A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 6

6.1 Environmental Statement

Chapter 11: Noise and Vibration

Planning Act 2008

Regulation 5(2)(a)

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

26 February 2021

Infrastructure Planning

Planning Act 2008

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

A428 Black Cat to Caxton Gibbet improvements

Development Consent Order 202[ ]

Chapter 11: Noise and Vibration

Regulation Reference:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010044
Application Document Reference	TR010044/APP/6.1
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Version	Date	Status of Version
Rev 1	26 February 2021	DCO Application

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11 Noise and vibration

11.1 Competent expert evidence

11.1.1 This chapter assesses the potential noise and vibration impacts associated with the construction of the Scheme and the traffic noise impacts associated with the operation of the Scheme, following the methodology set out in Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration Revision 2 (REF 11-1). It also summarises the regulatory and policy framework related to noise and vibration, details the methodology followed for the assessment, and describes the existing environment in the area surrounding the Scheme. Following this, the design and mitigation measures proposed to manage and minimise potential noise and vibration impacts are specified, after which residual effects of the Scheme are presented.

11.1.2 The assessment has been undertaken and reported by a team of competent acoustic specialists within AECOM, the quality and completeness of which has been approved by a Principal Acoustics Consultant who holds the qualifications of a MEng in Civil Engineering, MSc in Environmental Strategy and is a Member of the Institute of Acoustics (MIOA) and a Practitioner Member of the Institute of Environmental Management and Assessment (PIEMA).

11.1.3 They have 19 years of experience in transport acoustics, developing policy and assessment methodologies for application to major road and rail infrastructure schemes in the UK. They have also acted as technical lead for noise and vibration assessments associated with a number of road schemes in the UK and Ireland, providing written evidence for planning inquiries associated with these schemes as required.

11.2 Legislative and policy framework

11.2.1 The following legislation and planning policies are of direct relevance to the assessment of noise and vibration. Compliance (or otherwise) with statute and policy relating to noise and vibration is addressed (where applicable) within the Case for the Scheme **[TR010044/APP/7.1]** and Section 11.9 of this chapter.

Legislation

Land Compensation Act 1973

11.2.2 In general, noise and vibration are recognised as both a common law nuisance (either private or public) and a statutory nuisance. However, this does not apply to noise and vibration from road traffic. As a result, the *Land Compensation Act 1973* (REF 11-2) and *The Noise Insulation Regulations 1975* (as amended 1988) (REF 11-3) are used in respect of road traffic noise.

11.2.3 The *Land Compensation Act 1973* Part I (REF 11-2) provides a means by which compensation can be paid to owners of land or property which has experienced a loss in value caused by the use of public works, such as new or altered roads. Noise and vibration are two of the factors which would be considered in any claim for compensation; however the claim should consider all changes and effects, including betterment.

The Noise Insulation Regulations 1975 (as amended 1988)

11.2.4 *The Noise Insulation Regulations 1975* (NIR) (REF 11-3) were made under Part II of *The Land Compensation Act 1973* (REF 11-2). Regulation 3 imposes a duty, and Regulation 4 a power, on the relevant Highway Authority to undertake or make a grant in respect of the cost of undertaking noise insulation work in eligible buildings affected by a new or altered highway. This is subject to meeting a range of criteria relating to road traffic noise levels and distance from the works as specified in the Regulations. Regulation 5 also provides discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in eligible buildings with respect to construction noise.

Control of Pollution Act 1974

11.2.5 Under Section 60 of the *Control of Pollution Act 1974* (CoPA) (REF 11-4) the local authority can serve a notice specifying how construction works should be carried out, including working hours and noise/ vibration limits. Breaching the terms of the notice is an offence.

11.2.6 Section 61 of the CoPA allows the contractor undertaking demolition or construction works to apply in advance to the local authority for 'prior consent' to undertake the works.

National policy

National Policy Statement for National Networks

11.2.7 Paragraphs 5.186 to 5.200 of the National Policy Statement for National Networks (NPSNN) (REF 11-5) deals with noise and vibration. It states that excessive noise can have wide ranging impacts on the quality of human life and health, use and enjoyment of areas of value (such as quiet places) and areas with high landscape quality. It also notes that similar considerations apply to vibration.

11.2.8 The NPSNN (REF 11-5) states that operational noise and vibration, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. For the prediction, assessment and management of construction noise and vibration, reference should be made to any relevant British Standards and other guidance, which also give examples of mitigation strategies.

11.2.9 The NPSNN (REF 11-5) states that noise from a proposed development can also have adverse impacts on wildlife and biodiversity, and that noise effects of a proposed development on ecological receptors should be assessed in accordance with paragraphs 5.20 to 5.38 of the NPSNN (REF 11-5).

11.2.10 With respect to decision making, the NPSNN (REF 11-5) states that developments must be undertaken in accordance with statutory requirements for noise and that due regard must have been given to the relevant sections of the DEFRA *Noise Policy Statement for England* (NPSE) (REF 11-6), the National Planning Policy Framework (NPPF) (REF 11-7) and the Government's associated planning guidance on noise (REF 11-8).

11.2.11 The requirements of the NPSNN (REF 11-5) have been accounted for through a combination of desk studies, site monitoring and modelling to identify the existing noise climate, the likely effects associated with construction and operation of the Scheme (including changes in traffic flows on the road network), and appropriate mitigation and monitoring measures.

Overarching National Policy Statement for Energy (EN-1)

11.2.12 The *Overarching National Policy Statement for Energy (EN-1)* (REF 11-9) sets out the Government's policy on energy and infrastructure development.

11.2.13 With regard to noise and vibration, EN-1 (REF 11-9) states that applicants should assess the impacts from development on noise sensitive premises and areas, including measures to mitigate such impacts.

11.2.14 The requirements of EN-1 (REF 11-9) in relation to noise and vibration associated with the Cadent gas pipeline diversion within the Scheme have been accounted for in the assessment.

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

11.2.15 The *National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)* (REF 11-22) relates to gas supply and gas and oil pipelines and sits under EN-1 (REF 11-10).

11.2.16 In relation to noise and vibration, EN-4 (REF 11-10) identifies a number of additional considerations to those set out in EN-1 (REF 11-10) that are specific to pipelines. These include the identification of receptors sensitive to construction noise and vibration that may occur from activities including ground excavation, reinstatement and construction traffic on local roads associated with the movement of materials.

11.2.17 The likelihood of noise and vibration impacts associated with construction of the Cadent gas pipeline diversion within the Scheme has been assessed as part of the assessment of construction effects.

Noise Policy Statement for England

11.2.18 The *Noise Policy Statement for England* (REF 11-6) (NPSE) sets out the long-term vision of the government's noise policy, which is to "*promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development*". This long-term vision is supported by the three aims, as listed under the NPSNN (REF 11-5), and is designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

11.2.19 The Explanatory Note within the NPSE (REF 11-6) introduces the following concepts to aid in the establishment of significant effects:

a. No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established.

b. Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected.

c. Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.

11.2.20 The NPSE recognises that "*it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations*". The levels are likely to be different for different noise sources, for different receptors and at different times of the day.

National Planning Policy Framework

11.2.21 Paragraph 180 of the *National Planning Policy Framework* (NPPF) (REF 11-7) closely aligns with the aims set out in paragraph 5.195 of the NPSNN to avoid significant adverse impacts and to mitigate and reduce other adverse impacts. It also states that planning decisions should aim 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*". In accordance with the NPSNN, the NPPF policies are the primary source of policy guidance regarding this assessment.

Planning Practice Guidance

11.2.22 In March 2014, the Department for Communities and Local Government (DCLG) released its *Planning Practice Guidance* (PPG) (REF 11-8) web-based resource to support the NPPF (REF 11-7). The guidance advises that local planning authorities should consider:

a. Whether or not a significant adverse effect is occurring or likely to occur.

b. Whether or not an adverse effect is occurring or likely to occur.

c. Whether or not a good standard of amenity can be achieved.

11.2.23 Factors to be considered in determining if noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts. The guidance within PPG has been used to inform the setting of LOAEL and SOAEL levels as detailed in Section 11.3.

Highways England Policy

11.2.24 The Roads Investment Strategy 2 (RIS2): 2020 to 2025 (REF 11-11) sets out the action which Highways England will take on reducing the impact of noise pollution between 2020/21 to 2024/25 (Road Period 2). Specific actions include continuing with the Noise Important Area (NIA) improvement programme and considering the opportunities provided by new road surfaces and design of the soft estate, especially in sensitive areas such as National Parks and areas of high population density.

11.2.25 The Highways England Delivery Plan (2020-2025) (REF 11-12) sets out the target for 7,500 households to benefit from noise reduction in mitigated 'NIAs' in Road Period 2.

Local policy

Bedford Borough Local Plan 2030

11.2.26 Bedford Borough Council adopted their local plan in January 2020 (REF 11-13). There are no specific policies addressing noise and vibration; however, avoiding and/or mitigating impacts of noise do form part of the following policies:

a. Policy 32 (Impact of development – disturbance and pollution impacts).

b. Policy 47S (Pollution, disturbance and contaminated land).

c. Policy 88 (Impact of transport on people, places and environment).

Central Bedfordshire Local Plan 2015-2035 (Pre-submission)

11.2.27 This Local Plan (REF 11-14) is currently undergoing examination. There are no specific policies addressing noise and vibration; however, avoiding and/or mitigating impacts of noise form part of the following policies:

a. Policy EE6 (Tranquillity).

b. Policy CC8 (Pollution and Land Instability).

c. Policy HQ1 (High Quality Development).

11.2.28 Until the new plan is adopted, the policies set out in Central Bedfordshire's Core Strategy and Development Management Policies (2009) (REF 11-15) remain in force. This document did not set out any noise or vibration specific policies but Policy DM3 (High Quality Development) requires all proposals for new development to:

"comply with current guidance on noise, waste management, vibration, odour, water, light and airborne pollution".

Huntingdonshire's District Local Plan to 2036

11.2.29 Huntingdonshire District adopted their local plan (REF 11-17) in May 2019. There are no policies specific to noise and vibration. However, noise does form part of a number of location-specific policies, as well as the following policies relevant to this assessment:

a. Policy LP10 (The Countryside)

b. Policy LP14 (Amenity)

South Cambridgeshire Local Plan

11.2.30 The South Cambridgeshire Local Plan (REF 11-17) was adopted in September 2018 and covers the period 2011 to 2031.

11.2.31 The plan contains a policy specific to noise, this being Policy SC/10 (Noise Pollution). In addition to setting out its policy relating to noise in respect of applications for planning permission and conditions associated with developments, the policy also states:

"The Council will seek to ensure that noise from proposed commercial, industrial, recreational or transport use does not cause any significant increase in the background noise level at nearby existing noise sensitive premises which includes dwellings, hospitals, residential institutions, nursing homes, hotels, guesthouses, and schools and other educational establishments."

11.2.32 Noise also forms part of a number of location-specific policies, as well as the following policies relevant to this assessment:

a. Policy CC/6 (Construction methods).

b. Policy HQ1 (Design Principles).

c. Policy TI/2 (Planning for Sustainable Travel).

11.3 Assessment methodology

Scoping of the assessment

11.3.2 A scoping exercise was undertaken in mid-2019 to identify the matters to be covered by the noise and vibration assessment and agree the approach with relevant statutory bodies.

11.3.3 The assessment scope was established at that time by comparing available design and landtake details for the Scheme with data and information relating to noise and vibration.

11.3.4 The scoping exercise was informed by the technical and reporting guidance contained in the *Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment HD 213/11 Rev 2* (REF 11-18).

11.3.5 The outcomes of scoping were recorded in a scoping report (REF 11-19), which was consulted upon as part of a formal request to the Inspectorate for a scoping opinion and included a summary of all assessment work undertaken as part of the design-development of the Scheme.

11.3.6 The Inspectorate's Scoping Opinion **[TR010044/APP/6.5]** identified a number of additional overarching Environmental Impact Assessment (EIA) and topic-specific matters that were subsequently brought into the overall scope of the assessment. These further considerations are detailed in **Table 1-1** of **Appendix 4.3** of the Environmental Statement **[TR010044/APP/6.3]** and include a summary of how Highways England has responded to the points raised, and where this information is reported.

11.3.7 Subsequent to the publication of the Scoping Opinion **[TR010044/APP/6.5]**, Highways England published a series of new DMRB standards relating to sustainability and the environment (REF 11-20), resulting in the phased withdrawal of the guidance used to inform the scoping exercise (REF 11-18) from July 2019.

11.3.8 **Table 2** of **Appendix 4.3** of the Environmental Statement **[TR010044/APP/6.3]** sets out the changes to the scope and methodology of the noise and vibration assessment resulting from the adoption of the new DMRB standards (REF 11-20).

11.3.9 In addition to matters raised in the Scoping Opinion **[TR010044/APP/6.5]** and through the adoption of the new DMRB standards (REF 11-20), the final assessment scope has also been shaped by the following:

a. The outcomes of consultation and engagement with statutory bodies.

b. Design changes made to the Scheme in respect of its form and extent and the associated changes to traffic movements.

11.3.10 Consideration was given to the activities associated with the future maintenance and management of the Scheme, and whether these have the potential to result in significant effects on noise and vibration. Following a review of the maintenance activities associated with the Scheme (for example the routine inspection and maintenance of drains, periodic carriageway resurfacing and emergency repair works), the process concluded that there would be limited potential of such effects to occur, and that these activities are comparable with standard maintenance operations already being undertaken elsewhere on the strategic road network. Accordingly, the effects associated with this phase of the Scheme were scoped out of the assessment and not considered further.

Consultation

11.3.11 Consultation has been carried out with the Environmental Health Departments of Bedford Borough Council, Central Bedfordshire District Council, Huntingdonshire District Council and South Cambridgeshire District Council. Discussions during 2019 and 2020 confirmed the councils' agreement in principle to conducting further baseline noise monitoring at one location in each local authority. This monitoring would further supplement baseline monitoring undertaken in winter 2017. However, this additional monitoring has not been progressed during 2020 due to the presence of non-standard traffic conditions resulting from the restrictions on travel introduced in response to the Covid-19 pandemic. The discussions also identified the presence of further sensitive receptors not present in Ordnance Survey (OS) datasets, including the recent development of

residential properties, 'The Range', on the former site of St Neots Footgolf and Golf Centre on Potton Road which have been included in the assessment.

11.3.12 The Preliminary Environmental Information Report (PEIR) for the Scheme (REF 11-21) was published in June 2019 as part of the statutory consultation. The PEIR presented the environmental information collected at that stage, together with the preliminary findings of the assessment of likely significant environmental effects of the Scheme at the time. A supplementary consultation was held during June and July 2020. Comments received during both public consultations and the associated responses, are detailed within the Consultation Report **[TR010044/APP/5.1]**.

Assessment standards and guidance

11.3.13 The assessment of construction and operational noise and vibration has been undertaken using the methodology set out in DMRB LA 111 Noise and Vibration Rev 2 (REF 11-1).

11.3.14 The noise and vibration assessment includes the following elements:

a. Quantitative assessment of construction noise and vibration impacts.

b. Quantitative assessment of construction traffic noise impacts.

c. Quantitative assessment of operational traffic noise impacts.

11.3.15 Operational impacts resulting from vibration are scoped out of further assessment in accordance with DMRB (REF 11-1).

Baseline, Do-Minimum and sensitive receptors

11.3.16 The understanding of baseline conditions has been supported by a baseline noise monitoring survey undertaken in 2017. The monitoring methodology complies with the guidance in *BS 7445:2003 Description and measurement of environmental noise: Guide to qualities and procedures* (REF 11-22). Further details of the baseline survey are provided in **Appendix 11.2** of the Environmental Statement **[TR010044/APP/6.3]**.

11.3.17 The purpose of the baseline noise survey is to assist with developing an understanding of the general noise climate along the Scheme. For example, to identify if any other local noise sources (other than road traffic) are present and contribute significantly to the local noise climate.

11.3.18 The results of the baseline noise survey have been used to support a validation exercise for the traffic noise prediction modelling. The 2016 base year data from the traffic model has been used to predict 2016 traffic noise levels at the monitoring locations, with the predicted and 2017 measured levels being compared. The aim of this process is to demonstrate that the noise model is predicting a sensible range of results across the study area. An exact match would not be expected for a variety of reasons. For example, the noise predictions are based on typical weekday traffic conditions over a year, not the exact traffic conditions during the monitoring period. Weather conditions including wind speed, wind direction and rain will also affect the measurements (the prediction method is designed to be conservative in terms of the effect of

wind direction and wind speed by assuming moderate adverse wind conditions). In addition, the noise predictions only consider road traffic noise, whereas the measurements include all ambient noise sources.

11.3.19 Future Do-Minimum (DM) (without Scheme) conditions have been determined at all identified potentially sensitive receptors based on predicted traffic noise levels in the absence of the Scheme. Details of the traffic noise prediction methodology are provided in the paragraphs 11.3.45 – 11.3.53 below.

11.3.20 Potentially sensitive receptors have been determined from the OS address base dataset and OS mapping and discussions with local authorities. DMRB (REF 11-1) defines potentially sensitive receptors as residential properties, educational buildings, medical buildings, community facilities (such as places of worship), designated sites (Areas of Outstanding Natural Beauty (AONBs), National Parks, Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), scheduled monuments and Public Rights of Way (PRoWs). In addition, consideration has also been given to the requirements of the NPSNN (REF 11-5) which identifies '*certain parks and open spaces*' as potentially noise sensitive, designated sites '*where noise may have an adverse impact on the special features of interest, protected species or other wildlife*', and '*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*'.

Construction Assessment

Construction Noise methodology

11.3.21 A quantitative assessment of Scheme construction noise and vibration impacts has been undertaken. Estimates of monthly average construction noise levels have been made for a selection of 45 potentially sensitive receptors, which includes those closest to the Scheme construction works. These selected receptors are representative of neighbouring properties in their vicinity. By focussing on a selection of the closest identified potentially sensitive receptors, the reported impacts at these receptors are therefore typical of the worst affected receptors and all potentially significant effects are identified. The receptors selected further away from the works demonstrate how the impact would be reduced with increasing distance from the works.

11.3.22 Details of the location of the Scheme, and therefore the associated construction works, are provided in the General Arrangement Plans **[TR010044/APP/2.4]**, and **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]** which illustrates the location of the construction compounds, main haul route, topsoil storage areas and the borrow pits.

11.3.23 As required by DMRB (REF 11-1) construction noise levels have been estimated in accordance with the methodology in *BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'* (REF 11-23). Precise information on the construction works is not currently available and this will be confirmed during the detailed design stage. However, the appointed Buildability Advisor has provided assumptions regarding the construction works, plant requirements and construction traffic. Therefore, the estimated construction noise levels reported herein are based on information provided relating to the number and type of plant likely to be required for each construction activity, typical 'on' times for each item of plant, the likely location and extent of each activity, working times and which months the activity is likely to occur in. The monthly predictions are based on the likely area covered by each activity in each month. All activities programmed to occur in an individual month are assumed to occur at the same time, this is a conservative approach as some activities will occur sequentially and for a shorter duration than a whole month. Further details regarding construction assumptions are provided in **Appendix 11.3** of the Environmental Statement **[TR010044/APP/6.3]**.

