9.3 Construction noise impacts would vary throughout the construction period. Noise levels experienced at sensitive receptor locations are dependent on the tasks being undertaken and the methodology employed by the appointed Principal Contractor.

11.9.4 During the Detailed Design stage, the level of noise impacts for human and ecological noise sensitive receptors would be further examined based on a more detailed construction programme.

11.9.5 For this assessment, multiple planned construction activities have been identified following guidance from the appointed Principal Contractor using the best information available and by using professional judgement. Noise levels from these activities were compared with the BS 5228 noise threshold values derived from baseline noise levels for each key receptor location to establish the magnitude of impact and significance of effect per construction activity (in accordance with DMRB LA 111, Tables 3.12 and 3.16). Note that, the determination of significance has not been influenced by any noise insulation or temporary rehousing considerations. The planned construction activities considered in this assessment are contained in Table 11.20 below.

Table 11.20: Construction phases and activities assessed

Construction Phase	Activity
Phase 1 Autumn 2022 to Spring 2023	Site clearance
	Demolition
	Enabling works
	Set-up of main construction compound
	Pre-cast concrete piling near the River Etherow
	Temporary watercourse works and water control measures at the River Etherow
Phase 2 Spring 2023 to Autumn 2023	Earthworks, including excavation of the main cutting
	Transport of material to the eastern section of the Scheme
	Mottram Underpass piling
	Underpasses at Carrhouse Lane and Old Mill Farm Lane
	Temporary watercourse works and water control measures at the River Etherow
Phase 3 Autumn 2023 to Spring 2024	Mottram Underpass structure
	Road construction, including temporary road realignment of Roe Cross Road
	Landscaping
Phase 4 Spring 2024 to Autumn 2024	Excavation of material at the Mottram Underpass
	Transport of material to the western section of the Scheme
	Road construction
	Road surfacing
	Installation of street furniture
	Landscaping
Phase 5	Detrunking works to the existing A57 (the scope is to be confirmed with Tameside MBC, however, this assessment assumes that the

Construction Phase	Activity
Autumn 2024 to Spring 2025	works comprise replacing signage and adding traffic calming measures)
	Landscaping
All construction phases	Operation of construction compound (deliveries, offices, parking, and materials storage)
	Temporary works as needed, such as plant crossing points, and platforms for piling rigs and cranes

11.9.6 The shortest distances identified between each of the selected representative receptor locations and each planned construction activity are contained in Appendix 11.3 (~~TR010034/APP/6.5~~APP-176). The minimum distances have been used to predict worst-case noise levels experienced at each assessment location. Magnitudes of impact have been allocated to each assessment location per construction activity as per the DMRB LA111 and are available in Appendix 11.3 (~~TR010034/APP/6.5~~APP-176). A determination of significance has been made based on information provided by the appointed Principal Contractor regarding the duration and geographical progression of works. The indicated durations of activities that are capable of exceeding LOAEL thresholds at assessment locations are also provided in Appendix 11.3 (~~TR010034/APP/6.5~~APP-176).

11.9.7 Biodiversity receptors are considered in Chapter 8, Biodiversity. With regards to NPSNN compliance, it is considered that no ecological receptors are expected to be impacted by noise from the construction of the Scheme.

Construction Noise Levels by Distance

11.9.8 The predicted construction noise levels for each construction activity at distances of up to 300 m are provided in Table 11.21 below.

Table 11.21: Predicted construction activity noise levels

Construction activity	Phase	Predicted construction noise levels at different distances (L_{Aeq}, dB)								
		10m	25m	50m	75m	100m	150m	200m	250m	300m
Site clearance	1	80.9	73.0	65.4	61.0	57.9	53.5	50.4	48.0	46.0
Demolition	1	86.4	78.5	70.9	66.5	63.4	59.0	55.9	53.5	51.5
Enabling works	1	72.0	64.1	56.5	52.1	49.0	44.6	41.5	39.1	37.1
Construction compound set-up	1	82.0	74.1	66.5	62.1	59.0	54.6	51.5	49.1	47.1
Pre-cast concrete piling near the River Etherow	1	76.4	68.5	60.9	56.5	53.4	49.0	45.9	43.5	41.5
Traffic Management	1,2,3,4	67.3	59.4	51.8	47.4	44.3	39.9	36.8	34.4	32.4
All watercourse works	2,3	71.6	63.7	56.1	51.7	48.6	44.2	41.1	38.7	36.7
Earthworks	2	75.0	67.1	59.5	55.1	52.0	47.6	44.5	42.1	40.1
Transport of excavated material	2, 4	81.0	73.1	65.5	61.1	58.0	53.6	50.5	48.1	46.1
Mottram Underpass piling	2	76.5	68.6	61.0	56.6	53.5	49.1	46.0	43.6	41.6
Carrhouse Lane and Old Mill Farm Lane Underpasses	2	74.9	67.0	59.4	55.0	51.9	47.5	44.4	42.0	40.0
Mottram Underpass structure	3	75.2	67.3	59.7	55.3	52.2	47.8	44.7	42.3	40.3
Temporary road realignment	3	79.1	71.2	63.6	59.2	56.1	51.7	48.6	46.2	44.2
Road construction	3, 4	80.7	72.8	65.2	60.8	57.7	53.3	50.2	47.8	45.8
Landscaping	3, 4, 5	81.7	73.8	66.2	61.8	58.7	54.3	51.2	48.8	46.8
Mottram Underpass excavation	4	71.5	63.6	56.0	51.6	48.5	44.1	41.0	38.6	36.6

Construction activity	Phase	Predicted construction noise levels at different distances (L_{Aeq}, dB)								
		10m	25m	50m	75m	100m	150m	200m	250m	300m
Road surfacing	4	80.5	72.6	65.0	60.6	57.5	53.1	50.0	47.6	45.6
Installation of street furniture	4	70.5	62.6	55.0	50.6	47.5	43.1	40.0	37.6	35.6
Detrunking works to the existing A57	5	74.3	66.4	58.8	54.4	51.3	46.9	43.8	41.4	39.4
Operation of construction compound	All	78.3	70.4	62.8	58.4	55.3	50.9	47.8	45.4	43.4
Temporary Works	All	79.1	71.2	63.6	59.2	56.1	51.7	48.6	46.2	44.2
Legend										
		75.0 dB L_{Aeq} or higher						55.0 to 64.9 dB L_{Aeq}		
		65.0 to 74.9 dB L_{Aeq}						Less than 55.0 dB L_{Aeq}		

11.9.9 Table 11.21 shows that the construction activity predicted to have the greatest noise level was demolition, with a predicted noise level of 86.4 dB L_{Aeq} at a distance of 10 m. Further information on demolition activities is available in The Scheme chapter of this ES (Chapter 2). Multiple residential properties in the vicinity of Mottram Underpass and one outbuilding on Mottram Moor are scheduled to be demolished. The lowest noise levels predicted were for traffic management, with a predicted noise level of 67.3 dB L_{Aeq} at a distance of 10 m.

11.9.10 For 21 of the 24 representative receptor locations, the daytime SOAEL threshold has been established as 65 dB L_{Aeq} and at 75 dB L_{Aeq} for the other three representative receptor locations. Typically, each activity exceeds 65 dB L_{Aeq} within 50 m or less of the works. Demolition activities are the only example where 65 dB L_{Aeq} is exceeded between 75 and 100 m.

Construction Activities by Phase

Phase 1

11.9.11 During Phase 1 major magnitudes of impact result at assessment locations due to site clearance, enabling works, and demolitions. Of these activities only demolition works are considered capable of generating significant adverse impacts due to the duration (10 days) and geographical concentration of the works.

11.9.12 Significant adverse effects are predicted to occur at 15 Old Road, 23 Old Road, and 3 Tollemache Close due to their proximity to all planned demolitions. Remaining assessment locations for which major and moderate magnitudes of impact are predicted are not anticipated to experience significant adverse effects during demolition. Major magnitudes of impacts are predicted during demolition

works at 30 – 34 Four Lanes, 6 Old Road, 15 Old Road, 23 Old Road, 3 Tollemache Close, and 103 Mottram Moor. A moderate magnitude of impact is predicted at 43 Lodge Court.

11.9.13 At 23 Old Road it is considered noise levels predicted during the 10 days of demolition works would be sufficient meet the threshold for temporary rehousing for several days. During demolition works, other properties in the vicinity of the planned Mottram Underpass may also be subject to noise levels greater than the noise insulation threshold. The precise ordering of the planned demolition works in the area of Mottram Underpass would have an effect on any potential noise insulation and rehousing remediation. The need to implement noise insulation or temporary rehousing would be finalised during the Detailed Design stage when a detailed construction programme is available.

11.9.14 The appointed Principal Contractor has indicated that activities in the Hyde Road construction compound would not be conducted close to the eastern and south eastern boundaries of the compound's footprint, i.e. they will be conducted as far from noise sensitive receptors as possible. The layout and operation of the compound should be considered in the Detailed Design stage to minimise the potential for disturbance to neighbouring properties.

Phase 2

11.9.15 For the construction noise assessment, to enable a worst-case noise prediction, percussive piling has been assumed to be the methodology employed by the appointed Principal Contractor for the indicated period of 3 months. This is not the preferred method of the appointed Principal Contractor and this is addressed below in the construction vibration assessment.

