8. NOISE AND VIBRATION

8.1 INTRODUCTION

8.1.1 This chapter considers the potential noise and vibration impacts and effects that may arise as a result of the construction and operation of the proposed Northampton Gateway, including the strategic rail freight interchange (SRFI), the Roade Bypass and the other highway works[1]. Further details of the Proposed Development are given in Chapter 2 of the ES (Description of Development).

8.1.2 The Proposed Development has the potential to generate noise from the following sources:

- Construction of the SRFI (including warehousing), the Roade Bypass and the other highway works;
- The change in road traffic flows on the road network around the Main Site, including any effects of the highway works, and around the village of Roade as a consequence of the Roade Bypass;
- The traffic serving the SRFI travelling on the internal roads within the Main Site;
- The additional freight trains serving the SRFI travelling on the Northampton Loop railway line;
- The freight trains serving the intermodal freight terminal travelling within the Main Site, including the associated loading and unloading activities;
- Heavy goods vehicles (HGVs) and other operational activity at the Main Site such as manoeuvring, loading and unloading at the proposed warehouses, intermodal freight terminal, aggregates facility and 'rapid rail freight' facility; and
- Mechanical services plant associated with the warehousing at the SRFI.

8.1.3 It is also possible that the additional freight trains serving the SRFI travelling on the Northampton Loop could lead to an increase in perceptible vibration at receptors close to the railway line.

8.1.4 To assist with the understanding of this chapter, a Glossary of Acoustic Terms is provided in Appendix 8.1.

8.2 RELEVANT POLICY AND LEGISLATION

8.2.1 The overarching Government policy on noise is set out in the Noise Policy Statement for England (NPSE).

8.2.2 For nationally significant road, rail and strategic rail freight infrastructure projects (as defined in the Planning Act 2008), the National Policy Statement for National Networks (NPSNN) sets out the relevant policy objectives. Furthermore, at paragraph 5.193 of the NPSNN, it states that, in decision making, due regard be given to the NPSE, the National Planning Policy Framework (NPPF) and the Government's associated planning guidance on noise (PPG(N)).

1 These works are referred to as 'highway mitigation measures' in the other parts of the Environmental Statement, however, they are referred to as 'highway works' in this chapter to avoid confusion with any acoustic mitigation measures that may be proposed for the highway works.

National Policy Statement for National Networks (NPSNN) [2]

8.2.3 In terms of human receptors, the NPSNN specifies (paragraph 5.191) that noise and vibration should be assessed using the principles of the relevant British Standards and other guidance. The prediction of road traffic noise should be based on the method described in Calculation of Road Traffic Noise[3] (CRTN) and prediction of noise from railways should be based on the method described in Calculation of Railway Noise[4] (CRN). For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.

8.2.4 With respect to wildlife and biodiversity, impacts should be assessed in accordance with the Biodiversity and Ecological Conservation section of the NPSNN (Paragraphs 5.20 – 5.38). With regard to noise, the NPSNN states that:

The applicant should consult Natural England with regard to assessment of noise on designated nature conservation sites, protected landscapes, protected species or other wildlife. (Paragraph 5.192)

It goes on:

The results of any noise surveys and predictions may inform the ecological assessment.

8.2.5 The NPSNN also states that:

Applicants should consider opportunities to address the noise issues associated with the Important Areas as identified through the noise action planning process. (Paragraph 5.200) 5

8.2.6 Regarding mitigation, in paragraph 5.197 the NPSNN states that:

The Examining Authority and the Secretary of State should consider whether mitigation measures are needed both for operational and construction noise over and above any which may form part of the project application. The Secretary of State may wish to impose requirements to ensure delivery of all mitigation measures.

8.2.7 And in paragraph 5.198 that:

Mitigation measures for the project should be proportionate and reasonable and may include one or more of the following:

- engineering: containment of noise generated;
- materials: use of materials that reduce noise, (for example low noise road surfacing);
- lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmission through screening by natural or purpose built barriers;
- administration: specifying acceptable noise limits or times of use (e.g., in the case of railway station PA systems).

8.2.8 The NPSNN (at Paragraph 5.199) also states that for most projects, the relevant Noise Insulation Regulations will apply (See paragraph 8.2.25 *et seq.* below). This means that the assessment must consider whether the Proposed Development is likely to trigger any eligibility under the terms of these Regulations and provide an indication of any likely eligibility.

2 National Policy Statement for National Networks, Department for Transport (2014)
3 Calculation of Road Traffic Noise, Department of Transport (1988)
4 Calculation of Railway Noise, Department of Transport (1995)
5 Important Areas are defined in the relevant Noise Action Plans produced by the Department for Environment, Food and Rural Affairs when implementing the Environmental Noise (England) Regulations 2006, as amended (SI 2006/2238).

8.2.9 In paragraph 5.195, the NPSNN states that:

The Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life from noise as a result of the new development;*
- *mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and*
- *contribute to improvements to health and quality of life through the effective management and control of noise, where possible."*

8.2.10 These statements reflect the aims of the Noise Policy Statement for England (NPSE).

Noise Policy Statement for England (NPSE) 6

8.2.11 The NPSE is the overarching Government policy on noise. It seeks to clarify the underlying principles and aims in past and existing policy documents, legislation and guidance in relation to all forms of noise including environmental noise, neighbour noise and neighbourhood noise (but not noise in the workplace).

8.2.12 It uses the established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL). The NPSE extends these by introducing Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define SOAEL for noise that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times.

8.2.13 The NPSE's vision is consistent with paragraph 5.195 of the NPSNN referred to above – it is to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

This long-term vision is supported by the following aims:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.*

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

8.2.14 The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL. The NPSE asserts that, while this means that all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur [7].

6 Noise Policy Statement for England, Defra (2010)
7 Ibid, paragraph 2.24

8.2.15 In a decision letter associated with the Thames Tideway Tunnel project, the Government clarified the meaning of the phrase 'sustainable development' as follows:

The National Planning Policy Framework, the National Planning Practice Guidance on noise and the Noise Policy Statement for England are all clear that noise management should be determined in the context of sustainable development including the environmental, economic and social benefits of the proposal.

National Planning Policy Framework (NPPF)[8]

8.2.16 The NPPF sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. The NPPF addresses noise as a planning issue primarily through a statement of four principles, at paragraph 123:

Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established, and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

8.2.17 It can be seen how the NPPF reflects the aims of the NPSE and the decision tests in the NPSNN. Furthermore, the NPPF makes reference to the NPSE for advice on the achievement of these policy aims, and particularly in connection with the explanation of 'adverse impacts'.

Planning Practice Guidance (Noise) (PPG(N))[9]

8.2.18 Further guidance in relation to the NPPF has been published on the Government Planning Portal. *The* PPG(N) supports the NPPF by providing a range of advice and includes a noise exposure hierarchy based on the likely average response.

8.2.19 In line with the NPPF, the NPSE and the decision tests in the NPSNN, the guidance confirms that significant adverse effects should be avoided. At the next level down in the *hierarchy*, where there is an observed adverse effect, the PPG(N) confirms that effects should be mitigated and reduced to a minimum (as far as reasonably practicable). No mitigation measures are required for effects that are considered to be below the lowest observed adverse effect level (LOAEL).

Local Policy

8.2.20 The local planning policy context is addressed in detail in the separate Planning Statement which forms part of the submitted application. The West Northamptonshire Joint Core Strategy Local Plan (Part 1) 2014 contains two policies that are considered relevant to the assessment of noise impacts arising from the Proposed Development.

8 National Planning Policy Framework, Department for Communities and Local Government, (2012)
9 Planning Practice Guidance: Noise - http://planningguidance.planningportal.gov.uk/blog/guidance/noise/noise-guidance/

8.2.21 Policy S10 Sustainable Development Principles states that:

Development will:

…

k) Minimise pollution from noise, air and run off.

8.2.22 Policy BN9 Planning for Pollution Control states that:

Proposals for new development which are likely to cause pollution or likely to result in exposure to sources of pollution … will need to demonstrate that they provide opportunities to minimise and where possible reduce pollution issues that are a barrier to achieving sustainable development and healthy communities including:

…

e) Reducing the adverse impacts of noise.

8.2.23 Policy BN9 also states that:

Development that is likely to cause pollution, either individually or cumulatively, will only be permitted if measures can be implemented to minimise pollution to a level which provides a high standard of protection for health and environmental quality.

8.2.24 It can be seen that the specific local policies are broadly consistent with national policy objectives, and therefore achieving national policy objectives will also satisfy local policy requirements.

Noise Insulation Regulations 1975 (as amended 1988)[10]

8.2.25 These regulations apply to new and altered highways and place various duties and powers on the relevant authority to carry out or make a grant in respect of the cost of carrying out sound insulation work in or to an eligible building. Paragraph 5.199 of the NPSNN states that these regulations would apply for most national network projects.

8.2.26 The regulations apply only to residential properties not more than 300 m from the new or altered road. The relevant authority has a duty to offer compensation if the final road traffic noise exposure at the façade of the dwelling is at least 68 dB, LA10,18h (06.00 – 24.00 hours) as a result of noise from the new or altered road. In addition, other criteria must be met. These concern the increase in road traffic noise that would be experienced (it must be at least 1 dB(A) greater compared with the current situation), and the contribution being made by noise from the new or altered highway to the overall noise at the property (which must be at least 1 dB(A)).

8.2.27 In addition, the relevant authority has the power to offer compensation to dwellings affected by the altered highway if the final road traffic noise exposure at the façade of the dwelling is at least 68 dB, LA10,18h (06.00 – 24.00 hours).

Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996[11]

8.2.28 These regulations apply to additional and altered railways works and place various duties and powers on the relevant authority to carry out or make a grant in respect of the cost of carrying out sound insulation work in or to an eligible building. Paragraph 5.199 of the NPSNN states that these regulations would apply for most national network projects.

10 The Noise Insulation Regulations 1975 (SI 1975/1763), as amended by The Noise Insulation (Amendment) Regulations 1988 (SI 1988/2000)

11 The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (SI 1996/428)

8.2.29 The regulations apply only to residential properties. To be eligible for an offer of compensation, the final railway noise exposure at the façade of the dwelling must be at least either 68 dB, LAeq,18h (06.00 – 24.00 hours) or 63 dB LAeq,6h (00.00 – 06.00 hours) as a result of noise from the new or altered railway. In addition, other criteria concerning the increase in railway noise that would be experienced, and the contribution being made by noise from the new railway to the overall noise at the property, must be met.

8.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Assessment Methodology

8.3.1 The Proposed Development has the potential to generate noise from the following sources:

- *Construction of the SRFI (including warehousing), the Roade Bypass and the other highway works;*
- *The change in road traffic flows on the road network around the Main Site, including any effects of the highway works, and around the village of Roade as a consequence of the Roade Bypass;*
- *The traffic serving the SRFI travelling on the internal roads within the Main Site;*
- *The additional freight trains serving the SRFI travelling on the Northampton Loop railway line, which could also lead to an increase in perceptible vibration at receptors close to the railway line;*
- *The freight trains serving the intermodal freight terminal travelling within the Main Site, including the associated loading and unloading activities;*
- *Heavy goods vehicles (HGVs) and other operational activity at the Main Site such as manoeuvring, loading and unloading at the proposed warehouses, intermodal freight terminal, aggregates facility and 'rapid rail freight' facility; and*
- *Mechanical services plant associated with the warehousing at the SRFI.*

8.3.2 In general, the assessment methodology used for each type of source is different in terms of how the potential noise or vibration impact is predicted and how the effect is assessed. The degree of the impact and the significance of the effect is dependent upon several factors, including the noise level from the particular activity, the existing sound environment, and the duration, timing and character of the different noise sources.

8.3.3 The assessment methodologies that have been used for each element of the assessment are described below.

Construction Noise

8.3.4 An indication of the potential noise effects of activities associated with construction of the SRFI and Roade Bypass has been determined at the relevant nearby noise sensitive receptors as listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter. In addition, a qualitative assessment has been provided of the potential construction noise impacts of the other highway works based on the information available.

8.3.5 Based on the expected activity scenarios for construction of the SRFI and Roade Bypass, noise levels have been predicted using estimates of the type and numbers of plant and equipment likely to be used, together with their estimated usage, or on-time, for a typical working day when the activities are in relatively close proximity to the receptors. These estimates are based on detailed information provided by contractors prior to construction of a similar development and are summarised in Appendix 8.2.

8.3.6 For each activity, the contributions for each item of plant were combined and modelled as a single activity point source. Many of the construction activities will occur across the Main Site and along the length of the Roade Bypass site. For these activities, the activity point source was modelled in several different locations to give an indication of the likely noise exposure at each receptor when the activity is nearby. No allowance has been made for the potential screening effect that the proposed landscaping bunds around the Main Site and the Roade Bypass site may have, meaning that robust and worst-case assumptions have been considered for this aspect.

8.3.7 The construction noise predictions have been based on the principles of the methodology contained within Annex F of BS 5228-1:2009+A1:201412, as required by the NPSNN (Paragraph 5.191). This standard has been formally adopted by Government as the Code of Practice for use in this situation13. Propagation of construction noise has been predicted using IMMI noise modelling software and the principles of the ISO 9613-2:199614 methodology, assuming moderate downwind propagation between the source and receptors.

8.3.8 The significance of potentially adverse construction noise effects has been determined using the thresholds set out in Table 8.1. The values are based on the guidance within Annex E of BS 5228-1:2009+A1:2014 and the effects that construction noise can have on those exposed to it. The thresholds are expressed in terms of current Government policy.

Table 8.1 Thresholds of potential effects of construction noise at residential buildings

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a]
LOAEL	Day (07:00 – 23:00)	65
	Evening (19.00 – 23.00)	55
	Night (23.00 – 07.00)	45
SOAEL	Day (07:00 – 23:00)	75
	Evening (19.00 – 23.00)	65
	Night (23.00 – 07.00)	55

Notes:

[a] These effects are expected to occur if the programme of works indicates that the relevant threshold values are likely to be exceeded over a period of at least one month. The values apply to a location one metre from a residential building façade containing a window, ignoring the effect of the acoustic reflection from that façade.

8.3.9 In addition to the primary construction works taking place at the Main Site and the Roade Bypass site, a qualitative assessment has been made of the potential noise effects of the other highway works where a sensitive receptor is located within 300 m of the works based on the information available.

Construction Vibration

8.3.10 Of the likely activity scenarios to be used for construction of the Proposed Development, only piling has been identified as having the potential to generate levels of vibration that could adversely affect nearby receptors. The potential effects of this have been discussed based on the information available.

12 BS 5228-1:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise
13 Statutory Instrument 2015/227 – The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015
14 ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation, ISO (1996)

8.3.11 The potential for groundborne vibration caused by the passage of construction HGV traffic travelling on the road network has also been discussed.

8.3.12 Although the concepts regarding LOAEL and SOAEL in Government policy refer only to noise exposure, it is helpful to adopt the same principles when assessing vibration impact and effect. Table 8.2 sets out the construction vibration exposure thresholds based on the guidance within Annex B of BS 5228-2:2009+A1:201415.

Table 8.2 Thresholds of potential effects of construction vibration at residential buildings

Effect	Threshold Value (PPV, mm/s)[a]
LOAEL	0.5
SOAEL	1.0[b]

Notes:

[a] This is the level at a residential receptor.

[b] Guidance in BS 5228-2:2009+A1:2014 states that this level of exposure can be tolerated by those affected if prior warning and explanation has been given. It goes on to state that a level of 10 mm/s is likely to be intolerable in most building environments for any more than a very brief exposure.

Operational Phase – Railway Noise

8.3.13 The number of freight trains using the railway network will increase as a result of SRFI operations.

8.3.14 The potential change in average railway noise has been predicted using the environmental noise modelling software IMMI which incorporates the methodology for calculating railway noise set out in the Calculation of Railway Noise (CRN) as required by the NPSNN. This methodology assumes that the receptor is downwind of the source. The source terms for the different types of locomotive and wagon have been taken from CRN and from the 2007 Defra report16 which provided updated terms for newer rolling stock.

8.3.15 The noise levels arising from passenger and freight train activity on the Northampton Loop and West Coast Main Line have been predicted at the relevant receptor locations for the following Do-Minimum (DM) and Do-Something (DS) scenarios17:

- 2017 baseline;
- 2021 DM and DS – SRFI opening year;
- 2033 DM and DS – High Speed Two (HS2) Phase 2b opening year; and
- 2043 DM and DS – National Rail long-term planning horizon scenario.

15 BS 5228-2:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 2: Vibration

16 Additional railway noise source terms for "Calculation of Railway Noise 1995", Defra (2007)

17 The Do-Something (DS) and Do-Minimum (DM) scenarios refer to the noise or vibration environment with and without the Proposed Development respectively. By comparing the predicted noise levels from a particular source for the two scenarios in a given year, any changes that may result from the Proposed Development can be identified and assessed, taking account of changes that would be expected to occur regardless of the development.

8.3.16 The input data used to model the different scenarios has been provided by the rail consultant and includes the following considerations:

- The current level of freight and passenger train activity on the two lines;
- The likely background growth in freight train activity;
- The anticipated additional freight train movements associated with the Proposed Development; and
- The changes in passenger train activity following completion of HS2 Phase 1 in 2026 and HS2 Phase 2b in 2033.

8.3.17 It should be noted that while the information relating to changes in train services resulting from the operation of HS2 is based on current estimates, there is some uncertainty regarding the extent of the changes at this time.

8.3.18 The 2017 baseline scenario input data has been based on analysis of current passenger and freight train movements on the Northampton Loop and West Coast Main Line. For the future scenarios, the background growth in freight numbers has been based on Network Rail's 2016 Freight Network Study which indicates that intermodal rail traffic will grow at 5.2% per annum. The additional freight activity associated with the Proposed Development has been based on the 'high forecast' data from the rail traffic level forecast provided by the rail consultant, meaning that robust and worst-case assumptions have been considered for this aspect.

8.3.19 The predicted scenarios are understood to be representative of typical rail operations on the Northampton Loop or West Coast Main Line, with no engineering works taking place during the night-time period.

8.3.20 A summary of the assumptions used for the railway noise predictions on the railway network can be found in Appendix 8.3. The railway noise model has been verified using the results of the baseline noise survey as described in Appendix 8.4.

8.3.21 The significance of potentially adverse railway noise effects has been based on a combination of the change in noise exposure between the DM and DS scenarios, and the resulting noise exposure. The noise exposure thresholds are set out in Table 8.3. These have been derived from the effects that railway noise can have on those affected18 and are expressed in terms of Government policy.

Table 8.3 Thresholds of potential effects of railway noise at residential buildings

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a,b]
LOAEL	07.00 – 23.00	50
	23.00 – 07.00	40
SOAEL	07.00 – 23.00	65
	23.00 – 07.00	55

Notes:

a This is the average daily value at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.

b For the night-time period of 23.00 – 07.00, the relevant noise indicator is Lnight.

18 The evidence for using some these values can be found in guidance from the World Health Organisation. Similar values have been used for the assessment of other schemes such as HS2.

8.3.22 If the daytime LOAEL threshold value is exceeded, the data in Table 8.4 sets out how the magnitude of the impact is described taking account of the change in daytime noise exposure and the resulting exposure.

Table 8.4 Descriptors of magnitude of daytime railway noise change

Magnitude of Impact	Resulting Exposure	
	Between LOAEL & SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 2.9 dB(A)	Up to 0.9 dB(A)
Minor	3.0 – 4.9 dB(A)	1.0 – 2.9 dB(A)
Moderate	5.0 – 9.9 dB(A)	3.0 – 4.9 dB(A)
Major	10.0 dB(A) and over	**5.0 dB(A) and over**

8.3.23 Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 8.3, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 8.4, that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in railway noise during the daytime period. .

8.3.24 If the night-time LOAEL threshold is exceeded, the data in Table 8.5 sets out how the magnitude of the impact is described taking account of the change in night-time noise exposure and the resulting exposure.

Table 8.5 Descriptors of magnitude of night-time railway noise change

Magnitude of Impact	Resulting Exposure	
	Between LOAEL & SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 0.9 dB(A)	Up to 0.9 dB(A)
Minor	1.0 - 2.9 dB(A)	1.0 – 2.9 dB(A)
Moderate	3.0 – 4.9 dB(A)	3.0 – 4.9 dB(A)
Major	5.0 dB(A) and over	5.0 dB(A) and over

8.3.25 Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 8.3, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 8.5, that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in railway noise during the night-time period.

