

## 14 Noise and vibration

### Executive summary

Existing noise levels vary widely across the study area. They are currently high close to the existing A14 and A1 and a number of locations adjacent to these roads have been identified as 'Important Areas' in action plans published under the Government's environmental noise regulations.

During construction, noise would affect residents at areas including south of Girton interchange and south of the Cambridge Northern Bypass. Site specific noise controls would be agreed with the local authorities before construction is started. Noise insulation would be provided for qualifying properties close to construction activities where noise would otherwise be disruptive.

During operation, over 2,900 dwellings along the existing A14 corridor through Huntingdon, Godmanchester and Fenstanton and many sensitive non-residential facilities, including Hinchingsbrooke Hospital, Stukeley Meadow Primary School and Hemingford Nursery School would benefit from noise reductions as a result of the scheme. These improvements would result mainly from the re-routing traffic out of town and along the new bypass. Noise improvements also result from the provision of low noise road surfacing, and a number of noise barriers along the modified sections of the existing A1 and A14, including the Cambridge Northern Bypass. Existing noise barriers would be enhanced by the scheme at a number of locations, particularly at Girton and Impington. These noise reductions are in line with the aim of government noise policy to improve health and quality of life, where possible.

There would be around 330 dwellings with a minor adverse or greater noise impact predominantly along the new bypass section of the scheme between Brampton interchange and Fen Drayton. The magnitude of noise increases and the number of people adversely affected by them has been minimised by noise mitigation integrated into the scheme, in line with the aim of government noise policy to minimise as far as sustainable adverse impact on health and quality of life. Mitigation measures designed into the scheme to reduce noise impacts during operation, include careful design of the alignment and cuttings, the use of low noise road surfacing, landscaped earthworks and installation of noise fence barriers at a number of locations.

A small number of residential properties situated close to the scheme would qualify for noise insulation under the Government's regulations. Noise insulation combined with mitigation integrated into the scheme would avoid any significant adverse impact on health and quality of life, consistent with government noise policy.

## 14.1 Introduction

- 14.1.1 The assessment of noise and vibration considers the likely significant noise and vibration effects arising from the construction and operation of the scheme on:
- people, primarily where they live ('residential receptors') on an individual dwelling basis and on a community basis, including any shared community open areas<sup>1</sup>;
  - community facilities such as schools, hospitals, places of worship, and commercial properties such as offices and hotels, collectively described as 'non-residential receptors'; and
  - designated 'quiet areas'<sup>2</sup> (any impact on tranquillity, including that from noise, is considered in *Chapter 10*).
- 14.1.2 The term 'sound' describes the acoustic conditions which people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of community areas would be likely to be modified by the scheme. 'Noise' is defined as unwanted sound and hence adverse effects are termed noise effects rather than sound effects, mitigation is noise mitigation (for example noise barriers) and the baseline can also be referred to as baseline noise. To avoid potential confusion the more familiar term 'noise' is used in this assessment to consider 'baseline noise', 'construction noise' and 'road noise'.
- 14.1.3 In this assessment there are a number of different significant noise or vibration effect characteristics:
- adverse from an increase in noise levels or beneficial from a decrease in noise levels caused by the scheme;
  - temporary from construction or permanent from operation of the scheme; and
  - direct, resulting from the construction or operation of the scheme, and/or indirect e.g. resulting from changes in traffic patterns on existing roads that result from the construction or operation of the scheme.
- 14.1.4 The significance criteria adopted to assess likely significant effects from noise or vibration are summarised in *section 14.2* of this chapter with further supporting information in *Appendix 14.3*.
- 14.1.5 Noise and vibration effects may occur as a consequence of the overall noise or vibration levels that result from the scheme or because of changes in noise levels caused by the scheme.

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<sup>1</sup> 'Shared community open areas' are those that the *Planning Practice Guidance – Noise* (Department for Communities and Local Government, 2014) identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space that is nearby e.g. park or local green space.

<sup>2</sup> 'quiet areas' are defined as either Quiet Areas as identified under the *Environmental Noise Regulations 2007 (as amended)* or are resources which are prized for providing tranquillity as noted in the NPPF and are therefore designated as such under the relevant local plan or are designated under local plans or neighbourhood development plans as local green spaces.

14.1.6 For the assessment of operational noise and vibration, two scenarios have been assessed:

- the base scheme, which is the scheme including mitigation measures integrated into the scheme, such as low-noise road surfacing and landscaping earthworks; and
- the mitigated scheme, which is as the base scheme plus any additional mitigation including new and enhanced noise barriers.

14.1.7 The assessment is reported in this chapter and is supported by:

*Environmental Statement Figures*, including:

- *Figure 14.1*: Study areas, baseline measurement locations and non-residential receptors;
- *Figure 14.2*: Baseline measurement locations photographs;
- *Figure 14.3*: Construction noise and vibration impacts and likely significant effects;
- *Figure 14.4*: Operational noise contour maps – base scheme;
- *Figure 14.5*: Operational noise and vibration impacts and likely significant effects – base scheme;
- *Figure 14.6*: Operational noise contour maps – mitigated scheme; and
- *Figure 14.7*: Operational noise and vibration impacts and likely significant effects – mitigated scheme.

*Environmental Statement Appendices*, including:

- *Appendix 14.1*: Scheme operational noise and vibration policy;
- *Appendix 14.2*: Noise and vibration baseline;
- *Appendix 14.3*: Noise and vibration significance criteria;
- *Appendix 14.4*: Construction noise and vibration assumptions and assessment outputs;
- *Appendix 14.5*: Operational noise and vibration assumptions and assessment outputs for the base scheme;
- *Appendix 14.6*: Operational noise and vibration assumptions and assessment outputs for the mitigated scheme; and
- *Appendix 20.2*: Code of construction practice (CoCP)

14.1.8 The assessment of noise impact on:

- Cultural heritage is reported in *Chapter 9*;
- Ecological receptors are reported in *Chapter 11*;
- Tranquillity is reported in *Chapter 10*;
- Other travellers, including users of public rights of way is reported in *Chapter 15*; and
- Committed development is addressed in *Chapter 6: Approach to the EIA* and *Chapter 7: Traffic and transport*.

### Legislative and policy background

14.1.9 The following sub-sections set out the legislation, policy, regulations, guidance and standards that are relevant to this assessment. *Section 14.2* of this chapter explains how this context has informed the scope and methodology adopted for the assessment. Further information is provided in *Appendix 14.3*.

#### Legislation

14.1.10 Relevant legislation includes the *Control of Pollution Act 1974*, the *Environmental Protection Act 1990*, the *Noise and Statutory Nuisance Act 1993* and the *Land Compensation Act 1973* all as amended.

14.1.11 This legislation provides the foundation stones for the Government's noise policy, described below. The noise and vibration assessment and envisaged mitigation are informed by this legislation. Specific references are made to sections of legislation as necessary. For example the *CoCP* (see *Appendix 20.2*) states that 'Best Practicable Means' is defined in *section 72 of the Control of Pollution Act*, and prior consent for the construction method and steps to minimise noise will be sought from local authorities under *section 61 of the Control of Pollution Act*.

#### National policy

14.1.12 The Government's noise policy is set out in the *Noise Policy Statement for England (NPSE)* (Department for Environment, Food and Rural Affairs (Defra), 2010).

14.1.13 In legislative and policy terms noise is taken to include vibration.

14.1.14 Government noise policy sets three aims, which are to be met within the context of government policy on sustainable development:

- to avoid significant adverse impacts on health and quality of life;
- to mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

- 14.1.15 The same three aims are also reflected in:
- *National Planning Policy Framework (NPPF)* (Department for Communities and Local Government (DCLG), 2012);
  - *Planning Practice Guidance – Noise (PPG-Noise)* (DCLG, 2014); and
  - the *Draft National Policy Statement for National Networks (NPSNN)* (Department for Transport (DfT), 2013)<sup>3</sup>.
- 14.1.16 *PPG-Noise* (DCLG, 2014) provides guidance on the application of government noise policy. *PPG-Noise* notes that unacceptable adverse effects on health and quality of life due to noise exposure (set at a level higher than significant adverse impacts on health and quality of life) should be 'prevented'.
- 14.1.17 Thresholds for identifying policy adverse effect levels<sup>4</sup> are not defined numerically in any government document: rather they are to be established specifically for each scheme and context. The values adopted for this assessment are summarised in section 14.2 with further more detailed information provided in *Appendix 14.3*.
- 14.1.18 The thresholds adopted for noise policy adverse effect levels have been applied following the precedent set on recent major infrastructure schemes (e.g. High Speed 2 and the Thames Tideway Tunnel).
- 14.1.19 In addition to government noise policy, the scope and methodology for this assessment has also taken account of relevant guidance, particularly *DMRB HD213/11* (Highways Agency et al., 2011) as described below.
- Local policy*
- 14.1.20 A review of the local planning policy documents applicable to the study area has identified the following of relevance to noise and vibration:
- *Huntingdonshire Draft Local Plan to 2036*;
  - *South Cambridgeshire District Council Development Control Policies* (adopted July 2007);
  - *South Cambridgeshire Local Plan 2011-2031: Proposed Submission*;
  - *Cambridge City Local Plan 2006*;
  - *Cambridge Local Plan 2014: Proposed Submission*; and
  - *North West Cambridge Area Action Plan* (October 2009).
- 14.1.21 The scope and methodology for the assessment set out in section 14.2 has been checked against and fully accords with these local policies. Further information is provided in *Appendix 14.3*.

<sup>3</sup> The draft NPSNN specifically notes that due regard should be given to the *NPPF*, *PPG-Noise* and *NPSE*.

<sup>4</sup> Adverse effects, significant adverse effects and unacceptable adverse effects on health and quality of life

### *Regulations*

- 14.1.22 Relevant regulations include the *Noise Insulation Regulations 1975 as amended* (daughter regulations to the *Land Compensation Act 1973*), the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2009* and the *Environmental Noise (England) Regulations 2007* all as amended.
- 14.1.23 The *Noise Insulation Regulations* (NIR) set out:
- the qualifying criteria (including noise thresholds) at which the relevant authority is mandated to offer to provide noise insulation to owners and occupiers of eligible residential buildings;
  - the noise insulation ‘package’ to be offered and the process for communicating the outcome of the noise insulation assessment to interested parties; and
  - discretionary powers to provide noise insulation for construction noise (refer to the *CoCP, Appendix 20.2*).
- 14.1.24 The noise insulation trigger values are relevant to the scope and methodology for this assessment as they should align with the threshold for identifying significant adverse impacts on health and quality of life in response to government noise policy. It therefore follows that where all sustainable mitigation has been integrated into the scheme but the resulting noise inside a dwelling would result in a significant observed adverse effect on health and quality of life as a consequence of the scheme, then the provision of noise insulation would avoid this significant impact. This ensures compliance with the first aim of government noise policy.
- 14.1.25 The *Environmental Impact Assessment Regulations (EIA Regulations)* require ‘the identification of likely significant effects, both positive and negative, and the envisaged mitigation to avoid or reduce the significant effects’.
- 14.1.26 The scope and methodology (section 14.2 below) sets out how likely significant effects, in terms of the EIA Regulations, have been identified for noise and vibration taking account of government noise policy and all other relevant regulations, guidance and standards.
- 14.1.27 The *Environmental Noise Regulations* set out the requirements on competent authorities to undertake strategic noise mapping of major roads and then establish action plans. The second round action plan for roads (including major roads) was published in January 2014. It identifies a series of Important Areas where it is “*anticipated that the relevant highway authority will examine each Important Area having regard to any on-going noise mitigation initiatives, schemes and plans*”.
- 14.1.28 There are a number of Important Areas identified within the study area for this scheme. These are identified and assessed and mitigation proposed where required through this assessment.

## Guidance and standards

### Guidance

14.1.29 Relevant overarching guidance includes:

- Design Manual for Roads and Bridges (DMRB) *Volume 11, Section 3, Part 7, HD213/11 – Revision 1 Noise and Vibration* (HD213/11), (Highways Agency et al., 2011);
- Planning Practice Guidance – Noise (DCLG, 2014);
- Night Noise Guidelines for Europe (World Health Organisation, 2009);
- Guidelines for Community Noise (World Health Organisation, 1999);
- Guidelines for the Assessment of Groundborne Noise and Vibration (Association of Noise Consultants, 2012); and
- Environmental Noise Measurement Guide (Association of Noise Consultants, 2014).

### Standards

14.1.30 There are many standards that relate to this assessment. Each standard is noted as relevant in the later sections of this chapter and also in *Appendix 14.3*.

### Consultation

14.1.31 Engagement has taken place with Huntingdonshire District Council, South Cambridgeshire District Council and Cambridge City Council, focusing on the following points:

- It was agreed that methods of assessment would use the *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS5228, Part 1, 2009 + A1: 2014)* (BSI, 2014a) and *BS5228 Part 2: :2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration*. (BSI, 2014) for construction and *DMRB HD213/11* (Highways Agency et al., 2011) for operation, including site compounds and access routes;
- night time noise from road traffic is an important consideration, particularly due to the amount of goods traffic and would be assessed as required by *DMRB HD213/11* (Highways Agency et al., 2011);
- baseline noise measurement locations and methodology were agreed, including the need to measure at night. Several locations were highlighted in discussion with the local authorities that have been included in the surveys;
- the Local Authorities confirmed that baseline data from the *A14 Ellington to Fen Ditton environmental statement* (Highways Agency, 2009) remains relevant based on the modest changes in traffic flows that had occurred subsequently;

- noise and vibration sensitive areas;
- the *Code of construction practice (Appendix 20.2)*;
- other committed developments that may affect future traffic flows; and
- the assessment approaches applied to this scheme in response to government policy were introduced.

14.1.32 As noted in *Chapter 5*, a series of consultation events was held during a 10 week period from 7 April 2014, providing the public with the opportunity to comment on the scheme. There has also been a series of meetings with local community groups. These provided the opportunity for local stakeholder groups and members of the public to raise queries and concerns. In addition, local stakeholder groups and members of the public raised specific written consultation comments to which the Highways Agency replied providing emerging findings from the *ES* assessment and mitigation measures. Matters raised principally included suggested noise measurement locations in local areas, concern regarding increased noise levels during construction and operation in the areas near to the Huntingdon Southern Bypass, Cambridge Northern Bypass and around Brampton, Buckden and Huntingdon. Specific concerns have been addressed either in responses to the consultation submissions or in finalising this Chapter of the *ES*.

## 14.2 Scope and methodology

### Study area

- 14.2.1 For construction noise and vibration, the study area includes all receptors that are potentially sensitive to noise and vibration and which are within 300m of the scheme. This is consistent with the recommendations of *BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Part 1 Noise and Part 2 Vibration* (British Standards Institution, 2014, 2014a).
- 14.2.2 The study area for operational noise (see *Figure 14.1*) is defined in accordance with *DMRB HD213/11* (Highways Agency et al., 2011), as 600m around new or altered highways and sections of existing roads within 1km of the new works that are predicted to be subject to a change in noise level of more than 1dB(A) as a result of the scheme on opening in 2020.
- 14.2.3 Operational adverse effects have been assessed outside the study area. No significant effects outside the study area have been identified arising from the scheme. For completeness, the assessment of adverse effects outside the study area is described qualitatively in *Appendices 14.5* and *14.6*.
- 14.2.4 Residential and non-residential noise-sensitive receptors within the study area, as defined in section 14.1.1, were initially identified using Ordnance Survey Address Point data. The location and identity of sensitive receptors were then further refined during the assessment process. Non-residential noise-sensitive receptors identified in the study area are shown on *Figure 14.1*.

- 14.2.5 No designated Quiet Areas<sup>5</sup> have been identified in the study area. Further information on designations is provided in *Appendix 14.3*. Impacts, including noise, on tranquillity are reported in the landscape and visual assessment (*Chapter 10*).

