# M25 junction 10/A3 Wisley interchange TR010030
# 6.3 Environmental Statement Chapter 6: Noise and vibration

Regulation 5(2)(a)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009


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

# M25 junction 10/A3 Wisley interchange

**The M25 junction 10/A3 Wisley interchange Development Consent Order 202[x ]**

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## 6.4 ENVIRONMENT STATEMENT
## CHAPTER 6: NOISE AND VIBRATION

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# Executive summary

The noise and vibration assessment of the Scheme has considered impacts at receptors sensitive to noise and vibration that may occur during the construction and operation phases of the Scheme. This includes impacts from construction noise and vibration, construction traffic, and road traffic noise and vibration.

During the construction phase, significant adverse effects were predicted at 8 sensitive receptors due to daytime construction noise. No significant adverse effects were identified from construction works taking place at night. Significant adverse vibration effects were predicted at 7 sensitive receptors as a result of vibration from percussive piling during retaining wall construction works and use of a vibratory roller for road surfacing works and construction of the new slip roads at junction 10. No significant adverse effects were predicted as a result of construction traffic.

During the operation phase, no significant adverse effects were predicted at sensitive receptors due to the Scheme. No significant adverse effects were predicted at Noise Important Areas, the Thames Basin Heath SPA, ancient woodlands, or areas of cultural or historic importance. No significant adverse effects from airborne or ground-borne vibration were expected as a result of the Scheme.

Significant noise and vibration impacts during the construction phase are mitigated through measures set out in the CEMP and implementing Best Practicable Means. This will include a Traffic Management Plan to ensure that construction traffic use trunk roads.

No residual significant adverse effects from daytime or night-time construction noise would occur, although residual adverse effects are expected at sensitive receptors that are located close to the Painshill interchange and the A3. The noise impacts at these locations would be temporary and would cease when construction works move further away from the affected sensitive receptors.

Residual significant construction vibration impacts would occur at two properties on Seven Hills Road (The Spinney and Squirrel Wood) due to road surfacing works on the A245, noting that the predicted vibration levels would not be high enough to cause structural damage to buildings.

The design of the Scheme incorporates noise mitigation measures to reduce the adverse impacts of road traffic noise at sensitive receptors in line with national policy. These measures include environmental noise barriers at junction 10 and low noise road surfacing on the A3. No residual significant adverse effects were predicted in the operation phase of the Scheme.

A cumulative effect would occur during the operation phase of the Scheme when the proposed housing development at the Former Wisley Airfield becomes occupied, which would significantly increase traffic flows on Ockham Lane and other local roads irrespective of the Scheme. The Scheme was not predicted to introduce any additional significant effects to this area.

# 6. Noise and Vibration

## 6.1 Introduction

6.1.1 This chapter provides the environmental noise and vibration assessment of the Scheme, consisting of information relating to the baseline conditions, identification of sensitive receptors, the expected noise and vibration impacts and the mitigation measures that may be required to avoid significant effects. A commentary describing how noise and vibration impacts from the Scheme affect human health are provided in Chapter 14 Health Impacts.

## 6.2 Competent expert evidence

6.2.1 This noise and vibration chapter has been undertaken by the following individuals:

- A qualified acoustician (BSc, MSc, CEng MIOA), Chartered Engineer who holds professional membership with the Institute of Acoustics. They have 10 years of knowledge and experience in noise and vibration; and
- A qualified acoustician (BEng, CEng FIOA), Chartered Engineer who holds professional membership with the Institute of Acoustics. They have 25 years of knowledge and experience in noise and vibration and have used their knowledge and professional judgement to undertake this assessment.

## 6.3 Legislative and policy framework

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

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

6.3.2 These aims reflect those contained in the National Planning Policy Framework (NPPF)[2] and are further echoed in the National Policy Statement for National Networks (NPSNN)[3] and Planning Practice Guidance concerning noise[4].

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

- NOEL - no observed effect level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL - lowest observed adverse effect level. This is the level above which adverse effects on health and quality of life can be detected; and

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

- SOAEL - significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur.

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

6.3.5 The legislation and policies considered in undertaking this assessment are detailed in Table 6.1.

**Table 6.1: Legislation, regulatory and policy framework for noise and vibration**

| Legislation / Regulation | Summary of Requirements |
|---|---|
| **National** | |
| National Policy Statement for National Networks (NPSNN) [3] | The NPSNN states the following factors as determinants of the likely noise impact:<br>• construction noise and the inherent operational noise from the proposed development and its characteristics;<br>• the proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces);<br>• the proximity of the proposed development to quiet places and other areas that are particularly valued for their tranquillity, acoustic environment or landscape quality such as National Parks, the Broads or Areas of Outstanding Natural Beauty; and<br>• the proximity of the proposed development to designated sites where noise may have an adverse impact on the special features of interest, protected species or other wildlife. |
| National Planning Policy Framework (NPPF) 2019 [2] | Paragraph 180 states that decisions on development should aim to:<br>• ensure that new development is appropriate for its location, taking into account the likely effects (and cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site and wider area impacts that could arise from the development;<br>• mitigate and reduce to a minimum, other adverse impacts resulting from new development, and avoid noise giving rise to significant adverse effects on health and quality of life; and<br>• identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason. |
| Planning Practice Guidance: Noise 2014 [4] | This guidance provides advice on how planning can manage potential noise impacts in new development. Noise should not be considered in isolation and should instead be viewed in relation to social, economic and environmental context. |
| Environmental Noise (England) Regulations 2006 | This regulation is relevant to the operational phase of the Scheme. The regulations implement the European Environmental Noise Directive (END) in England. Developments must take into account Noise Action Plans. |

| Legislation / Regulation | Summary of Requirements |
|---|---|
| Noise Policy Statement for England (NPSE) 2010 [1] | Within the context of Government policy on sustainable development:<br>• Avoid significant adverse effects as a result of the Scheme;<br>• Mitigate and minimise adverse impacts as a result of the Scheme; and<br>• Contribute to the enhancement of the acoustic environment.<br>The Explanatory Note to the NPSE assists in the definition of significant adverse and adverse with reference to NOEL, LOAEL and SOAEL values.<br>The Government policy and guidance do not state values for the NOEL, LOAEL and SOAEL, rather, it considers that they are different for different noise sources, for different receptors and at different times and should be defined on a strategic or project basis taking into account the specific features of that area, source or project.<br>NPSE also states that sustainable development is a core principle underpinning all government policy. The goal is pursued in ways that protect and enhance the physical and natural environment, and that use resources and energy as efficiently as possible. |
| Land Compensation Act 1973 | This Act is relevant to the operational phase of the Scheme. Part I Compensation for depreciation caused by use of public works. |
| Infrastructure Act 2015 | Section 5(2) of the Infrastructure Act and the Highways England Licence seek to minimise the environmental impacts of projects, protect and enhance the quality of the surrounding environment and conform to the principles of sustainable development. |
| Road Investment Strategy (RIS) and Strategic Business Plan 2015 | The Department for Transport and Highways England RIS for the 2015/16 - 2019/20 Road Period aspires to the target that by 2040 over 90% fewer people are impacted by noise from the strategic road network. The target for the first Road Period, 2015-2020, is to mitigate at least 1,150 of the NIAs, which is expected to reduce the number of people severely affected by noise from the strategic road network by at least 250,000.<br>The Highways England Licence states that Highways England should ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money. |
| Control of Pollution Act 1974 (as amended) | This is relevant to the construction phase of the Scheme and includes:<br>• Section 60 - Control of noise on construction sites;<br>• Section 61 - Prior consent for work on construction sites;<br>• Section 71 - Codes of practice for minimising noise; and<br>• Section 72 - Best practicable means. |
| Environmental Protection Act 1990 (as amended) | This is relevant to the construction phase of the Scheme. Section 79 (1) (ga) noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street is a statutory nuisance; (NB if so should be inspected by the local authority)<br>(9) interpretation of “best practicable means”. |
| The Control of Noise (Code of Practice for Construction and Open Sites) | This is relevant to the construction phase of the Scheme and approves BS 5228:2009+A1:2014 Part 1 Noise and Part 2 Vibration for the purpose of giving guidance on appropriate methods for minimising noise and vibration. |

| Legislation / Regulation | Summary of Requirements |
|---|---|
| (England) Order 2015 | |
| Noise Insulation Regulations 1975 (as amended) | Operational phase:<br>• Regulation 3 imposes a duty on authorities to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings. This is subject to meeting certain criteria given in the Regulation. Regulation 4 provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings, subject to meeting certain criteria given in the Regulation; and<br>• Regulation 4 provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings, subject to meeting certain criteria given in the Regulation.<br>Construction phase:<br>• Regulation 5 provides relevant authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings with respect to construction noise. This is subject to meeting certain criteria given in the Regulation. |
| The Highways Noise Payments and Movable Homes (England) Regulations 2000 | This regulation is relevant to the operational phases of the Scheme. It provide highway authorities with a discretionary power to provide a noise payment where new roads are to be constructed or existing ones altered. The relevant Regulations set out the criteria which should be applied in assessing eligibility for making such payments. |
| **Local** | |
| Guildford Borough Council, Emerging Local Plan | • Policy D4 (1) requires that all developments will have no unacceptable effect on amenities enjoyed by occupants of buildings relating to noise and vibration;<br>• Policy ID3 (7) requires that mitigation of adverse material impacts is provided for sustainable transport systems to make them acceptable. This mitigation will address otherwise adverse material impacts on communities and the environment including impacts on communities, health, and noise pollution; and<br>• Policy A35 related to the development of the former Wisley Airfield and requires that noise issues related to this are considered. |
| Elmbridge Borough Council | Elmbridge Core Strategy 2011<br>• Policy CS25 (6) seeks to improve the environmental impact of transport through the use of mitigation measures, including noise reduction measures.<br>Elmbridge Development Management Plan 2015<br>• Policy D5a states that appropriate attenuation measures are expected to be included in developments that may result in noise emissions to mitigate the effect for existing and future residents; and<br>• Policy DM7a (i) states that the layout and siting of accesses (access roads/parking amenities) should be acceptable in terms of amenity, capacity, safety, pollution, noise and visual impact. |
| Woking Borough Council | Woking Core Strategy 2012<br>• Objective 3(7) aims to manage effectively the impacts of noise pollution; and |

| Legislation / Regulation | Summary of Requirements |
|---|---|
| | • Policy CS21 states that proposals for new developments should be designed to avoid significant harm to the environment and amenity resulting from noise and vibration.<br>Woking Development Management Plan 2015<br>• Policy DM7 states that details of noise mitigation measures (location, design, layout) should be provided along with the expected noise levels produced from developments generating noise that would affect noise-sensitive uses. The design of mitigation measures would need to take into account other planning considerations such as urban design and heritage settings; and<br>• Paragraph 4.24 states that noise disturbance should be minimised in areas that have remained relatively undisturbed by noise and are prized for their recreational and amenity value, including SPAs, SACs, SSSIs and other designated sites. |

Table Source: Various

## 6.4 Study area

### Construction

6.4.1 The Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 HD 213/11 Noise and Vibration[5] (referred to hereafter as DMRB 11:3:7) refers to BS 5228 for assessing noise and vibration impacts resulting from construction works. The study area for the construction noise and vibration assessment was 300 m from the construction footprint of the Scheme, in line with the guidance provided in BS 5228. Based on the site geometry, a study area of this size enabled the effects of the loudest construction works at junction 10 to be assessed over a wider area as many of the sensitive receptors were located in proximity to works on the A3 and M25.

6.4.2 The study area for construction traffic flows was also 300 m from the roads used by construction traffic, including roads used to transport material from the railhead to the construction sites and sections of the A3 and the M25 that will be subject to a temporary speed limit during the construction works. Effects in the wider area beyond 300 m from construction traffic routes were also considered.

### Operation

6.4.3 The study area for the assessment of noise and vibration effects is defined in the DMRB 11:3:7 as 600 m from the carriageway edge of any proposed new routes, existing routes to be bypassed or improved, or any other affected routes within 1 km of the Scheme. An affected route is defined as where it is calculated that there is a possibility of a change of 1 dB $L_{A10,18h}$ in the short term or 3 dB $L_{A10,18h}$ in the long term (assessed between the opening year and the future year, which are 2022 and 2037 respectively for the Scheme).

6.4.4 The DMRB 11:3:7 provides the following methodology for identifying the size and extents of the study area:

[5] The Highways Agency, Transport Scotland, Welsh Government and The Department for Regional Development Northern Ireland (2011). Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7: Noise and Vibration. HD 213/11. London: TSO

- Identify the start and end points of the physical works associated with the road project;
- Identify the existing routes that are being bypassed or improved and any proposed new routes between the start and end points (for each option);
- Define a boundary 1 km from the carriageway edge of each of the options identified above;
- Define a boundary 600 m from the carriageway edge around each of the options identified above and also 600 m from any other affected routes within the boundary defined above. The total area within these 600 m boundaries is termed the 'calculation area';
- Identify any affected routes beyond the boundary defined above; and
- Define a boundary 50 m from the carriageway edge of routes identified above.

6.4.5 Based on the above, the detailed noise calculation area (within 600 m of any affected route that is within 1 km of the Scheme) has been determined. Where required, the study area was extended slightly to incorporate additional sensitive receptors identified through consultation with local authorities that should be included in this assessment. The study area is shown in Figure 6.1 and Figure 6.2 (application document TR010030/APP/6.4).

## 6.5 Assessment methodology

### Construction

#### Noise

6.5.1 The construction activity noise calculations and assessments have been undertaken in accordance with guidance in BS 5228 Part 1[6], which the DMRB 11:3:7 recognises as the most appropriate standard to use for such assessments. The construction activity noise levels in dB $L_{Aeq,T}$ were calculated at a reference distance of 10 m from each main construction activity separately, taking into account the list of construction plant expected to be in use and their anticipated usage patterns. The activity noise levels were corrected for distance between the activity and the sensitive receptor, using the equations provided in Annex F of the Standard and based on the predominant intervening ground type.

6.5.2 The effects of construction activity phasing were considered where this information was available, as it is possible that sensitive receptors can be affected by construction noise from multiple locations within the study area. Where this occurs, the predicted construction noise levels at the sensitive receptor from each construction site was combined to determine the total construction noise level.

6.5.3 BS 5228 Part 1 contains example methods for deriving appropriate limit values that can be used as significance criteria. The Standard explains that the assessor needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.

[6] British Standards Institution (2014). BS 5228:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise. London: BSI

6.5.4 BS 5228 Part 1 Annex E provides example threshold levels that can be used to identify potential significant effects at sensitive receptors, as shown in Table 6.2~~Table 6.2~~. The ABC method assigns a threshold category for sensitive receptors depending on the baseline ambient noise level. If the construction noise level exceeds the threshold level for the assigned category, a potential significant effect can occur depending on other factors, such as duration of the construction works.

**Table 6.2: Example construction noise threshold levels**

| Assessment Category and Threshold Value Period | Threshold Value ($L_{Aeq,T}$ dB) | | |
|---|---|---|---|
| | Category A | Category B | Category C |
| Night-time (23:00 – 07:00) | 45 | 50 | 55 |
| Weekday evenings (19:00 – 23:00) and weekends (Saturdays 13:00 – 23:00, Sundays 07:00 – 23:00) | 55 | 60 | 65 |
| Weekday daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00) | 65 | 70 | 75 |
| Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.<br>Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.<br>Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values. If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise. | | | |

Table Source: BS 5228 Part 1, Annex E, Table E.1

6.5.5 In line with BS 5228 Part 1 and common practice on similar infrastructure construction on schemes, a “significant time period” for the threshold noise levels shown in Table 6.2 to be exceeded for is:

- a period of 10 or more days of working in any 15 consecutive days during construction; or
- for a total of 40 days or more in any 6 consecutive months during construction.

6.5.6 The total construction period for the Scheme is expected to be approximately 2 years, and the above criteria are appropriate.

6.5.7 Based on the information provided in BS 5228 Part 1, the noise thresholds and averaging periods shown in Table 6.2 are indicative of a SOAEL exceedance occurring at an affected property, where these occur for significant periods of time. Suitable LOAEL threshold levels are construction noise levels that are equivalent to the existing ambient noise levels for each of the corresponding time periods in Table 6.2. Non-residential receptors, such as educational buildings and medical centres, will be subject to individual considerations and have been assessed against the same criteria for the periods when they are open.

6.5.8 Noise impacts from construction traffic (HGVs) have been assessed separately by calculating the road traffic noise levels inclusive of construction traffic flows

using the Calculation of Road Traffic Noise (CRTN)[7] and using the same assessment criteria used to determine impact significance during the operation phase.