8.3.26 In accordance with the requirements of CRN, the information provided by the rail consultant was based on an 18 hour daytime period (06:00 – 24:00) and a 6 hour night-time period (00:00 – 06:00). The noise exposure results were, therefore, predicted in terms of these periods. Equivalence has been assumed with the corresponding 16 hour and 8 hour periods based on the guidance given in the Department for Transport document TAG Unit A3: Environmental Impact Appraisal19. Consequently, for the purpose of the assessment, the 16 hour values have been assumed as equal to the predicted 18 hour values, and the 8 hour values assumed as equal to the predicted 6 hour values.

8.3.27 When assessing the likelihood of eligibility for an offer of mitigation under the terms of the Noise Insulation Regulations (Railways), CRN requires that the day and night-time rail traffic flows used in the calculation shall represent when the noise levels are expected to be at their highest up to a period of 15 years after opening the system. Therefore, the 2033 DS scenario, with the SRFI fully operational, has been considered for the eligibility assessment.

8.3.28 Whilst the average night-time exposure provides an indication of the potential sleep disturbance, consideration has also been given to the associated maximum levels that would occur from train movements.

8.3.29 The approach that has been adopted considers the probability of a maximum noise level giving rise to a noise induced awakening[20]. It is based on research by Elmenhorst et al[21] and is increasingly being adopted to assess the impact on sleep of maximum noise levels at night[22].

8.3.30 The method determined the internal L_{Amax} value from the movements of the different train types; further details are given in Appendix 8.3. This was combined with the number of movements in the night period (23.00 – 07.00) to determine the probability of those movements causing a noise induced awakening. The change in probability as a result of the expected change in movements arising from the Proposed Development was determined for the various scenarios described above.

8.3.31 The expected change in probability of noise-induced awakenings has been determined at locations located on the Northampton Loop and also locations further south where the West Coast Main Line and Northampton Loop are joined. The assessment has assumed both windows open and windows closed.

8.3.32 A significant effect has been defined if there is expected to be an increase of one noise-induced awakening at night as a result of the Proposed Development.

Operational Phase – Railway Vibration

8.3.33 As the Proposed Development will increase the number of freight trains using the rail network, SRFI operations have the potential to increase groundborne vibration at receptors close to the Northampton Loop track as a result of passing trains.

8.3.34 The assessment of potentially adverse railway vibration effects has followed the principles of BS 6472-1:200823. The standard describes a method of estimating human response to vibration in buildings during the day and night-time periods by determining the vibration dose value (VDV) based on measured data. The standard identifies the probability of adverse comment based on the VDV experienced, as summarised in Table 8.6.

19 Transport Appraisal Guidance Unit A3: Environmental Impact Appraisal, Department for Transport (2015)
20 Awakening here means not just being woken in the conventional sense, but also experiencing change in sleep state to Sleep Stage S1
21 "Examining nocturnal railway noise and aircraft noise in the field: Sleep, psychomotor performance and annoyance", Elmenhorst et al, Science in the Total Environment, 424 (2012) 48-56
22 For example, HS2
23 BS 6472-1: 2008 – Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting

Table 8.6 Vibration dose value ranges that result in different probabilities of adverse comment

Place and Time	Low probability of adverse comment ($m/s^{1.75}$)	Adverse comment possible ($m/s^{1.75}$)	Adverse comment probable ($m/s^{1.75}$)
Residential buildings 16 hour day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hour night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

8.3.35 The vibration levels arising from passenger and freight train activity on the Northampton Loop have been predicted at two of the receptors closest to the line for the same DM and DS scenarios as for railway noise, as follows:

- 2017 baseline;
- 2021 DM and DS – SRFI opening year;
- 2033 DM and DS – High Speed Two (HS2) Phase 2b opening year; and
- 2043 DM and DS – National Rail long-term planning horizon scenario.

8.3.36 The input data considerations regarding the number and type of trains for the different scenarios are the same as for railway noise, summarised previously.

8.3.37 The two receptors are approximately 27 m and 85 m to the nearest rail on the Northampton Loop respectively. In soft soil conditions, significant levels of groundborne vibration resulting from passing freight trains may be propagated up to distances of 100 m from the track24. Consequently, assessment of groundborne vibration at the two receptors is considered a suitable approach to identifying any potential impacts.

8.3.38 VDVs have been calculated using vibration levels of passing passenger and freight trains derived from measurements taken at the two receptor locations. Both the measurement and calculation procedures followed the guidelines in BS 6472-1:2008. The predicted vibration levels are considered representative of those that would be measured inside the properties at the receptor locations.

8.3.39 In accordance with the requirements of CRN, the information provided by the rail consultant was based on an 18 hour daytime period (06:00 – 24:00) and a 6 hour night-time period (00:00 – 06:00). The VDV ranges indicating probability of adverse comment use a 16 hour daytime period (07:00 – 23:00) and 8 hour night-time period (23.00 – 07.00). It is not expected that this difference will have a significant effect as it is the magnitude of the vibration events that is usually more important rather than the number of events or their duration24. Furthermore, most train movements between 06:00 – 07:00 hours are and will continue to be passenger trains, which have a lower vibration magnitude than freight trains.

8.3.40 Although the concepts regarding LOAEL and SOAEL in Government policy refer only to noise exposure, it is helpful to adopt the same principles when assessing vibration impact and effect. Table 8.7 sets out the railway vibration exposure thresholds together with the descriptors for magnitude of impact.

24 Thompson, D, Railway Noise and Vibration, Mechanisms, Modelling and Means of Control, Chapter 12 (2009)

Table 8.7 Thresholds of potential effects of railway vibration at residential buildings (derived from BS 6472-1:2008)

Effect	Impact Description	Vibration Exposure[a]	
		VDV Daytime ($m/s^{1.75}$)	VDV Night-time ($m/s^{1.75}$)
-	Negligible	< 0.2	< 0.1
LOAEL	Minor	0.2	0.1
-	Moderate	0.21 – 0.79	0.11 – 0.39
SOAEL	Major	0.8	0.4

Notes:
a Usually determined in the centre of a normally loaded floor within the dwelling.

Operational Phase – Road Traffic Noise

8.3.41 The potential change in road traffic noise has been predicted using the environmental noise modelling software IMMI which incorporates the methodology for calculating road traffic noise from the Calculation of Road Traffic Noise (CRTN) as required by the NPSNN. This methodology assumes that the receptor is downwind of the source.

8.3.42 The noise levels arising from road traffic activity on the selected roads within the acoustic study area have been predicted at the relevant receptor locations for the following DM and DS scenarios:

- 2015 baseline;
- 2021 DM and DS – SRFI opening year (no Roade Bypass or highway works other than the A508 dualling between the Main Site and junction 15 of the M1, and the improvement works at junction 15 itself); and
- 2031 DM and DS – SRFI fully operational with all highway works completed, including the Roade Bypass.

8.3.43 In addition to the selected roads within the acoustic study area, traffic data for roads within the wider transport model has been analysed. Additional links have been identified from which there could be a noise impact. This has primarily been based on links where traffic flows are expected to increase by more than 25% from the DM to the DS scenarios and where a noise-sensitive receptor is within 300 m of the link. These are described as triggered data links. As these roads are not affected by the highway works, noise levels have been predicted by calculation of the daytime basic noise level (BNL) as described in CRTN for the relevant DM and DS scenarios.

8.3.44 The road traffic flows used for DM and DS scenarios include the cumulative effect of all committed development and infrastructure schemes. These include the smart motorway scheme between junctions 13 and 16 of the M1 which is expected to be completed by March 2022.

8.3.45 ES traffic data in the form of Annual Average Daily Traffic (AADT) and Annual Average Weekday Traffic (AAWT) flows have been provided by WSP from the Northamptonshire Strategic Transport Model (NSTM2), which they maintain and operate on the behalf of Northamptonshire County Council (NCC). WSP have produced the ES traffic data in accordance with their standard methodology for this process, which is understood to involve the use of peak period to AADT and AAWT conversion factors. However, so that the resulting data is appropriate to examine the more localised impacts that could arise from the Northampton Gateway development proposals, road type specific conversion factors have been used. Further details regarding the production of the ES traffic data are provided in Chapter 12 of the ES (Transportation).

8.3.46 The road traffic noise model has been verified using the results of the baseline noise survey as described in Appendix 8.4.

8.3.47 The significance of potentially adverse road traffic noise effects has been based on a combination of the change in noise exposure between the DM and DS scenarios, and the resulting noise exposure. The noise exposure thresholds are set out in Table 8.8. These have been derived from the effects that road traffic noise can have on those affected25 and are expressed in terms of Government policy.

Table 8.8 Thresholds of potential effects of road traffic noise at residential buildings

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a,b]
LOAEL	07.00 – 23.00	50
	23.00 – 07.00	40
SOAEL	07.00 – 23.00	65
	23.00 – 07.00	55

Notes:

a This is the average daily value at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.

b For the night-time period of 23.00 – 07.00, the relevant noise indicator is Lnight.

8.3.48 If the daytime LOAEL threshold is exceeded, the data in Table 8.9 sets out how the magnitude of the impact is described taking account of the change in daytime noise exposure and the resulting exposure.

Table 8.9 Descriptors of magnitude of daytime road traffic noise change

Magnitude of Impact	Resulting Exposure	
	Between LOAEL & SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 2.9 dB(A)	Up to 0.9 dB(A)
Minor	3.0 – 4.9 dB(A)	1.0 – 2.9 dB(A)
Moderate	5.0 – 9.9 dB(A)	3.0 – 4.9 dB(A)
Major	10.0 dB(A) and over	5.0 dB(A) and over

8.3.49 Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 8.8, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 8.9, that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in road traffic noise during the daytime period.

8.3.50 If the night-time LOAEL threshold is exceeded, the data in Table 8.10 sets out how the magnitude of the impact is described taking account of the change in night-time noise exposure and the resulting exposure.

25 The evidence for using some these values can be found in guidance from the World Health Organisation. Similar values have been used for the assessment of other schemes such as A14 DCO.

Table 8.10 Descriptors of magnitude of night-time road traffic noise change

Magnitude of Impact	Resulting Exposure	
	Between LOAEL & SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 0.9 dB(A)	Up to 0.9 dB(A)
Minor	1.0 – 2.9 dB(A)	1.0 – 2.9 dB(A)
Moderate	3.0 – 4.9 dB(A)	3.0 – 4.9 dB(A)
Major	5.0 dB(A) and over	**5.0 dB(A) and over**

8.3.51 Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 8.8, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 8.10, that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in road traffic noise during the night-time period.

8.3.52 CRTN calculates road traffic noise levels in terms of the LA10,18h index. In order to compare these results to the noise exposure thresholds, the relationship from paragraph 2.2.13 of the Department for Transport document TAG Unit A319 has been used for conversion to daytime LAeq,16h values, and the method described in the Defra commissioned report by TRL/Casella Stanger26 has been used for conversion to night-time Lnight values.

8.3.53 When assessing the likelihood of eligibility for an offer of mitigation under the terms of the Noise Insulation Regulations (Roads), CRTN requires that the day-time road traffic flows used in the calculation represent when the noise levels are expected to be at their highest up to a period of 15 years after the road is open to traffic. Therefore, the 2031 DS scenario, with the SRFI fully operational, has been considered for the eligibility assessment.

Operational Phase – Road Traffic Vibration

8.3.54 With regard to road traffic induced groundborne vibration, it is rare that this would result in perceptible levels of vibration within sensitive properties along a route. The main cause of vibration of this type is vehicles passing over irregularities in the road surface and is therefore not a direct result of any changes in the volume of road traffic.

8.3.55 As the highway works associated with the Proposed Development consist of the construction of a new road, i.e. the Roade Bypass, as well as improvements to other existing sections of road, the corresponding road surfaces will either be new or undergo maintenance as part of the works. As a result, it is not expected that any significant increase in road traffic induced groundborne vibration will occur as a result of the Proposed Development, and no further assessment has been carried out.27

26 Method for Converting the UK Road Traffic Noise Index $L_{A10,18h}$ to the EU Noise Indices for Road Noise Mapping, TRL/Casella Stanger for Defra (2006)

27 In some situations, those living close to highways can perceive vibration in their homes even if the road surface is smooth. That feature is generally caused by low-frequency sound from, as a rule, heavy goods vehicles causing the structure of the house to resonate slightly. There are no specific methods for assessing such an effect, but the risk of it occurring generally increases or decreases with the overall level of traffic noise experienced.

Operational Phase – SRFI Activities at Main Site

8.3.56 Sound from operational activities taking place at the SRFI has the potential to cause impacts at nearby receptors during the day and night-time periods.

8.3.57 Potential sources of operational sound at the SRFI include:

- heavy goods vehicles (HGVs) and light vehicles (e.g. cars) travelling on the internal access roads;
- freight train movements on the internal tracks;
- the use of rail mounted gantry cranes (RMGs), reach stackers and telehandlers to handle containers at the intermodal freight terminal;
- excavators and wheeled loaders distributing aggregate at the aggregates facility; and
- forklift trucks moving cargo at the 'rapid rail freight' facility.

8.3.58 The potential levels of sound arising from operational activities at the SRFI have been predicted using the environmental noise modelling software IMMI for the relevant receptor locations. Several different methods of prediction have been used depending on the type of source, all of which assume downwind propagation from the source to the receptor. These are:

- Calculation of Road Traffic Noise (CRTN) for vehicles travelling on the internal access roads;
- Calculation of Railway Noise (CRN) for freight trains travelling on the internal railway tracks; and
- ISO 9613-2:1996 for all other sources, together with appropriate source data.

8.3.59 The results have been processed so as to determine the impact during the peak hour of operations in the 16-hour daytime period (07.00 – 23.00), and the peak 15 minutes of operations in the 8-hour night-time period (23.00 – 07.00).

8.3.60 The predictions have been based on the SRFI operating at full capacity with all warehousing in use, meaning that robust assumptions have been considered for this aspect. The following information has been incorporated into the prediction model:

- The layout of the site as shown in the illustrative masterplan, including the size and heights of the proposed warehousing;
- The proposed topography for the site, including the inherent screening effects of the bunding and landscaping;
- The expected level of HGV activity at the proposed warehousing, intermodal freight terminal, 'rapid rail freight' facility and aggregates facility, including travel on the internal access roads;
- The number and type of freight train movements, including arrival, departure and shunting manoeuvres; and
- The expected activities at the intermodal freight terminal, 'rapid rail freight' facility and aggregates facility, including the likely durations that equipment will be operational during the assessment periods.

8.3.61 Further information regarding the assumptions made for the predictions of operational sound can be found in Appendix 8.5.

8.3.62 Sound emission from mechanical plant associated with the SRFI, such as that used for ventilation and cooling of the warehouses, is considered a component of operational sound. Prior to the occupants of the warehouses being known, no information regarding the type or number of these units is known.

8.3.63 Prior to installation, it is proposed that details of the mechanical plant will be submitted to and approved by the relevant planning authority. As part of this process, sound from the proposed plant installations will be assessed and, if required, mitigated to demonstrate compliance with the Government and Local policy set out in section 8.2. Items of plant will be selected and located to minimise operational sound at nearby receptors, with further options for mitigation including local screening, enclosures and in-duct attenuators.

8.3.64 The assessment of potential sound impacts from operation of the SRFI has been based on the principles of BS 4142:201428. This methodology provides an initial estimate of impact based on the difference between sound from the source being assessed (the specific sound level) and the existing background sound level at the receptor location, and the context in which the sound at the receptor occurs.

8.3.65 The standard also states that certain characteristics can increase the extent of the impact over that expected from a simple difference in noise levels. These characteristics include tonality, impulsivity and intermittency. The standard describes various options for taking any such features into account and for determining what is described in the standard as a 'rating level'.

8.3.66 The standard states that the extent of the impact can be determined by subtracting the typical background sound level from the rating level. The greater the difference the greater the magnitude of the initial impact estimate. The standard states that:

- A difference of around +10 dB29 or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact.

8.3.67 The standard states that while the difference between the rating level and background sound level provides an initial estimate of the impact, other factors should be considered in terms of the context, such as the absolute noise levels and how the character and level of the specific sound source relates to the existing sound environment.

8.3.68 Regarding consideration of the absolute levels of sound, the relevant guideline values provided in BS 8233:201430 have been referenced. Table 4 of that standard sets out desirable internal levels to be achieved in new dwellings from external sources. Information is also provided regarding desirable levels of sound for external amenity spaces associated with dwellings. The various values from BS 8233:2014 are summarised in Table 8.11.

28 BS 4142:2014: Method for rating and assessing industrial and commercial sound, BSI (2014)

29 BS 4142 states that: All the measurements and values used throughout this standard are "A"-weighted. Where "A" weighting is not explicit in the descriptor, it is to be assumed in all cases, except where it is clearly stated that it is not applicable, as in the case of tones.

30 BS 8233:2014: Guidance on sound insulation and noise reduction for buildings, BSI (2014)

Table 8.11 Summary of guideline sound levels from BS 8233:2014

Location (activity)	Time Period	Desirable Sound Level not to be exceeded
Inside Bedrooms and Living Rooms (resting)	Day (07:00 – 23:00)	35 - 40 dB $L_{Aeq,T}$
Inside Bedrooms (sleeping)	Night (23:00 – 07:00)	30 - 35 dB $L_{Aeq,T}$
Inside Dining Room/area (dining)	Day (07:00 – 23:00)	40 - 45 dB $L_{Aeq,T}$
External Amenity Space	Day (07:00 – 23:00)	50 - 55 dB $L_{Aeq,T}$

8.3.69 The lower values shown in Table 8.11 above are generally regarded as the LOAEL for steady external sound, i.e. no adverse effect due to the impact of the sound would be expected. If the sound has certain characteristics, it could be appropriate to consider a lower value as the LOAEL.

8.3.70 The World Health Organisation's Guidelines for Community Noise[31] have been used to consider the potential impact from any maximum short-term noise levels from SRFI operations during the night-time period.

8.3.71 The guidelines state that, for good sleep, indoor sound pressure levels should not exceed around 45 dB L_{AFmax} more than 10–15 times per night. This is equated to a level at the outside façade of 60 dB L_{AFmax} with a partially open window. It is generally accepted that this criterion is a LOAEL.[32]

8.3.72 The Institute of Environmental Management and Assessment (IEMA) published their Guidelines for Environmental Noise Impact Assessment in 2014[33]. The document describes a process for undertaking such assessments. It notes that the extent of the effects of noise impact can rarely be determined solely by the difference between current and future noise levels, and that there are other factors to consider when determining potential effects. This principle has been followed in the assessment.

Receptors

8.3.73 As the Proposed Development comprises several different elements, such as the SRFI at the Main Site and the Roade Bypass, not all receptors will be affected by the same sources of noise at potentially significant levels, and not all receptors will be affected by potentially significant levels of vibration.

8.3.74 Consequently, the potential impacts and effects have been considered at different receptor locations depending on which sources are likely to have potential to cause adverse impacts and effects. Broadly, these are the receptors closest to the particular source. When considering road traffic noise, the relevant receptors have been split into three groups: those around the Main Site (R01-R36), those around the Roade Bypass (R37-R56), and those around the other highway works (R57-R62).

8.3.75 The receptors are listed in Table 8.12, together with the relevant sources of noise from the Proposed Development used for assessment. The locations of the receptors are shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

31 Guidelines for Community Noise, WHO (1999)

32 There is no equivalent research regarding the probability of a noise-induced awakening from sources such as those which would occur at the SRFI. Hence the approach to maximum noise levels is based on WHO guidance.

