

M25 junction 10/A3 Wisley interchange TR010030

5.3 Habitats Regulations Assessment: Stage 2: Statement to inform appropriate assessment

Regulation 5(2)(g)
Planning Act 2008

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



Infrastructure Planning

Planning Act 2008

**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]**

5.3 HABITATS REGULATIONS ASSESSMENT STAGE 2: STATEMENT TO INFORM APPROPRIATE ASSESSMENT

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Executive summary

- 1.1.1. The proposed M25 junction 10/A3 Wisley interchange scheme (the Scheme) will require land take from the Thames Basin Heaths Special Protection Area (SPA) in order to improve a road junction. This Scheme is not connected with or necessary to site management for nature conservation.
- 1.1.2. The Habitats Regulations Assessment Report: Stage 1 Screening in Annex A of this report (application document TR010030/APP/5.3) identified the following impacts as having a likely significant effect on all three qualifying features (bird species) of the Thames Basin Heaths SPA:
 1. Habitat loss (temporary and permanent);
 2. Degradation of habitats (by changes in air quality and/ or hydrology);
 3. Disturbance (by changes in noise, recreational use and/ or lighting); and
 4. Spread of non-native invasive plant species.
- 1.1.3. As a result of the findings of the Stage 1 Screening, it was determined that a Stage 2 statement to inform an appropriate assessment (SIAA) was required in order to determine if the Scheme would have no adverse effect on the integrity of the SPA, when taking proposed mitigation measures into account.
- 1.1.4. The SIAA of the Scheme alone has ascertained that there will be no adverse effect on the integrity of the SPA as a result of degradation of habitats (by changes in air quality and/ or hydrology), disturbance (by changes in noise, recreational use and/or lighting) or spread of non-native invasive plants species. However, it is not possible to ascertain that this habitat loss of land would have no adverse effect on the integrity of the SPA 'alone', as a result of reductions in the extent and/ or distribution of supporting habitat of the three qualifying species (i.e. habitat that supports foraging qualifying species by providing an invertebrate resource), and a potential reduction in food resource.
- 1.1.5. In combination impacts with Local Plan HRAs and other plans and projects were ruled out.
- 1.1.6. The SIAA determined that the adverse effects resulting from the permanent land take of the Scheme alone could result in a permanent reduction in the extent and/ or distribution of supporting habitat of the three qualifying species, and a permanent reduction in food resource. The remaining stages of the HRA process are considered in Stage 3-5 assessment of alternatives, consideration of IROPI and compensatory measures (document reference TR010030/APP/5.3).

2. Introduction

2.1. Terms of reference

- 2.1.1. Atkins Limited (Atkins) has been appointed by Highways England (HE) to undertake studies to inform Habitats Regulations Assessment (HRA) associated with the M25 junction 10/A3 Wisley interchange (the Scheme).
- 2.1.2. The Scheme comprises two nationally significant infrastructure projects (NSIPs) and therefore, this assessment has been undertaken using the following guidance:
1. The Planning Inspectorate (2016) Habitat Regulations Assessment Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects;
 2. Highways England (2009) The Design Manual for Roads and Bridges (DMRB) Volume 11, Section 4, Part 1 Assessment of Implications (of Highways and/or Road Projects) on European Sites (Including Appropriate Assessment) (HD 44/09); and
 3. Natural England (2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.
- 2.1.3. The Stage 1: HRA Screening was undertaken in November 2017. However, this HRA Screening was updated in June 2018, in light of a recent (12 April 2018) Court of Justice of the European Union ("CJEU") ruling (referred to as the 'People over Wind' ruling, case C-323/17¹). The information in the Stage 1: HRA Screening was collated by Atkins in order for the competent authority (in this case the Secretary of State) to assess whether there would be a likely significant effect as a result of the Scheme on any European Sites as required by the Conservation of Habitats and Species Regulations 2017 (as amended), known as the Habitats Regulations.
- 2.1.4. The outputs of the HRA Screening document did not alter as a result of the update in June 2018, and the update of the HRA Screening document did not lead to any required changes in the approach to this statement to inform appropriate assessment (SIAA). Habitat Regulations Assessment Report: Stage 1 Screening (application document TR010030/APP/5.3) can be found in Annex A of this report.
- 2.1.5. The proposed Development Consent Order (DCO) boundary for the Scheme can be seen in the Scheme Layout plans (application document TR010030/APP/2.8)..

2.2. Outcome of the HRA screening

- 2.2.1. The Habitats Regulations Assessment Report: Stage 1 Screening in Annex A of this report (application document TR010030/APP/5.3) identified the following impacts as having a likely significant effect on all three qualifying features (bird species) of the SPA:

¹ People over wind, Peter Sweetman v Coillte Teoranta (C-323/17)

1. Habitat loss (temporary and permanent);
2. Degradation of habitats (by changes in air quality and/ or hydrology);
3. Disturbance (by changes in noise, recreational use and/ or lighting); and
4. Spread of non-native invasive plant species.

2.2.2. No other potential impact mechanisms for the Thames Basin Heaths SPA were identified during the screening process.

2.2.3. The HRA Stage 1: Screening (application document TR010030/APP/5.3) considered the Mole Gap to Reigate Escarpment Special Area of Conservation (SAC) and Ebernoe Common SAC due to being within 30 km of the Scheme and having bats as a qualifying feature. However, likely significant effects were ruled out for both sites due to the absence of land take, connectivity and/ or air quality impacts resulting from the Scheme and the absence of their qualifying bat features within the Scheme footprint. Refer to Tables 6 and 7 of the Habitat Regulations Assessment Report: Stage 1 Screening in Annex A of this report (application document TR010030/APP/5.3) for further detail.

2.2.4. The conclusions of the HRA Stage 1: Screening (application document TR010030/APP/5.3) have been agreed with the following stakeholders (as recorded in the HRA consultation report in Annex B of this report (application document TR010030/APP/5.3):

1. Natural England;
2. Royal Society for the Protection of Birds (RSPB); and
3. Surrey Wildlife Trust (SWT).

2.3. Background to HRA

2.3.1. HRA is required by Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017 for all plans and projects which are likely to have an effect on a European site and are not directly connected with or necessary to the management of the European site. Regulation 84 of the Habitats and Species Regulations 2017 explicitly applies regulation 63 to applications for development consent under the Planning Act 2008.

2.3.2. The Scheme is not directly connected with, or necessary to, the nature conservation management of any European sites.

2.3.3. European sites include SACs and Special Protection Areas (SPA). HRA is also required, as a matter of UK Government policy for listed Wetlands of International Importance (Ramsar sites), potential SPAs (pSPA), candidate SACs (cSAC) and proposed Ramsar sites (pRamsar) for the purposes of considering plans and projects, which may affect them². Hereafter all of the above designated nature conservation sites are referred to as 'European sites'.

2.3.4. The stages of HRA process are:

²National Planning Policy Framework. Department for Communities and Local Government. March 2012.

1. **Stage 1 – Screening:** To test whether a plan or project either alone or in combination with other plans and projects is likely to have a significant effect on a European site;
2. **Stage 2 – Appropriate Assessment:** To determine whether it can be ascertained, in view of the conservation objectives, that the plan or project (either alone or in combination with other projects and plans) would have no adverse effect on the integrity of a European site. If the potential for adverse effects on the integrity of a European site cannot be avoided, potential mitigation measures to alleviate those adverse effects should be proposed and assessed;
3. **Stage 3 – Assessment of alternative solutions:** Where it is not possible to ascertain no adverse effect on the integrity of a European site, but a decision maker is minded to proceed, notwithstanding the negative outcome to an appropriate assessment, it is first necessary to establish the absence of alternative solutions (e.g. alternative locations and designs of development); and,
4. **Stage 4 – Assessment of imperative reasons of overriding public interest (IROPI):** Where no alternative solutions can be identified and where reasonable scientific doubt remains as to the absence of adverse effects on site integrity, authorisation may be granted in exceptional circumstances.
5. **Stage 5 – Compensatory measures:** These must be put in place to ensure the overall coherence of the network is protected.

2.3.5. This statement comprises Stage 2 of the HRA process: Statement to Inform Appropriate Assessment.

2.4. Purpose of this statement

- 2.4.1. This SIAA is submitted on behalf of Highways England to inform the determination of the DCO application for the Scheme. It will inform the appropriate assessment to be carried out by the Secretary of State.
- 2.4.2. This SIAA assesses the potential impacts that were identified as leading to a likely significant effect on a European Site during the HRA Stage 1: Screening document, and determines whether it is possible to ascertain that the project would have no adverse effect on the integrity of a European site.

2.5. Consultation

- 2.5.1. Detailed consultation has been undertaken with key stakeholders throughout the HRA process (as recorded in the HRA consultation report in Annex B of this statement). This has consisted of Natural England, Forestry Commission, SWT, Surrey County Council and the RSPB.

2.6. Competent expert evidence

- 2.6.1. The lead author of this SIAA is a principal ecologist and the lead ornithologist for Atkins, with over 10 years' experience of undertaking ornithological studies and has authored HRA screening assessments for managed realignment, development and reservoir maintenance schemes. The lead author undertook all of the bird surveys for the Scheme and has an excellent understanding of the

distribution of the SPA qualifying species and the areas within which they have been recorded.

- 2.6.2. The SIAA has been produced with support and quality assurance inputs from experienced associate directors, with a range of relevant experience and regularly undertaking roles as authors and technical reviewers for HRAs for road and rail schemes across England and Wales. This experience includes producing HRAs for Highways England and local authorities, including road schemes, transport plans, local plans and providing guidance for clients across the UK on this subject, and writing the HRA Screening report for the London 2012 Olympic Park. It also includes being ecology advisor on the assessment of alternatives to nuclear power plant sites for the Department for Energy and Climate Change, and currently one of the lead authors on the Habitats Regulations Assessment of a confidential project relating to national policy matters.
- 2.6.3. The HRA has been reviewed by the external lawyers advising on this project, namely BDB Pitmans. They have significant experience of the HRA process and advised on the only other scheme, so far as can be ascertained, authorised by a DCO that involved an IROPI derogation.
- 2.6.4. The HRA has also been produced with advice and the benefit of critical review by DTA Ecology Ltd, a leading consultancy in the interpretation and application of the Habitats Regulations, and authors of the Habitats Regulations Assessment Handbook³.

³ Guidance on the assessment of plans or projects under the UK Habitats Regulations, produced by DTA Publishing.

3. Background to the project

3.1. Purpose and objectives of the project

- 3.1.1. In December 2014, the Department for Transport (DfT) published its Road Investment Strategy (RIS) for 2015-2020. The RIS sets out the list of schemes that are to be delivered by Highways England over the period covered by the RIS (2015 - 2020). The RIS identified improvements to the M25 junction 10/A3 Wisley interchange as one of the key investments in the strategic road network (SRN) for the London and south east region because it experiences heavy congestion on a daily basis and has one of the highest recorded collision rates across the SRN. This causes queues and prevents access from the Ockham Park junction (A3) to the M25 junction 10 and on to the Painshill junction (A3) in both directions. A similar problem is experienced by traffic entering and exiting the M25 junction 10/A3 Wisley interchange.
- 3.1.2. The M25 junction 10 is positioned on a critical section of the strategic road network (SRN). The M25 forms part of the 'Ten-T' Trans-European Transport Network and is therefore a nationally important link providing access to global markets and connections to the Heathrow, Gatwick and the channel ports for much of the UK as well as for the south east region. The A3 is also an important strategic route, linking London with the international port of Portsmouth, intersecting the M25 at junction 10, and has its own issues with traffic flow. It also connects to Guildford, which is the largest centre of employment in Surrey. The cost to the economy of ongoing delays here would be considerable if left unchanged. Please see paragraphs 3.2.5 to 3.2.38 of HRA Stages 3-5: assessment of alternatives, consideration of the IROPI and compensatory measures (application document TR010030/APP/5.3) for further details of the existing situation which includes detail on the traffic issues.
- 3.1.3. The highways proposals are included in the scheme layout plans (application document TR010030/APP/2.8). The principal components are:
1. A larger, signalised gyratory for M25 junction 10, including free-flow left turn slip roads that bypass the traffic signals.
 2. Amended and extended slip roads onto and off the M25 and the A3.
 3. Widening of the A3 to dual-four lanes between Ockham Park junction and M25 junction 10 and between Painshill junction and M25 junction 10.
 4. Provision of four running lanes on the M25 through junction 10.
 5. A comprehensive package of local road, private access and public rights of way (PRoW) changes and additions.
- 3.1.4. The proposals extend over 6.1km of the M25 and 5.5km of the A3. The scheme will require a permanent land take of 139.2 hectares with a further 101.4 hectares of land taken temporarily and then returned to the original landowners.

3.2. Land take from the SPA

- 3.2.1. The scheme will require land take from the SPA in order to improve the interchange. This scheme is not connected with or necessary to site management for nature conservation.

- 3.2.2. The permanent land acquisition (i.e. the areas outside the existing highway boundary but within the proposed highway boundary) for the Scheme will include approximately 5.9 ha of Thames Basin Heaths SPA. The temporary possession of land outside the proposed highway boundary will include approximately 8.6 ha of Thames Basin Heaths SPA.
- 3.2.3. This land take can be seen on Figure 1 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) and consists of 14.4 ha of Scots pine dominated mixed woodland around the edge of the SPA, where it bounds the M25 and A3. This woodland forms part of a wider belt of Scots pine dominated mixed woodland. The outer edge of Bolder Mere, equating to 0.1 ha, will also be lost as a result of the widening of the A3.
- 3.2.4. There will be no loss of land outside the DCO boundary. During detail design, the area of land take from the SPA may be reduced.

3.3. Scheme description and key stages

Motorway and trunk road

- 3.3.1. The Scheme entails elongating the roundabout from circular to oval, using the existing bridges under the A3 and new bridges over the M25. This will provide an additional lane and extended queueing lengths, which will increase capacity for right-turning traffic between and through the traffic signals. There will be dedicated left-turn free-flow lanes that enable this traffic to bypass the junction signals rather than using roundabout capacity. Two of the existing bridges, which carry the existing roundabout over the M25 will be demolished. To facilitate the continued operation of the junction during construction temporary slip roads will be built to carry traffic between the M25 and A3. Once the final junction arrangements are completed the temporary slip roads will be removed and the earthworks for them will be reconfigured to support other elements of the scheme.
- 3.3.2. The A3 will be widened from dual-three lane to dual-four lane between slip roads from the Ockham Park junction to M25 junction 10, to cater appropriately for the volumes of merging and diverging traffic. There will be a two-lane drop from the A3 northbound exit slip and two-lane gain on the A3 southbound entry slip at M25 junction 10, through which the A3 remains as dual-two lane passing over the roundabout.
- 3.3.3. The M25 carriageway will not be widened through the junction, but the hard shoulder will be used to provide a fourth running lane through junction 10. The clockwise exit and entry slip at junction 10 will be modified and widened into the SPA to increase junction capacity and to suit the higher traffic flows, the M25 amendments and the junction 10 free-flow left turn lanes, with two lane slip roads diverging or merging in all cases and ghost islands provided between the slip road lanes where appropriate.
- 3.3.4. The slip roads leading to and from Ockham Park junction will be amended to suit the A3 widening, with ghost islands provided between the slip road lanes where appropriate.
- 3.3.5. Retaining features such as walls or strengthened earthworks will be provided to minimise the land requirements and adverse impacts in the many sensitive locations, with the largest retaining features needed alongside, Bolder Mere, Hut

Hill, Clearmount and the base of Telegraph Hill cutting.

- 3.3.6. The free-flow left turns at junction 10 would prevent replacement of the current arrangements for non-motorised users (NMUs) to make their way around the junction and/ or across the M25 and A3. Almost all existing accesses to property or land direct from the A3 carriageways will also be closed, between Painshill and Ockham Park junctions.
- 3.3.7. The new and amended road links will be close to the existing M25, A3 and slip roads and will not segregate any areas of open land, but much of the space needed to provide and construct the Scheme is designated as SPA.
- 3.3.8. New LED lighting will be provided along the new verges of the widened A3 carriageway and all the amended junction slip roads; the existing central reserve lighting on the A3 across junction 10 and along the M25 will remain.
- 3.3.9. The increased area of road carriageway will lead to increased rates of surface water runoff, which needs to be attenuated to ensure that the existing rates of outfall into the receiving watercourses are not exceeded. Space has been allowed for the provision of drainage attenuation measures, with the aim of minimising the space required, as 14 of these are within the SPA. For the location of the drainage attenuation ponds, please see the Scheme Layout Plans (application document TR010030/APP/2.8).
- 3.3.10. To accommodate these changes to the strategic highways, the Scheme also includes comprehensive amendments to the network of local roads, access tracks and PRow, as outlined below, which will influence public access to local facilities and the existing pattern of registered commons and public open space, as well as the proposed areas of replacement land. In addition, a gas main will be diverted from a point in the verge on the A3 southbound entry slip at the Painshill interchange, near to West Lodge where it will peel off and follow the new Painshill Private Access Road to a point just west of Court Close Farm. From here the diversion is jointed to the existing pipe which crosses under the A3. There is then a short diversion around the ramp leading to the western end of the proposed Redhill NMU Bridge. The diversion then starts again adjacent to the drainage attenuation pond on the A3 northbound carriageway just north of the Cockcrow NMU Bridge where it continues south and follows the Wisley NMU route to a point just before the existing Wisley Lane junction with the A3. It is at this point where the diversion passes from west to east under the A3 and continues south until the new Wisley Lane which the diversion follows at the toe of the embankment on the eastern side before crossing Wisley Lane and joining to the existing gas pipe located in the verge on the A3 southbound exit slip at the Ockham Park interchange.

Local roads

- 3.3.11. There will be several changes to the local road network, summarised broadly from west to east along the Scheme:

1. The Byway section of Elm Lane will be upgraded across Ockham Common to provide access suitable for all vehicles between Old Lane and Elm Corner, as a substitute for the closure of the A3 connection to Elm Lane.
2. The connection to Old Lane from the junction 10 A3 southbound on-slip will be amended to improve safety and to suit the on-slip being widened to two lanes along its full length.

Private means of access (PMA)

- 3.3.12. There are two accommodation bridges to be replaced that are used for PMA, both of which also function as parts of the public rights of way network:
1. Reinstatement of Clearmount Bridge over the amended M25 as an accommodation/bridleway bridge, linking to Bridleway 8 and the farm access tracks used by SWT.
 2. Reinstatement of Cockcrow Bridge over the widened A3 as an accommodation/bridleway bridge, which also includes a wide green margin to provide habitat linkage between the two parts of the SPA⁴. There will be a new access to this bridge from Old Lane to provide (gated) access to Hut Hill Cottage, Pond Farm and Birchmere camp site; the current PMA from the A3 northbound off-slip to junction 10 will not be reinstated. Entry to the car parks at Ockham Bites will also be taken from this new access from Old Lane and existing car park entrances closed.

Public rights of way (PRoW)

- 3.3.13. The following new PRoW works will reinstate and/ or enhance existing NMU routes and connectivity, reduce severance caused by the A3 and provide suitable access to the areas of existing registered common and public open space, as well as to the proposed Replacement Land areas:
1. Diverting Footpath 14 along a maintenance track south from Bolder Mere to connect with Elm Lane.
 2. A restricted byway along the west side of the A3 between Wisley Lane and Cockcrow bridge, with links to Bridleway 8 and Footpaths 7, 9 and 10.
 3. The new Sandpit Hill restricted byway bridge across the M25 to the southeast of M25 junction 10, with restricted byway links to Pointers Road and across the corner of Ockham Common to Footpath 17, Cockcrow bridge and Old Lane.
- 3.3.14. A plan of the NMU routes and replacement land areas can be seen in Figure 12 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3). Where appropriate, these new NMU routes will also enable maintenance access to Highways England infrastructure, such as sign gantries,

⁴ A separate designated funds application is being made by the project team to secure additional funding from Highways England for the provision of a Green Bridge, as a replacement for the demolition of the existing Footpath 17 Cockcrow overbridge. The green bridge is intended to provide an additional enhancement measure to address historic issues relating to the severance of ecological habitats by the existing A3, including habitats that form part of the Ockham and Wisley Commons Site of Special Scientific Interest. Highways England is confident that there is a reasonable prospect of the designated funds application being approved and has therefore sought authorisation for these works within the scope of the DCO application. However, the inclusion of the green bridge feature within the DCO does not materially affect the overall extent of order land required for the Scheme or the level of funding that may be needed to compensate any affected land interests. In the unlikely event that designated funds are not forthcoming, this enhancement measure can be omitted from the scheme because it is not essential for the purposes of mitigating the scheme's environmental effects. Its omission would not have any material consequences for land acquisition matters and therefore any concerns about the certainty of funding for this element of the work need not indicate against the granting of development consent.

balancing ponds and traffic signals, as well as to any utilities that follow the NMU alignment. This minimises the need to identify additional land take to create specific maintenance accesses.

3.3.15. The PRoW proposals will connect the new and replacement NMU and local road bridges to the existing network of permissive horse rides and other tracks across the land managed by SWT. There will be an upgrade in status (but no physical change) of some of these permissive horse rides to bridleway, so that they appear on maps and provide an appropriate right of access to and between the areas of registered common. The routes that will be upgraded are:

1. In the western quadrant between Clearmount bridge over the M25 and Cockcrow Bridge over the A3, mostly along the line of Footpath 10 past Pond Farm. This follows an existing access track and runs along the outer edge of the existing heathland areas;
2. In the south-eastern quadrant between Sandpit Hill restricted byway bridge over the M25 and Bridleway 69, along the north-eastern edge of the open heathland on Telegraph Hill. This passes through the wooded area of the SPA and avoids the existing heathland areas.