11.3.24 DMRB (REF 11-1) uses the 'ABC' method in *BS 5228* (REF 11-23) for identifying the threshold of potentially significant construction noise effects. This approach is based on setting the threshold for the onset of potentially significant adverse effects (i.e. the SOAEL, as defined in Section 11.2) depending on the existing ambient noise level. Receptors with low existing ambient noise levels (Category A) have a lower threshold than those with high existing ambient noise levels (Category C). Higher thresholds are set for normal daytime construction working hours, compared to the more sensitive evening, weekend and night-time periods. As a conservative approach, DMRB (REF 11-1) sets the threshold for the onset of any adverse effect (i.e. the LOAEL, as defined in Section 11.2) at a construction noise level equal to the existing ambient noise level. Construction noise levels between the LOAEL and the SOAEL have the potential to result in adverse noise effects but would not normally be classed as significant adverse effects. However, noise mitigation measures are still considered and applied in such locations to seek to keep all noise effects to a minimum. **Table 11-1** which is adapted from Table E.1 in *BS 5228* (REF 11-23), sets out the construction noise SOAEL and LOAEL used for this assessment.

Table 11-1: Construction noise SOAEL and LOAEL for all receptors

Time of day	SOAEL $L_{Aeq,T}$ dB (façade)			LOAEL $L_{Aeq,T}$ dB (façade)
	A[1]	B[2]	C[3]	
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75	Existing ambient
Evenings (19:00 – 23:00 weekdays) and Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	55	60	65	Existing ambient
Night-time (23:00 – 07:00)	45	50	55	Existing ambient

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

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

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

NOTE: if the ambient noise level exceeds the Category C threshold values then the SOAEL and LOAEL are defined as equal to the existing ambient.

11.3.25 To determine the SOAEL and LOAEL, ambient noise levels at the relevant façade of each of the selected receptors have been predicted based on the DM (Without Scheme) scenario.

Construction Traffic Noise

11.3.26 An assessment of construction traffic noise impacts at noise sensitive receptors alongside existing roads has been undertaken. Traffic datasets for each of the following four phases were produced by the project's Transport Consultants for 2025, both with and without the additional construction traffic movements.

a. Phase 1 – proposed to last for six months and involves enabling works in advance of the main construction activities.

b. Phase 2 – proposed to last for 16 months and involves main road closures and temporary speed limits.

c. Phase 3 – proposed to last for 12 months and involves main road closures and temporary speed limits.

d. Phase 4 – proposed to last for 11 months and involves main road closures and temporary speed limits.

11.3.27 The traffic data provided for each of these phases was used to derive the change in the 18 hour CRTN Basic Noise Level (BNL Basic Noise Level (BNL) i.e. the traffic noise level at 10 m from the kerb, taking into account the flow, % Heavy Duty Vehicles (HDV), speed and road surface for each link in each phase.

11.3.28 As required by DMRB (REF 11-1), these BNLs have been used to identify public roads where there is the potential for an increase in BNL of 1 dB(A) or more as a result of the addition of construction traffic to existing traffic levels. In this assessment, these have been defined as 'affected routes'.

Construction Diversion Routes

11.3.29 A number of diversion routes are proposed to be used during the works. Further details of these routes are provided in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4].** As required by DMRB (REF 11-1), an assessment of potential impacts arising from traffic using these diversion routes has been undertaken. This is due to the sudden change of traffic levels on diversion routes, as a result of night time closures, which DMRB identifies as highly likely to cause disturbance to receptors within 25 metres of the road.

Construction vibration

11.3.30 Construction vibration impacts have been assessed for all construction activities that are a potentially significant source of vibration and which are in close proximity (less than 100m) to any identified sensitive receptors. These construction works comprise piling and works using vibratory rollers (including compound establishment/decommissioning, utility diversion works, earthworks, drainage works, road construction (including pavement), culvert construction, preparation for piling works and traffic phase switch works).

11.3.31 Rotary bored piling is proposed for bridgeworks and retaining walls. Vibration associated with rotary bored pilling is minimal. A discussion of the potential vibration impacts from piling is provided in Section 11.9.

11.3.32 Vibration levels due to vibratory rollers have been estimated in accordance with the relevant methodologies in BS 5228 (REF 11-23). Source data for the vibratory rollers have been taken from Transport Research Laboratory (TRL) Report 429 (REF 11-24). It is anticipated that three types of roller would be used primarily for earthworks and road construction (pavements), namely a large single drum roller (approximately 13 tonnes), a medium sized twin drum roller (approximately 3.5 tonnes) and a medium sized towed roller (approximately 3.5 tonnes).

11.3.33 The transmission of ground-borne vibration is highly dependent on the nature of the intervening ground between the source and receptor and the activities being undertaken. BS 5228 (REF 11-23) provides data on measured levels of vibration for various construction works. Vibration impacts are considered herein for both damage to buildings and annoyance to occupiers.

11.3.34 **Table 11-2** details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration effects on human receptors, based on guidance contained in BS 5228 (REF 11-23).

Table 11-2: Construction vibration criteria for human receptors (annoyance)

Peak particle velocity level	Description
10 mms^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.
1.0 mms^{-1}	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
0.3 mms^{-1}	Vibration might be just perceptible in residential environments.
0.14 mms^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

11.3.35 Based on the above scale, DMRB (REF 11-1) defines the LOAEL for human receptors as a PPV of 0.3 mms^{-1} (millimetres per second), this being the point at which construction vibration is likely to become perceptible. The SOAEL is defined as a PPV of 1.0 mms^{-1}, this being the level at which construction vibration can be tolerated with prior warning.

11.3.36 In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause human annoyance. Consequently, if vibration levels within buildings are controlled to those relating to annoyance (i.e. 1.0 mms^{-1}), then it is highly unlikely that buildings would be damaged by construction vibration.

11.3.37 BS 7385-2: 1993 ‘Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground-borne vibration’ (REF 11-25) provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228 (REF 11-23) and DMRB (REF 11-1). Guide values for transient vibration, above which cosmetic damage could occur, are given in **Table 11-3**.

Table 11-3: **Transient vibration guide values for cosmetic damage**

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50 mms^{-1} at 4 Hz and above.	
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mms-1 at 4 Hz increasing to 20 mms-1 at 15 Hz.	20 mms-1 at 15 Hz increasing to 50 mms-1 at 40 Hz and above.
NOTE 1: Values referred to are at the base of the building. NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

11.3.38 BS 7385-2 (REF 11-25) states that for transient vibration, such as from individual impacts, the probability of building damage tends towards zero at levels less than 12.5 mms^{-1} PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

11.3.39 It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 'Mechanical Vibration and Shock. Vibration of Fixed Structures. Guidelines for the Measurement of Vibrations and Evaluation of their Effects on Structures' (REF 11-26) defines three different categories of building damage, namely:

a. Cosmetic: formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick or concrete block constructions.

b. Minor: formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick or blocks.

c. Major: damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks.

11.3.40 BS 7385-2 (REF 11-25) states that minor damage occurs at a vibration level twice that of cosmetic damage, and that major damage occurs at a vibration level twice that of minor damage. This guidance has been used to define vibration criteria as detailed in **Table 11-4,** which can be used to assess continuous vibration impacts.

Table 11-4: Construction vibration criteria for assessing building damage

Damage risk	Continuous vibration level PPV mms^{-1}
Major	30
Minor	15
Cosmetic	6
Negligible	<6

Construction significance of effect

11.3.41 As set out in DMRB (REF 11-1) the key factors in identifying significant effects from construction noise and vibration annoyance are the magnitude of the impact and the duration. The magnitude of the impact is considered on a scale from negligible to major, as detailed in **Table 11-5**, adapted from DMRB.

Table 11-5: Construction noise and vibration magnitude of impact

Magnitude of impact	Construction noise level	Construction traffic noise level increase	Construction vibration level
Major	Above or equal to the SOAEL +5 dB	Greater than or equal to 5 dB	Above or equal to 10 mms^{-1} PPV
Moderate	Above or equal to the SOAEL and below +5 dB	Greater than or equal to 3 dB and less than 5 dB	Above or equal to the SOAEL and below 10 mms^{-1} PPV
Minor	Above or equal to the LOAEL and below the SOAEL	Greater than or equal to 1 dB and less than 3 dB	Above or equal to the LOAEL and below the SOAEL
Negligible	Below LOAEL	Less than 1 dB	Below LOAEL

11.3.42 For diversion routes used at night, DMRB (REF 11-1) specifies that a major magnitude of impact shall be determined at any noise sensitive receptors within 25m.

11.3.43 With regards to duration, DMRB (REF 11-1) states that construction noise, construction traffic noise or construction vibration shall constitute a significant effect where a major or moderate magnitude of impact would occur for a duration of:

a. Ten or more working days (or evenings/weekends or nights) in any 15 consecutive days.

b. More than 40 days (or evenings/weekends or nights) in any six consecutive months.

11.3.44 Detailed information on the exact timing and duration of individual construction activities is not confirmed at this stage. A conservative judgement has been made and these criteria have only been applied to those activities for which there is certainty that the durations would be considerably below the duration criteria, taking advice from the appointed Buildability Advisor.

Operational traffic noise

11.3.45 In accordance with DMRB (REF 11-1), traffic noise levels have been calculated using Calculation of Road Traffic Noise (CRTN) (REF 11-27) with modifications to determine the traffic noise change due to the Scheme for:

a. Short term: Do Minimum Opening Year (DM 2025) compared against the Do Something Opening Year (DS 2025).

b. Long-term: Do Minimum Opening Year (DM 2025) compared against the Do Something Future Year (DS 2040).

c. Non-project noise change: Do Minimum Opening Year (DM 2025) compared against the Do Minimum future year (DM 2040) .

11.3.46 Noise from a flow of road traffic is generated by both the vehicle engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (percentage of heavy duty vehicles (HDV) greater than 3.5 tonnes), road gradient, the type of road surface, the distance from the road and the presence of any obstructions between the road and the receptor.

11.3.47 Noise from a stream of traffic is not constant, but to assess the traffic noise impact a single figure estimate of the overall noise level is necessary. The index adopted by CRTN (REF 11-27) to assess traffic noise is $L_{A10,18h}$. This value is determined by taking the highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean.

11.3.48 The CRTN methodology applies a ‘low flow’ correction between 18 hour vehicle flows of 1,000 and 4,000. The low flow correction procedure amplifies the impact of changes in traffic flows that are already low, in particular at receptors very close to the road. The 1,000 18 hour flow cut off is the lower limit of the reliability of the CRTN prediction methodology.

11.3.49 Although the main focus of the assessment is on daytime impacts, DMRB (REF 11-1) also requires an assessment of night-time traffic noise levels using the parameter $L_{night,outside}$, which is the traffic noise level over the period 23:00 to 07:00. However, this parameter is not calculated by the standard CRTN methodology. DMRB (REF 11-1) refers to three methods for calculating night-time traffic noise levels developed by TRL (REF 11-28). ‘Method 3’, which factors the $L_{night,outside}$ from the $L_{A10,18h}$, is based on the typical diurnal pattern of traffic flows in the UK and provides reliable results for most UK roads. This method has been used to derive $L_{night,outside}$ reported in this assessment.

11.3.50 Predicted daytime and night-time traffic noise levels at noise sensitive receptors within the calculation area have been generated using noise modelling software. Predictions have been carried out for the opening year (2025) and future year (2040) (15 years after opening) for the DM (Without Scheme) and Do-Something (DS) (with Scheme) scenarios. The model is based on traffic data generated by a traffic model of the Scheme and the surrounding area. The traffic flow and % HDV are taken directly from the traffic model. However, the traffic speeds are subject to a process called 'speed pivoting', as required by DMRB (REF 11-1) which adjusts the modelled speed based on measured speed data.

11.3.51 The noise level predictions have also been corrected to account for the effect of the road surface types which will be in place in the different scenarios, as set out in paragraphs 11.6.12 and 11.6.13. The model also includes the ground topography, ground type and buildings to form a 3D representation of the study area. Further details of the noise model data sources and assumptions are provided in **Appendix 11.4** of the Environmental Statement **[TR010044/APP/6.3]**, whilst details of the traffic model are available in the Transport Assessment **[TR010044/APP/7.2]**.

11.3.52 Different façades of the same property can experience different changes in traffic noise level depending on their orientation to the noise source. DMRB (REF 11-1) requires that the assessment is based on the façade that experiences the greatest magnitude of change i.e. the largest numerical change whether this is an increase or decrease. Where this change is equal on more than one façade, the façade experiencing the highest DS traffic noise level is chosen.

11.3.53 For other road links more remote from the Scheme i.e. outside the calculation area, in accordance with DMRB (REF 11-1), a proportionate approach has been adopted based on the change in the 18 hour CRTN Basic Noise Level (BNL) i.e. the traffic noise level at 10m from the kerb, taking into account the flow, % HDV, speed and road surface. These links are defined as 'affected routes' and are defined further in section 11.5. A count of potentially sensitive receptors within 50m of affected routes has also been completed to give an indication of the number of receptors in the vicinity of each link, and which are likely to experience the estimated change in traffic noise.

11.3.54 The SOAEL and the LOAEL for road traffic noise used in this assessment for all noise sensitive receptors for the time periods when they are in use, are detailed in **Table 11-6** taken from DMRB (REF 11-1).

Table 11-6: Traffic noise SOAEL and LOAEL for all receptors

Time period	SOAEL	LOAEL
Daytime	68 dB $L_{A10,18h}$ (façade) 63 dB $L_{Aeq,16h}$ (free-field)	55 dB $L_{A10,18h}$ (façade) 50 dB $L_{Aeq,16h}$ (free-field)
Night	55 dB $L_{night,outside}$ (free-field)	40 dB $L_{night,outside}$ (free-field)

11.3.55 For daytime, the SOAEL is set at 68 dB $L_{A10,18h}$ (façade), which is consistent with the daytime trigger level in *The Noise Insulation Regulations 1975* (REF 11-3). The Noise Insulation Regulation threshold has a history of use in UK noise policy as it has previously been incorporated into planning guidance on the acceptability of sites for new residential developments. It is the external level that corresponds to an internal level with a closed single glazed window, which would meet the internal daytime criteria of 35 dB $L_{Aeq,16h}$ specified in BS 8233 (REF 11-29) as desirable for resting in living rooms. It also correlates with the results of Defra Study NANR316 (REF 11-30) and is supported by the guidance in the *Professional Practice Guidance: Planning and Noise produced by the Association of Noise Consultants, Institute of Acoustic and Chartered Institute of Environmental Health* (REF 11-31).

11.3.56 The daytime LOAEL is set at 50 dB $L_{Aeq,16h}$ (free-field), based on the guidance provided in the 1999 World Health Organisation (WHO) *Guidelines for Community Noise* regarding the onset of moderate community annoyance (REF 11-32). The WHO published the *Environmental Noise Guidelines for the European Region* in 2018 (REF 11-33) which provides guidelines for specific noise sources including road traffic. These guidelines suggest a recommended 53 dB L_{den} for road traffic noise (note L_{den} correlates approximately to $L_{A10,18h}$) based on a 10% risk of being Highly Annoyed. The guidelines state they are "*not meant to identify effect thresholds*". Instead, they are based on the "*smallest relevant risk increase*" for various effects, and therefore lie slightly above the LOAEL. On this basis a LOAEL of 50 dB $L_{Aeq,16h}$ (free-field) is consistent with the latest WHO Guidelines.

11.3.57 For night-time, the SOAEL is set at 55 dB $L_{night,outside}$ (free field), which corresponds to an internal level with a closed single glazed window, which would be slightly below the night time criteria of 30 dB $L_{Aeq,8h}$ specified in BS 8233 as desirable for sleeping in bedrooms. It also correlates well with the results of Defra Study NANR316 (REF 11-30) and is supported by the *Professional Practice Guidance: Planning and Noise guidance* (REF 11-31). The WHO 2009 *Night Noise Guidelines for Europe* (REF 11-34) explicitly identify the night time LOAEL as 40 dB $L_{Aeq,8h}$ (free-field). Therefore, this LOAEL has been adopted in the assessment. Levels between 40 and 55 dB are identified in the guidelines as 'adverse' but not significant adverse, where health effects are observed among the exposed population. 55 dB is identified in the guidelines as when the risk of cardiovascular disease increases.

11.3.58 The 2018 WHO Guidelines (REF 11-33) complement the WHO 2009 *Night Noise Guidelines for Europe* (REF 11-34) and suggest a recommended 45 dB L_{night} for road traffic noise based on a 3% risk of being Highly Sleep Disturbed. However, as discussed above the 2018 WHO guidelines (REF 11-33) state they are "*not meant to identify effect thresholds*". Instead, they are based on the "*smallest relevant risk increase*" for various effects, and therefore lie slightly above the LOAEL, as explicitly defined in the WHO 2009 *Night Noise Guidelines for Europe* (REF 11-34).

11.3.59 The operational road traffic noise SOAELs and LOAELs have been applied successfully for numerous road schemes in recent years, including schemes that have successfully been determined through the *Planning Act 2008* (REF 11-35) procedures. The same approach to the setting of LOAELs and SOAELs has also been adopted on other major infrastructure schemes such as the High Speed 2 rail project.

11.3.60 No special circumstances have been identified for the Scheme that suggest an alternative SOAEL or LOAEL should be adopted.

Operational significance of effect

11.3.61 DMRB (REF 11-1) provides two classifications for the magnitude of the traffic noise impact of a proposed road scheme, as shown in **Table 11-7**. These relate to both short-term changes and long-term changes in traffic noise levels. The short-term classification detailed in **Table 11-7** is the main driver of the initial identification of significant effects.

Table 11-7: Magnitude of traffic noise impacts

Short-term change (DMOY to DSOY)		Long-term change (DMOY to DSFY)	
Noise level change (rounded to 0.1 dB) $L_{A10,18h}$ dB	Magnitude of impact	Noise level change (rounded to 0.1 dB) $L_{A10,18h}$ dB	Magnitude of impact
0	No change	0	No change
0.1 – 0.9	Negligible	0.1 – 2.9	Negligible
1.0 – 2.9	Minor	3.0 – 4.9	Minor
3.0 – 4.9	Moderate	5.0 – 9.9	Moderate
5.0+	Major	10.0+	Major

11.3.62 Negligible changes in the short-term would not cause changes to behaviour or responses to noise, and as such would not give rise to significant effects. For minor, moderate and major changes DMRB (REF 11-1) outlines a range of additional factors that are considered in identifying significant effects:

a. Where the magnitude of change in the short-term lies relative to the boundaries between the bands outlined in **Table 11-7** - in some circumstances a change within 1 dB of the top of the minor range may be appropriate to be considered a likely significant effect. Conversely a change within 1 dB of the bottom of the moderate range, may in some circumstances be more appropriate to be considered as not likely to be a significant effect.

b. The magnitude of change in the long-term is different to that in the short-term - if the short-term change is minor (not significant), but the long-term change is moderate (significant) it may be more appropriate to be considered as a likely significant effect. Conversely, a smaller magnitude of change in the long-term compared to the short-term may indicate that it is more appropriate to be considered as not likely to be a significant effect.

c. The absolute noise levels relative to the SOAEL - if the DS traffic noise levels are high i.e. above the SOAEL, a traffic noise change in the short-term opening year of 1.0 dB or more may be more appropriate to be considered as a likely significant effect.

d. The location of noise sensitive parts of a receptor - a receptor may contain areas which are more or less sensitive than others e.g. office spaces or kitchens in a school would be considered less sensitive than classrooms. 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.

e. The acoustic context, if a proposed scheme changes the acoustic character of an area - if a scheme introduces road noise into an area where road noise is not currently a major source, it may be appropriate to conclude a minor short-term change is a likely significant effect.

f. The likely perception of a traffic noise change - if a proposed scheme results in obvious changes to the landscape or setting of a receptor it is likely the traffic noise level changes would be more acutely perceived, and it may be more appropriate to conclude a minor short-term change is a likely significant effect. Conversely if a proposed scheme is not visible it can be more appropriate to conclude a moderate change is not a likely significant effect.