### Study period

- 14.2.6 The assessment of noise and vibration from construction has considered the impacts of the main construction activities compared to a 2016<sup>6</sup> baseline. The construction period continues beyond the scheme opening date to allow completion of the works at the existing Huntingdon A14 Viaduct.
- 14.2.7 Assessment of operational noise change uses a comparison of traffic data projected with and without the scheme, both in the opening year (2020), and in the future assessment year (2035), i.e. the year of maximum projected traffic flow within 15 years of opening. The following scenarios have been considered :
- existing environment (2014);
  - baseline year (2016);
  - do-minimum<sup>7</sup> (without the scheme) in the opening year (2020);
  - do-minimum (without the scheme) in the future assessment year (2035);
  - do-something (with the scheme) in the opening year (2020); and
  - do-something (with the scheme) in the future assessment year (2035).
- 14.2.8 To simplify reporting the assessment has focused on the long term noise effects (i.e. with-scheme 2035 vs without-scheme 2020) as required by *DMRB HD213/11* (Highways Agency et al., 2011). The do-minimum 2035 was also considered to determine whether any significant effects identified are a consequence of traffic growth.

### Method of assessment

#### *Calculating noise and vibration from the scheme*

- 14.2.9 Noise and vibration from the scheme have been calculated using the following methodologies:
- Construction noise: calculations have been made using the methodology described in the *Code of practice for noise and vibration control on construction and open sites – noise (BS5228, Part 1, 2009 + A1: 2014)*.

<sup>5</sup> As defined by the *Environmental Noise Regulations, 2006 (as amended)*.

<sup>6</sup> 2016 is considered to be equivalent to 2014 baseline for this assessment and is likely to yield a conservative assessment.

<sup>7</sup> As defined in *Chapters 6 and 7 of the ES*.

- Construction vibration: calculations have been made based on the methods set out in *Transport Research Laboratory (TRL) Report 429 Ground vibration caused by mechanised construction works, (Hiller DM and Crabb GI 2000)* and *BS5228 part 2 :2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites: Vibration. (BSI, 2014)*.
- Operational noise: calculations have been made using the *Calculation of Road Traffic Noise – CRTN (Department of Transport and Welsh Office, 1988)*.
- Operational vibration: no calculations have been necessary. As set out in *DMRB HD213/11 (Highways Agency et al., 2011)*, appreciable groundborne vibration is not generated by a road with a well maintained road surface and the potential for airborne vibration (e.g. from HGV exhausts) is factored in to the assessment of airborne noise. A qualitative assessment has been reported where necessary.

#### *Assumptions - construction*

- 14.2.10 The assessment is based on the construction programme and phased activities as described in *Appendix 3.2*. In summary the phases are:
- Section 1 – A1 Alconbury to Brampton Hut 2016 to 2017
  - Section 2 – A1/A14 Brampton Hut to ECML 2017 to 2019
  - Section 3 – A14 ECML to Swavesey 2017 to 2019
  - Section 4 – A14 Swavesey to Girton 2016 to 2019
  - Section 5 – A14 Cambridge northern bypass 2018 to 2019
  - Section 6 – Huntingdon improvements 2020-2021
- 14.2.11 *Appendix 14.4* sets out the construction assumptions for the noise and vibration assessment that have been adopted to provide a likely worst case assessment of effects.
- 14.2.12 It is assumed that construction activities would be undertaken during normal working hours (Monday to Friday 0800 to 1800 and Saturday 0800 to 1300) except where this is not reasonable or practicable.
- 14.2.13 The following longer term activities are likely to be required to be undertaken during extended working hours, i.e. outside of normal working hours, for a period of greater than one month:
- pavement laying works along the online sections of road, for which extended working hours would reduce the impact on existing transport; and
  - seasonal earthworks, which would take advantage of extended daylight hours during the summer months to reduce the total construction duration and hence overall environmental effects and also to provide resilience in the construction programme in case weather adversely affects earth working during autumn, winter and spring months.

- 14.2.14 A number of short term activities would be required to be undertaken during extended working hours and sometimes at night. These primarily relate to works to or on existing transport corridors (such as bridge works) in order to reduce the impact on existing road and rail services. These include works at the Huntingdon viaduct to create and remove a protection canopy during railway possessions.
- 14.2.15 The base case assessment assumes the implementation of all mitigation identified in the *Code of construction practice (CoCP)*, including:
- Best Practicable Means (BPM) would be applied during construction activities to minimise noise and vibration at neighbouring residential properties;
  - as part of BPM, mitigation measures would be applied in the following order:
    - noise and vibration control at source. For example, the selection of quiet or low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings; and then
    - screening: for example local screening of equipment or perimeter hoarding;
  - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the *CoCP*, noise insulation or ultimately temporary re-housing would be offered in accordance with the noise insulation and temporary re-housing policy set out in the *CoCP*;
  - main contractors would seek to obtain prior consent from the relevant local authority under Section 61 of the *Control of Pollution Act 1974 (CoPA)* for the proposed construction works. The consent application would set out the final BPM measures to minimise construction noise, including control of working hours, and provide a further assessment of construction noise and vibration including confirmation of noise insulation/temporary re-housing provision;
  - contractors would undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to and be reviewed by the nominated undertaker and would be made available to the local authorities; and
  - contractors would be required to comply with the terms of the *CoCP* and appropriate action would be taken by the nominated undertaker as required to ensure compliance, including the monitoring of complaints.
- 14.2.16 The assessment of likely construction noise and vibration impacts has been undertaken based upon the plant assumptions, programme and other

information provided within *Appendix 3.2*. The assessment has predicted the construction noise level at the relevant noise sensitive property on a month by month basis, based upon the assumed programme. The robustness of the assessment is assured by the plant assumptions and that activities which are completed before the end of a month will be assumed to continue throughout the period and hence the assessment includes more overlapping activities than will be practicable on site. Any screening afforded by noise barriers, existing features or buildings has been limited to up to 10 dB attenuation, whereas in actuality the screening attenuation from some of these structures is likely to be greater. Furthermore, the baseline noise level used to determine the construction noise assessment category is based upon the start of construction year 2016, and not increased through the construction period due to the natural increase in road traffic noise and other sources. As such this provides a reasonably foreseeable worst case for assessment.

14.2.17 Further information is available in *Appendix 14.4*.

*Assumptions – operation*

14.2.18 Road traffic flows and speeds used in the assessment were provided by the project traffic engineers for all of the scenarios listed in 14.2.7.

14.2.19 Worst case traffic volumes on the existing road network and the scheme roads that are used in the assessment are described in *Chapter 7*.

14.2.20 Low noise surface would be laid on all new and altered roads in the scheme.

14.2.21 Landscape earthworks proposed for the offline section of the scheme to reduce visual and landscape impact (refer to *Chapter 10*) are assumed as an integrated part of the permanent scheme (both the base scheme and the mitigated scheme). These features would reduce wayside noise.

14.2.22 It is assumed that the Highways Agency would have laid low noise surface through all the Important Areas within the study area, as defined under the *Noise Action Plan for Major Roads* (Defra 2014), by 2021 and these would be in place throughout, including the assessment year. To assess a reasonably foreseeable worst case the do-minimum noise calculations in 2020 and 2035 assume low noise surface in all Important Areas in the study area.

14.2.23 It is assumed that noise insulation would be provided where future noise levels exceed the noise level trigger value of 68dB<sub>L<sub>pA10,18hr</sub></sub> (façade noise level) and the other requirements referred to in the *Noise Insulation Regulations 1975 (as amended)* (NIR). Confirmation of qualification for noise insulation would be made by the responsible authority before the scheme comes into operation, based on built information in accordance with the *NIR*. An estimate of the properties that are likely to be provided with noise insulation is presented in this assessment.

### Approach to assessment – all sources and receptors

- 14.2.24 The method for identifying likely significant effects of noise and vibration from construction and operation of the scheme, as required by the *EIA Regulations*, draws on best practice from other major infrastructure projects, and is consistent with *DMRB HD213/11* (Highways Agency et al., 2011) and government noise policy.
- 14.2.25 Taking government noise policy (Defra 2010) and *PPG-Noise (DCLG, 2014)* together, they are based on the premise that once noise becomes perceptible, the effect on people in dwellings and other receptors used by people (for example schools and hospitals) increases as the total level of noise increases. Government policy and practice guidance defines four levels of effect on health and quality of life in increasing severity:
- no effect;
  - adverse effect;
  - significant adverse effect; and
  - unacceptable adverse effect.
- 14.2.26 The Government noise policy and *PPG-Noise (DCLG, 2014)* also note that thresholds should be set to define the onset of these levels of effect, namely:
- Lowest Observed Adverse Effect Levels (LOAEL) to identify the onset of adverse impact on health and quality of life;
  - Significant Observed Adverse Effect Levels (SOAEL) to identify the onset of significant impacts on health and quality of life; and
  - Unacceptable Adverse Effect Levels (UAEL) to identify the onset of unacceptable impacts on health and quality of life.
- 14.2.27 Policy notes that these thresholds should reflect the nature of the noise source, the sensitivity of the receptor and the local context.
- 14.2.28 The *EIA Regulations* require the identification of ‘likely significant effects’. Where in terms of government noise policy the calculated noise or vibration indicates a significant adverse impact on health and quality of life (i.e. the level exceeds the relevant SOAEL), then this assessment identifies a likely significant observed adverse effect at each receptor. In accordance with *PPG-Noise (DCLG, 2014)* this is where, for example, noise would disrupt activities indoors.
- 14.2.29 Additionally, in line with best practice, *DMRB HD213/11* (Highways Agency et al., 2011) and previous projects, in some circumstance this assessment also identifies likely significant effects where the calculated noise or vibration is only an adverse impact on health and quality of life under government policy (i.e. the noise is greater than the relevant LOAEL but is less than the SOAEL). In this case, the basis for the likely significant effect is the change in noise caused by the scheme and the number of dwellings in a community that are subject to the change. With regard to *PPG-Noise (DCLG, 2014)*, such likely significant effects relate for example to a change in the outdoor “acoustic character” of an area and may be either adverse,

due to a noise increase, or beneficial, due to a noise reduction caused by the scheme.

- 14.2.30 *Table 14.1* summarises how noise levels in terms of government noise policy and change in noise levels (in term of *DMRB HD213/11* (Highways Agency et al., 2011)) have been collectively used with other contextual information to identify likely significant effects in this assessment. The following subsections provide further guidance and supporting information is also provided in *Appendix 14.3*.

*Residential receptors: direct effects – individual dwellings*

- 14.2.31 Where the predicted total noise or vibration (including noise from the scheme and taking account of the noise reduction measures), increases the baseline noise such that it exceeds the trigger value for onset of a significant observed adverse effect (refer to *Table 14.1*), then a likely significant noise or vibration effect has been identified on that individual receptor.
- 14.2.32 Such situations are significant observed adverse effects in terms of government noise policy (refer to *Table 14.1*). For clarity, in the assessment of effects and residual effects in *sections 14.4* and *14.6* of this chapter, the term ‘significant observed adverse effect’ is used to describe these effects. This is to distinguish them from effects, as described in the next subsection, that are considered to be significant in the environmental impact assessment (EIA) but which are not significant in terms of government noise policy.
- 14.2.33 With reference to *PPG-Noise (DCLG, 2014)*, significant observed adverse effects would generally be on residents inside buildings where the resulting noise or vibration could disrupt activities. Significant observed adverse effects can be avoided by mitigation in the scheme (e.g. low noise surfacing), mitigation at the receptor (i.e. noise insulation) or a combination of both.

*Residential receptors: direct effects – communities*

- 14.2.34 Where the predicted total level of noise or vibration (including noise from the scheme and taking account of the noise reduction measures) is between the trigger values for the onset of an adverse observed effect and a significant observed adverse effect (refer to *Table 14.1*), people’s perception of the level of effect is generally indicated by the increase in noise or vibration from what it would be without the scheme. People living in a local community when such a change in noise occurs, may consider it an adverse effect on the acoustic character of the area and hence may perceive it as a change in the quality of life.
- 14.2.35 People who do not experience the acoustic character of an area before a change occurs will consider noise or vibration, where it occurs, based on the absolute level, not the change in level. Their perception of the magnitude of any effect is therefore likely to be lower than those who experience the change. For example, this applies to proposed future residential development that would be occupied following opening of the scheme.

- 14.2.36 For operational noise, consistent with best practice and guidance given in *DMRB HD213/11* (Highways Agency et al., 2011), the magnitude of the effect on a community due to noise change is categorised as negligible, minor, moderate or major. Such effects can be adverse or beneficial.
- 14.2.37 For construction noise, adverse effects are identified where assessment criteria are exceeded. The assessment criteria are defined by the relevant *British Standard, BS5228 Part 1* (BSI, 2014) and are set based on the existing ambient noise level (the lower the existing level the lower the trigger level for the assessment category) and are also set at lower levels for evening and then lower levels again for night time, for the rare situation where construction work would be required at night.

**Table 14.1: Noise and vibration assessment approach to address both the EIA and government policy requirements**

	Perception	Government policy		EIA		Mitigation		
		Effect	Action	Assessment	Effect	Project	Receptor	
← Increasing level of noise or vibration	not noticeable	no observed effect	no specific measures required					
	noticeable and not intrusive	no observed adverse effect	no specific measures required					special cases
	<b>lowest observed adverse effect level – LOAEL</b>							
	noticeable and intrusive	observed adverse effect	mitigate and reduce to a minimum	noise level <b>change</b> as indicator of impact/effect magnitude + contextual significance criteria	change or absolute level may cause adverse effect on acoustic character. May be considered significant in EIA terms on a community basis	maximise mitigation as far as sustainable	none	
	<b>significant observed adverse effect level – SOAEL</b>							
	noticeable and disruptive	significant observed adverse effect	avoid	exceeding SOAEL is a significant effect	significant adverse effect on each receptor	maximise mitigation as far as sustainable. prevent UAELs where possible	noise insulation	
noticeable and very disruptive	unacceptable adverse effect	prevent	exceeding UAEL is a significant effect	rehouse where noise is from the scheme				

14.2.38 When considered collectively on a community basis, and taking into account the local context, adverse noise or vibration effects may be deemed to be significant in EIA terms (although not in terms of government noise policy terms). In considering whether the level of effect is significant in EIA terms on a community basis the following criteria have been taken into account:

- the change in noise levels (and resulting noise effect on receptors);
- the level of noise exposure once the scheme is in operation;
- the level and character of the existing noise environment;
- the number and grouping of adversely or beneficially affected dwellings and shared community facilities;
- any unique features of the source or receiving environment in the local area;
- combined exposure to noise and vibration;
- for construction, the duration of the adverse or beneficial effect; and
- the effectiveness of mitigation measures that are provided.

14.2.39 The assessment is evidence-based. As examples, the assessment methodology could consider the following cases to be a likely significant effect:

- a large number of dwellings subject to minor adverse or beneficial effect due to noise change in a quiet existing environment and that are grouped together forming a residential community area;
- a medium number of dwellings subject to moderate adverse or beneficial effect due to noise change in an existing environment with 'average' existing noise levels and that are grouped together forming a residential community area;
- a small number of dwellings subject to major adverse or beneficial effect due to noise change in an existing environment that is currently either quiet or averagely noisy and that are grouped closely together forming a residential community area; or
- a single dwelling subject to a significant observed adverse effect (refer to *Table 14.1*) i.e. a significant impact on health and quality of life consistent with government noise policy.

14.2.40 The evidence used to inform the significance decisions reported on this assessment is presented in *Appendices 14.4, 14.5 and 14.6*.

14.2.41 For the purposes of this assessment, ‘considered significant on a community basis’ refers to a group of residential dwellings situated close to each other, including any shared open space. Such residential community areas would usually be part of a named town, village or hamlet; in which case the name of the residential community is used to help denote the significant adverse or beneficial effect. Each significant effect has been given a unique identification, for example ON-C07(S). The identification is explained in *Appendix 14.4 (construction) and Appendices 14.5 and 14.6 (operation)*. These identifications are provided to navigate the reader between the text in this chapter, the results in *Appendix 14.4 (construction) and Appendices 14.5 and 14.6 (operation)*; and the *Figures 14.3, 14.5 and 14.7*.