3.3.16. The various NMU and PRoW works will also contribute towards achieving the aims of the Scheme.

Scheme construction

3.3.17. Construction of the scheme is planned to commence in winter 2020, with the Scheme planned to be fully open for traffic in autumn 2023. The assessments of construction effects will incorporate best practice, based on industry guidance and professional experience.

3.3.18. The main site compound will be adjacent to and accessed from Ockham Park junction roundabout, which is outside the SPA. There will be small construction compounds close to the new or replacement bridges, plus two satellite compounds; one each side of junction 10. One satellite compound falls within the SPA, but its size has been kept to the minimum required to provide its intended function. Please see the scheme layout plans (application document TR010030/APP/2.8).

3.3.19. Working space for construction has been included as a 5 m width beyond the extent of new earthworks or drainage works, increasing to 6 m if a haul route is required. Around the M25 junction 10 roundabout, space is also included for temporary slip roads to ensure continued function of junction 10 during the construction period; some of this extra space will be used to provide the new NMU links and/or drainage works. Where the new restricted byway routes are to be provided away from the main highways and bridge works, they will be constructed within a 7 m working width. Once the construction works are complete the land taken temporarily to enable the works to go ahead will be either be restored to its original condition or will form part of the environmental proposals for the Scheme. Table 1 describes the key construction stages of the Scheme.

Table 1: The key construction stages

Construction Phase \ Description of works	Approximate Start Date	Approximate Finish Date
Advance Works <ul style="list-style-type: none"> Construction of retaining walls Construction of Elm Lane upgraded byway Diversion of Southern Gas Network (SGN) underground plant. 	January 2021	September 2021
A3 Phase 1 <ul style="list-style-type: none"> Construction of carriageway widening Construction of retaining walls Diversion of underground utilities 	June 2021	June 2022
M25 Phase 1 <ul style="list-style-type: none"> Excavation for road widening Construction of temporary slip roads Construction of M25 retaining structures Construction of Clearmount overbridge Demolition of existing Clearmount overbridge 	June 2021	August 2022
M25 Phase 2 <ul style="list-style-type: none"> Construction of temporary slip roads Construction of elongated roundabout 	March 2022	January 2023
M25 Phase 3 <ul style="list-style-type: none"> Remove temporary slip roads Construction of Wisley interchange NMU bridge Construction of elongated roundabout 	September 2022	September 2023
M25 Phase 4 <ul style="list-style-type: none"> Remove temporary slip roads Construction of Wisley interchange NMU bridge Demolition of existing M25 overbridges 	February 2023	November 2023

3.4. Resource requirements throughout the lifetime of the Scheme

- 3.4.1. The Scheme will lead to the permanent loss of 5.9 ha of SPA land. During construction an additional 8.6 ha of SPA land will be temporarily lost. This will be reinstated after construction and replanted as habitats (mainly shrubs and trees) within the SPA.
- 3.4.2. This HRA assumes that all land within the land take areas will be lost, either temporarily or permanently. However, during detailed design, any opportunities to reduce land take or avoid features, such as veteran trees, will be taken.

- 3.4.3. The materials associated with the Scheme are presented in Table 2. Material estimates have been calculated from the current design information. The number of workers needed to build the scheme would vary over the course of the works but would be approximately 500 at its peak.

Table 2: Material use for the scheme

Material	Total material use (Tonnes)	Material use per annum (Tonnes)
Aggregate/fill*	442,650	177,060
Asphalt	145,270	58,110
Concrete†	31,020	12,410
Steel	1,060	420
Timber‡	1,900	760

- 3.4.4. Once built the Scheme will not require any further resources apart from electricity and telecommunications to operate road signs and lighting, details of which are not available at this time.

Decommissioning

- 3.4.5. M25 junction 10 forms part of the strategic road network and has an indefinite lifespan. Therefore, decommissioning has been scoped out of the assessment.

3.5. Waste products arising during construction and operation

- 3.5.1. The construction of the Scheme will result in the generation of waste. This will mainly be soil, aggregate, asphalt and concrete. However, smaller quantities of waste that would be generated include metal, wood and vegetation, as well as municipal waste and septic tank waste from the workforce. Where waste is not suitable for re-use on site it is required to be taken off site for potential re-use, recycling, recovery or disposal. No waste will be stored or disposed of outside the DCO boundary and duty of care checks will be made by the waste producer or holder to ensure waste is only transferred to an authorised person.
- 3.5.2. Waste quantities have been calculated from the current design information of the Scheme. Table 3 presents the estimated construction, demolition and excavation (CD&E) waste⁵ as total arisings and the annual arisings based on a construction period of 35 months. Where necessary estimates have been converted from cubic metres to tonnes for comparison with the baseline. For this assessment, it has been assumed that CD&E waste generation will arise equally across the construction phase.

⁵ CD&E waste is defined as inert or non-hazardous waste arising from construction and demolition activities, including the excavation of soils.

Table 3: CD&E waste arisings for the Scheme

Waste Type	Total Waste Arisings (Tonnes)	Waste Arisings per Annum (Tonnes)
Soil	21,730	8,690
Vegetation	13,050	5,220
Concrete	3,130	1,250
Metal	150	60
Packaging	160	70
Total	38,220	15,290

3.6. Other services

- 3.6.1. There is a significant number of existing services which are located within the existing verge along the A3. Due to the widening from dual-three lane to dual-four lane these services will need to be diverted to the new verge which is located within the SPA. The method of construction is currently envisaged to be by simple open excavation of trenches, laying ducts/pipelines and backfilling the trench. Trenchless technology such as thrust-boring and or directional drilling may also be used to pass diverted ducts and pipelines under the carriageway and or other locations which may prove to be difficult or uneconomical for conventional open excavation. The services requiring diversion are those operated by:
1. Southern Gas Networks (SGN);
 2. British Telecommunications (BT);
 3. UK Power Networks (UKPN); and
 4. Affinity Water.
- 3.6.2. In addition, street lighting, illuminated traffic signs and motorway communication ducts will be installed in the verge utilising similar construction methods to those mentioned in paragraph 3.6.1 above.

4. Protected sites potentially affected by the proposals

- 4.1.1. The Habitats Regulations Assessment Report: Stage 1 Screening (application document TR010030/APP/5.3) identified the Thames Basin Heaths SPA as the only European site with features that could be subject to likely significant effects as a result of the Scheme (refer to Annex A of this report for details).

4.2. Thames Basin Heaths SPA

- 4.2.1. This section gathers information on the SPA, including details on qualifying features and conservation objectives for the SPA.
- 4.2.2. The Thames Basin Heaths SPA is a composite site, 8,274.7 ha in size, that is located across the counties of Surrey, Hampshire and Berkshire in southern England. It consists of a network of heathland sites and encompasses all or parts of the following Sites of Special Scientific Interest (SSSI):
1. Ash to Brookwood Heaths SSSI;
 2. Bourley and Long Valley SSSI;
 3. Bramshill SSSI;
 4. Broadmoor to Bagshot Woods and Heaths SSSI;
 5. Castle Bottom to Yateley and Hawley Commons SSSI;
 6. Chobham Common SSSI;
 7. Colony Bog and Bagshot Heaths SSSI;
 8. Eelmoor Marsh SSSI, Hazeley Heath SSSI;
 9. Horsell Common SSSI;
 10. Ockham and Wisley Commons SSSI;
 11. Sandhurst to Owlsmoor Bogs and Heaths SSSI; and,
 12. Whitmoor Common SSSI.
- 4.2.3. The Scheme includes land that falls within the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA.
- 4.2.4. The Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA is 222.2 ha. The A3 runs approximately north to south through Ockham and Wisley Commons SSSI and separates Wisley Common from Ockham Common. The M25 runs approximately east to west through Ockham and Wisley Commons SSSI and forms the northern boundary of the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA.
- 4.2.5. The Scheme will result in the permanent loss of 5.9 ha of SPA. This will consist of 5.8 ha of Scots pine dominated woodland and 0.1 ha of open water at Bolder Mere. In addition, 8.6 ha of Scots pine dominated woodland will be temporarily lost as a result of the Scheme. However, this will be reinstated and replanted as shrubs and trees on completion of construction of the Scheme.
- 4.2.6. Neither the woodland or the open water being lost as a result of the Scheme (temporary or permanently) directly support breeding SPA qualifying species

(see section 4.7).

4.3. Qualifying features

- 4.3.1. The Thames Basin Heaths SPA was classified in 2005 under Article 4.1 of the Directive (79/409/EEC) by supporting breeding populations⁶ of:
1. Dartford warbler *Sylvia undata*, 445 pairs representing at least 27.8% of the breeding population in Great Britain (count as at 1999);
 2. Nightjar *Caprimulgus europaeus*, 264 pairs representing at least 7.8% of the breeding population in Great Britain (count mean 1998-99);
 3. Woodlark *Lullula arborea*, 149 pairs representing at least 9.9% of the breeding population in Great Britain (count as at 1997).
- 4.3.2. Since 2009 the statutory nature conservation bodies have led the SPA and Ramsar Scientific Working Group's (SPAR SWG) work to undertake the third Review of the UK SPA network. In 2016, the third review was published: The status of the UK's SPAs in the 2000s: The Third Network Review⁷. This review included the latest population estimates for the qualifying species of the UK's SPAs. The following information on the qualifying species of the Thames Basin Heaths SPA in Table 4 is taken from this review:

⁶ Data taken from JNCC (2005) SPA description: Thames Basin Heaths (<http://jncc.defra.gov.uk/page-2050-theme=default>; accessed 03/05/18).

⁷ JNCC (2016) The status of UK SPAs in the 2000s: the Third Network Review

Table 4: Percentage of the total UK SPA population and European population of qualifying species within the Thames Basin Heaths SPA

Qualifying feature	Thames Basin Heaths SPA population in 1990s (populations for which the SPA qualified)	Latest populations, taken from the 2016 JNCC SPA review			European population (percentage of European population within Thames Basin Heaths SPA ⁸ in brackets)
		Thames Basin Heaths SPA population in 2000s	Number of UK SPAs with this species as a qualifying feature	Total UK SPA population (percentage of UK SPA population within Thames Basin Heaths SPA in brackets)	
Dartford warbler	445 pairs	376 pairs	6	1,654 pairs (22.7%)	629,000-1,454,000 breeding pairs ⁹ (0.03%-0.06%)
Nightjar	264 pairs	301 pairs	10	2,124 pairs (14.2%)	614,000-1,100,000 lekking males ¹⁰ (0.03%-0.05%)
Woodlark	149 pairs	200 pairs	7	960 pairs (20.8%)	1,890,000-3,890,000 pairs ¹¹ (0.005%-0.01%)

4.4. Conservation objectives

4.4.1. The following is taken directly from the SPA conservation objectives¹²:

“With regard to the SPA and the individual species for which the site has been classified (Dartford warbler, nightjar and woodlark), and subject to natural change, ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

1. The extent and distribution of the habitats of the qualifying features;
2. The structure and function of the habitats of the qualifying features;
3. The supporting processes on which the habitats of the qualifying features rely;
4. The population of each of the qualifying features, and;
5. The distribution of the qualifying features within the site.”

4.4.2. Natural England produced supplementary advice on conserving and restoring

⁸ Based on the Thames Basin Heaths SPA population in 2016 JNCC SPA review

⁹ Taken from Birdlife International Data Zone (<http://datazone.birdlife.org/species/factsheet/dartford-warbler-sylvia-undata/text>; accessed 26/03/19)

¹⁰ Taken from Birdlife International Data Zone (<http://datazone.birdlife.org/species/factsheet/european-nightjar-caprimulgus-europaeus/text>; accessed 26/03/19)

¹¹ Taken from Birdlife International Data Zone (<http://datazone.birdlife.org/species/factsheet/woodlark-lullula-arborea/text>; accessed 26/03/19)

¹² As taken from Natural England (2014) European site objectives for Thames basin Heaths Special Protection Area, Site Code: UK9012141.

the site features of the Thames Basin Heaths SPA¹³. This document describes the attributes and targets for each of the three qualifying features (Dartford warbler, nightjar and woodlark). These can be found in Appendix A of this document, but the attributes and targets are summarised in the bullets below:

1. Supporting habitat (both within and outside the SPA);
2. Conservation measures: Maintain management or other measures (whether within and/ or outside the site boundary as appropriate) necessary to maintain or restore the structure, function and/ or the supporting processes associated with all three qualifying features and their supporting habitats;
3. Air quality¹⁴: Restore as necessary the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System¹⁵;
4. Extent and distribution of supporting habitat for the breeding season: Maintain the extent, distribution and availability of suitable breeding habitat which supports all three qualifying features for all necessary stages of their breeding cycle (courtship, nesting, feeding and roosting);
5. Vegetation characteristics: Maintain or restore the mix of vegetation throughout nesting areas required by each of the three qualifying features;
6. Disturbance caused by human activity¹⁶: Restrict and reduce the frequency, duration and/ or intensity of disturbance affecting nesting, roosting and/or foraging birds so that all three qualifying features are not significantly disturbed;
7. Landscape: Maintain or restore the necessary habitat structure required by each of the three qualifying features;
8. Predation: Reduce or restrict predation and disturbance of all three qualifying features, caused by native and non-native predators;
9. Food availability: Maintain or restore the distribution, abundance and availability of key prey items (e.g. moths, beetles, spiders, caterpillars) at prey sizes preferred by each of the qualifying features;
10. Connectivity with supporting habitats: Maintain or restore safe passage of birds moving between nesting and feeding areas (only relevant to nightjars);
11. Breeding population;
12. Population abundance: Maintain the size of all three qualifying features' breeding populations, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

4.4.3. In addition, Natural England have produced a Site Improvement Plan¹⁷ that outlines key threats and pressures on the qualifying species of the SPA (Dartford warbler, nightjar and woodlark), and proposed measures to address these issues. These are summarised in Table 5 below. This table shows the prioritised

¹³ Natural England (2016) Thames Basin Heaths SPA European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features.

¹⁴ This is a priority issue for all three qualifying features of the SPA according to the Thames Basin Site Improvement Plan (Natural England, 2014).

¹⁵ www.apis.ac.uk

¹⁶ This is a priority issue for all three qualifying features of the SPA according to the Thames Basin Site Improvement Plan (Natural England, 2014).

¹⁷ Natural England (2014) Site Improvement Plan: Thames Basin.

issues for the site, the proposed measures to address the issues and the delivery bodies whose involvement is required to deliver the measures. The list of delivery bodies includes those who have agreed to the actions as well as those where discussions over their role in delivering the actions is on-going.

Table 5: The key issues for the SPA with regards to the qualifying features, and the proposed measures to address these issues

Key threats and pressures	Proposed remedial measure	Delivery bodies
Public access/ disturbance	Agree and implement an over-arching access management strategy	Berks, Bucks and Oxon Wildlife Trust, Crown Estate (Rural), Forest Enterprise, Forestry Commission, Hampshire and Isle of Wight Wildlife Trust, Local Authorities, National Trust, Natural England, RSPB, Surrey County Council, Surrey Heath Borough Council, Surrey Wildlife Trust, Defence Infrastructure Organisation (DIO), Amphibian and Reptile Conservation Trust (ARCT), Horsell Common Preservation Society, Local partnership
Undergrazing	Agree and implement an over-arching access management strategy	National Trust, Natural England, RSPB, Defence Infrastructure Organisation (DIO)
Forestry and woodland management	Review and agree forestry Plans/ policies to ensure compatability with objectives	Forest Enterprise, Natural England, Defence Infrastructure Organisation (DIO), Crown Estate
Inappropriate scrub control	Agree habitat management strategies	Berks, Bucks and Oxon Wildlife Trust, Bracknell Forest Borough Council, Crown Estate (Rural), Forestry Commission, Hampshire and Isle of Wight Wildlife Trust, Natural England, RSPB, Surrey County Council, Surrey Heath Borough Council, Surrey Wildlife Trust, Windsor and Maidenhead Royal Borough Council, Amphibian and Reptile Conservation Trust (ARCT)
Wildfire/ arson	Agree and implement fire risk reduction strategies	Berks, Bucks and Oxon Wildlife Trust, Forestry Commission, Hampshire and Isle of Wight Wildlife Trust, Hampshire County Council, Local Authorities, Natural England, Surrey County Council, Surrey Wildlife Trust, Defence Infrastructure Organisation (DIO), Royal Berkshire Fire and Rescue Service, Hampshire Fire and Rescue Service, Surrey Fire and Rescue Service, Wildfire, Horsell Common Preservation Society, South East England Wildfire Group
Air pollution: impact of atmospheric nitrogen deposition	Agree and implement Nitrogen management/ mitigation strategies	Berks, Bucks and Oxon Wildlife Trust, Hampshire and Isle of Wight Wildlife Trust, Hampshire County Council, Natural England, Surrey Heath Borough Council, Surrey Wildlife Trust, Defence Infrastructure Organisation (DIO)

Key threats and pressures	Proposed remedial measure	Delivery bodies
Feature location/extent/condition unknown	Develop and implement improved bird monitoring strategy	Hampshire and Isle of Wight Wildlife Trust, Natural England, RSPB, Surrey Wildlife Trust, Defence Infrastructure Organisation (DIO), Surrey Bird Club
Military	Agree and implement integrated management plans for military sites	Hampshire and Isle of Wight Wildlife Trust, Natural England, Surrey Wildlife Trust, Defence Infrastructure Organisation (DIO), Amphibian and Reptile Conservation Trust (ARCT)
Habitat fragmentation	Commission study to identify habitat management priorities to reduce fragmentation	Berks, Bucks and Oxon Wildlife Trust, Bracknell Forest Borough Council, Crown Estate (Rural), Forestry Commission, Hampshire and Isle of Wight Wildlife Trust, Natural England, RSPB, Surrey Heath Borough Council, Surrey Wildlife Trust, Amphibian and Reptile Conservation Trust (ARCT)

- 4.4.4. The key threats and pressures listed in the Site Improvement Plan, refer to the wider SPA and do not identify any specific nature conservation initiatives likely to affect the Ockham and Wisley Commons SSSI component of the SPA. Of the key threats and pressures listed, public access/ disturbance and air pollution are LSEs identified during the HRA Screening.
- 4.4.5. The Ockham and Wisley Commons SSSI component of the SPA is managed by the SWT. Appendix 5 of the SWT's 2010-2020 Wisley and Ockham Management Plan¹⁸, gives species population objectives for the qualifying SPA species (numbers in the management plan are based on individuals rather than pairs):
1. Dartford warbler: based on a 5 year mean (2003-07) the Ockham and Wisley Commons SSSI supports three individuals. Therefore, the SWT management plan sets a discretionary target to maintain the population at two individuals or above;
 2. Nightjar: based on a 5 year mean (2003-07) the Ockham and Wisley Commons SSSI supports two individuals. Therefore, the SWT management plan sets a discretionary target to maintain the population at two individuals or above;
 3. Woodlark: based on a 5 year mean (2003-07) the Ockham and Wisley Commons SSSI supports one individual. Therefore, the SWT management plan sets a discretionary target to maintain the population at one individual or above.

¹⁸ Surrey Wildlife Trust: Wisley and Ockham Commons Management Plan 2010-2020.

4.5. Population estimates of qualifying features within the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA.

- 4.5.1. Targeted breeding bird surveys of Ockham and Wisley Commons for Dartford warbler, nightjar and woodlark were undertaken by Atkins in 2016, 2017 and 2018. A detailed methodology and the results of these surveys are described in Appendix B, and Figures 2A-2K of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) showing all observations of qualifying species and the territory mapping analysis that was undertaken.
- 4.5.2. In addition, the breeding bird data for Wisley Common and Ockham Common was obtained from 2J's¹⁹ for the six-year period of 2013-2018.
- 4.5.3. The findings of the 2017 and 2018 surveys were supported by the 2016 surveys which focused on a smaller survey area. All of these surveys were undertaken by Atkins. The results are described in detail in Appendix B but are summarised in Section 4.5.4 below.
- 4.5.4. Although populations of the qualifying features vary between breeding seasons, taking the 2016, 2017 and 2018 breeding bird survey results and 2J's²⁰ 2017²¹ and 2018 data into account, the current baseline is considered to be:
1. Three Dartford warbler territories within Wisley Common²² and four Dartford warbler territories within Ockham Common. This equates to approximately 1.9% of the Dartford warbler territories within the wider Thames Basin Heaths SPA (376 pairs²³) and 0.2% of the British breeding population (3,200 pairs);
 2. Three nightjar territories within Wisley Common and four nightjar territories within Ockham Common. This equates to approximately 2.3% of the nightjar territories within the wider Thames Basin Heaths SPA (301 pairs) and 0.15% of the British breeding population (4,600 pairs);
 3. One woodlark territory within Wisley Common and one woodlark territory within Ockham Common²⁴. This equates to approximately 1.0% of the woodlark territories within the wider Thames Basin Heaths SPA (200 pairs) and 0.06% of the British breeding population (3,100 pairs).
- 4.5.5. Table 6 shows the estimated percentage of the UK SPA population and European population of SPA qualifying features that the Wisley Common and Ockham Common components of the Thames Basin Heaths SPA support.

¹⁹ 2J's is a voluntary group of ornithologists who survey all of the Thames Basin Heaths SPA sites every breeding bird season, to monitor the numbers of SPA qualifying species. The 2J's data for the Ockham and Wisley Commons component of the SPA is gathered by Surrey Wildlife Trust staff. This data is utilised by the RSPB and Natural England.