The Noise Insulation Regulations 1975

11.3.63 A preliminary indication of any properties likely to qualify under *The Noise Insulation Regulations 1975* (REF 11-3) is provided in **Appendix 11.6** of the Environmental Statement **[TR010044/APP/6.3]**.

11.3.64 A full assessment would be completed once the detailed design of the Scheme is finalised and in accordance with the timescales set out in the Regulations.

Compliance with Policy

11.3.65 The key policy within NPSNN (REF 11-5) of relevance to the Scheme is in paragraph 5.195: 'The Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:

a. Avoid significant adverse impacts on health and quality of life from noise as a result of the new development.

b. Mitigate and minimise other adverse impacts on health and quality of life from noise from the new development.

c. Contribute to improvements to health and quality of life through the effective management and control of noise, where possible.'

11.3.66 The three aims, and how the Scheme complies with them are discussed for both construction and operation in **Appendix 11.6** of the Environmental Statement **[TR010044/APP/6.3]**.

11.3.67 To maintain consistency with the DMRB terminology used throughout this chapter, the compliance with policy discussion refers to effects rather than impacts.

11.3.68 As set out in DMRB (REF 11-1), the SOAEL is the level at which significant adverse effects on health and quality of life occur and the LOAEL is the level above which adverse effects on health and quality of life can be detected. Therefore, for the purpose of testing compliance with the NPSNN (REF 11-5) it is necessary to demonstrate that all sustainable mitigation measures have been applied to avoid exceedances of the SOAEL, to mitigate and minimise exceedances of the LOAEL, and to contribute to improvements where possible.

11.3.69 With regard to identifying sustainable noise mitigation measures, various factors have been considered – these include the cost versus the benefit, engineering practicality, generation of non-acoustic impacts (such as vegetation clearance, ecological effects, landscape and visual effects), and consultation and stakeholder engagement responses.

11.3.70 The discussion sets out what mitigation measures have been incorporated into the Scheme to meet the three aims, and also any measures which were not considered reasonable or practical to include, in the context of sustainable development.

11.3.71 The compliance with policy discussion complements, but is separate to, the EIA.

11.4 Assessment assumptions and limitations

Scheme design and limits of deviation

11.4.1 The assessment has been based on the Scheme description presented in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]** in order to establish a realistic assessment scenario.

11.4.2 The effect that any lateral and/or vertical deviation would realistically give rise to has been considered. This has, for example, taken into account the potential for components of the Scheme to be positioned at a slightly higher elevation, or brought into slightly closer proximity to receptors, within the limits of deviation and thereby potentially result in a different noise and/or vibration impact. However, changes in significant effects are considered unlikely.

11.4.3 Notwithstanding any potential deviation, mitigation measures incorporated into the design of the Scheme, as described in Section 11.8 would still be deliverable within the limits of deviation and would still fulfil their intended function. For example, if the scheme height increased slightly, the height of the associated bunds would increase accordingly.

Impact assessment and mitigation

11.4.4 The following assumptions or limitations are relevant to this noise and vibration impact assessment:

a. A small number of road links have very low flows, below the lower cut off of the CRTN prediction methodology of 1,000 vehicles over an 18 hour day. These include Park Road and School Lane in Roxton, The Lane in Wyboston, Chawston Lane in Chawston, Abbobtsley Road in Croxton, and Potton End and The Green in Eltisley. As a conservative approach, these road links have been retained in the traffic noise predictions though the contribution to traffic noise levels at nearby receptors must be treated with caution. Road links with a flow of less than 1,000 vehicles are not included in the identification of affected routes.

b. As detailed in **Chapter 15, Assessment of cumulative effects** of the Environmental Statement **[TR010044/APP/6.1]**, a number of development projects are ongoing, or are planned. In particular, a number of residential properties in the northern extent of the Wintringham development are expected to be occupied before the construction works start and therefore likely to experience impacts due to the construction works. The residents of these properties are also likely to experience the change in road traffic noise due to the Scheme. Therefore, the noise and vibration impacts of the Scheme on these residential properties has been included in the construction and operational noise and vibration assessments. The location of these properties is shown on **Figure 11-1** of the Environmental Statement **[TR010044/APP/6.2].** Other developments, including future phases of the Wintringham development, Loves Farm and Cambourne West are not predicted to be occupied prior to construction and therefore residents of these will not experience a change in their noise environment due to either the construction or operation of the Scheme. However, the screening effects of these developments have been included in the prediction of operational traffic noise levels at existing noise sensitive properties. A discussion of the noise environment in these other developments once the Scheme is operational is provided in Section 11.9.

c. The construction assessment is based on the construction information that is currently available, with details being provided by the appointed Buildability Advisor. As with all construction assessments, the exact details of the construction activities would not be fully understood before the detailed design stage of a scheme when the exact construction methods and programme will be determined. Whilst the precise details may be subject to change, the overall picture of significant construction effects is unlikely to be materially worse, and therefore the conclusions of the assessment would not be affected.

d. The construction works will include a number of diversions of utilities, including overhead electricity lines, water mains and telecommunication lines. As the exact details of these works are not currently available from the relevant utility companies, the assessment has assumed that the construction works will be in place along the whole length of each diversion for the entire period in which they are currently programmed by the appointed Buildability Advisor. As utility works are normally transitory, this approach is considered conservative in determining significant effects from such works.

e. Both the construction traffic and operational traffic noise assessments have been based on an opening year of 2025 and future assessment year of 2040. These years align with the traffic modelling undertaken to generate forecasts for these assessments. These years were assumed at the time of the traffic modelling when Scheme construction was expected to be completed in 2025 (see the Transport Assessment **[TR010044/APP/7.2**]), which is aligned to the key project milestones. However, the EIA has been undertaken based on an opening year of 2026 for the Scheme, in line with the reasonable worst case scenario construction programme presented in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**. This difference between the opening years does not invalidate the conclusions of the assessments reported in the Environmental Statement **[TR010044/APP/6.1]** and the Transport Assessment **[TR010044/APP/7.2]** as the forecast flows on the road network in years 2025 and 2040 are considered to be reasonably representative of the traffic flows that would exist on the network in years 2026 and 2041 respectively.

11.5 Study area

Construction

11.5.2 The quantitative assessment of construction phase noise impacts has focussed on 45 groups of sensitive receptors, including those closest to the Scheme construction works. An individual receptor considered to be representative of neighbouring properties in each of these groups has been identified for the purpose of assessing construction noise impacts. Receptors have been chosen based on their potential sensitivity (as defined in DMRB (REF 11-1) and receptor proximity to the various works. By focussing on a selection of the closest identified potentially sensitive receptors, the reported impacts are, therefore, typical of the worst affected receptors such that all potentially significant effects

have been identified. The receptors further away from the works, which are located up to 600m from the closest construction activity, demonstrate how the impact is reduced with increasing distance from the works.

11.5.3 The quantitative assessment of construction vibration impacts has focussed on locations where there are construction activities with the potential to generate vibration. Such activities include those involving compaction of materials with rollers and piling associated with ground improvement works. Receptors have been chosen based on their sensitivity and proximity to such activities. Based on the construction plant information provided by the Buildability Advisor, construction vibration impacts have been considered on vibration sensitive receptors up to a maximum distance of approximately 100m from the works, and no impacts are anticipated beyond this distance.

11.5.4 A study area of 50m from any existing roads that are predicted to be subject to an increase in traffic noise level of at least 1.0 dB as a result of the construction of the Scheme, has been adopted, as required by DMRB (REF 11-1). These routes are illustrated in **Figure 11.2** of the Environmental Statement **[TR010044/APP/6.2].**

11.5.5 A study area of 25m from any existing roads affected by night-time diversions (23:00-07:00), due to the closure of an existing road, has been adopted, as required by DMRB (REF 11-23). These routes are described in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4].**

Operation

11.5.6 The study area for the quantitative assessment of operational phase noise impacts has been defined following the guidance set out within DMRB (REF 11-1).

11.5.7 The study area initially consisted of an area within 600m of the Scheme and the existing A421, A1 and A428 routes altered or bypassed by the Scheme. However, this area has been extended beyond 600m to include a number of noise sensitive receptors in the rural area to the south east of St Neots, including Hill Farm, Abbotsley Country Homes and properties in the vicinity of Lower Wintringham Farm. The new dual carriageway introduces a new source of noise into these locations, and it is considered that there is the potential of significant effects extending across this wider area.

11.5.8 The study area has also been extended to include all noise sensitive receptors in the villages of Roxton, Little Barford, Croxton and Eltisley. It is considered that there is a reasonable stakeholder expectation that the noise assessment is undertaken in these wider areas, due to concerns raised by residents and the Parish Councils in these locations during the development of the Scheme, with regard to the noise impact on their residents.

11.5.9 The area described in 11.5.7 and 11.5.8 is defined as the calculation area for the operational noise assessment and are illustrated in **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2].**

11.5.10 The study area also includes the area within 50m of all existing roads that are predicted to be subject to a change in traffic noise level as a result of the Scheme of:

a. 1.0 dB or more in the short-term (DM opening year to DS opening year).

b. 3.0 dB or more in the long-term (DM opening year to DS 15 years after Scheme opening), subject to a minimum change of 1.0 dB between the DM and DS 15 years after Scheme opening.

11.5.11 For the purposes of the assessment the roads described in 11.5.10 are defined as 'affected routes' and are identified by the analysis of the operational phase traffic data. The identification of affected routes considered all roads with 18 hour (06:00 - 00:00) weekday traffic flows above the lower cut off of the CRTN prediction methodology in all scenarios.

11.5.12 For all affected routes that are outside the calculation area, an assessment has been undertaken by estimating the CRTN BNL for these routes with and without the Scheme. A count of the number of dwellings and other sensitive receptors within 50m of these routes has been undertaken.

11.5.13 The calculation area is illustrated in **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2]**. The identified affected routes are illustrated in **Figure 11.3** of the Environmental Statement **[TR010044/APP/6.2]**.

11.5.14 An estimated total of 7,371 residential properties are located within the study area, of which 3,049 are within the calculation area, and 4,322 are within 50m of affected routes outside the calculation area.

11.5.15 A total of 20 non-residential sensitive buildings are located within the calculation area, consisting of schools, community facilities, a medical facility, places of worship and hotels, as shown on **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2]**. A further 58 non-residential sensitive buildings are located within 50m of affected routes outside the calculation area.

11.6 Baseline conditions

11.6.1 The calculation area consists of a mixture of agricultural land use, built up areas, including Roxton, Chawston, St Neots, Little Barford, Wintringham, Croxton and Eltisley, individual or small groups of properties and major transport infrastructure including the A421, the existing A428 and A1.

11.6.2 The existing noise climate is dominated by road traffic noise, predominantly from the A1, the existing A428, A1198, A421 and associated junctions. Other sources of road traffic noise which contribute to existing noise levels include the B1428, B1043, B1046, and B1040, and a number of minor roads, in particular those in St Neots.

11.6.3 Rail noise from the East Coast Main Line railway influences the noise climate in rural locations to the south of the new dual carriageway and to the east of St Neots. Recreational aircraft flying out of Bourn (approximately 3.9 kilometres from the Scheme), Gransden Lodge (approximately 4.8 kilometres from the Scheme) and Little Gransden airfields (approximately 6.9 kilometres from the Scheme) are also intermittent contributors to the noise environment. Other noise sources include general urban and rural activities, for example those associated with agricultural operations.

11.6.4 Receptors identified within the study area that are sensitive to changes in noise include the following:

a. Residential properties in the settlements of St Neots, Tempsford, Roxton, Chawston and Wyboston, Little Barford, Wintringham, Croxton and Eltisley.

b. Individual dwellings located within the rural environment, for example properties located to south-east of St Neots.

11.6.5 Other receptors include the following educational buildings, medical facilities, places of worship and village halls, which are located in Roxton, St Neots, Croxton and Eltisley.

a. Treetops Nursery, Eaton Socon

b. Dumbelton Medical Centre, Eynesbury

c. Roxton Ce Academy, Roxton

d. St Mary Magdalen Church, Roxton

e. Roxton Village Hall, Roxton

f. Roxton Congregational Church, Roxton

g. The Village Hall, Wyboston

h. St James's Church, Croxton Park, Croxton

i. Chapel, Little End Road, Eaton Socon

j. Middlefield Community Primary School, Eynesbury

k. Village Hall, Croxton

l. The Newton Community Primary School, Eltisley

m. The Cade Pavilion, Eltisley

n. Bluebell Day Nursery, The Newton Community Primary School, Eltisley

o. St Pandionia And St John The Baptists Church, Eltisley

11.6.6 However, these receptors are generally occupied during the daytime and therefore night time noise impacts due to the Scheme have not been considered. There are also a number of Public Rights of Way located throughout the study area.

11.6.7 Five hotels have been identified in close proximity to the Scheme and routes bypassed by it. These hotels include the following and are considered to be sensitive to change in traffic noise levels both during the day and night time:

a. Wiilows Hotel, Wyboston
b. The Waterfront Hotel, Spa & Golf, Wyboston
c. Premier Inn, Colmworth Business Park, Eaton Socon
d. Premier Travel Inn, Phoenix Park, Wyboston
e. Iway Inn, Ermine Street South, Papworth Everard

11.6.8 A number of scheduled monuments have been identified within the study area which include:

a. Tempsford Bridge.
b. Croxton deserted medieval village and 16th-17th century garden remains.
c. Deserted village at Wintringham.
d. Deserted village (site of) at Weald.
e. Chawston Manor moated site and associated fishpond.
f. Moated enclosure and associated building platforms, The Lane, Wyboston.
g. Bowl barrow, known as the `Round Hill', 440m WNW of College Farm.
h. Moated site at Pond Farm.
i. Moated site at Pastures Farm.

11.6.9 No other international or national designated areas (World Heritage Site, SAC, SPA, SSSI, National Park or AONB) have been identified within the study area.

11.6.10 No quiet places or other areas that are publicly accessible and particularly valued by the public for their tranquillity or acoustic environment have been identified in the vicinity of the Scheme.

11.6.11 Under the *Environmental Noise Regulations* (REF 11-36), strategic noise mapping of major roads, railways, airports and agglomerations has been completed across England, including for the A421, A1 and the existing A428 in the vicinity of the Scheme. The following six NIAs were identified in the Round 3 strategic noise mapping (carried out in 2017) in the calculation area, which contain noise sensitive receptors exposed to high noise levels:

a. IA 5111 – properties adjacent to Bedford Road to north east of Roxton
b. IA 5134 – properties adjacent to the existing A428 to east of Caxton Gibbet.
c. IA 5314 – properties adjacent to the A1 between the existing Black Cat roundabout and approximately 170 metres north of The Lane, Wyboston.
d. IA 5317 – properties adjacent to the A1 between the A1(M)/A428 intersection and approximately 300 metres north of The Lane, Wyboston
e. IA 11746 – one property adjacent to the existing A428 at Wintringham
f. IA 14870 – properties adjacent to the A1 southbound at Black Cat junction (although no residential properties were identified within this NIA)

11.6.12 **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2]** illustrates the identified potentially sensitive receptors in the calculation area.

Existing and future surfacing

11.6.13 The information on existing road surfacing on Highways England roads in the study area is based on the data in the Highways England Pavement Management System (HAPMS) database. Information on future resurfacing plans in the area is based on Highways England's current maintenance proposals.

11.6.14 Taking into account surfacing information in the HAPMS database, thin surfacing has been assumed to be in place on the A421 and A1 throughout the study area, in the opening year and future year, with and without the Scheme[1]. Thin surfacing has also been assumed to be in place on the existing A428 to the east of Caxton Gibbet junction, in the opening year and future year, with and without the Scheme. Thin surfacing is proposed as part of the Scheme within the Order Limits.

11.6.15 All other roads included in the detailed quantitative noise modelling are assumed to be surfaced with hot rolled asphalt in the opening year and future year both with and without the Scheme. The exceptions are the sections of the existing A428 to be bypassed by the Scheme which are to be de-trunked once the Scheme is operational and will become the responsibility of the local highway authority, Cambridgeshire County Council. Thin surfacing has been assumed to be in place on these sections in the opening year and future year without the Scheme in place, taking into account the surfacing information in the HAPMS database. It is assumed that the surface on these sections will remain as thin surfacing, in accordance with Cambridgeshire County Council highway maintenance policy.

Baseline noise survey

11.6.16 A baseline noise survey was completed during November and December 2017. Noise monitoring locations are detailed on **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2]**. These locations were chosen to focus on some of the closest receptors both to the Scheme and routes bypassed by the Scheme.

11.6.17 Long-term unattended noise monitoring was completed over a number of weeks. A summary of the noise monitoring results is provided in **Table 11-8,** which details the range of measured noise levels for each site and a comparison with the predicted traffic noise levels. Traffic data used to derive the comparisons with the noise measurements is based on conditions in 2016. Further details are provided in **Appendix 11.2** of the Environmental Statement **[TR010044/APP/6.3]**.

[1] This has been confirmed by Highways England's Operations Directorate

Table 11-8: Summary of baseline noise monitoring results

Ref.	Description	Measured	Predicted	Comments
		$L_{A10,18h}$ dB	$L_{A10,18h}$ dB	
M1	Park Road, Roxton	51.3-54.2	53.6	Local major and minor roads are main contributors to acoustic environment
M2	Bedford Road, Roxton	64.2-64.7	59.3	Local major and minor roads are main contributors to acoustic environment
M3	School Lane, Roxton	48.0-49.3	52.5	A1 and local roads main contributors to the acoustic environment. Garden enclosed by fencing, the latter which is not included in noise model.
M4	Roxton Road, Chawston	55.3-58.6	55.7	Local major and minor roads are main contributors to acoustic environment
M5	Riverside Farm, Chawston	57.9-62.1	59.2	A1 main contributor to acoustic environment
M6	Rectory Farm, Barford Road, Little Barford	48.7-51.4	45.6	Located away from roadside. A number of other noise sources – agriculture, rail and corona discharge from overhead power lines – contribute to acoustic environment.
M7	Rectory Farm, Potton Road, St Neots	52.6	47.1	Equipment issues resulting in one complete day of measurements. Thus not considered representative.
M8	Wintringham Hall, Cambridge Road, St Neots	67.2-68.6	66.5	Existing A428 is dominant noise source. HAPMS records identify low noise surfacing materials installed in 2010
M9	High Street, Croxton	73.0-76.2	71.0-74.0	Existing A428 is dominant noise source.
M10	St Neots Road, Eltisley	62.3-66.8	62.3	Existing A428 is dominant noise source.

11.6.18 **Table 11-8** indicates that there is a reasonable match between the measured and predicted values at a majority of those locations which are both close to the roadside and dominated by road traffic noise.