Vibration

6.5.9 Construction generated vibration has been assessed in accordance with guidance in BS 5228 Part 2[8]. The main construction activities that can result in significant levels of vibration are percussive piling, earth compaction works, or other works requiring the use of a vibratory roller. The resulting peak particle velocity (PPV) in mm/s from potential works were calculated at sensitive receptors using the empirical formula in Annex E of BS 5228 Part 2.

6.5.10 Annex B of BS 5228 Part 2 provides guidance on the likely significance of PPV levels in mm/s due to construction works, which is reproduced below.

**Table 6.3: Guidance on the effects of PPV vibration levels perceptible to humans**

| Vibration level * | Effect |
|---|---|
| 0.14 mm/s | Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower levels, people are less sensitive to vibration. |
| 0.3 mm/s | Vibration might be just perceptible in residential environments. |
| 1.0 mm/s | It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents. |
| 10 mm/s | Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments. |
| * The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into a recipient.<br>A transfer function (which relates an external level to an internal level) needs to be applied only if external measurements are available.<br>Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6471-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment. | |

Table Source: BS 5228 Part 2, Annex B, Table B.1

6.5.11 Table 6.3 suggests that vibration levels of 0.3 mm/s from construction activities could suitably represent the LOAEL threshold as this is when vibration becomes perceptible. Typically, there are no significant sources of vibration in the general environment to influence people's perceptions and experiences. Therefore, as complaints become more likely, for example when vibration levels are 1 mm/s, this would be an appropriate threshold to use as a SOAEL for construction vibration.

[7]Department of Transport and the Welsh Office (1988). Calculation of Road Traffic Noise. London: HMSO
[8] British Standards Institution (2014). BS 5228:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 2: Vibration. London: BSI

6.5.12 Where high levels of vibration are predicted, the values in Table 6.4 are used to determine the potential for cosmetic damage to buildings.

**Table 6.4: Guidance on the effects of vibration levels perceptible to buildings**

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

Table Source: BS 5228 Part 2, Annex B, Table B.2

6.5.13 The vibration impact of construction traffic on the local road network was also predicted based on the predicted airborne noise levels. The predicted noise levels were calculated using the procedure described in CRTN and assessed using guidance found in the DMRB 11:3:7.

## Operation

### Noise

*Road traffic noise modelling*

6.5.14 Noise modelling has been undertaken to predict noise levels with and without the Scheme in its projected opening year (2022) and future assessment year (2037), and to use this information to complete a “detailed” assessment as defined within the DMRB 11:3:7, which consists of the following elements:

- Prediction of daytime ($L_{A10,18h}$) noise levels in the short-term (Scheme opening) and the long-term (future assessment year) at noise-sensitive receptors in the study area using the CRTN procedures and the advice in DMRB 11.3.7, Annex 4;
- Prediction of night-time ($L_{night}$) noise levels in the long-term at noise-sensitive receptors within the study area;
- Assessment of noise levels at traffic links located in the wider area; and
- Assessment of traffic nuisance impacts.

6.5.15 To complete a “detailed” assessment, the following traffic scenarios have been modelled and assessed:

- Do Minimum (without the Scheme) in the opening year (DM 2022);
- Do Something (with the Scheme) in the opening year (DS 2022);
- Do Minimum in the future assessment year (DM 2037); and

- Do Something in the future assessment year (DS 2037).

6.5.16 The noise modelling was undertaken using NoiseMap v5.2.4 software and traffic projections from strategic traffic modelling (Traffic Assessment Report (application document TR010030/APP/7.4)) to permit the degree of accuracy required for a detailed assessment. The traffic data comprised 18-hour average annual weekly traffic flows for each traffic link in the study area and the wider area, and the corresponding traffic speed and fleet composition for each traffic link. The noise modelling software predicted the road traffic noise levels at sensitive receptors by implementing the calculation procedure detailed in CRTN, which involvbes calculating the Basic Noise Level at 10 m from the kerb using the traffic parameters described above and taking into account topography, ground absorption and screening from intervening structires. The noise model included any existing noise mitigation measures that will be retained or replaced by the Scheme, as well as new measures included in the Scheme design to reduce noise pollution. The topographical model was built from Scheme drawings and Ordnance Survey Landform 5 m data at locations further away from the Scheme.

6.5.17 Ordnance Survey base mapping and Addressbase data were used to establish the relevant noise sensitive receptors within the appropriate calculation area. This included residential noise sensitive receptors and non-residential noise sensitive receptors, such as schools, medical facilities and places of worship. Prediction points were also included in the noise modelling to determine how the Scheme will change noise levels with the Thames Basin Heath SPA. The impacts at the Thames Basin Heath SPA are discussed in more detail in Chapter 7 Biodiversity and Section 7 of the Habitat Regulations Assessment (application document TR010030/APP/5.3).

6.5.18 All buildings in the noise model were set to 8 m in height except the Semaphore Tower and The Tower, which are assumed to be 20 m. Receivers were added to each façade of noise sensitive buildings in the study area to predict noise levels at heights of 1.5 m and 4 m above ground level, to represent the ground floor and first floor heights of buildings. Further assessment heights were included for tall buildings and the worst case noise levels predicted for each property have been reported.

*Assessment criteria*

6.5.19 A recognised formal methodology has not yet been published that establishes impact significance for road traffic noise. This is recognised in the DMRB 11:3:7 and an alternate approach is stated:

*6.5.20* "*In terms of road traffic noise, a methodology has not yet been developed to assign a significance according to both the value of a resource and the magnitude of an impact. However, the magnitude of traffic noise impact from a road project should be classified into levels of impact in order to assist with the interpretation of the road project. Therefore, for the assessment of traffic noise that is covered by this document, a classification is provided for the magnitude of impact."*

6.5.21 In absence of a formal methodology for establishing impact significance, the noise impact at each noise sensitive receptor has been assessed by taking into

account the following in order to provide an assessment fulfilling the requirements of the NPSE and NPPF:

- The sensitivity of noise sensitive receptors, which is assumed to be high for all types of receptor;
- The magnitude of the change in road traffic noise levels in the short-term and the long-term, using the descriptors provided in the DMRB 11:3:7; and
- The absolute noise levels predicted in the opening year and future assessment year of the Scheme.

6.5.22 The impact magnitude has been reported in accordance with the DMRB 11:3:7, detailing the number of noise sensitive receptors predicted to experience given changes in noise levels in both the short-term, and long-term periods. The magnitude of a noise change is perceived differently dependent on whether it is a sudden change, or a change over a longer period of time. In the short-term (e.g. on Scheme opening) a change in road traffic noise of 1 dB $L_{A10,18h}$ is the smallest that is considered to cause a minor impact and is the smallest change that is considered to be perceptible. In the long-term, a 3 dB $L_{A10,18h}$ change is considered the minimum required to cause a minor impact and is considered to be the lowest perceptible change in the long term. The impact magnitudes defined in the DMRB 11:3:7 are shown in Table 6.5, with comments on the corresponding impact significance in EIA terms based on guidance from IEMA (2014)[9], and is consistent with current Highways England guidance.

**Table 6.5: Classification of magnitude of noise impacts**

| Short-term noise change ($L_{A10,18h}$, dB) | Long term noise change ($L_{A10,18h}$, dB) | Magnitude of impact (adverse or beneficial) | Potential significance, depending on context |
|---|---|---|---|
| 0 | 0 | No change | Not significant |
| 0.1 - 0.9 | 0.1 - 2.9 | Negligible | Low likelihood of significant effect ↓ High likelihood of significant effect |
| 1 - 2.9 | 3 - 4.9 | Minor | |
| 3 - 4.9 | 5 - 9.9 | Moderate | |
| 5+ | 10+ | Major | |

Table Source: IEMA (2014) and DMRB Volume 11, Section 3, Part 7, HD 213/11

6.5.23 Furthermore, the absolute noise levels predicted at noise sensitive receptors in the opening year and future assessment year of the Scheme have been compared with the SOAEL and the LOAEL. Table 6.6 shows the thresholds assigned to represent the LOAEL and the SOAEL based upon guidance for environmental noise assessments and noise thresholds associated impacts to human health, noting that the selected threshold levels have changed slightly since the Scoping Report was issued.

[9] Institute of Environmental Management and Assessment (2014). Guidelines for Environmental Noise Impact Assessment, version 1.2. Lincoln: Ruddocks.

**Table 6.6: Significance threshold levels for road traffic noise**

| Effect level | Time period | Noise threshold | Relevant guidance |
|---|---|---|---|
| LOAEL | Day | 50 dB $L_{Aeq,16h}$ (free-field)<br>55 dB $L_{A10,18h}$ (1 m from façade) | WHO Community Noise Guidelines (WHO, 1999)[10] |
| | Night | 40 dB $L_{night}$ (free-field) | WHO Night Noise Guidelines for Europe (WHO, 2009)[11] |
| SOAEL | Day | 63 dB $L_{Aeq,16h}$ (free-field)<br>68 dB $L_{A10,18h}$ (1 m from façade) | Noise Insulation Regulations 1975 (amended 1988) |
| | Night | 55 dB $L_{night}$ (free-field) | WHO Night Noise Guidelines for Europe (WHO, 2009), Transport Analysis Guidance (DfT, 2015)[12] |

Table Source: Various

6.5.24 It is noted that new guidance was issued by the World Health Organisation in October 2018[13] where the threshold noise levels for adverse effects to human health were revised. The guidelines recommend a threshold noise level of 53 dB $L_{den,façade}$ (average sound pressure level over all days, evenings and nights in a year) for the onset of health effects to people with average noise exposure to road traffic noise. The guidance also recommends a threshold level of 45 dB $L_{night,façade}$ for the onset of adverse effects on sleep. The threshold levels in this assessment are based on recommendations from older guidance from the World Health Organisation which provide similar thresholds for adverse daytime noise levels and more stringent criteria for night-time noise levels. It is therefore considered that the older guidance is more likely to pinpoint the LOAELs for daytime and night-time periods.

6.5.25 The assessment of absolute noise levels aims to establish the following:

- Locations where the predicted road traffic noise levels are below the LOAEL;
- Locations where the predicted road traffic noise levels are at or above the LOAEL and below the SOAEL; and
- Locations where the predicted road traffic noise levels are at or above the SOAEL.

6.5.26 For the purpose of this assessment, a significant effect is defined as a noise sensitive receptor meeting any of the following criteria:

- A moderate or major adverse noise change in road traffic noise level is predicted in either the opening year or by the future assessment year when the predicted noise levels equal or exceed the LOAEL; or
- The predicted road traffic noise levels with the Scheme equal or exceed the SOAEL and are shown to increase by at least 1 dB.

[10] World Health Organisation (1999). Guidelines for Community Noise. Geneva: WHO.
[11] World Health Organisation (2009). Night Noise Guidelines for Europe. Copenhagen: WHO Regional Office for Europe.
[12] Department for Transport (2015). Transport Analysis Guidance. Available at: https://www.gov.uk/government/publications/webtag-tag-unit-a3-environmental-impact-appraisal-december-2015
[13] World Health Organisation (2018). Environmental Noise Guidelines for the European Region. Copenhagen: WHO Regional Office for Europe.

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

6.5.28 Depending on the predicted noise levels and impact magnitude, noise mitigation may be required under the following conditions:

- To reduce noise levels at noise sensitive receptors where moderate or major noise increases are predicted as a result of the Scheme and to minimise adverse impacts;
- To mitigate noise levels in areas with existing high noise levels, such as NIAs, which is a stated objective of the overarching RIS programme, and
- To avoid adverse effects at ecologically sensitive areas. The significance of effects to ecological receptors is defined in Chapter 7 Biodiversity.

6.5.29 Potential locations requiring noise mitigation based on previous assessments were reviewed to allow mitigation measures to be incorporated in the design of the Scheme. Further information regarding the mitigation measures designed into the Scheme are provided in section 6.9 “Design, mitigation and enhancement measures”.

6.5.30 Detailed noise modelling has been undertaken based on traffic projections from the South East Regional Traffic Model (SERTM). The detailed noise modelling included noise mitigation measures that will be introduced, retained or replaced by the Scheme.

Vibration

6.5.31 Road traffic can give rise to vibration impacts in two different ways:

- Airborne vibration that normally occurs if the exhaust note of (usually heavy) vehicles coincides with the resonant frequency of a building element, resulting in badly fitting windows or light fittings rattling; or
- Ground-borne vibration that may result from the passage of vehicles over discontinuities in the road surface.

6.5.32 Regarding airborne traffic-induced vibration, the DMRB 11:3:7 states that impacts should be considered at properties within 40 m of the road and there is a close correlation between road traffic noise levels and annoyance from airborne traffic-induced vibration. This means that if there are no changes to road traffic noise levels at noise sensitive properties then the airborne traffic-induced vibration impact would be unchanged from existing conditions. Furthermore, the DMRB 11:3:7 states that no traffic-induced vibration impacts should be assumed for noise levels below 58 dB. Therefore, the airborne traffic-induced vibration assessment only considered properties within 40 m of the Scheme where noise levels above 58 dB $L_{A10,18h}$ were predicted.

6.5.33 The DMRB 11:3:7 provides some guidance on assessment criteria to use for determining vibration impacts from road traffic, applicable to properties within 40 m for the new or altered road. It states that a PPV of 0.3 mm/s measured on the floor of a property in the vertical direction is perceptible and that “if the level of vibration at a receptor is predicted to rise above a level of 0.3 mm/s, or an existing level of 0.3 mm/s is predicted to increase, then this should be classed as an adverse impact from vibration”. The threshold level for perceptibility of

vibration stated in the DMRB 11:3:7 corresponds with that shown in Table 6.3 taken from BS 5228 Part 2. On this basis, a PPV of 0.3 mm/s would be an appropriate threshold to represent the LOAEL.

6.5.34 The DMRB 11:3:7 also notes: "for vibration from traffic…structure damage can occur when levels are above 10 mm/s…PPVs in the structure of buildings close to heavily trafficked roads rarely exceed 2 mm/s and typically are below 1 mm/s. Normal use of a building such as closing doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic noise." On this basis, a SOAEL threshold of 1 mm/s has been selected to appraise the Scheme, noting that if this value is exceeded damage to buildings is unlikely to occur. This value corresponds with the threshold for complaints shown in Table 6.3 taken from BS 5228 Part 2.

6.5.35 Research from Watts (1987)[14] into ground-borne vibration concluded there was a possibility of perceptible ground-borne vibrations generated during the passage of heavy vehicles when there is a road surface irregularity of about 20 mm within about 5 m of a building. This indicates that the condition of the road surface is a significant factor in determining the likelihood of ground-borne vibration impacts, which can be predicted if information about the ground type and the dimensions of the road surface irregularities are known (Watts, 1990)[15]. Road surface irregularities can be removed through remedial works and are most likely to occur if the road is poorly maintained. As the new roads and widened roads introduced by the Scheme would have new road surfaces free from irregularities, ground-borne vibration impacts would not occur. Therefore ground-borne vibration is scoped out of the assessment.

## 6.6 Assumptions and limitations

### Construction

#### Construction noise

6.6.1 The construction noise assessment was based on information provided by the construction stage contractor and reflects the best information available at the time of assessment. The plant lists, construction methods, phasing or the construction programme may change during the detailed design of the project, which may affect the resultant noise levels at sensitive receptors. The assumptions used for the construction noise assessment are stated below:

- Construction activities, plant lists, on-times and durations used in the assessment are those that were provided by the construction contractor. Some of the on-times were adjusted slightly to better represent the conditions during a 'typical' working day for each activity;
- The construction phasing and all periods of night-time working were shown in the construction programme;
- Daytime activities assumed a 12 hour working day (e.g. 07:00 to 19:00) for six days per week (Monday to Saturday) and night-time activities assume an 8 hours working period (e.g. 23:00 to 07:00);

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

- All calculations assume soft ground attenuation, which is the predominant ground type in the study area;
- All calculations assume no screening for intervening objects;
- The screening effect from the existing/proposed environmental noise barriers within the study area was not considered as the construction programme does not indicate when they will be removed and reinstated; and
- All calculations are free-field noise levels and do not include a façade correction.

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

Construction vibration

6.6.3 The construction vibration assessment was based on information provided by the construction stage contractor and reflects the best information available at the time of assessment. Vibration-generating activities and items of plant were identified from the plant lists provided by the construction contractor. The construction vibration assessment is based on the following assumptions:

- Only steady-state vibratory rolling is considered;
- The scaling factor used for vibratory rolling is assumed to have a 5% chance of exceedance;
- A Caterpillar CB434D or similar vibratory roller is assumed for all vibratory rolling;
- A rotary bored piling method will be used when piling works are undertaken for new overbridges and gantries;
- All piling for the retaining walls and the cofferdam is assumed to be driven (ABI MOBILRAM-System or similar);
- The scaling factor for driven piling is assumed to be 1.5 (e.g. piles are driven through stiff cohesive soil/compacted fill); and
- All piling assumes 85kJ hammer energy.