14.2.42 Such significant effects can be reduced by mitigation incorporated in the scheme (e.g. low noise surfacing and/or noise barriers).

*Non-residential receptors: direct effects*

14.2.43 Hotels, hospitals and other buildings where people may sleep temporarily (but which are not places of permanent residence), along with buildings having specific noise and vibration sensitive resources, are called non-residential receptors in this assessment.

14.2.44 The level of effect of noise or vibration on a non-residential receptor is dependent on:

- the overall noise level and the change in noise level (from the baseline) due to the scheme;
- the receptor’s generic sensitivity to noise or vibration, which is dependent on the use of the receptor; and
- the receptor’s specific sensitivity to noise or vibration, for example, the location, construction and layout of a school. This would include matters such as whether the most sensitive parts of the school are closest to and face the scheme or are further from and on the opposite side of a building to the scheme; and the noise insulation performance of the building.

14.2.45 The assessment has considered the noise and vibration exposure at each non-residential receptor and the receptor’s generic sensitivity. On a worst-case basis, it assumes that the receptor is the most sensitive it can be. For example, assuming that for a school the teaching spaces are at the closest point to the scheme, facing the route with windows open.

*All receptors: Indirect effects*

14.2.46 The assessment has considered likely noise or vibration effects from temporary or permanent changes in traffic on existing roads caused by the scheme. The assessment is based on evaluating the likely change in noise or vibration levels at receptors alongside each road based on the anticipated change in traffic type and numbers. In determining whether effects are significant, the assessment has considered the magnitude of the change, the number of residential dwellings that would be affected by the change and the sensitivity of any non-residential receptor.

## Approach to assessment: Construction airborne noise

### *Direct effects*

- 14.2.47 Temporary direct impacts from airborne noise may be caused, for example, by construction activities associated with demolition, earthworks, viaducts, bridges, pavements, utility works and borrow pit excavation.
- 14.2.48 Likely significant effects and significant observed adverse effects have been assessed at the closest noise sensitive receptors to the proposed locations for specific extended or major construction activities.
- 14.2.49 The assessments have been undertaken at locations that are representative of a number of dwellings or other sensitive receptors. For groups of properties, receptors are chosen to be representative of the worst case (most exposed) location in the group of properties. Where a receptor has multiple uses the assessment has been made based on the most sensitive use.
- 14.2.50 Construction noise levels have been predicted as the logarithmic average over a calendar month as an  $L_{pAeq,T}$ . The predictions consider the variation in the programme and the working area for the period assessed. The assessment results present the typical monthly noise level and the highest monthly noise level for a specified assessment location.
- 14.2.51 The predictions are presented as façade levels relating to a position 1m from the building. The assessment considers monthly noise levels but levels would vary day-to-day. Highest daily levels may sometimes be around 5dB higher than the monthly level but would also be substantially lower on other days in that month.
- 14.2.52 Many of the construction processes would move progressively along the line of route. For these processes, noise levels have been calculated for the worst case, i.e. when the process is closest to the receptor, and a more typical case within a month, i.e. when the process has progressed two weeks either way along the line. The resulting noise levels have been analysed to determine whether significance thresholds would be exceeded for more than a month as the works pass the receptor.

### *Indirect effects*

- 14.2.53 Indirect impacts of airborne noise could be caused by temporary changes to road or traffic patterns on the existing road network during construction.
- 14.2.54 The majority of construction traffic transporting soil and earth between borrow pits, soil storage and the construction works would be within the boundary of the site. Noise from all traffic movements within the confines of the site boundary is included in the direct impacts predictions and assessment.
- 14.2.55 A quantitative assessment has been completed for local and strategic roads in the vicinity of the scheme used for the movement of materials along the route of the scheme.

14.2.56 The methodology set out in *Calculation of Road Traffic Noise* (Department of Transport and Welsh Office, 1988) has been used to predict the change in noise level resulting from the change in road traffic during and due to construction of the scheme. The baseline noise levels and the levels during construction have been predicted as a free-field  $L_{pAeq,16hr}$  level at a reference distance of 10m from the kerb.

### **Approach to assessment: Construction vibration**

#### *Direct effects of vibration*

14.2.57 Vibration from construction has been assessed to ensure there is no risk of causing damage to existing buildings and then to assess the response of people to the vibration where they live and work.

14.2.58 Temporary direct effects due to groundborne vibration are only caused by a limited number of construction activities such as demolition, some types of piling and vibro-compaction.

14.2.59 Vibration has been assessed based on:

- *BS6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings (1Hz to 80Hz). Vibration sources other than blasting* (BSI, 2008);
- *BSISO 4866:2010 Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures* (BSI, 2010); and
- *BS7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration* (BSI, 1993).

14.2.60 For construction processes for which calculation methods are not described in these documents, other published sources of information have been used and are referenced in the detailed assessment as presented in *Appendix 14.4*.

14.2.61 Construction vibration levels considering human response have been predicted for daytime (07:00-23:00 hours). Current proposals for night time works do not include construction activities that are likely to generate appreciable vibration at receptors.

#### *Indirect effects of vibration*

14.2.62 Indirect impacts of vibration from construction traffic using the highway network can potentially arise from two sources:

- groundborne vibration produced by the movement of heavy vehicles over irregularities in the road surface; and
- airborne vibration arising from low frequency noise emitted by vehicle engines and exhausts.

14.2.63 Taking account of the *CoCP*, for example that temporary road surfaces will be maintained, significant groundborne vibration effects are highly unlikely.

### Approach to assessment: Operational airborne noise

- 14.2.64 Noise levels have been calculated for the base scheme, i.e. the scheme incorporating earthworks, structures and other features that are not specifically designed to mitigate noise but which do reduce wayside noise. Where significant adverse effects from operation of the road were identified for the base scheme, mitigation has been designed and incorporated in the assessment of residual effects, as described in this chapter.
- 14.2.65 A geographical information system (GIS) has been used to construct a three dimensional noise model of the study area. The model includes terrain data, buildings (and other structures that might screen or reflect noise), ground cover types and road links. Each road link is attributed with information on traffic flow, speed, proportion of heavy goods vehicles (HGVs) and road surface type, from which noise levels were calculated according to *CRTN* using proprietary noise modelling software.
- 14.2.66 The *CRTN* procedures assume typical worst case noise propagation scenarios which are consistent with moderately adverse wind velocities in all directions. The additional advice given in *DMRB HD213/11* (Highways Agency et al., 2011) has been adopted in relation to *CRTN* procedures. These include revisions to vehicle classification, traffic data and corrections due to road surface.
- 14.2.67 To respond to government policy and the *DMRB HD213/11* (Highways Agency et al., 2011) approach to assessment based on changes in noise levels, noise contour maps have been calculated for the outdoor noise level in terms of the free-field  $L_{pAeq,16hr}$  index at a height of 1.5m above local ground level. Sheets 1-24 of *Figures 14.4* and *14.6* show the total noise levels in 2035 for the base and mitigated schemes respectively. Sheet 25 of *Figures 14.4* and *14.6* show the long-term change in noise level due to the scheme (with-scheme 2035 vs without scheme 2020) for the base scheme and mitigated scheme respectively.
- 14.2.68 For the assessment of the significance of effects at buildings and for the production of the tables required by *DMRB HD213/11* which summarise changes in noise level and nuisance due to the scheme, noise levels are calculated at a height appropriate to each building. The details of the assessment of significant effects and the *DMRB* summary tables are presented in *Appendices 14.5* and *14.6*.
- 14.2.69 To assess as required by *DMRB HD213/11* indirect effects at dwellings between 600m and 2km from the scheme due to changes in traffic patterns on existing roads, an assessment of noise change has been made using basic noise levels (BNLs). The BNL is the noise level at a reference distance of 10m from the carriageway edge, derived using the *CRTN* methodology.

- 14.2.70 *DMRB HD213/11* (Highways Agency et al., 2011) also requires an assessment of the cumulative noise and vibration effects. This includes identifying likely compound effects of noise or vibration with other environmental topic-specific impacts upon people, dwellings and other sensitive receptors. This is presented in *Chapter 18*. The cumulative noise and vibration effects on the scheme and other currently planned projects within the noise study area are also considered within *Chapter 18*.
- 14.2.71 Night-time noise was calculated as required by *DMRB HD213/11* using an approach based on Method 3 from the report *Converting the UK traffic noise index  $L_{A10,18h}$  to EU noise indices for noise mapping* (Transport Research Laboratory, 2002). The assessment of night-time noise follows the same method as the daytime assessment.

#### **Approach to assessment: Operation vibration**

- 14.2.72 *DMRB HD213/11* requires that the effects of vibration are considered where appropriate. Vibration may be airborne or groundborne. In the case of groundborne vibration, the likelihood of perceptible vibration being caused is particularly dependent upon the smoothness of the road surface. Research has shown that wayside vibration is only caused by heavy vehicles travelling at speed over large discontinuities in the road surface.
- 14.2.73 It is a requirement of new highway construction specification that the surface would be smooth and free from any discontinuities of this magnitude (25mm). Paragraph A5.26 of *DMRB HD213/11* states that:
- “Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances.”
- 14.2.74 No such exceptional circumstances, such as low vibration laboratories or other facilities requiring very low vibration environments have been identified in the vicinity of the scheme, that are not already in the vicinity of a major highway, and hence no impacts or effects from groundborne vibration from traffic are predicted.
- 14.2.75 *DMRB HD213/11* covers the potential for airborne noise from heavy goods vehicles to cause vibration nuisance close to main roads. As an indication of the scale of impact, paragraph A6.21 states that:
- “for a given level of noise exposure the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for noise nuisance.”
- 14.2.76 It also notes that airborne vibration is expected to affect a very small percentage of people at exposure levels below 58dB $L_{pA10,18hr}$  and the significance of any change in airborne traffic vibration can be considered proportional to the significance of changes in traffic noise. The assessment of airborne vibration can therefore be considered to be included within the assessment of airborne noise. The reporting information required by *DMRB* is presented in *Appendices 14.5 and 14.6*.

### Assessment criteria

14.2.77 Assessment criteria have been established that respond to the requirements of:

- government policy, set out in *NPSE* (Defra, 2010), *NPPF* (DCLG, 2012), *PPG- Noise* (DCLG, 2014) and *NPSNN* (DfT, 2013);
- *DMRB HD213/11* (Highways Agency et al., 2011);
- relevant regulations, guidance and standards; and
- best practice as set by previous relevant projects.

14.2.78 The following presents the assessment criteria and outlines the basis for them. *Appendix 14.3* describes more fully the basis for the criteria.

#### *Construction noise assessment criteria*

14.2.79 Potential adverse effect thresholds have been established using the ABC Method described in *BS5228-1:2009+A1:2014*, (BSI, 2014) which defines thresholds on the basis of existing noise levels. These thresholds have been used to establish assessment criteria for monthly average<sup>8</sup> noise levels in terms of government policy as set out in *Table 14.2*.

**Table 14.2: Thresholds of potential effects of construction noise at residential buildings in terms of government policy**

Effect threshold (residential)	Threshold value, 1m in front of the relevant façade
lowest observed adverse effect level (LOAEL)	day 65dB <sub>L<sub>pAeq,daytime</sub></sub> evening 55dB <sub>L<sub>pAeq,1hr</sub></sub> night 45dB <sub>L<sub>pAeq,1hr</sub></sub>
significant observed adverse effect level (SOAEL)	day 75dB <sub>L<sub>pAeq,daytime</sub></sub> evening 65dB <sub>L<sub>pAeq,1hr</sub></sub> night 55dB <sub>L<sub>pAeq,1hr</sub></sub>
unacceptable adverse effect level (UAEL)	day 85dB <sub>L<sub>pAeq,daytime</sub></sub> evening 75dB <sub>L<sub>pAeq,1hr</sub></sub> night 65dB <sub>L<sub>pAeq,1hr</sub></sub>
Note: Day is 07:00 to 19:00, evening is 19:00 to 23:00 and night is 23:00 to 07:00	

#### *Construction vibration assessment criteria*

14.2.80 Guidance on the impact of vibration on people in buildings is presented in *BS6472:2008 Part 1, 2008 Guide to evaluation of human exposure to vibration in buildings (1Hz to 80Hz)*. *Vibration sources other than blasting* (BSI, 2008) which assesses the impact of vibration using the vibration dose value (VDV). This indicator takes into account how people respond to vibration in terms of frequency content, vibration magnitude and the number and duration of vibration events during an assessment period. Vibration from the operation of the scheme and all construction has been assessed using the criteria presented in *Table 14.3*.

<sup>8</sup> Logarithmic average of noise levels

**Table 14.3: Thresholds of likely effects of vibration for residential buildings (derived from BS 6472-1: 2008)**

Threshold (residential)	Impact classification	Vibration exposure <sup>1)</sup>	
		VDV daytime (07:00 – 23:00) (m/s <sup>1.75</sup> )	VDV night time (23:00 – 07:00) (m/s <sup>1.75</sup> )
lowest observed adverse effect level (LOAEL)	minor	0.2	0.1
-	moderate	0.4	0.2
significant observed adverse effect level (SOAEL)	major	0.8	0.4
Note			
1) Determined at the worst location on a normally loaded floor (usually the centre of the floor)			

14.2.81 For non-residential buildings, the following worst case multiplying factors are applied to the daytime VDV criteria, consistent with *BS6472-1 2008 Guide to evaluation of human exposure to vibration in buildings (1Hz to 80Hz). Vibration sources other than blasting* (BSI, 2008):

- offices – factor of 2; and
- workshops – factor of 4.

14.2.82 Risk of damage to buildings from groundborne vibration is assessed using the criteria in *Table 14.4*, which are based upon *BS7385: Part 2 1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration* (BSI, 1993). The criteria avoid the risk of any damage even ‘cosmetic damage’, defined in *BS ISO4866:2010<sup>9</sup> Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures* (BSI, 2010).

**Table 14.4: Vibration impact criteria for buildings (conservative criteria below which there is no risk of cosmetic damage)**

Category of building	Peak particle velocity <sup>1)</sup> (mm/s)	
	Transient <sup>2)</sup> vibration	Continuous <sup>3)</sup> vibration
potentially vulnerable building	6	3
structurally sound buildings	12	6
Notes:		
1) At the building foundation		
2) Transient relative to building response e.g. from percussive piling		
3) Continuous relative to building response e.g. from vibratory piling, vibrating rollers		

<sup>9</sup> *BS ISO4866:2010* defines cosmetic damage as “The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction”. *BS7385-2* states that ‘minor damage’ is possible at vibration twice that for cosmetic damage and ‘major damage’ is possible at four times the cosmetic damage values.

### Operational noise assessment criteria

14.2.83 Adverse effect levels have been set in *Table 14.5* in accordance with government noise policy (*National Planning Policy Framework (NPPF)* (Department for Communities and Local Government (DCLG), 2012); *Planning Practice Guidance – Noise (PPG-Noise)* (DCLG, 2014); and *Draft National Policy Statement for National Networks (NPSNN)* (Department for Transport (DfT), 2013). The *Draft NPSNN* specifically notes that due regard should be given to the *NPPF*, *PPG-Noise* and *NPSE* (Defra, 2010)) and with regard to the guidance from the World Health Organisation (*Guidelines for Community Noise* (World Health Organisation, 1999); and *Night Noise Guidelines for Europe* (World Health Organisation, 2009)), the *Noise Insulation Regulations 1975* (as amended) and best practice from other projects.

**Table 14.5: Thresholds of likely effects of operational noise at residential buildings in terms of government policy**

Effect threshold (residential)	Threshold value (free-field unless stated)
lowest observed adverse effect level (LOAEL)	day 50dB <sub>L<sub>pAeq,16hr</sub></sub> night 40dB <sub>L<sub>pAeq,8hr</sub></sub>
significant observed adverse effect level (SOAEL)	day 68dB <sub>L<sub>pA10,18hr</sub></sub> at the façade of a property (equivalent to ~63dB <sub>L<sub>pAeq,16hr</sub></sub> during the day and for this scheme equivalent to ~55dB <sub>L<sub>pAeq,8hr</sub></sub> at night)
unacceptable adverse effect level (UAEL)	day 74dB <sub>L<sub>pAeq,16hr</sub></sub>

14.2.84 The magnitude of the impact and effect caused by long term change in noise levels attributable to the scheme, where the overall 'end state' (i.e. operational noise level of the completed scheme), is between the lowest and the significant observed adverse effect levels, is evaluated in accordance with *Table 14.6*.