11.9.16 During Phase 2, major and moderate magnitudes of impact are predicted to occur at 15 Old Road, 23 Old Road, and 3 Tollemache Close that are attributable to noise from piling. The major and moderate impacts on Old Road and Tollemache Close that are attributable to piling are considered to give rise to significant adverse effects. The determination of significance at these three locations would remain even if rotary bored piling were used in this locale, such is the proximity of these properties to the piling works.

11.9.17 The transport of fill material is predicted to cause major and moderate impacts at 103 Mottram Moor, 3 Tollemache Close, Robin Hood Farm, and Meadow View. This construction activity is scheduled to last for six months, however the sizeable area within which this activity would be conducted throughout the six-month period decreases the likelihood of these impacts from becoming significant.

11.9.18 A moderate magnitude of impact is predicted to occur at 23 Old Road due to watercourse works. A moderate magnitude of impact is predicted to occur at 103 Mottram Moor due to earthworks and traffic management. The watercourse works and traffic management works are of too short a duration to exceed the significance thresholds in the DMRB LA 111. It is also considered that the earthworks are not sufficiently proximate to 103 Mottram Moor for a period that would give rise to a significant adverse effect.

Phase 3

11.9.19 During Phase 3, works on the Mottram Underpass structure are predicted to give rise to major and moderate magnitudes of impact at 15 Old Road, 23 Old Road, and 3 Tollemache Close. Due to the indication of duration for this activity (6 months) it is considered that these impacts constitute significant adverse effects.

11.9.20 Major and moderate impacts are predicted during the temporary road realignment at 6 Old Road, 23 Old Road, and 34 Four Lanes. This activity is indicated to take 10 consecutive days to complete, however the length (approximately 160 m) of the realignment means that the assessment locations are not predicted to experience moderate or major impacts for the whole duration of this activity, leading to the conclusion that no significant adverse effects will occur as a result of this activity.

11.9.21 Major and moderate impacts are predicted during the road construction works at 3 Tollemache Close, 103 Mottram Moor, Robin Hood Farm, Meadow View, 54 Woolley Bridge, and 18 Woolley Bridge. The pace of delivery indicated by the appointed Principal Contractor (approximately 300 m per day) leads to the conclusion that no significant adverse effects will occur as a result of this activity.

11.9.22 Landscaping activities are predicted to give rise to major and moderate impacts at 30 – 34 Four Lanes, 15 Old Road, 43 Lodge Court, 3 Tollemache Close, 103 Mottram Moor, Robin Hood Farm, Meadow View, Tara Brook Farm, and 18 Woolley Bridge. This activity is indicated to take place over the course of 15 non-consecutive days throughout a 12-month period. Consequently, it is not considered that these impacts are significant.

11.9.23 As with Phase 2, watercourse works are predicted to give rise to a moderate magnitude of impact at 23 Old Road. As previously, the watercourse works are indicated to not be of sufficient duration (5 days) to give rise to a significant adverse effect.

11.9.24 Traffic management works are planned for the night-time during Phase 3. These are confined to the M67 Junction 4 roundabout and at Woolley Bridge to connect the eastern Scheme extent to the existing road network. Major and moderate magnitudes of impact are predicted at 18 Woolley Bridge and 54 Woolley Bridge respectively. The appointed Principal Contractor has suggested that works in the vicinity of Woolley Bridge would not last long enough to meet the threshold of significance.

Phase 4

11.9.25 Road construction and road surfacing are predicted to give rise to multiple major and moderate magnitudes of impact at 6 Melyncourt Road, 30 – 34 Four Lanes, 15 Old Road, 23 Old Road, 3 Tollemache Close, 103 Mottram Moor, Robin Hood Farm, Meadow View, 18 Woolley Bridge and 54 Woolley Bridge. As with Phase 3, the rate of progression for these works indicated by the appointed Principal Contractor (approx. 50 m/300 m per day) greatly reduces the likelihood of these impacts resulting in significant adverse effects.

11.9.26 As was the case with Phase 3, landscaping activities are predicted to give rise to major and moderate impacts at 30 – 34 Four Lanes, 15 Old Road, 43 Lodge Court, 3 Tollemache Close, 103 Mottram Moor, Robin Hood Farm, Meadow View, Tara Brook Farm, and 18 Woolley Bridge. This activity is indicated to take

place over the course of 15 non-consecutive days throughout a 12 month period. Consequently, it is not considered that these impacts are significant.

11.9.27 The excavation and transport of fill material (both scheduled for 4 months of activity) give rise to moderate and major magnitudes of impact at 30 – 34 Four Lanes. Due to the proximity of the Mottram Underpass portal and the extensive cuttings planned in this locale, it is considered that these impacts are significant adverse effects.

11.9.28 The installation of street furniture is predicted to give rise to a moderate magnitude of impact at 18 Woolley Bridge. However, this activity is indicated to take 5 days and will not be in the vicinity of 18 Woolley Bridge for the entirety of this period and it is not considered that these impacts are significant.

11.9.29 Traffic management at Woolley Bridge is predicted to result in a moderate magnitude of impact at 103 Mottram Moor. This activity is considered to be of too short a duration to give rise to a significant adverse effect.

Phase 5

11.9.30 Detrunking works are predicted to give rise to a moderate magnitude of impact at 60 Hyde Road. However, this activity is indicated to progress at a rate of 150 m per day. As a result, no significant impact is anticipated.

11.9.31 As was the case with Phases 3 and 4, landscaping activities are predicted to give rise to major and moderate impacts at 30 – 34 Four Lanes, 15 Old Road, 43 Lodge Court, 3 Tollemache Close, 103 Mottram Moor, Robin Hood Farm, Meadow View, Tara Brook Farm, and 18 Woolley Bridge. This activity is indicated to take place over the course of 15 non-consecutive days throughout a 12-month period. Consequently, it is not considered that these impacts are significant.

Summary

11.9.32 Each construction phase is scheduled to take around six months. The transitory nature of several of the activities within each phase means that many would only be perceptible for a short time. An assessment of significance has been made based on predicted moderate and major magnitudes of impact and the indicated timescale for construction activities responsible for generating these impacts. Only traffic management activities are planned to take place at night. Night-time traffic management activities give rise to the adverse effects at night shown in Table 11.22 below. Table 11.22 shows the assessment locations that are predicted to experience adverse and significant adverse effects during construction.

Table 11.22: Assessment locations predicted to experience significant adverse and adverse effects from construction noise

Daytime construction noise		Night-time construction noise	
Significant adverse effects	**Adverse effects (above LOAEL)**	**Significant adverse effects**	**Adverse effects (above LOAEL)**
30 Four Lanes 32 Four Lanes 34 Four Lanes 15 Old Road 23 Old Road 3 Tollemache Close	6 Melyncourt Road 60 Hyde Road 8 Edge Lane 8 Rushycroft 3 Ash Close 23 Tollemache Road 6 Old Road 43 Lodge Court Mottram Old Hall 37 Woolley Lane 103 Mottram Moor Robin Hood Farm Meadow View Tara Brook Farm 54 Woolley Bridge 18 Woolley Bridge 7 Springfield Close 48 Lower Barn Road	N/A	7 Springfield Close 18 Woolley Bridge 54 Woolley Bridge

11.9.33 Locations of adverse and potential significant adverse effects for each phase of construction are shown in Figure 11.6 (~~TR010034/APP/6.4~~APP-135).

Construction Vibration

11.9.34 This part of the assessment considers the effects of groundborne vibration on key receptor locations during construction activities that feature piling, vibratory soil compaction, and asphalt rolling (see Section 11.4 for assumptions and risk). The construction activities associated with vibration are shown on Figure 11.6 (~~TR010034/APP/6.4~~APP-135). The construction activities that included these processes are:

- Piling
- Casting pile caps
- Earthworks
- Road surfacing
- Underpass works
- Compound set-up

Percussive Piling

11.9.35 Percussive piling is not the preferred methodology of the appointed Principal Contractor. The use of percussive piling is subject to consideration of a geological fault at the Detailed Design stage. There is potential for vibration from percussive piling operations to cause significant effects. During Phase 1, if percussive piling is utilised, a moderate magnitude of impact would be predicted at Tara Brook Farm. Owing to the nature and duration of the works in this locale, this would be considered to constitute a significant adverse effect. Minor magnitudes of impact would be predicted at 37 Woolley Lane, Robin Hood Farm, Meadow View, 54 Woolley Bridge, 18 Woolley Bridge, and 7 Springfield Close.

11.9.36 During Phase 2, percussive piling for the Mottram Underpass would generate a major magnitude of impact at 23 Old Road, and this is would constitute a significant adverse effect due to the extensive piling required in this area. Moderate magnitudes of impact would be generated at 30 Four Lanes, 6 Old Road, 15 Old Road, 43 Lodge Court, 3 Tollemache Close, and 32-34 Four Lanes. These would also be considered to be significant adverse impacts. Minor magnitudes of impact are predicted to occur at 3 Ash Close, 23 Tollemache Road, and Mottram Old Hall. The construction of the two ancillary underpasses (Carrhouse Lane and Old Mill) would generate moderate magnitudes of impact at Robin Hood Farm and Meadow View, and minor magnitudes of impact at 8 Edge Lane, 3 Ash Close, and 30 – 32 Four Lanes. No impacts associated with the ancillary underpasses are predicted to be significant adverse due to the duration and scale of the works.

Rotary Bored Piling

11.9.37 Rotary bored piling is the preferred methodology of the appointed Principal Contractor and its use is strongly recommended. It is predicted that, using rotary bored piling, only a minor magnitude of impact will arise at 23 Old Road and 15 Old Road during piling operations for the Mottram Underpass. No other piling impacts are predicted during the construction of the Scheme using this method.