6.6.4 The results of the construction vibration calculations provide a worst-case assessment of construction vibration levels by assuming that the vibration-generating plant is operating at the closest point to the sensitive receptors. The worst-case vibration levels would be temporary as the construction works are not fixed in one location for the duration of the build. Lower levels of vibration would occur when the vibration-generating activities take place at greater distances from the sensitive receptor.

Construction traffic

6.6.5 The construction traffic assessment is based on traffic data produced from a strategic traffic model for the ‘Design Fix 3.1’ iteration of the Scheme. The assessment has been completed by comparing the road traffic noise levels for

each road link with and without construction traffic. The road traffic noise levels were calculated in accordance with CRTN and represent the Basic Noise Level at 10 m from the kerb rather than road traffic noise levels at specific receptors.

6.6.6 Construction traffic flows take into account construction workers travelling to the sites, construction traffic routes between site compounds, and mass haul movements between the Scheme and the proposed railhead in Woking. The traffic data assumed that construction traffic will travel to and from the Scheme using trunk roads as far as possible to minimise disruption. It is also assumed that a 50 mph speed limit will be in place on both carriageways of the A3 between Ockham Park and the Painshill interchange, and on the M25 in proximity to junction 10.

## Operation

### Traffic data

6.6.7 The results from the detailed noise modelling are affected by limitations of the input data sources. Crucially, the results from the detailed noise modelling are influenced by the assumptions used to derive traffic flow, speed, and fleet composition data from the strategic traffic model for the Scheme. The traffic data was modelled using Saturn software and based on the South East Regional Traffic Model (SERTM). The traffic model took into account additional traffic from several cumulative developments in the surrounding area, including the proposed housing development at the Former Wisley Airfield.

6.6.8 The traffic model also assumed that the Smart Motorways project proposed for the M25 junction 10-16 is operational in the opening year of the Scheme. This includes through-junction running at junction 10, which is operational in the Do Minimum and Do Something traffic scenarios provided.

6.6.9 The traffic data did not include any road links for re-routed accesses to Birchmere Scout Campsite or Redhill Road. On this basis, it is assumed that traffic flows on these access roads are insignificant and would not give rise to a noise impact.

6.6.10 The traffic data used for the operational noise modelling is representative of the traffic projections for ‘Design Fix 2’ iteration of the Scheme rather than the current ‘Design Fix 3.1’ version of the Scheme. An analysis of the two datasets has been undertaken to ascertain how the use of Design Fix 2 traffic data would affected the predicted road traffic noise levels, which compared the Basic Noise Levels calculated at 10 m from the kerb of each traffic link for each dataset. The main difference between the two datasets was that the Design Fix 3.1 traffic data would result in predictions of quieter road traffic noise levels for the majority of road links in the study area or similar noise levels to those predicted using the Design Fix 2 traffic data. On this basis, Design Fix 2 traffic data has been used in this assessment in order to take a precautionary approach and to predict the worst-case noise levels. Where significant effects are identified, these are cross-referenced against the Design Fix 3.1 traffic data to check that the impact significance reflects the current Scheme design.

6.6.11 The noise predictions were based on the speed bands assigned to each road link rather than speeds generated by the traffic model, in line with IAN 185/15 and current Highways England guidance. Where the speed band changed

between traffic scenarios, advice was sought from traffic modellers to ensure that the change in speed band was appropriate.

6.6.12 The noise model included detailed information about road surfacing in each of the traffic scenarios that were modelled, and this was based on the following assumptions and data sources:

- In the Do Minimum scenario in the opening year, the road surface corrections applied to the M25 and A3 were assigned according to the road surfaces identified in the Highways Agency Pavement Management System (HAPMS) for each lane of each carriageway. In accordance with the DMRB 11:3:7, sections where an existing lower noise road surface was present were assigned a correction of -2.5 dB. From this information, an overall correction was applied to sections of each carriageway[16]. Where HAPMS data was unavailable for the local road network, a bituminous road surface with a texture depth of 1.5 mm was assumed everywhere except access to the Former Wisley Airfield, where a texture depth of 2 mm was assumed. As the speed on this road for all traffic scenarios was below 75 km/h, a correction of -1 dB was applied in line with the CRTN prediction methodology;
- In the Do Something scenario in the opening year, it is assumed that new lower noise road surfacing would be laid at the Ockham roundabout, all lanes of the A3 between Ockham and Painshill (except at junction 10) and A245. In accordance with the DMRB 11:3:7, sections of new lower noise road surfacing were assigned a correction of -3.5 dB. Where a mixture of road surfaces will be present on a given section of carriageway, an overall correction was determined[16]. Road surfacing at the realigned access road to RHS Wisley is assumed to be bituminous with a texture depth of 2 mm, and a concrete road surface was assumed at the new junction 10 roundabout and slip roads. Road surfacing on all other roads was the same as the Do Minimum scenario; and
- In the Do Minimum and Do Something scenarios in the future assessment year, it is assumed that the A3 and all road links with an existing low noise road surface will be resurfaced with a new low noise road surface during routine maintenance works. In accordance with the DMRB, sections of new lower noise road surfacing were assigned a correction of -3.5 dB.

Geographical data

6.6.13 The heights and widths of the A3, M25, junction 10 and the access road to the RHS Gardens at Wisley were modelled based on the Design Fix 3.1 drawings (application document TR010030/APP/2.8, TR010030/APP/2.9). The layout of local roads was based on Ordnance Survey data sources.

6.6.14 The resolution of the ground topography data imported into the road traffic noise model influences the results as it affects sound propagation. To minimise uncertainty and to improve the accuracy of the noise model, the ground topography close to the Scheme used very detailed topographical information from the Design Fix 3.1 drawings (application document TR010030/APP/2.8, TR010030/APP/2.9) and aerial survey data. Further away from the Scheme, where these data sources were unavailable, Ordnance Survey Terrain 5 data was used. This dataset provided equal height ground contours at 5 m height

[16] Muirhead, M (2017). CRTN revision and update. Paper presented to the Institute of Acoustics Sound Transport Modelling conference, Manchester 14 March 2017

intervals and would therefore not take into account small variations in ground level between each contour interval.

6.6.15 All noise sensitive receptors within the study area have been identified using Ordnance Survey Addressbase and added to the noise model accordingly. Therefore it is assumed that Addressbase is up to date and has not mislabelled land use categories for addresses. Where there are sensitive receptors that cover a large area, such as designated sites or parks, the level of impact has been assessed based on the variation of and changes to noise levels throughout the site, in line with current Highways England guidance.

6.6.16 The existing noise barriers at junction 10 will be replaced and repositioned to accommodate the proposed alignment of the slip roads and the elongated roundabout. It is assumed that the repositioned noise barriers will have a height of 2.5 m above ground level.

Calculation method

6.6.17 The DMRB 11:3:7 requires an assessment of night-time noise levels (23:00 to 07:00) using the $L_{night}$ noise index. These were calculated by the noise modelling software using "TRL Method 3", which calculates $L_{night}$ based on the predicted daytime $L_{A10,18h}$ noise level. This approach assumes that the diurnal traffic pattern is typical for the roads in the study area.

6.6.18 Due to the rural nature of the majority of the noise study area, the cut off distance for the noise predictions was set to 4,000 m to ensure that the noise emissions from the M25 and the A3 are fully accounted for and that noise from these sources is not underpredicted.

## 6.7 Baseline conditions

### Sensitive receptors

6.7.1 The M25 junction 10/A3 Wisley interchange is located between the urban areas of Ockham and Cobham in Surrey. The land use within 600 m of the Scheme consists mostly of green space, including Chatley Wood, Ockham Common and Wisley Common. The majority of the noise sensitive receptors are located close to the Painshill interchange to the north east of the study area.

6.7.2 The closest buildings to the M25 junction 10/A3 Wisley interchange are in proximity to the Painshill interchange and include West Lodge (8 m), East Lodge (20 m), Pains Hill Bungalow (45 m), Painshill Farm (50 m), and Feltonfleet School (50 m). There is an existing mixed use development between the A3 and A245 within 300 m of the Painshill interchange, and further residential buildings located at Seven Hills Road, approximately 430 m from the Painshill interchange. The land south west of the Painshill interchange towards the M25 and beyond, is sparsely populated with few noise sensitive receptors located within 600 m of the Scheme in this area.

6.7.3 A number of other notable noise sensitive receptors have been identified within 600 m of the M25, A3, and A245 Byfleet Road, including: Feltonfleet School, St George's Nursing Home, Hilton Hotel, Katz Castle, Convent of Notre Dame School, Foxwarren Park, Painshill Park, The Tower, Silvermere Equestrian Centre's Riding School, Pond Farm, Birchmere Scout Campsite, Semaphore

Tower, Elm Corner, Wisley Village and Royal Horticultural Society Gardens at Wisley.

6.7.4 In addition to the existing noise sensitive receptors located close to the Scheme, it is understood that there are proposals to develop the land occupied by the former Wisley Airfield into residential housing. The planning application for the development was rejected on several grounds in April 2016; a decision which is currently being appealed by the developer. If the appeal is successful and the planning application is approved, the development will include some mitigation as part of its design. The proposed Wisley Airfield development was included in the traffic model and is therefore considered in the appraisal of the Scheme.

6.7.5 The locations of the nearest noise sensitive receptors to the Scheme are shown in Figure 6.1 and Figure 6.2 (application document TR010030/APP/6.4).

6.7.6 Several 'Important Areas' for noise (NIAs) have been designated at noise sensitive properties in proximity to the Scheme. NIAs are the locations where the 1% of the population most affected by the highest noise levels from major roads and railways are located according to the strategic noise mapping undertaken by Defra. The NIAs within the study area for the operation phase assessment are shown in the table below, noting that there are other NIAs outside the study area close to the M25 or A3 north of the Painshill interchange.

**Table 6.7: Location and distance of NIAs from the Scheme**

| NIA ID | Location | Source of noise | Distance in metres | Comment |
|---|---|---|---|---|
| 5859 | Pointers Road, Cobham | Road | 150 | Adjacent to M25, east of junction 10 |
| 5868 | Murray's Lane, West Byfleet | Road | 750 | Adjacent to M25, west of junction 10 |
| 1004 | Byfleet Road, Cobham | Road | 65 | Adjacent to A245, west of Seven Hills Road |
| 5864 | Portsmouth Road, Cobham | Road | 400 | Adjacent to A245 in Cobham village |
| 5861 | Portsmouth Road, Cobham | Road | 29 | Adjacent to A3 at the San Domenico site |
| 5865* | Portsmouth Road, Cobham | Road | 7 to 21 | Adjacent to A3 and A245 at the Painshill interchange |
| 5863 | Mossfield, Cobham | Road | 730 | Adjacent to A3 north of the Painshill interchange (just outside study area) |

6.7.7 The locations of the NIAs in proximity to the Scheme are shown in Figure 2.2, (the Environmental Constraints Map), Figure 6.1 and Figure 6.2 (application document TR010030/APP/6.4).

6.7.8 It is understood that in the last three years Highways England has received complaints about noise from the A3. No vibration issues have been identified in the study area.

6.7.9 Ecological receptors are also present in proximity to the Scheme. In particular, there are three species of bird, nightjar, woodlark and Dartford warbler that could be adversely affected by changes to noise levels caused by the Scheme

inhabiting the Thames Basin Heath SPA. The SPA partially falls within the Scheme, directly adjacent to the south east and south west of M25 junction 10. A number of ancient woodlands are also close to the Scheme, as well as sites of cultural importance or historical heritage such as the Semaphore Tower at Chatley Heath and The Tower at Painshill Park, where protection of amenity is important. The location of the SPA, ancient woodlands and heritage sites are shown in Figure 2.2 Environmental Constraints Map (application document TR010030/APP/6.4). More details about the ecological receptors can be found in the Chapter 7, Biodiversity and Chapter 11, Cultural Heritage.

## Baseline noise monitoring

6.7.10 A series of noise surveys have been undertaken to ascertain the baseline noise levels at noise sensitive receptors within the study area of the Scheme. The noise surveys have been completed using one of the following methods:

- Unattended continuous noise monitoring for at least one week, where noise levels were logged in one-hour intervals. A weather station was also installed at each continuous monitoring station so that noise levels corresponding with periods of adverse weather conditions, such as precipitation and wind speeds exceeding 5 m/s, could be excluded from the results; and
- Attended short-term measurements following the Shortened Measurement Procedure stated in the CRTN. This requires three measurements at the same location in consecutive one-hour periods (10:00 to 17:00) of 15 minutes duration, from which the daytime $L_{A10,18h}$ can be calculated. Weather conditions and the main noise sources present during the measurements were noted.

6.7.11 For both measurement methods, the noise measurements were completed in accordance with BS 7445:2003 Part 1[17]. The sound level meter was tripod mounted with a microphone height of 1.5 m above ground level. All of the measurements were completed under free-field conditions (more than 3.5 m from reflective surfaces other than the ground).

6.7.12 The noise measurements were completed using Class 1 integrating sound level meters that were field calibrated before and after the measurements. The instrumentation used was within two years of their most recent laboratory calibration testing. Further information about the instrumentation, including laboratory calibration certificates, can be found in Appendix 6.1 Calibration Certificates (application document TR010030/APP/6.5).

6.7.13 A summary of the measured noise levels is provided in Table 6.8 and Table 6.9, with detailed results provided in Appendix 6.2 Baseline Noise Monitoring Data (application document TR010030/APP/6.5). A map showing baseline noise survey locations is provided in Figure 6.3 (application document TR010030/APP/6.4). Local authorities were contacted to approve outline baseline noise monitoring locations and the data collection methodology prior to the surveys commencing.

6.7.14 A calibration drift of 0.4 dB was observed at one of the continuous monitoring sites and a larger calibration drift of 0.9 dB was observed at two of the short-term monitoring sites. The data collected at these locations is not considered reliable

[17] British Standards Institution (2003). BS 7445:2003 Description and measurement of environmental noise, Part 1 - Guide to quantities and procedures. London: BSI

but is provided for indicative purposes only. The sites where calibration drifts were observed are indicated by (†) in Table 6.8 and Table 6.9.

### Table 6.8: Summary of survey results at each continuous monitoring location

| Location | Survey dates | Noise levels, dB | | | | Main sources |
|---|---|---|---|---|---|---|
| | | $L_{A10,18h}$ (day) | $L_{Aeq,16h}$ (day) | $L_{A90,16h}$ (day) | $L_{Aeq,8h}$ (night) | |
| L1: Feltonfleet School, Cobham | 23/01/18 to 30/01/18 | 71.9 | 70.8 | 67.8 | 65.3 | Road traffic noise - A3 |
| L2: 1 Fellside Cottage, Elm Corner | 23/01/18 to 30/01/18 | 60.9 | 60.8 | 58.4 | 54.9 | Road traffic noise - A3 |
| L3: Court Close Farm, Cobham † | 20/03/18 to 27/03/18 | 65.4 | 64.6 | 62.4 | 57.2 | Road traffic noise - A3 |

† Calibration drift of 0.4 dB. The acoustic data collected at this site is indicative only.

### Table 6.9: Summary of daytime survey results at each short-term measurement location

| Location | Survey date | Noise levels, dB | | | | Main sources |
|---|---|---|---|---|---|---|
| | | $L_{A10,18h}$ | $L_{Aeq,3h}$ | $L_{A90,3h}$ | $L_{Amax,3h}$ | |
| S1: Ockham Common † | 11/01/18 | 57.2 | 59.3 | 55.1 | 78.0 | Distant road traffic noise from A3 and M25 |
| S2: Footpath near Ockham Bites, Ockham Common † | 11/01/18 | 72.1 | 70.4 | 68.3 | 75.2 | Road traffic noise from A3, birdsong |
| S3: Ockham Lane, Cobham | 20/03/18 | 59.1 | 57.1 | 52.6 | 74.2 | Road traffic noise from A3 and M25, aircraft flyovers, birdsong |
| S4: Pointers Road, Cobham | 20/03/18 | 64.2 | 63.3 | 61.6 | 82.9 | Road traffic noise from M25 and A3, aircraft flyovers, birdsong |
| S5: Wisley Common | 23/04/18 | 62.4 | 59.6 | 47.0 | 77.3 | Local roads, A3, birdsong, mechanical plant at RHS Wisley |
| S6: Ockham Road North | 23/04/18 | 69.6 | 66.5 | 50.2 | 92.5 | Local roads, A3, birdsong, DIY |
| S7: Gothic Temple, Painshill Park | 28/06/18 | 50.7 | 50.4 | 47.9 | 64.7 | Distant road traffic noise from A3, aircraft flyover, birdsong |
| S8: Near Great Cedar, Painshill Park | 28/06/18 | 52.7 | 52.1 | 49.6 | 66.2 | Distant road traffic noise from A3, aircraft flyover, birdsong |

| Location | Survey date | Noise levels, dB | | | | Main sources |
|---|---|---|---|---|---|---|
| | | $L_{A10,18h}$ | $L_{Aeq,3h}$ | $L_{A90,3h}$ | $L_{Amax,3h}$ | |
| S9: Temple of Bacchus, Painshill Park | 28/06/18 | 57.2 | 56.6 | 54.9 | 65.3 | Distant road traffic noise from A3, aircraft flyover, gates, birdsong |
| S10: The Tower, Painshill Park | 28/06/18 | 62.7 | 60.7 | 60.7 | 74.2 | Road traffic noise from A3 and M25, aircraft flyover, insects |

† Calibration drift of 0.9 dB. The acoustic data provided at this site is indicative only.