²⁰ 2J's are a volunteer group that carry out annual monitoring of the SPA qualifying species throughout the Thames Basin Heaths SPA

²¹ The 2017 data for 2J's provided the peak counts for Dartford warbler and nightjar, but it should be noted that 2J's recorded higher numbers of woodlark (3 territories in Wisley Common) in the previous years (2013-2016). However, the number of woodlarks that 2J's recorded had declined in 2017, and they were absent in 2018. It is considered that this species has naturally declined at Wisley Common due to the heathland having grown in height since being cleared in 2010 (woodlarks require ground vegetation which is predominantly short (<5 cm) or medium (10-20cm) in height, with frequent patches of bare or sparsely-vegetated ground (as detailed in the Thames Basin Heaths supplementary advice in Appendix A)). This trend is also reflected in the increased numbers of nightjar in Wisley Common (three territories in 2017, compared to one territory or less in previous years), as nightjar require vegetation mostly of 20-60 cm height, with areas of tree cover less than 2 m in height (as detailed in the Thames Basin Heaths supplementary advice in Appendix A). It is considered that the 2J's 2017 data best represents the baseline for Wisley Common and Ockham Common.

²² It is noted that no Dartford warblers were recorded within Wisley Common in 2018. However, it is assumed that they may occur in future years, so the 2017 baseline has been used.

²³ All population estimates are based on the figures given in JNCC (2016) The status of the UKs SPAs in the 2000s: the Third Network Review.

²⁴ It is noted that no woodlarks were recorded within Wisley Common or Ockham Common in 2018. However, it is assumed that they may occur in future years, so the 2017 baseline has been used.

Table 6: Percentage of the total UK SPA population and British population of qualifying features within the Wisley Common and Ockham Common components of the Thames Basin Heaths SPA

Qualifying feature	The current baseline for the Wisley Common and Ockham Common components of the SPA	Percentage of Thames Basin Heaths SPA population ²⁵	Percentage of total UK SPA population ²⁶	Percentage of European population
Dartford warbler	7 pairs (increase from 3 individuals in 2003-07)	1.9% (376 pairs)	0.42% (1,654 pairs)	<0.001% (629,000-1,454,000 breeding pairs)
Nightjar	7 pairs (increase from 2 individuals in 2003-07)	2.3% (301 pairs)	0.33% (2,124 pairs)	<0.001% (614,000-1,100,000 lekking males)
Woodlark	2 pairs (increase from 1 individual in 2003-07)	1.0% (200 pairs)	0.21% (960 pairs)	<0.0001% (1,890,000-3,890,000 pairs)

- 4.5.6. Based on the latest estimates for Wisley Common and Ockham Common, it is clear that all three populations of all three qualifying species have increased since the period of 2003 to 2007. In addition, the populations of all three qualifying species for Wisley Common and Ockham Common equate to 1% or greater of the total population of the Thames Basin Heaths SPA.

4.6. Likely future changes in baseline conditions (in the absence of the Scheme)

- 4.6.1. The survey data, as described in Appendix B demonstrates that the breeding populations of qualifying species will fluctuate from year to year. This may depend on a number of factors, such as the amount of heathland management that has taken place in the previous year (for example, woodlark numbers will drop if there are no recently cleared areas²⁷), breeding success, or the severity of the previous winter (for example Dartford warblers are particularly susceptible to harsh winters with extended periods of cold weather, especially with prolonged blanketing of the ground by snow, which causes high mortality because invertebrate prey becomes scarce and inaccessible²⁸).
- 4.6.2. The Ockham and Wisley Commons SSSI component of the SPA is managed by

²⁵ Taken from the JNCC (2016) The status of UK SPAs in the 2000s: the Third Network review.

²⁶ Taken from the JNCC (2016) The status of UK SPAs in the 2000s: the Third Network review.

²⁷ According to the Natural England Supplementary Advice for Qualifying Features: A246 *Lullula aborea* Woodlark, woodlarks require habitats predominantly consisting of vegetation less than 20 cm in height (refer to Appendix A, Table 3)

²⁸ Jiguet, F. and Williamson, T. (2013) Habitat-dependent population recovery in the Dartford Warbler *Sylvia undata* following a severe winter episode. *Bird Study*, Volume 60, Issue 3 pp391-398.

the SWT. In the 2010-2020 Wisley and Ockham Management Plan, SWT confirm that the management plan will include the management of existing heathland, the removal of 5 ha of woodland to allow heathland restoration and the management of some retained areas of woodland. The woodland areas proposed to be cleared for heathland restoration fall outside the DCO boundary. The woodland around the outer edge of the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA is maintained to provide a buffer (against aerial pollution, traffic noise, spread of litter and visual disturbance) between the open heathland and the A3/M25.

- 4.6.3. The objectives set by the management plan include discretionary targets to maintain or increase the populations of all three qualifying SPA species within Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA.
- 4.6.4. The management work carried out since the SWT 2010-2020 Wisley and Ockham Management Plan was implemented, has led to increases in all three qualifying species since the 2003-2007 baseline (see Table 6).
- 4.6.5. Assuming that in the absence of the Scheme, the habitat within the Ockham and Wisley Commons SSSI component of the SPA will continue to be managed in a similar way by SWT, then the breeding populations of the qualifying species can be expected to remain fairly stable and will mirror the existing baseline.

4.7. Details of the key species, habitat dynamics and functional relationships that maintain the sites 'integrity'

- 4.7.1. The Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA consists of approximately 78 ha of open heathland and approximately 143 ha of woodland. The woodland consists of Scots pine dominated mixed woodland, and areas of Scots pine plantation. There are footpaths through the areas of woodland, including sandy open rides through the woodland on Ockham Common.
- 4.7.2. Breeding bird surveys in 2016, 2017 and 2018 have confirmed that all three qualifying species (breeding Dartford warbler, nightjar and woodlark) only occur within the open heathland areas of Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA.
- 4.7.3. There were no records of these qualifying species within any of the woodland areas within the SPA, including the DCO boundary (Refer to Figures 2A – 2K of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for all registrations of qualifying species during the 2016, 2017 and 2018 breeding bird surveys undertaken by Atkins).
- 4.7.4. During the 2018 breeding bird surveys, no woodlark territories were recorded. The number of woodlark territories appears to have reduced in recent years and this may be due to the successional growth of vegetation within previously cleared areas of the heathland²⁹.
- 4.7.5. The number of nightjar and Dartford warbler territories within Wisley Common and Ockham Common have remained fairly constant in recent years, with

²⁹ According to the Thames Basin Heaths SPA Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features (as shown in Appendix A), woodlarks require ground vegetation which is predominantly short (<5 cm) or medium (10-20cm) in height, with frequent patches of bare or sparsely-vegetated ground and scattered clumps of shrubs and trees.

nightjar territories distributed throughout the heathland areas and Dartford warbler territories associated with established gorse areas within the open heathland.

Dartford warbler

- 4.7.6. Dartford warblers are one of a small number of wholly insectivorous resident passerines (song birds) in Britain.
- 4.7.7. They are exclusively associated with heathland³⁰ and favour areas with tall, dense gorse and tall, mature heather for nesting. They are a resident species and can be found within these heathland habitats year-round.
- 4.7.8. The availability of areas of shorter but structurally diverse vegetation nearby are important in providing a year-round supply of prey, such as beetles, spiders, caterpillars and bugs³¹. This reliance on invertebrates throughout the year, ensures that Dartford warblers have a strong affinity to heathland with mature gorse³² and are negatively associated with woodland³³. A study by Bibby (1979)³⁴ has shown that gorse is a greater invertebrate resource than in dwarf shrub vegetation or pine or birch scrub.
- 4.7.9. Dartford warblers are resident year-round and will remain within their heathland habitat, rather than foraging further afield. Therefore, due to all of the heathland areas within and adjacent to the DCO boundary being surveyed, it is considered that all Dartford warbler territories have been recorded and fall outside the DCO boundary.
- 4.7.10. Due to the absence of heathland within the DCO boundary there is no functionally linked habitat for Dartford warblers throughout the wider Scheme.

Nightjar

- 4.7.11. Nightjars are summer visitors, arriving in the UK between late April to mid-May and typically depart again in August³⁵. They breed within open heathland and within open areas of plantation woodland. They are insectivorous, feeding primarily on flying insects, such as moths and beetles³⁰.
- 4.7.12. Studies by Sharps *et al.*³⁶, and Verstraten *et al.*³⁷ have demonstrated that nightjars actively avoid established woodland for foraging, even though it supports higher levels of invertebrate food. Instead nightjars select open areas, woodland edges and young woodland (less than 10 years age) for foraging. However, the adjacent woodland areas within the SPA may contribute to the invertebrate resource of nightjars, by increasing the abundance of moths and beetles within the heathland areas, especially at the woodland edges.

³⁰ Bibby, C.J. and Tubbs, C.R. (1975) Status, habitats and conservation status of the Dartford warbler in England. British Birds (Volume 68, No. 5).

³¹ Thames Basin Heaths SPA Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features (as shown in Appendix A).

³² Bibby, C. (1979) Foods of the Dartford warbler *Sylvia undata* on southern English heathland. Journal of Zoology, 188 (4). pp. 557-576.

³³ van den Berg, L. J. L., Bullock, J. M., Clarke, R. T., Langston, R. H. W., Rose, R. J. (2001) Territory selection by the Dartford warbler (*Sylvia undata*) in Dorset, England: the role of vegetation type, habitat fragmentation and population size. Biological Conservation, 101 (2). pp. 217-228.

³⁴ Bibby, C.J. (1979) Foods of the Dartford warbler *Sylvia undata* on southern English heathland. Journal of Zoology 188, 557.

³⁵ RSPB: nightjar (<https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/nightjar/>; accessed 10/04/19).

³⁶ Sharps, K., Henderson, I., Conway, G., Armour-Chelu, N. and Dolman, P. (2015) Home-range size and habitat use of European Nightjars *Caprimulgus europaeus* nesting in a complex plantation-forest landscape. Ibis, 157 (2). pp. 260-272.

³⁷ Vertschaeten, G., Baeten, L. and Verheyen, K. (2011) Habitat preferences of European Nightjars *Caprimulgus europaeus* in forests on sandy soils. Bird Study Vol 58, Issue 2.

- 4.7.13. The studies by Sharps *et al.* (2015) used radio tracking devices on 31 nightjars in Thetford Forest. This radio tracking revealed that nightjars travelled a mean maximum distance of 747 m between breeding and feeding locations each night, demonstrating the importance of having foraging and nesting habitats in close proximity. All observations of nightjars during the 2016, 2017 and 2018 surveys were within the open heathland habitats of Wisley Common and Ockham Common. However, Sharps *et al.* (2015) noted that nightjars can forage within grazed grassland (possibly as the dung leads to an increase in beetle abundance), and it is possible that nightjars breeding within Wisley Common may use the adjacent grazed fields within and surrounding Pond Farm for occasional foraging, and the nightjars at Ockham Common may use the grazed fields at Hatchford End for occasional foraging.
- 4.7.14. There is no grazed grassland within the temporary or permanent land take of the DCO boundary, and therefore no functionally linked habitat for nightjars within the wider Scheme³⁸.

Woodlark

- 4.7.15. Woodlarks are short-distance migrants, returning to heathland areas for breeding as early as January. They typically incubate eggs from mid-March and will have two, sometimes three broods, and can continue breeding into July³⁹. The key prey items of woodlarks are spiders, weevils and caterpillars. Woodlarks are known to require open areas with bare ground and short, sparse vegetation for foraging⁴⁰ and tend to nest in more densely vegetated areas where they can build a nest at the base of plants⁴². Therefore, they would not select to breed or forage within established mixed woodland. However, the adjacent woodland areas within the SPA may contribute to the invertebrate resource of woodlarks, by increasing the abundance of invertebrates such as moths and associated caterpillars within the heathland areas.
- 4.7.16. As described in the Natural England (2016) European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features, SPA (see Appendix A for details), woodlark tend to forage within open and unobstructed terrain within 0.2 km of their nest site. This can include adjacent grass areas, arable fields and golf courses. Therefore, it is possible that woodlarks breeding within Wisley Common may use the adjacent grazed fields within and surrounding Pond Farm for occasional foraging, and woodlarks at Ockham Common may use the grazed fields at Hatchford End for occasional foraging.
- 4.7.17. Woodlarks can also utilise wide rides and open areas in woodland plantations.
- 4.7.18. There is no grazed grassland, arable fields or golf courses within the temporary or permanent land take of the DCO boundary, and therefore no functionally linked habitat for woodlarks within the wider Scheme⁴³.

³⁸ The compensation package contains grazed grassland, but this will be considered separately in Chapter 13.

³⁹ RSPB: What do woodlarks need? (<https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/advice/conservation-land-management-advice/woodlarks/>; accessed 10/04/19).

⁴⁰ Bowden, C (1990) Selection of foraging habitats of woodlark (*Lullula arborea*) nesting in pine plantations. *Journal of Applied Ecology* 27(2): 410.

⁴¹ RSPB Land management for woodlarks (<https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/advice/conservation-land-management-advice/woodlarks/>; accessed 13/05/18).

⁴² Mallord, J. W., Dolman, P. M., Brown, A. and Sutherland, W. J. (2007) Nest-site characteristics of Woodlarks *Lullula arborea* breeding on heathlands in southern England: are there consequences for nest survival and productivity?, *Bird Study* (54:3, 307-314).

⁴³ The compensation package contains grazed grassland, but this is considered separately in the HRA Assessment of Alternatives, consideration of the IROPI and compensatory measures - HE551522-ATK-EAC-RP-ZH-000001.

5. Assessment methodologies and assumptions

- 5.1.1. The purpose of the SIAA is to establish whether there are elements of the Scheme that could have an adverse effect on the integrity of the site.
- 5.1.2. The assessment of integrity is based on the site features and conservation objectives of the Thames Basin Heaths SPA.
- 5.1.3. The SIAA includes two main parts⁴⁴:
 - 1. The first part is the procedural role of scoping the requirements for gathering and submission of information, in order to produce a detailed characterisation of the site and provide further characterisation of the Scheme.
 - 2. The second part is the consideration of this information, or the assessment/prediction of the impact that the Scheme will have on the integrity of a European Site.
- 5.1.4. A summary of the likely significant effects (LSEs) identified during the HRA Screening is provided in Appendix C of this document. The potential for adverse effects on the integrity of the European site from the Scheme 'in combination' with other projects and plans has also been considered in this HRA. Although impacts from an individual project or plan may have no adverse effects on the integrity of a European site, cumulative impacts from other plans and projects may result in an in-combination effect on one or more interest features of the European site. Adverse effects on integrity by these means must also be considered.
- 5.1.5. Details of Local Plan HRAs for local boroughs within 10 km of the DCO boundary, and projects within 2 km of the Ockham and Wisley Commons SSSI component of the SPA, that were taken to Stage 2 in the Cumulative Impacts Chapter of the Environment Statement were reviewed in order to determine whether there is potential for in combination effects (see Section 6.3).
- 5.1.6. Where appropriate, mitigation measures have been put forward to address or reduce adverse effects on integrity of the European site. These include embedded measures within the Scheme (Appendix D, Table D.1) and SPA-specific mitigation measures (Appendix D, Table D.2).
- 5.1.7. If, after taking mitigation measures into account, it cannot be ruled out that there will be no adverse effects on the integrity of the Thames Basin Heaths SPA, then Stage 3 of the HRA (Assessment of Alternative Solutions) is triggered, which may in turn lead to Stage 4 (Assessment of IROPI) and Stage 5 (Compensatory measures).
- 5.1.8. The key stakeholders (Natural England, SWT and RSPB) were consulted during the HRA Stage 1: Screening process and agreed on the potential impacts of the Scheme that would lead to an LSE on the Thames Basin Heaths SPA. These LSEs form the potential impacts for consideration during the SIAA and are summarised in Appendix C of this report. This process of consultation has been recorded in the HRA consultation report (application document TR010030/APP/5.3) in Annex B of this report.

⁴⁴ Taken from paragraphs 4.22-4.23 of DMRB Volume 11 Section 4 Part 1 HD44/09: Assessment of Implications (of highways and/or roads projects) on European Sites (including Appropriate Assessment).

- 5.1.9. For each LSE, the relevant specialists were consulted in order to obtain the relevant information and interpretation support, to allow an assessment of an adverse effect to be undertaken.
- 5.1.10. For each LSE identified during the HRA Screening, any predicted changes resulting from the Scheme were assessed against the existing baseline to determine any changes and identify any adverse effects on the integrity of the Thames Basin Heaths SPA.
- 5.1.11. This SIAA deviates from the template provided in Volume 11 Section 4 Part 1 HD 44/09 Annex F: Outline contents for a statement to inform an Appropriate Assessment, because the HRA-specific mitigation measures (as described in D.2 in Appendix D) are considered before the potential impacts on protected sites. This deviation is due to the SIAA identifying adverse effects that cannot be eliminated with HRA-specific mitigation. Therefore, to avoid repetition and for the convenience of the reader, the potential adverse effects are only assessed after both the embedded mitigation measures within the Scheme and the HRA-specific mitigation measures are taken into account.

6. Mitigation (embedded measures and HRA-specific mitigation)

- 6.1.1. The HRA Screening document was reviewed in light of a Court of Justice of the European Union (CJEU) ruling in April 2018 (referred to as the 'People over Wind' ruling⁴⁵) and does not consider avoidance and mitigation measures.
- 6.1.2. The embedded measures and HRA-specific mitigation measures, both for construction and design, have been taken into account in the SIAA, which is permissible at this stage of the Article 6 appropriate assessment process as clarified by the CJEU in the People Over Wind case.
- 6.1.3. Table D.1 in Appendix D lists the embedded measures within the construction and operation of the Scheme that benefit the whole Scheme, but still have beneficial measures for the SPA. These measures are committed to in the Environmental Statement (application document TR010030/APP/6.3).
- 6.1.4. Table D.2 in Appendix D lists HRA-specific mitigation measures that are designed specifically to ensure that the likely significant effects identified during the HRA Screening do not result in an adverse effect on the integrity of a European Site. These measures are committed to in the Environmental Statement (application document TR010030/APP/6.3) and will be secured through the Construction Environmental Management Plan (CEMP).
- 6.1.5. An Outline CEMP (application document TR010030/APP/7.2) has been produced. The CEMP will be produced during detailed design and will incorporate mitigation commitments identified in the Outline CEMP, the Environmental Statement and the HRA.

⁴⁵ People over wind, Peter Sweetman v Coillte Teoranta (C-323/17)

7. HRA Stage 2: potential impacts on protected sites

- 7.1.1. The competent authority (in this case the Secretary of State) is responsible for undertaking the appropriate assessment of the Scheme under the Habitats Regulations. This section will provide an objective and scientific assessment of the Scheme's implications on the integrity of the Thames Basin Heaths SPA.
- 7.1.2. Each of the potential impacts resulting from the Scheme (as identified in the HRA Screening, agreed with the stakeholders and listed in Appendix C) will be considered in detail in this section. The construction and design mitigation will be taken into account and the following tests on the integrity of the Thames Basin Heaths SPA will be considered for all of the qualifying features in view of their conservation objectives:
1. It cannot be concluded that there would be no adverse effect on site integrity, or;
 2. It can be concluded that there would be no adverse effect on site integrity.
- 7.1.3. When considering site integrity, the following checklist has been considered (as taken from Annex F of the DMRB Volume 11 Section 4 Part 1 HD44/09: Assessment of Implications (of highways and/or roads projects) on European Sites (including Appropriate Assessment)). Does the project have potential to:
1. Cause delays in progress towards achieving conservation objectives of the site?
 2. Interrupt progress towards achieving conservation objectives of the site?
 3. Disrupt those factors that help maintain the favourable conditions of the site?
 4. Interfere with the balance, distribution and density of key species that are the indicators of favourable condition of the site?
 5. Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?
 6. Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?
 7. Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?
 8. Reduce the area of key habitats?
 9. Reduce the population of key species?
 10. Change the balance between key species?
 11. Reduce the biodiversity of the site?
 12. Result in disturbance that could affect population size or density of the balance between key species?

13. Result in fragmentation?

14. Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding etc)?

- 7.1.4. In accordance with The Planning Inspectorate Advice Note 10⁴⁶ the following potential adverse effects on the integrity of the Thames Basin Heaths SPA have been summarised in an Integrity Matrix, as taken from Appendix 2 of Advice Note 10. This table can be found in Appendix E.

7.2. Alone

Habitat loss (construction and operation)

- 7.2.1. When considering Scheme options during the preliminary design stages, the Scheme option that caused the least habitat loss within the SPA was selected (see Section 2 of HRA Stages 3-5: Assessment of Alternatives, consideration of the IROPI and compensatory measures (application document TR010030/APP/5.3). This land take is considered as a construction impact.
- 7.2.2. The Scheme will result in the permanent loss of 5.9 ha of the Thames Basin Heaths SPA, and 8.6 ha temporary loss.
- 7.2.3. This is a permanent loss of approximately 0.1% of the total SPA (8,274.7 ha) and a temporary loss of approximately 0.1% of the total SPA.
- 7.2.4. This is also a permanent loss of 2.7% of the Ockham and Wisley Commons SSSI component of the SPA (222.2 ha) and a temporary loss of 3.9% of the Ockham and Wisley Commons SSSI component of the SPA.
- 7.2.5. The land take is immediately adjacent to the A3 and M25, and consists of 14.4 ha of Scots pine dominated mixed woodland and 0.1 ha of Bolder Mere. All existing heathland will be retained as a result of the Scheme (Refer to Figure 3 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for a plan of the habitats within the Ockham and Wisley Commons SSSI component of the SPA).
- 7.2.6. The temporary land take will be reinstated with shrub and tree planting, which will provide a more diverse habitat than the existing Scots pine-dominated woodland.

Potential reduction in nesting and foraging habitat

- 7.2.7. The Thames Basin Heaths SPA qualifies for its breeding populations of Dartford warbler, nightjar and woodlark. Therefore, the key habitats within the site are those used by foraging and nesting SPA qualifying species.
- 7.2.8. The breeding bird surveys carried out at Wisley Common and Ockham Common in 2016, 2017 and 2018 have provided numerous registrations⁴⁷ of all three qualifying species. These registrations have been recorded in Figures 2A – 2K of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3). It can be clearly seen that all three qualifying species (breeding Dartford warbler, nightjar and woodlark) only breed and forage within

⁴⁶ The Planning Inspectorate (2016) Habitats Regulations Assessment Advice note ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects.