Vibratory Compaction

11.9.38 During Phase 2, minor magnitudes of impact are predicted at 3 Tollemache Close and 103 Mottram Moor attributable to earthworks.

11.9.39 During Phase 3, a moderate magnitude of impact is predicted at 23 Old Road, 18 Woolley Bridge and 54 Woolley Bridge. These impacts are attributed to temporary road realignment on Roe Cross Road and road construction on A57 respectively. Owing to the transient nature of these works, none of these impacts are considered to be significant adverse. Minor magnitudes of impact from the aforementioned activities are predicted at 6 Old Road, 15 Old Road, 32 – 34 Four Lanes, 3 Tollemache Close, 103 Mottram Moor, and Robin Hood Farm.

11.9.40 During Phase 4, a moderate magnitude of impact is predicted at 6 Melyncourt Road, and 32-34 Four Lanes. These impacts are attributable to both road construction and road surfacing works. Clearly these works can only be completed sequentially, however they are predicted to be of such short duration in these locations that they are not considered to be significant adverse. Moderate magnitudes of impact are predicted at 23 Old Road, 54 Woolley Bridge and 18 Woolley Bridge that are attributable to short-term road surfacing works.

These are also not considered to be significant. Minor magnitudes of impact are predicted at 30 Four Lanes, 15 Old Road, 3 Tollemache Close, 103 Mottram Moor, and Robin Hood Farm during the construction and surfacing of the nearby road.

11.9.41 During Phase 5, 60 Hyde Road is predicted to experience a momentary minor magnitude of impact brought about by detrunking works.

Vibration Levels by Distance

11.9.42 Whilst rotary bored piling at Mottram Underpass is the preferred (and recommended) method of piling, percussive piling may yet be considered in this area if ground conditions in the vicinity of a geological fault mandate it. Table 11.23 below shows the predicted levels of PPV in mm/s attributed to both piling methods at various distances, as well as the predicted vibration levels of compaction activities associated with the remaining works dependant on vibration.

Table 11.23: Predicted vibration levels attributed to construction activities

Construction activity	Predicted PPV at different distances (mm/s)								
	10m	25m	50m	75m	100m	150m	200m	250m	300m
Percussive piling	21.8	6.7	2.7	1.6	1.1	0.6	0.4	0.3	0.3
Rotary bored piling	1.1	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Compaction	3.7	1.0	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

Legend			
	10 mm/s or higher		1.0 to 9.9 mm/s
	0.3 to 0.9 mm/s		Less than 0.3 mm/s

11.9.43 It can be seen in Table 11.23 that the LOAEL threshold would be exceeded at distances closer than 25 m during the preferred method of piling; rotary bored piling. Most properties within 25 m of the planned piling locations are scheduled for demolition.

11.9.44 The SOAEL threshold would be exceeded at distances within 10 m of rotary bored piling sites. As the closest vibration sensitive receptor is situated 14.5 m from the nearest piling activity (23 Old Road), the SOAEL is not predicted to be exceeded at vibration sensitive receptors. The anticipated PPV levels for rotary bored piling are considerably lower than those required for cosmetic damage to buildings stated in Table 11.6. Vibration sensitive receptors that were predicted to experience potential adverse vibration effects due to rotary bored piling are provided in Table 11.24.

11.9.45 Table 11.23 shows that, if a percussive piling method is used, the SOAEL threshold would be exceeded at vibration sensitive receptors within 110 m of the piling sites. This is of particular relevance during Phase 2 when piling works commence for the Mottram Underpass.

11.9.46 If percussive piling is utilised in the construction of the Mottram Underpass then major magnitudes of impact would arise at properties within 110 m of the piling

with the possibility of building damage occurring within 15 m of the works. Such impacts would be considered to be short-term only due to the nature of the works. The use of percussive piling should be avoided during the Detailed Design unless geologically essential.

11.9.47 The subterranean United Utilities Mottram Longdendale Aqueduct crosses the Scheme and has the potential to be affected by construction activities that generate vibration. Piling works are planned no closer than 160 m from the estimated location of the aqueduct. It can be seen in Table 11.23 that, at this distance, the expected PPV levels for rotary bored and percussive piling are substantially below those provided in BS 5228 Part 2 (Annex B.4.4) for underground services and impacts from piling are unlikely.

11.9.48 One active badger sett has been identified that has the potential to be affected by the piling works within the distance thresholds discussed above. A discussion of the impacts of noise on the relevant species is contained within Chapter 8 (Biodiversity).

Vibratory Compaction

11.9.49 At a steady state of operation, a resultant peak particle velocity of 3.7 mm/s is predicted for a Bomag 120 at a distance of 10 m from the vibratory roller. This calculation assumes a 5% probability of exceedance for a conservative assessment as vibration levels of the stated magnitude may occur infrequently. It can therefore be seen that there is the potential for vibration to be perceptible within 75 m of the works, as shown in Table 11.23.

11.9.50 The SOAEL threshold would be exceeded at vibration sensitive receptors closer than 25 m during various compaction works. These exceedances are not considered to constitute a significant impact due to the transitory nature of this activity.

11.9.51 Compaction works are planned above the United Utilities Mottram Longdendale Aqueduct. It can be seen in Table 11.23 that vibration levels from compaction works are below those provided in BS 5228 Part 2 (Annex B.4.4) for underground services and impacts from compaction works are unlikely.

11.9.52 Vibration sensitive receptors that were predicted to experience potential adverse vibration effects attributed to rotary bored piling (2 assessment locations) and vibratory compaction (13 assessment locations) are provided in Table 11.24.

Table 11.24: Assessment receptors predicted to experience adverse effects of construction vibration

Adverse effects of vibration resulting from rotary bored piling	Adverse effects of vibration resulting from compaction
15 Old Road 23 Old Road	30 Four Lanes 32 Four Lanes 34 Four Lanes 60 Hyde Road 6 Melyncourt Road 103 Mottram Moor 6 Old Road 15 Old Road 23 Old Road Robin Hood Farm 3 Tollemache Close 18 Woolley Bridge 54 Woolley Bridge

Construction traffic

11.9.53 The local highway network may experience changes in traffic flows and speeds during construction as a result of temporary traffic management measures and/or additional vehicles travelling to and from the construction site transporting materials, plant, and labour. As noted previously, traffic management is planned during Phases 1-4.

Additional construction-related vehicles on the road network

11.9.54 In accordance with DMRB LA 111 methodology, BNL calculations were performed using HGV movement data supplied by the appointed Principal Contractor (these data are reproduced in Appendix 11.2, ~~TR010034/APP/6.5~~APP-175) and combined with the modelled Do Minimum opening year traffic data. This allowed the resulting change in noise level at 10 m from kerbside to be calculated along potential construction traffic routes.

11.9.55 Only negligible magnitudes of impact were predicted when comparing the BNLs of the Do Minimum opening year scenario with the construction traffic data scenario. This is attributable to the existing high volume of traffic in Mottram area and on the M67 effectively masking noise from the relatively few vehicles involved in the construction process. In addition, construction vehicle movements along the length of the Scheme are planned to take place off the existing road network and within the footprint to the Scheme. The number of movements on the road network is minimised by vehicles relocating extracted materials from one area of the DCO footprint to another whilst remaining ‘off network’ at all times. As these movements are ‘off network’, they were considered as part of the construction activity assessment and has been addressed above.

Road closures and diversions

11.9.56 Planned traffic management activities have been considered as part of the above assessment. Traffic management activities are planned to take place during both daytime and night-time. Diversions are planned to accommodate the partial

temporary closures of Old Hall Lane and Old Road. The traffic management activities that have been assessed are contained within Table 11.25.

Table 11.25: Traffic restrictions during the construction phase

Construction Phase	Activity
Phase 1 Autumn 2022 to Spring 2023	Old Hall Lane partially closed
	No traffic changes on A57
Phase 2 Spring 2023 to Autumn 2023	Traffic restrictions on Mottram Moor to enable the transport of material across the A57 carriageway from north to south during peak hours.
	Partial road closures on Old Road and Old Hall Lane to enable Mottram Underpass works, traffic diverted north to Roe Cross Road.
Phase 3 Autumn 2023 to Spring 2024	Scheme to Woolley Bridge tie in – no restrictions are planned during peak hours, with road use down to a single lane at off peak times.
	Temporary road realignment of Roe Cross Road. Two lanes of traffic used in peak hours only on Hattersley roundabout.
Phase 4 Spring 2024 to Autumn 2024	Mottram Moor junction completed with diversion of the traffic onto the new junction while conversion of the existing carriageway into access to the local properties
	It is not expected that there would be any restrictions to the existing road network during this phase.

11.9.57 During Phase 1, the closure of Old Hall Lane is unlikely to give rise to significant adverse effects. Old Hall Lane features a single narrow carriageway and is highly likely to be used by a small minority of vehicles for access only in this locale, several of which are scheduled for demolition. Old Hall Lane has not been included in the traffic model and BNL calculations are not possible.

11.9.58 During Phases 2 and 3, partial closures on Old Road and Old Hall Lane will see traffic diverted to Roe Cross Road. A property count shows that 147 noise sensitive receptors within 25 m of the kerbside of the diversion route and incur a major magnitude of impact by default. Traffic restrictions on Mottram Moor are unlikely to contribute to significant adverse effects. The A57 Mottram Moor sees high traffic flows (particularly between 0700 – 1900) and the use of additional traffic signals here is unlikely to affect the $L_{A10,18hr}$ noise levels sufficiently to render a perceptible impact.