6.7.15 The measured noise levels show that road traffic noise from the M25 and the A3 are the main noise sources influencing noise levels in the study area. The loudest noise levels were measured at Feltonfleet School and near Ockham Bites, which were the measurement locations closest to the A3. The quietest noise levels were measured at Painshill Park (Gothic Temple, Great Cedar, and Temple of Bacchus) and Ockham Common, where road traffic noise was less dominant.

6.7.16 During the attended noise surveys aircraft noise was observed, related to the study area's position between Heathrow and Gatwick airports. There are no railways or heavy industrial noise sources within 1 km of the Scheme.

6.7.17 As the measured noise levels are representative of discrete locations, this information has been supplemented with information from publicly available online mapping sources. Strategic noise maps were published during 2015 by Defra for both major road and railways sources to meet the requirements of the Environmental Noise Directive (Directive 2002/49/EC) and the Environmental Noise (England) Regulations 2006 (as amended).

6.7.18 The strategic noise maps for road traffic noise during the daytime (07:00-23:00) and night-time (23:00-07:00) periods are shown in Figures 6.4 and 6.5 (application document TR010030/APP/6.4), along with the measured noise levels from the baseline noise surveys.

## 6.8 Potential impacts

### Construction

#### Construction noise

6.8.1 The proposed construction activities associated with the Scheme have the potential to give rise to adverse or significant adverse impacts at sensitive receptors. An assessment has been undertaken to calculate the construction noise levels that are expected to be generated during key phases of work.

6.8.2 The construction contractor's programme of work and associated equipment lists for each construction activity have been provided. Further information about the plant lists is available in Appendix 6.3 Construction Noise Plant Lists (application document TR010030/APP/6.5). This information has been used to calculate the construction noise levels as described in section 6.5.

6.8.3 The construction programme indicates that the construction phase will last up to 29 months and will consist of the following main activities:

- Site clearance;
- Utility diversions;
- Earthworks, including those for excavation and drainage;
- Landscaping;
- Road construction;
- Bridge construction;
- Demolition of the existing M25 East and West Overbridges;
- Retaining wall construction; and
- Installation of safety barriers, gantries, boundary fencing, lighting and signage.

6.8.4 According to the construction programme, the majority of the construction works will take place during the daytime only. Night-time works are only proposed at junction 10 for beam lifting and fabrication works associated with the new East and West Overbridges and for demolition of the existing structures. Road resurfacing works may also take place at night at the Painshill interchange.

6.8.5 The predicted construction noise levels at a variety of distances up to 300 m from the construction works are presented in Table 6.10 for each of the sub-activities identified in the construction programme. The plant list assumptions are provided in Appendix 6.3 (application document TR010030/APP/6.5). The significance of these predicted noise levels is discussed in section 6.10.

**Table 6.10: Predicted construction activity noise levels**

| Construction Activity | Predicted construction noise levels at different distances ($L_{Aeq}$, dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10m | 25m | 50m | 75m | 100m | 150m | 200m | 250m | 300m |
| Site clearance | 94.7 | 86.8 | 79.2 | 74.8 | 71.7 | 67.3 | 64.2 | 61.8 | 59.8 |
| Boundary fencing | 76.1 | 68.2 | 60.6 | 56.2 | 53.1 | 48.7 | 45.6 | 43.2 | 41.2 |
| Earthworks/excavation | 92.2 | 84.3 | 76.7 | 72.3 | 69.2 | 64.8 | 61.7 | 59.3 | 57.3 |
| Drainage | 84.6 | 76.7 | 69.1 | 64.7 | 61.6 | 57.2 | 54.1 | 51.7 | 49.7 |
| Finishing and landscaping | 93.6 | 85.7 | 78.1 | 73.7 | 70.6 | 66.2 | 63.1 | 60.7 | 58.7 |
| Temporary works | 92.2 | 84.3 | 76.7 | 72.3 | 69.2 | 64.8 | 61.7 | 59.3 | 57.3 |
| Traffic management | 79.2 | 71.3 | 63.7 | 59.3 | 56.2 | 51.8 | 48.7 | 46.3 | 44.3 |
| New gas main | 84.8 | 76.9 | 69.3 | 64.9 | 61.8 | 57.4 | 54.3 | 51.9 | 49.9 |

| Construction Activity | Predicted construction noise levels at different distances ($L_{Aeq}$, dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10m | 25m | 50m | 75m | 100m | 150m | 200m | 250m | 300m |
| Gas main crossing over the A3 | 89.9 | 82.0 | 74.4 | 70.0 | 66.9 | 62.5 | 59.4 | 57.0 | 55.0 |
| Other utility diversions (worst case) | 78.9 | 71.0 | 63.4 | 59.0 | 55.9 | 51.5 | 48.4 | 46.0 | 44.0 |
| Crib wall/reinforced earth wall | 85.4 | 77.5 | 69.9 | 65.5 | 62.4 | 58.0 | 54.9 | 52.5 | 50.5 |
| Precast concrete cantilever retaining wall/sheet pile wall | 86.8 | 78.9 | 71.3 | 66.9 | 63.8 | 59.4 | 56.3 | 53.9 | 51.9 |
| Roadbox | 82.2 | 74.3 | 66.7 | 62.3 | 59.2 | 54.8 | 51.7 | 49.3 | 47.3 |
| Road capping/subbase | 91.9 | 84.0 | 76.4 | 72.0 | 68.9 | 64.5 | 61.4 | 59.0 | 57.0 |
| Kerbs | 80.5 | 72.6 | 65.0 | 60.6 | 57.5 | 53.1 | 50.0 | 47.6 | 45.6 |
| Road surfacing/ pavement reconstruction | 94.6 | 86.7 | 79.1 | 74.7 | 71.6 | 67.2 | 64.1 | 61.7 | 59.7 |
| Safety barriers | 81.6 | 73.7 | 66.1 | 61.7 | 58.6 | 54.2 | 51.1 | 48.7 | 46.7 |
| Lighting and signage | 85.5 | 77.6 | 70.0 | 65.6 | 62.5 | 58.1 | 55.0 | 52.6 | 50.6 |
| Remove existing road surface | 85.8 | 77.9 | 70.3 | 65.9 | 62.8 | 58.4 | 55.3 | 52.9 | 50.9 |
| Removal of temporary slip roads | 92.2 | 84.3 | 76.7 | 72.3 | 69.2 | 64.8 | 61.7 | 59.3 | 57.3 |
| East and West Overbridge structures foundation works | 89.9 | 82.0 | 74.4 | 70.0 | 66.9 | 62.5 | 59.4 | 57.0 | 55.0 |
| Beam fabrication and lifting | 82.4 | 74.5 | 66.9 | 62.5 | 59.4 | 55.0 | 51.9 | 49.5 | 47.5 |
| Footbridge demolition | 95.0 | 87.1 | 79.5 | 75.1 | 72.0 | 67.6 | 64.5 | 62.1 | 60.1 |
| Bridge demolition | 108.3 | 100.4 | 92.8 | 88.4 | 85.3 | 80.9 | 77.8 | 75.4 | 73.4 |
| Culvert strengthening | 89.1 | 81.2 | 73.6 | 69.2 | 66.1 | 61.7 | 58.6 | 56.2 | 54.2 |

| Legend | | | |
|---|---|---|---|
| | 75 dB $L_{Aeq}$ or higher | | 55.0 to 64.9 dB $L_{Aeq}$ |
| | 65.0 to 74.9 dB $L_{Aeq}$ | | 45.0 to 54.9 dB $L_{Aeq}$ |

6.8.6 Table 6.10 shows that the construction activity that was predicted to have the highest noise levels was bridge demolition, with noise levels in excess of 75 dB $L_{Aeq}$ within 250 m of the works. The lowest construction noise levels were predicted for boundary fencing and utility diversions, which were predicted construction noise levels exceeding 65 dB $L_{Aeq}$ within 25-50 m of the works.

6.8.7 As the construction programme indicates that several construction activities would occur in parallel to expedite the build, construction noise levels were predicted at a selection of sensitive receptors across the study area to establish the combined noise levels from construction activities occurring simultaneously as shown in the construction programme. Table 6.11 shows the range of predicted construction noise levels at the selected noise sensitive receptors, along with their estimated ambient noise levels to the nearest decibel based on either the measurements from the baseline noise surveys or the data published in the Defra stratgic noise maps, as shown in Figure 6.4 and Figure 6.5 (application document TR010030/APP/6.4). The noise predictions reported for the Royal Horticultural Society Gardens and the Birchmere Scout Campsite were for the nearest buildings within these sites to the construction works.

**Table 6.11: Combined construction activity noise levels**

| Sensitive receptor | Estimated ambient noise levels ($L_{Aeq}$, dB) | | Daytime construction noise levels ($L_{Aeq}$, dB) | | Night-time construction noise levels ($L_{Aeq}$, dB) | |
|---|---|---|---|---|---|---|
| | Day | Night | Lowest | Highest | Lowest | Highest |
| Bridgefoot Farm, Ripley | 59.0 | 54.0 | 39.7 | 53.8 | N/A | N/A |
| Royal Horticultural Society Gardens, Wisley | 65.0 | 57.0 | 36.3 | 63.3 | N/A | N/A |
| 1 Fellside Cottage, Elm Corner | 61.0 | 55.0 | 43.9 | 68.8 | N/A | N/A |
| Reynards, Elm Corner | 61.0 | 55.0 | 44.1 | 74.7 | N/A | N/A |
| Hut Hill Cottage, Wisley | 65.0 | 63.0 | 52.4 | 74.2 | 32.2 | 64.2 |
| Birchmere Scout Campsite, Wisley Common | 70.0 | 67.0 | 51.2 | 72.5 | 30.6 | 63.8 |
| Wisley Chase, Wisley | 63.0 | 60.0 | 23.3 | 57.9 | N/A | N/A |
| Park Barn Farm, Wisley Common | 63.0 | 55.0 | 22.4 | 57.0 | N/A | N/A |
| Thames Basin Heath SPA | 63.0 | 60.0 | 21.0 to 55.0 | 59.5 to 75.0 | 17.5 to 57.4 | 49.5 to 75.8 |
| Semaphore Tower, Chatley Heath | 65.0 | 64.0 | 21.0 | 67.5 | 29.0 | 58.6 |

| Sensitive receptor | Estimated ambient noise levels ($L_{Aeq}$, dB) | | Daytime construction noise levels ($L_{Aeq}$, dB) | | Night-time construction noise levels ($L_{Aeq}$, dB) | |
|---|---|---|---|---|---|---|
| | Day | Night | Lowest | Highest | Lowest | Highest |
| The Lodge, Cobham | 67.0 | 60.0 | 18.7 | 56.7 | 25.8 | 55.5 |
| Pointers South, Cobham | 62.0 | 60.0 | 45.0 | 55.0 | 25.8 | 54.8 |
| The Cottage, Chatley Heath | 65.0 | 55.0 | 23.7 | 74.1 | 32.3 | 61.6 |
| The Tower, Painshill Park | 67.0 | 60.0 | 54.4 | 79.0 | 33.3 | 64.7 |
| Silvermere Lodge, Cobham | 64.0 | 57.0 | 54.0 | 83.4 | 33.3 | 64.3 |
| Court Close Farm, Cobham | 65.0 | 57.0 | 50.2 | 72.5 | 29.5 | 59.7 |
| Feltonfleet School, Cobham | 71.0 | 65.0 | 60.4 | 85.7 | N/A | 48.9 |
| Calvi, Cobham | 65.0 | 57.0 | 54.3 | 82.8 | N/A | 61.5 |
| West Lodge, Cobham | 60.0 | 55.0 | 58.5 | 94.8 | N/A | 46.5 |
| Painshill Farm, Cobham | 64.0 | 58.0 | 56.1 | 74.2 | N/A | 47.6 |
| Caigers Cottage, Cobham | 63.0 | 55.0 | 45.0 | 73.2 | N/A | 45.4 |

6.8.8 The predictions provided in Table 6.11 indicate that sensitive receptors close to junction 10 or the A3 between junction 10 and the Painshill interchange are most likely be affected by high noise levels from construction works. This includes receptors close to the Painshill interchange (Feltonfleet School, West Lodge, Calvi, Painshill Farm) that would be affected by the road widening works on the A3 and the A245, and receptors close to the A3 (The Tower, Silvermere Lodge, Court Close Farm) that would be affected by the road widening works, temporary slip roads, and retaining wall construction.

6.8.9 Close to junction 10 (Hut Hill Cottage, Birchmere Scout Campsite, parts of the Thames Basin Heath SPA), the highest noise levels were attributed to demolition works, slip road construction and road works. Temporary high noise levels were also predicted at properties in proximity to the proposed works at Elm Lane.

6.8.10 The predicted night-time construction noise levels are also shown in Table 6.11. The highest construction noise levels during the night were associated with road resurfacing works at the Painshill interchange and demolition works at junction 10.

Construction vibration

6.8.11 Based on the construction programme, the following vibration-generating activities were identified:

- Rotary bored piling for the new footbridges, M25 overbridges and gantries;

- Sheet piling for the retaining walls and cofferdam at Bolder Mere. The plant list provided by the construction contractor suggests that a percussive method will be used; and
- Vibratory rolling plant for road surfacing works.

6.8.12 Piling using the rotary bored method results in low vibration levels that are unlikely to be high enough to give rise to complaints or cause cosmetic damage. On this basis it is expected that there will not be a vibration impact in proximity to sites using the rotary bored technique or other methods that result in low vibration levels.

6.8.13 Percussive piling is more likely to generate high vibration levels, especially if the soil is stiff. Vibratory rolling may also generate high vibration levels depending on the size of the drums and the proximity of the plant to the sensitive receptors.

6.8.14 The predicted PPV vibration levels from percussive piling and use of a single vibratory roller are shown in Table 6.12.

6.8.15 Further predictions at a selection of sensitive receptors that are most likely to be affected by vibration-generating plant are provided in Table 6.13. The sensitive receptors were selected based on their proximity to the construction activities involving vibration-generating plant. The vibration levels shown in both tables were calculated in accordance with BS 5228 Part 2 and the assumptions listed in section 6.6.

**Table 6.12: Predicted PPV from vibration-generating plant**

| Construction Activity | Predicted PPV at different distances (mm/s) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10m | 25m | 50m | 75m | 100 m | 150m | 200m | 250m | 300 m |
| Percussive piling | 21.9 | 6.7 | 2.7 | 1.6 | 1.1 | 0.6 | 0.4 | 0.3 | < 0.3 |
| Vibratory roller | 5.7 | 1.6 | 0.6 | 0.3 | 0.2 | 0.1 | < 0.1 | < 0.1 | < 0.1 |

| Legend | | | |
|---|---|---|---|
| | 10 mm/s or higher | | 0.3 to 0.9 mm/s |
| | 1.0 to 9.9 mm/s | | Below 0.3 mm/s |

**Table 6.13: Predicted PPV from vibration-generating plant at sensitive receptors**

| Sensitive receptor | Vibration PPV (mm/s) | |
|---|---|---|
| | Piling | Vibratory rolling |
| Bridgefoot Farm, Ripley | < 0.1 | < 0.1 |
| Royal Horticultural Society Gardens, Wisley | 0.2 | < 0.1 |
| 1 Fellside Cottage, Elm Corner | 0.2 | < 0.1 |
| Reynards, Elm Corner | 0.2 | 0.2 |
| Hut Hill Cottage, Wisley | 0.5 | 0.4 |

| Sensitive receptor | Vibration PPV (mm/s) | |
|---|---|---|
| | Piling | Vibratory rolling |
| Birchmere Scout Campsite, Wisley Common | 0.4 | 0.4 |
| Wisley Chase. Wisley | < 0.1 | < 0.1 |
| Park Barn Farm, Wisley Common | 0.1 | < 0.1 |
| Thames Basin Heath SPA | 0.1 to 0.7 | ≤ 0.1 |
| Semaphore Tower, Chatley Heath | 0.2 | 0.1 |
| The Lodge, Cobhbam | 0.3 | < 0.1 |
| Pointers South, Cobham | 0.2 | < 0.1 |
| The Cottage, Chatley Heath | 1.4 | 0.3 |
| The Tower, Painshill Park | 1.4 | 0.5 |
| Silvermere Lodge, Cobham | 3.1 | 0.7 |
| Court Close Farm, Cobham | 0.6 | 0.2 |
| Feltonfleet School, Cobham | 0.4 | 0.7 |
| Calvi, Cobham | 1.5 | 0.7 |
| West Lodge, Cobham | 0.4 | 0.5 |
| Painshill Farm, Cobham | 0.5 | 0.4 |
| Caigers Cottage, Cobham | 0.4 | 0.1 |

6.8.16 The worst-case PPV vibration levels shown in Table 6.12 and Table 6.13 indicate that vibration from percussive piling or vibratory rolling is likely to be perceptible at a number of sensitive receptors, including Hut Hill Cottage and West Lodge. The threshold vibration levels for complaints was exceeded for percussive piling only at Silvermere Lodge, The Tower, The Cottage and Calvi. The activities causing the highest vibration levels at these properties were retaining wall construction works for the slip roads at junction 10 or Painshill Retaining Wall B.