**Table 14.6: Classification of magnitude of noise impact and effect on residential communities in the long-term under DMRB, where the 'end-state' level of overall exposure is between LOAEL and SOAEL**

Noise change (dB(A)) – decrease or increase	Magnitude of impact in the long term
0	no change
0.1 – 2.9	negligible
3.0 – 4.9	Minor
5.0 – 9.9	moderate
10.0 +	major

14.2.85 Where the overall exposure is greater than the relevant significant observed adverse effect level (SOAEL), then there is increasing risk of likely health effects associated with long term (permanent) exposure.

14.2.86 Some areas in the scheme noise study area are already exposed to high levels of road traffic noise. It is therefore considered appropriate to give greater weight to noise change where the existing baseline noise level is already in excess of the relevant SOAEL. This is to reflect the consideration of health effects. In these situations the magnitude of the impact and effect caused by change in noise levels attributable to the scheme is shown in *Table 14.7*.

**Table 14.7: Classification of magnitude of noise impact and effect on residential communities in the long-term under DMRB, where the baseline noise level is greater than SOAEL**

Noise change (dB(A)) – decrease or increase	Magnitude of impact in the long term
0	no change
0.1 – 0.9	negligible
1.0 – 2.9	minor
3.0 – 4.9	moderate
5.0 +	major

14.2.87 For non-residential buildings, the assessment considers the noise and vibration exposure at each receptor and the receptor's generic sensitivity. *Table 14.8* summarises the assessment criteria used for assessment on a likely worst case basis as set out in *Appendix 14.3*, which also sets out the rationale for the criteria in *Table 14.8*.

**Table 14.8: Noise impact screening criteria at non-residential receptors (construction and operation)**

Description	Impact (screening) criterion		Outcome	Reference
	Day 0700-2300	Night 2300-0700		
places of meeting for religious worship; courts; cinemas; lecture theatres; museums; and small auditoria or halls	50dB <sub>L<sub>pAeq,T</sub></sub> and a change >3dB	--	disturbance	BS8233: 2014, EFAs Acoustics Performance Standards <sup>2</sup> , HTM08-01 <sup>3</sup> , WHO guidelines <sup>4</sup>
schools; colleges; hospitals*; hotels*; and libraries	50dB <sub>L<sub>pAeq,T</sub></sub> and a change >3dB	*45dB <sub>L<sub>pAeq,T</sub></sub> and a change >3 dB	disturbance and sleep disturbance*	
offices	ABC <sup>1</sup> / 55dB <sub>L<sub>pAeq,T</sub></sub> and a change >3dB	--	disturbance	BS8233, BCO guidance
Note: 1. For construction assess using A and B categories from ABC method 2. Education Funding Agency (2012) 3. Department of Health (2013) 4. World Health Organisation (1999)				

## Limitations

### *Construction*

- 14.2.88 The assessment considers construction noise and vibration on a month-by-month basis as this is a realistic level of detail for the assessment at this stage. Noise levels would vary day-to-day; the highest daily levels may sometimes be around 5dB higher than the monthly average levels but would then be substantially lower on other days in that month. Noise and vibration from all construction activities, including short duration activities, is subject to control under the *CoCP (Appendix 20.2)* and hence minimisation of noise as far as practicable as agreed with the relevant local authority by consent under the *Control of Pollution Act 1974* before the works can commence on site.
- 14.2.89 It is anticipated that there may be some extended working during summer months to make best use of dry weather for earthworks. In these situations, it is expected that the noise effects would be limited in duration and hence are unlikely to be significant. Any noise effects arising from these short-term construction activities would be controlled by the management processes set out in the *CoCP (Appendix 20.2)* and as described above.

### *Operation*

- 14.2.90 The effects of noise and vibration from the operation of the scheme have been assessed based on traffic modelling (detailed results are presented in *Appendices 14.5 and 14.6*). Other developments may affect the predicted traffic using the scheme and these have, as far as possible, been included within the scheme on the basis of assumed dates for committed developments to be operational. It is likely that the changes in impact associated with any variability in programme for committed developments would be negligible in terms of predicted traffic noise levels.
- 14.2.91 There would be regular planned maintenance work along the route. Given the infrequent, irregular and short duration of works likely to cause appreciable noise or vibration, maintenance work is considered unlikely to give rise to significant noise or vibration effects.

## 14.3 Baseline

- 14.3.1 Baseline noise levels within the study area (refer to section 14.2) have been established by a combination of calculated road traffic noise and measured existing noise levels as set out above in section 14.2 and described more fully in *Appendix 14.2*.

- 14.3.2 Noise levels in the study area are generally dominated by road traffic and are therefore predictable using the road traffic noise model for the scheme and surrounding roads. The model has been checked against measured noise levels as discussed in *Appendix 14.2*. The model then enables the baseline to be determined at all other receptors alongside the existing road network. It also enables the 2014 levels to be scaled to the baseline (2016), 2020 do-minimum and 2035 do-minimum assessment years (including developments identified in *Chapter 7*). This allows for projected changes in traffic patterns and improvements planned by the Highways Agency, particularly the laying of low noise surfacing along a number of sections of the A14 (refer to *Scope of assessment* of this chapter).
- 14.3.3 For the offline Huntingdon Southern Bypass baseline, traffic noise is from distant roads. There are contributions from other noise sources, such as rail, aircraft and agriculture (see descriptions in *Appendix 14.2*). In these locations the baseline has been determined using survey and other information as described in *Appendix 14.2*.

### Noise Action Plan

- 14.3.4 *Noise Action Plan: Roads (Including Major Roads) (Noise Action Plan)* (Defra, 2014), prepared under the terms of the Environmental Noise (England) Regulations 2006, as amended, implements the Environmental Noise Directive (END) in England.
- 14.3.5 The Noise Action Plan aims to promote good health and quality of life through the effective management of noise, in line with government policy. Implementation of the Noise Action Plan has identified Important Areas through the Government's round 2 noise mapping in 2012. The relevant highway authority is expected to examine each Important Area (IA) with regard to noise mitigation in order to assist with the implementation of the Government's policy on noise.
- 14.3.6 The Important Areas in the scheme noise study area have been considered during the EIA process and as an integral part of the scheme, and are presented in *Figure 14.1*.
- 14.3.7 For Important Areas in the on-line improvement sections of the scheme, the use of low noise road surfacings has been included as the Highways Agency would have completed installation of low noise surfacings in these areas by 2021. Additionally earthworks and (fence) noise barriers have been considered as part of the EIA and included as appropriate.
- 14.3.8 The Huntingdon Southern Bypass would mitigate noise at a number of the Important Areas on the A14.

### Characterisation of baseline noise environment

14.3.9 The study area is predominantly rural with the exception of the principal urban areas of Huntingdon and Cambridge and smaller settlements along or close to the existing A14. Much of the study area follows existing major transport corridors which elevate existing noise levels in most locations be they rural or urban. The principal transport corridors that shape the baseline are the East Coast mainline railway that runs approximately north-south towards the eastern side of the study area, and the A1/A1(M), A14, A141, M11, A428 and A10. At locations within the study area that are more remote from major roads, the major noise sources are local traffic, agricultural activity and wildlife.

14.3.10 The baseline noise levels are quantified in *Appendix 14.2*; the following describes, largely qualitatively, the soundscape in each route section.

#### *Section 1: A1 Alconbury to Brampton Hut*

14.3.11 The noise climate within the study area in this section is characterised by road traffic on the A1 and A14. This section consists of on-line improvements which would reduce traffic and hence traffic noise to the Stukeleys, although these settlements are some distance to the east of the A14 and therefore not currently exposed to high traffic noise levels.

14.3.12 The A1(M) passes close to and along the eastern edge of Alconbury, where properties are exposed to elevated noise levels currently 52-63dB<sub>L<sub>pAeq,16hr</sub></sub> daytime and 50-60dB<sub>L<sub>pAeq,8hr</sub></sub> at night. There is an Important Area (IA 5153) to the north east of Alconbury where dwellings are closest to the motorway.

14.3.13 To the north of Alconbury, the study area is largely open agricultural land, exposed to noise from the A1(M), and with industrial/commercial developments at Alconbury Hill and an Important Areas (IA 5154) related to a small number of individual dwellings situated very close the motorway.

14.3.14 South of Alconbury, the A1 passes through agricultural land as far as the intersection with the A14 at Brampton Hut. Huntingdon Life Sciences' facilities are located off Woolley Road, the closest parts of the development being approximately 100m west of the A1(M).

#### *Section 2: A1/A14 Brampton Hut to East Coast mainline railway (including East Coast mainline railway bridge)*

14.3.15 The northern part of this route section comprises junction improvements at Brampton Hut and online improvement of the A1(M) south to Buckden Road, where the offline route commences. At the A14 intersection there is a service area, which includes a Premier Inn hotel. Current noise levels are high in this area and are dominated by traffic from the A14 and A1(M).

14.3.16 To the east of the A1(M) and south of the A14 is Brampton. The closest dwellings to the A1(M) are approximately 200m away and the existing environment is characterised by road traffic noise. Existing daytime ambient noise levels are typically 51-56dB<sub>L<sub>pAeq,16hr</sub></sub>, falling to around 43-47dB<sub>L<sub>pAeq,8hr</sub></sub> at night.

- 14.3.17 There is an Important Area (IA 5151) to the north of Brampton where dwellings in the large residential development off Thrapston Road are close to a section of the existing A14 that would be detrunked by the scheme and hence the existing road traffic noise levels reduced.
- 14.3.18 Important Area 5152 is associated with a small number of individual dwellings located south of the A14 and to the west of the A1(M). This Important Area is close to where the scheme would create a new intersection between the A14 and A1(M).
- 14.3.19 Further south is RAF Brampton, which at closest is around 600m east of the A1(M). The noise climate is dominated by the A1(M) and traffic on the local roads, particularly Buckden Road. Daytime noise levels are around 46-51dB<sub>L<sub>pAeq,16hr</sub></sub>, falling to around 44-46dB<sub>L<sub>pAeq,8hr</sub></sub> at night.
- 14.3.20 The new Huntingdon Southern Bypass is through a rural area and crosses the river Great Ouse, where distant road traffic and the East Coast mainline railway are the dominant noise sources.
- 14.3.21 The study area also extends south along the A1, past Buckden. The western side of Buckden is close to the A1 and hence existing noise levels are dominated by road traffic noise from the trunk road. Further east, the dwellings are increasingly remote from and screened from the A1. At the eastern edge of Buckden, there is currently open land, which would have a direct line of sight to the scheme. Measurements indicate a daytime baseline noise level of around 45dB<sub>L<sub>pAeq,16hr</sub></sub>. The noise climate is characterised by distant and local road traffic, birdsong and occasional aircraft.
- Section 3: A14 East Coast mainline railway to Swavesey (not including Swavesey)*
- 14.3.22 This reporting area covers the offline improvement and part of the south eastern section of the existing A14 that would be de-trunked. The new route passes through a largely agricultural area characterised by individual farms and small settlements.
- 14.3.23 Immediately to the east of the East Coast mainline railway are Offord Cluny and Offord Darcy. The most northerly properties of Offord Cluny are within the southern boundary of the noise study area. The soundscape is characterised by local road traffic, trains and occasional aircraft. Daytime noise levels were approximately 58dB<sub>L<sub>pAeq,16hr</sub></sub>, north of Offord Cluny.
- 14.3.24 Eastwards from the B1043, the scheme would pass through open agricultural land, where there is a small number of individual dwellings, before passing to the north of Hilton and Conington.
- 14.3.25 On the northern edge of Hilton, the soundscape is characterised by local road traffic and wildlife. Daytime noise levels are around 56dB<sub>L<sub>pAeq,16hr</sub></sub>, falling to around 52dB<sub>L<sub>pAeq,8hr</sub></sub> at night. The noise climate at Conington is similar but with subjectively more audible distant road traffic noise from the A14.
- 14.3.26 The existing A14 includes Important Area 5144 at Fenstanton where there are several individual dwellings very close to the A14 and so exposed to elevated noise levels.

- 14.3.27 Fen Drayton is within the study area but mostly around 500m or more north-east of the A14.
- 14.3.28 For this section, the baseline noise levels have been determined by averaging the measured noise levels from each of the survey locations within this section as described in *Appendix 14.2*.

#### *Section 4: A14 Swavesey to Girton*

- 14.3.29 This section would comprise online improvements and the existing noise level is dominated by the existing A14 road traffic. Between Conington and Bar Hill, the road passes through largely agricultural land with some individual properties close to the road. There are several smaller settlements further away from the A14. Noise levels are relatively high, giving rise to a number of Important Areas (IA 5143, IA 5142, IA 6114, IA 5140, IA 5139, IA 5138, IA 6113) associated with individual or small clusters of dwellings very close to the A14.
- 14.3.30 There is a larger settlement at Bar Hill, immediately to the south of, and bounded to the north by the A14. The closest dwellings to the A14 are around 200m away, with commercial uses and open space separating them. Daytime noise levels measured in Acorn Avenue were  $56\text{dB}_{\text{LAeq},16\text{hr}}$ , falling to  $47\text{dB}_{\text{LAeq},8\text{hr}}$  at night.

#### *Section 5: Cambridge Northern Bypass*

- 14.3.31 This reporting area is also an online improvement, where the soundscape is characterised by the existing A14 traffic. Noise levels are sufficiently high that there are several Important Areas (IA 5043, IA 5044, IA 6109, IA 5045), where dwellings are close to the road. Some sections of the road already have fence noise barriers. Important Area 5043 is the southern end of Girton, where the A14 is on an embankment where it passes the edge of a residential development. Further east and to the south of the A14, in Engledow Drive, where noise barriers are already in place, daytime noise levels were around  $53\text{dB}_{\text{LAeq},16\text{hr}}$ , falling to around  $50\text{dB}_{\text{LAeq},8\text{hr}}$  at night.

#### *Section 6: Huntingdon improvements*

- 14.3.32 Road traffic dominates existing noise levels, principally from traffic on the A14 but also from the A141 at the east of this reporting section and other A-roads. The East Coast mainline railway passes approximately north-south, to the west of Huntingdon. Moving south east from Huntingdon, the landscape becomes increasingly open, largely agricultural land, except for Godmanchester which is bounded to the north by the existing A14. The southern extremity of Hemingford Grey is on the northern boundary of the *DMRB HD 213/11* (Highways Agency et al., 2011) noise study area.

- 14.3.33 The A14 noise levels are sufficient to give rise to Important Areas at Stukeley Meadows (IA 6116); to the south of Huntingdon (IA6185, IA12131, IA5149); north of Godmanchester (IA6115) and at a number of individual properties or small settlements further east (IA5147, IA11743, IA5146, IA11744). There is also an Important Area, IA5150, to the east of Huntingdon at Hinchingsbrooke. All of these Important Areas would be bypassed, and existing road traffic noise levels reduced if the scheme is completed.

#### 14.4 Predicted impacts and significant effects

- 14.4.1 This section describes the results of the assessment of the base scheme. The base scheme includes earthworks around the road that are required for purposes other than noise mitigation, primarily to reduce visual and landscape impact, but which also reduce wayside noise. The base scheme does not include barriers proposed only for noise mitigation. The detailed results that have support the assessment are provided in *Appendix 14.4* and *Appendix 14.5*.
- 14.4.2 The assessment has been made on a reasonably foreseeable worst case basis.