11.9.59 During Phase 3, restrictions close to the Woolley Bridge tie in are planned only during off peak times and, consequently, no significant adverse impacts are foreseen in this locale. The temporary realignment of Roe Cross Road is also not considered to give rise to significant adverse effects, even if the temporary realignment were to result in substantial speed reductions along this route. The use of two lanes on Hattersley roundabout during Phase 3 matches the existing road conditions and consequently no adverse noise impacts are envisaged here.

11.9.60 During Phase 4, once Mottram Moor junction is completed, traffic is drawn from the existing A57 on to the new road alignment at a greater distance from noise sensitive receptors, including the assessment location at 103 Mottram Moor. Consequently, no adverse impacts are foreseen in this location.

11.9.61 The potential effects of traffic management measures are contained in Table 11.26.

Table 11.26: Assessment receptors predicted to experience significant adverse and adverse effects of construction traffic

Significant effects	Adverse effects
None	147 major impacts resulting from diversions in the vicinity of Mottram Underpass during Phases 2 and 3.

Operation Noise

Modelled noise sensitive receptors

11.9.62 Detailed noise predictions within 600 m of the Scheme and bypassed routes were carried out for the noise sensitive receptors detailed in Table 11.27. Figure 11.4 (~~TR010034/APP/6.4~~APP-133) shows the geographic location of these receptors.

Table 11.27: Noise sensitive receptors included in operational road traffic noise modelling

Receptor Type (AddressBase category)	Daytime		Night-time	
	Do Minimum	Do Something	Do Minimum	Do Something
Accommodation and Residential	~~2~~ 5,147	~~2~~ 5,120	~~2~~ 5,147	~~2~~ 5,102
~~Residential~~ All other sensitive receptors	~~5,187~~ 132	~~5,166~~ 130	~~5,187~~ 8	~~5,166~~ 8
~~Community~~	~~8~~	~~8~~	~~1~~	~~1~~
~~Ecological~~	~~5~~	~~5~~	~~5~~	~~5~~
~~Education~~	~~6~~	~~6~~	~~0~~	~~0~~
~~Future Development~~	~~4~~	~~4~~	~~4~~	~~4~~
~~Heritage~~	~~1~~	~~1~~	~~0~~	~~0~~
~~Leisure~~	~~8~~	~~8~~	~~0~~	~~0~~
~~Medical~~	~~4~~	~~4~~	~~0~~	~~0~~
~~Office~~	~~78~~	~~78~~	~~0~~	~~0~~
~~Open Space~~	~~14~~	~~14~~	~~0~~	~~0~~
Total	~~5,317~~ 5,279	~~5,296~~ 5,250	~~5,199~~ 5,155	~~5,178~~5,128

11.9.63 The number of Residential Dwellings is lower in the Do Something scenarios due to some properties being demolished as part of the Scheme. A greater number of noise sensitive receptors are included in the assessment of daytime impacts as several of the non-residential receptors are not in use at night and are therefore not considered to be noise sensitive during this time period.

11.9.64 Detailed noise predictions in the wider area beyond 600 m of the Scheme and bypassed routes were carried out for the number or receptors detailed in Table 11.28. The extent of the wider area considered is shown in Figure 11.5 (~~TR010034/APP/6.4~~APP-134).

Table 11.28: Noise sensitive receptors included in operational road traffic noise modelling in the wider area

Receptor Type	Daytime		Night-time	
	Do Minimum	Do Something	Do Minimum	Do Something
Accommodation and Residential	~~1~~ 2,745	~~1~~ 2,745	~~1~~ 2,745	~~1~~ 2,745
All other sensitive receptors ~~Residential~~	~~2,374~~ 303	~~2,374~~ 303	~~2,374~~ 6	~~2,374~~ 6
~~Community~~	~~6~~	~~6~~	~~2~~	~~2~~
~~Education~~	~~4~~	~~4~~	~~0~~	~~0~~
~~Future Development~~	~~3~~	~~3~~	~~3~~	~~3~~
~~Leisure~~	~~7~~	~~7~~	~~0~~	~~0~~
~~Medical~~	~~6~~	~~6~~	~~0~~	~~0~~
~~Office~~	~~256~~	~~256~~	~~0~~	~~0~~
Total	~~2,657~~ 3,048	~~2,657~~ 3,048	~~2,380~~ 2,751	~~2,380~~ 2,751

11.9.65 The sections below detail the short-term and long-term impacts of the Scheme, where comparisons are made between the Do Minimum and Do Something scenarios in the opening year and the future year. Long-term impacts without the Scheme are also considered.

11.9.66 The predicted daytime and night-time road traffic noise levels for a selection of representative properties are shown in Appendix 11.4 (~~TR010034/APP/6.5~~APP-177).

Short-term impacts with the Scheme

11.9.67 This part of the assessment compares the Do Minimum Opening Year (DMOY) and Do Something Opening Year (DSOY) scenarios inclusive of mitigation measures provided by the Scheme for noise sensitive receptors within 600m of the Scheme and bypassed routes. The assessment classifies each ‘dwelling’ and ‘other sensitive receptor’ according to the magnitude of impact identified using the methodology found in the DMRB LA 111, the results of which are shown in Table 11.29. The predicted daytime noise levels in the DMOY and DSOY scenarios are shown in Figures 11.7 (APP-136) and 11.8 (~~TR010034/APP/6.4~~APP-137), and the night-time noise levels are shown in Figures 11.14 (APP-143) and 11.15 (~~TR010034/APP/6.4~~APP-144). The noise change magnitudes are shown in Figure 11.11 (~~TR010034/APP/6.4~~APP-140).

Table 11.29: Operational noise change, short-term

Change in Noise Level dB(A)		DMRB impact magnitude	Daytime		Night-time	
			Number of dwellings	Number of other noise sensitive receptors	Number of dwellings	Number of other noise sensitive receptors
Increase in noise level dB $L_{A10,18hr}$ / L_{night}	< 1.0	Negligible	2,303 ~~2,394~~	53 ~~49~~	2,597 ~~2,711~~	2 ~~4~~
	1.0 – 2.9	Minor	1,412 ~~1,393~~	31 ~~34~~	1,226 ~~1,190~~	3 ~~4~~
	3.0 – 4.9	Moderate	136 ~~136~~	3	110 ~~115~~	0
	≥ 5	Major	92 ~~90~~	4	59 ~~44~~	0
No change	0	No change	91 ~~93~~	6 ~~7~~	144 ~~155~~	0
Decrease in noise level dB $L_{A10,18hr}$ / L_{night}	<1.0	Negligible	653 ~~646~~	12 ~~13~~	626 ~~591~~	~~21~~
	1.0 – 2.9	Minor	340 ~~328~~	18 ~~15~~	291 ~~304~~	1
	3.0 – 4.9	Moderate	79 ~~76~~	0	57 ~~50~~	0
	≥ 5	Major	14 ~~12~~	3	10 ~~8~~	0

11.9.68 The majority of the major and moderate increases in noise level were generally located at noise sensitive receptors close to the Mottram Underpass, on Edge Lane (to the northwest of the Scheme) and the Woolley Bridge junction.

11.9.69 The majority of the major and moderate decreases in noise level were at receptors on Woolley Lane, Hyde Road, Mottram Moor. These are locations adjacent to roads that are bypassed by the Scheme and are located with NIA 10992. There were some noise sensitive receptors within this NIA on the A6018 Back Moor and Roe Cross Road where noise levels were predicted to perceptibly increase due to the introduction of the Mottram Moor Link Road.

11.9.70 Minor and moderate short-term noise increases were predicted at most properties within NIA 10993 (Woolley Bridge, Brookfield).

11.9.71 Negligible changes were predicted at NIA 1574 (Melyncourt Road), NIA 7247 (adjacent to M67) and at medical and educational facilities throughout the study area except for three schools (Mottram C of E Primary School, St Charles Catholic Primary School and Longdendale High School) where minor increases in noise were predicted.

11.9.72 Community assets were predicted to receive negligible and minor noise increases on Scheme opening. At open spaces, minor noise decreases were predicted at a playground on Broadbottom Road and land adjacent to Mottram

Moor Farm, and a major decrease was predicted at allotments in Mottram in Longdendale. Negligible changes were predicted at all other areas of open space.

11.9.73 Two woodland areas in Hollingworth were predicted to receive minor noise increases in noise in the short-term. The road traffic noise impacts at all other woodland areas were predicted to be negligible.

11.9.74 The area where the bat mitigation would be installed as part of the Scheme to the northeast of the Mottram Underpass was predicted to receive road traffic noise levels of approximately 55 dB $L_{A10,18hr}$ in the daytime and 45 dB L_{night} at night. The area where the bat mitigation to east of the Scheme near Woolley Bridge junction would be installed was predicted road traffic noise levels of approximately 70 dB $L_{A10,18hr}$ in the daytime and 60 dB L_{night} at night. It is noted that the sound levels at the peak frequencies in a typical road traffic noise spectrum are normally below the hearing threshold for bats or outside their range of audible frequencies.

Long-term impacts with the Scheme

11.9.75 This part of the assessment compares the DMOY and Do Something Future Year (DSFY) scenarios. The predicted daytime and night-time noise levels in the DSFY scenario are shown in Figures 11.10 (APP-139) and 11.17 (~~TR010034/APP/6.4~~APP-146). The noise change magnitudes are shown in Table 11.30 and and Figure 11.12 (~~TR010034/APP/6.4~~APP-141).