11.6.19 The exceptions to this include M2 (Bedford Road, Roxton) and M9 (High Street, Croxton). At location M2, the measured levels are slightly higher than predicted. However in other monitoring locations in Roxton, the measured and predicted match more closely.

11.6.20 A range of road traffic noise predicted levels at M9 have been presented, due to mixed road surface types being present along the section of the existing A428 close to the monitoring location (50% Hot Rolled Asphalt and 50% Low Noise Surface). As no detailed information is available to reflect the actual noise reduction performance of these mixed surfaces, the predicted levels in **Table 11-8** have been calculated assuming two different surface corrections derived in accordance with LA 111 Appendix A2 (REF 11-1):

a. -3.5dB(A) for Low Noise Surface

b. -0.5dB(A) for Hot Rolled Asphalt surface

11.6.21 The resulting range of predicted traffic noise levels overlaps with the noise levels measured at this location.

11.6.22 There are a number of non-roadside locations where differences between measured and predicted traffic noise levels are evident. At location M7 (Rectory Farm, Potton Road), equipment and battery issues resulted in only 1 full day of monitoring data being collected. Due to this lack of data, reliable comparisons between the measured and predicted levels at this location cannot be made. At location M6, the predicted noise level is below the range of measured levels. However, other noise sources, including agricultural sources, rail from the nearby East Coast Mainline and corona discharge from nearby overhead power lines, were present and would result in higher measured levels compared to predicted.

11.6.23 Overall, the comparisons between measured and predicted noise levels provide confidence that the noise model developed to estimate the traffic noise impacts of the Scheme is a reasonable approximation.

Future Do-Minimum

11.6.24 As detailed in **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]**, in order to identify the effects of the Scheme on environmental features, it is important to understand the future DM situation during construction. The DM conditions during construction may be different to the current conditions and such changes could alter the sensitivity of existing environmental receptors, as well as introduce new sensitive receptors.

Construction year do-minimum (2026)

11.6.25 The baseline information reported in the section above describes the noise climate in 2017, the year that the baseline noise survey was undertaken. Baseline traffic data used to derive the comparisons with the noise measurements is based on conditions in 2016.

11.6.26 Preliminary works associated with the Scheme are anticipated to start in 2022, subject to securing a DCO with construction works being completed in 2026.

11.6.27 The majority of the land that would be impacted by the Scheme (and in its vicinity) comprises agricultural land and residential areas. Accordingly, environmental do-minimum conditions overall are not anticipated to change significantly by 2026 from the conditions as detailed above.

11.6.28 However, as detailed in **Chapter 15, Assessment of cumulative effects** of the Environmental Statement **[TR010044/APP/6.1]**, a number of development projects are ongoing, or are planned, that have the potential to change baseline conditions. The impact of a number of developments in terms of traffic flows are included within the traffic data used in the noise assessment.

11.6.29 As detailed in Section 11.3 ambient noise levels used to set significance criteria in the construction noise and construction traffic noise assessments are based on 2025 DM data. This data is considered to better reflect the traffic conditions likely to occur during construction.

Opening year do-minimum (2025)

11.6.30 As detailed in **Chapter 15, Assessment of cumulative effects** of the Environmental Statement **[TR010044/APP/6.1]**, a number of additional development projects in the area will have been completed by 2026. These are captured by the 2025 traffic data used in the operational traffic noise assessments.

15 years after opening do-minimum (2040)

11.6.31 **Table 11-9** summarises the long-term change in predicted traffic noise levels between the 2025 DM and 2040 DM scenarios at both residential buildings and other sensitive receptors in the calculation area. The number of receptors that are within 50 metres of affected routes outside the calculation area, where a proportionate approach based on the 18 hour CRTN BNL has been adopted, are reported in **Appendix 11.5** of the Environmental Statement **[TR010044/APP/6.3]**. As detailed in Section 11.6, five of the potentially sensitive non-residential buildings have been identified as being potentially sensitive at night.

Table 11-9: Long-term change in predicted DM traffic noise levels (DM 2025 to DM 2040)

Change in noise level		Daytime		Night-time	
		Number of residential buildings	Number of other sensitive receptors	Number of residential buildings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	2313	17	2278	4
	3.0 - 4.9	13	0	3	0
	5.0 - 9.9	0	0	0	0
	≥10	0	0	0	0
No change	0	85	1	95	1
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	638	2	673	0
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10	0	0	0	0

11.6.32 **Table 11-9** is based on the façade at each building, which undergoes the greatest magnitude of change in traffic noise level from the DM 2025 scenario to the DM 2040 scenario. The results are provided for the ground floor of the buildings for the daytime impacts and the top floor of each building, for example, 1. 5 metres for a one storey house, 4.0 metres for a two storey house for the night time impacts. For properties in blocks of flats, all floors are reported for both daytime and night time impacts. These floors have been chosen to represent where residents are likely to be during the day and night time periods. Further details of the noise model set-up and assumptions are provided in **Appendix 11.4** of the Environmental Statement **[TR010044/APP/6.3]**.

11.6.33 The traffic noise changes from DM 2025 to DM 2040 within the calculation area are presented as a noise difference contour plot in **Figure 11.4** of the Environmental Statement **[TR010044/APP/6.2]**. This plot is based on free-field traffic noise levels at first floor level (4.0m above ground) using a 10m x 10m grid and is provided for illustration purposes.

11.6.34 The majority of residential buildings and sensitive non-residential receptors within the calculation area would experience a negligible (0.1 - 2.9 dB) increase in daytime traffic noise levels from 2025 to 2040, in the absence of the Scheme. This is due to the general growth in traffic over time.

11.6.35 Minor increases in traffic noise are predicted on The Lane in the vicinity of the junction with Roxton Road. However, it should be noted that both the 2025 and 2040 Do-Minimum 18-hour traffic flows on this road are very low, increasing from around 500 vehicles in 2025 to around 700 vehicles in 2040. Both these flows are below the lower cut off of 1,000 vehicles per 18-hour day for the CRTN prediction methodology. Therefore, the magnitude of the predicted increases in traffic noise levels should be treated with some caution.

11.6.36 Moderate increases in traffic noise are also predicted to occur at a number of properties fronting St Neots Road in Eltisley, between the B1040 and The Green. However, it should be noted that both these flows are very low, increasing from around 1,600 vehicles in 2025 to around 3,300 vehicles in 2040. Both these flows are classified as 'low flow' in CRTN prediction methodology. Therefore, the magnitude of the predicted increases in traffic noise levels should be treated with some caution.

11.6.37 Approximately 21% of residential buildings and 2 sensitive non-residential receptors within the calculation area are predicted to experience a negligible (0.1 - 2.9 dB) decrease in daytime traffic noise levels from 2025 to 2040 in the absence of the Scheme. These decreases are predicted to occur at properties close to roads on which the increase in traffic noise from the growth in traffic flow is offset by the decrease in average speed due to these routes becoming more congested. This includes sections of the existing A428 in St Neots and between Cambridge Road junction and Eltisley, as well as the A1 between Black Cat junction and the junction with the existing A428 in St Neots.

11.6.38 The vast majority of identified affected routes are predicted to result in a negligible or minor long-term increase in traffic noise levels at the roadside in the absence of the Scheme. This is due to the normal growth of traffic over time. Five affected routes are predicted to result in negligible long-term decreases in traffic noise levels over time in the absence of the Scheme. Only one of these routes, (A1 southbound on-slip at B645/B10485 junction) has noise sensitive receptors within 50m of it. However, it should be noted that the flows on this route are low, decreasing from around 2100 in 2025 to around 1900 in 2040. Therefore, the magnitude of the predicted decreases in traffic noise levels should be treated with some caution.

11.7 Potential impacts

11.7.1 Mitigation measures incorporated in the Scheme design and measures to be taken to manage Scheme construction are set out in Section 11.8. Prior to implementation of defined mitigation measures, the Scheme has the potential to affect noise and vibration (positively or negatively), both during construction and once in operation; potential impacts are detailed in the sections below.

Construction

11.7.2 The main construction activities that would take place during the Scheme construction phase are utility works, site clearance, earthworks, retaining wall construction, bridge construction, bridge demolition and road construction (pavement) works. These construction activities have the potential to result in temporary noise impacts at the receptors closest to the Scheme.

11.7.3 The potential for temporary construction vibration impacts is dependent on the need for construction activities, which are a potentially significant source of vibration, such as earthworks and road construction (pavement) works using vibratory rollers. Piling would be required at the new bridges and at retaining walls. Rotary bored piling is proposed for bridge works and retaining walls. Vibration associated with rotary bored pilling would be minimal.

11.7.4 Construction traffic can have a temporary impact on sensitive receptors located along existing roads used by these vehicles. Details regarding construction traffic and temporary traffic management measures are detailed in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**.

11.7.5 The potential for construction traffic impacts is dependent on the volume and route of construction traffic. A number of night-time road closures are currently anticipated and indicative diversion routes identified. A number of indicative traffic management phases have been developed to facilitate the construction of Black Cat junction, Cambridge Road junction and Caxton Gibbet junction. These are set out in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. It is assumed that the traffic management scheme for the works provides sufficient capacity to prevent a significant re-routing onto alternative routes.

Operation

11.7.6 The operation of the Scheme has the potential to result in both beneficial and adverse permanent traffic noise impacts. The Scheme would alleviate traffic flow on the existing A428 close to some receptors but would provide a new noise source close to others. Additionally, the Scheme would attract traffic to the area (refer to the Transport Assessment **[TR010044/APP/7.2]**) which has the potential to generate adverse traffic noise impacts.

11.7.7 The magnitude of operational traffic noise impacts at a receptor is dependent on a range of factors, including the traffic flow, composition, speed, road surface, ground topography, the presence of intervening buildings and structures, and the distance to the road.

11.8 Design, mitigation and enhancement measures

Construction

Essential mitigation

11.8.2 As detailed in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**, construction of the Scheme would be subject to measures and procedures as defined within the First Iteration Environmental Management Plan (EMP) for the Scheme **[TR010044/APP/6.8]**. The First Iteration EMP includes a range of good practice measures associated with mitigating potential environmental impacts. The measures detailed within the First Iteration EMP would be developed into a Second Iteration EMP by the selected construction contractor which would be implemented for the duration of the Scheme construction phase.

11.8.3 The Second Iteration EMP would include a range of industry standard best practice construction phase noise mitigation measures required during all works undertaken where there is a potential for adverse effects on sensitive receptors (e.g. residential properties, schools etc.). The Second Iteration EMP would include relevant noise criteria, proposed surveys and a range of Best Practicable Means (BPM) associated with mitigating potential noise and vibration impacts. Such measures include:

a. Appointment of a Community Relations Manager (CRM) responsible for leading engagement with affected communities (refer to paragraph 11.8.5 below).

b. Implementation of a noise insulation and temporary re-housing policy.

c. Selection of quiet and low vibration equipment and methodologies.

d. Review of construction programme and methodology to consider low noise and low vibration methods (including non-vibratory compaction plant where required).

e. Optimal location of equipment on site to minimise noise disturbance.

f. The provision of acoustic enclosures around static plant, where necessary.

g. Use of less intrusive alarms, such as broadband vehicle reversing warnings.

h. Compliance with working hours as specified within the draft DCO as set out in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]** and the First Iteration EMP **[TR010044/APP/6.8]**.

i. No start-up or shut down of large vibratory rollers (approximately 13 tonnes) within 50 metres of receptors and medium vibratory rollers (approximately 3.5 tonnes) within 15 metres of receptors.

11.8.4 There is also the potential for additional attenuation of noise from construction activities through the use of localised temporary site hoardings or noise barriers. These have not been included in the assessment of construction noise, in order to represent a worst-case scenario. BS 5228 (REF 11-23) advises that such barriers can provide a reduction in noise levels of 5 dB when the top of the plant is just visible over the noise barrier, and 10 dB when the plant is completely screened from a receptor. The effectiveness of a noise barrier depends upon its length, effective height, position relative to the noise source and to the receptors, and the material from which it is constructed. Therefore, the potential attenuation provided by any such additional localised barriers cannot be quantified at this stage. Proposals for the use of localised temporary site hoardings or noise barriers would be developed at the detailed design stage and implemented during the works.

11.8.5 As detailed above, during the Scheme construction phase, appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (e.g. web-based, newsletters, newspapers, radio announcements). This would include the appointment of a CRM responsible for leading engagement with affected communities. An information web-page would be provided and kept up-to-date on the Highways England website to reflect construction and community liaison requirements. It is envisaged that the web-page would provide up-to-date information on the progress of the construction works, areas affected by construction, mitigation in place to reduce adverse effects, information regarding planned construction works (including any proposed works outside normal hours, diversion routes etc.) and works recently completed. The communication strategy would minimise the likelihood of complaints, including those associated with noise and vibration. Residents would be provided with a point of contact, the CRM, for any queries or complaints. In addition, the Highways England Customer Contact Centre (HECCC) would also be available to deal with queries from the public. This includes an information line staffed by Highways England at all times. A complaint management system would be in place, in line with systems used by Highways England on other major infrastructure projects. Any noise and vibration complaints would be investigated and appropriate action taken as required. The complainant would be provided with a response outlining the results of the investigation and any action taken.

11.8.6 Materials are expected to be transported to and from the site during the Scheme construction phase which would increase the number of Heavy Goods Vehicle (HGV) movements on the road network. Details regarding traffic movements and restrictions are detailed in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]** which includes details of measures to be taken to minimise the impact of construction traffic on customers and stakeholders, while ensuring work is carried out efficiently. Such measures include restricting HGV movements outside the immediate vicinity of the works to the strategic highway network. Such restrictions would assist in avoiding construction traffic impacts on nearby residential areas. In addition, the traffic management scheme for the works would provide sufficient capacity to prevent a significant re-routing onto alternative routes.

11.8.7 During the construction phase, surveys would be required which would include physical measurements and observational checks and audits to ensure that BPM were being employed at all times. The contractor would undertake and report noise and vibration surveys as is necessary to ensure and demonstrate compliance with all noise and vibration commitments and the requirements of the Second Iteration EMP (refer to Section 11.10).

11.8.8 The survey and compliance assurance process would be set out in the noise and vibration management plan(s), as part of the Second Iteration EMP. Site reviews would be logged and any remedial actions recorded. Such checks would report:

a. Compliance with hours of working.

b. Presence of mitigation measures e.g. engine doors closed, air lines not leaking and site hoarding in place

c. Compliance with agreed working methods.

d. Compliance with any specific requirements of the Second Iteration EMP.

Operation

Embedded mitigation

11.8.9 Environmental considerations, including traffic noise, have been taken into account during the choice of route, as detailed in **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]**. Once the overall route was chosen, the development of the Scheme design, in terms of both the horizontal and vertical alignment, has aimed to avoid and reduce potential impacts upon nearby sensitive receptors.

11.8.10 A number of sections of the route are below existing ground level (i.e. in cutting) which would screen traffic and reduce noise impacts in the vicinity. These include the A1 in the vicinity of Black Cat Junction, in the vicinity of the B1046 overbridge, Cambridge Road junction, east of Toseland Road bridge and through Eltisley junction. These cuttings would potentially reduce the need for additional noise barriers, which have potential knock on impacts, such as visual impacts, and require ongoing maintenance.

11.8.11 The Scheme would be constructed with a thin surfacing system (i.e. a low noise surface), which results in lower levels of noise generation than a standard hot rolled asphalt surface. The use of thin surfacing reduces noise levels by 3.5 dB at speeds of ≥75 km/hr.

11.8.12 Following initial noise modelling of the outline Scheme design, proposals for potential noise mitigation were developed in conjunction with other environmental disciplines to avoid secondary impacts (including, for example, landscape and visual impacts). The initial proposals for the design of noise bunding on the mainline, as the Scheme passes receptors in Roxton and close to the intersection with Potton Road, were consulted upon during the supplementary consultation held in 2020, for details refer to the Consultation Report **[TR010044/APP/5.1]**. Taking into account the analysis of the consultation responses and subsequent development of the Scheme design and noise models, this noise bunding has been included within the Scheme design.

Essential mitigation

11.8.13 No further noise mitigation is proposed within the Scheme design.

11.9 Assessment of likely significant effects

11.9.1 In accordance with LA 104 (REF 11-37), the prediction of impacts and the assessment of effects (and their significance) on noise and vibration associated with construction and operation of the Scheme has taken account of the effectiveness of both the embedded and essential mitigation measures summarised in Section 11.8.

Construction noise

11.9.2 Predicted monthly noise levels during the construction phase have been calculated over the Scheme construction period.

11.9.3 Predicted monthly noise levels at each selected representative receptor during the construction phase are shown in **Appendix 11.3** of the Environmental Statement **[TR010044/APP/6.3]**. Receptor locations are marked on **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2]**.

11.9.4 For two storey residential properties, ground floor results are provided for the daytime and evening, and first floor results for the night. For residential properties greater than two storeys, excluding blocks of flats, ground floor results are provided for the daytime and evening, and night-time results are provided for the highest occupied floor. For blocks of flats and non-residential sensitive properties, which may be occupied on one floor during all periods, results are provided for daytime, evening and night-time for the worst-case floor. The maximum predicted construction noise level, and whether the construction levels are predicted to be at or above the LOAEL and/or SOAEL, is summarised in **Table 11-10**. The predicted noise levels shown are based on the area over which each activity is likely to occur over the course of each month during the construction programme. As detailed in Section 11.3, to define the SOAEL and LOAEL, ambient noise levels at the relevant façade of each of the selected receptors has been determined based on predicted DM 2025 traffic flows.

Table 11-10: Summary of predicted construction noise levels (levels at or above the SOAEL/LOAEL in bold underline)[2]

Receptor ID	Daytime L_{Aeq} dB (façade)			Evening/ weekend L_{Aeq} dB (façade)			Night L_{Aeq} dB (façade)		
	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level
R01 - 53 Bedford Road, Roxton	65	**58**	62	60	**55**	57	**55**	**52**	58
R02 - 4 High Street, Roxton	65	**56**	57	55	52	52	55	**49**	52
R03 - 39 School Lane, Roxton	65	**53**	60	55	**50**	53	**50**	**45**	53
R04 - 2 Hills Close, Roxton	65	**51**	54	55	48	45	50	**43**	45
R05 - The Bungalow, Roxton Garden Centre Road, Roxton	**65**	**56**	67	**60**	**53**	63	**55**	**48**	63
R06 – Greenacres, Great North Road, Roxton	**65**	**62**	74	65	**59**	63	**55**	**54**	63
R07 - Kelpie Marina, Great North Road, Roxton	70	**63**	64	65	**60**	61	**55**	**55**	61
R08 - 10 Roxton Road, Chawston	**65**	**56**	69	60	**53**	62	**55**	**49**	62
R09A - Chawston Manor, Colesden Road, Chawston (S)	65	**54**	55	55	51	47	50	**47**	48
R09B - Chawston Manor, Colesden Road, Chawston (E)	65	**52**	55	55	49	47	50	**46**	48
R10 - Mandeville House, Chawston Lane, Chawston	**65**	**62**	66	65	**59**	64	**55**	**54**	64

[2] N/A indicates that there are no construction works which affect this receptor during the specified time period.