##### Assessment of impacts and effects during construction

###### *Residential receptors: direct effects – individual dwellings*

- 14.4.3 Taking account of the avoidance and mitigation measures integrated into the base scheme, the following dwellings are predicted to experience construction noise levels higher than the noise insulation trigger levels defined in the *CoCP (Appendix 20.2)*<sup>10</sup> :
- two dwellings on Huntingdon Road to the south of Girton Interchange;
  - approximately 220 dwellings on Chieftain Way to the south of the Cambridge northern bypass;
  - approximately 25 dwellings on Neal Drive to the south of the Cambridge northern bypass;
  - approximately 30 dwellings on Engledow Drive to the south of the Cambridge northern bypass; and
  - approximately 45 dwellings on Flack End to the south of the Cambridge northern bypass.
- 14.4.4 All the above locations are within the Cambridge northern bypass reporting area.
- 14.4.5 The provision of noise insulation, that includes additional ventilation as needed to enable windows to be kept closed, would avoid the significant observed adverse effect due to noise inside the dwellings that would otherwise occur.

<sup>10</sup>  $L_{pAeq,0700-1900}$  measured at the façade, outdoors, or the existing ambient if this is already above this level. (the noise insulation trigger levels are 75dB $L_{pAeq,12hr}$  daytime, 65dB $L_{pAeq,1hr}$  during the evening and 55dB $L_{pAeq,1hr}$  during the night)

14.4.6 Temporary significant effects due to noise exposure at the private open space (gardens) are avoided by noise screening (from hoarding or buildings), or partially offset<sup>11</sup> by access to shared open space that is less affected by construction noise from the scheme.

*Residential receptors: direct effects – communities*

14.4.7 In locations with lower existing noise levels, construction noise effects are likely to be caused by changes to noise levels outside dwellings. These may be considered by the local community as an effect on the acoustic character of the area and hence be perceived as a change in the quality of life.

14.4.8 With regard to noise outside dwellings, the assessment of temporary effects takes account of construction noise relative to existing noise levels.

14.4.9 The envisaged avoidance and mitigation measures for the scheme would avoid airborne construction noise adverse effects on the majority of receptors and communities.

14.4.10 Likely temporary significant construction noise effects are identified at the communities listed in *Table 14.9* due to the number of people exposed to construction noise adverse effects and their close proximity to one another. However, the level of noise would not cause significant adverse effects on health and quality of life i.e. the noise is intrusive but not disruptive as set out in *PPG-Noise* (DCLG, 2014).

**Table 14.9: Direct adverse effects from construction noise on residential communities**

Significant effect reference (see <i>Figure 14.3</i> and <i>Appendix 14.4</i> )	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed approximate duration of impact and details
<b>A1 Alconbury to Brampton Hut</b>					
No community significant effects					
<b>A1/A4 Brampton Hut to East Coast mainline railway</b>					
CN_C01	Noise (temporary increased annoyance)	Daytime	Approx. 10 dwellings at the south west corner of RAF Brampton base	Operation of borrow pits and soil storage compounds with monthly noise levels of approximately 67dB <sub>LpAeq,12hr</sub>	42 months
<b>A14 East Coast mainline railway to Swavesey</b>					
No community significant effects					

<sup>11</sup> Consistent with PPG-noise.

Significant effect reference (see Figure 14.3 and Appendix 14.4)	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed approximate duration of impact and details
<b>A14 Swavesey to Girton</b>					
CN_C02	Noise (temporary increased annoyance)	Night time	Six dwellings on the A14 between Bar Hill and Girton	Online pavement laying works on the existing A14 with monthly noise levels of approximately 70dB <sub>L<sub>pAeq,1hr</sub></sub>	1 month
<b>Cambridge Northern Bypass</b>					
CN_C03	Noise (temporary increased annoyance)	Night time	Approx. 25 dwellings on Girton Road and Wellbrook Court, Girton	Online pavement laying works on the existing A14 with monthly noise levels of up to 67dB <sub>L<sub>pAeq,1hr</sub></sub>	1 month
CN_C04	Noise (temporary increased annoyance)	Night time	Approx. 25 dwellings on Lone Tree Avenue and Cambridge Road, Impington	Online pavement laying works on the existing A14 with a monthly noise level of approximately 58dB <sub>L<sub>pAeq,1hr</sub></sub>	1 month
CN_C05	Noise (temporary increased annoyance)	Daytime, night time and evening	Approx. 250 dwellings on Chieftain way, Cambridge	Online pavement laying works on the existing A14 with a monthly night time noise level of approximately 64dB <sub>L<sub>pAeq,1hr</sub></sub>	1 month
CN_C06	Noise (temporary increased annoyance)	Daytime, night time and evening	Approx. 90 dwellings to the north east of Kings Hedges and open playground/park on Topper Street	Earthworks with monthly evening noise levels of up to 62dB <sub>L<sub>pAeq,4hr</sub></sub> Online pavement laying works on the existing A14 with monthly noise levels of up to 64dB <sub>L<sub>pAeq,1hr</sub></sub>	1-2 months

Significant effect reference (see Figure 14.3 and Appendix 14.4)	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed approximate duration of impact and details
<b>Huntingdon improvements</b>					
CN_C07	Noise (temporary increased annoyance)	Daytime	Approx. 30 dwellings on St George Street Huntingdon	Viaduct demolition with a monthly noise level of up to 73dB <sub>L<sub>pAeq,12hr</sub></sub> and evening earthworks with noise levels up to 67dB <sub>L<sub>pAeq,4hr</sub></sub>	1 month

*Residential receptors: indirect effects*

- 14.4.11 No temporary indirect significant effects are expected at residential receptors.

*Non-residential receptors: direct effects*

- 14.4.12 Significant construction noise effects on non-residential receptors have been identified on a cautious, worst case basis, assuming that occupied rooms or otherwise sensitive facilities are located at the closest facades of the building to the scheme and that windows are open. The Highways Agency would continue to engage with the owners and operators of all the non-residential receptors to establish sensitivity of the receptors and develop additional mitigation where necessary and practicable as required by the *CoCP*, which has not been included in this assessment. Specific mitigation would be included, where needed, in the relevant final local environmental management plan (*CoCP (Appendix 20.2)*).

*Section 1: A1 Alconbury to Brampton Hut*

- 14.4.13 Huntingdon Research Centre has been identified as potentially being sensitive to vibration from the proposed construction work. Significant adverse vibration effects (CV\_N01) have been identified at this receptor on a worst case basis, including the assumption that there is no vibration mitigation for any sensitive equipment in the building. The Highways Agency would continue to engage with the owners and operators of all the non-residential receptors to establish sensitivity of the receptors and develop additional mitigation where necessary and practicable as required by the *CoCP*, which has not been included in this assessment. Specific mitigation would be included, where needed, in the relevant final local environmental management plan (*CoCP (Appendix 20.2)*).

*Section 2: Brampton Hut to East Coast mainline railway*

- 14.4.14 Landsmans Ltd, Brampton Rd (CN\_N01). Significant noise effects have been identified during the daytime with noise levels of 65–70dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 13 months commencing in 2016 during the soil storage works and construction of Buckden Bridge.

*Section 4: A14 Swavesey to Girton*

- 14.4.15 Travel Lodge Hotel, Bar Hill (CN\_N05). Significant noise effects have been identified during the night time with noise levels of 60dB<sub>L<sub>pAeq,1hr</sub></sub> over a period of 1 month commencing in 2017 during pavement/surfacing activities.

*Section 5: Cambridge Northern Bypass*

- 14.4.16 Travel Lodge Hotel, Impington (CN\_N06). Significant noise effects have been identified during the night time with noise levels of 66dB<sub>L<sub>pAeq,1hr</sub></sub> over a period of 1 month commencing in 2017 during pavement/surfacing activities, and during the evening with noise levels of 67dB<sub>L<sub>pAeq,4hr</sub></sub> over a period of 1 month commencing in 2017 during earthworks activities.
- 14.4.17 An advanced technologies and bioscience research centre in Cambridge Science Park has been identified as potentially being sensitive to vibration from the proposed construction work. Significant adverse vibration effects (CV\_N02) have been identified at this receptor on a worst case basis, including assuming there is no vibration isolation to any sensitive equipment.
- 14.4.18 The Highways Agency would continue to engage with the owners and operators of all the non-residential receptors to establish sensitivity of the receptors and develop additional mitigation where necessary and practicable as required by the *CoCP*, which has not been included in this assessment. Specific mitigation would be included, where needed, in the relevant final local environmental management plan (*CoCP (Appendix 20.2)*).

*Section 6: Huntingdon improvements*

- 14.4.19 Hinchingsbrooke Hospital (CN\_N02). Significant daytime noise effects have been identified on a worst case basis with noise levels between 57–65dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 5 months commencing in 2020 during earthwork activities. Significant evening noise effects have been identified with noise levels of 60dB<sub>L<sub>pAeq,4hr</sub></sub> over a period of approximately 1 month commencing in 2020 during earthwork activities.
- 14.4.20 Cambridge Constabulary HQ, Huntingdon (CN\_N03). Significant noise effects have been identified during the daytime with levels of 70–76dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 3 months commencing in 2020 during the earthwork activities for surrounding new and altered roads
- 14.4.21 Hinchingsbrooke School (CN\_N04). Significant noise effects have been identified during the daytime with levels of 61–72 dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 5 months commencing in 2020 during earthwork activities for surrounding new and altered roads.

14.4.22 The Highways Agency would continue to engage with the owners and operators of all the non-residential receptors to establish sensitivity of the receptors and develop additional mitigation where necessary and practicable as required by the *CoCP*. Specific mitigation would be included, where needed, in the relevant final local environmental management plan (*CoCP (Appendix 20.2)*).

*Non-residential receptors: indirect effects*

14.4.23 No indirect significant effects are expected at non-residential receptors.

**Assessment of impacts and effects during operation**

14.4.24 Taking account of the incorporated mitigation in the base scheme, *Figure 14.4* shows the long term  $40\text{dB}_{\text{LAeq},8\text{hr}}$ <sup>12</sup> night-time noise level contour from the operation of the scheme. The extent of the  $40\text{dB}_{\text{LAeq},8\text{hr}}$  night-time noise level contour is slightly larger than the  $50\text{dB}_{\text{LAeq},16\text{hr}}$  daytime contour<sup>13</sup>. In general, below these night-time and daytime levels, adverse effects are not expected.

14.4.25 Above  $40\text{dB}_{\text{LAeq},8\text{hr}(\text{night})}$  and  $50\text{dB}_{\text{LAeq},16\text{hr}(\text{day})}$  the effect of noise is dependent on the baseline noise levels in that area and the change in noise level (magnitude of effect) brought about by the scheme. The airborne noise impacts and effects predicted for the operation of the scheme, together with Important Areas, are presented on *Figure 14.5* with additional information in *Appendix 14.5*.

14.4.26 *Figure 14.4* also shows the long term  $55\text{dB}_{\text{LAeq},8\text{hr}}$ <sup>14</sup> night-time noise level contour from the operation of the scheme. The extent of the  $55\text{dB}_{\text{LAeq},8\text{hr}}$  night-time noise level contour is slightly larger than the  $63\text{dB}_{\text{LAeq},16\text{hr}}$  daytime contour<sup>15</sup>. In general, above these night-time and daytime levels, significant adverse effects on health and quality of life are possible and hence noise insulation is offered to avoid these effects where sustainable mitigation in the scheme has been exhausted.

<sup>12</sup> Defined as the equivalent continuous sound level from 23:00 to 07:00 or  $L_{\text{pAeq},\text{night}}$

<sup>13</sup> With the traffic flows described in the assumptions section of the ES, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or  $L_{\text{pAeq},\text{day}}$  from the scheme) would be approximately 7dB higher than the night-time sound level. The night time 40dB contour is therefore greater in size than the daytime 50dB contour.

<sup>14</sup> Defined as the equivalent continuous sound level from 23:00 to 07:00 or  $L_{\text{pAeq},\text{night}}$

<sup>15</sup> With the traffic flows described in the assumptions section of the ES, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or  $L_{\text{pAeq},\text{day}}$  from the scheme) would be approximately 7dB higher than the night-time sound level. The night time 40dB contour is therefore greater in size than the daytime 50dB contour.

## Section 1: A1 Alconbury to Brampton Hut

### *Residential receptors: direct effects – individual dwellings*

- 14.4.27 Taking account of the avoidance and mitigation measures integrated into the base scheme, no residential buildings are predicted to experience noise levels higher than the noise insulation trigger levels as defined in *Noise Insulation Regulations 1975 (as amended)*. Hence no residential receptors are predicted to experience significant observed adverse effects from operational noise. For daytime the trigger level is  $63\text{dB}_{\text{LAeq},16\text{hr}}^{16}$  measured outdoors, or the existing ambient if this is already above this level. Based on the difference between daytime and night-time traffic flows this is equivalent night-time trigger level of  $55\text{dB}_{\text{LAeq},16\text{hr}}$ .

### *Residential receptors: direct effects – communities*

- 14.4.28 The mitigation measures integrated into the scheme would avoid the majority of airborne noise adverse effects on Alconbury and Little Stukeley. In this reporting area no residential dwellings are predicted to experience noise levels higher than  $40\text{dB}_{\text{LAeq},8\text{hr}(\text{night})}$  and  $50\text{dB}_{\text{LAeq},16\text{hr}(\text{day})}$  due to the operation of the scheme.
- 14.4.29 Therefore no likely significant adverse direct effects are identified at communities in this reporting area.

### *Residential receptors: indirect effects*

- 14.4.30 The indirect adverse or beneficial effects on the areas of the residential communities identified in *Table 14.10* are considered to be significant.

**Table 14.10: Indirect effects on residential communities and shared open areas that are considered to be significant on a community basis**

Significant effect number (see <i>Figure 14.5</i> )	Source of significant effect	Time of day	Location details
ON-C01(S)	Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Great North Road, Manor Lane, Hillfield, Ash End, Beech End, Maple End, Willow End, School Lane, Sharps Lane, Rusts Lane, High Street, Field Close and Frumetty Lane in Alconbury. Predicted increase in noise from road traffic which is likely to cause a minor adverse effect on the acoustic character of the area around the closest properties.

### *Important Areas*

- 14.4.31 This reporting area contains Important Area IA5153 A1, Alconbury.

### *Non-residential receptors: direct effects*

- 14.4.32 The assessment has not identified any likely significant effects of operational noise and vibration on non-residential receptors in this reporting area.

<sup>16</sup>  $63\text{dB}_{\text{LAeq},0700-2300}$  freefield which is equivalent to  $68\text{dB}_{\text{LAeq},10,0600-2400}$  measured on the façade of a property

*Non-residential receptors: indirect effects*

- 14.4.33 Permanent changes in traffic on existing roads caused by the scheme are not likely to cause adverse noise effects on non-residential receptors in this reporting area.

*Committed developments*

- 14.4.34 No sensitive committed developments are subject to any non-negligible noise impacts in this section.

*Quiet Areas*

- 14.4.35 There are no known designated Quiet Areas within this section.

**Section 2: A1/A14 Brampton Hut to East Coast mainline railway (including East Coast mainline railway)***Residential receptors: direct effects – individual dwellings*

- 14.4.36 Taking account of the avoidance and mitigation measures integrated into the base scheme, Rectory Farm Great North Road, Brampton) is predicted to experience noise levels higher than the noise insulation trigger levels as defined in *Noise Insulation Regulations 1975 (as amended)*. The installation of noise insulation would avoid the significant observed adverse effect (refer to *Table 14.1*) that would otherwise occur inside these dwellings.
- 14.4.37 Noise levels are currently above the threshold for a significant observed adverse effect (refer to *Table 14.1*) at two residential receptors (Little Meadow and Woodhatch Farm, Thrapston Road, Ellington). Taking account of the avoidance and mitigation measures integrated into the base scheme, noise levels would remain a significant observed adverse effect. As these receptors fall within an Important Area (IA5152), further mitigation has been considered as discussed in section 14.5. These dwellings are within an Important Area and mitigation options are considered further in following subsections.

*Residential receptors: direct effects – communities*

- 14.4.38 The avoidance and mitigation measures integrated into the base scheme for this reporting area would avoid airborne noise adverse effects on the majority of receptors in this reporting area, with the exception of those listed below in *Table 14.11*.
- 14.4.39 The increases in noise levels listed in *Table 14.11* are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life. These adverse effects are considered to be significant primarily as a consequence of the number of affected receptors.