33 Guidelines for Environmental Noise Impact Assessment, IEMA (2014)

Table 8.12 List of receptors and assessed sources of noise

Receptor	Construction Noise	Road Traffic Noise			Railway Noise	SRFI Operational Noise
		Around Main Site	Roade Bypass	Other High-way Works		
R01 Woodpecker Way	-	Y	-	-	Y	-
R02 Northampton South SUE W	-	Y	-	-	Y	Y
R03 Northampton South SUE S	-	Y	-	-	Y	Y
R04 Collingtree Ct	Y	Y	-	-	-	Y
R05 Collingtree Ct	Y	Y	-	-	-	Y
R06 Watering Ln	Y	Y	-	-	-	Y
R07 Windingbrook Ln	-	Y	-	-	-	-
R08 Hilton West	Y	Y	-	-	-	Y
R09 Hilton East	-	Y	-	-	-	-
R10 Saxon Ave	-	Y	-	-	-	-
R11 Holiday Inn West	Y	Y	-	-	-	Y
R12 Maple Farm East	-	Y	-	-	-	Y
R13 Maple Farm South	Y	Y	-	-	-	Y
R14 Collingtree Rd	Y	Y	-	-	-	Y
R15 Collingtree Rd North	-	Y	-	-	Y	Y
R16 Collingtree Rd South	Y	Y	-	-	Y	Y
R17 Collingtree Rd West	-	Y	-	-	Y	Y
R18 Collingtree Rd North	-	Y	-	-	Y	-
R19 Collingtree Rd South	Y	Y	-	-	Y	Y
R20 Stockwell Way	-	Y	-	-	Y	-
R21 Barn Lane	Y	Y	-	-	Y	Y
R22 Rectory Ln	-	Y	-	-	-	-
R23 Barn Ln	Y	Y	-	-	Y	Y
R24 Lodge Farm	Y	Y	-	-	Y	Y
R25 Barn Ln	Y	Y	-	-	Y	Y
R26 Northampton Rd	-	Y	-	-	-	-
R27 Blisworth High St	-	Y	-	-	-	-
R28 Courteenhall Rd	Y	Y	-	-	Y	Y
R29 West Lodge Cottag-es West	Y	Y	-	-	-	Y
R30 West Lodge Cottag-es East	-	Y	-	-	-	-
R31 Bridge Cottage North	-	Y	-	-	Y	-
R32 Bridge Cottage South	-	Y	-	-	Y	-
R33 Bridge Cottage West	-	Y	-	-	Y	-

Receptor	Construction Noise	Road Traffic Noise			Railway Noise	SRFI Operational Noise
		Around Main Site	Roade Bypass	Other High-way Works		
R34 Courteenhall West	-	Y	-	-	-	-
R35 Thorpewood Farm North	-	Y	-	-	-	-
R36 Thorpewood Farm South	-	Y	-	-	-	-
R37 Plain Woods Farm	-	-	Y	-	-	-
R38 Hyde Farm	Y	-	Y	-	-	-
R38a Hyde Farm	-	-	Y	-	-	-
R39 Bailey Brooks Ln West	Y	-	Y	-	Y	-
R39a Bailey Brooks Ln West	Y	-	Y	-	Y	-
R40 London Rd	Y	-	Y	-	-	-
R40a London Rd	-	-	Y	-	-	-
R41 Blisworth Rd N	Y	-	Y	-	-	-
R42 Dovecote Rd	Y	-	Y	-	-	-
R42a Dovecote Rd	-	-	Y	-	-	-
R43 Abbots Way	Y	-	Y	-	-	-
R44 Stratford Road 2	-	-	Y	-	-	-
R45 Northampton Rd	-	-	Y	-	-	-
R46 Blisworth Rd S-Left	Y	-	Y	-	-	-
R47 Blisworth Rd S-Right	Y	-	Y	-	-	-
R48 Hyde Rd	-	-	Y	-	-	-
R49 Hyde Farm House	Y	-	Y	-	-	-
R50 Stratford Rd West	-	-	Y	-	-	-
R51 Stratford Rd East	-	-	Y	-	-	-
R52 Roade High St	-	-	Y	-	-	-
R53 Eliz Wood School	Y	-	Y	-	-	-
R54 Ashton Rd W	-	-	Y	-	Y	-
R55 Ashton Rd E	-	-	Y	-	-	-
R56 Northampton Rd	Y	-	Y	-	-	-
R57 The Lodge	-	-	-	Y	-	-
R57a Woodleys Farm-house	-	-	-	Y	-	-
R58 Tunnel Hill Cottages	-	-	-	Y	-	-
R59 Blaize Farm	-	-	-	Y	-	-
R60 Stokehill Cottage	-	-	-	Y	-	-
R61 Northampton Rd	-	-	-	Y	-	-
R62 Paddocks Farm	-	-	-	Y	-	-

8.3.76 The effects of any potential increase in groundborne vibration from additional freight trains serving the SRFI has been predicted at two receptors: R18 (Collingtree Road) and R24 (Lodge Farm). The locations of the receptors are shown in Figure 8.1 at the end of this chapter and in Appendix 8.6.

8.4 BASELINE CONDITIONS

Noise Surveys

8.4.1 To characterise and quantify the existing baseline sound environment around the Main Site and Roade, a first set of baseline noise surveys were undertaken during September, October and November 2016. Following a review of the measured data and weather conditions during the surveys, a second set of surveys were conducted in June and July 2017. Details regarding the surveys are given below.

8.4.2 The primary source of noise in the area is road traffic on the M1, which runs along the eastern boundary of the Main Site. Other sources of noise are the West Coast Main Line and Northampton Loop railway lines, which run through the village of Roade and diverge just south of the Main Site, and road traffic on local roads. Both railway lines are used by passenger and freight services.

8.4.3 The village of Collingtree, to the north-east of the Main Site, is on the southern outskirts of the urban area of Northampton. The properties in closest proximity to the development site are also close to the M1 and subsequently currently experience high levels of road traffic noise. There is also existing industrial and commercial development around Junction 15 of the M1.

8.4.4 The area to the south and west of the M1 around the Main Site and Roade Bypass site could be considered semi-rural, and is predominantly composed of farmland, villages and individual dwellings. These areas are all affected to some extent by road traffic noise from the M1. Through the centre of Roade there are high volumes of road traffic and consequently there are high levels of road traffic noise.

8.4.5 As noted above, following the first set of baseline surveys, the results were reviewed together with measured weather data for the same period. This indicated that the wind direction was atypical for a large proportion of the survey. The prevailing wind direction in the UK is south-westerly, but during the first round of surveys there were several periods with northerly winds.

8.4.6 Wind direction can have a significant effect on noise levels. This can be particularly apparent when there is a dominant, static, and steady source of noise such as road traffic on the M1. The effect of the wind is greater as the distance from the source increases. Noise levels generally increase downwind of the source and decrease upwind of the source.

8.4.7 The effect of different wind directions will affect some noise indices used to describe the noise environment more than others. At locations which experience distant road traffic noise from the M1, the background level (LA90,T), a measure indicating the constant, underlying level of noise, may vary significantly with wind direction. However, if there is local road traffic or railway noise at the same location, it is these sources that will usually dominate the ambient noise level (LAeq,T). Furthermore, as the local sources are typically closer to the receptors, the results will tend to show less variation with wind direction.

8.4.8 Following the review, a second set of baseline surveys were carried out in June and July 2017 so that a more robust and comprehensive set of measurement data including noise levels representative of different wind directions was collected. This was particularly important at locations closer to the Main Site where the background noise level would be used in the assessment of operational noise from SRFI activities. The second set of surveys also captured some locations where access could not be obtained at the time of the first surveys.

8.4.9 The dates of the surveys were chosen so that monitoring was not carried out during atypical periods, e.g. during school or public holidays.

8.4.10 The surveys comprised 15 static monitoring locations left unattended for the duration of the monitoring, and 8 locations where short-term attended measurements were undertaken. The locations were selected to be representative of the existing noise sensitive receivers around the Proposed Development. At all measurement positions, the microphones were in the acoustic free field and at a height of 1.5 to 2.0 m above local ground level.

8.4.11 In addition, short-term measurements of road traffic noise were made at 3 locations to assist in verifying the predicted levels of road traffic noise.

8.4.12 A summary of the survey dates, number of day and night-time periods recorded, and observations of main noise sources at each location are summarised in Table 8.13 for the unattended measurements, Table 8.14 for attended measurements, and Table 8.15 for the road traffic noise model verification measurements.

8.4.13 Plans showing the monitoring locations are provided in Appendix 8.7, and details of the monitoring equipment used are given in Appendix 8.8.

Table 8.13 Details of unattended noise surveys[34]

Unattended Survey Location	Survey Dates		No. of Full Continuous Periods Recorded		Observations of Main Noise Sources
	Start	End	Day (16hr)	Night (8hr)	
L1	Collingtree Road	14/10/16	28/10/16	13	14	Road traffic on Collingtree Road and M1; passenger/ freight trains.
		13/06/17	27/06/17	13	14	
L2	Collingtree Court	14/10/16	31/10/16	16	17	Road traffic on M1.
L4	Barn Lane	29/09/16	13/10/16	13	14	Road traffic on M1 (distant); light aircraft overhead.
		13/06/17	27/06/17	13	14	
L5	Courteenhall Road	30/09/16	13/10/16	12	13	Road traffic on M1 (distant); passenger/ freight trains.
		13/06/17	27/06/17	13	14	
L6	Lodge Farm	14/06/17	12/07/17	27	28	Passenger/ freight trains; road traffic on M1 (distant).
L7	Collingtree Road	14/10/16	31/10/16	16	17	Passenger/ freight trains; road traffic on Collingtree Road and M1.
		13/06/17	27/06/17	13	14	
L8	Hilton Hotel (west)	29/09/16	13/10/16	13	14	Road traffic on M1 and A45.
		14/06/17	27/06/17	12	13	
L9	Holiday Inn	30/09/16	13/10/16	12	13	Road traffic on M1.
L10	West Lodge Cottages	13/10/16	31/10/16	17	18	Road traffic on Northampton Road.
		13/06/17	27/06/17	13	14	

34 Note that, ultimately, the monitoring location designations L3, S1, S2 and S9 were not used.

Unattended Survey Location	Survey Dates			No. of Full Continuous Periods Recorded		Observations of Main Noise Sources
L11	Windingbrook Lane	14/10/16 13/06/17	31/10/16 27/06/17	16 13	17 14	Road traffic on A45 and M1.
L12	Woodleys Farm	02/11/16	18/11/16	15	16	Road traffic on Northampton Road; light aircraft overhead.
L13	Bailey Brooks Lane	01/11/16	18/11/16	16	17	Passenger/ freight trains; road traffic on M1 (distant).
L14	Blisworth Road	01/11/16	18/11/16	16	17	Road traffic on A508, Blisworth Road and M1 (distant); passenger/ freight trains.
L15	Dovecote Road	01/11/16	18/11/16	16	17	Road traffic on A508, Blisworth Road and M1 (distant); passenger/ freight trains.
L16	Hyde Farm House	01/11/16	18/11/16	16	17	Road traffic on M1 (distant).

Table 8.14 Details of attended noise surveys

Attended Survey Location		Date	Start Time	No. of Full 15min Intervals Recorded	Observations of Main Noise Sources
S3	Hilton Hotel (east)	30/09/16	11:51	3	Road traffic on A45.
		13/10/16	10:54	4	
S4	Rathvilly Farm	14/06/17	12:23	3	Passenger/freight trains; road traffic on M1 (distant).
		12/07/17	15:07	3	
S5	Stockwell Way	14/10/16	13:47	4	Road traffic on M1 and Collingtree Road; passenger/ freight trains.
		31/10/16	10:44	3	
S6	Saxon Avenue	14/10/16	14:07	3	Road traffic on Saxon Avenue, Finney Drive, A45 and M1.
		31/10/16	10:44	3	
S7	Courteenhall	30/09/16	12:55	3	Road traffic on M1.
		13/10/16	11:05	3	
NML3	Bridge Cottage	30/09/16	10:29	3	Road traffic on Courteenhall Road and M1 (distant); passenger/freight trains.
		13/10/16	12:58	4	
NML4	Courteenhall Road	30/09/16	10:25	3	Road traffic on Courteenhall Road and M1 (distant); passenger/freight trains.
		13/10/16	12:57	3	
NML5	Northampton Road	14/06/17	14:58	3	Road traffic on Northampton Road.
		12/07/17	13:48	3	

Table 8.15 Details of road traffic noise surveys

Road Traffic Noise Survey Location		Date	Start Time	No. of Full 1hr Intervals Recorded	Observations of Main Noise Sources
S8	London Road	01/11/16	14:56	3	Road traffic on A508
S10	Stratford Road	01/11/16	13:42	3	Road traffic on A508
S11	Northampton Road	01/11/16	09:45	3	Road traffic on A508

8.4.14 A field calibration check was undertaken prior to and following each set of survey measurements and no significant drift in calibration was identified at any location. All the sound level meters (SLMs) and field calibrators used for the surveys were Class 1 approved. All SLMs were within 2 years of their last laboratory calibration, and all calibrators within 1 year.

8.4.15 The results of the surveys are presented in Appendix 8.9. Time history graphs have been produced for the long-term unattended survey locations, and tables have been provided summarising the measured noise levels at the short-term attended and road traffic noise survey locations.

8.4.16 A weather station was installed close to survey location L5 to record precipitation rate, wind speed and wind direction data from 9th October 2017 until the survey measurements were completed. Prior to this, and to supplement the data where required, publicly accessible weather data from the nearby weather station INORTHAM935 was used to provide details of local weather conditions.

Noise - Important Areas

8.4.17 As stated in paragraph 8.2.5 above, the NPSNN states that applicants should consider opportunities to address the existing noise issues associated with the Important Areas as identified by Defra through the noise action planning process.

8.4.18 The following Important Areas have been identified near to the Proposed Development, with the corresponding noise source in brackets:

- Properties adjacent to the existing railway track in Roade (rail);
- High Street, Collingtree at the properties adjacent to the M1 (road traffic);
- A section of the A508 through Roade (road traffic); and
- A section of the A508 through Grafton Regis (road traffic).

8.4.19 The locations of the four Important Areas are shown in Appendix 8.10.

35 https://www.wunderground.com/personal-weather-station/dashboard?ID=INORTHAM9

Characterisation of Background Sound Levels for Assessment of SRFI Operational Activities at Main Site

8.4.20 As mentioned in the assessment methodology section, the assessment of potential impacts from the sound of operational activities at the SRFI is based on BS 4142:2014. This standard considers both the difference between the predicted sound level from the activities at the receptors and the corresponding existing typical background sound level (LA90,T), and the context in which the sound occurs at the receptor, which includes consideration of the absolute levels of sound.

8.4.21 BS 4142:2014 states that it is important to ensure that the background sound levels used in the assessment are reliable and suitably represent the particular circumstances and periods of interest. The objective is to quantify what is typical during the periods when the noise sources would be operational, rather than ascertaining the lowest background sound level.

8.4.22 To characterise the baseline sound environment, the survey results and weather data were reviewed and any measured sound levels that were likely to have been contaminated by high wind speeds, precipitation, the dawn chorus and other such events were excluded.

8.4.23 As discussed previously, the wind direction has a strong influence on the measured sound levels in the area around the Proposed Development. Consequently, the survey results have been split into two data sets based on the wind direction at the time of measurement, as follows:

- **Broadly south-westerly winds** (i.e. sound levels measured when winds from the west, west southwest, southwest, south southwest or south); and
- **Broadly north-easterly winds** (i.e. sound levels measured when winds from the west northwest, northwest, north northwest, north, north northeast, northeast, east northeast, east, east southeast, southeast, south southeast).

8.4.24 In general, for positions to the south or west of the M1, broadly south-westerly winds will result in lower background sound levels. The same wind directions will cause generally higher background sound levels at positions to the north or east of the M1.

8.4.25 For positions north or east of the M1 the opposite is true, i.e. broadly south-westerly winds will result in generally higher background sound levels, and broadly north-easterly winds will cause generally lower background sound levels.

8.4.26 After filtering the measurement data according to wind direction, the frequency of occurrence of the measured background sound levels (rounded to the nearest whole number) was examined. The modal value, i.e. the most frequently occurring value, was identified for both the day and night-time periods for each monitoring location. Generally, the modal value is considered to be a good indicator of the typical background sound level within these periods.

8.4.27 However, in some situations, the background sound level is not evenly spread about the modal value and there can be quite a few occasions when a lower value occurs.

8.4.28 To explore whether this feature existed, the following process was adopted. For the measurements made at each monitoring location, the value of the result was identified for which 75% of the all the measured values were higher. This value is known as the lower quartile and was determined for both the day and night-time periods. When the lower quartile value was more than 2 dB(A) below the modal value, this was considered an indication that there was unevenness in the distribution of the background sound level. In those cases, the lower quartile value was used as a sensitivity test in the operational sound assessment, in addition to the modal value. This means that a robust approach to the consideration of typical background sound levels in the assessment has been followed.

8.4.29 Based on this analysis, the background sound levels (LA90,15min) for each monitoring position have been identified for the daytime (07.00 – 23.00) and night-time (23:00 – 07:00) periods. These values are presented in Appendix 8.11. The appendix also identifies the representative monitoring location for each receptor location, along with any required correction to relate the results from the monitoring location to the relevant receptor location.

Vibration Survey

8.4.30 As previously discussed, receptors close to the Northampton Loop railway line, on which freight trains serving the SRFI will be travelling, are already exposed to frequent passenger and freight train passes. At the closest receptors to the line, groundborne vibration resulting from the train passes may be experienced.

8.4.31 To characterise and quantify the existing levels of vibration resulting from freight and passenger trains using the Northampton Loop, Vibration Dose Value (VDV) measurements of train passes were undertaken at two of the closest receptors. These are shown as locations V1 and V2 on the monitoring location plan in Appendix 8.7. The results have been used to predict the potential increase in perceptible vibration at the corresponding receptors due to additional freight trains serving the SRFI on the Northampton Loop.

8.4.32 Vibration measurements were carried out following the principles of BS 6472-1:2008. A triaxial accelerometer was attached to a mounting plate conforming to the German standard DIN 45669-2:2005-0636. At V1 the mounting plate was placed in the middle of a concrete slab used for car parking on the side of the residence closest to the railway. At V2 it was placed on a concreted yard/driveway area in-line with the closest point of the residence to the track. Both positions were considered representative of the floor vibration experienced inside the properties.

8.4.33 Both monitoring locations were to the west of the railway, and so closer to the northbound line. V1 was approximately 22 m to the centre of the northbound track, and V2 was approximately 87 m.

8.4.34 At each location, a measurement was started as a train approached the monitoring site and stopped as it moved away. The measurements indicated that the weighted acceleration in the vertical axis was the dominant direction of vibration. In accordance with BS 6472-1:2008, only this axis has been considered further.

8.4.35 The number and type of measured train passes together with the average and maximum VDVb results for each train type are summarised in Table 8.16.

Table 8.16 Summary of measured VDVb levels for train passes

Survey Location	Train Type	Northbound (nearside)			Southbound (far side)		
		No. of Passes	Avg, VDV_b	Max, VDV_b	No. of Passes	Avg, VDV_b	Max, VDV_b
V1	Freight	4	0.016	0.019	3	0.008	0.011
	Passenger (4 car)	14	0.009	0.012	13	0.005	0.006
	Passenger (8 car)	-	-	-	3	0.007	0.008
	Passenger (12 car)	1	0.011	0.011	-	-	-
V2	Freight	3	0.004	0.004	3	0.004	0.004
	Passenger (4 car)	4	0.001	0.002	4	0.003	0.003

36 DIN 45669-2:2005-06 Measurement of vibration immission - Part 2: Measuring method

8.5 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

Construction Noise

8.5.1 This section deals with the assessment of the potential temporary noise effects at nearby noise sensitive receptors resulting from construction works associated with the Proposed Development as described in section 8.3.

8.5.2 Predicted noise levels for the activities likely to be used in the construction of the SRFI and Roade Bypass at the relevant receptors are presented in Appendix 8.12, based on the estimates of plant and equipment listed in Appendix 8.2. The relevant receptors are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.3 The values represent the LAeq,12hr noise levels to be expected on a typical working day at ground floor level when the activities are in relatively close proximity to the receptor. The tables are colour coded to indicate how the predicted noise levels correspond to the thresholds of potential effects stated in Table 8.1.

8.5.4 On occasion, there may be days when the predicted noise levels could be slightly higher than those presented, when activities are taking place at closest possible point to the receptor. However, this would be very much a worst case, atypical occurrence.

SRFI

8.5.5 Table 1 of Appendix 8.12 indicates that the vast majority of activities involved in the construction of the SRFI would result in daily construction noise levels below the LOAEL even when they are in relatively close proximity to the relevant receptors. No activities are predicted to cause an impact which exceeds the SOAEL. Therefore, no significant adverse noise effects are expected.

8.5.6 It should also be noted that at two receptors, R4 and R5, where the predicted daily construction levels for one activity, bulk earthworks, are between the LOAEL and the SOAEL when in relatively close proximity, the existing levels of ambient noise are comparable to the predicted construction noise levels due to the proximity of the M1. Due to the constant nature of the noise from the M1, it is unlikely that construction activity will be audible at these receptors.

8.5.7 The construction noise levels will vary considerably throughout the works programme depending on the different activities being undertaken during each phase, and how they are distributed across the site.

8.5.8 The indicative master programme indicates that much of construction activity for the Main Site (bulk earthworks, landscaping, road construction and construction of rail terminal) is expected to be carried out over a period of around two and a half years. Depending on the rate of take-up of development plots, work on constructing the warehouse buildings could extend for around a further three years. The initial works will include the creation of the landscaping bunds around the site. This should provide screening of the construction activities from the receptors and reduce the predicted noise levels from those shown in Table 1 of Appendix 8.12.