Table 11.30: Operational noise change, long-term

Change in Noise Level dB(A)		DMRB impact magnitude	Daytime		Night-time	
			Number of dwellings	Number of other noise sensitive receptors	Number of dwellings	Number of other noise sensitive receptors
Increase in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	4,107 ~~4239~~	98 ~~100~~	4,291 ~~4396~~	6 ~~9~~
	3.0 – 4.9	Minor	244 ~~198~~	5 ~~2~~	134 ~~130~~	0
	5.0 – 9.9	Moderate	93 ~~90~~	3 ~~4~~	69 ~~56~~	0
	≥ 10	Major	5 ~~4~~	1	1 ~~3~~	0
No change	0	No change	95 ~~72~~	2 ~~3~~	109 ~~71~~	1 ~~0~~
Decrease in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	509 ~~504~~	18 ~~15~~	467 ~~471~~	1
	3.0 – 4.9	Minor	55 ~~50~~	0	42 ~~35~~	0
	5.0 – 9.9	Moderate	12 ~~11~~	2	7 ~~6~~	0
	≥ 10	Major	0	1	0	0

11.9.76 The majority of the major and moderate long-term increases in noise level were predicted at noise sensitive receptors located close to the Mottram Underpass, on Edge Lane (to the northwest of the Scheme) and Woolley Bridge junction.

11.9.77 The majority of the major and moderate decreases in noise level were predicted at properties on Woolley Lane and Hyde Road that would be bypassed by the Scheme.

11.9.78 Noise levels at receptors within NIA 10992 were predicted to decrease as the majority of the area covered by this NIA is bypassed by the Scheme. Most of the decreases in noise level were predicted to be negligible although some perceptible increases were predicted at some noise sensitive receptors on the A6018 Back Moor and Roe Cross Road.

11.9.79 Negligible long-term increases in road traffic noise were generally predicted at NIA 1574 (Melyncourt Road), NIA 7247 (adjacent to M67) and NIA 10993 (Woolley Bridge), with a few properties close to the Woolley Bridge junction predicted to receive minor or moderate noise increases.

11.9.80 Impacts at medical and education facilities, woodland areas and community assets throughout the study area were predominantly predicted to be negligible. The non-residential receptor with a major decease is a pharmacy on Mottram Moor.

11.9.81 ~~Minor~~ Major to moderate decreases in road traffic noise level were predicted at allotments located to the rear of 12 Mottram Moor. No changes or negligible changes to road traffic noise levels were predicted at all other open spaces in the study area.

11.9.82 The area where bat mitigation would be installed as part of the Scheme to the northeast of the Mottram Underpass is predicted to have noise levels of approximately 55 dB $L_{A10,18hr}$ in the daytime and 45 dB L_{night} at night. Similarly, the area where the bat mitigation to east of the Scheme near Woolley Bridge junction would be installed is predicted to have noise level of approximately 70 dB $L_{A10,18hr}$ in the daytime and 60 dB L_{night} at night.

Long-term impacts without the Scheme

11.9.83 This part of the assessment compares the DMOY and Do Minimum Future Year (DMFY) scenarios, i.e. the effects of road noise over the course of 15 years were the Scheme not built. The predicted daytime and night-time noise levels in the DMFY scenario are shown in Figures 11.9 (APP-138) and 11.16 (~~TR010034/APP/6.4~~APP-145). The noise change magnitudes are shown in Table 11.31 and Figure 11.13 (~~TR010034/APP/6.4~~APP-142).

Table 11.31: Operational noise change, long-term (without the Scheme)

Change in Noise Level dB(A)		DMRB impact magnitude	Daytime		Night-time	
			Number of dwellings	Number of other noise sensitive receptors	Number of dwellings	Number of other noise sensitive receptors
Increase in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	3,438 ~~4,068~~	70 ~~92~~	3,371 ~~4,013~~	~~57~~
	3.0 – 4.9	Minor	0	0	0	0
	5.0 – 9.9	Moderate	0	0	0	0
	≥ 10	Major	0	0	0	0
No change	0	No change	896 ~~661~~	39 ~~23~~	1,066 ~~808~~	2 ~~3~~
Decrease in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	813 ~~460~~	23 ~~13~~	710 ~~368~~	1 ~~0~~
	3.0 – 4.9	Minor	0	0	0	0
	5.0 – 9.9	Moderate	0	0	0	0
	≥ 10	Major	0	0	0	0

11.9.84 Table 11.31 shows that negligible or 'no change' impacts were predicted throughout the study area in the long-term without the Scheme.

11.9.85 The negligible reductions in noise in the long term without the scheme are due to the following:

- B6174 Market Street, B6174 Stalybridge Road – reduction in flow

- A57 between Stalybridge Road and Back Moor, and A628 Market Street – reduction in percentage of heavy vehicles

Wider area

11.9.86 An assessment of noise impacts outside the detailed noise modelling area due to traffic changes on the wider road network has also been undertaken. The road network considered is shown in Figure 11.5 (APP-134), which extends as far as Denton, Calver, Elland and Chapeltown.

11.9.87 The road traffic noise levels on the majority of the road network in the wider area of the Scheme were predicted to change by less than 1dB $L_{A10,18h}$ in the opening year of the Scheme and less than 3dB $L_{A10,18h}$ by the future year. Negligible impacts would occur at these locations, which include Dukinfield, Stalybridge, Romiley, New Mills, Holmfirth, Woodhead, Langsett and Padfield. These roads are shown in blue in Figure 11.5 (APP-134).

11.9.88 Noise increases or decreases of at least 1dB $L_{A10,18h}$ in the opening year were predicted at some locations on the wider road network, which are indicated in purple in Figure 11.5 (APP-134). Minor, moderate or major impacts were predicted at these locations.

[In response to Relevant Representations the text below has been relocated to below Table 11.34 and amended to provide additional clarification]

~~11.9.86 The modelled traffic flows on the A628 through the Peak District National Park were not predicted to cause a perceptible change in noise level in the short or long-term. This road passes through the Dark Peak SSSI, South Pennine Moors SAC and Peak District Moors SPA. The A628 is adjacent to the Trans-Pennine Trail and crosses the Pennine Way; impacts on these footpaths would be negligible from changes in traffic on A628.~~

~~11.9.87 Traffic flows on A57 Sheffield Road, A57 Woodcock Road, A57 Snake Pass and A57 Snake Road would increase to give a perceptible noise increase in the short-term, however, by the future year the increase would have a negligible impact. This road also passes through part of the Dark Peak SSSI, South Pennine Moors SAC and Peak District Moors SPA and crosses the Pennine Way. Therefore, noise levels in these areas near the A57 would perceptibly increase in the short-term, and the impact would be limited to within approximately 10 m of the road.~~

~~11.9.88 In Tintwistle, traffic flow increases on New Road and Waterside would lead to perceptible increases in noise in the short-term and long-term. Noise sensitive receptors adjacent to these roads would experience a minor or negligible increase in road traffic noise. Negligible increases were predicted on the A628 Manchester Road and A628 Woodhead Road in the short-term and long-term.~~

11.9.89 Table 11-32 to Table 11.34 details the magnitude of impacts at all noise sensitive receptors considered in the wider area. For clarity, the noise sensitive receptors included in these tables do not include designated areas or footpaths but do include properties adjacent to the A57 where an address point was provided in AddressBase Plus and the locations shown in Figure 11.5 (~~TR010034/APP/6.4~~ APP-134).

Table 11.32: Operational noise change, short-term– wider area

Change in Noise Level dB(A)		DMRB impact magnitude	Daytime		Night-time	
			Number of dwellings	Number of other noise sensitive receptors	Number of dwellings	Number of other noise sensitive receptors
Increase in noise level dB $L_{A10,18hr}$ / L_{night}	< 1.0	Negligible	1,001~~,~~ ~~807~~	180 ~~237~~	1,408~~,~~ ~~1174~~	5 ~~0~~
	1.0 – 2.9	Minor	780 ~~635~~	87 ~~19~~	672 ~~555~~	1 ~~2~~
	3.0 – 4.9	Moderate	0	0	0	0
	≥ 5	Major	0	0	0	0
No change	0	No change	63	1 ~~0~~	27 ~~30~~	0
Decrease in noise level dB $L_{A10,18hr}$ / L_{night}	<1.0	Negligible	437 ~~411~~	16 ~~11~~	228 ~~202~~	0
	1.0 – 2.9	Minor	458 ~~442~~	19 ~~15~~	408 ~~410~~	0
	3.0 – 4.9	Moderate	6 ~~15~~	0	24	0
	≥ 5	Major	0 ~~2~~	0	0	0

~~11.9.90 The moderate and major decreases in noise level are predominantly at receptors on Victoria Street and Talbot Road, to the west of the Scheme area, due to traffic flows reducing by at least half.~~