**Table 14.11: Direct effects on residential communities and shared open areas that are considered to be significant on a community basis**

Significant effect number (see Figure 14.5)	Source of significant effect	Time of day	Location details
ON-C04(S)	Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Stewart Close on the south west edge of Brampton. Predicted increase in noise from road traffic which is likely to cause a minor adverse effect on the acoustic character of the area around the closest properties. No adverse effects on shared open spaces have been identified.
ON-C05(S)	Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the west edge of RAF Brampton. Predicted increase in noise from road traffic which is likely to cause a minor adverse effect on the acoustic character of the area around the closest properties. No adverse effects on shared open spaces have been identified.

*Residential receptors: indirect effects*

- 14.4.40 The avoidance and mitigation measures integrated into the base scheme for this reporting area would avoid indirect airborne noise significant observed adverse effects.
- 14.4.41 The beneficial effects on the areas of the residential communities identified in *Table 14.12* are considered to be significant as a consequence of the number of affected receptors.

**Table 14.12: Indirect effects on residential communities and shared open areas that are considered to be significant on a community basis**

Significant effect number (see Figure 14.5)	Source of significant effect	Time of day	Location of details
ON-C02(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Thrapston Road on the north edge of Brampton. Predicted reduction in noise from road traffic which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties.
ON-C03(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Huntingdon Road on the east edge of Brampton. Predicted reduction in noise from road traffic which is likely to cause a minor beneficial effect on the acoustic character of the area around the closest properties.

### *Important Areas*

- 14.4.42 This reporting area contains two Important Areas.
- 14.4.43 The first Important Area (IA5152) is at the location where Little Meadow and Woodhatch Farm are located. The base scheme would not reduce the noise levels at these locations and hence further mitigation is considered in *section 14.5* of this chapter as noted earlier.
- 14.4.44 The second Important Area (IA5151) is on the existing A14 directly north of Brampton. Properties at this Important Area are indirectly and beneficially affected as traffic flows reduce in this location due to the introduction of the scheme and hence noise levels would reduce.

### *Non-residential receptors: direct effects*

- 14.4.45 The assessment of effects on non-residential receptors has been undertaken on a reasonable worst case basis taking account of all the public information about each receptor.
- 14.4.46 The assessment has not identified any adverse airborne noise effects within this reporting area.
- 14.4.47 The beneficial effects on non-residential receptors identified in *Table 14.13* are considered to be significant.

**Table 14.13: Direct effects on non-residential receptors**

Significant effect number (see <i>Figure 14.5</i> )	Type of effect and source	Time of the day	Location and details
ON-N01 (BA)	Moderate reduction in the risk that hotel activities would be disturbed by external road traffic noise.	Day and night	Premier Inn, Brampton Hut

### *Non-residential receptors: indirect effects*

- 14.4.48 The assessment has not identified any significant indirect adverse or beneficial airborne noise effects within this reporting area.

### *Committed developments*

- 14.4.49 There is one committed development in this section: CD15 (shown on *Figure 14.1*) which includes around 400 proposed dwellings and office and retail space. The vast majority of this committed development's footprint would be subject to negligible noise impacts as a result of the scheme. The extreme south-western portion of its footprint would be subject to minor adverse impacts.

### *Quiet Areas*

- 14.4.50 There are no known designated Quiet Areas within this reporting area.

### Section 3: A14 East Coast mainline railway to Swavesey (not including Swavesey)

#### *Residential receptors: direct effects – communities*

- 14.4.51 The avoidance and mitigation measures integrated into the base scheme for this reporting area would avoid any significant observed adverse effects and also would avoid airborne noise adverse effects on the majority of receptors in this reporting area, other than those listed below in *Table 14.14*. The increases in noise levels listed in *Table 14.14* are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life.
- 14.4.52 The adverse effects on the areas of the residential communities identified in *Table 14.14* are considered to be significant primarily as a consequence of the number of receptors subject to the predicted change in noise levels.

**Table 14.14: Direct effects on residential communities and shared open areas that are considered to be significant on a community basis**

Significant effect number (see <i>Figure 14.5</i> )	Source of significant effect	Time of day	Location details
ON-C06(S)	Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Pear Tree Close, Fenstanton. Predicted increase in noise from road traffic which is likely to cause a moderate adverse effect on the acoustic character of the area around the closest properties. No adverse effects on shared open spaces have been identified.

#### *Residential receptors: indirect effects*

- 14.4.53 The indirect adverse or beneficial effects on the areas of the residential communities identified in *Table 14.15* are considered to be significant.

**Table 14.15: Indirect effects on residential communities and shared open areas that are considered to be significant on a community basis**

Significant effect number (see <i>Figure 14.5</i> )	Source of significant effect	Time of day	Location details
ON-C07(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings to the south of Fenstanton close to the A14. Predicted reduction in noise from road traffic which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties.

#### *Important Areas*

- 14.4.54 There is one Important Area (IA5144) in this reporting area at Fenstanton, where there are approximately 80 properties. Here the existing A14 noise levels would reduce as a consequence of traffic on this section of the A14 being reduced by the scheme.

*Non-residential receptors: direct effects*

- 14.4.55 The assessment has not identified any adverse or beneficial airborne noise impacts on non-residential receptors within this area.

*Non-residential receptors: indirect effects*

- 14.4.56 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptors identified in *Table 14.16*.
- 14.4.57 The assessment of effects on non-residential receptors has been undertaken on a worst case basis taking account of all the public information about each receptor.

**Table 14.16: Indirect effects on non-residential receptors**

Significant effect number (see Drawing 14.6)	Type of effect and source	Time of day	Location details
ON-N02 (BA)	Moderate reduction in the risk that office activities would be disturbed by external road traffic noise (indirect).	Day	Stagecoach Ltd, Fenstanton
ON-N03 (BA)	Moderate reduction in the risk that office activities would be disturbed by external road traffic noise (indirect).	Day	MAB General Insurance Services Ltd, Fenstanton

*Committed Developments*

- 14.4.58 There is no sensitive committed development in this section.

*Quiet Areas*

- 14.4.59 There are no known designated Quiet Areas within this section of the scheme.

**Section 4: A14 Swavesey to Girton***Residential receptors: direct effects – individual dwellings*

- 14.4.60 Taking account of mitigation measures included in the base scheme, the noise levels at the following individual dwellings are predicted to exceed the noise insulation trigger levels defined in *Noise Insulation Regulations 1975 (as amended)*:
- Friesland Farm, Huntingdon, Conington; and
  - Foxhollow, Bar Hill<sup>17</sup>.
- 14.4.61 Noise insulation would avoid the significant observed adverse effects (refer to *Table 14.1*) that would otherwise occur inside these dwellings.

<sup>17</sup> This takes account of increased traffic on Craft Way.

14.4.62 The existing noise levels at the following individual dwellings are predicted to exceed the threshold for a significant observed adverse effect (refer to *Table 14.1*):

- 1-6 Catchall Farm Cottages<sup>18</sup>, Cambridge (Important Area IA5138);
- Crouchfield Villa and Westdene at Hackers Fruit Farm, Huntingdon Road, Lolworth (Important Area IA5139); and
- Rhadegund Cottages, Huntingdon Road, Cambridge (Important Area IA5140).

14.4.63 Taking account of the mitigation included in the base scheme, the noise levels would remain a significant observed adverse effect at these locations. Given that these receptors lie within Important Areas (as noted above and later in this subsection), further mitigation is considered in section 14.5.

14.4.64 The scheme moves the carriageways of the A14 away from Hill Farm Cottages resulting in a reduction in noise levels at the property closest to the A14 (no. 1 Hill Farm Cottages). However, the neighbouring receptors at Hill Farm Cottages are subject to a significant observed adverse effect as a consequence of the scheme<sup>19</sup>. Given that Hill Farm Cottages collectively fall with Important Area IA6114, further mitigation is considered in *section 14.5* of this chapter.

*Residential receptors: direct effects – communities*

14.4.65 No adverse or beneficial direct effects of noise have been identified on a community basis in this reporting area.

*Residential receptors: indirect effects*

14.4.66 The scheme is not likely to create any indirect effects at residential receptors in this reporting area.

*Important Areas*

14.4.67 This reporting area contains seven Important Areas, which are identified on *Figure 14.5* and in *Appendix 14.5*, located at:

- Unoccupied/derelict house (IA5143);
- Unoccupied/derelict house (IA5142);
- Hill Farm Cottages (IA6114);
- Rhadegund Cottages (IA5140);
- Crouchfield Villa, and Westdene at Hackers Fruit Farm (IA 5139);
- Catchall Farm (IA5138); and
- Elm Grange/Grange Farm (IA6113).

<sup>18</sup> The effect reaches and unacceptable adverse effect level at some of these receptors (refer to *Table 14.1* and *Appendix 14.5*)

<sup>19</sup> Further information is presented in *Appendix 14.5*.

14.4.68 IA5142 and IA5143 are not considered further due to their current uncertain status. Highways Agency would monitor any future change in status at these locations.

14.4.69 As noted earlier in this reporting section, further mitigation is considered for IAs 6114, 5138, 5139 and 5140 in *section 14.5* of this chapter.

*Non-residential receptors: direct effects*

14.4.70 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptors identified in *Table 14.17*.

14.4.71 The assessment of effects on non-residential receptors has been undertaken on a reasonable worst case basis taking account of all the public information about each receptor. Further information can be found in *Appendix 14.5*.

**Table 14.17: Direct effects on non-residential receptors**

Significant effect number (see Drawing 14.6)	Type of effect and source	Time of day	Location details
ON-N04 (S)	Moderate adverse risk of disturbance of office activities due to increase in external road traffic noise.	Day	New Close Business Park

*Non-residential receptors: indirect effects*

14.4.72 No adverse or beneficial indirect effects of noise have been identified at non-residential receptors in this reporting area.

*Committed developments*

14.4.73 There are no sensitive committed developments in this section.

*Quiet Areas*

14.4.74 There are no known designated Quiet Areas within the scheme.

**Section 5: Cambridge Northern Bypass**

*Residential receptors: direct effects – individual dwellings*

14.4.75 Taking account of the existing noise barrier, the noise levels at 10 dwellings in Lone Tree Avenue, Impington, are predicted to exceed the noise insulation trigger levels as defined in *Noise Insulation Regulations 1975 (as amended)* as a result of the scheme.

14.4.76 The installation of noise insulation would avoid the significant observed adverse effects that would otherwise occur inside the dwellings at Lone Tree Avenue. As these properties fall within Important Area IA6109, as discussed below, further mitigation is discussed in *section 14.5* of this chapter.

14.4.77 Noise levels at Blackwell Caravan Park, Cambridge are currently a significant observed adverse effect (refer to *Table 14.1*) and this is also predicted to be the case with the scheme in operation. As these dwellings fall with Important Area IA5045, further mitigation is considered in *section 14.5* of this chapter.

*Residential receptors: direct effects – communities*

- 14.4.78 The avoidance and mitigation measures integrated into the base scheme for this reporting area would avoid airborne noise adverse effects on the receptors in this reporting area.

*Residential receptors: indirect effects*

- 14.4.79 The scheme would not cause indirect adverse noise effects on residential receptors in this section.

*Important Areas*

- 14.4.80 This section contains four Important Areas, which are identified on *Figure 14.5* and in *Appendix 14.5*, located at:

- Girton (IA5043);
- Woodhouse Farm, Impington (IA5044);
- Lone Tree Avenue, Impington (IA6109); and
- Blackwell Caravan Park (IA5045).

- 14.4.81 Further mitigation is considered in *section 14.5* of this chapter.

*Non-residential receptors: direct effects*

- 14.4.82 The assessment has not identified any adverse or beneficial airborne noise direct effects at non-residential receptors within this section.

*Non-residential receptors: indirect effects*

- 14.4.83 The assessment has not identified any adverse or beneficial airborne noise indirect impacts at non-residential receptors within this section.

*Committed developments*

- 14.4.84 There is one committed development in this section which is subject to non-negligible noise impacts: CD7 (shown on *Figure 14.1*) is a proposal for the construction of up to 3,000 dwellings and substantial commercial space. The vast majority of this committed development's footprint would be subject to negligible noise impacts as a result of the scheme: however, the north-eastern part of the site (opposite Girton College) would be subject to minor adverse impacts.

*Quiet Areas*

- 14.4.85 There are no known designated Quiet Areas within this section.

**Section 6: Huntingdon improvements***Residential receptors: direct effects – individual dwellings*

- 14.4.86 Taking account of the avoidance and mitigation measures integrated into the base scheme, no significant observed adverse effects are identified at individual dwellings in this section.

*Residential receptors: direct effects – communities*

- 14.4.87 There are no direct effects on the Huntingdon community from the scheme in this section.

*Residential receptors: indirect effects*

14.4.88 The beneficial indirect effects on the residential communities identified in *Table 14.18* are considered to be significant primarily as a consequence of the number of receptors experiencing the noise change.

**Table 14.18: Indirect effects on residential communities and shared open areas that are considered to be significant on a community basis**

Significant effect number (see Drawing 14.5)	Source of significant effect	Time of day	Location details
ON-C09(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings on the western periphery of Hinchingsbrooke. Predicted reduction in noise from road traffic which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties. This is also identified as an Important Area.
ON-C10(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings to the east of Hinchingsbrooke Hospital close to the existing A14. Predicted reduction in noise from road traffic which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties.
ON-C11(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings at Stukeley Meadows close to the existing A14. Predicted reduction in noise from road traffic which is likely to cause a minor, moderate or major beneficial effect on the acoustic character of the area around the closest properties.
ON-C12(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in the centre of Huntingdon on Castle Hill, Prince's Street, Alder Drive and Sayer Street. Predicted reduction in noise from road traffic which is likely to cause a minor, moderate or major beneficial effect on the acoustic character of the area around the closest properties.
ON-C13(BA)	Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings to the north of Godmanchester. Predicted reduction in noise from road traffic which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties.

### *Important Areas*

14.4.89 This reporting area contains ten Important Areas:

- Stukeley Meadows, Huntingdon (IA6116);
- Bliss Close, Huntingdon (IA5150);
- Mill Common, Huntingdon (IA6185);
- Waters Meet, Huntingdon (IA12131);
- Bridge Place, Huntingdon (IA5149);
- Rectory Gardens/Cambridge Villas, Godmanchester (IA6115);
- New Farm, Hemingford Abbot (IA5147);
- Rectory Farm, Hemingford Abbot (IA11743);
- Gore Tree Cottage, Hemingford Grey (IA5146); and
- The Cottages, Woolpack Farm, Hemingford Grey (IA11744).

14.4.90 The scheme is predicted to provide noise reductions as a consequence of reducing traffic on the existing A14 and hence no further mitigation has been considered for these Important Areas.

#### *Non-residential receptors: direct effects*

14.4.91 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptors identified in *Table 14.19*

14.4.92 The assessment has been undertaken on a worst case basis taking account of all the public information about each receptor.

**Table 14.19: Direct effects on non-residential receptors**

Significant effect number (see <i>Figure 14.5</i> )	Type of effect and source	Time of the day	Location details
ON-N05	Moderate adverse risk of disturbance of office activities due to increase in external road traffic noise.	Day	Cambridgeshire Constabulary Headquarters

#### *Non-residential receptors: indirect effects*

14.4.93 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptors identified in *Table 14.20*.

14.4.94 The assessment has been undertaken on a reasonable worst case basis taking account of all the public information about each receptor.