Receptor ID	Daytime L_{Aeq} dB (façade)			Evening/ weekend L_{Aeq} dB (façade)			Night L_{Aeq} dB (façade)		
	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level
R11 - Russet House, Nagshead Lane, Wyboston	**65**	**60**	70	60	57	52	55	**53**	53
R12 - 25 Great North Road, Wyboston	75	75	69	72	72	57	66	66	57
R13 - 3 The Lane, Wyboston (W)	**65**	**57**	75	**60**	**53**	64	**55**	**51**	65
R14 - 51 Great North Road, Wyboston	75	75	61	73	73	53	67	67	54
R15A - 9 Great North Road, Chawston (W)	75	**70**	71	**67**	**67**	74	**61**	**61**	74
R15B - 9 Great North Road, Chawston (S)	**70**	**67**	71	**65**	**64**	71	**58**	**58**	71
R16 - 2 The Barns, Little Barford Road, Little Barford	**70**	**66**	71	**65**	**63**	68	**58**	**58**	68
R17 - Rectory Farm, Little Barford Road, Little Barford	65	**47**	61	55	43	42	**45**	**40**	50
R18 - Hill Farm, Station Road, Tempsford	65	**44**	53	55	40	N/A	45	37	N/A
R19 - Orchard House, Potton Road, Abbotsley	65	**55**	57	55	52	32	55	48	32
R20 - Parkers Farmhouse, Potton Road, Abbotsley	**65**	**59**	68	**60**	**56**	60	**55**	**52**	61
R21 - Rectory Farm Cottage, Potton Road, Abbotsley	**65**	**53**	74	55	**50**	50	**50**	**47**	50
R22 - Rectory Farm, Potton Road, Abbotsley	65	**49**	60	55	46	43	45	**42**	43

Receptor ID	Daytime L_{Aeq} dB (façade)			Evening/ weekend L_{Aeq} dB (façade)			Night L_{Aeq} dB (façade)		
	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level
R23A - 2 Rectory Farm Cottage, Potton Road, Abbotsley (SE)	**65**	**58**	68	60	**55**	55	**55**	**50**	55
R23B - 2 Rectory Farm Cottage, Potton Road, Abbotsley (NW)	**65**	**61**	67	65	**58**	59	**55**	**53**	59
R24 - 155 Howitts Gardens, Eynesbury	65	51	50	55	48	39	50	44	40
R25 - Greyholme, Cambridge Road, St Neots	**65**	**60**	65	**60**	**57**	64	**55**	**54**	64
R26 - 4 Stone Hill, St Neots (GF)	65	61	52	60	57	43	55	52	43
R27 - 1 Wintringham Cottages, Wintringham Road, Wintringham (N)	**65**	**62**	74	65	59	57	**55**	**55**	58
R28 - Wintringham Hall, Wintringham Road, Wintringham	65	**62**	63	65	**58**	63	**55**	**55**	63
R29 - Lower Wintringham Farm, Wintringham Road, Wintringham	65	**45**	50	55	41	40	45	**39**	41
R30 - Eltisley Manor, Cambridge Road, Eynesbury (GF)	70	65	61	65	62	51	57	57	51
R31 - North Farm, Cambridge Road, Eynesbury	65	**53**	60	55	49	43	50	47	43
R32 - Whitehall Farm House, Whitehall Farm, Cambridge Road, Croxton	70	**64**	65	65	61	47	57	57	48
R33 - 24 St Neots Road, Eltisley	70	64	63	65	61	59	**56**	**56**	59

Receptor ID	Daytime L_{Aeq} dB (façade)			Evening/ weekend L_{Aeq} dB (façade)			Night L_{Aeq} dB (façade)		
	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level
R34 - Lion House, Cambridge Road, Eltisley	65	**59**	63	60	**56**	56	**55**	**52**	57
R35 - 46 Caxton End, Eltisley	65	**48**	53	55	45	44	45	**41**	44
R36 - Fairview Farm, St Ives Road, Yelling	65	62	60	65	59	54	55	**54**	54
R37 - North East Farmhouse, North East Farm, Cambridge Road, Eltisley	65	**56**	60	60	53	44	55	50	44
R38 - Pembroke Farmhouse, Pembroke Farm, Cambridge Road, Eltisley	65	**53**	59	55	**50**	51	**50**	**47**	52
R39 - The Bungalow, Pastures Farm, Ermine Street, Caxton	65	**51**	55	55	48	46	50	**43**	46
R40A - Iway Inn, Ermine Street South, Papworth Everard (1 Storey SW - GF)	75	69	67	**66**	**66**	71	**60**	**60**	71
R40B - Iway Inn, Ermine Street South, Papworth Everard (1 Storey S - GF)	**65**	**60**	67	**60**	**57**	63	**55**	**52**	63
R41 - Crows Nest Farm House, Farm, Ermine Street South, Papworth Everard	65	57	46	60	54	40	55	49	40
R42 - Oak Tree Cottage, St Neots Road, Cambourne	70	**63**	66	65	**60**	63	**56**	**56**	63
R43 - Swansley Wood Farmhouse, Swansley Wood Farm, St Neots Road, Cambourne	65	**50**	52	55	**47**	47	50	**44**	47

Receptor ID	Daytime L_{Aeq} dB (façade)			Evening/ weekend L_{Aeq} dB (façade)			Night L_{Aeq} dB (façade)		
	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level	SOAEL	LOAEL	Max Level
R44 - 4 Common Farm Cottages, Brockley Road, Elsworth	65	**49**	55	55	**46**	48	50	**43**	49
R45 - Lawn Farm, St Neots Road Old Alignment, Elsworth	65	51	37	55	48	32	50	45	33

11.9.5 Of the 45 selected construction noise assessment locations:

a. 36 are predicted to experience construction noise levels which are at or above the LOAEL during the daytime period in one or more months, of which 14 would also be at or above the SOAEL.

b. For the evening/weekend period, 22 receptors are predicted to be at or above the LOAEL, of which 8 would also be at or above the SOAEL.

c. For the night-time period, 33 receptors are predicted to be at or above the LOAEL, of which 22 would also be at or above the SOAEL.

11.9.6 A discussion of the construction noise assessment data as summarised in **Table 11-10 i**s provided below. With regard to duration, a conservative approach has been adopted in reporting the number of months during which noise levels at or above the SOAEL are anticipated. The noise level at or above the SOAEL may not be for all of each month identified, it may be for a much shorter period within a month.

a. At receptor R01 (53 Bedford Road, Roxton) night-time levels 3 dB above the SOAEL are predicted in three months (moderate impact) and are limited to the period of works to demolish the existing Roxton Road bridge.

b. At R03 (39 School Lane, Roxton) night-time levels 2 dB to 3 dB above the SOAEL are predicted in three months (moderate impact) and are limited to the period of works to demolish the existing Roxton Road bridge.

c. At R05 (The Bungalow, Roxton Garden Centre Road, Roxton) daytime levels at the SOAEL to 2 dB above the SOAEL are predicted in 10 months (moderate impact) and primarily relate to works to demolish the existing Roxton Road bridge and A421/A1 roundabout; works to divert the utility duct in close proximity to the receptor; earthworks associated with Kelpie Marina access road and flood alleviation, the new Bedford Road spur, the new south gyratory and the attenuation pond in close proximity to the receptor; road construction activities associated with Kelpie Marina access road and the new Bedford Road spur; and pile cap works to structures associated with the new gyratory (S6/S7), A428 (S8) and A1 underpass (S51/52).

Evening levels 3 dB above the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in the new Bedford Road spur. These works will be of very short duration.

Night-time levels 1 dB to 3 dB above the SOAEL are predicted in 6 months (moderate impact) and levels 8 dB above the SOAEL are predicted in one month (major impact). The moderate impacts primarily relate to works to demolish the existing Roxton Road bridge; and tie-in works associated with the widening of the existing A421 onslip, the A1 southbound onslip, the temporary south gyratory, the new south gyratory and the new Bedford Road spur. The major impact is limited to the period of works to tie-in the new Bedford Road spur.

d. At R06 (Greenacres, Great North Road, Roxton) daytime levels at the SOAEL to 2 dB above the SOAEL are predicted in 12 months (moderate impact) and levels 6 dB and 9 dB above the SOAEL are predicted in two months (major impact). The moderate impacts primarily relate to works to commission and decommission the site compound; works to demolish the existing Roxton Road bridge, A421/A1 roundabout and to remove the existing A1 in close proximity to the receptor; earthworks associated with the A1 and A1 northbound offslip; road construction works associated with the A1 northbound offslip and southbound onslip including drainage to the access tracks in close proximity to the receptor; and structural works associated with the A1 northbound retaining wall (S51D) and the eastern A428 bridge (S8). The major impacts relate to earthworks associated with the A1 mainline, A1 southbound onslip and access tracks in close proximity to the receptor; and road construction associated with the A1 southbound onslip and access tracks in close proximity to the receptor.

   Night-time levels at the SOAEL to 3 dB above SOAEL are predicted in nine months (moderate impact) and levels 6 dB and 8 dB above the SOAEL are predicted in two months (major impact). The moderate impacts primarily relate to works to demolish the existing Roxton Road bridge; on-site concrete batching at the compound; structural works to the A1 northbound retaining wall (S51D) and east A428 bridge (S8); tie in works associated with the new Bedford Road spur, the south temporary gyratory and the A1 southbound onslip; and the traffic phasing switch for the opening of the A1 southbound onslip. The major impacts are limited to the period of works to tie-in the A1 and A1 southbound onslip.

e. At R07 (Kelpie Marine, Great North Road, Roxton) night-time levels 1 dB above the SOAEL are predicted in one month (moderate impact) and levels 6 dB above the SOAEL are predicted in one month (major impact). Both moderate and major impacts are limited to the period of works to tie-in the A1 northbound offslip in close proximity to the receptor. These works will be of very short duration.

f. At R08 (10 Roxton Road, Chawston) daytime levels at the SOAEL and 4 dB above the SOAEL are predicted in 4 months (moderate impact) and primarily relate to pile cap works associated with the new Roxton Road bridge; and earthworks associated with the Roxton Road realignment and the Roxton Road link in close proximity to the receptor.

   Evening levels 2 dB above the SOAEL are predicted in one month and are limited the period of works to tie-in the new Roxton Road alignment. These works will be of very short duration.

   Night-time levels 1 dB and 3 dB above the SOAEL are predicted in three months (moderate impact) and levels 5 dB and 7 dB above the SOAEL are predicted in two months (major impact). Both moderate and major impacts primarily relate to works to demolish the existing Roxton Road bridge and works to tie-in the new Roxton Road re-alignment. These works will be of very short duration.

g. At R10 (Mandeville House, Chawston Lane, Chawston) daytime levels 1 dB above the SOAEL are predicted in one month and are limited to the period of earthworks associated with the A1 in close proximity to the receptor.

   Night-time levels 1 dB to 3 dB above the SOAEL are predicted in three months (moderate impact) and levels 7 dB and 9 dB above the SOAEL are predicted in three months (major impact). Both moderate and major impacts are limited to the period of works to tie-in Chawston Lane and the A1 northbound. These works will be of very short duration.

h. At R11 (Russet House, Nagshead Lane, Wyboston) daytime levels at the SOAEL and 2 dB above the SOAEL are predicted in two months (moderate impact) and levels 5 dB above the SOAEL are predicted in one month (major impact). The moderate impacts are limited to the period of road construction works associated with the Roxton Road link between Chawston Lane and The Lane. The major impact is limited to the period of earthworks associated with the new link between Chawston Lane and The Lane.

i. At R13 (3 The Lane, Wyboston (W)) daytime levels at the SOAEL are predicted in two months (moderate impact) and levels 5 dB and 10 dB above the SOAEL are predicted in two months (major impact). The moderate impacts primarily relate to the road construction works associated with the link between Chawston Lane and The Lane and the works associated with the BT diversion in close proximity to this receptor. The major impacts are primarily related to the earthworks (10 dB) and road construction works (5 dB) associated with the link between Chawston Lane and The Lane.

   Evening levels 4 dB above the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in The Lane. These works will be of very short duration.

Night-time levels 2 dB to 3 dB above the SOAEL are predicted in two months (moderate impact) and levels 5 dB above the SOAEL and 10 dB above the SOAEL are predicted in two months (major impact). Both moderate and major impacts are limited to the period of works to tie-in The Lane. These works will be of very short duration.

j. At R15A (9 Great North Road, Chawston (W)) evening levels 1 dB to 2 dB above the SOAEL are predicted in five months (moderate impact) and levels 7 dB above the SOAEL are predicted in one month (major impact). The moderate impacts primarily relate to the South Brook culvert works which cross the existing A1; and the tie-in works associated with the temporary A1 and A1 south bound offslip works. The major impact is limited to the period of works to tie-in the temporary A1 southbound offslip.

   Night-time levels at the SOAEL and 4 dB above the SOAEL are predicted in four months (moderate impact) and levels 5 dB, 7 dB to 8 dB and 13 dB above the SOAEL are predicted in seven months (major impact).The moderate impacts primarily relate to the tie-in works associated with the new A1 southbound offslip, the A1 mainline section and the temporary A1 and A1 south bound offslip works; and the traffic management works associated with opening the new A1 southbound offslip. The major impacts primarily relate to the South Brook culvert works which cross the existing A1; and the tie-in works associated with the new A1 southbound offslip and the temporary A1 and A1 south bound offslip works.

k. At R15B (9 Great North Road, Chawston (S)) daytime levels 1 dB above the SOAEL are predicted in one month (moderate impact) and are limited to the period of earthworks associated with the new A1 southbound offslip and the new A1 mainline section in close proximity to the receptor.

   Evening levels 1 dB to 2 dB above the SOAEL are predicted in five months (moderate impact) and levels 6 dB above the SOAEL are predicted in one month (major impact). The moderate impacts primarily relate to the South Brook Culvert works which cross the existing A1; and the tie-in works associated with the temporary A1 south bound offslip. The major impact is limited to the period of works to tie-in the temporary A1 southbound offslip.

   Night-time levels at the SOAEL and 3 dB to 4 dB above the SOAEL are predicted in three months (moderate impact) and levels 8 dB to 9 dB and 13 dB above the SOAEL are predicted in six months (major impact). The moderate impacts primarily relate to the tie-in works associated with the new A1 southbound offslip and the A1 mainline section in close proximity to the receptor; and the traffic phase switch works associated with opening the new A1 southbound offslip. The major impacts primarily relate to the South Brook culvert works which cross the existing A1; and the tie-in works associated with the temporary A1 south bound offslip.

l. At R16 (2 The Barns, Little Barford Road, Little Barford) daytime levels 1 dB above the SOAEL are predicted in two months (moderate impact) and primarily relate to earthworks and road construction activities associated with the Barford Road re-alignment, in close proximity to the receptor.

Evening levels 1 dB and 3 dB above the SOAEL are predicted in two months (moderate impact) and are limited to the period of works to tie-in the Barford Road re-alignment. These works will be of very short duration.

Night-time levels 4 dB above the SOAEL are predicted in one month (moderate impact) and levels 6 dB, 8 dB and 10 dB above the SOAEL are predicted in three months (major impact). Both moderate and major impacts are limited to the period of works to tie-in the Barford Road re-alignment. These works will be of very short duration.

m. At R17 (Rectory Farm, Little Barford Road, Little Barford) night-time levels at the SOAEL to 1 dB above the SOAEL are predicted in four months (moderate impact) and levels 5 dB above the SOAEL are predicted in two months (major impact). The moderate impacts primarily relate to structural works associated with the East Coast Mainline rail bridge; and tie-in woks associated with the new Barford Road re-alignment. The major impacts primarily relate to the earthworks associated with the access/egress tracks for the East Coast Mainline rail bridge works.

n. At R20 (Parkers Farmhouse, Potton Road, Abbotsley) daytime levels 2 dB to 3 dB above the SOAEL are predicted in eight months (moderate impact) and primarily relate to overhead electricity and water main diversions in close proximity to the receptor; structural works associated with the B1046 road bridge; and earthworks associated with Potton Road and the section of the new dual carriageway in close proximity to the receptor. Water diversions currently assume excavation of three trenches. Impacts can be reduced through excavation of one trench.

   Evening levels at the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in Potton Road in close proximity to the receptor. These works will be of very short duration.

   Night-time levels 3 dB above the SOAEL are predicted in one month (moderate impact) and levels 6 dB above the SOAEL are predicted in one month (major impact). Both the moderate and major impacts are limited to the period of works to tie-in Potton Road in close proximity to the receptor. These works will be of very short duration.

o. At R21 (Rectory Farm Cottage, Potton Road, Abbotsley) daytime levels 1 dB above the SOAEL are predicted in one month (moderate impact) and levels 6 dB and 8 dB to 9 dB above the SOAEL are predicted in seven months (major impact). The moderate impact primarily relates to structural works associated with the B1046 road bridge; and the earthworks haul route associated with movements between the East Coast Mainline rail bridge and the Wintringham compound. The major impacts primarily relate to overhead electricity and water main diversions in close proximity to the receptor; structural works associated with the B1046 road bridge; and earthworks associated with the new dual carriageway. Water diversions currently assume excavation of three trenches. Impacts can be reduced through excavation of one trench

   Night-time levels at SOAEL are predicted in three months (moderate impact) and are limited to the period of structural works associated with the abutments for the B1046 road bridge. These works will be of very short duration.

p. At R23A (2 Rectory Farm Cottage, Potton Road, Abbotsley (SE)) daytime levels at the SOAEL to 3 dB above the SOAEL are predicted in nine months (moderate impact) and primarily relate to works associated with the BT, buried and overhead electricity, and water mains diversions in close proximity to the receptor; structural works associated with the B1046 road bridge; earthworks associated with the new dual carriageway, Potton Road and the B1046; and the earthworks haul route associated with movements between the East Coast Mainline rail bridge and the Wintringham compound. Water diversions currently assume excavation of three trenches. Impacts can be reduced through excavation of one trench

   Night-time levels at the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in Potton Road and the B1046. These works will be of very short duration.

q. At R23B (2 Rectory Farm Cottage, Potton Road, Abbotsley (NW)) daytime levels at the SOAEL and 2 dB above the SOAEL are predicted in seven months (moderate impact) and primarily relate to works associated with the BT, buried electricity, and water mains diversions in close proximity to the receptor; and earthworks associated with the new dual carriageway, Potton road and the B1046. Three separate excavations are currently programmed for the water main diversions. There is the potential to reduce this impact through the one excavation for all water main diversions

   Night-time levels at the SOAEL and 4 dB above the SOAEL are predicted in two months (moderate impact) and are limited to the period of works to tie-in Potton Road and the B1046. These works will be of very short duration.

r. At R25 (Greyholme, Cambridge Road, St Neots) daytime levels at the SOAEL are predicted in two months (moderate impact) and primarily relate to earthworks associated with the northern Cambridge Road alignment/roundabout and Fox Brook west pond; and road construction works associated with the northern Cambridge Road alignment/roundabout.

Evening levels 4 dB above the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in the northern Cambridge Road alignment/roundabout. These works will be of very short duration.