Table 11.33: Operational noise change, long-term– wider area

Change in Noise Level dB(A)		DMRB impact magnitude	Daytime		Night-time	
			Number of dwellings	Number of other noise sensitive receptors	Number of dwellings	Number of other noise sensitive receptors
Increase in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	1,941~~,~~ ~~1654~~	205 ~~258~~	2,075 ~~,1767~~	5 ~~2~~
	3.0 – 4.9	Minor	114 ~~112~~	6 ~~5~~	101	0
	5.0 – 9.9	Moderate	0	0	0	0
	≥ 10	Major	0	0	0	0
No change	0	No change	48 ~~42~~	3 ~~1~~	39 ~~28~~	0
Decrease in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	638 ~~554~~	89 ~~18~~	529 ~~478~~	1 ~~0~~
	3.0 – 4.9	Minor	4 ~~12~~	0	1	0
	5.0 – 9.9	Moderate	0 ~~1~~	0	0	0
	≥ 10	Major	0	0	0	0

~~11.9.91 The moderate decreases in noise level is on Victoria Street, to the west of the Scheme, due to traffic flows reducing by more than half.~~

Table 11.34: Operational noise change, long-term (without the Scheme)– wider area

Change in Noise Level dB(A)		DMRB impact magnitude	Daytime		Night-time	
			Number of dwellings	Number of other noise sensitive receptors	Number of dwellings	Number of other noise sensitive receptors
Increase in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	2,582~~,~~ ~~2304~~	223 ~~271~~	2,604~~,~~ ~~2311~~	5 ~~2~~
	3.0 – 4.9	Minor	7 ~~6~~	2 ~~1~~	0	0
	5.0 – 9.9	Moderate	0	0	0	0
	≥ 10	Major	0	0	0	0
No change	0	No change	35 ~~23~~	4 ~~5~~	4 ~~123~~	0
Decrease in noise level dB $L_{A10,18hr}$ / L_{night}	< 3.0	Negligible	121 ~~42~~	74 ~~5~~	100 ~~41~~	1 ~~0~~
	3.0 – 4.9	Minor	0	0	0	0
	5.0 – 9.9	Moderate	0	0	0	0
	≥ 10	Major	0	0	0	0

11.9.90 Table 11.32 and Table 11.33 show that moderate and major decreases were predicted on the wider road network in the short-term and the long-term with the Scheme. The short-term moderate and major decreases were predicted at receptors on Victoria Street and Talbot Road in Hyde, to the west of the Scheme area, due to traffic flows reducing by at least 50%. Moderate decreases were predicted at Victoria Street (Hyde) in the long-term due to lower traffic flows relative to the DMOY scenario. Minor short-term decreases were predicted with the Scheme at Matley Lane, which is located close to Victoria Street and Talbot Road.

11.9.91 The modelled traffic flows on the A628 through the Peak District National Park were not predicted to cause a perceptible change in noise level in the short or long-term with the Scheme. This road passes through the Dark Peak SSSI, South Pennine Moors SAC and Peak District Moors SPA. The A628 is adjacent to the Trans-Pennine Trail and crosses the Pennine Way; impacts on these footpaths would be negligible from changes in traffic on A628. Negligible increases were predicted in Tintwistle on the A628 Manchester Road and A628 Woodhead Road in the short-term and long-term.

11.9.92 At Charlesworth, Chisworth and Lane Ends, lower traffic flows on the A626 Glossop Road/Marple Road were predicted to result in minor decreases in the short-term with the Scheme. These noise decreases would be perceptible and result in beneficial impacts. Negligible noise decreases were predicted from the A626 in the long-term.

11.9.93 Minor short-term noise decreases were predicted at A626 Glossop Road (Gamesley) with the Scheme. This would be perceptible and benefit residential properties in the south east of Gamesley (such as Castleton Crescent). Negligible noise decreases were predicted at Glossop Road in the long-term relative to current conditions.

11.9.94 Minor short-term noise increases were predicted at Brookfield, which may be perceptible to residential properties in the north east of Gamesley (such as Hathersage Crescent) depending on the level of shielding provided by industrial and commercial premises located adjacent to Brookfield. Negligible noise increases were predicted at Brookfield in the long-term.

11.9.95 Minor short-term noise increases were predicted at Ellison Street (Glossop) and Dinting Road (Glossop), which would be perceptible. However, by the future year the increase would have a negligible impact according to DMRB criteria.

11.9.96 Traffic flow increases on New Road (Tintwistle) and Waterside (Hadfield) linked to the avoidance of traffic calming measures on Woolley Lane would lead to minor increases in noise in the short-term and negligible increases in the long-term with the Scheme. The noise increases would be perceptible in the short-term at noise sensitive receptors adjacent to these roads.

11.9.97 Traffic flows on A57 Sheffield Road, A57 Woodcock Road, A57 Snake Pass and A57 Snake Road would increase to give a minor noise increase in the short-term that would be perceptible. However, by the future year the increase would have a negligible impact. This road also passes through part of the Dark Peak SSSI, South Pennine Moors SAC and Peak District Moors SPA and crosses the Pennine Way. Therefore, noise levels in these areas near the A57 would perceptibly increase in the short-term.

~~Most long-term noise impacts in the wider area without the Scheme would be negligible. However, minor increases were predicted that would be perceptible at sensitive receptors on Bennett Street (Hyde) due to traffic flows almost doubling.~~

Most long-term noise impacts in the wider area without the Scheme would be negligible. Hiowever, minor increases were predicted that would be ~~The~~ perceptible ~~increases would be~~ at sensitive receptors on Bennet Street (Hyde)~~, west of the Scheme area,~~ due to traffic almost doubling.

Noise Insulation Regulations Assessment

~~11.9.92~~11.9.98 Based on the predicted road traffic noise levels and impact magnitudes described above, there are nine properties that may be eligible for an offer of noise insulation under the Noise Insulation Regulations 1975 (as amended). Eight of the nine affected properties are dwellings located close to the Woolley Bridge junction with the A57 Link Road. The other property is adjacent to M67 Junction 4 at the west end of the Scheme.

~~11.9.93~~11.9.99 Should these properties be shown to be eligible, further assessment would be required to determine whether the qualifying facades contain rooms where noise insulation would be applicable.

~~11.9.94~~11.9.100 No formal offers of noise insulation can be made until after the completion of the statutory processes and the finalisation of the detailed engineering design of the Scheme.

Significance

~~11.9.95~~11.9.101 As described in Section 11.3, a significant adverse effect occurs if any of the following conditions are met:

- A moderate or major change to road traffic noise levels is predicted,
- The predicted noise levels with the Scheme increase by at least 1 dB and exceed the SOAEL, or
- Contextual factors in combination with the predicted noise levels are considered to constitute a significant adverse effect.

~~11.9.96~~11.9.102 Potential qualification for noise insulation has not been used to reduce the significance of impacts

~~11.9.97~~11.9.103 Table 11.35 identifies the general locations where significant effects were predicted, taking into account the following factors:

- The short-term and long-term changes in road traffic noise levels and impact magnitudes shown in Figures 11.11 (APP-140) to 11.13 (~~TR010034/APP/6.4~~APP-142)
- The predicted daytime and night-time noise levels shown in Figures 11.7 (APP-136) to 11.10 (~~TR010034/APP/6.4~~APP-139) and Figures 11.14 (APP-143) to 11.17 (~~TR010034/APP/6.4~~APP-146), and how they compared with the LOAEL and SOAEL thresholds levels stated in Section 11.3
- The sensitivity and circumstances of the sensitive receptor (for example, if it is located within a NIA)
- The proportion of large sites that would be affected by noise changes (for example, Peak District National Park)
- How the Scheme may affect the acoustic character of the study area
- The likely perception of local residents, who may be influenced by the visibility of the Scheme from their properties and landscaping changes
- Whether the significant effect is adverse or beneficial.

~~11.9.98~~11.9.104 Where a number of receptors is stated in an area, the effect applies to this number of receptors. It is noted in some areas that there are other receptors on the same streets where the effect level is different. For example, if a significant adverse effect is stated for a certain location, the significant adverse effect may not apply to all noise sensitive receptors within that location.

Table 11.35: Significance of road traffic noise in the operational phase

Receptor(s)	DMRB impact magnitude		Factors informing significance conclusion	Conclusion of significance of environmental effect
	Short Term (Opening year 2025)	Long Term (Opening Year 2025 to Future year 2040)		
664 Dwellings and 3 other sensitive receptors on: • Market Street, SK14 6JG • Hyde Road, SK14 6NG • Littlefields, SK14 6TA • Stalybridge Road, SK14 6NF	Major Decrease	Moderate Decrease	The rear facades of some properties may have a perceptible increase, however the overall noise level at each receptor would reduce. These receptors are predominantly within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme only a few receptors would have noise levels above SOAEL. In all cases, these receptors would have a moderate or major decrease in noise on the façades facing the existing A57.	Significant Benefit
730 Dwellings and 5 other sensitive receptors on: • Mottram Moor, SK14 6LA • Shaw Street, SK14 6LE • Mottram Moor, SK14 8NB • Back Moor, SK14 6LF • Temperance Square, SK14 6JH • Stalybridge Road, SK14 6NE	Moderate to Major Decrease	Minor to Major Decrease	The overall noise level at each receptor would reduce. These receptors are predominantly within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme only a few receptors would have noise levels above SOAEL. In all cases, these receptors would have a moderate or major decrease in noise on the façades facing the existing A57.	Significant Benefit
60 Dwellings on: • Hyde Way, SK14 6NQ • Ford Grove, SK14 6NN	Minor to Major Decrease	Minor to Moderate Decrease	The overall noise level at each receptor would reduce. These receptors would have a moderate or major decrease in noise on the façades facing the existing A57.	Significant Benefit