8.5.9 The bulk earthworks activity may take up to two years to prepare the entire site, and therefore the time spent in relatively close proximity to any one receptor is expected to be minimal, with daily construction noise levels typically being much lower during this phase of the works than those shown in Table 1 of Appendix 8.12.

8.5.10 While it is possible that more than one activity may take place concurrently, the predicted noise levels shown in Table 1 of Appendix 8.12 are based on the activities being in relatively close proximity to the receptors. Therefore, it is unlikely that any other activities taking place at the same time would be close enough to a particular receptor to cause a material increase in construction noise levels over those shown.

8.5.11 Regarding construction working hours, the following are currently anticipated:

- 07:00 – 19:00 hours: Monday to Friday;
- 07:00 – 16:00 hours: Saturdays.
- No works on Sundays or public holidays.

8.5.12 It is expected that all construction related deliveries would also take place during these hours, except for large items of plant which usually have to be transported on the road network at other times when there is minimal traffic. Site personnel would typically be permitted to access the site shortly before and after these hours.

8.5.13 On occasion, out of hours works may be required where it is not practicable to complete them within the hours stated above. Such activities may include long concrete pours, which cannot be interrupted once started, and power floating of the rail terminal which must be undertaken when the concrete has cured to a certain level. Any such works would be appropriately managed and mitigated to minimise any potential adverse noise effects as far as practicable.

8.5.14 In addition, some activities taking place around the outside of the Main Site will require out of hours working, including during the night-time period, to comply with the requirements of Highways England. As above, these works would be appropriately managed and mitigated to minimise any potential adverse noise effects as far as practicable.

8.5.15 As will be the case in the operational phase, vehicles accessing the Main Site will approach primarily using the A508 Northampton Road from Junction 15 of the M1. The total number of daily vehicle movements for the construction works is anticipated to be lower than when the SRFI is operational. Therefore, the potential construction road traffic noise impact is expected to be no worse, and likely less, than that predicted for the operational phase, and consequently no significant adverse noise effects are anticipated at the relevant receptors.

Roade Bypass

8.5.16 Table 2 of Appendix 8.12 indicates that most of activities taking place on the Roade Bypass site would result in daily construction noise levels below the LOAEL even when they are in relatively close proximity to the relevant receptors. There are a small number of receptors where the impact is expected to fall between the LOAEL and SOAEL. For two activities, it is predicted that the SOAEL might be exceeded depending on the duration of those activities. This may occur when the works are in relatively close proximity to two receptors, resulting in four instances of a potential (temporary) significant adverse noise effect.

8.5.17 These two receptors, R38 and R41, are very close to the central roundabout of the proposed Roade Bypass that forms the junction with the existing Blisworth Road. The potential exceedances of the SOAEL are predicted when enabling works and the first phase of road construction take place in this area.

8.5.18 The outline construction programme indicates that the works associated with the Roade Bypass are expected to be carried out over an 18 month period. With the main bypass route being over 2 km in length, the time spent by a single activity in relatively close proximity to any one receptor would likely be minimal, with construction noise levels throughout the duration of the works being typically much lower.

Other Highway Works

8.5.19 Regarding construction noise at the other highway works locations, six sites have been identified where a receptor is within 300 m of the works boundary. These are the sites associated with the seven receptors R57 to R62 (incl. R57a) as shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.20 These works consist of alterations and realignments of existing roads and are expected to last between two and six months depending the extent of the works. No earthworks are expected except at the site encompassing the junctions between the A508 and Rookery Lane/Ashton Road, just south of the Roade Bypass, associated with the receptor R60. Some out of hours works are expected to be needed to accommodate tie-ins between the old and new road surfaces.

8.5.21 Estimates of the type and numbers of plant and equipment likely to be used for these works, as well as their estimated usage for a typical working day, are not available at this stage. Therefore, it is not possible to produce an indication of the potential effects in terms of the prediction of noise levels. This will be considered in detail during production of the relevant Phase specific Construction Environmental Management Plan (P-CEMP) as required by the DCO.

8.5.22 While relatively small-scale when compared to construction of the SRFI and Roade Bypass, it is possible that these works could result in some adverse noise effects at the relevant receptors. Any such works will be appropriately managed and mitigated to minimise any potential adverse noise effects as far as practicable.

Construction Vibration

8.5.23 Of the construction activities listed in the outline construction programme for the Proposed Development, only piling has been identified as having the potential to give rise to vibration that may cause adverse effects at nearby receptors.

8.5.24 It is understood that the only element of the Proposed Development for which piling may be required is the construction of foundations for the Roade Bypass railway bridge. The location of the bridge is approximately 110 m from the nearest sensitive receptors located at the end of Bailey Brooks Lane in Roade.

8.5.25 The propagation of vibration from the activity to the receptor will depend upon the piling method, the equipment used, and the intervening soil and geology type. Consequently, it is difficult to predict the likely effects with a sufficient level of certainty at this stage. However, it has been found previously that, in general, no material adverse effects are likely to occur when the distance to the nearest receptor is over 100 m. Consequently, no significant adverse vibration effects from construction activities are expected.

8.5.26 With regard to potential groundborne vibration caused by the passage of HGV traffic serving the site during construction, as discussed in section 8.3, this is primarily a result of the condition of the underlying road surface. Construction HGV traffic will be routed away from any sensitive receptors where practicable to minimise any potential groundborne vibration.

Railway Noise

8.5.27 This section deals with the assessment of the potential change in railway noise as a result of the Proposed Development. Operation of the SRFI will mean that additional freight trains will use the rail network, entering and exiting the site via the Northampton Loop line that runs along the western boundary of the Main Site.

8.5.28 Average railway noise levels have been predicted at the relevant receptors including the effects of both passenger and freight train activity on the Northampton Loop and West Coast Main Line for the baseline, DM and DS future year scenarios described in section 8.3.

8.5.29 The West Coast Main Line has been included as the two lines are adjacent until just south of the Main Site, whereby the West Coast Main Line diverges to the north-west. This means that receptors to the south of the Main Site, including those in Roade, are approximately the same distance from both lines. The relevant receptors include those close to the two lines where they run together, and the Northampton Loop where it diverges.

8.5.30 As previously discussed, the predictions assume typical rail operations with no engineering works taking place. Details of the number and type of trains used for each scenario are presented in Appendix 8.3. The relevant receptors are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.31 It should be noted that noise from the SRFI freight trains once they have moved off the Northampton Loop and into the SRFI site is not part of these predictions as it is considered an operational sound source and are assessed in the corresponding section below. No SRFI freight trains have been assumed to travel on the section of Northampton Loop line next to the Main Site, i.e. they will either enter or exit the SRFI from the connections at the northern and southern ends of the site.

8.5.32 Table 1 of Appendix 8.13 presents the predicted daytime average railway noise levels, with Table 5 presenting the levels for the night-time period. The daytime values are presented as LAeq,16hr noise levels, and the night-time values as LAeq,8hr noise levels.

8.5.33 Tables 2 to 4 of Appendix 8.13 present the assessment of any expected significant adverse effects and the impact magnitudes during the daytime period in accordance with Table 8.4. Tables 6 to 8 present the corresponding assessment for the night-time period in accordance with Table 8.5.

Significant Adverse Effects

8.5.34 It can be seen from the assessment tables in Appendix 8.13 that no significant adverse effects have been predicted at the relevant receptors as a result of the change in average railway noise associated with the Proposed Development for any of the future year scenarios in either the day or night-time periods.

Impact Magnitudes

8.5.35 The assessment tables in Appendix 8.13 also show that no adverse impacts have been predicted at the relevant receptors as a result of the change in average railway noise associated with the Proposed Development for any of the future year scenarios in either the day or night-time periods. All impact magnitudes are expected to be either negligible or no change.

Noise Insulation Regulations (Railways)

8.5.36 No receptors have been identified as being likely to be eligible for an offer of mitigation under the terms of these regulations.

Noise Action Planning Important Areas

8.5.37 As stated in paragraph 8.4.18 above, there is a railway Important Area (IA) in the vicinity of the Proposed Development. The railway noise IA shown in Figure 1 of Appendix 8.10 encompasses the Northampton Loop and West Coast Main Line as they run through Roade. The relevant receptors most representative of this area are R39, R39a and R54.

8.5.38 The assessment tables in Appendix 8.13 show that no significant adverse effects or adverse impacts as a result of the Proposed Development are expected at these receptors in any future year scenario. The expected impact magnitudes for all future years are at worst negligible during both the day and night-time periods.

8.5.39 Given the limited size of the expected impact magnitudes, the Order limits of the Proposed Development, and the nature of the scheme, it is not considered that there are any practicable opportunities to address the existing noise issues associated with this railway noise IA with regard to paragraph 5.200 of the NPSNN.

Site of Special Scientific Interest

8.5.40 The Roade Cutting Site of Special Scientific Interest (SSSI) encompasses the area around the railway lines between the southern boundary of the Main Site and the centre of Roade. The site is also listed in the Geological Conservation Review (GCR) and has been identified as a potential Local Wildlife Site (LWS). Further details can be found in Chapter 6 of the ES (Ecology and Nature Conservation).

8.5.41 It is anticipated that the additional freight train activity resulting from operation of the SRFI would have, at most, a negligible impact on this area and therefore no significant adverse noise effect on any geology or wildlife is expected.

Maximum Noise Levels from Railway Movements

8.5.42 The impact of night-time maximum noise levels from train movements was assessed at six receptors: R1, R18, R24, R32, R39 and R54. Two assessments were undertaken, one assuming bedroom windows are partly open for ventilation providing an overall sound attenuation of 12 dB(A); the other assuming windows closed providing a sound attenuation of 25 dB(A). This latter assumption could be an underestimate if the receptors have standard thermal double-glazed windows, meaning that robust and worst-case assumptions have been considered for this aspect.

8.5.43 The probability of a noise induced awakening has been determined by reference to Figure 2 in a paper presented to Internoise in 2013 by Fenech et al37. That figure is based on the work by Elmenhorst (Footnote 17). Further details of the assessment method are set out in Appendix 8.3.

8.5.44 The results of the assessment are set out in Appendix 8.13. It can be seen that the potential increase in noise induced awakenings from maximum noise levels is less than one in all the assessment years with windows closed and hence no significant adverse effects are expected.

8.5.45 For windows open, the same result is true for locations R23, R32 and R39 for all scenarios and for locations R1, R18 and R54 for 2021 and 2033. However, in 2043, at these three locations, it is estimated that the number of noise induced awakenings from maximum noise levels could increase by just over one per night indicating that a significant adverse effect could occur at these receptors.

8.5.46 It should be noted, particularly regarding the assessment of maximum noise levels from railway movements, that while two types of freight locomotive have been assumed for the predictions of railway noise for both SRFI and non-SRFI movements (see Appendix 8.3), it is likely that other types of freight locomotive that produce lower levels of noise will be used for some of the movements. However, it is not possible to accurately identify how many movements this may affect. This means that worst-case and robust assumptions have been considered for this aspect.

Summary

8.5.47 The assessment of the potential change in average railway noise as a result of the operation of the SRFI has shown that no significant adverse noise effects or adverse impacts are expected at any of the relevant receptors for all future year scenarios during both the day and night-time periods. The associated impact magnitudes would be, at worst, negligible.

8.5.48 The assessment of the potential change in night-time maximum railway noise levels as a result of the operation of the SRFI has shown that there are three of the receptors assessed where, in 2043, the national rail long term planning horizon, there could just be a significant adverse effect due to a possible increase of one noise induced awakening a night for that scenario.

37 "Health effects from high-speed railway noise – a literature review", Fenech et al, Internoise 2013

Railway Vibration

8.5.49 This section deals with the assessment of the potential change in railway induced vibration as a result of the Proposed Development. Operation of the SRFI will mean that additional freight trains will use the rail network, entering and exiting the site via the Northampton Loop line that runs along the western boundary of the Main Site. Freight trains travelling on surface railways are considered a potential source of groundborne vibration.

8.5.50 Railway induced vibration levels have been predicted at two receptors including the contribution of both passenger and freight train activity on the Northampton Loop for the baseline, DM and DS future year scenarios described in section 8.3. The predictions have been based on the measurements of train passes taken during the baseline survey, with the receptors corresponding to the two measurement locations.

8.5.51 The receptors, R18 and R24, are around 30 m and 86 m from the centre of the northbound track. In the most favourable conditions, significant levels of vibration would not be expected to propagate beyond 100 m from the track. Therefore, the predicted vibration levels at the two receptors are considered representative of those that may be experienced at other receptors close to the track. The locations of these receptors are shown in Figure 8.1 and in Appendix 8.6.

8.5.52 As previously discussed, the predictions assume typical rail operations with no engineering works taking place. Details of the number and type of trains used for each scenario are presented in Appendix 8.3. The vibration levels used in the predictions are the highest measured values for each representative train type taken during the baseline survey.

8.5.53 As the results of the predictions are being considered as representative of other receptors, in order to provide a robust (worst-case) assessment, it has been assumed that all freight trains serving the SRFI pass the two receptor locations. As discussed in the railway noise assessment section, the SRFI freight trains will either enter or exit the SRFI from the connections to the Northampton Loop at the north and the south of the site. Therefore, during actual operation, it is expected that some SRFI freight trains will only travel on the track to the north of the site, and some only on the track to the south.

8.5.54 Table 8.17 below presents the predicted daytime vibration dose values (VDVs) from railway induced vibration. These are considered representative of the levels that could occur inside the properties at the receptor locations. Table 8.18 presents the predicted VDVs for the night-time period.

Table 8.17 Predicted railway VDVs for daytime period (07:00 – 23:00)

Receptor	Predicted VDV_b ($m/s^{1.75}$) - Day						
	2017 Baseline	2021 DM	2021 DS	2033 DM	2033 DS	2043 DM	2043 DS
R18 Collingtree Rd	0.05	0.05	0.05	0.05	0.05	0.05	0.06
R24 Lodge Farm	0.01	0.01	0.01	0.01	0.01	0.01	0.02

Notes:
DM = Do Minimum, DS = Do Something

Table 8.18 Predicted railway VDVs for night-time period (23:00 – 07:00)

Receptor	Predicted VDV_b ($m/s^{1.75}$) - Night						
	2017 Baseline	2021 DM	2021 DS	2033 DM	2033 DS	2043 DM	2043 DS
R18 Collingtree Rd	0.03	0.03	0.03	0.04	0.04	0.04	0.04
R24 Lodge Farm	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:
DM = Do Minimum, DS = Do Something

Significant Adverse Effects

8.5.55 It can be seen from Tables 8.17 and 8.18 that no exceedances of the SOAEL as described in Table 8.7, have been predicted at the two receptors as a result of the change in railway induced vibration associated with the Proposed Development for any of the future year scenarios in either the day or night-time periods. Therefore, no significant adverse effects are expected at receptors close to the Northampton Loop line.

Impact Magnitudes

8.5.56 Tables 8.17 and 8.18 also show that no adverse impacts have been predicted at the two receptors as a result of the change in railway induced vibration associated with the Proposed Development for any of the future year scenarios in either the day or night-time periods. All impact magnitudes are expected to be negligible as described in Table 8.7.

Sites of Special Scientific Interest

8.5.57 The Roade Cutting Site of Special Scientific Interest (SSSI) encompasses the area around the railway lines between the southern boundary of the Main Site and the centre of Roade. The site is also listed in the Geological Conservation Review (GCR) and has been identified as a potential Local Wildlife Site (LWS). Further details can be found in Chapter 6 of the ES (Ecology and Nature Conservation).

8.5.58 It is anticipated that the additional freight train activity resulting from operation of the SRFI would have, at most, a negligible impact on this area and therefore no significant adverse vibration effect on any geology or wildlife is expected.

Summary

8.5.59 The assessment of the potential change in railway induced vibration as a result of the operation of the proposed SRFI has shown that no significant adverse vibration effects or adverse impacts are expected at receptors close to the Northampton Loop for all future year scenarios during both the day and night-time periods.

Road Traffic Noise – Around Main Site

8.5.60 This section deals with the assessment of the potential change in road traffic noise as a result of the Proposed Development on the roads around the Main Site. The assessment does not include the roads within the Main Site itself, providing access to the SRFI warehousing and other elements, as they are considered to be an operational sound source and are assessed in the corresponding section below.

8.5.61 Road traffic noise levels have been predicted at the relevant receptors for the baseline, DM and DS future year scenarios described in section 8.3. The relevant receptors are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.62 Table 1 of Appendix 8.14 presents the predicted daytime road traffic noise levels, with Table 4 of that appendix presenting the levels for the night-time period. The daytime values are presented as LAeq,16hr noise levels, and the night-time values as Lnight, equivalent to LAeq,8hr, noise levels.

8.5.63 Tables 2 and 3 of Appendix 8.14 present the assessment of any expected significant adverse effects and the impact magnitudes during the daytime period in accordance with Table 8.9. Tables 5 and 6 present the corresponding assessment for the night-time period in accordance with Table 8.10.

Significant Adverse Effects

8.5.64 It can be seen from the assessment tables in Appendix 8.14 that most receptors around the Main Site are not expected to experience any significant adverse effects as a result of the change in road traffic noise associated with the Proposed Development for any of the future year scenarios in either the day or night-time periods.

8.5.65 A significant adverse effect has been predicted at one receptor: R30 West Lodge Cottages - East Façade, located on the A508 just to the south of the Main Site, for the 2031 DS day and night-time scenarios. This is due to the predicted road traffic noise level exceeding the SOAEL for the DS scenarios, together with a minor increase of 1.7 dB(A) from the DM to the DS scenario for the day, and 1.6 dB(A) for the night.

8.5.66 At R27 Blisworth High Street, in the 2021 DS daytime scenario only, it can be seen from Appendix 8.14 that the results indicate a significant adverse effect in that year. However, this effect would only be temporary as once the Roade Bypass is operational, R27 would receive a minor beneficial impact for both the day and night-time as indicated by the results for the 2031 DS scenarios.

8.5.67 Other expected impact magnitudes are discussed in the following paragraphs.

Impact Magnitudes

8.5.68 The assessment tables in Appendix 8.14 show that most receptors around the Main Site are not expected to experience any material adverse impacts as a result of the change in road traffic noise associated with the Proposed Development for any of the future year scenarios in either the day or night-time periods. The impact magnitudes are expected to be largely negligible.

8.5.69 Minor beneficial impacts have been predicted at up to ten of the receptors close to the north and west boundaries of the Main Site depending on the future year and assessment period, due to the landscaping bunds around the site screening them from road traffic noise from the M1. This outcome means that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above).

8.5.70 In addition to the minor adverse impact at R30 leading to a significant adverse effect as discussed above, the receptor R29, which is located on the other side of the same property, is also predicted to experience a minor adverse impact during both future year night-time scenarios.

8.5.71 Minor adverse impacts are also predicted at the receptors R31 to R33 for the 2021 DS night-time scenario, which are different facades of the same building (Bridge Cottage) located on Courteenhall Road at the south of the Main Site. However, in the 2031 DS scenario these have changed to be mainly minor beneficial due to the Roade Bypass affecting the flow of traffic in this area. As discussed above, it is expected that the beneficial impacts as a result of the bypass would occur considerably before 2031. Achieving this outcome means that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above).

Noise Insulation Regulations (Roads)

8.5.72 One receptor has been identified as being likely to be eligible for an offer of mitigation. This is R30 West Lodge Cottages - East Façade, the same receptor where a significant adverse effect may occur.

Noise Action Planning Important Areas

8.5.73 As stated in paragraph 8.4.18 above, there are three road Important Areas in the vicinity of the Proposed Development. One of these Important Areas encompasses Collingtree Court, which is opposite the north-east area of the Main Site, on the other side of the M1 (See Figure 2 of Appendix 8.10). The relevant receptors most representative of this area are R4 and R5.

8.5.74 The assessment tables in Appendix 8.13 show that no significant adverse effects or adverse impacts as a result of the Proposed Development are expected at these receptors in any future year scenario. The expected impact magnitudes for all future years are at worst negligible during both the day and night-time periods. It also noted that 2 m high fencing is already in place between Collingtree Court and the M1.

8.5.75 Given the limited size of the expected impact magnitudes, the Order limits of the Proposed Development, and the nature of the scheme, it is not considered that there are any practicable opportunities to address the existing noise issues associated with this road traffic noise IA with regard to paragraph 5.200 of the NPSNN.

Summary

8.5.76 The assessment of the potential change in road traffic noise as a result of the Proposed Development on the roads around the Main Site has shown that potentially significant adverse effects are expected at just two of the 36 receptors considered. However, for one of these instances the effect is temporary and should be mitigated following the completion of the Roade Bypass.