Night-time levels 4 dB above the SOAEL are predicted in one month (moderate impact) and levels 5 dB and 9 dB above the SOAEL are predicted in two months (major impact). The moderate impact is limited to the period of works to tie-in the northern Cambridge Road alignment/roundabout. The major impact relates to works to tie-in the northern Cambridge Road alignment/roundabout (9 dB) and new side roads (5 dB). These works will be of very short duration.

s. At R27 (1 Wintringham Cottages) daytime levels at the SOAEL to 3 dB above the SOAEL are predicted in seven months (moderate impact) and levels 9 dB above the SOAEL are predicted in one month (major impact). The moderate impacts primarily relate to site clearance for the northern Cambridge Road alignment/roundabout; earthworks associated with the new dual carriageway, the new dual carriageway eastbound onslip, the access/egress tracks for the Cambridge Road junction bridge works and Fox Brook east pond and adjoining access tracks; the earthworks haul route associated with movements between Cambridge Road junction and Eltisley junction; and the overhead electricity diversion in close proximity to the receptor. The major impact is limited to the period of earthworks associated with the new dual carriageway westbound offslip.

   Night-time levels at the SOAEL and 3 dB above the SOAEL are predicted in two months (moderate impact) and are limited to the period of works to tie-in the southern alignment of Cambridge Road and the new side roads in close proximity to the receptor. These works will be of very short duration.

t. At R28 (Wintringham Hall, Wintringham Road) night-time levels 3 dB above the SOAEL are predicted in one month (moderate impact) and levels 8 dB above the SOAEL are predicted in one month (major impact). The moderate impact is limited to the period of works to tie-in the new side roads to the new southern alignment of Cambridge Road. The major impact is limited to the period of works to tie-in the southern alignment of Cambridge Road.

u. At R33 (24 St Neots Road, Eltisley) night-time levels 1 dB and 3 dB above the SOAEL are predicted in two months (moderate impacts) and are limited to the period of works to tie-in Cambridge Road and the pond access track to the new Scheme alignment in close proximity to the receptor. These works will be of very short duration.

v. At R34 (Lion House, Cambridge Road, Eltisley) night-time levels 2 dB above the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in Cambridge Road and the pond access track to the new Scheme alignment in close proximity to the receptor. These works will be of very short duration.

w. At R38 (Pembroke Farmhouse, Pembroke Farm, Cambridge Road, Eltisley) night-time levels 2 dB above the SOAEL are predicted in one month (moderate impact) and primarily relate to the works to tie-in the existing A1198, new northern A1198 dumbbell/underpass and Cambridge Road; and structural works to the parapets for the Caxton Gibbet junction bridge. These works will be of very short duration.

x. At R40A (Iway Inn, Ermine Street South, Papworth Everard (SW)) evening levels 5 dB above the SOAEL are predicted in one month (major impact) and are limited to the period of works to tie-in the existing A1198, new northern A1198 dumbbell/underpass and Cambridge Road.

   Night-time levels 1dB and 4 dB above the SOAEL are predicted in three months (moderate impact) and levels 11 dB above the SOAEL are predicted in one month (major impact). Both the moderate and major impacts are limited to the period of works to tie-in the existing A1198, new northern A1198 dumbbell/underpass and Cambridge Road. These works will be of very short duration.

y. At R40B (Iway Inn, Ermine Street South, Papworth Everard (S)) daytime levels at the SOAEL and 1 dB to 2 dB above the SOAEL are predicted in eight months (moderate impact) and primarily relate to works associated with the overhead electricity and water main diversions in close proximity to the receptor; earthworks associated with the Caxton Gibbet flyover embankments and eastbound onslip; and structural works associated with pilecap works to the Caxton Gibbet junction bridge.

   Evening levels 3 dB above the SOAEL are predicted in one month (moderate impact) and are limited to the period of works to tie-in the existing A1198, new northern A1198 dumbbell/underpass and Cambridge Road. These works will be of very short duration.

   Night-time levels at the SOAEL are predicted in one month (moderate impact) and levels 8 dB above the SOAEL are predicted in one month (major impact). The moderate impact primarily relates to the works to tie-in the existing A1198, new northern A1198 dumbbell/underpass and Cambridge Road. The major impact primarily relates to the works to tie-in the existing A1198, new northern A1198 dumbbell/underpass and Cambridge Road; and structural works associated with the Caxton Gibbet junction bridge. These works will be of very short duration.

z. At R42 (Oak Tree Cottage, St Neots Road, Cambourne) night-time levels 7 dB above the SOAEL are predicted in one month (major impact) and are limited to the period of works to tie-in new dual carriageway mainline and westbound offslip.

11.9.7 As detailed in Section 11.4, the construction assessment is based on the construction information that is currently available, with advice being provided by Highways England's appointed buildability advisors. Given that the exact details of construction activities and the duration of the various works are not fully known, a conservative judgement has been made and these criteria have only been applied to those activities for which there is certainty that the durations would be considerably below the duration criteria set out in 11.3.43, taking advice from the appointed Buildability Advisor.

11.9.8 On this basis, significant adverse construction noise effects are identified at the closest receptors to the construction works in the vicinity of the following receptors/locations:

a. A1 between 9 and 25 Great North Road; The Lane, Nagshead Lane and Chawston Lane in proximity to the Roxton Road Link between Roxton Road and The Lane. (Receptor references R10, R11, R13 – daytime works only; Receptor reference R15A – day and night works only; Receptor reference R15B – day, evening and night works)

b. Roxton Road and Roxton Garden Centre in proximity to the north and south of the Roxton Road re-alignment. (Receptor references R05, R08 – both day and night works only)

c. Greenacres (Receptor reference R06 – day and night works).

d. Bedford Road in the proximity of the western A421 works (Receptor reference R01 – night works).

e. School Lane in the proximity of the southern A1 works (Receptor reference R03 – night works).

f. The Barns, Rectory Farm; Potton Road in proximity of the new dual carriageway (Receptor References R16, R20, R21, R23A, R23B – day works only; Receptor reference R17 – night works) .

g. Cambridge Road and Wintringham Road in proximity of the Cambridge Road junction northern and southern alignment works (Receptor references R25, R27 – day works only).

h. Ermine Street in proximity to the northern Caxton Gibbet dumbbell (Receptor reference R40B – day works only).

i. St Neots Road in proximity to the tie-in point between the Scheme and the existing A428 at Caxton Gibbet east (Receptor reference R42 – night works).

11.9.9 The evening works at R05, R08, R13, R16, R20, R25 and R40B, where the magnitude of the construction impacts are major or moderate, are not identified as significant effects. The works leading to these impacts will be of very short duration.

11.9.10 The night works at R10, R13, R16, R20, R21, R23A, R23B, R25, R27 and R40B, where the magnitude of the construction impacts are major or moderate, are not identified as significant effects. The works leading to these impacts will be of very short duration.

11.9.11 At all of the remaining six selected receptors (R07, R28, R33, R34, R38 and R40A) where the magnitude of the construction impacts are major or moderate, the works resulting in these impacts will be of very short duration and not identified as significant effects.

11.9.12 At the remaining selected receptors, the magnitude of the construction noise impacts are minor or negligible, and therefore are not identified as a significant effect.

11.9.13 Once specific details of the construction works are available, the potential to reduce the magnitude of construction noise impacts, for example, through the use of localised site hoarding, will be determined through the requirements in the Second Iteration EMP. In some locations where the exceedances of the SOAEL are small this may result in the removal of significant effects. Where exceedances of the SOAEL are larger the provisions of the noise insulation and temporary re-housing policy may apply.

Construction vibration

11.9.14 The activities with the potential to generate vibration during Scheme construction are works using vibratory rollers (compound establishment/decommissioning, utility diversion works, earthworks, drainage works, road construction (pavement), tunnel construction (bat mitigation), culvert construction, preparation for piling works and traffic phase switch works) and use of a rotary bored piling rig during bridge and retaining wall construction.

11.9.15 Vibration levels during works using vibratory rollers have been calculated in accordance with the procedures set out in BS 5228-2 Table E.1 (REF 11-23). Source data for a typical large and medium sized vibratory roller has been taken from TRL Report 429 (REF 11-24).

11.9.16 For human receptors, the LOAEL for vibration annoyance is defined as a PPV of 0.3 mms^{-1}, this being the point at which construction vibration is likely to become perceptible. The SOAEL is defined as a PPV of 1.0 mms^{-1}, this being the level at which construction vibration can be tolerated with prior warning.

11.9.17 The predicted PPV due to the steady state operation of vibratory plant is estimated to exceed the SOAEL for vibration annoyance within approximately 50m of works using a large (approximately 13 tonnes) roller, and approximately 20m for the medium sized twin drum roller and medium sized towed roller (approximately 3.5 tonnes).

11.9.18 Approximately 68 sensitive buildings (67 residential, one hotel) are located within 50m of works using a large vibratory roller. Specific locations include:

a. 64 to 68 Great North Road (alongside the southbound A1).

b. Parallel to both sides of the A1 between The Lane and Black Cat junction.

c. Along parts of The Lane, Nags Head Lane and Chawston Lane in proximity to the Roxton Road link.

d. Where the new Roxton Road re-alignment ties into the existing Roxton Road.

e. Greenacres.

f. Kelpie Marina.

g. At the new turning head on School Lane.

h. To the north east of the new alignment of Barford Road.

i. Along Potton Road in proximity to the new Scheme alignment.

j. At the southern alignment of the new Cambridge Road junction.

k. At the junction between Cambridge Road and Toseland Road.

l. Along the A1198 to the north of the new Caxton Gibbet junction (Iway Inn).

11.9.19 Approximately 38 sensitive buildings (37 residential, one hotel) are located within 20m of works using a medium sized twin drum vibratory roller and within 20m of works using a medium sized towed roller. These buildings are located:

a. At 64 to 66 Great North Road (alongside the southbound A1).

b. Parallel to both sides of the A1 between 1 Great North Road, Wyboston and Black Cat junction.

c. Along parts of The Lane, Nags Head Lane and Chawston Lane in proximity to the Roxton Road Link.

d. Where the new Roxton Road re-alignment ties into the existing Roxton Road.

e. At Greenacres.

f. To the north east of the new alignment of Barford Road.

g. At the junction between Potton Road and the B1046.

h. At the southern alignment of the new Cambridge Road junction.

i. Along the A1198 to the north of the new Caxton Gibbet junction (Iway Inn).

11.9.20 All of these receptors are also within 50 metres of the works using a larger vibratory roller. The magnitude of the potential vibration annoyance impact is moderate at the majority of the identified receptors. Major vibration annoyance impacts are possible at a total of 11 properties located:

a. Along the northbound carriageway of the A1 between 1 Great North Road, Wyboston and Nags Head Lane.

b. At 9 Great North Road, Chawston.

c. At 1 Great North Road, Chawston.

d. At Greenacres.

e. To the north east of the new alignment of Barford Road.

f. Along Potton Road in proximity to the new Scheme alignment.

g. At the southern alignment of the new Cambridge Road junction.

h. Along the A1198 to the north of the new Caxton Gibbet junction (Iway Inn).

11.9.21 As with the construction noise assessment, the construction vibration assessment is based on the construction information that is currently available, with advice being provided by Highways England's appointed buildability advisors. Given that the exact details of construction activities and the duration of the various works are not fully known, a conservative judgement has been made and these criteria have only been applied to those activities for which there is certainty that the durations would be considerably below the duration criteria set out in 11.3.43 , taking advice from the appointed Buildability Advisor.

11.9.22 On this basis, significant adverse construction vibration effects are identified at the following locations where either moderate or major adverse vibration annoyance impacts are predicted to occur:

a. 64 to 68 Great North Road (alongside southbound A1).
b. Parallel to both sides of the A1 between The Lane and Black Cat junction.
c. Along parts of The Lane, Nags Head Lane and Chawston Lane in proximity to the Roxton Road Link between Roxton Road and The Lane.
d. Where the new Roxton Road re-alignment ties into the existing Roxton Road.
e. Greenacres.
f. Kelpie Marina.
g. At the new turning head on School Lane.
h. To the north east of the new alignment of Barford Road.
i. Along Potton Road in proximity to the new Scheme alignment.
j. At the southern alignment of the new Cambridge Road junction.
k. At the junction between Cambridge Road and Toseland Road.
l. Along the A1198 to the north of the new Caxton Gibbet junction (Iway Inn).

11.9.23 With regards to structural damage, the PPV due to vibratory rollers would be well below the threshold for cosmetic building damage at any receptors during start-up and run-down, assuming a minimum 50 metre separation distance is used for the large (approximately 13 tonnes) roller, and 20 metres for the medium sized twin drum and towed rollers (approximately 3.5 tonnes).

11.9.24 Rotary bored piling would be required for bridges and retaining walls along the length of the Scheme at the following locations:

a. Roxton Road bridge.
b. New dual carriageway/A1 gyratory and A1 underpass.
c. Kelpie Marina bridge.
d. River Great Ouse viaduct.
e. Barford Road bridge.
f. East Coast Mainline rail bridge.
g. New Allington Top Farm accommodation bridge.

h. B1046 road bridge.

i. Wintringham pedestrian bridge.

j. Cambridge Road junction bridge.

k. Fox Brook bridge.

l. Toseland Road bridge.

m. Eltisley St Ives road bridge.

n. Caxton Gibbet junction bridge.

11.9.25 The measured piling vibration data in BS 5228 (REF 11-23) indicates that at a distance of more than 10m typical PPV levels from the boring works do not exceed the LOAEL. PPV levels due to ancillary works, such as driving in the pile casing, do not exceed the SOAEL at distances of more than 10m. No rotary bored piling works are anticipated within 10m of a potentially sensitive receptor, the closest approach of such works to any identified potentially sensitive receptor is approximately 100m, at Greenacres. On this basis, vibration impacts due to rotary bored piling at new bridges and retaining walls are not anticipated to result in significant adverse effects.

11.9.26 Given the above, there is the potential for combined significant adverse effects from construction noise and vibration during the construction works at receptors located in close proximity to the works at the following locations:

a. 64 to 68 Great North Road (alongside southbound A1).

b. Parallel to both sides of the A1 between The Lane and Black Cat junction.

c. Along parts of The Lane, Nags Head Lane and Chawston Lane in proximity to the new Link between Roxton Road and The Lane.

d. Where the new Roxton Road re-alignment ties into the existing Roxton Road.

e. Greenacres.

f. At the new turning head on School Lane.

g. To the north east of the new alignment of Barford Road.

h. Along Potton Road in proximity to the new Scheme alignment.

i. At the southern alignment of the new Cambridge Road junction.

j. Along the A1198 to the north of the new Caxton Gibbet junction (Iway Inn).

11.9.27 As with the construction noise, once specific details of the construction works are available, the potential to reduce the magnitude of construction vibration impacts, for example, through the use of low vibration plant, will be determined through the requirements in the Second Iteration EMP. In some locations where the exceedances of the SOAEL are small this may result in the removal of significant effects. Where exceedances of the SOAEL are larger, or the duration of moderate or major impacts cannot be below the temporal criteria set out in Section 11.3, the provisions of the temporary re-housing policy may apply.

Construction traffic

11.9.28 During the Scheme construction phase, additional traffic would be generated by the construction works directly. Night time closures are also planned and diversion routes proposed. Outline details regarding construction traffic, night time closures and diversion routes are provided in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. It is assumed that the traffic management schemes for the works provide sufficient capacity to prevent significant re-routing onto alternative routes.

11.9.29 Details of the existing roads that are predicted to be subject to an increase in traffic noise level of at least 1.0 dB as a result of the construction of the Scheme are presented in Tables 1.1 to 1.4 of **Appendix 11.5** of the Environmental Statement **[TR010044/APP/6.3]**. These tables also include the number of noise sensitive receptors which are within 50m of these routes.

11.9.30 The road traffic noise increases on the majority of the affected routes identified in these tables are predicted to be minor, which are not likely to result in significant adverse effects on nearby properties. However, there are moderate increases in road traffic noise on the following routes:

a. Bourn Road, Caxton between Caxton Road and Royston Road (Phase 4).

b. Main Street, Caldecote between B1046 and approximately New Barns Farm, Caldecote (Phase 3 and Phase 4).

c. Caxton Road between Alms Hill, Caxton End and Bourn Road, Caxton (Phase 3 and Phase 4).

d. B1046 Meadow Road, Great Gransden (Phase 3 and Phase 4).

11.9.31 The increases in road traffic levels on these routes range from 3.0 to 3.2 dB(A). Flows on all these routes, both with and without construction traffic, are classified as ‘low flow’ in CRTN prediction methodology and the low flow correction amplifies the resulting magnitude of the noise change in such small flows. However, traffic flows on these routes are predicted to increase by at least 70% during construction, and this is likely to be noticeable by residents along these routes. Therefore, the moderate magnitude of change in noise resulting from construction traffic on these routes is likely to result in a significant adverse effect at nearby properties.

11.9.32 Noise sensitive properties have been identified within 25m of each of the following diversion routes and hence are likely to experience a major adverse impact:

a. Sandy to Black Cat: 89 residential properties along the A603 between the A421 and A1.

b. Wyboston to Black Cat: 182 residential properties and 2 hotels along the existing A428, A1198, A505 and A1.

c. Renhold to Black Cat: 116 residential properties and 1 hotel along the A1 and A603.

d. Caxton to St Neots: 15 residential properties and 1 hotel along the A1198 and A1.

e. Girton to Caxton: 21 residential properties along the existing A428, A14 and A1.

11.9.33 The night-time closures associated with these diversion routes are likely to be of a short duration. However, given that the exact details of construction activities and the duration of the various works associated with these closures are not fully known, a conservative approach has been adopted and the closures are therefore assumed to be at risk of exceeding the duration criteria set out in Section 11.3 of 10 or more days (or 10 evenings, weekends or nights) in any consecutive 15, or 40 or more days (or 40 evenings, weekends or nights) in any consecutive six month period. On this basis, significant adverse construction traffic noise effects are identified at all noise sensitive properties within 25 metres of the proposed diversion routes.

Operation

11.9.34 All the operational traffic noise comparisons reported herein are based on the façade at each building which undergoes the greatest magnitude of change in traffic noise level as a result of the Scheme. The results are provided for the top floor of each building, for example, 1.5 metres for a one storey house and 4.0m for a two storey house. Further details of the noise model set-up and assumptions are provided in **Appendix 11.4** of the Environmental Statement **[TR010044/APP/6.3]**.

11.9.35 All the noise difference contour plots (refer to **Figures 11.5** and **Figure 11.6** of the Environmental Statement **[TR010044/APP/6.2]**) are based on free-field traffic noise levels at first floor level (4.0m above ground) using a 10m x 10m grid and are provided for illustration purposes.

11.9.36 **Table 11-11** summarises the short-term change in predicted traffic noise levels in 2025 between the DM (without Scheme) and the DS (with Scheme) scenarios at both residential buildings and other sensitive receptors. The long-term change in predicted traffic noise levels between the 2025 DM (without Scheme) and the 2040 DS (with Scheme) scenarios at both residential buildings and other sensitive receptors are summarised in **Table 11-12**. The number of receptors that are within 50 metres of affected routes outside the calculation area, where a proportionate approach based on the 18 hour CRTN BNL has been adopted, are reported in **Appendix 11.5** of the Environmental Statement **[TR010044/APP/6.3]**. As detailed in Section 11.6, five of the potentially sensitive non-residential buildings have been identified as potentially sensitive at night.