Receptor(s)	DMRB impact magnitude		Factors informing significance conclusion	Conclusion of significance of environmental effect
	Short Term (Opening year 2025)	Long Term (Opening Year 2025 to Future year 2040)		
• Longdale Drive, SK14 6NW • Atherton Avenue, SK14 6NJ • Ford Way, SK14 6NH • Weavers Court, SK14 6JY • John Kennedy Road, SK14 6NP • John Kennedy Gardens, SK14 6PN				
23 Dwellings on: • Mottram Moor, SK14 6LD	Moderate to Major Decrease	Moderate to Major Decrease	The rear facades of some properties may have a perceptible increase, however the overall noise level at each receptor would reduce. These receptors are within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme noise levels would still be above SOAEL at some receptors, however, in all cases, there would be a moderate or major decrease in noise on the façades facing the existing A57.	Significant Benefit
28 Dwellings on: • Mottram Moor, SK14 8LZ • Mottram Moor, SK14 6LD • Carrhouse Lane, SK14 8NA	Moderate to Major Decrease	Minor to Moderate Decrease	The overall noise level at each receptor would reduce. These receptors are within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme noise levels would still be above SOAEL at some receptors, however, in all cases, there	Significant Benefit

Receptor(s)	DMRB impact magnitude		Factors informing significance conclusion	Conclusion of significance of environmental effect
	Short Term (Opening year 2025)	Long Term (Opening Year 2025 to Future year 2040)		
			would be a perceptible decrease in noise on the façades facing the existing A57.	
7 Dwellings on: • Mottram Moor, SK14 8LZ	Minor Decrease	Minor to Moderate Decrease	The overall noise level at each receptor would reduce. These receptors are within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme noise levels would still be above SOAEL at some receptors, however, in all cases, there would be a perceptible short term decrease in noise on the façades facing the existing A57	Significant Benefit
15 Dwellings on: • Mottram Moor, SK14 8LZ • Mottram Moor, SK14 8NB	Minor Decrease	Negligible Decrease	The overall noise level at each receptor would reduce. These receptors are within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme noise levels would still be above SOAEL at some receptors, however, in all cases, there would be a perceptible short term decrease in noise on the façades facing the existing A57.	Significant Benefit
5 Dwellings on: • Mottram Moor, SK14 8LZ	Moderate to Major Decrease	Minor to Moderate Decrease	The overall noise level at each receptor would reduce. These receptors are within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme noise levels would still be above SOAEL at some receptors, however, in all cases, there would be a perceptible decrease in noise on the façades facing the existing A57.	Significant Benefit

Receptor(s)	DMRB impact magnitude		Factors informing significance conclusion	Conclusion of significance of environmental effect
	Short Term (Opening year 2025)	Long Term (Opening Year 2025 to Future year 2040)		
85 Dwellings and 1 other sensitive receptor on: • Woolley Lane, SK14 8NW • Woolley Lane, SK14 8NN • Market Street, SK14 8NE • Cross Street, SK14 8NZ	Major Decrease	Minor to Moderate Decrease	The overall noise level at each receptor would reduce. These receptors are predominantly within NIA 10992 and highest Do minimum noise level at each building is predominantly above SOAEL, and with the Scheme noise levels would still be below SOAEL at most receptors. In all cases, there would be a moderate or major decrease in noise on the façades facing the existing A57.	Significant Benefit
8 Dwellings on: • Edge Lane, SK14 6SE	Major Increase	Moderate increase	Receptors have a moderate increase on facades facing the new road. There is a likely perception of change from residents.	Significant Adverse
2~~1~~0 Dwellings on: • Four Lanes, SK14 6PP • Ash Close, SK14 6PS	Moderate to Major Increase	Minor to Major Increase	Receptors have a moderate or major increase on facades facing the new road. There is a likely perception of change from residents.	Significant Adverse
1~~3~~2 Dwellings on: • Tollemache Close, SK14 6LN • Tollemache Road, SK14 6LL • Old Hall Lane, SK14 6LT	Moderate to Major Increase	Minor to Major Increase	Receptors have a minor to major increase on facades facing the new road. There is a likely perception of change from residents.	Significant Adverse
2 Dwellings on: • Tollemache Close, SK14 6LN • Tollemache Close, SK14 6LL	Minor Increase	Minor Increase	Receptors have a minor increase on facades facing the new road. There is a likely perception of change from residents.	Significant Adverse

Receptor(s)	DMRB impact magnitude		Factors informing significance conclusion	Conclusion of significance of environmental effect
	Short Term (Opening year 2025)	Long Term (Opening Year 2025 to Future year 2040)		
8 Dwellings on: • Old Hall Lane, SK14 6LU • Old Hall Close, SK14 6LX • Old Road, SK14 6LG	Moderate to Major Increase	Minor to Moderate increase	Receptors have a Minor to moderate increase on facades facing the new road. There is a likely perception of change from residents.	Significant Adverse
12 Dwellings and 2 other sensitive receptors on: • Old Road, SK14 6NB • Old Road, SK14 6LG	Major Increase	Moderate Increase	Receptors have a moderate increase on facades facing the new road. There is a likely perception of change from residents.	Significant Adverse
50 Dwellings on: • Market Street, SK14 6JQ • Market Street, SK14 6JG • Back Lane, SK14 6JE • Temperance Square	Minor Increase	Negligible Increase	Long-term change is negligible; however the short-term change and future year change would be greater than 1dB, with absolute noise levels above SOAEL.	Significant Adverse
5 Dwellings on: • Carrhouse Lane, SK14 8NA • Woolley Lane, SK14 8NW	Moderate to Major Increase	Minor to Moderate Increase	Whilst some of these receptors have a negligible decrease on some facades, the facades facing the new road would have a moderate increase. There is a likely perception of change from residents, and overall noise levels would perceptibly increase at these receptors	Significant Adverse
• Grange Farm, Harrop Edge Road, Mottram, Hyde, SK14 6SJ • Spring Tavern, Woolley Bridge, Glossop,	Minor to Moderate Increase	Negligible to Minor Increase	Potentially qualify for an offer of noise insulation The short-term change and future year change would be greater than 1dB, with absolute noise levels above SOAEL.	Significant Adverse

Receptor(s)	DMRB impact magnitude		Factors informing significance conclusion	Conclusion of significance of environmental effect
	Short Term (Opening year 2025)	Long Term (Opening Year 2025 to Future year 2040)		
• 8, Woolley Bridge, Glossop, Glossop, SK13 2NX • 18, Woolley Bridge, Glossop, Glossop, SK13 2NX • 14, Woolley Bridge, Glossop, Glossop, SK13 2NX • 54, Woolley Bridge, Glossop, Glossop, SK13 2NX • 12, Woolley Bridge, Glossop, Glossop, SK13 2NX • Hillside, Woolley Bridge, Glossop, Glossop, SK13 2NX • 16, Woolley Bridge, Glossop, Glossop, SK13 2NX				

~~11.9.99~~11.9.105 In all other areas, effects are considered to be not significant due a combination of:

- No noise increases of at least 1 dB when above SOAEL or no exceedance of SOAEL,
- Unlikely perception of beneficial or adverse change from residents, or
- No change in acoustic context.

~~11.9.100~~11.9.106 A total of 12~~86~~ dwellings and 2 other sensitive receptors have been identified as having significant adverse effects due to the Scheme. There are also 3625~~7~~ dwellings and 9 other sensitive receptors identified as having significant beneficial effects.

11.10 National Policy Statement for National Networks (NPS NN) Compliance

11.10.1 The NPS NN requirements for noise and vibration are detailed in paragraphs 5.186 to 5.200 of the policy document, which cover the following themes:

- Using relevant technical guidance and standards (such as CRTN and BS 5228) to undertake the assessment
- Incorporation of good design measures to minimise noise and vibration emissions
- Reporting requirements, including the identification of sensitive receptors, description and operating characteristics of noise and vibration sources, noise modelling outcomes and details of mitigation measures
- Consideration of noise and vibration impacts to ecological receptors and sharing of information with ecologists and relevant organisations
- Consideration of impacts directly associated with the development located elsewhere on the national network
- Paying due regard to the NPSE and NPPF to ensure that their policy aims are met in the context of government policy on sustainable development.

11.10.2 It is evident in this noise and vibration chapter that the requirements for undertaking, assessing, and reporting the noise and vibration impacts from the Scheme are compliant with the NPS NN. This includes consideration of impacts to human and ecological receptors as well as designing the Scheme to incorporate embedded and essential mitigation measures to avoid significant effects and minimise adverse effects from noise and vibration as far as possible, as discussed in Section 11.8 and Chapter 2 of this Environmental Statement.

11.10.3 The first two aims of the NPSE are to avoid significant impacts and to mitigate and minimise adverse impacts on health and quality of life. In the context of this noise and vibration assessment, significant and adverse impacts are understood to refer to significant and adverse effects for parity with the DMRB LA 111. The Scheme aims to meet these objectives during the construction phase through the implementation of measures stated in the EMP, such as using temporary noise barriers and low noise and vibration plant, equipment, and processes as far as reasonably practicable.

11.10.4 The construction noise assessment shows significant adverse effects are predicted at six assessment locations. The assessment also shows that construction noise levels would exceed the SOAEL at the majority of selected assessment locations at some point during the construction of the Scheme. The SOAEL exceedances may not necessarily occur for an extended time period, for example, where works are considered to be transient. The assessment includes the inherent assumption that all of the construction activities occur at their closest distances to each receptor. This approach to the construction assessment has ensured that all activities capable of generating adverse and significant adverse effects on an individual basis have been identified. As a detailed schedule of works is created for the Detailed Design stage, consideration should be given as to how to minimise prolonged exposure to high noise levels during each construction activity at noise sensitive receptors.