**Table 14.20: Indirect effects on non-residential receptors**

Significant effect number (see Drawing 14.6)	Type of effect and source	Time of the day	Location details
ON-N06 (BA)	Moderate reduction in the risk that office activities would be disturbed by external road traffic noise.	Day	Cambridgeshire Fire and Rescue Service.
	Moderate reduction in the risk that sleep would be disturbed by external road traffic noise.	Night	Cambridgeshire Fire and Rescue Service.
ON-C07 (BA)	Minor and moderate reduction in the risk that internal activities would be disturbed by external road traffic noise levels.	Day	Hinchingbrooke Business Park
	Minor reduction in the risk that sleep would be disturbed by external road traffic noise.	Night	Huntingdon Marriott Hotel
ON-N08 (BA)	Moderate reduction in the risk that educational activities would be disturbed by external road traffic noise	Day	Stukeley Meadows Primary School
ON-N09 (BA)	Moderate reduction in the risk that internal activities would be disturbed by external road traffic noise.	Day	Hinchingbrooke Hospital
	Moderate reduction in the risk that sleep would be disturbed by external road traffic noise.	Night	Hinchingbrooke Hospital
ON-N10 (BA)	Minor and moderate beneficial – reduced risk of disturbance of internal activities due to external road traffic noise.	Day	Central Huntingdon
ON-N11 (BA)	Minor reduction in the risk that internal activities would be disturbed by external road traffic noise	Day	Godmanchester Baptist Church and Community Centre
ON-N12 (BA)	Major reduction in the risk that internal activities would be disturbed by external road traffic noise.	Day	Cardinal Park
ON-N13 (BA)	Minor and major reduction in the risk that activities would be disturbed by external road traffic noise.	Day	Hemingford Nursery School and offices

*Committed developments*

14.4.95 Committed developments CD1, CD4, CD16 and CD17 would be subject to minor to moderate beneficial impacts as a result of the scheme.

- 14.4.96 Committed development CD18 would be subject to minor adverse impacts as a result of the scheme.

#### *Quiet Areas*

- 14.4.97 There are no known designated Quiet Areas within this section of the scheme.

### **14.5 Mitigation**

#### *Construction*

- 14.5.1 The base case assessment assumes that the works would be undertaken following the principles and processes set out in the *Code of construction practice (Appendix 20.2)*.
- 14.5.2 As set out in *section 14.4* of this chapter and in *Chapter 20*, further mitigation could be detailed as required in the local environmental management plans following dialogue with local authorities.

#### *Operation*

- 14.5.3 The scheme noise policy (*Appendix 14.1*) sets out how noise and vibration from the operation of the scheme would be controlled through detailed design, post consent of the Development Consent Order (if granted)<sup>20</sup>.
- 14.5.4 To avoid significant observed adverse effects from the scheme, minimise as far as sustainable other likely significant adverse effects from the scheme and reduce existing and future significant observed adverse effects in a number of Important Area, the additional mitigation described in *Table 14.21* is envisaged. This includes the replacements or upgrade of existing barriers in a number of locations. Equivalent or better mitigation would be developed during detailed design of the scheme.
- 14.5.5 To ensure that additional mitigation is sustainable, the provision has been subject to the following tests:
- Benefit (monetised benefit of noise reduction evaluated using WebTAG<sup>21</sup>) compared to cost of the mitigation;
  - Engineering practicability;
  - Other environmental effects potentially caused by the mitigation (for example landscape or visual effects); and
  - Stakeholder engagement and consultation responses.

<sup>20</sup> Refer to *Chapter 20* for further information.

<sup>21</sup> Additional weight has been given to significant or unacceptable observed adverse effects (refer to *Table 14.1*).

**Table 14.21: Envisaged noise mitigation measures for operation of the scheme**

Mitigation identification (See Figures 14.6 and 14.7)	Location	Indicative chainage	Indicative barrier length (m)	Total barrier height (m)	Description
<b>Section 1: A1 Alconbury to Brampton Hut</b>					
M14	Alconbury – west of A1(M)	Beyond scheme chainage	1,120	2 to 4	Replace existing 2m reflective barriers with 4m absorptive, and additional 2m absorptive barrier along existing 2m earth bund.
M16	Alconbury – east of A1(M)	Beyond scheme chainage.	200	2	Absorptive barrier alongside B1043 (A1 Southbound offslip).
<b>Section 2: A1/A14 Brampton Hut to East Coast mainline railway (including East Coast mainline railway bridge)</b>					
M17	Brampton Hut – west of A14/A1 Interchange	Ch 0+775 to 1+060	285	3	Absorptive barrier for Little Meadows and Woodhatch Farm.
M18	Brampton	Ch 2+230 to 3+230	1,000	2	2m absorptive barrier on top of 2m false cutting along scheme alignment.
<b>Section 3: East Coast mainline railway to Swavesey (not including Swavesey)</b>					
-	-	-	-	-	-
<b>Section 4: A14 Swavesey to Girton</b>					
M20	Swavesey	Ch 23+940 to 24+260	320	4	4m reflective barrier for Hill Farm Cottages.
M21	Bar Hill, south of J29 (A14)	Ch 26+365 to 26+485	120	3	3m reflective barrier for Rhadegund Cottages
M22	Dry Drayton	Ch 27+670 to 27+930	260	3	3m absorptive barrier for Crouchfield Villa and Westdene, Huntingdon Road
M22	Dry Drayton	Ch 27+930 to 28+220	290	3	3m absorptive barrier for Cambridge Crematorium.

Mitigation identification (See Figures 14.6 and 14.7)	Location	Indicative chainage	Indicative barrier length (m)	Total barrier height (m)	Description
M23	Dry Drayton	Ch 28+535 to 28+735	200	3	3m absorptive barrier for Catchall Farm properties
M24	Girton	Ch 29+200 to 29+300	100	3	3m absorptive barrier for Grange Farm Cottages.
<b>Section 5: Cambridge Northern Bypass</b>					
M25	Girton (Wellbrook)	Ch 31+050 to 31+160	110	3	West of Girton Road - 3m absorptive barrier for properties close to A14.
M26	Girton (Wellbrook)	Ch 31+170 to 31+210	40	3	East of Girton Road - 3m absorptive barrier for 4 properties.
M27	Girton (Oakington)	Ch 31+200 to 31+300	100	3	East of Girton Road – 3m absorptive barrier along top of existing cutting.
M28/34	Girton (Oakington)	Ch 30+820 to 31+185	390	4	West of Girton Road - replace existing 2m reflective barrier with 4m absorptive, along top of existing cutting.
M29	Impington	Ch 32+250 to 32+500	250	2	2m absorptive barrier for properties in Orchard Close and Woodhouse Farm, just west of Junction 32.
M30/33	Impington	Ch 32+660 to 33+000	320 250	4 3	Replace existing 2m barrier with new 4m absorptive, and also extend to west by 250m with 3m absorptive barrier.
M31	Blackwell Caravan Park	Ch 34+310 to 34+610	250	3	3m absorptive barrier
<b>Section 6: Huntingdon improvements</b>					
-	-	-			-

14.5.6 The envisaged mitigation measures are shown on *Figure 14.6*.

## 14.6 Residual significant effects

- 14.6.1 This section reports the assessment of likely noise and vibration residual significant effects taking account of proposed additional mitigation described in section 14.5.
- 14.6.2 Significant observed adverse effects (refer to *Table 14.1*) are avoided by the combination of envisaged mitigation integrated into the scheme that has been maximised as far as sustainable and, where required, noise insulation.

### Construction

- 14.6.3 The likely residual temporary significant construction noise effects are identified at the communities listed in *Table 14.9*.
- 14.6.4 Significant construction noise effects on non-residential receptors have been identified on a cautious, worst case basis, assuming, for example, that occupied rooms or otherwise sensitive facilities are located at the closest facades of the building to the scheme and that windows are open.
- 14.6.5 The Highways Agency would continue to engage with the owners and operators of the non-residential receptors identified as being subject, on a worst cases basis, to a likely significant effect as noted below to establish sensitivity of the receptors and develop additional mitigation where necessary and practicable as required by the CoCP. As noted in *Chapter 20*, any additional mitigation would be included, where needed, in the relevant final local environmental management plan.

#### *Section 1: A1 Alconbury to Brampton Hut*

- 14.6.6 Huntingdon Research Centre, Woolley Road (CN\_N01). Significant noise effects have been identified during the daytime with noise levels of  $70\text{dB}_{\text{LAeq},12\text{hr}}$  over a period of approximately 1 month commencing in 2016 during site clearance works.
- 14.6.7 Huntingdon Research Centre has also been identified as potentially being sensitive to vibration from the proposed construction work. Significant adverse vibration effects (CV\_N01) have been identified at this receptor, on a worst case basis that assumes no vibration mitigation to any sensitive equipment. The magnitude and duration of any significant effect and the mitigation to avoid it would be included in the relevant final local environmental management plan following further engagement with the owners and operators as noted above.

#### *Section 2: A1/A14 Brampton Hut to East Coast mainline railway (including East Coast mainline railway bridge)*

- 14.6.8 Landsmans Ltd, Brampton Rd (CN\_N02). Significant temporary noise effects have been identified during the daytime with noise levels of  $65\text{--}70\text{dB}_{\text{LAeq},12\text{hr}}$  over a period of approximately 13 months, commencing in 2016 during the soil storage works and construction of Buckden Bridge.

#### *Section 4: A14 Swavesey to Girton*

- 14.6.9 Days Inn Hotel, Cambridge Services (CN\_N08). Significant temporary noise effects have been identified during the night time with noise levels of

56dB<sub>L<sub>pAeq,1hr</sub></sub> over a period of 1 month commencing in 2017 during pavement/surfacing activities.

- 14.6.10 Travel Lodge Hotel, Bar Hill (CN\_N09). Significant temporary noise effects have been identified during the night time with noise levels of 60dB<sub>L<sub>pAeq,1hr</sub></sub> over a period of 1 month commencing in 2017 during pavement/surfacing activities.

#### *Section 5: Cambridge Northern Bypass*

- 14.6.11 Travel Lodge Hotel, Impington (CN\_N10). Significant temporary noise effects have been identified during the night time with noise levels of 66dB<sub>L<sub>pAeq,1hr</sub></sub> over a period of 1 month commencing in 2017 during pavement/surfacing activities, and during the evening with noise levels of 67dB<sub>L<sub>pAeq,4hr</sub></sub> over a period of 1 month commencing in 2017 during earthworks activities.

- 14.6.12 Premier Inn Hotel, Impington (CN\_N11). Significant temporary noise effects have been identified during the night time with noise levels of 65dB<sub>L<sub>pAeq,1hr</sub></sub> over a period of 1 month commencing in 2017 during earthworks activities.

- 14.6.13 An advanced technologies and bioscience research centre in Cambridge Science Park has been identified as potentially being sensitive to vibration from the proposed construction work. Significant adverse vibration effects (CV\_N02) have been identified at this receptor. The magnitude and duration of any significant effect and the mitigation to avoid it would be included in the relevant final local environmental management plan following further engagement with the owners and operators as noted above.

#### *Section 6: Huntingdon improvements*

- 14.6.14 Hinchingsbrooke Hospital (CN\_N03). Significant temporary daytime noise effects have been identified on a worst case basis with noise levels between 57–65dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 5 months commencing in 2020 during earthwork activities and during the evening with noise levels of 60dB<sub>L<sub>pAeq,4hr</sub></sub> over a period of approximately 1 month commencing in 2020 during earthwork activities.

- 14.6.15 All Saints Church, Huntingdon (CN\_N04). Significant temporary noise effects have been identified during the daytime with levels up to 52dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 2 months commencing in 2020 during earthworks for surrounding new and altered roads

- 14.6.16 Dental Surgery, Brampton Road, (CN\_N05). Significant temporary noise effects have been identified during the daytime with levels up to 71dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 1 month commencing in 2020 during earthwork activities for surrounding new and altered roads

- 14.6.17 Cambridge Constabulary HQ, Huntingdon (CN\_N06). Significant temporary noise effects have been identified during the daytime with levels of 70-76dB<sub>L<sub>pAeq,12hr</sub></sub> over a period of approximately 3 months commencing in 2020 during the earthwork activities for surrounding new and altered roads

- 14.6.18 Hinchingsbrooke School (CN\_N07). Significant temporary noise effects have been identified during the daytime with levels of 61–72 dBL<sub>pAeq,12hr</sub> over a period of approximately 5 months commencing in 2020 during earthwork activities for surrounding new and altered roads.

### Operation

#### *Section 1: A1 Alconbury to Brampton Hut*

- 14.6.19 The avoidance and mitigation measures in this reporting area would avoid any significant observed adverse (refer to *Table 14.1*) effects and would minimise as far as sustainable adverse effects on the majority of receptors and communities including their shared open areas.
- 14.6.20 There is one Important Area (Highways Agency's ID reference 5153) within this section, representing dwellings in north Alconbury which face onto the A1(M). The scheme would significantly enhance the existing noise mitigation measures in this location, replacing the current noise fence barrier with a new taller fence barrier, improving the noise environment within this IA. No dwellings in this IA would be subject to a residual likely significant effect.
- 14.6.21 No likely significant effects have been identified on noise or vibration sensitive committed developments in this section.

#### *Section 2: A1/A14 Brampton Hut to East Coast mainline railway (including East Coast mainline railway bridge)*

- 14.6.22 The avoidance and mitigation measures in this reporting area would avoid any significant observed adverse effects (refer to *Table 14.1*) and would minimise as far as sustainable adverse effects on the majority of receptors and communities including their shared open areas.
- 14.6.23 Two Important Areas fall within this section: Important Area reference 5152, representing two dwellings (Woodhatch Farm and Little Meadow, represented by assessment location 253) and Important Area reference 5151 representing dwellings in north Brampton, facing onto the A14 Thrapston Road).
- 14.6.24 At Important Area 5152, the proposed mitigation would provide moderate beneficial noise reductions to the dwellings and ensure that the residual noise levels at these dwellings would avoid significant adverse effect on health and quality of life. The mitigation measures would reduce noise inside the dwellings which fall within Important Area ref 5152 (Little Meadow and Woodhatch Farm), such that the current significant observed adverse effects (refer to *Table 14.1*) would be avoided with the scheme in operation.
- 14.6.25 At Important Area reference 5151, there is an existing noise fence barrier in place between A14 Thrapston Road and the adjacent dwellings.
- 14.6.26 The existing A14 Thrapston Road is significantly de-trafficked as a result of the project. A significant beneficial effect is identified in this location as a result.

14.6.27 The changes in noise combined with the number and proximity of receptors exposed to the changes are considered to be significant in the residential community areas summarised in *Table 14.22*.

**Table 14.22: Likely significant noise or vibration effects on residential receptors arising from operation of the scheme – Section 2: Brampton Hut to East Coast mainline railway**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location details
ON-C02(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Thrapston Road on the north edge of Brampton. Predicted reduction in noise from road traffic which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties.
ON-C03(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Huntingdon Road on the east edge of Brampton. Predicted reduction in noise from road traffic which is likely to cause a minor beneficial effect on the acoustic character of the area around the closest properties.
ON-C04(S)	Direct: Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Stewart Close on the west edge of Brampton. Predicted increase in noise from road traffic which is likely to cause a minor adverse effect on the acoustic character of the area around the closest properties. No adverse effects on shared open spaces have been identified.
ON-C05(S)	Direct: Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the west edge of RAF Brampton. Predicted increase in noise from road traffic which is likely to cause a minor adverse effect on the acoustic character of the area around the closest properties. No adverse effects on shared open spaces have been identified.

14.6.28 For non-residential receptors, the assessment of operational noise and vibration indicates that significant direct effects are likely at the Premier Inn, Brampton Hut, as identified in *Table 14.23*.

**Table 14.23: Likely significant noise or vibration effects on non-residential receptors arising from operation of the scheme – Section 2 Brampton Hut to East Coast Mainline railway**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location details
ON-N01 (BA)	Direct: Moderate reduction in the risk that hotel activities would be disturbed by external road traffic noise.	Day and night	Premier Inn, Brampton Hut

14.6.29 There is one committed development in this section: CD15 (shown on *Figure 14.1*) which includes approximately 400 dwellings and substantial office and retail space. The vast majority of this committed development's footprint would be subject to negligible noise impacts as a result of the scheme. The extreme south-western portion of its footprint would be subject to minor adverse impacts.

*Section 3: A14 East Coast mainline railway to Swavesey (not including Swavesey)*

14.6.30 The combined onsite and offsite (noise insulation) envisaged mitigation measures would reduce noise and vibration inside all dwellings such that it does not reach a level where it would result in a significantly observed adverse effect on residents (refer to *Table 14.1*).