⁴⁷ A registration is a record of a bird, either by sight or sound. The location of a bird is marked on a map, along with details of the species, number of birds and any behavioural activities (such as singing, calling, nest building).

the open heathland areas, and are not found within the mixed woodland areas which will be lost as a result of the Scheme. Therefore, the Scheme will not lead to a direct reduction in the area of key habitats that directly support these species.

- 7.2.9. Section 4.7 considers existing studies to establish the nesting and foraging habitats that each of the qualifying species require and provides evidence to demonstrate that none of the three qualifying species will directly utilise any of the established woodland throughout the Ockham and Wisley Commons SSSI component of the SPA for nesting or foraging, and that there is no functionally linked land for any of the three qualifying species within the DCO boundary throughout the wider Scheme.

Potential reduction in invertebrate resource

- 7.2.10. Whilst the mixed woodland to be lost as a result of the Scheme does not directly support the qualifying species as a nesting or foraging habitat, it does form a supporting habitat of the SPA and does contribute to the overall invertebrate resource within the wider SPA.
- 7.2.11. However, the qualifying species are all heathland specialists, and it may not be the case that the qualifying species rely on the presence of this woodland in order to have sufficient invertebrate food resource.
- 7.2.12. SWT has undertaken extensive clearance of woodland parcels within Ockham Common and Wisley Common since 2010, as part of the 2010-2020 Wisley and Ockham Management Plan. This has led to increases in heathland within the Ockham and Wisley Commons SSSI component of the SPA from 29 ha to 78 ha between 1999 and 2011. These increases in heathland have led to increases in all three qualifying species since the 2003-2007 baseline (see Table 6), indicating that the heathland habitat provides sufficient invertebrate resource to support the qualifying species, and the loss of woodland in order to allow heathland to regenerate has not prevented the populations from increasing in response to the additional areas of heathland.
- 7.2.13. As described in Section 4.7, Dartford warblers are solely reliant on heathland and the associated invertebrate resource provided by plants, such as gorse. The surrounding woodland does not contribute to the invertebrate resource requirements of Dartford warblers.
- 7.2.14. A study by Wright *et al.* (2007)⁴⁸ has demonstrated that there was no significant difference in reproductive productivity of woodlark between heathland and forest clear-fells, indicating that forestry and heathland habitats are similar in quality for breeding woodlarks. Therefore, the heathland habitats within the Ockham and Wisley Common SSSI component of the SPA would provide a suitable invertebrate resource for woodlarks, even in the absence of surrounding woodland. This is further supported by Langston *et al.* (2007)⁴⁹ who assessed the population changes of woodlark and identified increases in population size in direct response to the restoration of heathland habitats.
- 7.2.15. Nightjars forage over open heathland, forest rides and woodland edges and do

⁴⁸ Wright, L. J., Hoblyn, R. A., Sutherland, W. J., and Dolman, P. M. (2007) Reproductive success of Woodlarks *Lullula arborea* in traditional and recently colonized habitats. *Bird Study* 54(3):315-323.

⁴⁹ Langstone, R. H. W., Wotton, S. R., Conway, G. J., Wright, L. J., Mallord, J. W., Currie, F. A., Drewitt, A. L., Grice, P. V., Hoccom, D. G. and Symes, N. (2007) Nightjar *Caprimulgus europaeus* and Woodlark *Lullula arborea* – recovering species in Britain? *IBIS*, 149 (250-260).

not forage within the woodland areas to be lost as a result of the Scheme. However, as described in section 4.7, established woodland provides a good invertebrate resource and therefore may increase the availability of invertebrates within the heathland and woodland edge habitats. However, this is not to say that the heathland habitat alone cannot support nightjar in the absence of surrounding woods.

- 7.2.16. Nightjars are present in the UK between late April and the end of August, with young typically hatching from mid-June and fledging in late August⁵⁰. This peak period of food demand when provisioning young coincides with the flowering period for the key plants that occur within the heathland (cross-leaved heath is in flower from June to September⁵¹, bell heather is in flower from July to November⁵² and gorse is in flower from July to November⁵³) and therefore invertebrate abundance within the heathland will be at a peak with regards to nectar-reliant invertebrate species during the period that nightjars are provisioning young.
- 7.2.17. The permanent loss of 5.9 ha of mixed woodland habitat, and temporary loss of 8.6 ha of mixed woodland habitat from the SPA equates to 10.1% of the total woodland within the Ockham and Wisley Commons SSSI component of the SPA (143 ha).
- 7.2.18. The temporary land take will be reinstated with shrub and tree planting, which will provide a more diverse habitat than the existing Scots pine-dominated woodland, and once established, this diverse habitat is likely to provide an enhanced invertebrate resource.

Consideration of conservation objectives and other indicators

- 7.2.19. Although the loss of this woodland habitat would not lead to a physical reduction in the number or distribution of qualifying species, this land take will reduce the overall size of the SPA. The land take will therefore result in a reduction in the habitats that provide supporting habitat to the SPA (for example, providing a woodland buffer between the roads and the open heathland areas).
- 7.2.20. The loss of invertebrate resources could have an impact on the following targets identified in the Natural England Supplementary Advice on Conserving and Restoring Features, and thus interrupt progress towards achieving the conservation objectives of the SPA, particularly with regards to nightjar:
1. Food availability: Maintain or restore the distribution, abundance and availability of key prey items at prey sizes preferred by all three of the qualifying features;
 2. Extent and distribution of supporting habitat for the breeding season: Maintain the extent, distribution and availability of suitable breeding habitat which supports each of the three qualifying features for all necessary stages of their breeding cycle (courtship, nesting, feeding and roosting).
- 7.2.21. The adverse effects resulting from the permanent land take would result in a permanent reduction in the extent of supporting habitat for the SPA, including contributing to the invertebrate food resource for all three qualifying species

⁵⁰ Ferguson-Lees, J., Castall, R. and Leech, D. (2011) A field guide to monitoring nests. BTO; Thetford.

⁵¹ <https://www.wildlifetrusts.org/wildlife-explorer/wildflowers/cross-leaved-heath>; accessed 10/04/19.

⁵² <https://www.wildlifetrusts.org/wildlife-explorer/wildflowers/bell-heather>; accessed 10/04/19

⁵³ <https://www.wildlifetrusts.org/wildlife-explorer/trees-and-shrubs/common-gorse>; accessed 10/04/19.

(especially nightjar) during the breeding season. The temporary land take will be reinstated with shrub and tree planting, and therefore any adverse effects resulting from the loss of this land (i.e. the resulting reduction in invertebrates) will be long-term (i.e. up to 20 years for shrub and trees to establish) but not permanent.

- 7.2.22. Case law has established that, in order for the integrity of a site not to be adversely affected, the site needs to be preserved at a favourable conservation status; this entails 'the lasting preservation of the constitutive characteristics of the site concerned, that are connected to the presence of the natural habitat type whose preservation was the objective justifying the designation of that site'⁵⁴. Furthermore, where a plan or project will lead to the 'the lasting and irreparable loss' of the whole or part of a habitat type whose conservation was the objective that justified the classification of a site, 'the view should be taken that such a plan or project will adversely affect the integrity of that site'⁵⁵.
- 7.2.23. When considering the appropriate assessment test, although the evidence provided clearly demonstrates that the qualifying species are mainly reliant on the heathland habitats for their invertebrate resource, the loss of 10.1% of the total woodland within the Ockham and Wisley Commons SSSI component of the SPA will contribute to some reduction in the invertebrate food resource within the wider SPA and thus could have an indirect negative impact on the qualifying species (particularly nightjar).
- 7.2.24. The loss of this land will represent a permanent and irreversible adverse effect on the integrity of the Thames Basin Heaths SPA, with respect to the conservation objectives to 'maintain the extent and distribution of the habitats of the qualifying features' and 'maintain or restore the distribution, abundance and availability of key prey items'. However, this loss of land would not cause any reductions in the abundance and/ or distribution of populations of any of the three qualifying species, as the heathland habitats within which they occur will remain untouched by the Scheme.

Degradation of habitats by changes in air quality

- 7.2.25. As explained in section 4.7 above, all three SPA qualifying features are heavily reliant on heathland habitats (for nesting and foraging) and their associated invertebrate resource.
- 7.2.26. High levels of nitrogen deposition can lead to habitat changes, such as changes in plant species composition (e.g. dominance of tall grasses) and reductions in plant species richness.
- 7.2.27. The UK Air Pollution Management System (APIS) provides critical loads for pollutants being deposited from the air to the ground. Critical loads are defined as "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*"⁵⁶.
- 7.2.28. The air quality assessment (refer to Chapter 5 of the Environmental Statement (application document TR010030/APP/6.3)) has estimated the nitrogen deposition rates at receptor points within the SPA, both with and without the

⁵⁴ Case C-258/11 Sweetman v An Bord Pleanála (refer to paragraph 39)

⁵⁵ Case C-258/11 Sweetman v An Bord Pleanála (refer to paragraph 46)

⁵⁶ APIS (<http://www.apis.ac.uk/>) is a searchable database for information on pollutants and their impacts on habitats and species.

construction of the Scheme. These are calculated for the opening year 2022, although construction will take place between 2020 and 2023. However, the baseline for 2022 is considered to be sufficiently representative for the whole construction period. In addition, the existing baseline for 2015 has also been calculated. The nitrogen deposition rates are derived from the estimated changes in oxides of nitrogen (NO_x) concentrations.

- 7.2.29. The Ockham and Wisley Commons SSSI component of the SPA contains three critical load class habitat types according to the APIS site information⁵⁷:
3. Fen, marsh and swamp – Valley mires, poor fens and transitional mires (critical load 10-15 kg N/ ha/ year);
 4. Dwarf shrub heath – Dry heaths (critical load 10-20 kg N/ ha/ year); and,
 5. Dwarf shrub heath – Northern wet heath (critical load 10-20 kg N/ ha/ year).
- 7.2.30. The critical load is taken to be 10 kg N/ ha/ year as this is the lower limit of the critical load for all three critical load class habitat types within the Ockham and Wisley Commons SSSI.
- 7.2.31. The Ockham and Wisley Commons SSSI component of the SPA already exceeds the critical load for nitrogen deposition (refer to the 2015 baseline in Table 7 below).
- 7.2.32. A potentially significant effect can be considered where there is an increase in the nitrogen deposition rate of 1%, or greater, of the critical load of a habitat as a result of the Scheme, when compared against predictions without the Scheme taking place. This assessment of significance has been agreed with Natural England⁵⁸.
- 7.2.33. Significant increases in nitrogen deposition resulting from the Scheme (during construction or operation) could lead to a reduction in the quality (structure and diversity) of habitats that support nesting and foraging SPA qualifying species and their invertebrate resource. This could alter the structure and function of the habitats of the qualifying features, and thus lead to an adverse effect on the integrity of the Thames Basin Heaths SPA.
- 7.2.34. The details below are summarised from the air quality assessment in Chapter 5 of the Environmental Statement (application document TR010030/APP/6.3).

Construction

- 7.2.35. The embedded mitigation measures listed in Table D.1 of Appendix D will minimise the incidence of dust emissions during construction. These measures will ensure that dust emissions will not cause sufficient changes in air quality to have an adverse effect on any of the conservation objectives of the three qualifying species, or the integrity of the SPA. These embedded mitigation measures are proposed to be incorporated into the CEMP. The CEMP will state when these mitigation measures will be implemented and confirm who will be responsible for their implementation and monitoring.
- 7.2.36. An increase in vehicle movements is expected to occur during the construction period, associated with the transport of materials, plant and workers to and from

⁵⁷ APIS Ockham and Wisley Commons SSSI Site/Feature Information (<http://www.apis.ac.uk/src/select-a-feature?site=1001052&SiteType=SSSI&submit=Next>; accessed 21/02/19)

⁵⁸ Natural England meeting minutes 27/03/2018 as provided in Annex B HRA consultation report (application document TR010030/APP/5.3)

site. In addition, traffic movements will change as a result of road closures and the provision of temporary access roads. This may result in changes in nitrogen deposition during construction.

- 7.2.37. Nitrogen deposition levels were calculated for six transects within the SPA. These transects were selected to provide an accurate representation of the SPA surrounding M25 junction 10 (see Figure 4 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3)):
1. Transect 1: running south from M25 at the A3 northbound off-slip (at M25 junction 10, to west of A3);
 2. Transect 2: running south from M25 at the A3 southbound on-slip (at M25 junction 10, to east of A3);
 3. Transect 3: running west from A3 at the A3 northbound off-slip (at M25 junction 10);
 4. Transect 4: running east from A3 at the A3 southbound on-slip (at M25 junction 10);
 5. Transect 5: the A3 northbound, to the south of junction 10 (adjacent to Bolder Mere, to west of A3); and,
 6. Transect 6: the A3 southbound, to the south of junction 10 (adjacent to Bolder Mere, to east of A3).
- 7.2.38. Table 7 below shows the change in nitrogen deposition rate and the percentage change in critical load of nitrogen deposition when comparing the construction of the Scheme against no Scheme (calculations estimated for the year 2022, excluding overall reductions predicted). This table also shows the existing (2015) baseline.

Table 7: Changes in nitrogen deposition when comparing the construction of the Scheme against no Scheme (calculations estimated for the year 2022, excluding overall reductions predicted)

Transect	Distance from road edge	2015 existing baseline	2022 no Scheme	2022 construction of the Scheme	2022: no Scheme vs construction of the Scheme	
					2022 Change in N dep rate	Change as % of Lowest Range of Critical Load
Transect 1: running south from M25 at the A3 northbound off-slip (at M25 junction 10, to west of A3)	5 m	17.88	15.09	15.10	+0.01	+0.1%
	10 m	17.47	14.76	14.77	+0.01	+0.1%
	25 m	16.70	14.13	14.14	+0.01	+0.1%
	50 m	16.06	13.60	13.61	+0.01	+0.1%
	75 m	15.71	13.31	13.32	+0.01	+0.1%
	12 m	17.32	14.48	14.49	+0.01	+0.1%

Transect	Distance from road edge	2015 existing baseline	2022 no Scheme	2022 construction of the Scheme	2022: no Scheme vs construction of the Scheme	
					2022 Change in N dep rate	Change as % of Lowest Range of Critical Load
Transect 2: running south from M25 at the A3 southbound on-slip (at M25 J10, to east of A3)	25 m	16.71	14.00	14.01	+0.01	+0.1%
	50 m	16.11	13.55	13.55	<0.01	<0.1%
	75 m	15.80	13.30	13.31	+0.01	+0.1%
Transect 3: running west from A3 at the A3 northbound off-slip (at M25 J10)	7 m	17.74	14.91	14.94	+0.03	+0.3%
	10 m	17.36	14.54	14.56	+0.02	+0.2%
	25 m	16.38	13.74	13.76	+0.02	+0.2%
	50 m	15.77	13.27	13.28	+0.01	+0.1%
	75m	15.48	13.06	13.07	+0.01	+0.1%
Transect 4: running east from A3 at the A3 southbound on-slip (at M25 J10)	5 m	20.31	15.78	15.82	+0.04	+0.4%
	12 m	19.03	15.19	15.23	+0.04	+0.4%
	25 m	17.44	14.24	14.27	+0.03	+0.3%
	50 m	16.43	13.63	13.65	+0.02	+0.2%
	75 m	15.96	13.33	13.34	+0.01	+0.1%
Transect 5: the A3 northbound, to the south of junction 10 (adjacent to Bolder Mere, to west of A3)	8 m	18.27	15.60	15.65	+0.05	+0.5%
	10 m	17.79	15.20	15.24	+0.04	+0.4%
	25 m	16.34	13.95	13.97	+0.02	+0.2%
	50 m	15.54	13.24	13.25	+0.01	+0.1%
	75 m	15.20	12.93	12.94	+0.01	+0.1%
Transect 6: the A3 southbound, to the south of J10 (adjacent to Bolder Mere, to east of A3)	10 m	18.43	16.02	16.08	+0.06	+0.6%
	25 m	16.88	14.51	14.55	+0.04	+0.4%
	50 m	15.92	13.61	13.63	+0.02	+0.2%
	75 m	15.50	13.22	13.24	+0.02	+0.2%

- 7.2.39. As can be seen in Table 7, all increases in nitrogen deposition rates as a result of construction are less than 1% of the lowest range of the critical load. In addition, the total nitrogen deposition during the construction of the Scheme is still predicted to be below the current (2015) baseline levels (due to predicted technological improvements in vehicle emissions between now and the time the Scheme is operational). Therefore, it can be concluded with confidence that changes to air quality as a result of the construction of the Scheme will have no perceivable effect on any habitats within the SPA, nor the favourable conditions of the site upon which the qualifying features rely. Therefore, the conservation objectives of the SPA will not be affected as a result of the short-term (two to three years) construction works.
- 7.2.40. The changes in air quality as a result of the construction of the Scheme will have no adverse effects on the habitats within, nor the integrity of, the SPA, in respect of all three qualifying SPA features.

Operation

- 7.2.41. During operation, there is the potential for changes in nitrogen deposition as a result of changes in vehicle movements and the number of vehicles within the Affected Road Network (ARN). The air quality assessment has estimated the nitrogen deposition rates at receptor points within the SPA, both with and without the Scheme. These are calculated for 2022, when the Scheme is first expected to be operational. In addition, the existing baseline for 2015 has also been calculated.
- 7.2.42. Nitrogen deposition levels were calculated for six transects within the SPA. These transects were selected to provide an accurate representation of the SPA surrounding M25 junction 10 (see Figure 4 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3)):
1. Transect 1: running south from M25 at the A3 northbound off-slip (at M25 junction 10, to west of A3);
 2. Transect 2: running south from M25 at the A3 southbound on-slip (at M25 junction 10, to east of A3);
 3. Transect 3: running west from A3 at the A3 northbound off-slip (at M25 junction 10);
 4. Transect 4: running east from A3 at the A3 southbound on-slip (at M25 junction 10);
 5. Transect 5: the A3 northbound, to the south of junction 10 (adjacent to Bolder Mere, to west of A3); and,
 6. Transect 6: the A3 southbound, to the south of junction 10 (adjacent to Bolder Mere, to east of A3).
- 7.2.43. Table 8 below shows the change in nitrogen deposition rate and the percentage change in critical load of nitrogen deposition when comparing the operational Scheme against no Scheme (calculations estimated for the year 2022, excluding overall reductions predicted). This table also shows the existing (2015) baseline.
- 7.2.44. The assessment concluded that there will be no increases in nitrogen deposition greater than 1% of the relevant critical load within the SPA, for the transects running south from M25 at junction 10, to the west and east of the A3 (transects

1 and 2).

- 7.2.45. An increase in nitrogen deposition greater than 1% of the relevant critical load is predicted for the transect running west from A3 at the A3 northbound off-slip (transect 3). There is an increase of 1.1% of the critical load within the first 7m of the road edge, dropping to below 1.0% beyond this point.
- 7.2.46. An increase in nitrogen deposition greater than 1% of the relevant critical load is predicted for the transect running east from A3 at the A3 southbound on-slip (transect 4). There is an increase of 1.6% of the critical load within the first 5 m of the road edge, and 1.2% within 12 m of the road edge, dropping to below 1.0% beyond this point.
- 7.2.47. Within the SPA land adjacent to the A3 itself, nitrogen deposition levels are predicted to decrease as a result of the Scheme. To the west of the A3 (transect 5) there is a calculated decrease of 2.2% of the relevant critical load within the first 5 m of the road edge, dropping to 0.7% decrease at a distance of 50 m from the road edge. To the east of the A3 (transect 6), there is a calculated decrease of 4.1% of the relevant critical load within the first 5 m of the road edge, dropping to 0.7% decrease at a distance of 75 m from the road edge.
- 7.2.48. Although there is estimated to be an increase of greater than 1% of the relevant critical load within 12 m of the road edge in some locations within the SPA, as can be seen in Table 8, the total nitrogen deposition with the Scheme is still predicted to be below the current (2015) baseline levels (due to predicted technological improvements in vehicle emissions between now and the time the Scheme is operational). It can therefore be considered that the effect would not be significant.