11.10.5 Instances of SOAEL exceedance for both construction noise and vibration are particularly prevalent very close the Mottram Underpass, and significant adverse noise effects have been identified in this locale for the majority of the construction period. The use of quieter plant/techniques would be requisite but unlikely fully alleviate the predicted SOAEL exceedance in this area. This is due to the proximity and duration of the works to residential receptors.

11.10.6 As works progress along the length of the Scheme, it is inevitable that the distance from noise assessment locations and works will vary. Due to the length of the Scheme it is considered that the noise levels attributable to transient activities will often fall below the LOAEL as they move further away from the assessment locations. Some construction activities are far enough away from the assessment locations to avoid any potential exceedances of the LOAEL, for example works on the supplementary Carrhouse Lane Underpass and Old Mill Farm Underpass. For these two activities, only one assessment location (Meadow View) is predicted to experience a construction noise level above LOAEL during work on the Carrhouse Lane Underpass.

11.10.7 The maximum noise reduction for effective noise mitigation permitted by BS 5228 has been applied throughout the construction assessment. Consequently, any further attempts to mitigate construction noise levels to below the LOAEL will need to be conducted at the Detailed Design stage.

11.10.8 Where it is not possible to reduce significant construction noise levels, a temporary rehousing or noise insulation scheme would be implemented where noise levels exceed the thresholds set out in Table 11.17 for a period of 10 or more days in any consecutive 15 day period, or a total number of 40 days in any 6 month period. This would remediate some of the impacts from construction noise and safeguard the amenity of local residents. The locations of properties that may require this will be confirmed in the Detailed Design.

11.10.9 The Scheme was designed to avoid significant adverse effects and minimise adverse effects during the operation phase as far as practicable given that the Scheme would introduce a new noise source to the local area. This includes the alignment of existing sources of road traffic noise further away from properties (Mottram Moor junction), maximising the depth of cuttings and the height of adjacent embankments along the Mottram Moor Link Road to provide as much natural screening of the new road as possible, and low noise road surfacing. Permanent environmental noise barriers were included in the design at the worst

affected locations with the effect of generating perceptible reductions in road traffic noise at 59 noise sensitive receptors.

11.10.10 As mentioned in Section 11.8, the operation phase mitigation measures were developed in consultation with other discipline specialists in line with the principles of sustainable development. Through this process, the noise barrier dimensions were agreed, and solutions found where there were competing needs between environmental disciplines.

11.10.11 Even with these mitigation measures, adverse and significant adverse effects were predicted at several locations. There are a number of locations close to the Scheme where existing (Do Minimum) noise levels exceed the SOAEL and remain above the SOAEL with the Scheme, such as Mottram Moor and Woolley Bridge. Properties that are predicted to experience noise levels below the SOAEL in the Do Minimum scenario and above the SOAEL in the Do Something scenario are generally in locations away from the Scheme corridor, such as A628 Market Street, Ashworth Lane and B6174 Market Street. In all of the locations mentioned, the noise sensitive receptors face directly onto the road that contributes the most to noise levels and it would not be practical to install a noise barrier due to access requirements. Low noise road surfacing would also have limited effects in these areas due to predicted speed being less than 75 kph.

11.10.12 It is a similar case for receptors with noise levels above LOAEL. These receptors predominantly face directly onto a road that causes noise levels to exceed the LOAEL. At these locations, the installation of a noise barrier would be impractical due to access constraints and low noise road surfacing would have a limited impact due to the predicted traffic speeds being less than 75 kph.

11.10.13 In the short term, noise levels within NIA 10992 would generally decrease, with some decreases being moderate or major in magnitude. NIAs 1574 and 1575 would have a negligible short-term change in noise level. NIA 10993 would have a negligible to minor increase in the short term. Overall, the number of decreases within NIAs would be greater that the number of increases.

11.10.14 In the long term, noise levels within NIA 10992 would generally decrease, with some decreases being moderate in magnitude. NIAs 1574 and 1575 would have a negligible long-term change in noise level. NIA 10993 would have a negligible increase in the long term. Overall, the number of decreases within NIAs would be greater that the number of increases.

11.10.15 However, the predicted adverse and significant adverse effects are coupled with significant beneficial effects on Hyde Road and other properties within NIA 10992 (Mottram-in-Longdendale) where the Scheme results in moderate decreases at a location with high existing noise levels. The predicted noise levels at several properties on Hyde Road and Woolley Lane were reduced from above the SOAEL to below the SOAEL due to the Scheme. The reduced noise levels on the bypassed section of the A57 contribute to improvements to health and quality of life at these locations, in line with third NPSE aim.

11.10.16 In addition to the NPSE aims, the NPPF seeks to identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason. Although there are no formally designated Quiet Areas in proximity to the Scheme, it is located close to the Peak District National Park and there is a stakeholder expectation for operational noise levels to not significantly change the character of the area. As

discussed in Section 11.9, no short-term or long-term perceptible changes to road traffic noise levels were predicted in this area.

11.10.17 It can be concluded that the Scheme is therefore in compliance with the National Policy Statement for National Networks in respect of noise and vibration.

11.11 Monitoring

Construction

11.11.1 Noise monitoring at sensitive areas is a requirement as part of the EMP. The noise monitoring methodology and assessment locations would be determined during the Detailed Design stage but is likely to comprise a mixture of continuous noise monitoring and spot measurements. Noise monitoring may also be a requirement if Section 61 consents are sought from the Local Authorities situated within the DCO boundary of the Scheme. Implementation of the EMP and compliance with its requirements and environmental commitments would be managed as described in the EMP (~~TR010034/APP/7.2~~APP-183).

11.11.2 If percussive methods of piling are used at Mottram Underpass, vibration monitoring is required in sensitive areas. Predicted percussive vibration levels are high enough for structural damage to occur at the closest receptors to planned piling works. Percussive piling vibration would be perceptible at sensitive receptors and attended vibration monitoring may be appropriate at key locations if it is not possible to use a low vibration piling method.

11.11.3 In addition to the monitoring of construction noise and vibration levels, regular site inspections would be undertaken to ensure that suitable and appropriate mitigation measures are being implemented to reduce noise and vibration emissions. Noise and vibration management procedures and practices would be reviewed on a regular basis to ensure that the adverse effects of construction are minimised as far as reasonably practicable.

Operation

11.11.4 Likely significant environmental effects from noise during the operation phase shall be monitored and include:

- Ensuring that embedded and essential mitigation measures for the operational phase are incorporated in the as-built project;
- Where mitigation measures in the Scheme's design are excluded from the as-built project, ensuring that the resultant noise levels are no higher than set out in the Environmental Statement. For example, this could be achieved by using a different noise mitigation strategy compared to the current design; and
- Ensuring that the specifications of noise mitigation measures meet design specifications.

11.11.5 During the operation phase, routine maintenance of road surfaces is required to avoid further noise and vibration impacts from surface discontinuities.

11.11.6 Regular inspections of the permanent environmental noise barriers would be undertaken, and remedial works would be completed where defects are found, including sources of sound leakage such as holes or gaps in the barrier panels.

11.12 Summary

11.12.1 Significant adverse effects from daytime construction activities have the potential to arise during the five construction phases. At specific points during the construction works, up to six of the 24 representative assessment locations were predicted to experience significant adverse effects. The extent to which these effects materialise is dependent on detailed construction planning with due regard to noise limits described in this chapter and the use of best practicable means throughout the works. No night works are anticipated with the exception of traffic management.

11.12.2 Significant adverse effects from construction vibration are not predicted at any of the representative assessment locations. Some instances of SOAEL exceedance are likely to occur, however, owing to the transitory nature of works, it is not considered that these constitute significant adverse effects. It is noted that the preferred method of piling for the Mottram Underpass is a rotary bored piling method. Uniform use of this method would render any potential significant adverse effects from this activity to be highly unlikely. Vibratory rolling is not anticipated to cause significant adverse effects.

11.12.3 No significant or adverse effects resulting from construction traffic are expected during the construction phase of the Scheme. The closure of Old Hall Lane during Phases 1 - 3 and Old Road during Phases 2 - 3 of the works have the potential to give rise to adverse impacts at neighbouring roads, subject to diversions. Adverse impacts at night have been predicted at three assessment locations that are attributable to traffic management.

11.12.4 The road traffic noise modelling results for the operation phase identified that ~~128~~ 130 significant adverse effects would occur at noise sensitive receptors due to the Scheme; this includes receptors where there is a noise increase of at least 1 dB above SOAEL, there is a change in the acoustic context of the environment, or there is a likely perception of change from residents. There were also ~~366~~ 371 significant benefits from the Scheme; these were receptors where a reduction in noise results in a less significant effect level (for example, changing from above the SOAEL in the DMOY scenario to above or below the LOAEL in a Do Something scenario, or changing from above the LOAEL in the Do Minimum to below the LOAEL in the Do Something scenario). The significant benefits were primarily at dwellings within NIA 10992 (Mottram-in-Longdendale). Overall, there were more perceptible increases than perceptible decreases with the Scheme, however, the decreases were predominantly within existing NIAs.

11.12.5 The Scheme incorporates several embedded and essential mitigation measures within its design, including permanent noise barriers and low noise road surfacing. The benefits of these mitigation measures are inherent in outcomes of the noise and vibration assessment.

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