Table 11-11: Short-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2025)

Change in noise level		Daytime		Night-time	
		Number of residential buildings	Number of other sensitive receptors	Number of residential buildings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 0.9	510	3	549	0
	1.0 – 2.9	377	9	358	1
	3.0 – 4.9	55	1	34	1
	≥5	18	0	12	0
No change	0	13	0	9	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 0.9	1,060	0	1172	0
	1.0 – 2.9	812	6	745	3
	3.0 – 4.9	77	0	70	0
	≥5	127 [3]	1	100	0

[3] Includes 59 address registered at Eltisley Manor, Cambridge Road, Eynesbury

Table 11-12: Long-term change in predicted Do-Something traffic noise levels (DM2025 to DS 2040)

Change in noise level		Daytime		Night-time	
		Number of residential buildings	Number of other sensitive receptors	Number of residential buildings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 2.9	2090	11	2,066	2
	3.0 – 4.9	80	3	54	1
	5.0 – 9.9	36	1	23	0
	≥10	4	0	1	0
No change	0	9	0	9	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 2.9	662	4	749	2
	3.0 – 4.9	127	0	117	0
	5.0 – 9.9	38	1	30	0
	≥10	3	0	0	0

11.9.37 The short-term traffic noise changes within the calculation area from the DM 2025 to DS 2025 are presented as a noise difference contour plot in **Figure 11.5** of the Environmental Statement **[TR010044/APP/6.2]**, The long-term traffic noise changes within the calculation area from the DM 2025 to DS 2040 are presented as a noise difference contour plot in **Figure 11.6** of the Environmental Statement **[TR010044/APP/6.2]**. Both the short and long term changes in BNL on affected routes outside of the calculation area are presented in **Appendix 11.5** of the Environmental Statement **[TR010044/APP/6.3]**.

11.9.38 In the short term, the overall trend in the study area is a decrease in road traffic noise levels as a result of the Scheme. In opening year of 2025, 35% of residential buildings within the calculation area are predicted to experience a negligible (0.1 – 0.9 dB) decrease in traffic noise levels due to the Scheme, with a further 27% anticipated to experience a minor (1.0 – 2.9 dB) decrease. A further 3% are predicted to experience a moderate (3.0 – 4.9 dB) decrease with the 4% anticipated to experience a major decrease due to the Scheme. These decreases are predicted at residential properties close to roads from which traffic transfers onto the new dual carriageway. 17% of residential buildings within the calculation area are predicted to experience a negligible (0.1 – 0.9 dB) increase in traffic noise levels due to the Scheme, with a further 12% anticipated to experience a minor (1.0 – 2.9 dB) increase. A further 2% are predicted to experience a moderate (3.0 – 4.9 dB) increase with the 1% anticipated to experience a major increase due to the Scheme. These increases are predicted at residential properties which are either close to existing roads predicted to experience an increase in traffic flow as a result of the Scheme, or close to the new dual carriageway. At night, the same overall trend is observed as for the day, with the majority of receptors experiencing negligible and minor changes in traffic noise levels. 46 properties within the calculation area (1%) are predicted to experience moderate and major increases in traffic noise levels at night with 170 (5%) predicted to experience a moderate decrease.

11.9.39 An overall decrease in traffic noise levels due to the Scheme in the study area is also predicted to occur in the longer term. However, the impact of traffic growth over time reduces the beneficial impacts of the Scheme. In the future year of 2040, only 22% of residential buildings within the calculation area are anticipated to experience a negligible (0.1 – 0.9 dB) decrease in traffic noise levels due to the Scheme. A further 4% are anticipated to experience a minor (1.0 – 2.9 dB) decreases with the 1% predicted to experience moderate (5.0 – 9.9 dB) decreases. 69% of residential buildings within the calculation area are anticipated to experience a negligible (0.1 – 0.9 dB) increase in traffic noise levels due to the Scheme. A further 3% are anticipated to experience a minor (1.0 – 2.9 dB) increase with the 1% predicted to experience moderate (5.0 – 9.9 dB) increases. At night, the majority of receptors are predicted to experience negligible and minor changes in traffic noise levels. 24 properties within the calculation area (1%) are predicted to experience a moderate and major increases in traffic noise levels at night, with 30 (1%) predicted to experience a moderate decrease.

Operational noise impacts and effects

11.9.40 A number of properties within the study area are predicted to experience negligible or no changes in traffic noise due to the Scheme. A majority of these properties are located close to the A428 in St Neots between the A1 and the B1046. These properties are predicted to experience a negligible decrease in traffic noise in the short term which results from the combined effect of a decrease in traffic flow and increase in traffic speed along this section of route. Negligible changes are also predicted at a number of residential properties in Roxton, most of which are located in the centre of the village at a distance from

the Scheme. A number of properties along Bedford Road are predicted to experience negligible changes in traffic noise in the short term. These changes result from traffic flow changes and speed on both the Bedford Road and the A421 as a result of the Scheme, as well as from the effect of the proposed noise bunding alongside the A421 westbound carriageway. A number of properties in Croxton and Eltisley are also predicted to experience negligible changes in traffic noise due to the Scheme, although these tend to be located further away from both the existing A428 and the new dual carriageway.

11.9.41 In accordance with DMRB (REF 11-1), further analysis has been undertaken on the minor, moderate and major short-term changes reported in **Table 11-11** to identify the likelihood of significant effects due to the Scheme. The results of this analysis are summarised in **Table 11-13**, with further details of the analysis supporting the significance outcomes set out in paragraphs 11.9.43-11.9.79.

Table 11-13: Summary of operational noise effects

Location	Significance	Summary of significance	Paragraph reference
Roxton village (south of A421)	Not significant	Noise sensitive properties predicted to experience a range of impacts from minor/moderate decreases to minor/moderate increases. Road traffic noise continues to dominate area and hence acoustic character of area remains unchanged.	11.9.43 – 11.9.45
Roxton Road, Chawston (north of A421	Significant adverse (1 property)	1 property, 10 Roxton Road, predicted to experience noise level above SOAEL and an increase of 1dB(A) during the night due to the scheme in the opening year. This property significantly affected. Other properties alongside Roxton Road in Chawston not significantly affected.	11.9.46
The Bungalow, Roxton Garden Centre, Roxton	Significant adverse (1 property)	Minor increase in traffic noise predicted. Property close to new Black Cat junction. Obvious change in nearby landscape likely to result in minor change being acutely perceived	11.9.44
Chawston and Wyboston (Great North Road, Nags Head Lane, The Lane)	Not significant	Moderate and major decreases in traffic noise due to decrease in flow and realignment of A1 below existing ground level. However, road traffic noise levels remain above SOAEL with scheme in place. Obvious changes to the landscape in this location due to the introduction of the new Black Cat junction layout. Acoustic character remains unchanged with traffic noise continuing to dominate in this location.	11.9.47 – 11.9.50

Location	Significance	Summary of significance	Paragraph reference
Greenacres, Great North Road	Not significant	Minor increase in traffic noise due to the scheme. However, road traffic noise level change towards the lower half of minor range and traffic levels remains below SOAEL during day and night in the opening year. Obvious changes to the landscape in this location due to the introduction of the new Black Cat junction layout. Acoustic character remains unchanged with traffic noise continuing to dominate in this location.	11.9.52
Isolated properties close to route between Black Cat Junction and East Coast Mainline (1 and 2 The Barns, Little Barford Road and Rectory Farm, Little Barford Road)	Significant adverse (3 properties)	Major increases in traffic noise predicted due to the Scheme. Introduces new noise source to these properties	11.9.54
Little Barford	Not significant	Minor decreases in traffic noise predicted due to Scheme, due to decrease in traffic along Barford Road. However, traffic noise levels continue to dominate acoustic environment and levels at properties remain above or near to SOAEL both with and without the Scheme. A single property at the edge of the village is predicted to experience a major increase in traffic noise on the façade facing the scheme and a minor decrease on the opposite façade. Scheme results in no obvious changes in landscape in this location.	11.9.53
Isolated properties between East Coast Mainline and B1046 overbridge (Hill Farm, 5 residential properties at The Range, Rectory Farm,	Significant adverse (13 properties)	Major increases in traffic noise predicted due to the Scheme. Introduces new noise source close to a number of these properties. Major increases remain at Hill Farm, Rectory Farm and Rectory Farm cottage in the long term, with all other reducing to moderate. Significant adverse effects not predicted at 1 and 2 Rectory Farm Cottages.	11.9.56 – 11.9.60

Location	Significance	Summary of significance	Paragraph reference
Orchard House, Parkers Farmhouse, The Bungalow at Parkers Farm, The Bramleys, Glen Eden, Rectory Farm Cottage)			
Howitts Gardens, St Neots	Not significant	Minor increases in traffic noise predicted due to the Scheme. However, changes are towards the lower half of minor band and Scheme moves traffic away from the existing A428 close to these properties.	11.9.63
Abbotsley Country Homes, Lansbury Farm and 1 and 2 Lansbury Farm Cottages, Abbotsley	Not significant	Moderate increases in traffic noise predicted at Abbotsley Country Homes and Lansbury Farm due to the Scheme introducing new noise source into the area. However, the view of the new dual carriageway from these properties is limited. Moderate decrease predicted at Lansbury Farm Cottages due to reduction in traffic flow on St Neots Road once the Scheme is in operation. However, the flow on St Neots Road is classified as 'low flow' in CRTN prediction methodology.	11.9.61 – 11.9.62
Cambridge Road: Lower Wintringham	Not significant	Major and moderate increases in traffic noise are predicted due to the Scheme moving traffic noise slightly closer to these properties. Major increase reduces to moderate in the long term. However, the traffic noise levels at these properties will remain low with the Scheme (below LOAEL) and the view of the Scheme limited with existing vegetation in close proximity to these receptors providing screening.	11.9.64
Wintringham development, St Neots	Not significant	Minor decreases and increases in traffic noise predicted due to the Scheme.	11.9.65 – 11.9.66
Cambridge Road: Tithe Farm and Wintringham Cottages	Significant adverse (5 properties)	Major increases in traffic noise predicted due to the Scheme either moving traffic closer or introducing a new noise source to these receptors. Major increase at Tithe Farm reduces to moderate in the long term. However, Scheme is visible from these receptors.	11.9.68 – 11.9.69

Location	Significance	Summary of significance	Paragraph reference
Cambridge Road: Toll Gate Cottage, Wintringham Hall, Cottage at Wintringham Hall, Weald Farm	Not significant	Major decreases in traffic noise predicted due to the Scheme moving traffic from Cambridge Road onto new dual carriageway. However, Wintringham Hall, Wintringham Hall Cottage and Weald Farm are also predicted to experience increases in traffic noise due to the transfer of traffic from the existing A428 to the west onto the new dual carriageway. The Scheme also introduces a new noise source to the rear of the property. The Scheme is visible from all receptors.	11.9.70 – 11.9.72
Cambridge Road: North Farm Cottage and Weald Farm Cottage, North Farm Barn and North Farm	Significant adverse (4 properties)	Major and moderate decreases in noise predicted to due Scheme moving traffic from Cambridge Road to the Scheme. However, major and moderate increases in traffic noise predicted due to Scheme introducing new noise source to north of these properties. Scheme visible from rear of properties.	11.9.73
Croxton including Eltisley Manor	Significant beneficial (52 residential properties, 1 care home and 1 community facility)	Major, moderate and minor decreases at 54 receptors. Scheme moves traffic from the nearby Cambridge Road to the Scheme located further to the North. Scheme results in the traffic noise level at a number of properties reducing from above to below SOAEL.	11.9.74
Eltisley (North and West)	Significant beneficial (66 residential properties)	Moderate and major decreases in traffic noise predicted at receptors. Scheme moves traffic from the nearby Cambridge Road to the Scheme located further to the North. Scheme also removes traffic from St Neots Road through the village. Scheme results in the traffic noise levels at a number of properties reducing from above to below SOAEL.	11.9.76
Eltisley (South and East)	Not significant	Moderate and minor increases in traffic noise predicted at 86 receptors to the south and east of Eltisley, including Newtown Community Primary School and The Cade Pavilion. The new dual carriageway to the east of Eltisley junction moves traffic slightly closer to these properties. Moderate increases reduce to minor in the long term. Scheme located at least 600m away and will not result in obvious change in landscape. Traffic noise levels generally remain low with the scheme. Minor increases in traffic noise are also predicted at North East Farmhouse located between Eltisley	11.9.77

Location	Significance	Summary of significance	Paragraph reference
		and Caxton Gibbet junctions. The new dual carriageway moves traffic away from this property. There is no change in acoustic character at these properties.	
Isolated properties in vicinity of Caxton Gibbet junction (Pastures Farm, The Dovecote at Pastures Farm, Pembroke Farmhouse, The Cow Shed (1 and 2 Pembroke Farm), New Bungalow, Oak Tree Cottage, 1-4 Common Farm Cottages and the Iway Inn)	Significant adverse (11 properties and 1 hotel)	Minor and moderate increases in traffic noise predicted at these properties. Scheme moves noise source closer to properties. Obvious change in landscape to these properties due to the presence of the elevated dual carriageway and new Caxton Gibbet junction.	11.9.78
Swansley Wood Farmhouse	Not significant	Minor increase in traffic noise predicted at this property. However, view of Scheme likely to be limited due to screening from proposed Cambourne West development.	11.9.79

Black Cat to ECML

11.9.42 The existing character of the noise environment in Roxton is currently dominated by traffic noise from the A1, A421, other local minor roads and Black Cat junction, and will remain so with the Scheme in place with day and night levels generally remaining between the day and night LOAEL and SOAEL both in the opening and future years.

11.9.43 A number of properties in the village of Roxton are predicted to experience minor to moderate decreases in day and night time traffic noise levels with the Scheme. These properties are located to the north west of Roxton, close to the A421 westbound carriageway and the 3m high noise bunding proposed alongside it. Conversely, properties to the east of Roxton are predicted to experience increases in day and night levels on the minor/moderate border due to the increase in flow on the A1 south of Black Cat and the A421 elevated in the distance over Black Cat junction.

11.9.44 One of these properties, The Bungalow in Roxton, is situated close to the new Black Cat junction, particularly the elevated A421. It is considered that the minor traffic noise level change during the day and night would be more acutely perceived at this property as a result. Therefore, this minor change is considered as likely to result in a significant adverse effect at this property, both during the day and night. No other significant effects are predicted to occur in the village of Roxton.

11.9.45 Further modelling has been undertaken to assess the noise reduction benefit of increasing the effective height of the noise bund alongside the A421 westbound carriageway, through the addition of a 1m barrier along its length. However, further noise reductions provided by the barrier are generally limited to the properties to the north west of Roxton, although these additional reductions are limited to a maximum of approximately 1dB(A). As a result, such a barrier is not considered cost effective when comparing its cost, both its installation and ongoing maintenance, with the limited additional noise reductions it provides.

11.9.46 Increases in traffic noise are also predicted at a number of residential properties on Roxton Road to the north of the Scheme. Although these increases are minor in magnitude in the short term, these result in an exceedance of the night-time SOAEL at one of these properties, 10 Roxton Road, this will remain above the night-time SOAEL in the future year. This exceedance of the SOAEL is due to the predicted increase in traffic speed on Roxton Road as a result of the Scheme. This minor change is considered as likely to result in a significant adverse effect at this property during the night. Further noise mitigation measures have been considered along Roxton Road, including noise barriers. However, these are not considered to be a practical engineering option to reduce noise levels along this route.

11.9.47 Minor to major decreases are also predicted at properties alongside the A1 between Black Cat and Wyboston during the day and night. These properties benefit from reduced traffic flows on the A1 as a result of the Scheme. The realignment of the A1 away from properties alongside the A1 southbound carriageway and the lowering of the A1 carriageway below existing ground level also contribute to reduced traffic noise levels at properties in this area.

11.9.48 Moderate and minor decreases in traffic noise are predicted to occur at residential properties along The Lane between the A1 and Rookery Road. Minor reductions in traffic noise levels are predicted at those properties close to the A1. Decreases in traffic noise also result from a predicted reduction in traffic flow as a result of the removal of direct access from The Lane onto the A1 northbound carriageway. However, the traffic flows on this section of The Lane are below the lower cut off of the CRTN prediction methodology of 1,000 vehicles over an 18 hour day both with and without the Scheme. Therefore, the decreases in traffic noise levels are to be treated with caution.

11.9.49 Most of these properties in the vicinity of the A1 are predicted to experience levels above the day and night time SOAELs both with and without the Scheme and in both the short and long term. In addition, road traffic noise continues to dominate the acoustic environment at all of these residential properties once the Scheme is operational. Taking these factors into consideration, the beneficial impacts at properties in the vicinity of the A1 are not considered to result in significant beneficial effects.

11.9.50 Consideration was given to the installation of a noise barrier to further reduce the high traffic noise levels at properties along the A1 north of the Black Cat junction. However, installing a barrier at this location would require further reductions in standards or the removal of the service road alongside the A1 carriageway. There is established tree/shrub screening in this verge, so the addition of a noise barrier would require the removal of this vegetation, which screens the properties on the Old Great North Road (South) from the A1. In considering all these factors, additional barriers alongside the A1 have not been included in the Scheme design.

11.9.51 To the east of Black Cat junction, there are a number of isolated properties predicted to experience a range of impacts due to the Scheme.

11.9.52 A minor increase in traffic noise is predicted to occur at Greenacres on the Great North Road which results from the new dual carriageway introducing a new noise source to the north east of the property. However, this increase is in the lower half of the minor increase band. The installation of a noise barrier alongside the new dual carriageway is unlikely to be effective at reducing this increase. The distance between the new dual carriageway and this property is approximately 330m at its closest point . At such distances, barriers are not effective at reducing road traffic noise. The property is also predicted to experience negligible decreases in traffic noise on its front façade due to the lowering of the A1 beneath existing ground level, which reduces traffic noise levels at this property to below SOAEL in the opening year.

11.9.53 Decreases in traffic noise on the minor/moderate border are predicted at noise sensitive receptors in Little Barford. These decreases result from the predicted reduction in traffic along Barford Road. However, traffic noise levels continue to dominate the acoustic environment and levels at properties remain above or near to SOAEL both with and without the Scheme. Although the Scheme introduces a new noise source to these properties, the new dual carriageway is approximately 1km from Little Barford and hence does not result in a change in an obvious change in landscape at these properties. Taking these factors into consideration, significant adverse effects on these residential properties is unlikely.

11.9.54 Major decreases in traffic noise are predicted to occur at two residential properties along Little Barford Road. These major decreases result from both the realignment of the Little Barford Road slightly away from these properties and an approximately 50% reduction in traffic flow on this route once the Scheme is operational. However, moderate and major increases are predicted to occur at the rear of these properties when the Scheme is operational. Major increases in road traffic noise are also predicted to occur at Rectory Farm on Little Barford Road. These increases are due to the new dual carriageway introducing a new

source of noise which will be visible from these three properties and change their acoustic setting. Taking these factors into consideration, it is considered that significant adverse effects on these residential properties during both the day and night are likely due to the Scheme. The installation of noise barriers alongside the new dual carriageway would not be effective at reducing the increases in traffic noise at these properties. The distances between the new dual carriageway and these properties is approximately 300m at their closest approach. At such distances, barriers are not effective at reducing road traffic noise.

ECML to Cambridge Road

11.9.55 The new dual carriageway which runs between the East Coast Mainline and Cambridge Road Junction, introduces a new major traffic noise source into this rural area. As a result, moderate and major noise increases are predicted at a number of residential properties located close to it during both the day and night.