Table 8: Changes in nitrogen deposition when comparing the operational Scheme against no Scheme (calculations estimated for the year 2022, excluding overall reductions predicted)

Transect	Distance from road edge	2015 existing baseline	2022 no Scheme	2022 operational Scheme	2022: no Scheme vs operational Scheme	
					Change in N dep rate	Change as % of Lowest Range of Critical Load
Transect 1: running south from M25 at the A3 northbound off-slip (at M25 J10, to west of A3)	5 m	17.88	15.85	15.79	-0.06	-0.6%
	10 m	17.47	15.18	15.21	+0.03	+0.3%
	25 m	16.70	14.35	14.40	+0.05	+0.5%
	50 m	16.06	13.75	13.78	+0.03	+0.3%
	75 m	15.71	13.43	13.45	+0.02	+0.2%
Transect 2: running south from M25 at the A3 southbound on-slip (at M25 J10, to east of A3)	12 m	17.32	14.77	14.78	+0.01	+0.1%
	25 m	16.71	14.22	14.21	-0.01	-0.1%
	50 m	16.11	13.72	13.70	-0.02	-0.2%
	75 m	15.80	13.45	13.43	-0.02	-0.2%
Transect 3: running west from A3 at the A3 northbound off-slip (at M25 J 10)	7 m	17.74	15.05	15.16	+0.11	+1.1%
	10 m	17.36	14.63	14.70	+0.07	+0.7%
	25 m	16.38	13.82	13.83	+0.01	+0.1%
	50 m	15.77	13.36	13.35	-0.01	-0.1%
	75m	15.48	13.14	13.13	-0.01	-0.1%
Transect 4: running east from A3 at the A3 southbound on-slip (at M25 J10)	5 m	20.31	16.06	16.22	+0.16	+1.6%
	12 m	19.03	15.51	15.63	+0.12	+1.2%
	25 m	17.44	14.41	14.45	+0.04	+0.4%
	50 m	16.43	13.75	13.76	+0.01	+0.1%
	75 m	15.96	13.43	13.43	0.00	0.0%
Transect 5: the A3 northbound, to the south of J10 (adjacent to Bolder Mere, to west of A3)	8 m	18.27	15.76	15.54	-0.22	-2.2%
	10 m	17.79	15.35	15.15	-0.20	-2.0%
	25 m	16.34	14.08	13.95	-0.13	-1.3%
	50 m	15.54	13.33	13.26	-0.07	-0.7%
	75 m	15.20	13.02	12.97	-0.05	-0.5%

Transect	Distance from road edge	2015 existing baseline	2022 no Scheme	2022 operational Scheme	2022: no Scheme vs operational Scheme	
					Change in N dep rate	Change as % of Lowest Range of Critical Load
Transect 6: the A3 southbound, to the south of J10 (adjacent to Bolder Mere, to east of A3)	10 m	18.43	16.44	16.03	-0.41	-4.1%
	25 m	16.88	14.75	14.53	-0.22	-2.2%
	50 m	15.92	13.76	13.64	-0.12	-1.2%
	75 m	15.50	13.33	13.26	-0.07	-0.7%

- 7.2.49. Figure 4 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) shows the estimated changes in nitrogen deposition rates as a result of the Scheme for the year of opening, 2022 and Figure 5 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) shows the estimated percentage change of critical load of nitrogen deposition as a result of the Scheme for the year of opening, 2022.
- 7.2.50. These assessments have demonstrated that the potential for increases in nitrogen deposition greater than 1% of the critical load due to operation will be restricted to the first 12 m from the operational road boundary for Transect 4 and within 7 m from the operational road boundary for Transect 3. All other estimated increases in nitrogen deposition within the SPA can be considered not to be significant as they are below 1% of the critical load, and in many locations, nitrogen deposition will be reduced when compared against the no Scheme 2022 scenario.
- 7.2.51. There is no lowland heath habitat present within the area of the SPA which will experience deposition greater than 1% of the critical load. The qualifying species only breed within the open heathland areas and are not found within the mixed woodland areas adjacent to the A3 and / or the M25, where the increases occur. Also, as explained in Section 3.7, there is no functionally linked land for any of the qualifying species within or immediately adjacent to the DCO boundary elsewhere throughout the wider Scheme.
- 7.2.52. Any increases predicted as a result of the operation of the Scheme in 2022 are below the current (2015) baseline nitrogen deposition levels (see Table 8). Therefore, it can be concluded with confidence that changes to air quality as a result of the operation of the Scheme will have no perceivable effect on any habitats within the SPA, nor the favourable conditions of the site upon which the qualifying species rely. Therefore, the changes in air quality as a result of the operational Scheme will have no adverse effects on the habitats within, nor the integrity of, the SPA, in respect of all three qualifying SPA features.

Degradation of habitats by changes in water quality (surface water, groundwater and flood risk)

- 7.2.53. The baseline for the Scheme, including the SPA, is described in Section 8.7 of

the Environmental Statement (application document TR010030/APP/6.3).

- 7.2.54. Section 4.7 of this report considers the dietary and habitat requirements of Dartford warblers, nightjars and woodlarks. The key points are summarised here:
1. Dartford warblers are associated with heathland with dense gorse and tall, mature heather, with nearby areas of shorter but structurally diverse heathland vegetation nearby for foraging. They feed on a diet mainly of beetles, spider, caterpillars and bugs;
 2. Nightjars breed within open heathland and within open areas of plantation woodland. They select open areas, woodland edges and young woodland (less than 10 years age) for foraging and feed primarily on flying insects, such as moths and beetles;
 3. Woodlarks require open areas with bare ground and short, sparse vegetation for foraging and tend to nest in more densely vegetated areas where they can build a nest at the base of plants. Their key prey items are spiders, weevils and caterpillars.
- 7.2.55. The habitat and food requirements for all three SPA qualifying species demonstrate a strong reliance on heathland habitats, rather than a preference for any wetland habitats or associated wetland invertebrates. Therefore, any adverse effects on SPA qualifying species resulting from changes in water quality, would have to be as a result of changes to the surrounding heathland areas (and thus a change to the structure and function of the habitats of the qualifying features), rather than as a direct result of the changes to the water quality.

Construction

- 7.2.56. Temporary impacts during construction have the potential to affect the water environment through (but not limited to) the following:
1. The excavation of materials, and the subsequent deposition of soils, sediment, or other construction materials, **for example through the creation of balancing ponds which are proposed at various locations within the Scheme boundary;**
 2. The spillage of fuels or other contaminating liquids from plant used in the construction process;
 3. The mobilisation of contamination following the disturbance of contaminated ground or groundwater, for example through earth movement during the construction of the new roads such as the new Wisley Lane; and,
 4. Runoff from construction sites to surface water bodies, for example where construction works are immediately adjacent to a watercourse or lake such as the widening of the A3 immediately adjacent to Bolder Mere.
- 7.2.57. These impacts could result in sediment and/ or other contaminants entering watercourses, or groundwater affecting the quality of the water within the SPA. This could in turn affect the conservation objectives of the SPA, by altering the structure and function of the habitats of the qualifying features and/ or the supporting processes on which the habitats of the qualifying features rely.
- 7.2.58. A number of embedded mitigation measures are listed in Table D.1 of Appendix D. These embedded measures are described in more detail in Section 8.9 of the

Environmental Statement (application document TR010030/APP/6.3). These Scheme-wide measures are in place to avoid these potential construction impacts.

- 7.2.59. In addition, the construction works will include the diversion of a gas main under the A3. No active dewatering of groundwater will take place during the diversion of the gas main or for any other construction works. Where construction works extend below the water table, measures will be implemented such that groundwater levels are not adversely impacted outside of the DCO boundary. Therefore, the SPA outside the land take area (and the habitats and qualifying features that it supports) will not be adversely affected.
- 7.2.60. These embedded measures will be specified within contract documentation and incorporated into the CEMP. The CEMP will state when these mitigation measures will be implemented and confirm who will be responsible for their implementation and monitoring.
- 7.2.61. Therefore, with the embedded measures in place, the risk of contamination or water quality incidents during construction will be negligible. **With such low risks**, there should be no deterioration of the condition of the surface water and/or groundwater within the site whatsoever. It can be concluded with confidence that there will be no adverse effects on the integrity of the SPA as a result of changes in surface water quality, groundwater quality or flood risk, in respect of all three qualifying SPA features, during the construction of the Scheme.

Operation

- 7.2.62. During operation, roads are designed to drain freely to prevent build-up of standing water on the carriageway whilst avoiding exposure to or causing flooding. Contaminants deposited on the road surface are quickly washed off during rainfall. The assessment of the impact of road run-off being discharged into the water environment (including mitigation measures) has identified a negligible impact with neutral significance of effects on the drains within the SPA (refer to Chapter 8 road drainage and the water environment of the Environmental Statement (application document TR010030/APP/6.3) for further details).
- 7.2.63. On all roads, there is also a risk that a spillage may lead to an acute pollution incident. However, an assessment of pollution impacts from accidental spillages determined that all catchments which discharge to surface water have negligible potential for an impact from spillages (refer to Chapter 8 of the Environmental Statement (application document TR010030/APP/6.3) for further details).
- 7.2.64. Overall, the surface water and groundwater assessment in Chapter 8 of the Environmental Statement (application document TR010030/APP/6.3) shows that the impact on water quality is negligible. Therefore, it can be concluded that there will be no anticipated significant effect on licenced abstractions, consented discharges or designated sites during operation.
- 7.2.65. The operation of the Scheme is not considered to adversely affect flood risk. The design of the scheme avoids impacts to floodplains and mitigates any potential impacts on surface water due to changes in the drainage runoff. There are no impacts on other sources of flood risk (refer to Chapter 8 of the Environmental Statement (application document TR010030/APP/6.3) for further details).

- 7.2.66. Therefore, with the embedded mitigation measures in place, the risk of contamination or water quality incidents during operation will be negligible. With such low risks, there should be no deterioration of the condition of the surface water and/ or groundwater within the site whatsoever. It can be concluded with confidence that there will be no adverse effects on the integrity of the SPA as a result of changes in surface water quality, groundwater quality or flood risk, in respect of all three qualifying SPA features, during the construction of the Scheme.

Disturbance by changes in noise

- 7.2.67. An assessment of existing studies on the effects of road noise on birds by Dooling and Popper (2007)⁵⁹ identified several cases where the density of breeding birds is reduced in the proximity of busy roads, in response to the higher levels of noise.
- 7.2.68. This included a study by Forman *et al.* (2002)⁶⁰ which looked at the presence of five species of grassland bird populations in grasslands at different distances from roads in and around Boston. They found that as traffic flow increased, the distance from the road at which breeding density was lower also increased.
- 7.2.69. The cause of reduced breeding density as a result of road noise has not been conclusively proven, but is thought to be due to increased noise causing disturbance of communication and/ or increased stress in birds⁶¹ (i.e. traffic noise could hamper detection of song by conspecifics, making it more difficult for birds to establish and maintain territories, attract mates and maintain pair bonds, and possibly leading to reduced breeding success⁶²).
- 7.2.70. A study of 20 passerine bird species in pasture-woodland environments near several roads in western central Spain by Peris and Pescador (2004)⁶³, demonstrated that changes in breeding density in response to road noise varies between species. In addition, studies by Reijnen *et al.* (1995⁶⁴ and 1997⁶⁵) have shown that the average noise threshold for woodland bird species is 42-34 dB, and ranges from 36 dB for the most sensitive species (e.g. cuckoo) to 58 dB for the least sensitive (e.g. woodcock). Above these thresholds, a rapid fall in population numbers of breeding birds is evident.
- 7.2.71. It was not possible to find specific studies on the response of any of the three SPA qualifying species to noise levels. However, based on the studies described in this section it is almost certain that the existing background noise levels, which exceed 55 dB throughout the heathland areas during both the daytime and night time⁶⁶ will have a reducing effect on the breeding density of the SPA qualifying species, and that any significant noise increases as a result of the Scheme could

⁵⁹ Dooling, R. and Popper, A.N. (2007) The effects of highway noise on birds. California Department of Transportation; Sacramento.

⁶⁰ Forman, R. T. T., Reineking, B., and Hersperger, A. M. (2002) Road traffic and nearby grassland bird patterns in a suburbanizing landscape. *Environ. Manage.* (29, 782-800).

⁶¹ Reijnen, R., Foppen, R., Ter Braak, C. and Thissen, J. (1995) The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* (32, 187-202).

⁶² Parris, K. (2009) Impacts of Traffic Noise and Traffic Volume on Birds of Roadside Habitats. *Ecology and Society* (14: 1).

⁶³ Peris, S. J., and Pescador, M. (2004). Effects of traffic noise on passerine populations in the Mediterranean wood pastures. *Appl. Acoust.* (65, 357-366).

⁶⁴ Reijnen, R., Veenbaas G. & Foppen R.P.B. (1995). Predicting the effects of motorway traffic on breeding bird populations. Ministry of Transport and Public Works, Delft, The Netherlands.

⁶⁵ Reijnen, R., Foppen, R. & Veenbaas G. (1997). Disturbance by traffic of breeding birds: Evaluation of the effect and considerations in planning and managing road corridors. *Biodiversity and Conservation*, Vol 6, Iss 4, pp 567-581.

⁶⁶ As is shown in Figure 7 and Figure 8 in 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3), the existing noise levels within the SPA are already greater than 60 dB throughout the heathland areas on Wisley Common during the daytime (and over 55dB at night time) and 55 dB throughout the heathland areas at Ockham Common (day and night).

further reduce the breeding density. Reductions in breeding density could harm the conservation objectives to maintain the population and distribution of each of the qualifying features, and thus lead to an adverse effect on the integrity of the SPA.

Construction

- 7.2.72. Even after taking into account the embedded construction measures described in Table D.1 of Appendix D, the noise assessment in Chapter 6 noise and vibration of the Environmental Statement (application reference TR010030/APP/6.3) has identified a number of loud construction activities, such as site clearance, earthworks and road surfacing (see Table 9 below).

Table 9: Construction noise residual effects after mitigation

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
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

Construction Activity	Predicted construction noise levels at different distances (L_{Aeq} , dB)								
	10m	25m	50m	75m	100 m	150m	200m	250m	300 m
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
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

- 7.2.73. As is shown in Figure 7 and Figure 8 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3), the existing noise levels within the SPA are already greater than 60 dB throughout the heathland areas on Wisley Common during the daytime (and over 55dB at night time) and 55 dB throughout the heathland areas at Ockham Common (day and night).
- 7.2.74. Figure 6 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) demonstrates that the territories of the SPA qualifying species are all located at a distance of over 200 m from the DCO boundary (with

the exception of a single nightjar and Dartford warbler territory in 2017⁶⁷). As can be seen in Table 9, all of these construction activities, with the exception of bridge demolition, fall below 55 dB at a distance of 200 m (i.e. the closest distance that the qualifying species occur).

- 7.2.75. These construction activities (with the exception of bridge demolition) will still be audible against the existing ambient sound levels at the location of the qualifying species territories but will be more easily masked by other closer noise sources. Although there will be minor increases (up to 3 dB) as a result of continuous construction noises, the qualifying species are less likely to be startled by transient irregular noises that cause maximum noise levels (such as dropping objects at heights) because of their distance from the DCO boundary (i.e. the extent of the construction works).
- 7.2.76. In addition, construction activities will all take place within the DCO boundary and will therefore be visually separated from the areas of heathland where the qualifying species occur by a belt of woodland.
- 7.2.77. Therefore, with the exception of bridge demolition activities, the construction activities will not lead to increased disturbance of qualifying species, as the levels of noise resulting from the construction activities will be lower than the background noise in the heathland where the qualifying species occur, only leading to minor increases in background noise.
- 7.2.78. The bridge demolition will cause noise levels of approximately 68 dB at 200 m. However, each bridge demolition will take place during a single night closure, so this level of noise disturbance will be extremely short in duration.
- 7.2.79. Noise modelling (as described in Chapter 6 of the Environmental Statement (application document TR010030/APP/6.3)) has demonstrated that there will be no residual increases in noise resulting from construction traffic (when compared to existing traffic noise levels on the M25 and A3).
- 7.2.80. Embedded mitigation measures will reduce potential vibration disturbance resulting from construction activities, such as percussive piling proposed for the retaining wall along the A3. Even with these measures in place, some significant effects (i.e. vibration levels perceptible to humans) can occur within 100m of the piling site. However, the disturbance will be temporary and localised and piling locations along the A3 are over 200 m from qualifying feature breeding territories (refer to Figure 6 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3)).
- 7.2.81. In conclusion, there will be no adverse effects on the integrity of the SPA as a result of disturbance of any of the three qualifying species from construction noise or vibration.

Operation

- 7.2.82. The embedded mitigation measures for the Scheme include new noise barriers at junction 10 and low noise road surfacing along the A3.
- 7.2.83. The new noise barriers will be aligned with the new road layout and will be of a similar specification to existing noise barriers, but will be more extensive in their

⁶⁷ These territories were over 200 m from the main works along the A3, but fall within 200 m of the works on Wisley Lane. The works along Wisley Lane will not include any demolition or bridge works, but will include site clearance, earthworks and road surfacing. These territories were not present in 2018.

coverage (refer to Figure 9 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for changes in noise barrier extent resulting from the Scheme).

- 7.2.84. Figures 10 and 11 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) show the changes in noise levels during day time and night time for the operational Scheme. It can be seen that the vast majority of the Ockham and Wisley Commons SSSI component of the SPA (including all existing heathland areas) will either increase by less than 1 dB or decrease in noise levels by up to 3 dB as a result of the Scheme in the long-term. The reductions in noise are along the A3, where low noise road surfacing will be installed. The DMRB Volume 11, Section 3, Part 7⁶⁸ classes long term changes of less than 3 dB (increase or decrease) as a negligible change.
- 7.2.85. Whilst the majority of the SPA will undergo operational changes of less than 3 dB, there will be some localised increases (refer to Figures 10 and 11 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3)). However, all increases of 3 dB or greater fall within the retained woodland buffer immediately adjacent to the M25 and do not occur within the heathland areas of the SPA or the SPA enhancement areas (as described in Section 3 of HRA Stages 3-5: Assessment of Alternatives, consideration of the IROPI and compensatory measures (application document TR010030/APP/5.3)).
- 7.2.86. The heathland areas where the qualifying species occur (refer to Figures 2A – 2K of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for the distribution of qualifying species), all potential functionally linked habitat (as described in Section 4.7) and the proposed heathland creation areas (as described in Section 5 of HRA Stages 3-5: Assessment of Alternatives, consideration of the IROPI and compensatory measures (application document TR010030/APP/5.3)) are subject to increases of less than 1 dB or decreases of up to 3 dB in background noise levels.
- 7.2.87. These minor changes are classed as a negligible long-term change (refer to DMRB Volume 11, Section 3, Part 7) and are too negligible to have any measurable impact on the density of qualifying species within the Ockham and Wisley Commons SSSI component of the SPA.
- 7.2.88. The vibration assessment has concluded that there will be no perceivable increases in airborne or ground-borne vibration due to road traffic from the Scheme.
- 7.2.89. Therefore, it can be concluded with confidence that the negligible noise level increases or reductions as a result of the operation of the Scheme, and the absence of airborne or ground-borne vibration increases, will not lead to any increased disturbance to qualifying species, nor interfere with the distribution or density of the qualifying species of the SPA.

Disturbance by changes in recreational use

- 7.2.90. The Thames Basin Heaths SPA is open access land and is regularly used by recreational visitors. A study of the whole Thames Basin Heaths SPA by

⁶⁸ Highways Agency (2011) Design Manual for Roads and Bridges: Volume 11, Section 3, Part 7 Noise and vibration HD213/11 (paragraph 3.37)

Fearnley and Liley (2013)⁶⁹ identified that almost all (98%) visitors are local residents, with the majority (75%) of visitors arriving by car. Of all visitors, the majority (80%) were accompanied by a dog.

- 7.2.91. A survey conducted by Atkins in September 2017 on users of the open space areas (Wisley and Ockham Common, including the bridges) provided similar conclusions for the Ockham and Wisley Commons SSSI component of the SPA, with the majority of visitors being relatively local and arriving by car. It was found that the majority of existing users were walkers, including a large proportion of dog walkers. Equestrians were also observed, and it was noted that cyclists were infrequent. Some of the users encountered agreed to take part in a questionnaire. The results showed that they valued the quietness and wildness of the open spaces, the convenient access, the lack of other users and the ability to allow dogs to roam (refer to section 13.7 of the Environmental Statement (application document TR010030/APP/6.3) for details).
- 7.2.92. It is well known that human disturbance can have adverse effects on the breeding success of birds. However, the sensitivity to disturbance varies between species.
- 7.2.93. A study of the effects of disturbance on breeding Dartford warblers by Murison *et al.* (2007)⁷⁰ identified that the effects of disturbance on productivity varied between heathland types. The productivity of Dartford warblers in heather-dominated territories was significantly affected by disturbance, resulting in reduced numbers of broods and a reduction in the average number of chicks fledged per pair. However, the effect of disturbance on productivity was not recorded in territories with significant areas of gorse.
- 7.2.94. A study of woodlark in the Brecklands by Dolman (2010)⁷¹ provided strong evidence that neither woodlark nest success, nor the productivity of successful nests, were affected by recreational disturbance. Strong evidence for a nil effect was recorded.
- 7.2.95. Studies by Murison (2002)⁷² identified higher nightjar breeding success at sites with no public access when compared to sites with open access. Within the open access sites, nests that were successful were located further away from the paths. Nest failure was almost exclusively due to predation, and it was hypothesised that closer proximity to a path caused increased flushing from the nest, betraying the nest site to predators.
- 7.2.96. Conversely, the study of woodlarks and nightjars by Dolman (2010) found no evidence that rates of flushing of incubating female nightjar were higher close to paths. In addition, nightjar did not nest further from paths in patches with greater levels of recreational activity, and no instances of flushing by dogs were observed in over 2000 hours of diurnal footage from 22 nests.
- 7.2.97. Analysis of a useful sample of nests (44 nests, providing 297 egg days, 430 chick days and a total of 522 nest days) produced no evidence for any effect of recreational activity on nightjar nest success; conversely strong evidence for a nil

⁶⁹ Fearnley, H. and Liley, D. (2013) Results of the 2012/13 visitor survey on the Thames Basin Heaths Special Protection Area (SPA). Natural England Commissioned Reports, Number XXX.

⁷⁰ Murison, G., Bullock, J. M., Underhill-Day, J., Langston, R., Brown, A. F and Sutherland, W. J. (2007) Habitat types determines the effects of disturbance on the breeding productivity of the Dartford warbler *Sylvia undata*. Ibis (149, 16-26).

⁷¹ Dolman, P. M. (2010) Woodlark and nightjar recreational disturbance and nest predator study 2008 and 2009. University of East Anglia, Norwich.

⁷² Murison, G. (2002) The impact of human disturbance on the breeding success of nightjar *Caprimulgus europaeus* on heathlands in south Dorset

effect was recorded.

- 7.2.98. As can be seen, there is some conflicting evidence about the susceptibility of the SPA qualifying species to recreational disturbance. However, it is clear that, although these species may not be particularly prone to disturbance, there is likely to be some existing recreational disturbance within the Ockham and Wisley Commons SSSI component of the SPA, due to the regular presence of dog walkers.
- 7.2.99. Increased recreational pressure, or changes in visitor usage patterns, resulting from the Scheme (construction or operation) could lead to increased disturbance of the SPA qualifying species and a resulting reduction in breeding success or density within the Ockham and Wisley Commons SSSI component of the SPA.