8.5.77 The assessment has also shown that the predicted impact magnitudes at the receptors are largely negligible for all future year scenarios during both the day and night-time periods. Several minor impacts, both beneficial and adverse, have been identified, but none of the latter are expected to result in material adverse effects.

Road Traffic Noise - Roade Bypass

8.5.78 This section deals with the assessment of the potential change in road traffic noise as a result of the Proposed Development on the roads around the Roade Bypass site, as well as on the bypass itself.

8.5.79 It should be noted that the Roade Bypass is not planned to be competed in the 2021 DS scenario, which represents the expected opening year of the SRFI. The traffic noise predictions for this scenario are based on the existing road layout. However, the bypass, as well as all other highway works, are expected to be completed in 2031 DS and have been modelled as such.

8.5.80 Otherwise, road traffic noise levels have been predicted at the relevant receptors for the baseline, DM and DS future year scenarios described in section 8.3. The relevant receptors are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.81 Table 1 of Appendix 8.15 presents the predicted daytime road traffic noise levels, with Table 5 presenting the levels for the night-time period. The daytime values are presented as LAeq,16hr noise levels, and the night-time values as Lnight, equivalent to LAeq,8hr, noise levels.

8.5.82 Tables 2 and 3 of Appendix 8.15 present the assessment of any expected significant adverse effects and the impact magnitudes during the daytime period in accordance with Table 8.9. Tables 6 and 7 present the corresponding assessment for the night-time period in accordance with Table 8.10.

Significant Adverse Effects

8.5.83 It can be seen from the assessment tables in Appendix 8.15 that no significant adverse effects have been predicted at the relevant receptors around the Roade Bypass site as a result of the change in road traffic noise for any of the future year scenarios in either the day or night-time periods.

Impact Magnitudes

8.5.84 Tables 2 and 6 in Appendix 8.15 show that in 2021, prior to construction of the bypass, the vast majority of receptors around the Roade Bypass site are not expected to experience any adverse impacts as a result of the change in road traffic noise associated with the Proposed Development in that year in either the day or night-time periods.

8.5.85 Many of the 2021 DS noise levels are below the LOAEL and therefore no adverse impact is identified. The predicted impacts at almost all other receptors are expected to be negligible. A minor adverse impact is predicted at one receptor, R52 Roade High Street.

8.5.86 Tables 3 and 7 in Appendix 8.15 show that in 2031, with the Roade Bypass constructed and in use, both beneficial and adverse impacts would be expected at the receptors around the site, as well as several negligible impacts.

8.5.87 In particular, beneficial impacts are expected at the receptors located on the A508 as it passes through the centre of Roade, as road traffic is relocated onto the bypass. This outcome means that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above). Adverse impacts are expected at the receptors close to the Roade Bypass site on the western side of the village where existing levels of road traffic noise are relatively low.

8.5.88 The design of the bypass includes landscape bunding next to the new road, particularly on the side closest to Roade. Care has been taken to optimise the design to provide the maximum acoustic benefit as far as is practicable following the recommendations given in paragraph 5.198 of the NPSNN, with a resulting reduction in road traffic noise levels of up to 3 dB(A) at the receptors closest to the bypass over what they might have been otherwise.

8.5.89 In order to mitigate and minimise further the predicted adverse impacts, the potential for additional mitigation has been identified in the form of acoustic fencing. This is described in the mitigation section below together with an overall analysis of the noise impact of the proposed bypass.

Noise Insulation Regulations (Roads)

8.5.90 No receptors have been identified as being likely to be eligible for an offer of mitigation under these regulations.

Noise Action Planning Important Areas

8.5.91 As stated in paragraph 8.4.18 above, there are three road Important Areas in the vicinity of the Proposed Development. One of these Important Areas encompasses the section of the A508 that passes through Roade to the north of the railway line. The relevant receptor most representative of this area is R44.

8.5.92 The assessment tables in Appendix 8.15 show that a negligible impact is expected at R44 in the 2021 DS scenario. However, in the 2031 DS scenario when the Roade Bypass is operational, the receptor is expected to experience a minor beneficial impact during the day and a major beneficial impact during the night because of the reduction in traffic volume on the A508. This outcome means that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above).

8.5.93 It can be seen that the Roade Bypass is expected to help address the existing noise issues associated with this IA with regard to paragraph 5.200 of the NPSNN by reducing the levels of road traffic noise within it.

Local Wildlife Sites

8.5.94 The Roade Quarry Local Wildlife Site (LWS) is located at the south of Roade, adjacent to the A508 on the east side. Further details can be found in Chapter 6 of the ES (Ecology and Nature Conservation).

8.5.95 It is anticipated that in 2021, prior to the construction of the bypass, the change in road traffic noise associated with the Proposed Development would have, at most, a negligible impact on the LWS and therefore no significant adverse noise effect on any wildlife is expected. In 2031, beneficial noise impacts are anticipated at the LWS as a result of the Roade Bypass. This is further described in the mitigation section below.

Summary

8.5.96 The assessment of the potential change in road traffic noise as a result of the Proposed Development on the roads around the Roade Bypass site, as well as from the bypass itself, has shown that no significant adverse noise effects are expected at any of the relevant receptors for any future year scenario during both the day and night-time periods.

8.5.97 The assessment has also shown that in 2021, prior to the construction of the bypass, the predicted impact magnitudes at the receptors are almost all negligible. In 2031, when the bypass has been constructed and is in use, there are a variety of beneficial and adverse impact magnitudes, reflecting the shift of road traffic travelling through the centre of Roade on the A508 onto the bypass to the west of the village. The beneficial impacts are in part due to the careful landscaping around the new bypass. In order to mitigate and minimise further the predicted adverse impacts, additional mitigation has been identified and is discussed in the mitigation section below.

8.5.98 In reducing road traffic noise in the centre of Roade, the construction of the bypass helps address the existing noise issues associated with the Noise Action Planning Important Area located there, as well as at the Roade Quarry Local Wildlife Site at the south of the village. This outcome means that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above).

Road Traffic Noise – Other Highway Works

8.5.99 This section deals with the assessment of the potential change in road traffic noise as a result of the Proposed Development in the areas around the other highway works where a noise-sensitive property is within 300 m of the site.

8.5.100 The other highway works consist of alterations and realignments of several sections of existing road, described in Chapter 2 of the ES (Description of Development). The following works are already integrated into the assessment of road traffic noise around the Main Site:

- the new roundabout on the A508 to serve as access to the SRFI;
- dualling of the A508 between the new roundabout and M1 Junction 15;
- enlargement and reconfiguration of M1 Junction 15; and
- widening of the A45 to the north of M1 Junction 15.

8.5.101 Six of the other highway works have been identified for assessment, corresponding to the seven receptors R57 to R62 (incl. R57a), which were selected to be those closest to the changes in road realignment. These works are part of the 'A508 route upgrade' described in Chapter 2 of the ES, and in detail in Chapter 12 (Transportation).

8.5.102 Road traffic noise levels have been predicted at the relevant receptors for the baseline, DM and DS future year scenarios described in section 8.3. The relevant receptors are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.103 Table 1 of Appendix 8.16 presents the predicted daytime road traffic noise levels, with Table 3 presenting the levels for the night-time period. The daytime values are presented as LAeq,16hr noise levels, and the night-time values as Lnight, equivalent to LAeq,8hr, noise levels.

8.5.104 Table 2 of Appendix 8.16 presents the assessment of any expected significant adverse effects and the impact magnitudes during the daytime period in accordance with Table 8.9. Table 4 presents the corresponding assessment for the night-time period in accordance with Table 8.10. Note that as the other highway works will not have begun in 2021 and their locations are largely isolated from the Main Site and Roade Bypass site, assessment has been carried out for the 2031 scenarios only.

Significant Adverse Effects

8.5.105 It can be seen from the assessment tables in Appendix 8.16 that most receptors around the other highway works are not expected to experience any significant adverse effects as a result of the change in road traffic noise associated with the Proposed Development for the 2031 scenario in either the day or night-time periods.

8.5.106 A significant adverse effect has been predicted at one receptor: R57 The Lodge, located on the A508 just to the south of the Main Site, for the 2031 DS daytime scenario only. This is due to the predicted road traffic noise level exceeding the SOAEL for the DS scenario, together with a minor increase of 1.3 dB(A) from the DM to the DS scenario.

8.5.107 It should be noted that R57 is located on the same section of the A508, between the south-east corner of the Main Site and the Roade Bypass, as R30, for which a significant adverse effect has also been indicated as part of the road traffic noise assessment for receptors around the Main Site. The predicted significant adverse effects at both receptors arise from minor increases in road traffic noise in terms of impact magnitude resulting in noise exposure above the SOAEL.

Impact Magnitudes

8.5.108 The assessment tables in Appendix 8.16 also show that there is a mixture of impact magnitudes predicted at the receptors close to the other highway works for the 2031 DS scenarios.

8.5.109 It can be seen that minor beneficial impacts are predicted at R60 during both the day and night-time periods. This outcome means that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above). A moderate adverse impact is predicted at R58 during the night-time period only. The other impacts consist of minor adverse and negligible magnitudes.

Noise Insulation Regulations (Roads)

8.5.110 One receptor has been identified as being likely to be eligible for an offer of mitigation. This is R57 The Lodge, the same receptor where a significant adverse effect is expected as discussed above.

Noise Action Planning Important Areas

8.5.111 As stated in paragraph 8.4.18 above, there are three road Important Areas in the vicinity of the Proposed Development. One of these Important Areas encompasses the section of the A508 as it passes through Grafton Regis. The relevant receptor most representative of this area is R62.

8.5.112 The assessment tables in Appendix 8.16 show that no significant adverse effects or adverse impacts as a result of the Proposed Development are expected at this receptor in the 2031 future year scenario. The expected impact magnitudes for the 2031 DS scenarios are negligible during both the day and night-time periods.

8.5.113 It is possible that the existing noise issues associated with this road traffic noise Important Area could be mitigated, if practicable, by use of a low noise road surface, such as a thin surface course. The viability of this potential mitigation measure would be discussed with the local highway authority during the detailed design approval process, as in some situations the increased maintenance requirements restrict the potential use of this type of mitigation. It is not considered that there are any other practicable opportunities to address the existing noise issues associated with this road traffic noise IA with regard to paragraph 5.200 of the NPSNN.

Summary

8.5.114 The assessment of the potential change in road traffic noise as a result of the Proposed Development in the areas around the other highway works has shown that a potentially significant effect is expected at one receptor.

8.5.115 The assessment has also shown that there are a variety of impact magnitudes expected at the other receptors, in general negligible and minor, with the latter including both beneficial and adverse impacts.

8.5.116 There may be an opportunity to reduce road traffic noise levels at the Noise Action Planning Important Area at Grafton Regis if practicable, but this would require further discussion with the local highway authority during the detailed design approval process.

Road Traffic Noise – Triggered Data Links

8.5.117 This section deals with the assessment of the potential change in road traffic noise as a result of the Proposed Development on the triggered data links, i.e. roads in the wider transport model that have met certain criteria in terms of the increase in traffic flows (see section 8.3 for further details). In total, six such roads have been identified.

8.5.118 As previously discussed, road traffic noise from the triggered data links has been predicted as a daytime basic noise level (BNL) for the future year DM and DS scenarios where certain criteria have been met. This means that the predicted levels apply to a reference distance of 10 m from the road rather than at a specific receptor. As potential noise change is a key consideration, this approach would enable the scale of any noise impact to be determined. Depending on the location, the assessment years has been either 2021 or 2031.

8.5.119 Table 1 of Appendix 8.17 presents the assessment of any expected significant adverse effects and the impact magnitudes in accordance with Table 8.9. The table includes the predicted daytime road traffic noise levels presented as LAeq,16hr values.

Significant Adverse Effects

8.5.120 It can be seen from the assessment table in Appendix 8.17 that no significant adverse effects have been predicted as a result of the change in road traffic noise for the relevant future year scenarios.

Impact Magnitudes

8.5.121 Table 1 in Appendix 8.17 also shows that there are a variety of impact magnitudes predicted for the relevant future year scenarios.

8.5.122 It can be seen that no change and negligible impacts are predicted at two locations, and minor adverse impacts at two others. The predicted DS road traffic noise levels are below the LOAEL at the two remaining locations, and therefore no adverse impact has been identified.

Summary

8.5.123 The assessment of the potential change in road traffic noise as a result of the Proposed Development on the six triggered data links has shown that no significant adverse noise effects are expected in the immediate areas around the corresponding roads.

8.5.124 The assessment has also shown that there are a variety of impact magnitudes expected at in the immediate area around the roads with, at worse, minor adverse impacts predicted.

Operational Sound from SRFI Activities at the Main Site

8.5.125 This section deals with the assessment of sound from operational activities taking place at the SRFI. An overview of the different sources and activities included is given in section 8.3. Full details of all modelling assumptions, including source levels, are provided in Appendix 8.5. The predictions assume that the SRFI is fully operational, meaning that robust and worst-case assumptions have been considered for this aspect.

8.5.126 As discussed in section 8.3, the primary assessment has been based on the principles of BS 4142:2014. To make an initial estimate of the impact of the source being assessed, two values are required. The first is the rating level of the source to be assessed. This is the specific sound level that, if required, has been corrected to account for certain acoustic features than can increase the extent of the impact.

8.5.127 The operational sound from the SRFI would be complex in nature, composed of different sources in different locations around the site. As a cautious approach, a +3 dB(A) penalty has been applied to all sources of an industrial nature on the SRFI to account for features that may be readily distinctive at the receptors.

8.5.128 The second value required is the typical background sound level at the receptor, against which the rating level is compared. As discussed in section 8.4, it has been recognised that wind direction has a strong influence on the measured noise levels in the area around the Main Site. Consequently, typical background sound levels have been derived for each survey location using the modal value of the survey results for two wind conditions: broadly south-westerly winds and broadly north-easterly winds. The initial estimate of impact is considered under both wind conditions, although it needs to be borne in mind that, as in the rest of the UK, the prevailing wind direction in the area is broadly south-westerly.

8.5.129 Also discussed in section 8.4, where the distribution of measured background sound levels was not typical, the lower quartile of the values has been identified and used as an additional sensitivity test. The typical and sensitivity test values have been corrected to relate the results from the monitoring location to the relevant receptor location if required. Further details of the background sound derivation process can be found in Appendix 8.11.

8.5.130 The initial estimate of impact is determined by subtracting the typical background sound level from the rating level and considering the difference. The estimate can then be modified by taking context into account, such as the absolute level of the specific sound and the likely façade insulation of the relevant dwelling.

8.5.131 Rating levels for operational activities taking place at the SRFI have been predicted at the relevant receptors for the peak hour during the day and the peak 15 minutes during the night. The relevant receptors are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6.

8.5.132 Table 1 of Appendix 8.18 presents the comparison of the predicted rating levels with the typical background sound levels at the relevant receptors for both wind conditions during the daytime period. Table 2 of the appendix presents the corresponding sensitivity test comparisons where required. Tables 3 and 4 of the appendix present the same comparisons for the night-time period.

Assessment of Operational Sound Impacts – Daytime – Broadly South-Westerly Winds

8.5.133 It can be seen from Tables 1 and 2 of Appendix 8.18 that under broadly south-westerly winds during the daytime, most relevant receptors are expected to experience low impacts from operational sound from the SRFI.

8.5.134 At the receptors from R2 to R13, broadly to the north-east of the Main Site and relatively close to the M1, the predicted rating levels are at least 10 dB(A) below both the modal and any sensitivity test background sound levels. As a result, no significant adverse effects or adverse impacts are expected due to operational sound at these receptors.

8.5.135 As the location of the receptors moves further away from the M1 to the west, the background sound levels become lower as road traffic noise levels decrease due to both the greater distance to the motorway and the effect of the broadly south-westerly winds.

8.5.136 This, along with a slight increase in rating levels due to the location of the rail terminal on the west side of the Main Site, results in the difference between rating and background sound levels being reduced, and at several receptors to the west and south of the site, the rating level is expected to exceed the background sound level under broadly south-westerly winds.

8.5.137 The rating levels at five receptors in the vicinity of R21 to R28 exceed the corresponding modal background sound levels by up to 6 dB(A), as at R28 Courteenhall Road at the south of the site, and the sensitivity test background sound levels, where present, by up to 7 dB(A), as at R25 Barn Lane directly to the west of the site.

8.5.138 Without taking context into account, the impacts at these receptors could be considered as potentially adverse, though are not significantly adverse.

8.5.139 However, considering the context, especially with respect to the absolute levels of predicted sound, the rating levels predicted at the five receptors range from 41 up to 45 dB LAr,1hr, as predicted at R25 Barn Lane. When these are compared to the daytime external guideline desirable sound levels for dwellings from BS 8233:2014, as summarised in Table 8.11, the rating levels are at least 5 dB(A) below the lower threshold for external amenity space. Assuming a typical reduction of 12 dB(A) for external sound passing through an open window into a habitable room, the rating levels are at least 2 dB(A) lower than the lower threshold for resting inside living rooms during the daytime.

8.5.140 Furthermore, none of the predicted rating levels at the receptors in the vicinity of R21 to R28 are expected to exceed the LOAEL either outside or within dwellings during the daytime.

8.5.141 It should be noted that the guideline desirable levels in Table 8.11 are for the full 16 hour daytime period, whereas the assessment has considered the peak hour of the day in terms of SRFI operational activity. Therefore, it would be expected that at least some other hours of the day would feature lower levels of operational sound from the SRFI, further reducing the impact.

8.5.142 In summary, some adverse impacts are indicated initially for the daytime peak hour of SRFI operations under broadly south-westerly winds at some receptors to the west and south of the Main Site. However, when the impact magnitudes and predicted absolute levels of operational sound are taken into account, no significant adverse effects or adverse impacts are expected.

Assessment of Operational Sound Impacts – Daytime – Broadly North-Easterly Winds

8.5.143 It can be seen from Tables 1 and 2 of Appendix 8.18 that under broadly north-easterly winds during the daytime, almost all the relevant receptors are expected to experience low impacts from operational sound from the SRFI according to the principles of BS 4142:2014.

8.5.144 While the relevant receptors from R2 to R11 are to the east of the M1, they are generally close enough to the road so as not be to be significantly affected by any potential decrease in road traffic noise levels due to broadly north-easterly winds. Conversely, most of the receptors to the west are further from the road and therefore experience increased background sound levels under these conditions. As a result, no significant adverse effects or adverse impacts are expected due to operational sound at all receptors except R23 and R25.

8.5.145 At receptors R23 and R25, to the west of the site, the modal background sound levels of the two wind directions are the same, though under broadly north-easterly winds there are no additional sensitivity test values. As a result, the rating levels at the receptors are 3-4 dB(A) above the modal background sound levels, and the resulting impacts could be considered as potentially adverse.

8.5.146 However, considering the context, especially with respect to the absolute levels of predicted sound, the rating levels predicted at the two receptors are 44-45 dB LAr,1hr, and therefore the assessment is the same as for broadly south-westerly winds. The result is that neither of the predicted rating levels at receptors R23 and R25 are expected to exceed the LOAEL either outside or within dwellings during the daytime.

8.5.147 In summary, the predicted rating levels for the daytime peak hour of SRFI operations under broadly north-easterly winds exceed the modal and/or sensitivity test background sound values at two receptors at the west of the Main Site. However, no significant adverse effects are expected, and, once the predicted absolute levels of operational sound have been taken into account, no adverse impacts are likely.

Assessment of Operational Sound Impacts – Night-Time – Broadly South-Westerly Winds

8.5.148 It can be seen from Tables 3 and 4 of Appendix 8.18 that under broadly south-westerly winds during the night-time, most relevant receptors are expected to experience low impacts from operational sound from the SRFI based on the principles of BS 4142:2014.

8.5.149 At the receptors from R2 to R13, to the east of the Main Site and relatively close to the M1, the predicted rating levels are almost all below both the modal and any sensitivity test background sound levels. The rating level at R13 Maple Farm – South Façade is 2 dB(A) less that the modal value and exceeds the sensitivity test value by just 1 dB(A). Consequently, no significant adverse effects or adverse impacts are expected due to operational sound at receptors R2 to R13.

8.5.150 As in the daytime assessment under broadly south-westerly winds, due to lower background sounds levels at the relevant receptors further away from the M1 to the west, and slightly higher rating levels due to the proximity of the rail terminal, the rating level exceeds the background sound level at several receptors to the west and south of the site. As background levels are typically lower at night, this is expected to occur at nine receptors, a higher number than during the day.