6.8.17 However, the predictions indicate that the threshold level for structural damage to buildings was not exceeded at any of the selected receptors. The significance of the predicted vibration levels is discussed in section 6.10.

Construction traffic

6.8.18 The local highway network may experience changes in traffic flows and speeds during construction as a result of temporary traffic management measures and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour.

6.8.19 The predicted changes in Basic Noise Levels at 10 m from the kerb due to construction traffic are shown in Figure 6.6 (application document TR010030/APP/6.4). The predicted noise levels include roads within the study area and the wider area, extending as far as Woking, Guildford, Addlestone and East Horsley.

6.8.20 The figure shows that with construction traffic, a noise increase of at least 5 dB $L_{A10,18h}$ was predicted at access roads from the M25 to Cobham Services. This is due to low traffic flows predicted on these links without the Scheme and is expected to result in a negligible impact at the nearest sensitive receptors as noise from the increased traffic flow on these links would not be perceptible against much higher levels of noise from traffic on the M25.

6.8.21 Elsewhere, a minor noise increase was predicted at a merge lane forming part of the M25 clockwise on-slip at junction 10. Again, the noise contribution predicted at 10 m from the merge lane was much smaller than the M25 clockwise carriageway adjacent to it (65.1 dB $L_{A10,18h}$ compared with 81.3 dB $L_{A10,18h}$) so the minor noise increase at the merge lane would not be perceptible at the nearest sensitive receptors.

6.8.22 Minor noise decreases were predicted on the A3 on all traffic links associated with the Scheme which are attributed to the proposed 50 mph speed limit during the construction works. Negligible noise changes of up to 1 dB were predicted on all other traffic links in proximity to the Scheme and in the wider area.

## Operation

### Noise

6.8.23 Detailed predictions have been carried out for a total of 2,149 residential receptors identified within the study area; together with a total of 76 non-residential noise sensitive receptors, including schools, churches, Royal Horticultural Society Gardens at Wisley, and sites of ecological, historic or cultural importance. Five receptor points have been used to represent the proposed development at the Former Wisley Airfield, where one receptor is reported for each development phase, and three receptor points have been used to represent Painshill Park in addition to receptor points at The Tower. The noise predictions take into account existing noise mitigation measures and new mitigation measures proposed by the Scheme.

6.8.24 The sections below detail the short-term and long-term impacts of the Scheme. For short-term impacts, a comparison is made between the Do Something and Do Minimum scenarios in 2022, the opening year of the Scheme. For long term impacts as a result of the Scheme, a comparison is made between the Do Minimum scenario in 2022 and the Do Something scenario in 2037. Long-term impacts without the Scheme have also been considered. The predicted daytime and night-time noise levels for a selection of noise sensitive properties are shown in Appendix 6.4 (application document TR010030/APP/6.5) and noise nuisance information is provided in Appendix 6.5 (application document TR010030/APP/6.5).

*Changes to road traffic noise levels without the Scheme*

6.8.25 The predicted changes in daytime road traffic noise levels in the long-term without the Scheme are shown in Table 6.14, which represent changes to the future baseline road traffic noise levels due to natural traffic growth and contributions from major developments expected to occur irrespective of the Scheme. The predicted daytime noise levels throughout the study area are shown in Figures 6.7 and 6.9 (application document TR010030/APP/6.4) and noise change contours are provided in Figure 6.13 (application document

TR010030/APP/6.4) to illustrate how road traffic noise levels change in the long-term without the Scheme.

**Table 6.14: Long-term traffic noise magnitude changes without the Scheme**

| Change in noise level, dB | | DMRB impact magnitude | Number of dwellings | Number of other sensitive receptors |
|---|---|---|---|---|
| Increase in noise level, $L_{A10,18h}$ | 0.1 - 2.9 | Negligible | 1,833 | 47 |
| | 3 - 4.9 | Minor | 21 | 2 |
| | 5 - 9.9 | Moderate | 4 | 0 |
| | >= 10 | Major | 0 | 0 |
| No change | 0 | No change | 45 | 5 |
| Decrease in noise level $L_{A10,18h}$ | 0.1 - 2.9 | Negligible | 246 | 21 |
| | 3 - 4.9 | Minor | 0 | 1 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |

6.8.26 At the majority of locations within the study area, long-term changes to road traffic noise of up to 3 dB were predicted without the Scheme, which the DMRB 11:3:7 classes as a negligible impact magnitude. These locations include Elm Corner, Wisley, Pyrford, Cobham, and properties on Seven Hills Road and Byfleet Road.

6.8.27 As shown in Figure 6.13 (application document TR010030/APP/6.4), the long-term daytime road traffic noise levels within the Thames Basin Heath SPA were mostly predicted negligible changes. Minor noise decreases were predicted at some locations adjacent to the A3 due to lower noise road surfacing laid during routine maintenance works.

6.8.28 No long-term noise increases greater than 1 dB $L_{A10,18h}$ were predicted at any of the NIAs in the study area.

6.8.29 Table 6.14 and Figure 6.13 (application document TR010030/APP/6.4) show that minor beneficial changes in daytime noise levels were also predicted in the future assessment year. The noise decreases were predicted at an ancient woodland adjacent to the A3 in proximity to the Ockham interchange and Phase 1B of the proposed development at the Former Wisley Airfield. The noise decreases were attributed to lower noise road surfacing laid on the A3 during routine maintenance works by the future assessment year.

6.8.30 Figures 6.13 (application document TR010030/APP/6.4) also indicates that the predicted long-term changes to daytime road traffic noise levels at Painshill Park, The Tower, and most of the ancient woodlands in the study area were also negligible noise decreases, noting that the ancient woodland close to Painshill Park was predicted minor decreases in noise levels in some areas as they are closer to the sections of the A3 with lower noise road surfacing.

6.8.31 Without the Scheme, 4 moderate noise increases and 23 minor noise increases were predicted at properties south of the Former Wisley Airfield at Ockham, Bridge End and Martyr's Green. These noise increases are attributed to traffic growth at Ockham Lane and other local roads due to the occupation of the proposed housing development at the Former Wisley Airfield, which would

increase 18 hour traffic flows from 640 vehicles to 1,720 vehicles by 2037. The predicted impacts in these areas are consistent with those published in the Environmental Statement for the proposed development at the Former Wisley Airfield, which shows that it would give rise to minor and moderate noise increases at Ockham Lane.

*Short-term changes to daytime road traffic noise levels with the Scheme*

6.8.32 Table 6.15 shows the predicted changes in daytime noise levels for residential and non-residential receptors in the study area. The predicted daytime noise levels throughout the study area are shown in Figures 6.7 to 6.8 (application document TR010030/APP/6.4), and noise change contours are provided in Figures 6.11 illustrate how road traffic noise levels change in the short-term, when the Scheme opens.

**Table 6.15: Short-term traffic noise magnitude changes with the Scheme**

| Change in noise level, dB | | DMRB impact magnitude | Number of dwellings | Number of other sensitive receptors |
|---|---|---|---|---|
| Increase in noise level, $L_{A10,18h}$ | 0.1 - 0.9 | Negligible | 130 | 7 |
| | 1 - 2.9 | Minor | 9 | 3 |
| | 3 - 4.9 | Moderate | 0 | 0 |
| | >= 5 | Major | 0 | 0 |
| No change | 0 | No change | 726 | 14 |
| Decrease in noise level $L_{A10,18h}$ | 0.1 - 0.9 | Negligible | 1,149 | 44 |
| | 1 - 2.9 | Minor | 135 | 7 |
| | 3 - 4.9 | Moderate | 0 | 1 |
| | >= 5 | Major | 0 | 0 |

6.8.33 Table 6.15 shows that in the opening year of the Scheme, 9 dwellings were predicted minor increases in daytime road traffic noise levels compared with noise levels without the Scheme. The affected receptors were located at Hatch Lane (Yew Tree Cottage and 2 Yew Tree Cottages) and Ockham Lane (The Cottage, Appstree Cottage, 2 Appstree Cottages, Red Rose Cottage, Beech Cottage, Bridge End, and Ivy Cottage). Minor noise decreases were predicted at several locations within the study area including Elm Corner, Wisley Common, and Pyrford. Other than a moderate noise decrease at an ancient woodland near the Former Wisley Airfield, no moderate or major changes in daytime noise level were predicted.

6.8.34 The predicted noise levels at NIAs generally changed by less than 1 dB $L_{A10,18h}$ in the opening year of the Scheme, however, there were minor noise decreases at some properties located within NIAs. Decreases of 1 dB or more were predicted at properties within the following NIAs:

- NIA 5865*, improving noise levels at one property close to the Painshill roundabout due to the provision of lower noise road surfacing on the A3;
- NIA 5861, reducing noise levels at San Domenico due to the provision of lower noise road surfacing on the A3; and

- NIA 5859, where noise levels were reduced at Pointers Road due to the extended noise barrier adjacent to the M25 slip road.

6.8.35 Within the Thames Basin Heath SPA, the daytime road traffic noise levels were mostly predicted to decrease by up to 3 dB close to the A3 and to change by less than 1 dB further away from the Scheme, as shown in Figure 6.11 (application document TR010030/APP/6.4). These changes are due to the provision of lower noise road surfacing and are classed as negligible to minor beneficial depending on the location within the SPA. Minor or moderate changes (adverse and beneficial) were predicted adjacent to the M25 due to the proposed NMU access routes altering the ground profile in these areas.

6.8.36 Figure 6.11 (application document TR010030/APP/6.4) also indicates that the predicted short-term change to daytime road traffic noise levels at Painshill Park, The Tower, Semaphore Tower, Royal Horticultural Society Gardens and most of the ancient woodlands in the study area were also negligible to minor beneficial. Noise decreases in these locations are attributable to the provision of lower noise road surfacing that would also benefit the ancient woodland close to Painshill Park.

*Long-term changes to daytime road traffic noise levels with the Scheme*

6.8.37 The predicted changes in daytime road traffic noise levels in the long-term with the Scheme are shown in Table 6.16 below. The predicted daytime noise levels throughout the study area are shown in Figures 6.7 to 6.10 (application document TR010030/APP/6.4) and noise change contours are provided in Figures 6.12 (application document TR010030/APP/6.4) to illustrate how road traffic noise levels change in the long-term.

**Table 6.16: Long-term traffic noise magnitude changes with the Scheme**

| Change in noise level, dB | | DMRB impact magnitude | Number of dwellings | Number of other sensitive receptors |
|---|---|---|---|---|
| Increase in noise level, $L_{A10,18h}$ | 0.1 - 2.9 | Negligible | 1,789 | 49 |
| | 3 - 4.9 | Minor | 9 | 1 |
| | 5 - 9.9 | Moderate | 11 | 1 |
| | >= 10 | Major | 0 | 0 |
| No change | 0 | No change | 75 | 6 |
| Decrease in noise level $L_{A10,18h}$ | 0.1 - 2.9 | Negligible | 265 | 18 |
| | 3 - 4.9 | Minor | 0 | 1 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |

6.8.38 Negligible long-term changes were predicted at the majority of locations within the study area, including Elm Corner, Wisley, Pyrford, Cobham, and properties on Seven Hills Road and Byfleet Road.

6.8.39 Within the Thames Basin Heath SPA, the daytime road traffic noise levels were mostly predicted to be change by less than 3 dB in the long-term, which is classed as a negligible change in the DMRB 11:3:7, as shown in Figures 6.12 (application document TR010030/APP/6.4). Minor adverse changes in noise

were predicted close to the M25 and the new slip roads at junction 10. Negligible and minor beneficial changes were predicted adjacent to the A3 due the proposed noise barriers at junction 10 and lower noise road surfacing that would be installed during routine maintenance by 2037.

6.8.40 No long-term noise increases greater than 1 dB $L_{A10,18h}$ were predicted at any of the NIAs in the study area. Negligible noise decreases were predicted at Pointers Road (NIA 5859), Mossfield (NIA 5863), some properties close to the Painshill interchange (NIA 5865*), and San Domenico (NIA 5861) due to the noise mitigation measures incorporated into the design of the Scheme.

6.8.41 Figure 6.12 (application document TR010030/APP/6.4) also indicates that the predicted long-term changes to daytime road traffic noise levels at Painshill Park, The Tower, Semaphore Tower, and most of the ancient woodlands in the study area were also negligible noise decreases, noting that the ancient woodland close to Painshill Park was predicted minor decreases in noise levels in some areas as they are closer to the sections of the A3 with lower noise road surfacing.

6.8.42 With the Scheme, 12 properties were predicted to experience moderate noise increases and 10 properties were predicted minor noise increases. All of the minor or moderate noise increases were predicted at locations south of the Former Wisley Airfield at Ockham, Bridge End and Martyr's Green.

6.8.43 The results presented in Table 6.16 show the effects of the Scheme in combination with the development at Former Wisley Airfield. In order to identify which impacts are due to the Scheme and which are cumulative with the Former Wisley Airfiled development, Table 6.17 shows the change in noise impacts in the long term, i.e. the difference between Table 6.14 and Table 6.16.

**Table 6.17: Change in long-term traffic noise with the Scheme**

| Change in noise level, dB | | DMRB impact magnitude | Change to number of dwellings | Change to number of other sensitive receptors |
|---|---|---|---|---|
| Increase in noise level, $L_{A10,18h}$ | 0.1 - 2.9 | Negligible | -44 | +2 |
| | 3 - 4.9 | Minor | -12 | -1 |
| | 5 - 9.9 | Moderate | +7 | +1 |
| | >= 10 | Major | 0 | 0 |
| No change | 0 | No change | +30 | +1 |
| Decrease in noise level $L_{A10,18h}$ | 0.1 - 2.9 | Negligible | +19 | -3 |
| | 3 - 4.9 | Minor | 0 | 0 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |

6.8.44 Compared with the future baseline there would be no change to the number of properties with perceptible decreases in noise. There would be eight additional properties with moderate increases in noise and 13 fewer properties with minor increases in noise. The additional properties where moderate noise increases were predicted were located at Ockham Lane.

6.8.45 Although the Scheme would slightly increase traffic flows on Ockham Lane (an additional 441 vehicles compared to without the Scheme in the future year), the noise increases are mostly attributed to additional traffic generated by the proposed housing development at the Former Wisley Airfield rather than the Scheme itself. This is because the noise increases were identified in the same geographical areas in the future year without the Scheme in Table 6.14 and Figure 6.13 (application document TR010030/APP/6.4). The impacts of the Scheme at locations in proximity to the proposed development at the Former Wisley Airfield are examined further in the following subsection.

*Analysis of daytime road traffic noise levels in proximity to the proposed development at the Former Wisley Airfield*

6.8.46 As discussed above, minor and moderate noise increases were predicted at locations south of the Former Wisley Airfield at Ockham, Bridge End and Martyr's Green, both with and without the Scheme, that were attributed to additional traffic relating to the proposed housing development at the Former Wisley Airfield.

6.8.47 Further analysis has been undertaken to understand what noise changes caused sensitive receptors to changes impact magnitude bands in the future year with the Scheme and the actual noise changes attributable to the Scheme relative to the future baseline conditions at this particular location. Full details of the analysis are presented in Appendix 6.6 (application document TR010030/APP/6.5) and the key findings are discussed below.

6.8.48 Appendix 6.6 (application document TR010030/APP/6.5) shows that the road traffic noise from the Scheme was predicted to generate minor noise increases at Bridge End and Martyr's Green from Ockham Lane. The road traffic noise levels at sensitive receptors in these areas were 1-1.5 dB $L_{A10,18h}$ higher than without the Scheme. It is therefore reasonable to conclude that the moderate noise increases shown in Table 6.16 were not due to the Scheme and instead indicate a potential cumulative effect. The Scheme would not alter any of the impacts identified in the Environmental Statement for the proposed development at the Former Wisley Airfield.