Construction

- 7.2.100. The SPA will remain open to the public during the construction process. However, the construction will inevitably cause localised restrictions in access to areas where work is being undertaken. The DCO boundary runs adjacent to the edge of the A3 and M25. Therefore, the majority of routes that walkers will choose to take will remain open throughout the construction phase and only paths within the DCO boundary will be closed.
- 7.2.101. The SPA is accessed directly by car parks on Old Lane (access to Ockham Common) and Wisley Lane (access to Wisley Common). Parking access for the SPA will not be enhanced during construction, and indeed, some of the work on Ockham Common will lead to temporary partial closures and reduced parking capacity at Ockham Bites car park. In addition, the ongoing construction works may deter some recreational visitors from visiting the SPA at all during construction, although it is not possible to quantify this effect.
- 7.2.102. For the reasons listed above, although it is not possible to conclude that recreational disturbance will be reduced during construction, it is possible to state with confidence that recreational usage of the SPA will not increase during the construction works. The construction works within the SPA will take approximately two to three years to complete.
- 7.2.103. All construction workers will be required to adhere to the contractor's policy of no pets allowed on site, thus avoiding the potential for an increased level of disturbance from construction workers walking their dogs on the SPA. This will be set out in the CEMP. A small number (up to 20) of vehicle recovery operatives will stay overnight in static caravans at advanced locations on the approaches to the traffic management area at either end of the A3 and M25 Scheme limits. However, these locations are away from the SPA and no construction workers will stay overnight in the works areas within the SPA, so this will not lead to increased recreational pressure on the SPA.
- 7.2.104. Due to there being no increase in recreational disturbance as a result of the construction of the Scheme, there will be no adverse effects on the integrity of the SPA as a result of increased recreational disturbance during construction.

Operation

- 7.2.105. The Scheme will improve traffic flows at M25 junction 10 but will not improve direct access to Wisley or Ockham Common, nor will it change the existing car parking options for recreational visitors to either of these Commons (the SPA is

only accessed directly by car parks on Old Lane and Wisley Lane).

- 7.2.106. The Byway section of Elm Lane will be upgraded across Ockham Common to provide access suitable for all vehicles between Old Lane and Elm Corner, as a substitute for the closure of the A3 connection to Elm Lane. However, this is a minor access road, servicing 16 properties and will not provide parking opportunities for visitors. This access road is separated from the heathland areas of Ockham Common where the qualifying species occur by Old Lane and a belt of woodland and changes in its use will not lead to increased disturbance if qualifying species.
- 7.2.107. Therefore, the operation of the Scheme is not expected to result in changes to the numbers of visitors to the Thames Basin Heaths SPA, or the way in which visitors gain access to the SPA.
- 7.2.108. The Scheme will provide new surfaced non-motorised user (NMU) routes within the SPA, and a new bridge linking Ockham Common to the Chatley Wood replacement land in the north-east quadrant.
- 7.2.109. The NMU route through Ockham Common will run through the retained woodland for the most-part and will fall outside the existing heathland areas where the qualifying SPA species occur.
- 7.2.110. The NMU route through Wisley Common will follow the existing access track to Pond Farm and will link to the Park Barn Farm replacement land in the north-west quadrant. The NMU route will fall outside the existing heathland areas where the qualifying SPA species occur.
- 7.2.111. A plan of the NMU routes and replacement land areas can be seen in Figure 12 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3).
- 7.2.112. As explained above, these new routes will fall outside the heathland areas where the qualifying species occur and will allow visitors to the SPA to increase their current walking route options and are therefore likely to lead to some changes in the recreational use of the SPA with some visitors being drawn away from the sensitive heathland areas.
- 7.2.113. In addition, should a green bridge be installed at Cockcrow, this may attract some recreational visitors to walk over the bridge, potentially attracting more visitors from Ockham Common into Wisley Common and thus reducing recreational pressure on the heathlands of Ockham Common, where the majority of the qualifying species occur (refer to section 4.5).
- 7.2.114. Signage and waymarking will be provided, informing users of recommended routes, and these will focus on the surfaced NMU routes and linkages with areas outside the SPA, such as new areas of open space within the north-west and north-east quadrant. This will be installed during construction and secured through the CEMP. Although adherence to recommended routes is voluntary, it will encourage a proportion of users to take these routes, reducing some of the recreational pressure from the sensitive heathland areas within the Thames Basin Heaths SPA.
- 7.2.115. Due to access to the SPA not improving, the number of recreational visitors will not increase as a result of the Scheme and may even reduce. Therefore, due to the provision of additional NMU routes away from the sensitive heathland areas and signage, it can be concluded with confidence that recreational usage of

routes within the SPA will be further diluted and recreational pressure of sensitive heathland areas will not increase as a result of the operational Scheme.

- 7.2.116. Due to there being no increase in recreational disturbance as a result of the operational Scheme, there will be no adverse effects on the integrity of the SPA as a result of increased recreational disturbance once operational.

Disturbance by changes in lighting (construction and operation)

- 7.2.117. All lighting will be confined to within the DCO boundary during construction, and within the permanent land take areas during operation (refer to Scheme Layout plans in Application document TR010030/APP/2.8). Light spill will be minimised by embedded design measures, with the provision of directional lighting to avoid light spill outside the DCO boundary, and thus avoiding spilling out onto the wider SPA. Through robust design, proposed lighting has been kept to a minimum, and includes column mounting heights not exceeding the existing and to be used in similar locations to existing lighting. Similarly, lighting levels are lower or similar to the existing heights and luminaires will utilise Light Emitting Diode (LED) light sources which will emit no lighting above the horizontal.
- 7.2.118. Therefore, on the basis that the CEMP will clearly establish the necessary details as to how the mitigation measures will be delivered, implemented and secured, it is considered that there will not be an increase in lighting within the SPA as a result of the construction or operation of the Scheme. The absence of changes in lighting, either during construction or operation, will ensure that there is no adverse effects on the integrity of the SPA as a result of disturbance of any of the qualifying species.

Spread of non-native invasive plant species (construction only)

- 7.2.119. The embedded mitigation measures described in Appendix D will ensure that the construction activities do not cause the spread of non-native invasive plant species. The risk of spreading non-native invasive plant species is only relevant to the construction period, when works and machinery movements are taking place.
- 7.2.120. Therefore, on the basis that the CEMP will clearly establish the necessary details as to how the embedded measures will be implemented, it can be concluded with confidence that there will not be any spread of non-native invasive plant species within the SPA (and therefore no associated adverse effects on the integrity of the SPA) as a result of the construction of the Scheme.

7.3. In combination

- 7.3.1. It was advised by Natural England⁷³ that the in combination assessment should focus on the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA, due to the distance from the other SSSI components (Horsell Common SSSI is the closest component SSSI and is located approximately 6 km from the DCO boundary at its closest point), and the lack of hydrological connectivity between Ockham and Wisley Commons SSSI and any other component SSSIs of the Thames Basin Heaths SPA.
- 7.3.2. Natural England advised that the in combination assessment should focus on the

⁷³ Natural England meeting minutes 09/10/2018 (refer to Appendix C of the HRA Screening document (Annex A this report, application document TR010030/APP/5.3)).

Local Plan HRAs for local boroughs within 10 km of the DCO boundary, rather than focus on individual projects. This consists of:

1. Elmbridge Borough Council;
2. Guildford Borough Council;
3. Mole Valley District Council;
4. Runnymede Borough Council;
5. Spelthorne Borough Council;
6. Surrey Heath Borough Council; and,
7. Woking Borough Council.

7.3.3. Table 10 summarises the potential impacts of Local Plan HRAs on the Thames Basin Heaths SPA, both during construction and long-term operation, and the potential for in combination adverse effects when the Local Plan mitigation measures are taken into account.

Table 10: Potential adverse effects of the Scheme in combination with Local Plan HRAs for local boroughs within 10 km of the DCO boundary

Local Planning Authority (LPA)	Potential impacts on Thames Basin Heaths SPA	LPA mitigation in place	Potential for adverse effect in combination
Elmbridge Borough Council ⁷⁴	<ul style="list-style-type: none"> Increased recreational pressure; General urbanisation; Air quality impacts; Risk of effect on water levels from abstraction if future water needs require this. 	<ul style="list-style-type: none"> No residential development permitted within 400 m of the SPA boundary; Provision of Suitable Alternative Natural Green Space (SANGS) for residential developments between 400 m and 5 km from SPA boundary; Strategic Access Management and Monitoring (SAMM) for residential developments between 400 m and 5 km from SPA boundary. 	<p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p> <p>Any development within the Elmbridge Borough council administrative area would have to follow the required mitigation and will not cause any land take of the SPA.</p> <p>The Scheme will not lead to increased recreational disturbance, nor affect water levels. In addition, any development within the Elmbridge Borough council administrative area would have to provide a SANG to fully mitigate for potential increases in recreational pressure resulting from the development. Therefore, there is no potential for in combination effects as a result of increased recreational disturbance or changes in water levels.</p> <p>Air quality increases of greater than 1% as a result of the Scheme will be confined to the first 10 m of the SPA i.e. the road edge and will be reduced in some locations. These negligible changes will not lead to in combination impacts with other developments on the supporting habitats of the qualifying SPA species.</p>
Guildford Borough Council ⁷⁵	<ul style="list-style-type: none"> Increased recreational pressure; General urbanisation; Air quality impacts. 	<ul style="list-style-type: none"> No residential development permitted within 400 m of the SPA boundary; Provision of Suitable Alternative Natural Green Space (SANGS) for residential developments between 400 m and 5 km from SPA boundary. Large developments, 	<p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p> <p>Any development within the Guildford Borough council administrative area would have to follow the required mitigation and will not cause any land take of the SPA.</p> <p>The Scheme will not lead to increased recreational disturbance. In addition, any development within the Guildford Borough council administrative area would have to provide a SANG to fully mitigate for potential increases in recreational pressure resulting from the development. Therefore, there is no potential for in combination</p>

⁷⁴ Elmbridge Local Plan Habitats Regulations Assessment Stage 1: Initial Screening Report Spatial Strategy Options (2016)

⁷⁵ Habitats Regulations Assessment for Guildford Borough Proposed Submission Local Plan: Strategy and Sites (2018 update)

Local Planning Authority (LPA)	Potential impacts on Thames Basin Heaths SPA	LPA mitigation in place	Potential for adverse effect in combination
		<p>such as the proposed development at the former Wisley Airfield would require bespoke SANGs to fully mitigate their own impacts on the SPA;</p> <ul style="list-style-type: none"> • Strategic Access Management and Monitoring (SAMM) for residential developments between 400 m and 5 km from SPA boundary. 	<p>effects as a result of increased recreational disturbance or changes in water levels.</p> <p>Air quality increases of greater than 1% as a result of the Scheme will be confined to the first 10 m of the SPA i.e. the road edge and will be reduced in some locations. These negligible changes will not lead to in combination impacts with other developments on the supporting habitats of the qualifying SPA species.</p>
Mole Valley District Council ⁷⁶	<p>Not significant.</p> <p>Mole Valley has reached agreement with Natural England that it will consult with them on all housing developments over 50 dwellings within 7 km driving distance of the SPA boundary⁷⁷. This only affects a very small, mostly rural part of the District, that is not the focus for the new development.</p>	None	<p>No in combination adverse effect predicted during construction or operation (short-term and long-term), as the Mole Valley District Council HRA has ruled out any impacts on the SPA.</p>

⁷⁶ Mole Valley Local Development Framework: Mole Valley Appropriate Assessment (2008)

⁷⁷ Natural England reviewed and responded to this HRA document on the 12th April 2019. In the response, Natural England clarified the current consultation parameters for Mole Valley District Council, and this text has been amended to reflect this.

Local Planning Authority (LPA)	Potential impacts on Thames Basin Heaths SPA	LPA mitigation in place	Potential for adverse effect in combination
Runnymede Borough Council ⁷⁸	<ul style="list-style-type: none"> Increased recreational pressure; General urbanisation; Air quality impacts; Water quality and water quantity. 	<ul style="list-style-type: none"> No residential development permitted within 400 m of the SPA boundary; Provision of Suitable Alternative Natural Green Space (SANGS) for residential developments between 400 m and 5 km from SPA boundary; Strategic Access Management and Monitoring (SAMM) for residential developments between 400 m and 5 km from SPA boundary; Construction Environmental Management Plan to be put in place to avoid water impacts on SPA (Chobham Common SSSI component). 	<p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p> <p>Any development within the Runnymede Borough council administrative area would have to follow the required mitigation and will not cause any land take of the SPA.</p> <p>The Scheme will not lead to increased recreational disturbance, nor affect water quality. In addition, any development within the Runnymede Borough Council administrative area would have to provide a SANG to fully mitigate for potential increases in recreational pressure resulting from the development. Therefore, there is no potential for in combination effects as a result of increased recreational disturbance or changes in water levels.</p> <p>Air quality increases of greater than 1% as a result of the Scheme will be confined to the first 10 m of the SPA i.e. the road edge and will be reduced in some locations. These negligible changes will not lead to in combination impacts with other developments on the supporting habitats of the qualifying SPA species.</p>
Spelthorne Borough Council	N/A No Local Plan HRA available	N/A No Local Plan HRA available	No in combination adverse effect predicted during construction or operation (short-term and long-term), as Spelthorne Borough Council is over 5 km from the Ockham and Wisley Commons SSSI component of the SPA at its closest point.
Surrey Heath Borough Council ⁷⁹	<ul style="list-style-type: none"> Increased recreational 	<ul style="list-style-type: none"> No residential development permitted 	No in combination adverse effect predicted during construction or operation (short-term and long-term).

⁷⁸ Appropriate Assessment Report Pursuant to the Conservation of Habitats and Species Regulations 2017 on the Likely Significant Effects and Adverse Effects on Integrity of Runnymede Borough Council's Local Plan: HRA Screening and Appropriate Assessment Report (2018)

⁷⁹ Surrey Heath Borough Council Draft Local Plan to 2032 Issues and Options Consultation: Habitats Regulations Assessment (2018)

Local Planning Authority (LPA)	Potential impacts on Thames Basin Heaths SPA	LPA mitigation in place	Potential for adverse effect in combination
	<p>pressure and disturbance;</p> <ul style="list-style-type: none"> General urbanisation; Air quality impacts. 	<p>within 400 m of the SPA boundary;</p> <ul style="list-style-type: none"> Provision of Suitable Alternative Natural Green Space (SANGS) for residential developments between 400 m and 5 km from SPA boundary; Strategic Access Management and Monitoring (SAMM) for residential developments between 400 m and 5 km from SPA boundary. 	<p>Any development within the Surrey Heath Borough council administrative area would have to follow the required mitigation and will not cause any land take of the SPA.</p> <p>The Scheme will not lead to increased recreational disturbance. In addition, any development within the Surrey Heath Borough council administrative area would have to provide a SANG to fully mitigate for potential increases in recreational pressure resulting from the development. Therefore, there is no potential for in combination effects as a result of increased recreational disturbance or changes in water levels.</p> <p>Air quality increases of greater than 1% as a result of the Scheme will be confined to the first 10 m of the SPA i.e. the road edge and will be reduced in some locations. These negligible changes will not lead to in combination impacts with other developments on the supporting habitats of the qualifying SPA species.</p>
Woking Borough Council ⁸⁰	<ul style="list-style-type: none"> Increased recreational pressure and disturbance; Air quality impacts. 	<ul style="list-style-type: none"> No residential development permitted within 400 m of the SPA boundary; Provision of Suitable Alternative Natural Green Space (SANGS) for residential developments between 400 m and 5 km from SPA boundary; Strategic Access Management and Monitoring (SAMM) for residential developments between 400 m and 5 km from SPA boundary. 	<p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p> <p>Any development within the Surrey Heath Borough council administrative area would have to follow the required mitigation and will not cause any land take of the SPA.</p> <p>The Scheme will not lead to increased recreational disturbance. In addition, any development within the Woking Borough Council administrative area would have to provide a SANG to fully mitigate for potential increases in recreational pressure resulting from the development. Therefore, there is no potential for in combination effects as a result of increased recreational disturbance or changes in water levels.</p> <p>Air quality increases of greater than 1% as a result of the Scheme will be confined to the first 10 m of the SPA i.e. the road edge and will be reduced in some locations. These negligible changes will not lead to</p>

⁸⁰ Woking Borough Council Site Allocations DPD: habitats Regulations Assessment (2018)

Local Planning Authority (LPA)	Potential impacts on Thames Basin Heaths SPA	LPA mitigation in place	Potential for adverse effect in combination
			in combination impacts with other developments on the supporting habitats of the qualifying SPA species.

Draft

- 7.3.4. In addition to the assessment of Local Plan HRAs for local boroughs within 10 km of the DCO boundary, an assessment was also undertaken for all projects within 2 km of the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA, that were taken to Stage 2 in the Cumulative Impacts Chapter of the Environment Statement (refer to Chapter 16 of the Environmental Statement (application reference TR010030/APP/6.3)). A total of 10 projects were considered and are shown in Table 11 below.
- 7.3.5. When producing traffic models for the Scheme, and when considering the plans and projects to be considered in combination with the Scheme, the Heathrow Expansion was scoped out.
- 7.3.6. The Department for Transport has confirmed that the expansion of Heathrow Airport is not expected to result in any additional traffic demand. Therefore the Heathrow Expansion has not been included within the forecasts.

Draft

Table 11: Potential adverse effects of the Scheme in combination with plans and projects within 2 km of the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
Junction 10 - 16 Smart Motorway Programme (SMP)	Immediately adjacent	M25 J10 to junction 16 includes upgrading the M25 between J10 (A3) and J16 (M40) through a mixture of enhancements, including hard shoulder running between junctions 15 and 16. The scope also includes gantry works at junction 10.	No	<p>The SMP has been taken into account for the traffic modelling and therefore in combination effects on air quality and noise have been considered. This project will not lead to increased land take as all requirements have been allowed for within the DCO boundary, and will not alter access to the SPA.</p> <p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p>
The former Wisley Airfield	400 m	<p>Residential led mixed use development, allocated for: approximately 2000 homes, including some specialist housing and self-build plots, approximately 100 sheltered/extra care homes, 8 traveller pitches, approximately 1,800 sq m of employment floor space, approximately 2,500 sq m of employment floor space, approximately 500 sq m of comparison retail, approximately 600 sq m of convenience retail, approximately 550 sq m services in a new local centre, approximately 500 sq m of community uses in a new local centre, two form entry primary school, and a secondary school.</p> <p>The scheme is allocated for development in the Guildford</p>	No	<p>An appeal on a planning application was dismissed by the inspector on 13 June 2018: App No. 15/P/00012.</p> <p>The footprint of the former Wisley Airfield project overlaps with the temporary land take area of the Scheme. This consists of a large area of hardstanding that will be used to store spoil throughout the duration of the construction period. The two projects cannot take place at the same time as they share the same space. Therefore, there will be no in combination impacts resulting from construction works or combined land take loss (i.e. the temporary land take of the Scheme would be reinstated prior to the Wisley Airfield project commencing).</p> <p>The formal Wisley Airfield proposals will bring an extra 2000 homes to the local areas. The project will not receive planning consent unless it can be demonstrated that it will not cause any increase in</p>

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
		Borough Council Local Plan, which was adopted in April 2019.		<p>recreational pressure on the SPA⁸¹. The Wisley Airfield project proposes to do this by providing a Suitable Alternative Natural Greenspace (SANG). The M25 J10 Scheme will not improve user access to the SPA and will provide new NMU routes and replacement land outside the designated areas.</p> <p>Therefore, both projects alone will not increase recreational pressure, and there will be no in combination impact.</p> <p>This project has been included in the traffic model for the M25 J10 Scheme and therefore, air quality and noise impacts have already been accounted for.</p> <p>In conclusion, should the Wisley Airfield project receive planning permission, it will not have in combination effects with the M25 junction 10 Scheme on the SPA during construction or operation (short-term and long-term).</p>
Land to the East of South Cottage, White Horse Lane, Ripley, GU23 6BB	1.95 km	Outline planning application for the demolition of existing petrol filling station, car sales buildings and dilapidated workshops and the construction of up to 26 residential units to the rear and 2 retail/commercial units on the High Street frontage and associated car parking and landscaping all matters reserved except access.	No	<p>This a small development of an existing site, providing up to 26 residential units.</p> <p>There will be no overlap or adjacent land take, and there will be no in combination land take effects.</p> <p>The small number of properties will not lead to increased recreational pressure on the SPA.</p> <p>This small development will not have in combination impacts with the Scheme on the SPA</p>

⁸¹ The Wisley Airfield Information for Habitats Regulations Assessment document (EPR, 2005, ref P14/67-2F) quotes the 'Dilly Lane Judgement' (May 2008, J Sullivan in Hart DC v the Secretary of State for Communities and Local Government) in paragraph 1.23, stating that "the purpose of the SANGs was not to lessen the increase in visitor pressure, but to avoid it altogether by drawing some existing users away from the Heath to compensate for those new residents who might use it on occasion".