8.5.151 The rating levels at the nine receptors in the vicinity of R16 to R29 exceed the corresponding modal background sound levels by up to 8 dB(A), as at R28 Courteenhall Road at the south of the site, and the sensitivity test background sound levels, where present, by up to 9 dB(A), as at R23 Barn Lane and R25 Barn Lane.

8.5.152 Without taking context into account, the impacts at the nine receptors could be considered as potentially adverse, and some as possibly significantly adverse.

8.5.153 However, considering the context especially with respect to the absolute levels of predicted sound, the rating levels predicted at the nine receptors range from 42 dB LAr,15min up to 45 dB LAr,15min, as predicted at R23 Barn Land and R25 Barn Lane. Assuming a typical reduction of 12 dB(A) for external sound passing through an open window into a habitable room, the internal rating levels are equal to or up to 3 dB(A) greater than the lower threshold for bedrooms, but below the upper threshold in all cases.

8.5.154 It should be noted that the guideline desirable levels in Table 8.11 apply to the full 8 hour night-time period, whereas the assessment has been based on the peak 15 minutes of the night in terms of SRFI operational activity. Therefore, it would be expected that at least some other 15 minute periods of the night would feature lower levels of operational sound from the SRFI.

8.5.155 On this basis, all of the predicted rating levels at the nine receptors in the vicinity R16 to R29 are expected to exceed the LOAEL within dwellings during the night-time with windows open during the peak 15 minute period.

8.5.156 In summary, the predicted rating levels exceed the modal and/or sensitivity test background sound values at some receptors at the west and south of the Main Site during the peak 15 minute period. When context is taken into account, no significant adverse impacts or effects are expected in this situation. It is possible that some adverse impacts or effects may occur, but this would be dependent on how often throughout a night the peak activity occurs.

Assessment of Operational Sound Impacts – Night-Time – Broadly North-Easterly Winds

8.5.157 It can be seen from Tables 3 and 4 of Appendix 8.18 that under broadly north-easterly winds during the night-time, almost all the relevant receptors are expected to experience low impacts from operational sound from the SRFI according to the principles of BS 4142:2014.

8.5.158 While the relevant receptors from R2 to R11 are to the east of the M1, they are generally close enough to the road so as not be to be significantly affected by any potential decrease in road traffic noise levels due to broadly north-easterly winds. Conversely, most of the receptors to the west are further from the road and therefore experience increased background sound levels.

8.5.159 The rating levels at two receptors, R23 Barn Lane and R25 Barn Lane, are predicted to exceed the modal background sound level, but only by 1 dB(A). Neither receptor has a sensitivity test value. On this basis, it is considered highly unlikely that an adverse impact would be expected at either receptor.

8.5.160 In summary, no significant adverse effects are expected in this situation. Furthermore, no adverse impacts are likely.

Assessment of Operational Sound Impacts – Maximum Noise Levels at Night

8.5.161 As discussed in section 8.3, the potential impact of maximum noise levels from operational activities taking place at the SRFI during the night-time has also been considered.

8.5.162 This is based on the comparison of the predicted maximum noise levels with the guideline criterion of 60 dB LAFmax at the outside façade of the receptor, which should not be exceeded more that 10-15 times per night for good sleep. This is generally accepted as the LOAEL.

8.5.163 Maximum noise levels from operational activities taking place at the SRFI have been predicted at the relevant receptors, which are listed in Table 8.12 and shown in Figures 8.1, 8.2 and 8.3 at the end of this chapter and in Appendix 8.6. Further details of all modelling assumptions, including source levels, are provided in Appendix 8.5.

8.5.164 It can be seen from Table 1 of Appendix 8.18 that no predicted maximum noise levels are expected to exceed the 60 dB LAFmax at the outside façade of any relevant receptor.

8.5.165 In summary, no significant adverse effects or adverse impacts are expected as result of maximum noise levels from operational activities taking place at the SRFI during the night-time period.

Summary of Operational Sound Impacts

8.5.166 The assessment of the potential impacts of sound from operational activities taking place at the SRFI has shown that no significant adverse effects are expected at any of the relevant receptors when the SRFI is fully operational during both the day and night-time periods.

8.5.167 The assessment has also shown that some adverse impacts might occur at some of the relevant receptors to the west and south of the Main Site during the night-time period under broadly south-westerly winds.

Summary of Expected Significant Adverse Effects

8.5.168 Based on the results of the assessments of the potential sources of noise and vibration associated with the Proposed Development, Table 8.19 summarises the receptors at which significant adverse effects have been identified, together with the corresponding sources.

8.5.169 The results have taken into account any mitigation that it is inherently integrated into the design of the Proposed Development, such as the landscaping bunds around the Main Site and Roade Bypass, except in the assessment of construction noise, meaning that robust assumptions have been considered prior to the development being completed.

Table 8.19 Summary of expected significant adverse effects

Description	Location	Receptor	DS Scenario	Impact Magnitude	Resulting Exposure	Significant	Additional Specific Mitigation Proposed
Construction Noise	Roade Bypass site	R38 Hyde Farm	N/A	N/A	≥SOAEL	Yes	Yes
		R41 Blisworth Road – North Façade	N/A	N/A	≥SOAEL	Yes	Yes
Railway Noise (maximum noise levels)	Three locations adjacent to railway	R01 Wood-pecker Way	2043 Night	One additional noise induced awakening	N/A	Yes	No
		R28 Collingtree Road North			N/A	Yes	No
		R54 Ashton Rd W			N/A	Yes	No
Road Traffic Noise	Around Main Site	R27 Blisworth High Street	2021 Day	Minor Adverse	≥SOAEL	Yes	No (Temporary Short-Term Effect)
		R30 West Lodge Cottages – East Façade	2031 Day/ Night	Minor Adverse	≥SOAEL	Yes	Yes
	Other Highway Works	R57 The Lodge	2031 Day	Minor Adverse	≥SOAEL	Yes	Yes

Uncertainty and Limitations of the Assessment

8.5.170 The uncertainty and limitations of the assessment are discussed in Appendix 8.19.

8.6 MITIGATION

Construction Noise and Vibration

8.6.1 This section deals with the proposed mitigation of temporary noise and vibration impacts and effects that may result from construction works associated with the Proposed Development.

8.6.2 In general, construction noise and vibration will be managed by the use of best practicable means (BPM), i.e. the use of all reasonable measures to minimise construction noise and vibration. This will follow the principles of the guidance within BS 5228:2009+A1:2014 parts 1 and 2[38] and may include the following where appropriate:

- Selection of appropriate equipment and construction methods;
- Plant to be located as far away as is reasonably practicable from noise-sensitive receptors;
- Static plant/equipment fitted with suitable enclosures or screening where practicable;
- Temporary hoardings/screens around the site boundary or specific activities as appropriate;
- Site personnel instructed on BPM to reduce noise and vibration as part of their induction training and as required prior to specific work activities;
- Appropriate management of working hours for noisier tasks; and
- Liaison with residents in advance of works commencing to provide information regarding the programme.

8.6.3 Regarding the results of the predicted construction noise levels discussed in section 8.5, while the majority are below the LOAEL when in close proximity to the relevant receptors, potentially significant adverse temporary noise effects have been predicted at two receptors, R38 Hyde Farm and R41 Blisworth Road – North Façade, when two activities associated with the Roade Bypass works are in relatively close proximity: the initial enabling works and the first phase of road construction.

8.6.4 It is expected that by use of BPM, particularly through use of temporary screens around the construction activities, that the noise from these activities could be attenuated so that the predicted construction noise levels would be below the SOAEL in all instances.

8.6.5 As discussed in section 8.5, the predicted noise levels for construction of the SRFI and Roade Bypass are based on estimates of the plant and equipment likely to be used for the construction activities, as well as their usage during a typical working day. The use of other specific BPM measures will be considered for all construction works associated with the Proposed Development and described in the relevant Phase specific Construction Environmental Management Plan (P-CEMP) as required by the DCO, when detailed information regarding the proposed construction methods are available. This may also include a noise monitoring regime for the works.

38 BS 5228-1:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise; BS 5228-2:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 2: Vibration

Summary

8.6.6 Mitigation of the temporary noise and vibration impacts and effects resulting from construction works associated with the Proposed Development will be managed through use of BPM, such as careful location of plant and use of temporary screens around construction activities. Specific BPM measures will be considered and described in the relevant Phase specific Construction Environmental Management Plans (P-CEMPs).

8.6.7 Regarding the significant adverse noise effects predicted at the receptors R38 and R41 during certain construction activities associated with the Roade Bypass works, it is expected that these can be attenuated through the use of temporary screens such that the construction noise would be below the SOAEL in all instances.

8.6.8 As a result, it is considered that all expected significant adverse noise effects resulting from the construction works have been appropriately mitigated.

Railway Noise and Vibration

8.6.9 For the most part, no significant adverse effects or adverse impacts are expected as a result of the potential change in railway noise or railway induced vibration associated with the Proposed Development for any of the future year scenarios at any of the relevant receptors. The exceptions are three locations when in 2043, the national rail long term planning horizon, there could just be a significant adverse effect due to a possible increase of one noise induced awakening a night in that scenario.

8.6.10 In considering mitigation options, it needs to be recognised that the results of the assessment have only just indicated a significant adverse effect for the situation some 25 years ahead. As mentioned in Appendix 8.19, there is a degree of uncertainty associated with this assessment. This includes the noise levels emitted from the rolling stock. As discussed in section 8.5, it is likely that some of the freight locomotives used for the prediction of railway noise from both SRFI and non-SRFI movements would generate lower levels of noise than those currently assumed.

8.6.11 Work is being carried out at a European level to reduce the noise from freight trains and it is likely that by 2043, quieter rolling stock will be in use compared with that assumed for this assessment. Therefore, the potential significant adverse effect would be mitigated by the use of quieter rolling stock.

Road Traffic Noise – Around Main Site

8.6.12 This section deals with the proposed mitigation of any expected significant adverse noise effects resulting from the potential change in road traffic noise associated with the Proposed Development on the roads around the Main Site.

8.6.13 As discussed in section 8.5 and summarised in Table 8.19, a significant adverse noise effect has been predicted for 2031 DS at one receptor, R30 West Lodge Cottages - East Façade. This is located on the A508 just to the south of the Main Site. This is associated with a minor adverse impact magnitude that results in an exposure above the SOAEL.

Mitigation of Significant Adverse Effects

8.6.14 Regarding the significant adverse impact predicted at R30 for the 2031 DS day and night-time scenarios, mitigation will be applied through implementing the Noise Insulation Regulations for the residential properties represented by that receptor.

Mitigation of Other Adverse Impacts

8.6.15 While not identified as significant, consideration has also been given to the predicted impacts at the other relevant receptors around the Main Site, as required by the NPSNN. As discussed in section 8.5, the predicted magnitudes are largely negligible, and of the small number of expected minor adverse impacts, the majority are no longer present following the opening of the Roade Bypass. On this basis, no additional mitigation is required.

Summary

8.6.16 For receptor R30, where a significant adverse noise effect resulting from the potential change in road traffic noise associated with the Proposed Development on the roads around the Main Site is expected, the Noise Insulation Regulations will be implemented for the affected dwellings to provide mitigation.

8.6.17 As a result, it is considered that all expected significant adverse noise effects resulting from the change in road traffic noise on the roads around the Main Site have been appropriately mitigated.

Road Traffic Noise – Roade Bypass

8.6.18 No significant adverse effects are expected due to the potential change in road traffic noise as a result of the Proposed Development on the roads around the Roade Bypass site, as well as on the bypass itself, for any of the future year scenarios at any of the relevant receptors.

Mitigation of Other Adverse Impacts

8.6.19 While no significant adverse effects are expected, it is recognised from the assessment in section 8.5 that following the opening of the Roade Bypass, as reflected in the 2031 DS scenarios, a variety of beneficial and adverse impacts are predicted at the relevant receptors. This includes several major adverse impacts, with changes of more than 10 dB(A), but which result in a level below the SOAEL when the DM and DS scenarios are compared.

8.6.20 In accordance with the Government policy aim to mitigate and minimise adverse impacts, the effect of additional mitigation measures has been analysed, in addition to the landscape bunding included in the design of the bypass.

8.6.21 Following a review of the different mitigation options available, the targeted use of fencing on top of the landscape bunding has been utilised, following the recommendations given in paragraph 5.198 of the NPSNN. This increases the overall height of the barrier and provides additional attenuation of the road traffic noise from the bypass at the relevant receptors and other nearby properties.

8.6.22 The location of the fencing is shown in Figure 8.6 at the end of this chapter and in Appendix 8.20 and is focused around the central roundabout and connecting road to the southern roundabout. This location was selected to be most beneficial to those receptors where the greatest adverse impacts were otherwise predicted.

8.6.23 The additional mitigation is a mixture of 2 m and 3 m high fencing and is considered the maximum practicable height to use following coordination with the landscape consultant. Some sections of the fencing have sound absorptive coverings facing the road to reduce reflected road traffic noise.

8.6.24 Tables 1 and 5 of Appendix 8.15 include the predicted day and night-time road traffic noise levels for the 2031 DS scenarios with the additional fencing in place. Tables 4 and 8 of the Appendix present the assessment of any expected significant adverse effects and the impact magnitudes for the 2031 DS scenarios including the fencing.

8.6.25 When compared to the 2031 DS scenarios without the fencing, the number of predicted beneficial and negligible impacts remains the same for both the day and night-time periods. However, the number of moderate and major adverse impacts during the day decreases by two and one respectively, with no major adverse impacts remaining. During the night, the number of major adverse impacts decreases by three, with the number of moderate adverse impacts increasing by two as a result.

8.6.26 The property at which the highest increases in road traffic noise between the 2031 DM and DS scenarios are expected is Hyde Farm, represented by receptors R38 and R38a. When the results of the 2031 DS scenarios with and without the additional fencing are compared, the predicted road traffic noise levels at these receptors are reduced by 4 to 5 dB(A).

8.6.27 Two of the receptors predicted to experience major adverse impacts in the 2031 DS night-time scenario, regardless of additional fencing, are R39 and R39a. This is primarily because they are close to the bypass as it crosses over the railway tracks, and for structural reasons, the bridge parapets are limited to a height of 1.9 m. Therefore, limited screening of road traffic noise passing over the bridge is possible.

8.6.28 This outcome, however, is based on considering road traffic noise only. Whilst road traffic and railway noise are of different character, the two receptors already experience noise from the nearby railway. To give an indication of what a combined impact may be, the predicted road traffic and railway noise levels at R39 and R39a have been combined for the 2033/2031 DM and DS night-time scenarios and the results considered in accordance with Tables 8.5 and 8.10. This indicates that the change in combined road traffic and railway noise would reduce to a negligible impact at R39 and a minor adverse impact at R39a.

8.6.29 It has been shown that as a result of the proposed landscape bunding plus additional fencing, the adverse impacts due to the introduction of the Roade Bypass have been mitigated and reduced to a minimum at the most affected receptors, in accordance with Government policy aims.

Further Analysis of Change in Road Traffic Noise Levels due to Roade Bypass

8.6.30 As has been previously discussed, the receptors selected for the assessment of potential change in road traffic noise on the roads around the Roade Bypass site, as well as the bypass itself, do not reflect the total number of dwellings that may experience beneficial or adverse impacts. To assess this aspect further, two additional analyses have been carried out.

8.6.31 Figure 8.7 at the end of this chapter contains a drawing showing Roade as it would appear with the bypass, also shown in Appendix 8.21. Overlaying the drawing are coloured contours indicating the change in road traffic noise levels between the 2031 DM and DS (including additional fencing) daytime scenarios at a height of 1.5 m. The key is shown in the bottom right-hand corner.

8.6.32 It can be seen that the areas where a reduction in road traffic noise levels is expected, primarily through the centre of Roade along the A508, appear to affect more properties than the areas showing an increase in road traffic noise around the bypass route, which are less heavily populated. The red contour also shows how, as a result of the landscape bunding and fencing, the highest increases in road traffic noise are restricted, particularly on the east side of the bypass facing Roade.

8.6.33 Using the change contours and Ordnance Survey AddressBase data, it has been possible to estimate the number of residential properties within the limits of the drawing shown in Figure 8.7 that would experience certain approximate levels of road traffic noise for both the 2031 DM and DS daytime scenarios and calculate the change in numbers between the two scenarios. The results are presented in Table 8.20 below.

Table 8.20 Estimated number of residential properties in Roade exposed to different levels of road traffic noise for 2031 DM and DS daytime scenarios

Predicted $L_{Aeq,16hr}$ (dB) from Road Traffic Noise	Number of residential properties		
	2031 DM	2031 DS w/Mit	Change from 2031 DM to DS
38	2	1	-1
43	479	415	-64
48	460	553	+93
53	138	160	+22
58	107	74	-33
63	23	7	-16
68	1	0	-1

8.6.34 Table 8.20 indicates that, broadly speaking, as a result of the Roade Bypass and the proposed mitigation, the number of residential properties exposed to higher levels of road traffic noise would be reduced. In particular, there would be a reduction of about 70% in the number of properties with noise exposures above the SOAEL. The number of residential properties that would experience lower levels of noise would also increase once the bypass is in operation.

8.6.35 On this basis, it can be seen that, in general, the effect of the Roade Bypass satisfies Government policy with regard to contributing to the improvement of health and quality of life through the effective management and control of noise.

8.6.36 It should also be noted that a significant proportion of the residential properties located in the centre of Roade, where road traffic noise will be alleviated the most, are within the Noise Action Planning Important Area as discussed in section 8.5.

8.6.37 The change contours shown in Figure 8.7 also indicate how road traffic noise will be reduced within the Roade Quarry Local Wildlife Site (LWS) as a result of the Roade Bypass. It can be seen that, due to the lower volume of traffic travelling on the A508 directly adjacent to the LWS at the south of the village, reductions in road traffic noise of up to 10 dB(A) between the 2031 DM and DS daytime scenarios are expected, particularly at the western side of the site closest to the A508.

Summary

8.6.38 While no significant adverse effects are expected due to the potential change in road traffic noise as a result of the Proposed Development on the roads around the Roade Bypass site, as well as on the bypass itself, for any of the future year scenarios, additional mitigation measures have been utilised to satisfy Government policy with regard to mitigating and minimising other adverse impacts. This follows the requirements regarding mitigation measures in the NPSNN.

8.6.39 It has also been shown that the number of residential properties exposed to the highest levels of road traffic noise in the 2031 DM daytime scenario are likely to be reduced with the opening of the bypass, indicating an overall beneficial impact of the scheme. A similar reduction in road traffic noise at the Roade Quarry LWS has also been indicated. These outcomes mean that the requirement of Government policy as set out in the 3rd bullet point of paragraph 5.195 of the NPSNN is met (see paragraph 8.2.9 above).

Road Traffic Noise – Other Highway Works

8.6.40 This section deals with the proposed mitigation of any expected significant adverse noise effects resulting from the potential change in road traffic noise associated with the Proposed Development in the areas around the other highway works where a noise-sensitive property is within 300 m of the site.

8.6.41 As discussed in section 8.5 and summarised in Table 8.19, a significant adverse noise effect has been predicted at one receptor, R57 The Lodge, located on the A508 just to the south of the Main Site.

Mitigation of Significant Adverse Effects

8.6.42 Regarding the significant adverse impact predicted at R57 for the 2031 DS daytime scenario, mitigation will be applied through implementing the Noise Insulation Regulations for the residential properties represented by that receptor.

Mitigation of Other Adverse Impacts

8.6.43 While not identified as significant because the resulting level is below the SOAEL, consideration has also been given to the predicted impacts at the relevant receptors around the other highway works sites. As discussed in section 8.5, a moderate adverse impact is predicted at R58, at the junction between Stoke Road and Knock Lane, during the 2031 DS night-time scenario.

8.6.44 Considering the space available between the road and the receptor, it is unlikely that installation of a barrier would be practicable, especially as during the night-time the receptor is the first-floor window at a height of 4.5 m. In addition, as the section of road is close to a junction, road traffic is unlikely to be travelling at sufficient speeds to make a low noise road surface effective. On this basis, there is no practicable opportunity to mitigate this impact.

8.6.45 At locations R57a and R59, minor adverse impacts are predicted during the 2031 DS night-scenario only. As the other highway works are not taking place on the sections of road closest to these receptors, there is not considered to be a practicable opportunity for specific mitigation.

Summary

8.6.46 For receptor R57, where a significant adverse noise effect resulting from the potential change in road traffic noise associated with the Proposed Development in the areas around the other highway works is expected, the Noise Insulation Regulations will be implemented for the affected dwellings to provide mitigation.

8.6.47 Regarding the receptor R58, which is expected to experience a moderate adverse impact but with a resulting level which is below SOAEL, it is considered that there are no practicable options to mitigate this impact. This is also the case regarding the predicted minor adverse impacts at R57a and R59.