6.8.49 Appendix 6.6 (application document TR010030/APP/6.5) also shows that minor noise decreases were also predicted at some properties located at Martyr's Green. The beneficial changes in road traffic noise levels at these properties is not transparent in Table 6.16 due to traffic growth from the proposed development at the Former Wisley Airfield increasing overall road traffic noise levels from Ockham Lane.

*Changes to night-time road traffic noise levels*

6.8.50 The change in road traffic noise levels at night throughout the study area has also been considered in the appraisal of the Scheme. The predicted noise levels at night for each traffic scenario are shown in Figures 6.14 to 6.17 (application document TR010030/APP/6.4), with change contour plots provided in Figures 6.18 and 6.19 (application document TR010030/APP/6.4).

6.8.51 Table 6.18 and Table 6.19 show the change in night-time noise levels in the long-term for properties predicted noise levels above 55 dB $L_{night}$, as required by the DMRB 11:3:7.

**Table 6.18: Long-term traffic night-noise magnitude changes without the Scheme**

| Change in noise level, dB | | DMRB impact magnitude | Number of dwellings | Number of other sensitive receptors |
|---|---|---|---|---|
| Increase in noise level, $L_{night}$ | 0.1 - 2.9 | Negligible | 73 | 8 |
| | 3 - 4.9 | Minor | 0 | 0 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |
| No change | 0 | No change | 0 | 0 |
| Decrease in noise level $L_{night}$ | 0.1 - 2.9 | Negligible | 6 | 2 |
| | 3 - 4.9 | Minor | 0 | 1 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |

**Table 6.19: Long-term traffic night-noise magnitude changes with the Scheme**

| Change in noise level, dB | | DMRB impact magnitude | Number of dwellings | Number of other sensitive receptors |
|---|---|---|---|---|
| Increase in noise level, $L_{night}$ | 0.1 - 2.9 | Negligible | 73 | 9 |
| | 3 - 4.9 | Minor | 0 | 0 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |
| No change | 0 | No change | 0 | 0 |
| Decrease in noise level $L_{night}$ | 0.1 - 2.9 | Negligible | 6 | 2 |
| | 3 - 4.9 | Minor | 0 | 0 |
| | 5 - 9.9 | Moderate | 0 | 0 |
| | >= 10 | Major | 0 | 0 |

6.8.52 Table 6.18 and Table 6.19 show that no noise sensitive receptors where noise levels of 55 dB $L_{night}$ were predicted are also predicted to have a noise increase exceeding 3 dB.

6.8.53 Minor beneficial changes in night-time noise levels were also predicted in the vicinity of the Former Wisley Airfield. The ancient woodland in this area was predicted minor noise decreases both with and without the Scheme, and Phase 1B of the proposed development at the Former Wisley Airfield was predicted a minor noise decrease without the Scheme.

*Changes to road traffic noise levels in the wider area*

6.8.54 To determine the potential effects within the wider area, the Basic Noise Levels were calculated using the methodology in the CRTN for road links outside of the calculation area. The wider area extends to Guildford, M25 junction 9, M25 junction 11, and Hersham.

6.8.55 In the short-term and the long-term, the Basic Noise Level calculations indicated that for the majority of roads the change in road traffic noise levels was negligible according to the impact magnitude criteria in the DMRB 11:3:7. However, at Hungry Hill Lane (south east of the Ockham interchange) a major adverse change was predicted by the future assessment year both with and without the Scheme, affecting five properties. The severity of the change in road traffic noise levels is attributed to low flows on this road in the opening year and increased traffic flows accessing the A3 from Burnt Common in the future assessment year. Comparison of the future year traffic flows with and without the Scheme, to establish whether the Scheme contributes to the noise increase, shows that the Basic Noise Level does not change at all (58.8 dB $L_{A10,18h}$ with and without the Scheme). Given the increased traffic flows associated with the proposed development at the Former Wisley Airfield and that the Scheme does not contribute to noise levels at Hungry Hill Lane, this is not considered an effect of the Scheme.

*Impacts of the proposed changes to the A245*

6.8.56 New traffic data was issued in December 2019 in order to account for design revisions to the A245. These design changes consisted of adding a banned right turn at Seven Hill Road and not widening all of the A245 eastbound to three lanes between Seven Hills Road and the Painshill interchange.

~~6.8.55~~6.8.57 Sensitivity testing has been undertaken to determine how the updated traffic data, referred to as Design Fix 3.21, would affect the results reported above. The Basic Noise Levels were calculated for each traffic dataset and compared against each other. The Basic Noise Levels were lower in the Design Fix 3.21 dataset than the modelled Design Fix 2 dataset by up to 1 dB $L_{A10,18h}$. The impact magnitude in the opening year and the future year was the same for both traffic datasets. On this basis, the design changes to the A245 would not result in different impact magnitudes to those reported in the subsections above.

Vibration

~~6.8.56~~6.8.58 The long-term change in airborne vibration nuisance for road traffic as a result of the Scheme is shown in Table 6.20 for properties within 40 m of the roads included in the study area, as required by the DMRB 11:3:7. The sensitive receptors reported in Table 6.20 are those where road traffic noise levels above 58 dB $L_{A10,18h}$ were predicted during the operation phase of the Scheme.

**Table 6.20: Traffic airborne vibration nuisance**

| Change in nuisance level | | Number of dwellings | |
|---|---|---|---|
| | | Do Minimum | Do Something |
| Increase in nuisance level | < 10% | 264 | 244 |
| | 10 < 20% | 0 | 0 |
| | 20 < 30% | 0 | 0 |
| | 30 < 40% | 0 | 0 |
| | > 40% | 0 | 0 |
| No change | 0% | 116 | 136 |

| Change in nuisance level | | Number of dwellings | |
|---|---|---|---|
| | | Do Minimum | Do Something |
| Decrease in nuisance level | < 10% | 19 | 19 |
| | 10 < 20% | 0 | 0 |
| | 20 < 30% | 0 | 0 |
| | 30 < 40% | 0 | 0 |
| | > 40% | 0 | 0 |

~~6.8.57~~6.8.59 Table 6.20shows that the predicted long-term traffic-induced airborne vibration nuisance levels were similar with and without the Scheme. However, fewer properties were predicted a change in airborne vibration nuisance with the Scheme than without the Scheme. On this basis, it is considered that the Scheme would not adversely affect airborne vibration levels at properties in the study area.

~~6.8.58~~6.8.60 However, two properties were predicted a 10-20% increase in nuisance level with the Scheme. These properties are located at Bridge End (Beech Cottage and Bridge End) and the increase in nuisance can be attributed to the increased traffic associated with the proposed development at the Former Wisley Airfield and is therefore not directly attributable to the Scheme.

~~6.8.59~~6.8.61 Ground-borne vibration from road traffic will be limited to within 5 m of HGV traffic on rough road surfaces (more than 20 mm surface roughness). As any new roads introduced by the Scheme will have a smooth road surface, this will generate PPV levels below the threshold of perception at the nearest properties. Therefore, the Scheme will not significantly alter existing levels of ground-borne vibration and no impacts are expected.

~~6.8.60~~6.8.62 In summary there are no adverse impacts from airborne or ground-borne vibration predicted due to road traffic from the Scheme.

## 6.9 Design, mitigation and enhancement measures

### Construction

6.9.1 To mitigate any potential noise and vibration impacts during the construction phase, the construction contractor should consult with the Environmental Health Departments at the relevant Local Planning Authorities to obtain guidance on their requirements for managing and controlling noise and vibration from construction works.

6.9.2 A Construction Environmental Management Plan (CEMP) shall be created and implemented by the contractor and be approved by the Local Authorities prior to the commencement of construction works. The CEMP shall outline the following:

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

6.9.3 A Traffic Management Plan shall also be provided in the CEMP to manage the routing of construction traffic and road diversions during the construction phase of the Scheme.

6.9.4 The contractor also will have the option to apply for a Section 61 a under the Control of Pollution Act 1974 for some construction works, particularly if night-time working is proposed. This should be discussed when engaging with the Local Authorities prior to works commencing.

6.9.5 The contractor shall also be encouraged to join (if not already a member) the Considerate Contractors Scheme that is recognised by industry and the Government for encouraging firms to be sensitive to the environment.

6.9.6 Good stakeholder relations are often the most effective way to manage potential noise impacts on site. Therefore, the contractor shall keep local residents and other affected parties informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. All noise complaints shall be effectively recorded, investigated and addressed.

6.9.7 In addition, the contractor shall use the following good working practices (Best Practicable Means) that will minimise impacts to local residents and ecological receptors:

- All vehicles and plant fitted with effective exhaust silencers which should be maintained in good and efficient working order;
- All compressors and generators 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use;
- All ancillary pneumatic percussive tools should be fitted with mufflers or suppressors as recommended by the manufacturers which should be kept in a good state of repair;
- Machines in intermittent use shut down when not in use or where this is impracticable, throttled down to a minimum;
- The site compound and static machines be sited as far as is practicable from noise sensitive buildings;
- Where practicable, plant with directional noise characteristics orientated to minimise noise at nearby properties;
- Manage weekend daytime construction activities to minimise noise at nearby properties as this is a more sensitive time period (Saturday afternoons 13:00 to 19:00);
- Plant certified to meet the current EU legislation and should be not be louder than the noise levels provided in Annex C and D of BS 5228-1;
- Where appropriate, temporary noise barriers or other noise containment measures installed to minimise construction noise levels;
- The loading or unloading of vehicles and the movement of equipment or materials undertaken in a manner that minimises noise generation;
- Cleaning of concrete mixers to not be undertaken by hammering the drums; and

- When handling materials, care shown not to drop materials from excessive heights.

6.9.8 In addition to the above good working practices, where piling is required, the piling method should be selected carefully to minimise noise and vibration impacts at receptors. Where practicable, piling methods that result in low levels of vibration, such as rotary bored piling, shall be used. Methods that cause much higher levels of vibration, such as percussive piling, shall be avoided wherever possible. Alternative methods such as vibratory piling, pre-boring prior to piling, or using the Giken method could be used instead of percussive piling.

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

## Operation

6.9.10 The Scheme includes noise mitigation measures to minimise the potential for adverse and significant adverse impact occurring. These mitigation measures consist of new noise barriers along the M25 and at junction 10 and low noise road surfacing. Further details about these mitigation measures are provided in Table 6.21. The positions of the mitigation measures are shown in the Scheme Layout Plans (application document TR010030/APP/2.10).

**Table 6.21: Noise mitigation measures included in the design**

| Noise mitigation measure | Location | Approximate length | Details |
|---|---|---|---|
| Noise barriers | Each quadrant of junction 10 and along the M25, replacing existing noise barriers. | North east quadrant: 960m<br>South east quadrant: 1,060m<br>South west quadrant: 1,860m<br>North west quadrant: 2,150m | Height of noise barriers assumed to be 2.5 m or as existing. |
| New low noise road surfacing | In the opening year, the following areas would have low noise road surfacing included as part of the Scheme: Ockham interchange and slip roads, both carriageways of A3 (except at junction 10), the A245 and slip roads at the Painshill interchange.<br>In the design year, these areas would be resurfaced again along with the entire A3 as part of the road maintenance cycle. | N/A | Correction of -3.5 dB for newly laid low noise road surfacing, as stated in the DMRB 11:3:7. |

6.9.11 The benefits of the mitigation measures shown in the table above are inherent in the predicted noise levels discussed in section 6.8 and section 6.10, and the noise contour plots shown in Figure 6.7 to Figure 6.19 (application document TR010030/APP/6.4). In particular, the noise barriers were predicted to cause

localised noise decreases in proximity to these structures. The use of lower noise road surfacing on all lanes of the A3 had more influence on reducing noise levels, benefitting a larger number of noise-sensitive receptors over a wider area. The effect of the lower noise road surfacing on the A3 is clear from the noise contour plots shown in Figures 6.11 to 6.13 (application document TR010030/APP/6.4).

6.9.12 The road traffic noise increases shown at Ockham, Alms Heath, Bridge End, Martyr's Green and Hatchford End would occur with or without the Scheme, and no mitigation measures are proposed for these areas.

6.9.13 Any road resurfacing that takes place prior to the Scheme opening or during routine maintenance will ensure that road roughness is minimised and will reduce the likelihood of vibration effects arising at sensitive receptors.

## 6.10 Assessment of effects

### Significant effects

#### Construction Noise

6.10.1 Based on the construction noise levels predicted in section 6.8, an assessment of the potential construction noise significance has been undertaken.

6.10.2 The predicted construction noise levels shown in Table 6.10 (in section 6.8) indicate that a potential significant effect could occur at sensitive receptors during the daytime within 75-100 m of the loudest construction activities, provided that the noise levels exceed the SOAEL for a significant time period. Table 6.11 identified several sensitive receptors where the SOAEL would be exceeded from daytime and night-time working based on the predicted activity noise levels, the construction programme and phasing of activities. Taking into account the duration of the loudest combinations of activities and whether these would occur for a significant time period, Table 6.22 identifies the sensitive receptors where significant adverse effects and adverse effects are likely.

**Table 6.22: Significance of construction noise levels**

| Daytime construction noise | | Night-time construction noise | |
|---|---|---|---|
| **Significant adverse effects** | **Adverse effects** | **Significant adverse effects** | **Adverse effects** |
| • Hut Hill Cottage, Wisley<br>• The Cottage, Chatley Heath<br>• The Tower, Painshill Park<br>• Silvermere Lodge, Cobham<br>• Court Close Farm, Cobham<br>• Feltonfleet School, Cobham<br>• Calvi, Cobham | • Royal Horticultural Society Gardens, Wisley<br>• 1 Fellside Cottage, Elm Corner<br>• Reynards, Elm Corner<br>• Birchmere Scout Campsite, Wisley Common<br>• Semaphore Tower, Chatley Heath<br>• Painshill Farm, Cobham | • None | • Hut Hill Cottage, Wisley<br>• The Cottage, Chatley Heath<br>• The Tower, Painshill Park<br>• Silvermere Lodge, Cobham<br>• Court Close Farm, Cobham<br>• Calvi, Cobham |

| Daytime construction noise | | Night-time construction noise | |
|---|---|---|---|
| **Significant adverse effects** | **Adverse effects** | **Significant adverse effects** | **Adverse effects** |
| • West Lodge, Cobham | • Caigers Cottage, Cobham | | |

6.10.3 Table 6.22 shows that significant adverse effects would occur from daytime construction works at several sensitive receptors, particularly those that are close to the Painshill interchange and the A3 between junction 10 and the Painshill interchange. The significant effects are attributed to earthworks that are indicated in the construction programme to take place for at least three consecutive months. Although the highest construction noise levels would not occur everyday during the earthworks, there is a higher risk that the SOAEL would be exceeded for a significant time period, and for this reason it is deemed that a significant effect would occur at the identified receptors. Adverse effects would occur properties where the LOAEL is exceeded, affecting sensitive receptors such as the Royal Horticultural Society at Wisley, residents at Elm Corner, Birchmere Scout Campsite and Painshill Farm.

6.10.4 It should be noted that the adverse effect or significant adverse effects would not necessarily occur throughout the entire construction phase. The worst case construction noise levels will occur at their closest point to the sensitive receptors but not for the entire duration of the construction activity. The majority of the construction works for the Scheme are linear, with a construction team progressing the activity throughout the worksite over the designated time period in the construction programme. This means that the construction noise levels for each activity will decrease as the works progress further away from sensitive receptors, and the worst case construction noise levels would not occur throughout the construction phase.

6.10.5 As the Thames Basin Heath SPA covers a large area, the impacts of construction noise will vary throughout the designated site. Users of the Thames Basin Heath SPA could be exposed to construction noise from earthworks, retaining wall construction, pavement construction and road surfacing works on the A3, and bridge installation and demolition works at junction 10. Based on the predicted construction noise levels shown in Table 6.10 in section 6.8 and the construction programme, people visiting parts of the Thames Basin Heath SPA within approximately 100 m of the construction works taking place on the A3 or M25 would be exposed to noise level above the SOAEL, and construction noise levels would exceed the LOAEL within 150 m of the works. People visiting parts of the Thames Basin Heath SPA that are more than than 150 m from the works would be exposed to construction noise levels below the LOAEL. For people visiting the Thames Basin Heath SPA, exposure to construction noise would be temporary and not result in an overall significant or adverse effect.