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
				during construction or operation (short-term and long-term).
Royal Horticultural Society Gardens, Wisley Lane, Wisley, Woking, GU23 6QS 16/P/01080	Immediately adjacent, separated by Wisley Lane	Erection of new part single-storey part two-storey building accommodating retail, entrance and visitor facilities and alterations to the car parking and hard and soft landscaping and following the demolition of the existing plant centre, the extensions to the Laboratory building, toilet blocks, Aberconway Cottage and part of Aberconway House.	No	<p>This development, and the impacts of the development, will be contained within the existing RHS Wisley site.</p> <p>Planning Condition 13 for application 16/P/01080 states that prior to the commencement of development (excluding site clearance, demolition and groundworks) details of measure to ensure that construction activities will not adversely impact on the Thames Basin Heath Special Protection Area shall be submitted to and approved by the Local Planning Authority. This shall include details of dust management and control, lighting control, pollution runoff control and areas for the storage of plant and materials. The development shall be undertaken only in accordance with the approved details.</p> <p>Therefore, this development will not have in combination effects with the Scheme on the SPA during construction or operation (short-term and long-term).</p>
Royal Horticultural Society Gardens, Wisley Lane, Wisley, Woking, GU23 6QS 16/P/00976	Immediately adjacent, separated by Wisley Lane	Demolition of existing buildings and erection of a two-storey building accommodating science, education, research and restaurant facilities, associated landscaping including a landscape bund and other works associated with the development.	No	<p>This development, and the impacts of the development, will be contained within the existing RHS Wisley site.</p> <p>Planning Condition 9 for application 16/P/00976 states that 'prior to the commencement of development (excluding site clearance, demolition and groundworks) details of measure to ensure that construction activities will not adversely impact on the Thames Basin Heath Special</p>

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
				Protection Area shall be submitted to and approved by the Local Planning Authority. This shall include details of dust management and control, lighting control, pollution runoff control and areas for the storage of plant and materials. The development shall be undertaken only in accordance with the approved details'. Therefore, this development will not have in combination effects with the Scheme on the SPA during construction or operation (short-term and long-term).
Former San Domenico Restaurant 2017/0524	1.3 km	Demolition of existing main building and the construction of the new petrol filling station (Sui Generis) with ancillary convenience store and food to go outlet, 4 no. pump islands, canopy, underground tanks, revisions to vehicular access, parking and circulation arrangements, landscaping and associated works.	No	This proposal is separated from the SPA by the M25 and a large area of woodland. Therefore, it is not directly connected to the SPA and will have no in combination impacts with the M25 junction 10 Scheme during construction or operation (short-term and long-term). Planning permission for this proposal was refused by Elbridge Borough Council on 15 February 2019.
Felton Fleet School Byfleet Road Cobham Surrey KT11 1DR	1.8 km	Two-storey detached building (Music Facility) with single storey glazed link and new pedestrian access, conversion of Leighton House to ancillary staff accommodation, internal refurbishment of David Rutherford Centre, two-storey detached building (Digital Technology & Art Hub), single storey building and 4m high brick wall enclosure to provide rifle range, single storey maintenance shed, rearrangement of	No	This proposal is separated from the SPA by the M25 and a large area of woodland. Therefore, it is not directly connected to the SPA and will have no in combination impacts with the M25 J10 Scheme during construction or operation (short-term and long-term).

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
		maintenance yard, single storey detached building to provide new Head's House, cricket nets and replacement boundary wall along Byfleet Road following the demolition of part two/part single storey detached building (Keith Leighton Memorial Hall), single storey store and toilet, attached garage to Leighton House and existing rifle range and open store building.		
Land surrounding West Hall, Parvis Road, West Byfleet Site allocation GB15	1.8 km a	Allocated use is residential including affordable house. 592 dwellings proposed. The site is 29.33 ha.	No	<p>This is allocated land within the Woking Borough Council Site Allocations Development Plan Document (June 2015).</p> <p>This development has been included in the traffic model for the M25 J10 Scheme and therefore, any potential air quality and noise impacts have already been accounted for.</p> <p>It is possible that the development could lead to increased visitors to the SPA. However, the M25 junction 10 Scheme will not increase traffic flows past the SPA car parks, will not improve user access to the SPA and will provide new NMU routes and replacement land outside the designated areas.</p> <p>Therefore, the M25 junction Scheme will not increase, and may possibly even reduce recreational pressure, and there will be no in combination impact with this allocated development.</p>

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
				<p>This Site Allocation is included within the Woking Borough Local Plan HRA⁸² (see Table 10) and will also be assessed and designed to avoid impacts on the SPA.</p> <p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p>
Broadoaks, Parvis Road, West Byfleet PLAN/2016/1003	1.8 km	<p>The site is 14.7 ha.</p> <p>Allocated for Quality offices and research premises, residential including Affordable Housing and housing to meet the accommodation needs of the elderly. Proposed land use B1a, 16722 proposed GFA m2 and 1323.8 proposed jobs FTE.</p> <p>Full planning application for the change of use of vacant class B1 business building [Sherwood House] to Class D1 secondary school with playing field and Multi Use Games Area (MUGA), floodlighting, landscaping, internal roads, car, mini bus and cycle parking areas, restoration and change of use of Model Dairy to a shop/office [ancillary to the use of the school]; demolition and removal of all former MOD and other buildings, hardstanding and structures across the site apart from the part demolition, restoration and conversion of Broadoaks House to create two dwellings and erection of</p>	No	<p>This is allocated land within the Woking Borough Council Site Allocations Development Plan Document (June 2015).</p> <p>This development has been included in the traffic model for the M25 junction 10 Scheme and therefore, any potential air quality and noise impacts have already been accounted for.</p> <p>It is possible that the development could lead to increased visitors to the SPA.</p> <p>the M25 junction 10 Scheme will not increase traffic flows past the SPA car parks, will not improve user access to the SPA and will provide new NMU routes and replacement land outside the designated areas.</p> <p>Therefore, the M25 junction 10 Scheme will not increase, and may possibly even reduce recreational pressure, and there will be no in combination impact with this allocated development.</p> <p>This Site Allocation is included within the Woking Borough Local Plan HRA (see Table 10) and will also be assessed and designed to avoid impacts on the SPA.</p>

⁸² Woking Borough Council Site Allocations DPD: habitats Regulations Assessment (2018)

Development	Approximate Distance from SPA (closest point)	Description	Potential cumulative impact (Yes / No)	Justification
		two new garages, part demolition, restoration and extension to the Coach House to create six dwellings and restoration and reuse of the two Lodge Houses as independent dwellings and erection of 2 new garages, erection of 151 new dwellings including 36 affordable dwellings and associated garages, together with new altered access points to Parvis Road and Hobbs Close and separate pedestrian/cycle link from Parvis Road, associated internal roads, fencing including acoustic fencing to Parvis Road frontage and hard and soft landscaping throughout the site and off site highway works.		No in combination adverse effect predicted during construction or operation (short-term and long-term).
Library, 71 High Road, Byfleet Site Allocation UA1	1.6 km a	0.13 ha site allocated for mixed use development to comprise residential and replacement library and community uses. Estimated yield of 12 dwellings.	No	<p>This is a small development of 12 dwellings. Therefore, it will not lead to increased visitor pressure on the SPA, nor will it lead to changes in the ARN that would have in combination impacts on air quality or noise.</p> <p>The development is not connected to the SPA and will not have any in combination land take impacts.</p> <p>No in combination adverse effect predicted during construction or operation (short-term and long-term).</p>

7.4. SIAA summary

Alone

- 7.4.1. The Scheme will require land take from the Thames Basin Heaths SPA in order to improve the interchange. This Scheme is not connected with or necessary to site management for nature conservation.
- 7.4.2. The SIAA of the project alone has ascertained that on the basis that the CEMP establishes the necessary details as to how the mitigation measures will be delivered, implemented and secured, there will be no adverse effect on the integrity of the Thames Basin Heaths SPA as a result of degradation of habitats (by changes in air quality and/ or hydrology), disturbance (by changes in noise, recreational use and/or lighting) or spread of non-native invasive plants species.
- 7.4.3. The permanent loss of 5.9 ha of the Thames Basin Heaths SPA, and temporary loss of 8.6 ha, will be confined to the woodland edge of the SPA and therefore will not directly affect the heathland habitats nor the qualifying species that they support. Nor will the land take affect any functionally linked habitats for the qualifying species (such as grazed grass fields).
- 7.4.4. Although the loss of this woodland habitat would not lead to a physical reduction in the number or distribution of qualifying species, this land take will reduce the overall size of the SPA. The land take will therefore result in a reduction in the supporting habitats of the SPA (for example, providing a woodland buffer between the roads and the open heathland areas).
- 7.4.5. The loss of invertebrate resources could have an impact on the following targets identified in the Natural England Supplementary Advice on Conserving and Restoring Features, and thus interrupt progress towards achieving the conservation objectives of the SPA:
1. Food availability: Maintain or restore the distribution, abundance and availability of key prey items at prey sizes preferred by all three of the qualifying species; and,
 2. Extent and distribution of supporting habitat for the breeding season: Maintain the extent, distribution and availability of suitable breeding habitat which supports each of the three qualifying species for all necessary stages of their breeding cycle (courtship, nesting, feeding and roosting). The adverse effects resulting from the permanent land take would result in a permanent reduction in the extent of habitat contributing to the overall fabric of the SPA, including contributing to the invertebrate food resource for all three qualifying species during the breeding season. The temporary land take will be reinstated, and therefore any adverse effects will be long-term (i.e. up to 20 years for woodland to re-establish) but not permanent.
- 7.4.6. Therefore, it is not possible to ascertain that this habitat loss of land would have no adverse effect on the integrity of the Thames Basin Heaths SPA 'alone', as a result of reductions in the extent and/or distribution of supporting habitat of the three qualifying species (i.e. habitat that supports foraging qualifying species by providing an invertebrate resource), and a potential reduction in food resource. This is summarised in Table 12.

Table 12: SIAA – overall impacts on the conservation objectives of the Thames Basin Heaths SPA as a result of the Scheme alone

Impact	Construction/ Operation	Conservation objectives affected
Habitat loss	Construction and operation	<ul style="list-style-type: none"> Extent and distribution of supporting habitat for the breeding season: Maintain the extent, distribution and availability of suitable breeding habitat which supports all three qualifying features for all necessary stages of their breeding cycle (courtship, nesting, feeding and roosting); Food availability: Maintain or restore the distribution, abundance and availability of key prey items (e.g. moths, beetles, spiders, caterpillars) at prey sizes preferred by each of the qualifying features (particularly nightjar).

7.4.7. The adverse effects resulting from the permanent land take requirements of the Scheme could result in a permanent reduction in the extent and/or distribution of supporting habitat of the three qualifying species, and a permanent reduction in food resource. Therefore, this SIAA concludes that the Scheme will adversely affect the integrity of the SPA. The remaining stages of the HRA process are considered in Stage 3-5 assessment of alternatives, consideration of IROPI and compensatory measures (document reference TR010030/APP/5.3).

7.4.8. A summary of the potential impacts and their effects on each of the qualifying species of the Thames Basin Heaths SPA can be found in Appendix E of this document.

In Combination

7.4.9. An assessment of the Local Plan HRAs for local boroughs within 10 km of the DCO boundary has determined that all developments would need to fully mitigate for their impacts on the Thames Basin Heaths SPA.

7.4.10. In addition, all plans and projects within 2 km of the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA that were taken to stage 2 as described in the assessment of cumulative effects in Chapter 16 of the Environment Statement (application document TR010030/APP/6.3) have been considered for potential in combination impacts as a result of land take, changes in air quality and noise, and recreational pressure on the SPA. No in combination impacts were identified.

7.4.11. Therefore, in combination impacts can be ruled out.

Appendix A. Thames Basin Heaths SPA conservation objectives: supplementary advice on conserving and restoring site features⁸³

Table A.1: Supplementary advice for qualifying features: A224 *Camprimulgus europaeus* European nightjar

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/supporting process	Conservation measures	Maintain management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain or restore the structure, function and/or the supporting processes associated with Nightjar and its supporting habitats.	<p>Active and ongoing habitat management is usually required to protect, maintain or restore populations of breeding nightjar. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target.</p> <p>This information will typically be found within, where applicable, supporting documents such as the Natura 2000 Site Improvement Plan, any Site Management Strategies or Plans, the notified Views about Management Statement for the underpinning SSSI and/or management agreements. Further details about the necessary conservation measures for this site can be provided by Natural England.</p> <p>Habitat management should retain the open, mosaic structure of lowland wet and dry heath, ensuring that all life cycle stages of heather are present. It may, in certain areas, be appropriate to maintain scrubby vegetation and occasional taller trees should be available for the nightjar to 'churr' from.</p> <p>Where habitat conditions are currently unsuitable, management should seek to increase the availability and continuity of lowland heath or other suitable open habitat. Plantations should continue to be managed by providing permanent open space and by rotational</p>	NATURAL ENGLAND, 2014.

⁸³ Taken from Natural England European Site Conservation Objectives for Thames Basin Heaths SPA (<http://publications.naturalengland.org.uk/publication/4952859267301376>; accessed 21/02/2019)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			clear-fell and re-stocking, which can temporarily create suitable breeding habitat for up to 10 years.	
	Air quality	Restore as necessary the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	<p>The structure and function of habitats which support the SPA population are sensitive to changes in air quality.</p> <p>Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats. Some of the effects that might be attributable to aerial pollution could include accelerated and more vigorous growth of bramble, birch and coarse grasses and consequent loss of bare ground and/or heather.</p> <p>Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition.</p> <p>There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. Excessive dust deposition can significantly change the nature of the supporting habitat. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but critical levels for the protection of semi-natural habitats are still under development.</p> <p>It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p>	<p>More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).</p> <p>LATIMER, W, GLENCROSS, S. & JACKSON, G. 2003</p>
Breeding population	Population abundance	Maintain the size of the breeding nightjar population at or above 264 'churring' males,	<p>This will sustain the site's population and ensures it contributes to a viable local, national and bio-geographic population.</p> <p>Due to the mobility of birds and the dynamic nature of population change, the target-value given for the abundance of this feature is considered to be the minimum standard for conservation/restoration</p>	The latest UK survey information can be found on the BTO website: http://blx1.bto.org/b

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
		whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<p>measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period. The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current abundance of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account.</p> <p>Maintaining or restoring bird abundance depends on the suitability of the site. However, factors affecting suitability can also determine other demographic rates of birds using the site including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and / or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured/estimated to inform judgements of likely impacts on abundance targets.</p> <p>Unless otherwise stated, the population size will be that measured using standard methods such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these</p>	<p>irdfacts/results/bob7780.htm</p> <p>CONWAY, G., WOTTON, S., HENDERSON, I., LANGSTON, R., DREWITT, A. & CURRIE, F. (2007)</p>

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			<p>values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available.</p> <p>The data originally used in support of the SPA classification was derived from records submitted by volunteer bird recorders for the period 1998-99. The figure given for the total SPA of nightjar was 264 pairs which was an estimated 8% of the total GB population at the time. This represents the minimum acceptable number of breeding pairs which should be present expressed as a 5-year mean for the feature to be considered to be in favourable condition.</p> <p>However, annual monitoring has demonstrated that numbers show a general trend of increasing population size since SPA classification. It is likely that this is a result of a combination of a range of factors including improved habitat management, recovery of parts of the complex after heath fires, changes in access management and implementation of measures to reduce recreational disturbance. The objective of this target is therefore both to ensure that the overall population is maintained above the minimum population size and to seek to ensure that new activities do not affect the general population trend, measured through the on-going monitoring programme.</p>	
Supporting habitat (both within and outside the SPA): extent and distribution	Extent and distribution of supporting habitat for the breeding season	Maintain the extent, distribution and availability of suitable breeding habitat which supports nightjar for all necessary stages of its breeding cycle (courtship, nesting, feeding and roosting).	<p>Conserving or restoring the extent of supporting habitats and their range is key to maintaining the ability and capacity of the SPA to support internationally important numbers of nightjar.</p> <p>The extent and distribution of supporting habitat used by nightjar will vary over time in relation to habitat management, succession and ad hoc events such as heath fires. The objective is to seek to ensure that there is no over reduction in habitat availability whilst taking this variability into account.</p> <p>Nightjars are known to forage several kilometres away from their nesting territory. This target may also apply to any supporting foraging habitat which is known to occur outside the site boundary.</p>	
Supporting habitat (within the SPA):	Vegetation characteristics	Maintain or restore the mix of vegetation (optimal	The height, cover, variation and composition of vegetation are important characteristics of habitats which support breeding nightjar and enable successful nesting/rearing/concealment/roosting.	This attribute will be periodically monitored as

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
structure		conditions normally with vegetation mostly of 20-60 cm with frequent bare patches of >2 m ² , 10-20% bare ground and <50% tree/scrub cover overall; trees <2 m in height) throughout nesting areas.	Nightjar show a preference for bare patches or areas of very short vegetation with widely scattered trees where they are able to see predators approaching. These patches may be on open heathland and within open areas of plantation woodland. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may result in loss of extent of suitable breeding habitat.	part of Natural England's site condition assessments.
Supporting habitat (both within and outside the SPA): disturbance	Disturbance caused by human activity	Restrict and reduce the frequency, duration and/or intensity of disturbance affecting nesting, roosting and/or foraging birds so that the nightjar feature is not significantly disturbed	<p>The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can, for example, result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites, increased predation of eggs and chicks and desertion of supporting habitat (both within or outside the designated site boundary).</p> <p>This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling and presence of people, animals (including dogs) and structures.</p> <p>Nightjar is a bird known to be sensitive to disturbance. Disturbance caused by human activity is particularly significant for this SPA because many parts are in close proximity to urban areas. There is also high pressure from new residential development. In 2012 a visitor survey was conducted to provide a baseline for monitoring trends in visitor use and numbers.</p> <p>Strategic avoidance and mitigation measures designed to minimise further disturbance associated with new housing are in place for this SPA as set out in policy NRM6 of the South East Regional Plan</p>	<p>FEARNLEY, H. AND LILEY, D. 2013.</p> <p>DURWYN, L., DIGGER, J. AND UNDERHILL-DAY, J. 2005.</p> <p>THAMES BASIN HEATHS JOINT STRATEGIC PARTNERSHIP BOARD, 2009.</p> <p>GOVERNMENT OFFICE FOR THE SOUTH-EAST, 2009.</p>

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			which has been adopted in the relevant development plans in the TBH area. This sets out the agreed approach through the provision of Suitable Accessible Natural Greenspace (SANG) and Strategic Access Monitoring and Management (SAMM)	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain or restore the amount and continuity of open and unobstructed patches within nesting and foraging areas, including areas of clear-fell, windfall, wide tracks, open spaces within forests and heath.	<p>This feature is known to favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within nesting, feeding or roosting habitat to detect approaching predators, increase accessibility to prey or to ensure visibility of displaying behaviour.</p> <p>Nightjar will also utilise areas of permanent open space and temporary clear-fell within rotationally-managed plantation woodland and sparsely vegetated areas such as former quarry workings.</p> <p>An open landscape will also be required to facilitate movement of birds between the SPA and any off-site supporting habitat.</p>	
Supporting habitat (both within and outside the SPA): predation	Predation	Reduce or restrict predation and disturbance caused by native and non-native predators.	<p>This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that can maintain or restore the abundance of the feature.</p> <p>Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also indirectly as a result of significant disturbance. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control.</p> <p>Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features.</p>	
Supporting habitat (both within and outside the SPA):	Food availability	Maintain or restore the distribution, abundance and availability of key prey items (e.g.	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
function/ supporting process		moths, beetles) at prey sizes preferred by Nightjar	distribution, abundance and availability of prey may adversely affect the population. The nightjar is insectivorous, feeding primarily on moths and beetles. Aspects which might affect prey availability will include lighting, pest control, changes in land use and habitat management.	
	Connectivity with supporting habitats	Maintain or restore the safe passage of birds moving between nesting and feeding areas	The ability of the feature to safely and successfully move between feeding and nesting areas using flight-lines and movement routes is critical to their breeding success and to adult fitness and survival. The nightjar is insectivorous, feeding primarily on moths and beetles. The location of feeding areas which support the SPA's nightjar population is often not well understood and may require specific studies and or research. More generally, nightjars are known to forage in habitats such as open forest and heathland. This target will apply within the site boundary and also where birds regularly move to and from off-site habitat where this is relevant. The foraging range of nightjar is known to extend up to several kilometres from their nest sites. Detailed information about the range of nightjar using this SPA is not currently available.	

Version Control

Advice last updated: 9 May 2016 Minor amendments made to attributes (conservation measures, vegetation characteristics, disturbance, landscape) in the draft Advice dated 29 February 2016 following receipt of comments from local stakeholders

Variations from national framework of integrity-guidance:

Simplification of some "Supporting Notes" wording; generic advice updated to include site specific measures and information taken from the sources as referenced in the text; generic target wording amended to ensure site/species relevance is maintained.

The targets for some attributes listed above include both 'maintain' or 'restore' objectives. This is because this SPA is an extensive complex of geographically-separate component sites. Overall, both objectives will be applicable to the SPA but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.