14.6.31 One Important Area falls within this section: Highways Agency's ID reference 5144, representing dwellings in south-west of Fenstanton alongside the existing A14. There are existing noise fence barriers at this location. The existing A14 would be significantly de-trafficked as a result of the scheme. A significant beneficial effect is identified in this location.

14.6.32 The avoidance and mitigation measures in this area would minimise noise adverse effects on the majority of receptors and communities including their shared open areas.

14.6.33 The changes in noise, combined with the number and proximity of receptors exposed to the changes, are considered to be significant in two residential community areas as summarised in *Table 14.24*:

**Table 14.24: Likely significant noise or vibration effects on residential receptors arising from operation of the scheme – Section 3: East Coast mainline railway to Swavesey**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location and details
ON-C06(S)	Direct: Airborne noise increase in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Pear Tree Close, Fenstanton. Predicted increase in noise from road traffic which is likely to cause a moderate adverse effect on the acoustic character of the area around the closest properties. No adverse effects on shared open spaces have been identified.
ON-C07(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings to the south of Fenstanton close to the A14. Predicted reduction in noise from road traffic, which is likely to cause a minor or moderate beneficial effect on the acoustic character of the area around the closest properties.

14.6.34 There are no sensitive committed developments within this section.

14.6.35 At non-residential receptors, the assessment has not identified any residual adverse or beneficial airborne significant direct effects from noise within this reporting area.

14.6.36 Significant indirect effects are likely on the non-residential receptors identified in *Table 14.25*.

**Table 14.25: Likely significant noise or vibration effects on non-residential receptors arising from operation of the scheme – Section 3: East Coast mainline railway to Swavesey**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location details
ON-N02 (BA)	Indirect: Moderate beneficial on office activities due to decrease in external road traffic noise	Day	Stagecoach, Fenstanton
ON-N03 (BA)	Indirect: Moderate beneficial on office activities due to decrease in external road traffic noise.	Day	MAB General Insurance Services Ltd, Fenstanton

*Section 4: A14 Swavesey to Girton*

14.6.37 The combined onsite and offsite (noise insulation) envisaged mitigation measures would avoid all significant observed adverse effects that could otherwise be caused by the scheme.

14.6.38 Seven Important Areas fall within this section.

- 14.6.39 Important Areas 5142 and 5143 represent dwellings which are currently derelict. Noise mitigation has not been considered at these locations.
- 14.6.40 Important Area 6114 represents 1-4 Hill Farm Cottages alongside the existing A14 near Bar Hill. The mitigation proposed would provide major beneficial noise reductions to the dwellings.
- 14.6.41 At Important Area reference 5140, the mitigation proposed would provide substantial reductions in road traffic noise at the two dwellings.
- 14.6.42 At Important Area reference 5139, the mitigation proposed would provide substantial reductions in road traffic noise at the two dwellings and would prevent the unacceptable adverse noise effects that currently exist.
- 14.6.43 At Important Area reference 5138, the mitigation proposed would provide substantial reductions in road traffic noise at the six dwellings.
- 14.6.44 At Important Area 6113, the mitigation proposed would provide substantial reductions in road traffic noise and result in major beneficial impacts overall at the three dwellings (Grange Farm Cottages) alongside the existing A14.
- 14.6.45 The residual levels at Rhadegund Cottages (IA5140), the dwellings at Hackers Fruit Farm (IA5138), and Catchall Farm (IA5138) would be a major reduction on the existing levels.
- 14.6.46 The changes in noise due to the scheme combined with the number and proximity of receptors exposed to the changes are considered to be significant in the residential community area summarised in *Table 14.26*:

**Table 14.26: Likely significant noise or vibration effects on residential receptors arising from operation of the scheme – Section 4: A14 Swavesey to Girton**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location details
ON-C16 (BA)	Direct: Airborne noise <u>reduction</u> in road traffic noise	Daytime and night-time	Dwellings in the vicinity of Huntingdon Road, Lolworth. Predicted reduction in noise from road traffic which is likely to cause a major beneficial effect on the acoustic character of the area around the closest properties.

- 14.6.47 For non-residential receptors, the assessment of operational noise effects indicates that significant residual effects would be likely on the non-residential receptors identified in *Table 14.27*.

**Table 14.27: Likely significant noise or vibration direct effects on non-residential receptors arising from operation of the scheme – Section 4: A14 Swavesey to Girton**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location details
ON-N04 (S)	Moderate adverse - risk of disturbance of office activities due to increase in external road traffic noise.	Day	New Close Business Park
ON-N14 (BA)	Minor reduction in disturbance to visitors to the crematorium due to reduction in external road traffic noise	Day	Cambridge City Crematorium

14.6.48 The assessment has not identified any residual significant adverse or beneficial indirect airborne noise impacts within this reporting area.

14.6.49 There are no noise or vibration sensitive committed developments in this section.

*Section 5: Cambridge Northern Bypass*

14.6.50 The mitigation measures would reduce noise and vibration inside all dwellings caused by the scheme such that it does not reach a level where it cause significant observed adverse effects (refer to *Table 14.1*) on residents.

14.6.51 There would be two direct beneficial significant effects on a community in this reporting area. These likely significant effects have been identified based on the magnitude of the noise and primarily the number of receptors subject to the changes and are summarised in *Table 14.28*:

**Table 14.28: Summary of likely significant effects on residential receptors – Section 5: Cambridge Northern Bypass**

Significant effect number (see <i>Figure 14.7</i> )	Source of significant effect	Time of day	Location details
ON-C17(BA)	Direct: Airborne noise decrease in road traffic noise	Daytime and night-time	Dwellings in Girton alongside the existing A14. Predicted decrease in noise from road traffic which is likely to cause minor to moderate beneficial effects on dwellings and associated open spaces.
ON-C18(BA)	Direct: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings at Blackwell Caravan Park alongside the existing A14. Predicted decrease in noise from road traffic which is likely to cause moderate beneficial effects on dwellings and associated open spaces.

14.6.52 Four Important Areas fall within this section.

- 14.6.53 At Important Area 5043 (representing dwellings in Girton adjacent to the existing A14) the mitigation measures proposed would provide minor beneficial impacts.
- 14.6.54 Important Area 5044 represents four dwellings at Woodhouse Farm. The mitigation measures proposed would result in major beneficial impacts to three of these dwellings.
- 14.6.55 Important Area 6109 represents dwellings in Impington adjacent to the existing A14. There is an existing noise fence barrier to the north of the existing A14 at this location which would be enhanced and expanded as part of the scheme, reducing road traffic noise levels at the dwellings.
- 14.6.56 Important Area 5045 represents approximately thirty dwellings at Blackwell caravan site. The proposed mitigation would provide minor to moderate beneficial noise reductions.
- 14.6.57 One committed development in this section would be subject to noise impacts: CD7 (shown on *Figure 14.1*), which is proposed to be up to 3,000 dwellings and substantial commercial space. The vast majority of this development would be subject to negligible noise impacts as a result of the scheme: however, the north-eastern part of the site (opposite Girton College) would be subject to minor adverse impacts.

*Section 6: Huntingdon improvements*

- 14.6.58 The changes, primarily decreases in noise combined with the number and proximity of receptors exposed to the changes, are considered to be significant in five residential community areas as summarised in *Table 14.29*.

**Table 14.29: Summary of likely significant effects on residential receptors – Section 6: Huntingdon Improvements**

Significant effect number (see <i>Figure 14.7</i> )	Source of significant effect	Time of day	Location details
ON-C09(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings on the western periphery of Hinchingsbrooke. Predicted reduction in noise from road traffic which is likely to cause a beneficial effect on the acoustic character of the area around the closest properties. This is also identified as an Important Area.
ON-C10(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings to the east of Hinchingsbrooke Hospital close to the existing A14. Predicted reduction in noise from road traffic which is likely to cause a beneficial effect on the acoustic character of the area around the closest properties.

Significant effect number (see Figure 14.7)	Source of significant effect	Time of day	Location details
ON-C11(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings at Stukeley Meadows close to the existing A14. Predicted reduction in noise from road traffic which is likely to cause a beneficial effect on the acoustic character of the area around the closest properties.
ON-C12(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in the centre of Huntingdon on Castle Hill, Prince's Street, Alder Drive and Sayer Street. Predicted reduction in noise from road traffic which is likely to cause a beneficial effect on the acoustic character of the area around the closest properties.
ON-C13(BA)	Indirect: Airborne noise reduction in road traffic noise	Daytime and night-time	Dwellings in northern Godmanchester. Predicted reduction in noise from road traffic which is likely to cause a beneficial effect on the acoustic character of the area around the closest properties.

14.6.59 Ten Important Areas fall within this section: Highways Agency's ID references 5150, 6116, 6185, 12131, 5149, 6115, 5147, 11743, 5146 and 11744. All of these are alongside the existing A14, which would be significantly de-trafficked as part of the scheme, resulting in minor, moderate and major reductions in noise levels at the receptors across the Important Areas.

14.6.60 The assessment of operational noise and vibration indicates that significant residual effects are likely on the non-residential receptors identified in *Table 14.30*.

**Table 14.30: Likely significant noise or vibration direct effects on non-residential receptors arising from operation of the scheme – Section 6: Huntingdon improvements**

Significant effect number (see <i>Figure 14.7</i> )	Type of effect and source	Time of day	Location and details
ON-N05 (BA)	Moderate adverse risk of disturbance of office activities due to increase in external road traffic noise.	Daytime	Cambridgeshire Constabulary Headquarters
ON-N06 (BA)	Moderate reduction in the risk that office activities would be disturbed by external road traffic noise.	Daytime	Cambridgeshire Fire and Rescue Service
	Moderate reduction in the risk that sleep would be disturbed by external road traffic noise.	Night	Cambridgeshire Fire and Rescue Service
ON-N07 (BA)	Minor and moderate reduction in the risk that internal activities would be disturbed by external road traffic noise levels.	Day	Hinchingbrooke Business Park
	Minor reduction in the risk that sleep would be disturbed by external road traffic noise.	Day and night	Huntingdon Marriott Hotel
ON-N08 (BA)	Moderate reduction in the risk that educational activities would be disturbed by external road traffic noise.	Day	Stukeley Meadows Primary School
ON-N09 (BA)	Moderate reduction in the risk that internal activities would be disturbed by external road traffic noise.	Day and night	Hinchingbrooke Hospital
ON-N10	Moderate reduction in the risk of internal activities being disturbed by external road traffic noise.	Day	Central Huntingdon
ON-N11	Minor reduction in the risk that internal activities would be disturbed by external road traffic noise	Day	Godmanchester Baptist Church and Community Centre
ON-N12	Major reduction in the risk that internal activities would be disturbed by external road traffic noise.	Day	Cardinal Park
ON-N13	Major and minor reduction in the risk that activities would be disturbed by external road traffic noise.	Day	Hemingford Nursery School and offices

14.6.61 Committed developments CD1, CD4, CD16 and CD17 would be subject to minor to moderate beneficial impacts as a result of the scheme.

14.6.62 CD18 would be subject to minor adverse impacts as a result of the scheme.

### *Assessment of affected routes beyond the calculation area*

- 14.6.63 An assessment of the change in the basic noise level on routes beyond the operational noise study area has been undertaken. In the majority of routes a reduction in noise level is predicted. However, on a small number of routes an increase in the short term and long term basic noise level of up to 2dB<sub>L<sub>pA10</sub></sub> is predicted. This does not represent a significant effect.

## **14.7 Summary and conclusion**

- 14.7.1 Existing noise levels vary widely across the study area. They are currently high close to the existing A14 and A1 and a number of locations adjacent to these roads have been identified as 'Important Areas' in action plans published under the Government's environmental noise regulations.
- 14.7.2 During construction, noise would affect residents at areas including south of Girton interchange and south of the Cambridge Northern Bypass. Site specific noise controls would be agreed with the local authorities before construction is started. Noise insulation would be provided for qualifying properties close to construction activities where noise would otherwise be disruptive (i.e. a significant observed adverse effect, with reference to *Table 14.1*).
- 14.7.3 During operation, over 2,900 dwellings along the existing A14 corridor through Huntingdon, Godmanchester and Fenstanton and many sensitive non-residential facilities, including Hinchingbrooke Hospital, Stukeley Meadow Primary School and Hemingford Nursery School would benefit from noise reductions as a result of the scheme. These improvements would result mainly from re-routeing traffic out of town and along the new bypass. Noise improvements also result from the provision of low noise road surfacing, and a number of noise barriers along the modified sections of the existing A1 and A14, including the Cambridge Northern Bypass. Existing noise barriers would be enhanced by the scheme at a number of locations, particularly at Girton and Impington.
- 14.7.4 These widespread noise reductions are in line with the aim of government noise policy to contribute to the improvement of health and quality of life.
- 14.7.5 There would be around 330 dwellings with a minor or moderate adverse noise effect, predominantly along the new bypass section of the scheme between Brampton interchange and Fen Drayton. In line with the aim of government noise policy to minimise adverse impacts on health and quality of life as far as is sustainable, the magnitude of noise increases and the number of people adversely affected by them has been minimised by noise mitigation integrated into the scheme. Mitigation measures designed into the scheme to reduce noise impacts during operation, include careful design of the alignment and cuttings, the use of low noise road surfacing, landscaped earthworks and installation of noise fence barriers at a number of locations along the scheme.

- 14.7.6 A small number of residential properties situated close to the scheme would qualify for noise insulation under the Government's regulations. The combination of mitigation integrated into the scheme (e.g. low noise surfacing and noise barriers) together with noise insulation would avoid significant observed adverse effects (i.e. avoid significant adverse impact on health and quality of life in line with government noise policy).
- 14.7.7 A summary of the operational noise effects by reporting section is provided below.
- Section 1: A1 Alconbury to Brampton Hut*
- 14.7.8 The assessment has identified no residual significant observed adverse effects or other likely significant adverse effects at residential or non-residential receptors in this reporting area.
- Section 2: A1/A14 Brampton Hut to East Coast mainline railway (including East Coast mainline railway bridge)*
- 14.7.9 There would be beneficial significant effects at the communities alongside the de-trafficked A14 to the north and east of Brampton. There would be minor increases in noise at properties on the west of Brampton and western edge of RAF Brampton. Though the increase in noise is minor this is reported as two likely significant adverse effects due to the number of properties in two community areas subject to the noise change..
- 14.7.10 For non-residential receptors, the assessment of operational noise and vibration indicates that a significant beneficial direct effect would be likely at a hotel.
- Section 3: A14 East Coast mainline railway to Swavesey (not including Swavesey)*
- 14.7.11 There would be likely significant adverse effects in the area south of Fenstanton closer to the Huntingdon Southern Bypass and likely significant beneficial effects in Fenstanton adjacent to the existing A14. These are community effects associated with change in noise levels that are considered to be significant due to the number of properties in the two community areas.
- 14.7.12 For non-residential receptors, the assessment identifies significant adverse effects at two commercial buildings in Fenstanton.
- Section 4: A14 Swavesey to Girton*
- 14.7.13 A likely significant beneficial effect has been identified at Lolworth north of the existing A14 due to minor, moderate and some major noise reductions and the number of properties benefiting.
- 14.7.14 A likely significant adverse effect has been identified at the non-residential New Close Business Park.
- Section 5: Cambridge Northern Bypass*
- 14.7.15 There would be a likely significant beneficial effect at the southern edge of Girton alongside the scheme and at Blackwell Caravan Park, reported due to noise reductions and the number of properties benefiting.

*Section 6: Huntingdon improvements*

- 14.7.16 Provision of the Huntingdon Southern Bypass would result in beneficial effects on a large number of dwellings and non-residential receptors along and adjacent to the de-trunked A14. These changes are reported as likely significant beneficial effects on a number of communities due to the number of properties experiencing the noise reductions.
- 14.7.17 Likely significant adverse effects have been identified at two non-residential receptors associated with the changed roads and local changes in traffic patterns associated with removing the Huntingdon viaduct.

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