6.10.6 The territories of the qualifying species inhabiting the Thames Basin Heath SPA are all located at distances from the Scheme that are great enough to avoid exposure to the highest construction noise levels shown in Table 6.10 for long-term activities, such as earthworks. Although the ambient noise levels will increase at the qualifying species territories during the construction works and construction noise will be audible, it will be more easily masked by other closer noise sources. The greatest source of disturbance is most likely to be from

transient irregular noises from construction activities (such as dropping objects at heights) and short-term demolition works that cause the highest sound levels, but given the proximity of the construction works to the territories of interest and the duration of the short-term activities, this is unlikely to give rise to any significant effects. Further information on impacts to the qualifying species is available in Chapter 7: Biodiversity and Section 7 of the Habitat Regulations Assessment (application document TR010030/APP/5.3).

6.10.7 No significant adverse effects from night-time construction works were identified due to high existing ambient noise levels at night. However, adverse effects would occur at sensitive receptors where demolition works at junction 10 or road resurfacing works at the Painshill interchange were predicted to exceed the LOAEL, including Hut Hill Cottage, Silvermere Lodge and Calvi.

6.10.8 The proposed change to construction working hours to include Saturday afternoon (13:00 to 19:00) has the potential to result in impacts at noise sensitive receptors depending on the existing ambient noise levels and the locations where extended weekend working would take place. As Saturday afternoons are a more sensitive time period, the threshold levels for the LOAEL and the SOAEL may be lower depending on the existing ambient noise levels (as shown in Table 6.2~~Table 6.2~~). Lower threshold levels increase the likelihood of an adverse or significant adverse effect from construction noise.

~~6.10.7~~6.10.9 Based on the information provided in Table 6.11~~Table 6.11~~ and the corresponding LOAEL and SOAEL values applicable to Saturday afternoons following the methodology set out in Table 6.2, no new adverse or significant adverse effects were identified in additional to those stated in Table 6.22.

Construction Vibration

~~6.10.8~~6.10.10 The predicted PPV vibration levels shown in section 6.8 indicate that vibration from percussive piling could give rise to an adverse effect within 250 m of the piling works and a significant adverse effect within 100 m of the works. For a single vibratory roller, an adverse effect is likely to occur within 75 m of the works and a significant adverse effect within 25-50 m of the works.

~~6.10.9~~6.10.11 Based on the predictions shown in section 6.8, Table 6.23 lists the sensitive receptors where adverse and significant adverse effects from construction vibration are likely. Although some significant adverse effects were predicted, the impact is temporary and none of the vibration levels predicted were at levels likely to cause structural damage.

**Table 6.23: Significance of construction vibration levels**

| Significant adverse effects | Adverse effects |
|---|---|
| • The Cottage, Chatley Heath<br>• The Tower, Painshill Park<br>• Silvermere Lodge, Cobham<br>• Foxwarren Cottage, Cobham<br>• Calvi, Cobham<br>• Squirrel Wood, Cobham<br>• The Spinney, Cobham | • Hut Hill Cottage, Wisley<br>• Birchmere Scout Campsite, Wisley Common<br>• Semaphore Tower, Chatley Heath<br>• Court Close Farm, Cobham<br>• Heyswood Girl Guide Campsite, Cobham<br>• Feltonfleet School, Cobham<br>• Feltonfleet Lodge, Cobham<br>• The Cottage, Cobham |

| Significant adverse effects | Adverse effects |
|---|---|
| | • West Lodge, Cobham<br>• East Lodge, Cobham<br>• Painshill Farm, Cobham<br>• Caigers Cottage, Cobham<br>• Oakwood House, Cobham<br>• Petit Tor, Cobham<br>• Little Warren, Cobham<br>• Manor Pond House, Cobham<br>• Two Beeches, Cobham<br>• Tudor House, Cobham<br>• Lingwood, Cobham<br>• Old Lodge, Cobham<br>• Cobham Veterinary Centre, Cobham<br>• Old Trees, Cobham<br>• St George's Care Home, Cobham<br>• Inglewood, Cobham<br>• Wood Court Lodge, Cobham |

Construction traffic

~~6.10.10~~6.10.12 As discussed in section 6.8, the Basic Noise Level predictions at 10 m from the kerb indicated noise increases of more than 1 dB were predicted at two locations: access roads to Cobham Services and a merge lane forming part of the M25 clockwise on-slip. Despite the noise increases, the road traffic noise levels at these locations are much lower than the road traffic noise levels from the M25, which is immediately adjacent to both locations. Therefore these noise increases would not be perceptible at the nearest sensitive receptors and the effect of the noise increases would not be significant.

~~6.10.11~~6.10.13 Overall, the effect of construction traffic within the study area and in the wider area is considered not significant.

Operation Noise

~~6.10.12~~6.10.14 As described in section 6.8, a significant adverse effect occurs if the LOAEL is exceeded and a moderate or major adverse change to the road traffic noise levels is predicted, or if the predicted noise levels exceed the SOAEL and increase by at least 1 dB. Table 6.24 identifies the general locations where significant effects were predicted, taking into account the following factors:

- The short-term and long-term changes in road traffic noise levels and impact magnitudes discussed in section 6.8 and shown in Figures 6.11 to 6.13 and Figures 6.18 to 6.20 (application document TR010030/APP/6.4);
- The predicted daytime and night-time noise levels shown in Figures 6.7 to 6.10 and Figures 6.14 to 6.17 (application document TR010030/APP/6.4) and how they compare with the LOAEL and SOAEL threshold levels stated in section 6.5;
- The sensitivity and circumstances of the sensitive receptor (for example, if it is located within a NIA);

- The proportion of large sites that were affected by noise changes (for example, designated sites, parks and open spaces);
- How the Scheme may affect the existing acoustic character of the study area;
- The likely perception of local residents, which may be influenced by visibility of the Scheme from their properties and landscaping changes; and
- Whether the significant effect is adverse or beneficial.

### Table 6.24: Significance of road traffic noise in the operation phase

| Receptor(s) | DMRB impact magnitude | | Conclusion of significance of environmental effect | Justification of significance conclusion |
|---|---|---|---|---|
| | Opening year (2022) | Future year (2037) | | |
| Ockham and Alms Heath | Negligible | Negligible | Not significant | In the future year, the predicted noise levels exceeded the SOAEL and increased by less than 1 dB due to the Scheme. |
| Bridge End, Martyr's Green and Hatchford End | Negligible | Negligible to minor increase | Not significant | In the future year, the predicted noise levels increased by up to 1.5 dB due to the Scheme and were below the SOAEL. |
| Elm Corner | Minor decrease | Negligible | Not significant | The SOAEL was not exceeded at this location and no moderate or major changes to the road traffic noise level were predicted. Tree loss from road widening will be mitigated by replacement planting to restore visual screening of the road (see Chapter 9 Landscape for more information) |
| Royal Horticultural Society Gardens, Wisley | Minor decrease | Negligible | Not significant | The SOAEL was not exceeded at this location and no moderate or major changes to the road traffic noise level were predicted. In the future year, more negligible noise decreases were predicted with the Scheme than without the Scheme. |
| Wisley and Pyrford | Negligible | Negligible | Not significant | The criteria for a significant effect outlined in section 6.5 were not met. |
| Wisley Common | Minor decrease | Negligible | Not significant | The SOAEL was not exceeded at this location and no moderate or major changes to the road traffic noise level were predicted. |
| Thames Basin Heath SPA | Minor decrease | Negligible | Not significant | Although noise decreases of up to 3 dB were predicted close to the A3, changes of this magnitude are not considered significant. |
| Downside | Negligible | Negligible | Not significant | The criteria for a significant effect outlined in section 6.5 were not met. |
| Painshill Park | Negligible / minor decrease | Negligible | Not significant | The predicted road traffic noise levels with the Scheme decrease throughout Painshill Park in the opening year and the future year, with the greatest noise reductions at the The Tower. However, despite the noise decreases the criteria for a significant (beneficial) effect were not met. |
| Redhill Road | Negligible / minor decrease | Negligible | Not significant | The criteria for a significant effect outlined in section 6.5 were not met. |

| Receptor(s) | DMRB impact magnitude | | Conclusion of significance of environmental effect | Justification of significance conclusion |
|---|---|---|---|---|
| | Opening year (2022) | Future year (2037) | | |
| Portsmouth Road | Negligible / minor decrease | Negligible | Not significant | Noise decreases of up to 3 dB were predicted in the opening year and future year, with the greatest reductions close to the A3. Changes of this magnitude are not considered significant. |
| NIA 5861 (San Domenico) | Minor decrease | Negligible | Significant beneficial | Predicted noise levels without the Scheme were above the SOAEL and decreased by more than 1 dB with the Scheme. |
| Painshill Intersection, including NIA 5865* | Negligible | Negligible | Not significant | The predicted noise levels at this location changed by less than 1 dB. |
| Cobham including NIA 5864 (A245) | Negligible | Negligible | Not significant | The criteria for a significant effect outlined in section 6.5 were not met. |
| Seven Hills Road | Negligible | Negligible | Not significant | Potential significant effects were identified at properties on Seven Hills Road that are attributed to a 27% increase in traffic flow in DS 2037 compared with DM 2022 in the DF2 traffic data. The latest traffic data (DF3) indicates that the traffic flow on Seven Hills Road would increase by 18% in the future year with the Scheme (DS 2037) and therefore the resultant noise levels would not give rise to a significant effect. |
| Convent Lane | Negligible | Negligible | Not significant | The criteria for a significant effect outlined in section 6.5 were not met. |
| Ancient woodlands | Negligible<br>Moderate decrease | Negligible<br>Minor decrease | Significant beneficial | Predicted noise levels without the Scheme were above the SOAEL and decreased by more than 1 dB at two ancient woodlands with the Scheme. The ancient woodlands are those located near the Former Wisley Airfield and at Pointers Road. |
| Former Wisley Airfield | Minor decrease | Negligible | Not significant | The criteria for a significant effect outlined in section 6.5 were not met. |
| NIA 5859 (Pointers Lane) | Minor decrease | Negligible | Significant beneficial | The road traffic noise levels without the Scheme were above the SOAEL and decreased by more than 1 dB with the Scheme. |
| Other NIAs | Negligible | Negligible | Not significant | The predicted road traffic noise levels with the Scheme changed by less than 1 dB. |

6.10.15 Table 6.24 shows that significant beneficial effects would occur at two NIAs and two ancient woodlands due to the use noise mitigation measures incorporated into the design of the Scheme, namely low noise road surfacing on all lanes of the A3 and repositioned noise barriers on the M25 to accommodate the slip road from junction 10 to the anticlockwise M25. No significant effects were predicted at the other NIAs or ancient woodlands, Royal Horticultural Society Gardens, Elm Corner, Wisley, Pyrford, the Thames Basin Heath SPA, Downside, Semaphore Tower, The Tower, and Painshill Park. No significant adverse effects were identified that were attributable to the Scheme.

~~6.10.13~~6.10.16 No adverse or significant adverse effects were identified in relation to the design changes for the A245.

### Vibration

~~6.10.14~~6.10.17 The airborne vibration nuisance assessment provided in section 6.8 indicated that the Scheme would not adversely affect airborne vibration nuisance levels, and no significant adverse effects are expected.

~~6.10.15~~6.10.18 No significant adverse effects are likely from ground-borne vibration as all new roads will have a smooth road surface and be located at least 5 m from properties.

## Residual effects

### Construction noise

~~6.10.16~~6.10.19 Table 6.25 shows the predicted construction activity noise levels at distances up to 300 m from the proposed works, taking into account the construction noise mitigation measures discussed in section 6.9. The predicted construction noise levels are colour coded to indicate which activities in isolation exceed the SOAEL thresholds for daytime and night-time works.

**Table 6.25: Construction noise residual effects**

| Construction Activity | Predicted construction noise levels at different distances ($L_{Aeq}$, dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10m | 25m | 50m | 75m | 100 m | 150m | 200m | 250m | 300 m |
| Site clearance | 84.7 | 76.8 | 69.2 | 64.8 | 61.7 | 57.3 | 54.2 | 51.8 | 49.8 |
| Boundary fencing | 66.1 | 58.2 | 50.6 | 46.2 | 43.1 | 38.7 | 35.6 | 33.2 | 31.2 |
| Earthworks/ excavation | 82.2 | 74.3 | 66.7 | 62.3 | 59.2 | 54.8 | 51.7 | 49.3 | 47.3 |
| Drainage | 74.6 | 66.7 | 59.1 | 54.7 | 51.6 | 47.2 | 44.1 | 41.7 | 39.7 |
| Finishing and landscaping | 83.6 | 75.7 | 68.1 | 63.7 | 60.6 | 56.2 | 53.1 | 50.7 | 48.7 |
| Temporary works | 82.2 | 74.3 | 66.7 | 62.3 | 59.2 | 54.8 | 51.7 | 49.3 | 47.3 |
| Traffic management | 69.2 | 61.3 | 53.7 | 49.3 | 46.2 | 41.8 | 38.7 | 36.3 | 34.3 |
| New gas main | 74.8 | 66.9 | 59.3 | 54.9 | 51.8 | 47.4 | 44.3 | 41.9 | 39.9 |

| Construction Activity | Predicted construction noise levels at different distances ($L_{Aeq}$, dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10m | 25m | 50m | 75m | 100 m | 150m | 200m | 250m | 300 m |
| Gas main crossing over the A3 | 79.9 | 72.0 | 64.4 | 60.0 | 56.9 | 52.5 | 49.4 | 47.0 | 45.0 |
| Other utility diversions (worst case) | 68.9 | 61.0 | 53.4 | 49.0 | 45.9 | 41.5 | 38.4 | 36.0 | 34.0 |
| Crib wall/reinforced earth wall | 75.4 | 67.5 | 59.9 | 55.5 | 52.4 | 48.0 | 44.9 | 42.5 | 40.5 |
| Precast concrete cantilever retaining wall/sheet pile wall | 76.8 | 68.9 | 61.3 | 56.9 | 53.8 | 49.4 | 46.3 | 43.9 | 41.9 |
| Roadbox | 72.2 | 64.3 | 56.7 | 52.3 | 49.2 | 44.8 | 41.7 | 39.3 | 37.3 |
| Road capping/subbase | 81.9 | 74.0 | 66.4 | 62.0 | 58.9 | 54.5 | 51.4 | 49.0 | 47.0 |
| Kerbs | 70.5 | 62.6 | 55.0 | 50.6 | 47.5 | 43.1 | 40.0 | 37.6 | 35.6 |
| Road surfacing/ pavement reconstruction | 84.6 | 76.7 | 69.1 | 64.7 | 61.6 | 57.2 | 54.1 | 51.7 | 49.7 |
| Safety barriers | 71.6 | 63.7 | 56.1 | 51.7 | 48.6 | 44.2 | 41.1 | 38.7 | 36.7 |
| Lighting and signage | 75.5 | 67.6 | 60.0 | 55.6 | 52.5 | 48.1 | 45.0 | 42.6 | 40.6 |
| Remove existing road surface | 75.8 | 67.9 | 60.3 | 55.9 | 52.8 | 48.4 | 45.3 | 42.9 | 40.9 |
| Removal of temporary slip roads | 82.2 | 74.3 | 66.7 | 62.3 | 59.2 | 54.8 | 51.7 | 49.3 | 47.3 |
| East and West Overbridge structures foundation works | 79.9 | 72.0 | 64.4 | 60.0 | 56.9 | 52.5 | 49.4 | 47.0 | 45.0 |
| Beam fabrication and lifting | 72.4 | 64.5 | 56.9 | 52.5 | 49.4 | 45.0 | 41.9 | 39.5 | 37.5 |
| Footbridge demolition | 85.0 | 77.1 | 69.5 | 65.1 | 62.0 | 57.6 | 54.5 | 52.1 | 50.1 |

| Construction Activity | Predicted construction noise levels at different distances ($L_{Aeq}$, dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10m | 25m | 50m | 75m | 100 m | 150m | 200m | 250m | 300 m |
| Bridge demolition | 98.3 | 90.4 | 82.8 | 78.4 | 75.3 | 70.9 | 67.8 | 65.4 | 63.4 |
| Culvert strengthening | 79.1 | 71.2 | 63.6 | 59.2 | 56.1 | 51.7 | 48.6 | 46.2 | 44.2 |

| Legend | | | |
|---|---|---|---|
| | Exceeds daytime SOAEL (Category C sensitive receptor) | | Exceeds night-time SOAEL (for activities where night-time working is proposed in proximity to Category C receptors) |
| | Exceeds daytime SOAEL (Category A sensitive receptor) | | Exceeds night-time SOAEL (for activities where night-time working is proposed in proximity to Category A receptors) |

~~6.10.17~~6.10.20 Table 6.25 shows that the loudest construction activity was bridge demolition works, where construction noise levels in excess of 65 dB $L_{Aeq}$ were predicted within 200 m of the works. Construction noise levels from other construction activities were predicted construction noise levels above 65 dB $L_{Aeq}$ generally within 50 m of the works. A potential significant adverse effect could occur at sensitive receptors within these distances of the associated construction activities. Adverse could occur within 50-150 m of most of the daytime construction works depending on the existing ambient noise conditions.