Road Traffic Noise – Triggered Data Links

8.6.48 No significant adverse effects are expected as a result of the potential change in road traffic noise as a result of the Proposed Development on the triggered data links for the relevant future year scenarios in the immediate areas around the corresponding roads.

Mitigation of Other Adverse Impacts

8.6.49 Minor adverse impacts have been predicted at two of the triggered data links for the 2031 DS daytime scenario. However, due to their relative isolation from the Proposed Development and that no works are planned at their location, it is not considered that there is a practicable opportunity to mitigate these impacts.

Summary

8.6.50 No significant adverse effects are expected as a result of the potential change in road traffic noise as a result of the Proposed Development on the triggered data links for the relevant future year scenarios and therefore no additional mitigation is required.

8.6.51 Consideration has also been given to the minor adverse impacts predicted at two of the triggered data links, but there is not considered to be a practicable opportunity to mitigate them.

Operational Sound from SRFI Activities at the Main Site

8.6.52 No significant adverse effects are expected as a result of the potential impacts of sound from operational activities taking place at the SRFI at any of the relevant receptors when the SRFI is fully operational.

Mitigation of Other Adverse Impacts

8.6.53 While not identified as significant, consideration has also been given to the potential adverse impacts at the relevant receptors to the west and south of the Main Site during the night-time period under broadly south-westerly winds. Under these wind conditions, the prevailing wind direction in the UK, the receptors at these locations will generally experience lower background sound levels.

8.6.54 The primary source of predicted sound from SRFI operations in this area is the rail terminal at the west of the Main Site, and more specifically, the reach stackers and telehandlers used to handle and move the intermodal containers.

8.6.55 The design of the Main Site includes landscape bunds around the perimeter of the SRFI, with heights optimised to provide maximum environmental mitigation while remaining practicable, following the recommendations given in paragraph 5.198 of the NPSNN. The bunding along the west of the site, adjacent to the rail terminal, would be approximately 16m above the level of the rail terminal ground surface, and, as the ground to the west is typically at a lower level, at an even greater height above the ground level at the receptors.

8.6.56 It has been estimated that the bunding and landscaping around the Main Site would reduce operational sound levels by between 5 and 13 dB(A) at the receptors R21 and R23-R25 to the west of the site, and by 3 dB(A) at R28 to the south of the site.

8.6.57 The benefit of any practicable increase in bund height in terms of further reducing operational sound levels from the rail terminal at the relevant receptors has been analysed and been found to be minimal. This is primarily due to the relatively large area of the rail terminal within which the noise sources can move, limiting the effectiveness of screening at the boundary. This is particularly the case at the receptor R28, at the south of the site, due to the relative orientation of the rail terminal.

8.6.58 It should be noted that due to limitations in standard environmental noise modelling techniques, the sound attenuating properties of the bunding may be underestimated at receptors close to the bottom of the bunding, such as those to the west of the site. This is due to potential additional ground attenuation as the sound travels from the top of the bund to the receptor not being recognised. It is estimated that this could further reduce operational sound levels at the relevant receptors by up to 5 dB(A).

8.6.59 In addition to the bunding, the use of additional barriers around the perimeter of the rail terminal has also been investigated. However, again due to the relatively large size of the rail terminal, the inclusion of such barriers would have no benefit at practicable heights, particularly considering the height and screening effect of the bunding already in place.

8.6.60 It should be noted that the predictions of operational sound from the rail terminal assume there are no stored containers in place. This means a robust and worst-case approach is considered because in reality, there would typically be a significant number of stacked intermodal containers that could provide a screening effect as the reach stackers and telehandlers would often be in close proximity to them. Preliminary modelling indicates that with the addition of single height rows of containers in the available spaces, operational sound from the rail terminal would be reduced by up to 2 dB(A) at the receptors to the west and south of the Main Site. It is understood that containers could be stacked two high in the reception area, and higher than this in the main area of the rail terminal, which would likely increase the screening effect.

8.6.61 Following the assessment of other potential options for mitigation of operational sound from the rail terminal, it has been concluded that taking into account the attenuation provided by the bunding around the Main Site, there are no other practicable options materially to reduce further the sound levels at the relevant receptors.

Summary

8.6.62 No significant adverse effects are expected as a result of the potential impacts of sound from operational activities taking place at the SRFI at any of the relevant receptors when the SRFI is fully operational and therefore, no additional mitigation is required.

8.6.63 Consideration has also been given to the potential adverse impacts predicted during the night-time period under broadly south-westerly conditions at several receptors to the west and south of the Main Site, mainly as a result of the rail terminal. However, following analysis of different options, no practicable method of providing further significant mitigation has been found when considering the mitigation already provided by the extensive bunding around the perimeter of the Main Site. Consequently, Government noise policy has been appropriately applied.

8.7 RESIDUAL EFFECTS

8.7.1 Following the implementation of the proposed mitigation measures described in the previous section, Table 8.21 below confirms that the predicted significant adverse effects are considered to have been mitigated.

Table 8.21 Confirmation of mitigation to address expected significant adverse noise effects

Description	Location	Receptor	Summary of mitigation
Construction Noise	Roade Bypass site	R38 Hyde Farm	Use of BPM
		R41 Blisworth Road - North Façade	
Railway Noise (maximum noise levels)	Three locations adjacent to railway	R01 Woodpecker Way	Introduction of quieter rolling stock by 2043
		R18 Collingtree Road North	
		R54 Ashton Rd W	
Road Traffic Noise	Around Main Site	R30 West Lodge Cottages - East Façade	Implementation of NIR
	Other Highway Works	R57 The Lodge	Implementation of NIR

8.7.2 Further to Table 8.21, it is not considered that there are any residual significant adverse noise effects following mitigation.

8.8 CUMULATIVE EFFECTS

Road Traffic Noise

8.8.1 The traffic data used in the prediction of road traffic noise for all baseline and future year scenarios has been supplied by the transport consultant and includes the changes in traffic associated with all committed development and allocated sites within the Northamptonshire area.

8.8.2 The data also includes the committed infrastructure schemes and those highly likely to come forward before the forecast assessment years. This includes the Highways England Smart Motorway Project.

8.8.3 Based on this information, the cumulative road traffic noise impacts of the Proposed Development together with other defined land uses and infrastructure schemes have been assessed as part of the primary road traffic noise assessment in section 8.5.

8.8.4 The Northampton South Sustainable Urban Extension (SUE) is the closest committed development to the Proposed Development and is located just to the north-east of the Main Site on the other side of the M1. This development is primarily residential and is therefore not a development that is expected to generate noise. Consequently, it is not expected to cause any adverse noise impacts or effects at existing receptors, other than from any associated increase in road traffic noise. Therefore, the cumulative effect of noise from the Proposed Development and the Northampton South SUE has only been considered for road traffic.

Rail Central SRFI

8.8.5 Rail Central (RC) is a proposed SRFI NSIP scheme located on a site directly to the west of the Northampton Gateway (NGW) site.

8.8.6 The scheme is not yet the subject of an application for development consent, however, a Scoping Report was submitted in December 2015 and an updated Preliminary Environmental Information Report (PEIR), which included a noise and vibration chapter, was issued in March 2018 as part of the stage 2 pre-application consultation process.

8.8.7 Although not a commitment, due to the type, size and proximity of the RC scheme to the NGW, any potentially significant cumulative effects have been considered based on the currently available information.

8.8.8 The assessments below discuss two aspects of the cumulative effects: road traffic noise, for which the NGW transport consultant has supplied appropriate data, and operational sound, which considers the predicted rating levels at the two receptor locations that are shared by the assessments for both schemes.

Road Traffic Noise

8.8.9 The transport consultant has supplied a 2031 DS scenario that includes road traffic from the NGW and the RC proposals current at the time the traffic modelling was carried out. This includes highway works elements from both schemes, though most significantly in terms of potential changes in road traffic noise levels, the Roade Bypass is included. However, the information from RC was not finalised by the time of the cumulative assessment. Therefore, the conclusions set out below should be regarded as tentative.

8.8.10 Road traffic noise levels have been predicted for traffic associated with the Main Site, the Roade Bypass and other highway works receptors listed in Table 8.12, for the cumulative 2031 DS scenario using the method described in section 8.3. The results are therefore directly comparable with those featuring only the NGW in the previous sections of this chapter. Note that this includes the proposed additional mitigation measures for the Roade Bypass as discussed in section 8.6.

8.8.11 Tables 1, 3 and 5 of Appendix 8.22 present the predicted daytime road traffic noise levels at the Main Site, Roade Bypass and other highway works receptors respectively, together with the results for the 2031 DM and DS without Rail Central scenarios. Tables 8, 10 and 12 present the results for the night-time period.

8.8.12 Tables 2, 4 and 6 of Appendix 8.22 present the assessment of any expected significant adverse effects and the impact magnitudes during the daytime period in accordance with Table 8.9. Tables 9, 11 and 13 present the corresponding assessment for the night-time period in accordance with Table 8.10.

8.8.13 Rather than provide a full commentary on the results of the cumulative road traffic scenarios, it is considered proportionate to consider just the results in terms of the differences between them and the 2031 DS without RC scenarios, which have already been discussed in detail in section 8.5.

8.8.14 In general, the predicted road traffic noise levels for the cumulative 2031 scenarios at the relevant receptors are within ± 1 dB(A) of the levels for the DS scenario without RC.

8.8.15 In terms of significant adverse effects, the cumulative 2031 DS scenarios are predicted to produce exactly the same results as the DS scenario without RC, i.e. they are indicated at R30 and R57. These are summarised in Table 8.19 at the end of section 8.5, the main assessment of likely significant effects section.

8.8.16 Tables 7 and 14 of Appendix 8.22 present the differences in effect level and impact magnitude between the cumulative and NGW only 2031 DS day and night-time scenarios respectively. Broadly, any changes are a result of small increases in the DS road traffic noise level and largely result in negligible impacts.

8.8.17 At the Roade Bypass receptor R41 Blisworth Rd N-W during the daytime period, a minor adverse impact has increased to a moderate adverse impact due to an increase of 0.6 dB(A) between the two scenarios.

Operational Sound from SRFI Activities

8.8.18 The assessment of sound from operational activities that are expected to take place at the Rail Central SRFI has been included in the PEIR issued in March 2018 in connection with that proposal.

8.8.19 The RC operational sound assessment has been based on the principles of BS 4142:2014. This is the same basis as used for the assessment of the NGW proposals. However, there appear to be differences in the approach adopted to identifying significant adverse effects in the RC PEIR compared with that described above for the NGW. In particular, no consideration of the absolute levels of operational sound appears to have been undertaken for the RC assessment. Consequently, the conclusions from the two assessments are not directly comparable.

8.8.20 If RC were approved and constructed there would be only two receptor locations remaining that are likely to be affected by operational noise from both proposals. These are described in Table 8.22 below:

Table 8.22 Receptors shared by Northampton Gateway and Rail Central assessments of operational sound

Receptor	Rail Central Designation
R21 Barn Lane	NSR 04 Barn Lane, Milton Malsor
R28 Courteenhall Road	NSR 05 West Lodge Farm

8.8.21 The results of the NGW assessment at these receptors has indicated that no significant adverse effects are expected during the day or night-time periods under either of the two wind conditions considered. It is possible, that an adverse impact may occur at R28 during the night-time under broadly south-westerly winds.

8.8.22 The background sound levels used for the initial estimate of impact have been based on survey measurements for both proposals. For NGW, the most relevant situation for these receptors was with broadly south-westerly winds. It is unclear which conditions apply to the background sound levels used for RC. Nevertheless, the background sound values used in the RC assessment are between 5 and 10 dB(A) higher during the daytime and 6 and 7 dB(A) higher during the night-time at these receptors compared with the equivalent values used for NGW. As the assessment methodology requires a comparison between the operational sound and the background sound, using the higher RC background sound levels would reduce the apparent magnitude of the impact, before context is considered.

8.8.23 The process for arriving at the rating levels for operational sound is broadly the same in both assessments in that a +3 dB(A) penalty has been added to the predicted specific sound levels to account for distinctive acoustic features. It is also the case that operational sound is considered at ground floor level during the daytime and at upper floor level during the night-time in both assessments. On this basis, the cumulative rating level from both proposals can be approximated by logarithmically summing the individual rating levels for each scheme. The rating levels for each scheme at the two receptors, as well as the cumulative rating level, are shown in Table 8.23 below.

Table 8.23 Cumulative rating levels for Northampton Gateway and Rail Central

Receptor	Daytime Rating Level, dB $L_{Ar,1hr}$			Night-Time Rating Level, dB $L_{Ar,15min}$		
	NGW	RC	Cumulative	NGW	RC	Cumulative
R21 Barn Lane	42	47	48	42	48	49
R28 Courteenhall Road	42	45	47	43	47	48

8.8.24 It is understood that the rating levels quoted for RC include the currently proposed mitigation measures for that scheme.

8.8.25 It can be seen that the rating levels from the RC development are expected to be greater than those from NGW at the two receptors by between 3 and 5 dB(A) during the day and between 4 and 6 dB(A) during the night.

8.8.26 An initial estimate of the potential impact has been carried out using the background sound levels identified in the NGW assessment (i.e. under broadly south-westerly winds). Table 8.24 compares the rating levels from Table 8.23 with the NGW background sound levels (BSL) for the daytime period, and Table 8.25 does the same for the night-time period.

Table 8.24 Initial estimate of impact from NGW, RC and cumulative SRFI operations under broadly south-westerly winds for daytime period

Receptor	Daytime (07:00-23:00)						
	BSL	NGW		RC		Cumulative	
		Rating	Difference	Rating	Difference	Rating	Difference
R21 Barn Lane	40	42	+2	47	+7	48	+8
R28 Courteen-hall Road	36	42	+6	45	+9	47	+11

Table 8.25 Initial estimate of impact from NGW, RC and cumulative SRFI operations under broadly south-westerly winds for night-time period

Receptor	Night-Time (23:00-07:00)						
	BSL	NGW		RC		Cumulative	
		Rating	Difference	Rating	Difference	Rating	Difference
R21 Barn Lane	36	42	+6	48	+12	49	+13
R28 Courteen-hall Road	35	43	+8	47	+12	48	+13

8.8.27 It can be seen from Tables 8.24 and 8.25 that the initial estimates of cumulative operational sound impact under broadly south-westerly winds are generally dominated by the RC SRFI. During the night-time in particular, potentially significant adverse impacts are initially indicated at both receptors as a result of RC SRFI operations.

8.8.28 Regarding context, when the cumulative daytime rating levels are compared to the corresponding guideline desirable external sound levels for dwellings, as summarised in Table 8.11, the cumulative rating levels are below the lower threshold for external amenity space. Assuming a typical reduction of 12 dB(A) for external sound passing through an open window into a habitable room, the cumulative rating levels would be equal to and 1 dB(A) above the lower threshold for resting inside living rooms. This would just indicate a potential adverse effect.

8.8.29 During the night-time, assuming a typical reduction of 12 dB(A) for external sound passing through an open window into a habitable room, the cumulative rating levels would exceed the upper threshold for sleeping inside bedrooms by 1 and 2 dB(A). This would indicate a potential adverse effect.

8.8.30 Based on the results of both the initial estimate of impact and the consideration of context, the cumulative assessment of sound from operational activities taking place at both the Northampton Gateway and Rail Central under broadly south-westerly winds has indicated that adverse impacts and effects could occur during both the daytime and night-time period at the two shared receptor locations. In particular, the impact would be greater with the addition of RC compared with NGW operating on its own.

8.8.31 The assessment uses the currently available information from Rail Central. This could be subject to change, for instance if Rail Central were to identify the need for additional mitigation.

Summary of Cumulative Assessment with Rail Central

8.8.32 The assessment of the potential change in road traffic noise as a result of the cumulative effects of both the NGW and RC schemes on the roads around the Main Site, Roade Bypass and other highway works has shown there is no change in terms of expected significant adverse effects to the scenario featuring only NGW traffic. However, there is uncertainty over the currently available traffic figures associated with RC. Consequently, this can only be a tentative conclusion.

8.8.33 A comparison of the cumulative DS scenario, including both NGW and RC, and NGW on its own has shown a small number of changes in the DS effect levels and impact magnitudes at some receptors. The impact magnitude at one receptor close to the Roade Bypass is expected to increase from minor adverse to moderate adverse.

8.8.34 The assessment of sound from operational activities taking place at both the NGW and RC has shown that those from the RC SRFI are likely to dominate at the two shared receptors, with adverse impacts and effects possibly occurring during both the daytime and night-time periods. The cumulative impact with both NGW and RC operating is worse compared with NGW operating on its own.

8.9 CONCLUSIONS

8.9.1 The potential noise and vibration impacts and effects that may arise as a result of the construction and operation of the proposed Northampton Gateway Strategic Rail Freight Interchange (SRFI) development, including the associated new road infrastructure, in particular, the Roade Bypass, and works to the existing road network, have been assessed in accordance with relevant Government and Local Policy.

8.9.2 A small number of significant adverse effects have been identified relating to the construction phase, night-time railway operations and to road traffic noise. Mitigation measures have been proposed to address those effects. Other adverse impacts have been mitigated and minimised where practicable.

8.9.3 The proposed Roade Bypass is expected to reduce significantly the level of road traffic noise on the A508 through the centre of Roade, part of which is within a Noise Action Planning Important Area. A similar reduction in road traffic noise is expected at the Roade Quarry Local Wildlife Site at the south of the village. Additional mitigation has been proposed to minimise the adverse impacts associated with the relocation of road traffic onto the bypass.