11.9.56 Such properties include Hill Farm which lies to the east of the East Coast Mainline and is predicted to experience a major increase in noise due to the Scheme. Major increases in traffic noise are also predicted to occur at Orchard House and five properties located in The Range, located on Potton Road to the east of the new dual carriageway. All these properties have a direct view of the new dual carriageway. Significant adverse operational noise effects during both the day and night on these residential properties are likely due to the Scheme. As with the properties in the vicinity of Little Barford Road, the installation of a noise barriers alongside the new dual carriageway would not be effective at reducing the increases in traffic noise at these properties due to their distance from the Scheme.

11.9.57 Major increases in traffic noise are also predicted to occur in the daytime at six properties in the vicinity of the Scheme close to the new B1046 overbridge. Two of these six properties, Rectory Farm Cottage and Rectory Farm, lie to the west of the new dual carriageway. The four remaining properties, Parkers Farmhouse, The Bungalow at Parkers Farm, The Bramleys and Glen Eden, lie to the east.

11.9.58 These increases result from the new dual carriageway introducing a new source of noise into the locality. Although the new dual carriageway is in cutting at the closest point to these properties, with additional screening provided by the noise bunding alongside the new dual carriageway, it is visible to these properties. Significant adverse operational noise effects during both the day and night at these six properties are likely due to the Scheme.

11.9.59 Further modelling has been undertaken to assess the noise reduction benefit of increasing the effective height of the noise bund, through the addition of a 1m barrier along its length. Although the barrier results in further reductions in traffic noise at these properties, these additional reductions are limited to a maximum of approximately 1dB(A) at the properties closest to the Scheme and hence the predicted moderate and major increases in traffic noise would remain. As a result, such a barrier is not considered cost effective when comparing its cost, both its installation and ongoing maintenance, with the limited additional noise reductions it provides.

11.9.60 However, there are also major and moderate decreases in traffic noise predicted at properties along this section of the route. 1 and 2 Rectory Farm Cottages are predicted to experience decreases in traffic noise levels due to the realignment of St Neots Road away from these properties. The removal of through traffic on the existing Potton Road also contributes to this decrease and offsets any increase in traffic noise from the new dual carriageway. Although the new dual carriageway is in cutting at the closest point to these properties, with additional screening provided by the noise bunding alongside the dual carriageway, the properties do have a view of the new dual carriageway to the north. Taking all these factors into consideration, even with the major and moderate beneficial noise impacts, these are unlikely to result in a significant beneficial effect as a result of the Scheme.

11.9.61 Moderate decreases in traffic noise are predicted at 1 and 2 Lansbury Farm Cottages which result from the predicted reduction in traffic flow on St Neots Road once the Scheme is in operation. However, the flow on St Neots Road is classified as 'low flow' in CRTN prediction methodology. Therefore, the magnitude of the predicted decreases in traffic noise levels from St Neots Road should be treated with caution. Traffic noise levels also remain low at these properties both with and without the Scheme. The reduction in flow on St Neots Road also result in decreases in traffic noise to the rear of Lansbury Farm. However, this property is also predicted to experience moderate increases in traffic noise due to the introduction of the new dual carriageway to the front of the property. Despite this increase, the view of the new dual carriageway from this property is limited with intervening buildings and existing vegetation providing some visual screening. Taking all these factors into consideration, no significant effects are likely at these properties.

11.9.62 Moderate increase in traffic noise are predicted at properties within Abbotsley Country Homes which result from the introduction of the new dual carriageway to the west of these properties. Despite this increase, the view of the new dual carriageway from these properties is limited with existing vegetation in close proximity to these receptors providing screening. Traffic noise levels also tend to remain low with most properties experiencing low traffic noise levels in the opening and future years. Taking these factors into consideration, no significant effects are likely at these properties.

11.9.63 Minor increases in traffic noise are predicted at a number of properties in Howitts Gardens, St Neots to the west of the Scheme. The introduction of the new dual carriageway to the east of the existing Cambridge Road moves traffic away from these properties, although the decrease in noise from moving traffic away is offset by the increased flows and speed of traffic on the new dual carriageway. However, the increases in traffic noise are towards the lower half of minor band and taking all these factors into consideration, no significant effects are likely at these properties.

11.9.64 However, increases in traffic noise on the moderate/minor border are predicted at a number of properties in the vicinity of Lower Wintringham Farm. Although the Scheme moves traffic slightly closer to these properties, the acoustic environment of these properties remains unchanged with the new dual carriageway is at least 600m from these properties and traffic noise levels tending to remain low both during the day and night and in the opening and future years. Taking all these factors into consideration, no significant effects are likely at these properties.

11.9.65 Moderate and minor decreases are also predicted at properties located closest to the existing A428 on the east side of the Wintringham development, which result from the transfer of traffic from the existing A428 onto the new dual carriageway approximately 300m to the south east. Despite this decrease, traffic noise continues to dominate the acoustic environment at these residential properties once the Scheme is operational, with both the new dual carriageway and Cambridge Road junction visible from these properties. Taking these factors into consideration, the beneficial impacts at these properties are not considered to result in significant beneficial effects.

11.9.66 Increases in traffic noise on the minor/moderate border are predicted at properties to the north of the Wintringham development and those along Cambridge Road to the east of Station Road in St Neots. The increases at these properties result from the increase in traffic flow along the existing Cambridge Road to the west of the new junction, as traffic from the Loves Farm and Wintringham tends to make more use of the Cambridge Road junction with the Scheme in place. There is also some transfer of traffic onto this section of Cambridge Road from routes through Toseland and Yelling. Notwithstanding this increase, traffic noise continues to dominate the acoustic environment at these residential properties once the Scheme is operational. Taking these factors into consideration, the adverse impacts at these properties are not considered to result in significant adverse effects.

Cambridge Road to Elitsley

11.9.67 Between Cambridge Road and Eltisley, the introduction of the new dual carriageway draws traffic away from the existing A428. As a result, the Scheme is predicted to result in both traffic noise increases and decreases at properties along this section.

11.9.68 Major increases in traffic noise are also predicted to occur at Tithe Farm to the north of the Cambridge Road junction. These increases result from the new dual carriageway moving traffic closer to the property, which carries a greater volume of traffic at higher speed compared to the existing A428. Although the new dual carriageway is in cutting through the nearby Cambridge Road junction, the new dual carriageway to the east of the junction will be visible from the property and results in a change in its acoustic setting. Taking these factors into account, it is considered that a significant adverse effect on this residential property is likely due to the Scheme. The installation of a noise barrier alongside the new dual carriageway to avoid this significant effect has been considered. However, a noise barrier will not be effective at reducing road traffic noise.at this property due to its distance from the new dual carriageway.

11.9.69 Major decreases in traffic noise are predicted at Wintringham Cottages located to the north of the existing A428, close to the Cambridge Road Junction. These major decreases result from the transfer of traffic from the existing A428 onto the new dual carriageway, with traffic noise levels reducing below SOAEL. However, these same properties are also predicted to experience moderate and major increases in traffic noise due to the Scheme introducing a new source of noise which is visible from the rear of these properties. Taking these factors into account, it is considered that, notwithstanding the major decreases in traffic noise, a significant adverse effect on these residential properties is likely due to the Scheme. The installation of a noise barrier alongside the new dual carriageway to avoid this significant effect has been considered. However, barriers will not be effective at reducing road traffic noise.at these properties due to their distance from the new dual carriageway.

11.9.70 Major decreases in road traffic noise are also predicted to occur in the daytime at Toll Gate Cottage, which also result from the transfer of traffic from the existing A428 onto the Scheme. However, the levels remain above SOAEL. The Scheme also introduces a new noise source which is visible to the rear of this property. Taking these factors into account, it is considered that a significant beneficial effect at this property is unlikely.

11.9.71 Major and moderate decreases in road traffic noise are also predicted to occur at Wintringham Lodge, Wintringham Hall and the Cottage at Wintringham Hall to the south of Cambridge Road in Wintringham. These major decreases result from the transfer of traffic from the existing A428 to the north onto the new dual carriageway, with traffic noise levels remaining below SOAEL. However, these same properties are also predicted to experience increases in traffic noise on their rear facades due to the transfer of traffic from the existing A428 to the west onto the new dual carriageway. Taking these factors into account, it is considered that, notwithstanding the major decreases predicted to occur at these properties, significant beneficial effects at these properties are unlikely.

11.9.72 Further along the existing A428, moderate decreases in traffic noise are predicted to occur in the daytime at Weald Farm, which result from the transfer of traffic from the existing A428 onto the Scheme, reducing from above to below LOAEL with the Scheme in both the opening and future years. However, the Scheme introduces a new noise source to the rear of this property, which changes its acoustic setting, although this change is minor and the new dual carriageway is located approximately 1km to the west at its closest approach. Taking all these factors into consideration, no significant effects are likely at this property.

11.9.73 Major decreases in road traffic noise are also predicted at a further four residential properties along Cambridge Road (North Farm Cottage and Weald Farm Cottage, North Farm Barn and North Farm). These major decreases result from the transfer of traffic from the existing A428 onto the Scheme and result in traffic noise levels reducing from above to below SOAEL. However, the Scheme introduces a new noise source visible from the properties, which result in the properties also experiencing minor to major increases in traffic noise levels on their rear facades and changing the acoustic character of the properties. Taking

these factors into account, it is considered that, notwithstanding the major decreases, a significant adverse effect on these residential properties is likely due to the Scheme. The installation of a noise barrier alongside the new dual carriageway to avoid this significant effect has been considered. However, barriers will not be effective at reducing road traffic noise.at these properties due to their distance from the new dual carriageway.

11.9.74 Major and moderate decreases in traffic noise are also predicted at Eltisley Manor and properties in the vicinity of Croxton. These major decreases result from the transfer of traffic from the existing A428 onto the new dual carriageway, which lies at least 600m to the north. Traffic noise levels at a number of properties closest to the existing A428 also reduce from above to below SOAEL due to the Scheme. It is considered that the major and moderate decreases in noise at these properties is likely to result in a significant beneficial effect at these properties.

Eltisley to Caxton Gibbet

11.9.75 As with the previous section, the introduction of the new dual carriageway between Eltisley and Caxton Gibbet draws traffic away from the existing A428. As a result, the Scheme is predicted to result in both traffic noise increases and decreases at properties along this section.

11.9.76 Major and moderate decreases in day and night time traffic noise levels are predicted at properties in the north and west of Eltisley. These decreases result from traffic no longer predicted to use St Neots Road and The Green to access the B1040 once the Scheme opens, with this traffic accessing the B1040 via Potton End instead. The transfer of traffic from the existing A428 onto the Scheme also contributes to these decreases, with traffic levels at a number of properties reducing from above to below SOAEL. It is considered that the major and moderate decreases in noise at these properties are likely to result in a significant beneficial effect at these properties.

11.9.77 However, increases in traffic noise on the moderate/minor border are predicted at properties to the east of Eltisley. Although the Scheme moves traffic slightly closer to these properties, the acoustic environment of these properties remains unchanged with the new dual carriageway at least 600m from these properties and traffic noise levels tending to remain low both during the day and night. Minor increases in traffic noise are also predicted at North East Farmhouse located between Eltisley and Caxton Gibbet junctions, although new dual carriageway moves traffic slightly further away from this property. Taking all these factors into consideration, no significant effects are likely at these properties.

11.9.78 Minor and moderate increases in traffic noise are also predicted at a number of isolated properties in the vicinity of Caxton Gibbet junction, including Pastures Farm, The Dovecote at Pastures Farm, Pembroke Farmhouse, The Cow Shed (1 and 2 Pembroke Farm), New Bungalow, Oak Tree Cottage, 1-4 Common Farm Cottages and the Iway Inn. These increases in traffic noise result from traffic transferring from the existing A428 to the new dual carriageway which moves slightly closer to a number of these properties, in addition to the new dual carriageway carrying a greater volume of traffic at higher speed through the

proposed grade separated junction. Traffic noise will continue to dominate their acoustic environment, these properties have a direct line of sight of the new dual carriageway and Caxton Gibbet junction, both of which are elevated in this section. Taking all these factors into account, it is considered that significant adverse effects are likely to occur at these properties.

11.9.79 Consideration has been given to the installation a noise barrier along the westbound A428 between Eltisley and Caxton Gibbet junctions as a means of reducing traffic noise impacts at the properties to the west of the junction. However, the distance between the new dual carriageway and properties at Pembroke and Pastures Farm is generally in excess of 500 meters. At such distances, barriers are not effective at reducing road traffic noise. As a result, these additional barriers along the A428 in this location are not included in the Scheme design. In addition, the provision of noise barriers on the new dual carriageway through the junction have been considered to avoid the significant adverse effects predicted at properties to the east. However, a barrier in this location is not considered to be a sustainable noise mitigation measure, when considering the cost of both its installation and ongoing maintenance with the noise reduction benefits, which will be limited to a small number of properties.

11.9.80 Increases in traffic noise on the minor/moderate border are also predicted at Swansley Wood Farmhouse in Cambourne, located approximately 500m to the south east of the Scheme. However, the view of the Scheme from this property is likely to be limited, due to the development of Cambourne West providing screening of the Scheme at this property. Taking these factors into account, it is considered that a significant adverse effect is unlikely to occur at this property.

Development areas

11.9.81 As set out **Chapter 15, Assessment of cumulative effects** of the Environmental Statement **[TR010044/APP/6.1],** a number of housing developments are due to be completed both prior to and after the Scheme opening. These include further phases in the Wintringham development, Loves Farm and Cambourne West.

11.9.82 Minor increases in traffic noise levels, on the minor/moderate border, are predicted in the areas of both the Wintringham and Loves Farm development closest to the existing A428. The increases are predicted in the areas close to the existing A428 and result from the increase in traffic flow along the existing Cambridge Road to the west of the new junction. This predicted increase results from Loves Farm and Wintringham traffic tending to make more use of the Cambridge Road junction with the Scheme in place. There is also some transfer of traffic onto this section of Cambridge Road from routes through Toseland and Yelling. Minor increases in traffic noise levels are also predicted to the east of the Loves Farm development which is closest to the new dual carriageway. Despite this increase, traffic noise will continue to dominate the acoustic environment in these areas once the Scheme is operational.

11.9.83 Decreases in traffic noise are predicted in the areas to the east of the Wintringham development, with moderate decreases in noise predicted in the areas close to the existing A428. These decreases result from the predicted transfer of traffic from the existing A428 onto the new dual carriageway approximately 300m to the south east. Despite this decrease, traffic noise continues to dominate the acoustic environment in these areas once the Scheme is operational, with both the new dual carriageway and Cambridge Road junction visible.

11.9.84 Increases in traffic noise are predicted in the area of the Cambourne West development, with moderate increases in noise predicted in the areas close to the Scheme. These increases result from the new dual carriageway carrying a greater volume of traffic at higher speed through the proposed grade separated junction. Traffic noise will continue to dominate the acoustic environment in these areas once the Scheme is operational, with both the new dual carriageway and Caxton Gibbet junction visible to those properties to be located on the north and west boundaries of the development.

Affected routes

11.9.85 The majority of affected routes are predicted to experience minor and moderate decreases in road traffic noise levels in the short term. These decreases result from traffic drawn to the Scheme rather than alternative parallel east-west routes through smaller villages to the north and south. Villages predicted to experience these moderate decreases in road traffic noise include Yelling, Toseland, Gamlingay, and Abbotsley. However, it should be noted that flows on the routes through these villages are classified as 'low flow' in CRTN prediction methodology. However, traffic flows on these routes tend to decrease by at least 40% due to traffic which is likely to be noticeable by residents along these routes. On this basis of the moderate decrease in noise resulting from Scheme on routes through these villages are likely to result in significant beneficial effects.

11.9.86 A small number of affected routes are predicted to experience a minor increase in traffic noise levels in the short term. These routes are predominantly in the vicinity of the west and eastern extents of the Scheme. These increases are a result of traffic being drawn to the Scheme on routes in close proximity to the western and eastern extent of the Scheme, including the A421 to the west of Roxton, the existing A428 east of Caxton Gibbet and routes through Caxton. This adverse effect is classed as not significant.

Public Rights of Way

11.9.87 A number of PRoWs are located in the study area, (refer to **Figure 11.1** of the Environmental Statement **[TR010044/APP/6.2]**) which experience a range of impacts.

11.9.88 The PRoWs to the west of Black Cat junction generally experience between negligible to minor increases in road traffic noise levels, though the Footpath A10 to the west of the realigned Roxton Road experiences a minor decrease in traffic noise at the southern end as it approaches the existing A421, this decrease resulting from the noise bunding proposed along the eastbound carriageway.

11.9.89 The PRoWs in the vicinity of St Neots generally experience a negligible to minor decrease in noise, particularly on those sections to the south which follow the River Great Ouse approaching both Cambridge Road and also close to Barford Road.

11.9.90 There are various PRoWs which cross the Scheme between Potton Road and Cambridge Road junction, parts of which are closed and diverted in the Scheme. Footpath No 1/16, 1/17, 1/19, and 1/20 are diverted along a new path running parallel to the east of the Scheme which provides crossing points underneath the mainline at Hen Brook and over the mainline on a dedicated footpath bridge to the north of Wintringham Brook. Footpath 1/9 is diverted underneath the mainline at Hen Brook, connecting with Footpath 194/55 to the west of the Scheme. These footpaths experience a range of impacts from moderate adverse to the east of the Scheme, with major adverse impacts at their closest points to it. To the west of the Scheme, there are major impacts on these footpaths at their closest points to it, with moderate decreases predicted at their intersection with the existing A428.

11.9.91 There are a number of PRoWs which cross the Scheme between Cambridge Road and Eltisley junction. There is a range of impacts along Bridleway No 1/18, which is diverted as a result of the Scheme over a new accommodation bridge to the east of Cambridge Road junction. The impacts range from major beneficial on the sections to the south of the Scheme which are close to the existing A428, to major adverse in the vicinity of and to the north of the Scheme. Bridleway 74/6, which is located to the west of Eltisley junction and is diverted across the Scheme through an underpass, experiences a similar range of effects as Bridleway 1/181/18. This range of impacts is also predicted for Footpaths 278/9 and 59/1, which are located to the north and south of the Scheme respectively and are diverted over the realigned Toseland Road bridge.

11.9.92 Given the linear nature of PRoWs, the range of noise impacts along them, the absolute traffic noise levels, and the transient usage of a PRoW, a material change in the experience of using the PRoWs as a whole, which could affect people's health or quality of life, is not anticipated and no significant adverse or beneficial effects on PRoWs have been identified

11.10 Monitoring

Construction

11.10.1 Given the potential significant construction noise and vibration effects, as reported in Section 11.9, monitoring would be undertaken during the Scheme construction stage to ensure that the mitigation measures as detailed in Section 11.8 were being appropriately implemented. During the construction phase, surveys would be required which would include physical measurements and observational checks and audits to ensure that BPM were being employed at all times. The contractor would undertake and report noise and vibration surveys as necessary to ensure and demonstrate compliance with all noise and vibration commitments and the requirements of the Second Iteration EMP.

Operation

11.10.2 As detailed in Section 11.9, the performance specification of specific operational mitigation measures would be confirmed at the Scheme detailed design stage to ensure the performance assumed in the assessment is achieved. Surveys would be undertaken to ensure that measures, such as low noise surfacing materials, were installed as required. No further monitoring is proposed.

11.11 References

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