~~6.10.18~~6.10.21 Only four of the construction activities are programmed to take place at night (road surfacing, bridge demolition, East and West Overbridge structures, and beam fabrication and lifting). Of these activities, bridge demolition was predicted the greatest noise levels and has the potential to cause a significant adverse effect beyond 300 m of the works.

~~6.10.19~~6.10.22 The residual construction nose levels, with mitigation measures are shown in Table 6.26. These predictions assume that a 10 dB reduction of construction noise can be achieved by applying Best Practicable Means and using temporary noise barriers. The construction noise levels at these receptors take into account the combined noise level from activities taking place simultaneously based on the phasing of works indicated in the construction programme.

**Table 6.26: Combined construction activity noise levels**

| Sensitive receptor | Estimated ambient noise levels ($L_{Aeq}$, dB) | | Daytime construction noise levels ($L_{Aeq}$, dB) | | Night-time construction noise levels ($L_{Aeq}$, dB) | |
|---|---|---|---|---|---|---|
| | Day | Night | Lowest | Highest | Lowest | Highest |
| Bridgefoot Farm, Ripley | 59.0 | 54.0 | 29.7 | 43.8 | N/A | N/A |
| Royal Horticultural Society Gardens, Wisley | 65.0 | 57.0 | 26.3 | 53.3 | N/A | N/A |

| Sensitive receptor | Estimated ambient noise levels ($L_{Aeq}$, dB) | | Daytime construction noise levels ($L_{Aeq}$, dB) | | Night-time construction noise levels ($L_{Aeq}$, dB) | |
|---|---|---|---|---|---|---|
| | Day | Night | Lowest | Highest | Lowest | Highest |
| 1 Fellside Cottage, Elm Corner | 61.0 | 55.0 | 33.9 | 58.8 | N/A | N/A |
| Reynards, Elm Corner | 61.0 | 55.0 | 34.1 | 64.7 | N/A | N/A |
| Hut Hill Cottage, Wisley | 65.0 | 63.0 | 42.4 | 64.2 | 22.2 | 54.2 |
| Birchmere Scout Campsite, Wisley Common | 70.0 | 67.0 | 41.2 | 62.5 | 20.6 | 53.8 |
| Wisley Chase, Wisley | 63.0 | 60.0 | 13.3 | 67.9 | N/A | N/A |
| Thames Basin Heath SPA | 63.0 | 60.0 | 11.0 to 45.0 | 49.5 to 65.0 | 7.5 to 47.4 | 39.5 to 65.8 |
| Park Barn Farm, Wisley Common | 63.0 | 55.0 | 12.4 | 47.0 | N/A | N/A |
| Semaphore Tower, Chatley Heath | 65.0 | 64.0 | 11.0 | 57.5 | 19.0 | 48.6 |
| The Lodge, Cobham | 67.0 | 60.0 | 8.7 | 46.7 | 15.8 | 45.5 |
| Pointers South, Cobham | 62.0 | 60.0 | 35.0 | 45.0 | 15.8 | 44.8 |
| The Cottage, Chatley Heath | 65.0 | 55.0 | 13.7 | 64.1 | 22.3 | 51.6 |
| The Tower, Painshill Park | 67.0 | 60.0 | 44.4 | 69.0 | 23.3 | 54.7 |
| Silvermere Lodge, Cobham | 64.0 | 57.0 | 44.0 | 73.4 | 23.3 | 54.3 |
| Court Close Farm, Cobham | 65.0 | 57.0 | 40.2 | 62.5 | 19.5 | 49.7 |
| Feltonfleet School, Cobham | 71.0 | 65.0 | 50.4 | 75.7 | N/A | 38.9 |
| Calvi, Cobham | 65.0 | 57.0 | 44.3 | 72.8 | N/A | 51.5 |
| West Lodge, Cobham | 60.0 | 55.0 | 48.5 | 84.8 | N/A | 36.5 |
| Painshill Farm, Cobham | 64.0 | 58.0 | 46.1 | 64.2 | N/A | 37.6 |
| Caigers Cottage, Cobham | 63.0 | 55.0 | 35.0 | 63.2 | N/A | 35.4 |

~~6.10.20~~6.10.23 The residual construction noise levels shown in Table 6.26 indicate that with mitigation measures, the highest construction noise levels will be below the

LOAEL at several sensitive receptors. The predictions show that the SOAEL is exceeded at some sensitive receptors located between junction 10 and the Painshill interchange (Silvermere Lodge, Feltonfleet School, Calvi, West Lodge).

~~6.10.21~~6.10.24 Table 6.27 shows the locations where residual significant effects are expected based on the predictions shown in Table 6.26 and whether the works would take place for a significant time period.

**Table 6.27: Construction noise residual effects**

| Daytime construction noise | | Night-time construction noise | |
|---|---|---|---|
| **Significant adverse effects** | **Adverse effects** | **Significant adverse effects** | **Adverse effects** |
| • None | • Hut Hill Cottage, Wisley<br>• The Cottage, Chatley Heath<br>• The Tower, Painshill Park<br>• Silvermere Lodge, Cobham<br>• Court Close Farm, Cobham<br>• Feltonfleet School, Cobham<br>• Calvi, Cobham<br>• West Lodge, Cobham | • None | • The Cottage, Chatley Heath<br>• The Tower, Painshill Park<br>• Silvermere Lodge, Cobham<br>• Court Close Farm, Cobham<br>• Calvi, Cobham |

~~6.10.22~~6.10.25 With the mitigation measures in place, no significant adverse effects are likely for daytime and night-time construction works. Adverse effects would occur at other sensitive receptors in proximity to the A3 or the Painshill interchange, such as The Tower, Silvermere Lodge and Calvi. The noise impacts at these locations would be temporary and would cease when construction works move further away from the affected sensitive receptors.

~~6.10.23~~6.10.26 No significant adverse effects would occur from construction works taking place at night, with adverse effects limited to one property close to the Painshill interchange (Calvi), and sensitive receptors within 1 km of the bridge demolition works at junction 10.

Construction vibration

~~6.10.24~~6.10.27 The assessment provided in section 6.8 and the significant effects identified in Table 6.23 indicate that vibration from construction activities would be perceptible at several sensitive receptors for a limited time period. The threshold level for a significant effect is based on human comfort, and exceedances of this threshold level were only predicted within 100 m of percussive piling sites (retaining walls), meaning that complaints may be made about vibration but structural damage is unlikely to occur.

~~6.10.25~~6.10.28 The residual effect of using an alternate piling method that produces lower levels of vibration is that there would be no significant effects from piling. Two temporary significant effects would occur at Seven Hills Road (Squirrel Wood and The Spinney) due to road resurfacing works, noting that the vibration levels would be perceptible and unlikely to cause structural damage to buildings.

Construction traffic

~~6.10.26~~6.10.29 As no significant effects were shown, there are no residual impacts from construction traffic with mitigation measures in place.

Operation noise

~~6.10.27~~6.10.30 As discussed in section 6.8 and the significant effects section above, no further noise mitigation measures are proposed other than those already included in the design of the Scheme. This is because no significant adverse effects were identified that were directly attributable to the Scheme.

Operation vibration

~~6.10.28~~6.10.31 As no significant effects were shown, there are no residual vibration impacts.

## 6.11 Cumulative effects

6.11.1 There is potential for cumulative effects to occur during the construction and operation phases of the Scheme due to other developments located near to or within the study area. The cumulative effects arising from these other developments are shown in Table 6.28.

**Table 6.28: Cumulative effects**

| Other Scheme | Cumulative impact on assets affected by Scheme | Additional significant construction effects | Additional significant operation effects |
|---|---|---|---|
| M25 junction 10-16 Smart Motorway Programme | Construction effects may occur as it is expected that the construction of both schemes would take place simultaneously.<br>Development included in all traffic scenarios as it assumed to be operational before the Scheme opens. Therefore, operational impacts from this development are inherent in the noise modelling results for the Scheme. | Yes | No |
| The Former Wisley Airfield (15/P/00012) | Construction effects may occur if the construction of both schemes takes place simultaneously.<br>Cumulative significant effects in the operation phase have been identified in the assessment of local roads in proximity to the proposed Former Wisley Airfield development. However, it does not alter the predicted effect of the proposed development or introduce any additional significant effect. | Yes | No |
| Land to the East of South Cottage, White Horse Lane, Ripley, GU23 6BB (16/P/00608) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The additional traffic accessing this development when operational would not give rise to a significant effect. | No | No |

| Other Scheme | Cumulative impact on assets affected by Scheme | Additional significant construction effects | Additional significant operation effects |
|---|---|---|---|
| Royal Horticultural Society Gardens, Wisley (16/P/0 Lane, Wisley 2080 and 16/P00976) | No cumulative construction effects are expected as no adverse construction effects were predicted at Wisley due to the Scheme.<br>There is potential for the development to increase traffic flows accessing the RHS Gardens by at least 1 dB. As the majority of the traffic (~80%) is expected to access the RHS Gardens via the A3 rather than through Wisley Village, no significant effects are likely. | No | No |
| Land at Garlick's Arch (Policy A43) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>This development was included in the operation phase assessment and no significant effects were identified. | No | No |
| Land for new north facing slip roads to/from A3 from Burnt Common (Policy A43) | No cumulative construction effects are likely as the Schemes are sufficiently far apart.<br>No significant effects are expected in the operation phase due to the Scheme. | No | No |
| The Former San Domenico Restaurant (2017/0524 and 2014/4612) | There is potential for a significant adverse effect during the construction phase of the Scheme as access to the site may affect the routing of construction traffic for the development.<br>No significant effects during the operation phase of the Scheme were identified at the San Domenico site. The additional traffic generated by the development would not result in a significant effect. | Yes | No |
| Enfin, Painshill Farm, Portsmouth Road (2018/2432) | There is potential for a construction noise impact due to the Scheme if the proposed development is operational during the construction phase, due to its proximity to the Painshill interchange.<br>No significant effects during the operation phase of the Scheme were identified at the Painshill Farm. The additional traffic generated by the proposed care home would not result in a significant effect. | Yes | No |
| Feltonfleet School, Byfleet Road, Cobham, KT11 1DR (2017/2106) | There is potential for a cumulative construction effect as a significant effect was predicted at Feltonfleet School during the construction phase of the Scheme.<br>The proposed development would not affect traffic flows so no operational phase cumulative effects would occur. | Yes | No |

| Other Scheme | Cumulative impact on assets affected by Scheme | Additional significant construction effects | Additional significant operation effects |
|---|---|---|---|
| Land at Chippings Farm, Portsmouth Road, Cobham, KT11 1EH (Land Parcel 20) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The cumulative effects during the operation phase were inherent in the appraisal of the Scheme. No significant effects were identified. | No | No |
| Land surrounding West Hall, Parvis Road, West Byfleet (Site allocation GB15) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The cumulative effects during the operation phase were inherent in the appraisal of the Scheme. No significant effects were identified. | No | No |
| Broadoaks, Parvis Road, West Byfleet (PLAN/2016/1003) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The cumulative effects during the operation phase were inherent in the appraisal of the Scheme. No significant effects were identified. | No | No |
| Land to the north of Old Woking Road and east of Station Approach (PLAN/2017/0128) | No cumulative construction effects are expected as the Schemes are sufficiently far apart and construction works for the development would be complete before construction works for the Scheme.<br>The proposed development would not affect traffic flows in the study area so no operational phase cumulative effects would occur. | No | No |
| Camphill Tip, Camphill Road, West Byfleet (Site allocation UA49) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The cumulative effects during the operation phase were inherent in the appraisal of the Scheme. No significant effects were identified.sc | No | No |
| Library, 71 High Road, Byfleet (Site allocation UA1) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The proposed development would not affect traffic flows in the study area so no operational phase cumulative effects would occur. | No | No |
| Byfleet Road, New Haw (IE1 Site 51/HO6/7) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The proposed development would not affect traffic flows in the study area so no | No | No |

| Other Scheme | Cumulative impact on assets affected by Scheme | Additional significant construction effects | Additional significant operation effects |
|---|---|---|---|
| | operational phase cumulative effects would occur. | | |
| Central Veterinary Laboratory (APHA), Woodham (RI.17/1477) | No cumulative construction effects are expected as the Schemes are sufficiently far apart.<br>The proposed development would not affect traffic flows in the study area so no operational phase cumulative effects would occur. | No | No |

## 6.12 NPSNN compliance

6.12.1 In line with the national guidance discussed in section 6.3, the Scheme aims to avoid significant adverse effects from noise and vibration as far as possible and to use mitigation measures to reduce significant adverse and adverse impacts. To date, this has been achieved by noise modelling different option variants of the Scheme in previous assessment stages to determine what impacts may occur and where, and which areas may require mitigation.

6.12.2 As the design of the preferred option has progressed, the following activities have been undertaken in order to meet the national policy objectives:

- Examination of locations where significant adverse impacts were previously predicted to determine the feasibility of noise mitigation options for these areas;
- Investigation of predicted noise levels at ecological sites and locations of historical or cultural heritage to ensure that noise levels from the Scheme do not significantly deteriorate the value of these areas;
- Replacement of existing noise barriers as part of the Scheme's design to ensure that their acoustic performance is not diminished by holes or gaps that may have appeared in the existing noise barriers over time;
- Incorporation of mitigation measures in the Scheme's design to improve road traffic noise levels at Important Areas wherever possible. This has included low noise road surfacing and extending some of the existing noise barriers at junction 10; and
- Investigation of noise mitigation measures for the Thames Basin Heath SPA.

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

## 6.13 Monitoring

### Construction

6.13.1 Noise monitoring at sensitive areas is a requirement as part of the CEMP. This may also be a requirement if Section 61 consents are sought from the local authorities in the study area. Implementation of the CEMP and compliance its

requirements and environmental commitments will be managed as described in the Outline CEMP (application document TR010330/7.2).

6.13.2 Vibration monitoring during piling works will also be undertaken at sensitive areas. As the predicted vibration levels were not high enough for structural damage to occur but may be perceptible at sensitive receptors, attended vibration monitoring may be appropriate at key locations if it is not possible to use a low vibration piling method for the retaining wall construction.

### Operation

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

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

6.13.5 Any monitoring measures required for ecological receptors due to noise or vibration in the operation phase are stated in the Chapter 7 Biodiversity.

## 6.14 Summary

6.14.1 No significant adverse effects from daytime construction activities are expected provided that noise mitigation measures such as best practicable means that are specified in the CEMP are used by the construction contractors. Adverse effects would occur at sensitive receptors in proximity to the A3 or the Painshill interchange, such as the Gothic Tower, Silvermere Lodge and Calvi. The noise impacts at these locations would be temporary and would cease when construction works move further away from the affected sensitive receptors. The effect of daytime construction noise, with mitigation measures, at Elm Corner and properties close to the A3 between Ockham Park and junction 10 was not found to be significant. No additional adverse or significant adverse effects were identified from extending working hours on Saturday afternoons.

6.14.2 No significant adverse effects from night-time construction works are expected during the construction phase of the Scheme, and adverse effects would be limited provided that mitigation measures are used.

6.14.3 Significant adverse effects from construction vibration were predicted at 7 sensitive receptors situated within 100 m of the percussive piling works for retaining walls and 25-50 m of work sites using a vibratory roller. Provided that the proposed mitigation measures are used, the number of temporary significant effects would be reduced to two properties located on Seven Hills Road (The Spinney and Squirrel Wood) due to road surfacing works on the A245, noting that the predicted vibration levels would not be high enough to cause structural damage to buildings.

6.14.4 No significant adverse effects resulting from construction traffic are expected during the construction phase of the Scheme.

6.14.5 The road traffic noise modelling results for the operation phase identified that no significant adverse effects would occur at dwellings or sensitive receptors due to the Scheme. No adverse or significant adverse effects were identified in relation to the design changes at the A245. No significant adverse effects or perceptible noise increases were predicted at sensitive receptors located in Noise Important

Areas, the Thames Basin Heath SPA, ancient woodlands, or areas of cultural or historic importance.

6.14.6 No significant adverse effects from airborne or ground-borne vibration are expected as a result of the Scheme.

6.14.7 A cumulative effect would occur during the operation phase of the Scheme when the proposed housing development at the Former Wisley Airfield becomes occupied, which would significantly increase traffic flows on Ockham Lane and other local roads irrespective of the Scheme. The Scheme was not predicted to introduce any additional significant effects to this area.

6.14.8 The Scheme includes several mitigation measures within its design, namely noise barriers and low noise road surfacing. The benefits of these mitigation measures are inherent in outcomes of the noise and vibration assessment.

## 6.15 References

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