8.9.4 A cumulative assessment of sound from operational activities taking place at both the Northampton Gateway and Rail Central SRFI scheme has shown that adverse impacts and effects possibly occurring during both the daytime and night-time period at those receptors potentially affected by both schemes. Furthermore, the cumulative impact with both NGW and RC operating is worse compared with NGW operating on its own

8.9.5 It is concluded that the requirements set out in paragraph 5.195 of the NPSNN have been met.

Figure 8.1 Receptor locations for noise and vibration assessment – Around Main Site and other highway works south of Main Site

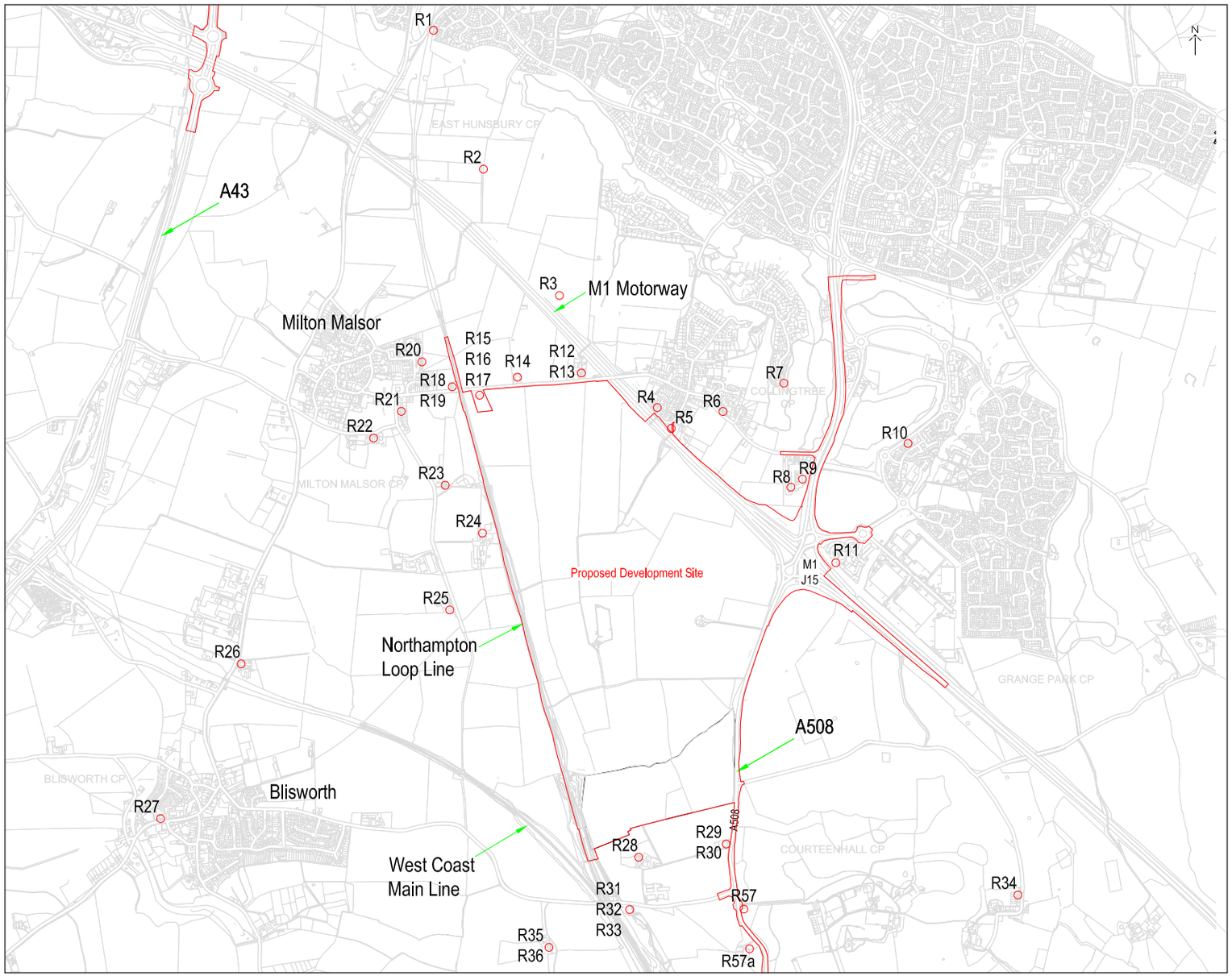

Figure 8.2 Receptor locations for noise and vibration assessment – Roade Bypass and around other highway works west of Roade

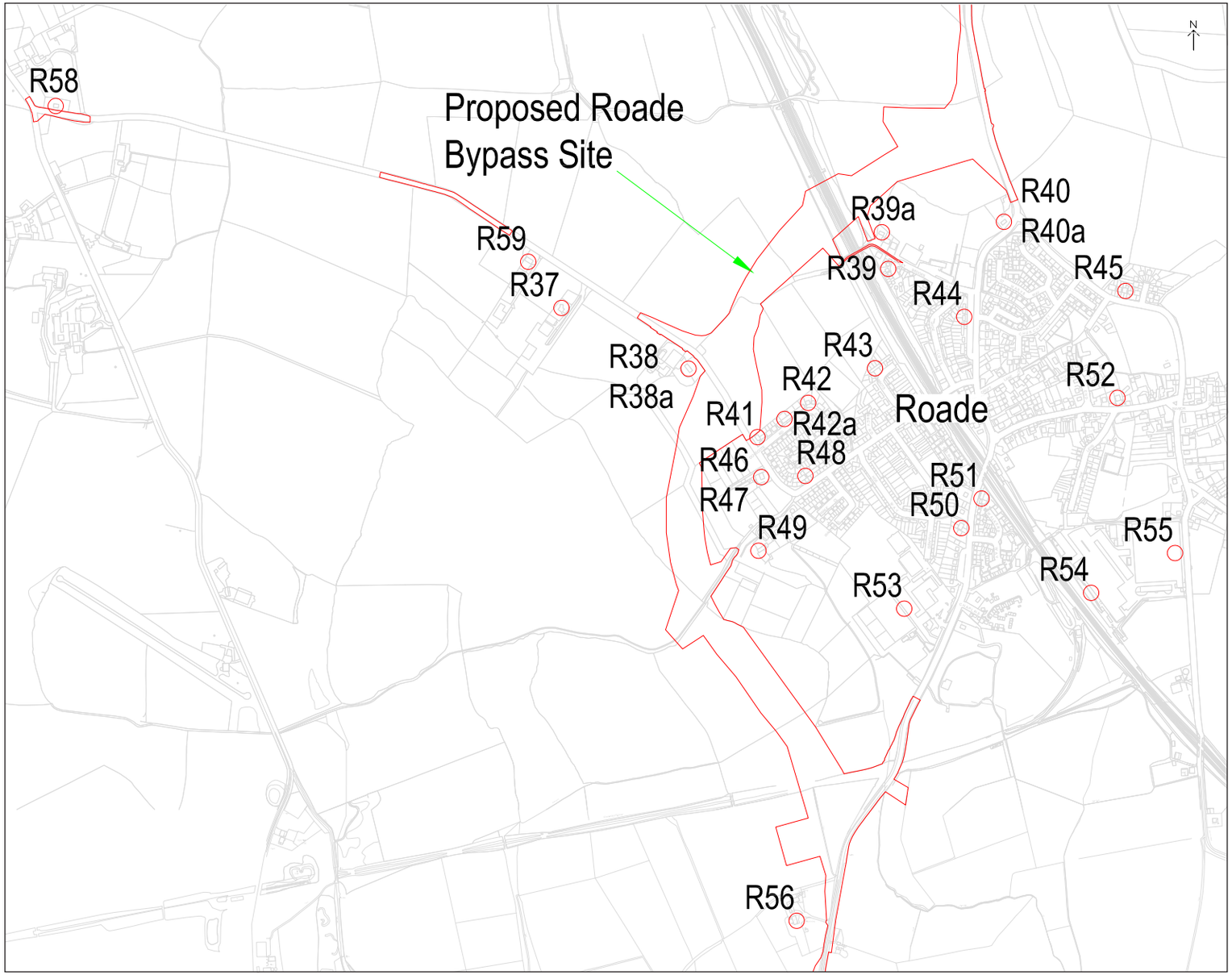

Figure 8.3 Receptor locations for noise and vibration assessment – Around other highway works south of Roade

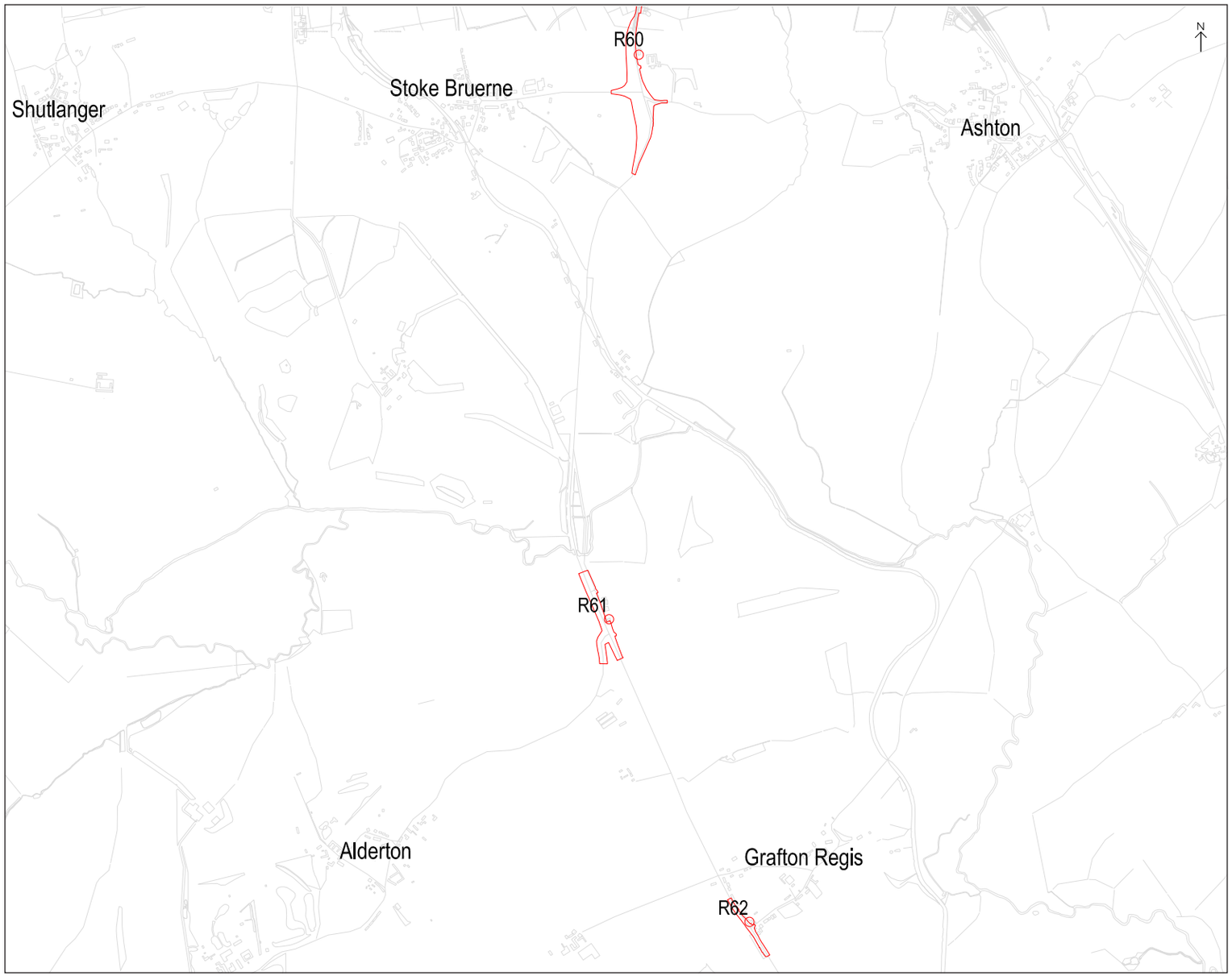

Figure 8.4 Noise and vibration monitoring locations - SRFI

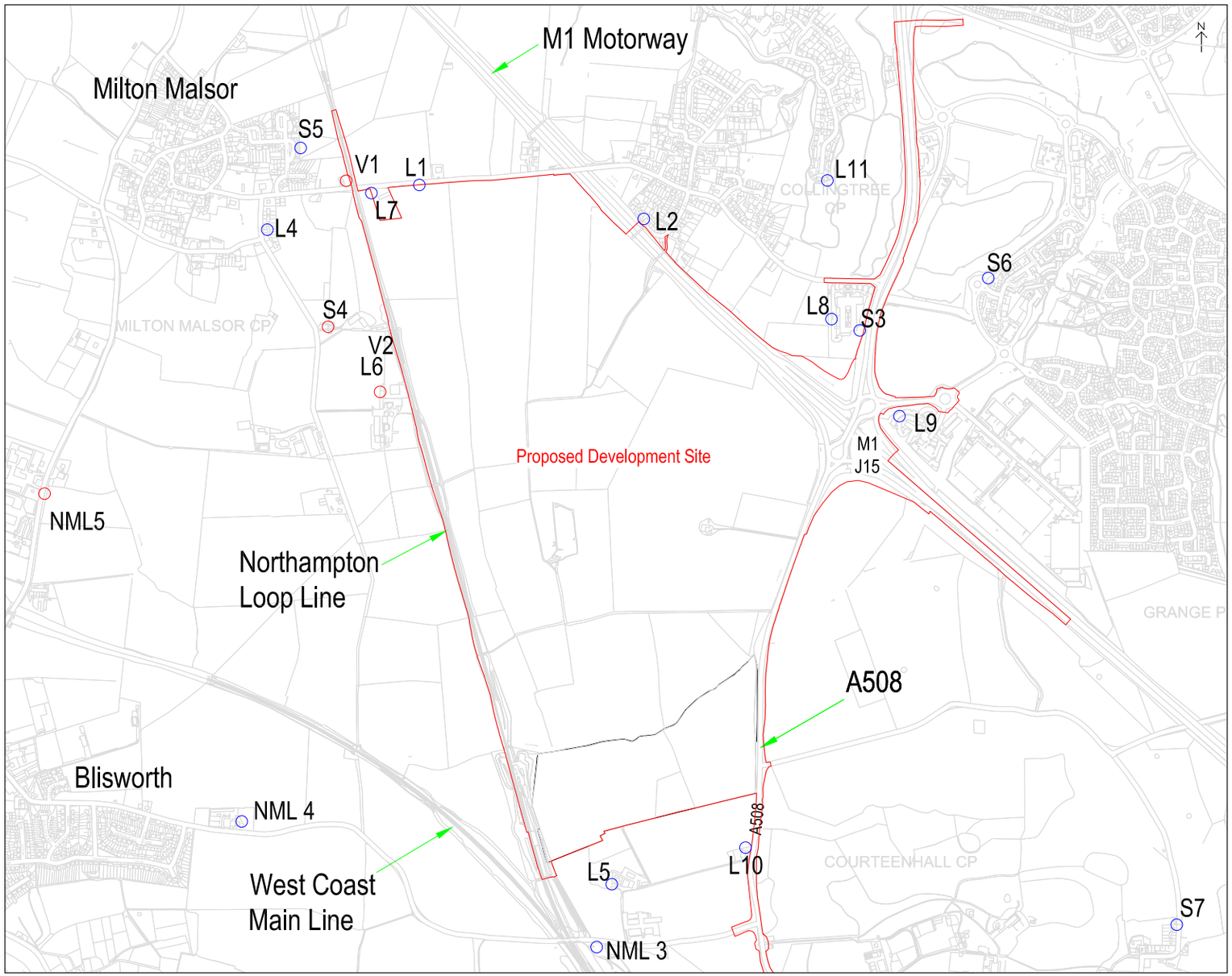

Figure 8.5 Noise and vibration monitoring locations - Roade

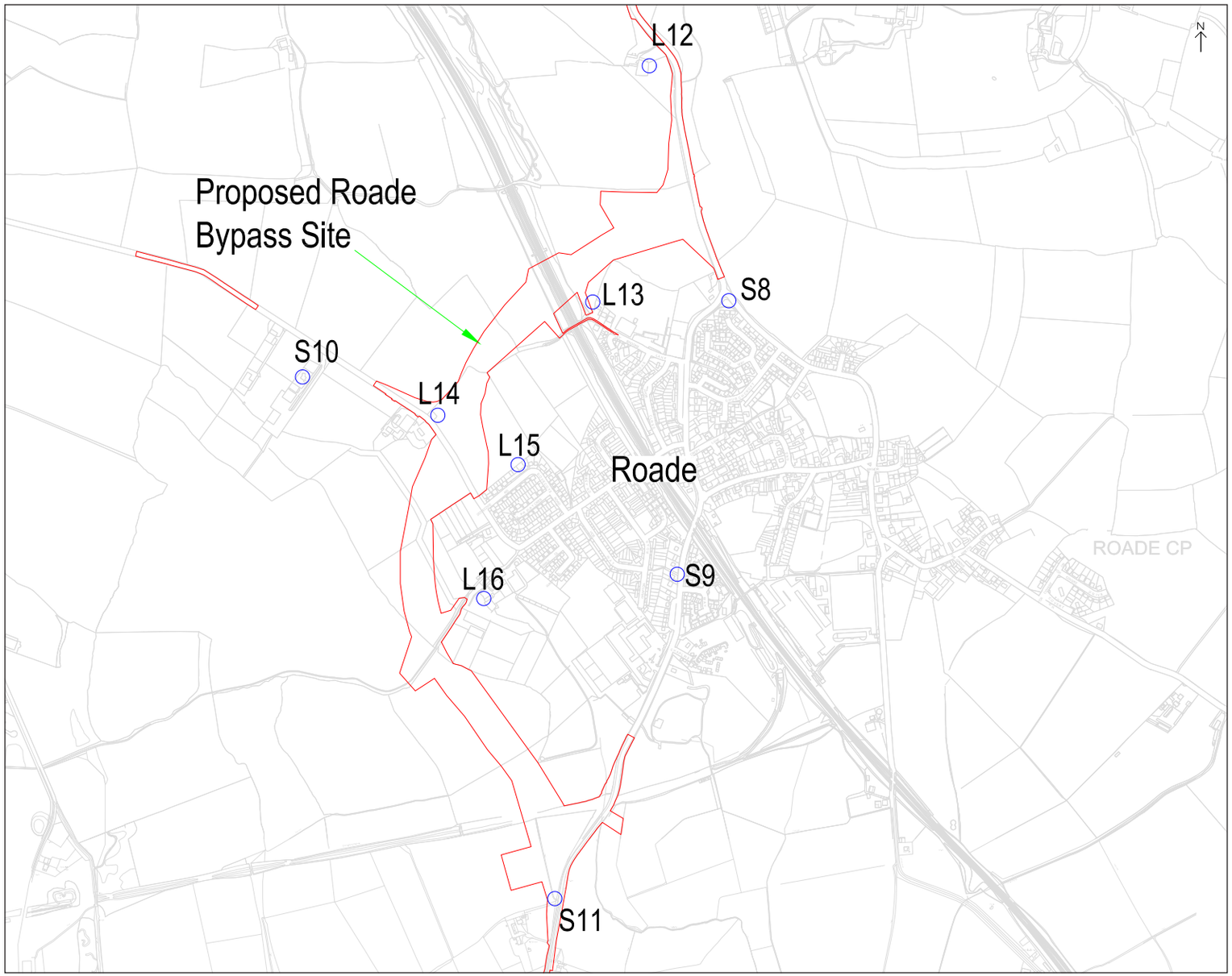

Figure 8.6 Roade Bypass: Location of proposed fencing

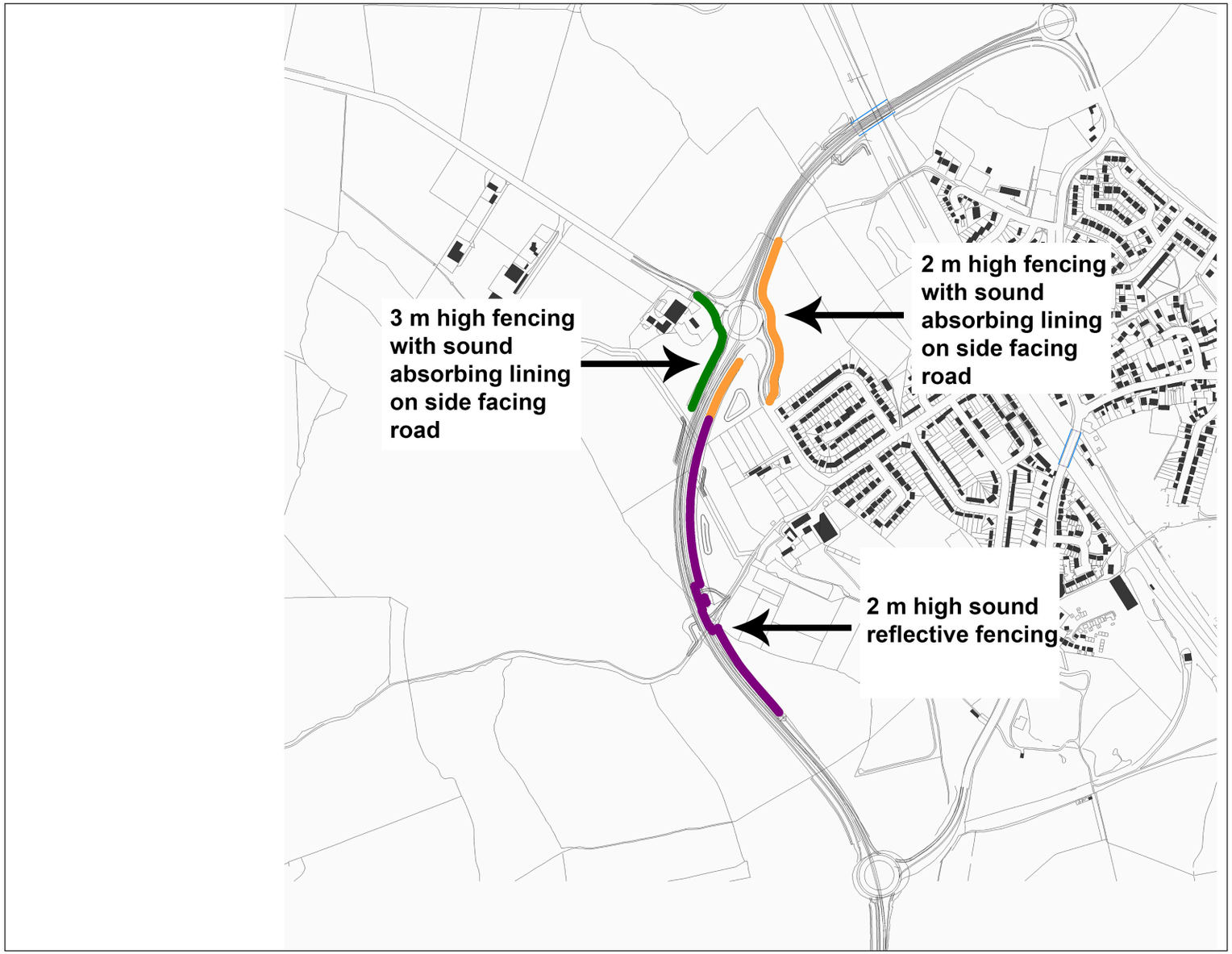

Figure 8.7 Roade: Change in road traffic noise from 2031 DM to DS w/Mitigation scenarios for daytime period