Table A.2: Supplementary advice for qualifying features: A246 *Lullula aborea* woodlark

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Maintain or restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain or restore the structure, function and/or the supporting processes associated with woodlark and its supporting habitats.	<p>Active and ongoing conservation management is essential to protect, maintain or restore the breeding woodlark population at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target.</p> <p>Further details about the necessary conservation measures for this site can be provided by Natural England. This information will typically be found in supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>At this site management should retain the open, mosaic structure of lowland wet and dry heath, ensuring that all life cycle stages of heather are present. Occasional taller trees should be present to provide song posts. Areas of bare or sparsely-vegetated ground created as a result of rotational forestry management can also be valuable.</p> <p>Habitat management should seek to ensure that the overall extent and continuity of supporting habitat is at least maintained. Areas of plantation forestry should continue to be managed by providing permanent open space and rotational clear-fell and restocking, which can temporarily create suitable breeding habitat for up to 10 years.</p>	NATURAL ENGLAND, 2014
	Air quality	Maintain or restore as necessary concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air	See explanatory notes for this attribute in Table A.1 above.	More information about site- relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
		Pollution Information System (www.apis.ac.uk).		the Air Pollution Information System
Breeding population	Population abundance	Maintain the size of the breeding woodlark population at a level which is at or above 149 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<p>See explanatory notes for this attribute above in Table A.1.</p> <p>The data originally used in support of the SPA classification was derived from records submitted by volunteer bird recorders for 1997. The figure given for the total SPA of woodlark was 149 pairs which was an estimated 10% of the total GB population at the time. This represents the minimum acceptable number of breeding pairs which should be present expressed as a 5-year mean for the feature.</p> <p>However, annual monitoring has demonstrated that numbers show a general trend of increasing population size since SPA classification. It is likely that this is a result of a combination of a range of factors including improved habitat management, changes in access management and implementation of measures to reduce recreational disturbance. The objective of this target is therefore both to ensure that the overall population is maintained above the minimum population size and to seek to ensure that new activities do not affect the general population trend, measured through the on-going monitoring programme.</p>	Survey information for this species can be obtained from the BTO; http://blx1.bto.org/birdfacts/results/bob9740.htm
Supporting habitat (both within and outside the SPA): extent and distribution	Extent and distribution of supporting habitat for the breeding season	Maintain or restore the extent, distribution and availability of suitable breeding habitat which supports woodlark for all necessary stages of its breeding cycle (courtship, nesting, feeding).	<p>Conserving or restoring the extent of supporting habitats and their range is a critical factor in maintaining the ability and capacity of the SPA to support the breeding woodlark population.</p> <p>The extent and distribution of supporting habitat used by woodlark will vary over time as a result of habitat management, succession, and ad hoc events such as heath fires. The objective is to seek to ensure that there is no overall reduction in habitat availability whilst taking this variability into account.</p>	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			<p>There should at all times be a sufficient extent of the habitat in order to support the population despite the variations in habitat cover over the year. Bare ground should be adjacent to structurally diverse vegetation, favouring very short heather areas.</p> <p>This target may also apply to any supporting foraging habitat which is known to occur outside the SPA boundary.</p>	
Supporting habitat (both within and outside the SPA): disturbance	Disturbance caused by human activity	Restrict and reduce the frequency, duration and/or intensity of disturbance affecting nesting, foraging or feeding birds so that the woodlark feature is not significantly disturbed	<p>The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population.</p> <p>Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites, increased predation of eggs and chicks and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and presence of people, animals (including dogs) and structures.</p> <p>Woodlark are known to be sensitive to disturbance. Disturbance caused by human activity is particularly significant for this SPA because many parts are in close proximity to urban areas. There is also high pressure from new residential development. In 2012 a visitor survey was conducted to provide a baseline for monitoring trends in visitor use and numbers.</p> <p>A framework of strategic avoidance and mitigation measures designed to minimise further disturbance</p>	<p>FEARNLEY, H. AND LILEY, D. 2013.</p> <p>MALLORD, J.W 2003</p> <p>THAMES BASIN HEATHS JOINT PROJECT BOARD, 2009.</p> <p>GOVERNMENT OFFICE FOR THE SOUTH- EAST, 2009.</p>

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			associated with new housing is in place for this SPA as set out in policy NRM6 of the South East Regional Plan which has been adopted in the relevant development plans in the TBH area. This sets out the agreed approach through the provision of Suitable Accessible Natural Greenspace (SANG) and Strategic Access Monitoring and Management (SAMM).	
Supporting habitat (both within and outside the SPA): predation	Predation	Reduce or restrict predation and disturbance caused by native and non-native predators.	<p>This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that can maintain or restore the abundance of the feature.</p> <p>Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also indirectly as a result of significant disturbance. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding.</p> <p>Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features.</p>	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain or restore open and unobstructed terrain, typically within at least 0.2 km of nesting areas, with no increases in tall (>0.2 m) vegetation cover to >50% of the site overall.	<p>Woodlark favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. They show a preference for areas with an unobstructed line of sight in nesting, feeding or roosting habitat to detect approaching predators and to ensure visibility of displaying behaviour.</p> <p>The maintenance of a predominantly open landscape may also be required to facilitate movement of birds between the SPA and any off-site supporting habitat. Woodlark often utilise land adjacent to heathland which is outside the SPA boundary for feeding, including areas of grassland, arable fields and golf courses. Woodlark will</p>	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			also utilise open areas, wide rides and fire breaks in plantations as well as bare areas in quarry sites.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Food availability	Maintain or restore the distribution, abundance and availability of key prey items (e.g. spiders, weevils, caterpillars) at prey sizes preferred by woodlark.	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the woodlark population. Inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey in foraging areas may adversely affect the population.	
Supporting habitat (both within and outside the SPA): structure	Vegetation characteristics	Within nesting and feeding areas, maintain or restore ground vegetation which is predominantly short (<5 cm) or medium (10-20cm) in height, with frequent patches of bare or sparsely-vegetated ground and scattered clumps of shrubs and trees	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature and which enable successful nesting/rearing/concealment/roosting and/or displaying. Many bird species will have specific requirements that conservation measures will aim to maintain, for others such requirements will be less clear. Woodlarks need areas of short, sparse, naturally developed turf with a high abundance of invertebrate prey on bare ground. This needs to be interspersed with tussocky vegetation for nesting. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may therefore adversely affect the feature.	

Version Control

Advice last updated: 9 May 2016 - minor amendments made to attributes (conservation measures, vegetation characteristics, disturbance, landscape) in the draft
 Advice dated 29 February 2016 following receipt of comments from local stakeholders

Variations from national framework of integrity-guidance:

Simplification of some "Supporting Notes" wording; Generic advice updated to include site specific measures and information taken from the sources as referenced in the text; Generic Target wording amended to ensure site/species relevance is maintained.

The targets for some attributes listed above include both 'maintain' or 'restore' objectives. This is because this SPA is an extensive complex of geographically-separate component sites. Overall, both objectives will be applicable to the SPA but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.

Table A.3: Supplementary advice for qualifying features: A302 *Sylvia undata* Dartford warbler

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Maintain or restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain or restore the structure, function and/or the supporting processes associated with the Dartford warbler population and its supporting habitats.	Active and ongoing conservation management is required to protect, maintain or restore the breeding Dartford warbler population. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site can be provided by Natural England. This information will typically be found in supporting documents such as the Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. The site should have areas of structurally diverse heather and gorse. Dartford Warbler particularly favour areas of tall, dense gorse and tall, mature heather for nesting. The availability of areas of shorter but structurally diverse vegetation nearby are important in providing invertebrate prey such as spiders and weevils.	NATURAL ENGLAND, 2014
	Air quality	Maintain or restore as necessary concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table A.1 above.	More information about site- relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System
Breeding population	Population abundance	Maintain or restore the size of the breeding Dartford Warbler population at or to a level which is	See explanatory Notes for this attribute above in Table A.1.	Survey information for this species can be obtained from the BTO;

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
		at or above 445 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<p>The data originally used in support of the SPA classification was derived from records submitted by volunteer bird recorders for 1999. The figure given for the total SPA of Dartford warbler was 445 pairs which was an estimated 28% of the total GB population at the time. This represents the minimum acceptable number of breeding pairs which should be present expressed as a 5-year mean for the feature to be considered to be in favourable condition.</p> <p>However, annual monitoring has demonstrated that numbers vary considerably from year to year. It is likely that this is a result of a combination of a range of factors including cold winters, damp spring weather, improved habitat management, recovery of parts of the complex after heath fires, changes in access management and implementation of measures to reduce recreational disturbance. The objective is therefore both to ensure that the overall population is maintained above the minimum population size (subject to natural population variation in response to climatic factors) and to seek to ensure that new activities do not adversely affect the general population trend, measured through the on-going monitoring programme.</p> <p>Dartford warblers are particularly susceptible to climatic factors such as prolonged periods of snow cover in winter and cold, damp spring weather. Survival and productivity appears to be enhanced when patches of dense gorse are available which provide protection from bad weather.</p>	http://blx1.bto.org/birdfacts/results/bob12620.htm
Supporting habitat (both within and outside the SPA): predation	Predation	Reduce or restrict predation and disturbance caused by native and non-native predators.	<p>This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that maintain or restore the abundance of the feature. Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also from significant disturbance.</p>	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features.	
Supporting habitat (both within and outside the SPA): extent and distribution	Extent and distribution of supporting habitat for the breeding season	Maintain or restore the extent, distribution and availability of suitable habitat which supports Dartford warbler for all necessary stages of its breeding cycle (courtship, nesting, feeding).	<p>Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the ability and capacity of the SPA to support internationally important numbers of Dartford warbler.</p> <p>The extent and distribution of supporting habitat used by Dartford warbler will vary over time as a result of habitat management, succession, and ad hoc events such as heath fires. The objective is to seek to ensure that there is no overall reduction in habitat availability whilst taking this variability into account.</p> <p>This target may also apply to any supporting foraging habitat which is known to occur outside the SPA boundary.</p>	
Supporting habitat (within the SPA): structure	Vegetation characteristics	Maintain or restore an optimal mix of vegetation (>50% cover of heather and/or gorse, <25 trees/ha and of 0.5-3 m height) in nesting areas with areas of structurally diverse vegetation	<p>The height, cover, variation and composition of vegetation are important characteristics of habitats supporting Dartford warbler which enable successful nesting/rearing/concealment/roosting.</p> <p>Dartford warbler have specific requirements that conservation measures should seek to maintain. Stands of gorse are closely associated with Dartford warblers due to its high invertebrate biomass which may be related to its year-round flowering and evergreen nature. Its dense and spikey structure may also provide protection from both the weather and predators.</p> <p>Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			characteristics may adversely affect breeding success and population size.	
Supporting habitat (both within and outside the SPA): disturbance	Disturbance caused by human activity	Restrict or reduce the frequency, duration and/or intensity of disturbance affecting nesting, foraging or feeding birds so that the Dartford Warbler feature is not significantly disturbed	<p>The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population.</p> <p>Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts.</p> <p>Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, the presence of people, animals (including dogs) and structures.</p> <p>Dartford warbler are known to be sensitive to disturbance. Disturbance caused by human activity is particularly significant for this SPA because many parts are in close proximity to urban areas. There is also high pressure from new residential development. In 2012 a visitor survey was conducted to provide a baseline for monitoring trends in visitor use and numbers.</p> <p>Strategic avoidance and mitigation measures designed to minimise further disturbance associated with new housing is in place for this SPA as set out in policy NRM6 of the South East Regional Plan which has been adopted in the relevant development plans in the TBH area. This sets out the agreed approach through the</p>	<p>FEARNLEY, H. AND LILEY, D. 2013.</p> <p>MURISON, G et al. 2007 THAMES BASIN HEATHS JOINT STRATEGIC PARTNERSHIP BOARD, 2009. GOVERNMENT OFFICE FOR THE SOUTH- EAST, 2009.</p>

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of sites-based evidence (where available)
			provision of Suitable Accessible Natural Greenspace (SANG) and Strategic Access Monitoring and Management (SAMM)	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain or restore the distribution, abundance and availability of key prey items (e.g. spiders, weevils, caterpillars) at prey sizes preferred by Woodlark.	Local populations of Dartford warbler are subject to large variation in numbers in response to changing weather patterns and habitat structure. It is important that birds are able to move across the landscape and between patches of suitable habitat so they can re-colonise readily from strongholds. Habitat connectivity is particularly important for this species. This may be relevant within large sites as well as between component parts of the SPA.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Food availability	Maintain or restore the distribution, abundance and availability of key prey items (e.g. beetles, spiders, caterpillars, bugs) at prey sizes preferred by Dartford Warbler.	<p>The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population.</p> <p>In general, structurally-diverse vegetation will provide larger availability of prey.</p>	
Version Control Advice last updated: N/A				
Variations from national framework of integrity-guidance Simplification of some "Supporting Notes" wording; Generic advice updated to include site specific measures and information taken from the sources as referenced in the text; Generic Target wording amended to ensure site/species relevance is maintained. The targets for some attributes listed above include both 'maintain' or 'restore' objectives. This is because this SPA is an extensive complex of geographically-separate component sites. Overall, both objectives will be applicable to the SPA but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further advice on request.				

Appendix B. SPA qualifying species survey methodology and results (2016 to 2018)

B.1. Breeding bird surveys (2016 to 2018)

- B.1.1. The 2016, 2017 and 2018 breeding bird surveys were based on the British Trust for Ornithology's (BTO) Common Bird Census methodology (as described in Gilbert *et al.*, 1998⁸⁴). These will be hereafter referred to as 'CBC surveys' to avoid confusion with the nightjar surveys.
- B.1.2. The CBC surveys commenced at sunrise (following standard CBC methodology) and lasted approximately three to four hours. Often several transects were surveyed in a single visit, so the order in which they were surveyed was varied between visits to minimise recording bias.
- B.1.3. The nightjar surveys commenced approximately half an hour after sunset and lasted for up to two hours, or commenced approximately 1.5 hours before sunrise and lasted until sunrise (these timings follow the nightjar survey method as described in Gilbert *et al.*, 1998).
- B.1.4. The surveys carried out ensured that the species-specific survey methodologies for the qualifying breeding bird species of the Thames Basin Heaths SPA (woodlark, Dartford warbler and nightjar), as taken from Gilbert *et al.* (1998) were incorporated within the survey effort. The species-specific survey requirements are listed below:
- Woodlark – three early morning visits (Visit 1 between 15 February and 21 March; Visit 2 between 22 March and 25 April; Visit 3 between 26 April and 1 June). These were covered by the CBC surveys in 2016⁸⁵ and 2017. In 2018, specific survey visits to record woodlark and Dartford warbler were undertaken.
 - Dartford warbler – three early morning visits (Visit 1 between beginning of April and mid-May; Visit 2 between mid-May and late-May; Visit 3 during June). These were covered by the CBC surveys in 2016 and 2017. In 2018, specific survey visits to record woodlark and Dartford warbler were undertaken.

⁸⁴ Gilbert, G., Gibbons, D.W. and Evans, J. (1998) Bird monitoring methods: A manual of techniques for key UK species. RSPB: Sandy.

⁸⁵ The 2016 surveys did not commence until the 28th April 2016, and therefore missed the peak survey period for woodlark

- Nightjar – two dusk or pre-dawn visits between June and mid-July. These were covered by nightjar-specific surveys in 2016, 2017 and 2018.
- B.1.5. The surveys involved walking transect routes that allowed birds to be recorded within the heathland and woodland habitats of the survey area. Refer to Figures 7.21, 7.22 and 7.23 in Volume 3 of the Environmental Statement (application reference TR010030/APP/6.3) for a plan of the survey areas and transect routes.
- B.1.6. For all surveys, the direction surveyors walked through the site was varied between visits to optimise detection and minimise recording bias. The bird surveys were undertaken in fair weather conditions (i.e. not in heavy rain, poor visibility or wind greater than Beaufort 4). The surveys were led by an experienced ornithologist and Chartered Ecologist, with over ten years of professional bird survey and assessment experience.
- B.1.7. The surveyors, with the aid of binoculars, recorded all contacts with birds by either sight or sound by walking through the site at a slow and steady pace. The positions of the recorded birds were plotted as accurately as possible (to the nearest 10-20m) on a suitably scaled base map, i.e. a 'visit map'. Standard BTO codes and symbols were used for mapping species (including sex and age, e.g. juvenile, immature or adult) and bird activity (including singing, alarm-calling, nest-building and location, carrying food or faecal sacs, territorial disputes and copulation).
- B.1.8. Registrations of birds during the surveys were judged to be 'breeding', 'probable/possible breeding', or 'non-breeding' according to the criteria in Table B.1 below⁸⁶. Breeding behaviour includes displaying, singing, territorial activity, agitated or defensive behaviour or pairs of adults together.

⁸⁶ Breeding criteria definitions adapted from Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000) *Bird Census Techniques: Second Edition*. Academic Press: London.

Table B.1: Definition of breeding criteria

Category	Criteria
Breeding	Adults observed at nest Nest with eggs Unfledged young Carrying nest material, food or faecal sac Present in one location (within normal territory range) on at least two occasions and displaying behaviour indicative of breeding on at least one occasion.
Probable breeding	Present in suitable breeding habitat in the same location (within normal territory range) on one or more occasions Displaying breeding behaviour on one occasion only
Possible breeding	Present in suitable breeding habitat on one occasion
Non-breeding	Present in non-suitable habitat for breeding Immature birds

- B.1.9. The data captured over the survey visits was analysed to provide an estimate of the number of recorded SPA qualifying feature breeding territories and their locations. Data from the 'visit maps' was transferred to a single breeding bird survey map for each qualifying feature, giving an indication of where the qualifying species were recorded and where they may be breeding.
- B.1.10. Table B.2 summarises the number of surveys undertaken for each qualifying feature in 2016, 2017 and 2018. Full details of the surveys undertaken can be found in Appendix 7.13 of the Environmental Statement (application reference TR010030/APP/6.3).

Table B.2: Summary of SPA qualifying species surveys

Section of SPA	Qualifying feature	Number of survey visits		
		2016	2017	2018
Wisley Common	Dartford warbler ⁸⁷ and woodlark (CBC survey)	4 ⁸⁸	7	5
	Nightjar survey	2	4	3
Ockham Common	Dartford warbler and woodlark (CBC survey)	4	7	5
	Nightjar survey	2 ⁸⁹	5	3

B.2. 2J's SPA qualifying species breeding data

- B.2.1. Every year, breeding bird surveys of the Thames Basin Heaths SPA for Dartford warblers, nightjars and woodlarks are undertaken by 2J's⁹⁰. The breeding bird data for Wisley Common and Ockham Common was obtained from 2J's for the five-year period of 2013-2017, and again in 2018.
- B.2.2. Breeding bird survey data from 2J's on the qualifying species of the Thames Basin Heaths SPA species at Wisley Common and Ockham Common, for the six-year period 2013-2018, recorded up to seven Dartford warbler territories (peak count in 2016), up to six nightjar territories (peak count 2017), and up to four woodlark territories (peak count in 2013, 2014, 2015 and 2016). All territories were recorded outside the DCO boundary. See Table B.3 for a summary of the 2J's breeding bird data.

⁸⁷ Dartford warblers were also recorded during the dawn nightjar surveys

⁸⁸ The 2016 surveys did not commence until the 28th April 2016, and therefore missed the peak survey period for woodlark

⁸⁹ There were also a couple of bat surveys where nightjars were recorded at Ockham Common, and these were used in the territory analysis

⁹⁰ 2J's is a voluntary group of ornithologists who survey all of the Thames Basin Heaths SPA sites during the breeding bird season, to monitor the numbers of SPA qualifying species.

Table B.3: 2J's breeding bird data for qualifying species of the Wisley Common and Ockham Common components of the Thames Basin Heaths SPA between 2013 and 2017

Year	Common name	Number of territories within Wisley Common	Number of territories within Ockham Common
2013	Dartford warbler	None recorded	None recorded
	Nightjar	None recorded	Four territories, all outside DCO boundary
	Woodlark	Three territories, all outside DCO boundary	One territory, outside DCO boundary
2014	Dartford warbler	None recorded	None recorded
	Nightjar	One territory, outside DCO boundary	Four territories, all outside DCO boundary
	Woodlark	Three territories, all outside DCO boundary	One territory, outside DCO boundary
2015	Dartford warbler	One territory, outside DCO boundary	Two territories, both outside DCO boundary
	Nightjar	None recorded	Five territories, all outside DCO boundary
	Woodlark	Three territories, all outside DCO boundary	One territory, outside DCO boundary
2016	Dartford warbler	Three territories, all outside DCO boundary	Four territories, all outside DCO boundary
	Nightjar	One territory, outside DCO boundary	Four territories, all outside DCO boundary
	Woodlark	Three territories, all outside DCO boundary	One territory, outside DCO boundary
2017	Dartford warbler	Three territories, all outside DCO boundary	Three territories, all outside DCO boundary
	Nightjar	Three territories, all outside DCO boundary	Three territories, all outside DCO boundary
	Woodlark	One territory, outside DCO boundary	Two territories, both outside DCO boundary
2018	Dartford warbler	One territory, outside DCO boundary	Three territories, all outside DCO boundary
	Nightjar	Three territories, all outside DCO boundary	Three territories, all outside DCO boundary
	Woodlark	No territories	No territories

B.3. Breeding bird survey results (2016-2018)

2016

- B.3.1. During the 2016 surveys, no qualifying species were recorded within the Wisley Common section of the SPA. However, during this initial survey set, the surveys focused on the heathland by M25 junction 10, rather than the wider Wisley Common heathland areas. Therefore, some qualifying species within the wider Wisley Common may have been missed.
- B.3.2. Within Ockham Common, the following qualifying species were recorded:
1. Three confirmed, one probable and one possible Dartford warbler territory; and,
 2. Four confirmed nightjar territories.
- B.3.3. These territories were all located within the open heathland habitat. There were no records of any qualifying species within any woodland areas or the DCO boundary. Refer to figures 2A and 2B of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for plans showing all Dartford warbler and nightjar records within Wisley Common during the 2016 surveys, and showing the territory analysis of those records.

2017

- B.3.4. Within Wisley Common, the following qualifying species were recorded:
1. One confirmed woodlark territory;
 2. Two probable Dartford warbler territories; and,
 3. Two confirmed and one probable nightjar territory.
- B.3.5. These territories were all located within the open heathland habitat. There were no records of any qualifying species within any woodland areas or the DCO boundary. Refer to figures 2C, 2D and 2E of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for plans showing all Dartford warbler, nightjar and woodlark records within Wisley Common during the 2017 surveys, and showing the territory analysis of those records.
- B.3.6. Within Ockham Common, the following qualifying species were recorded:

1. One confirmed woodlark territory;
2. Three confirmed and one probable Dartford warbler territory; and,
3. Four confirmed nightjar territories.

B.3.7. These territories were all located within the open heathland habitat. There were no records of any qualifying species within any woodland areas or the DCO boundary. Refer to figures 2F, 2G and 2H of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for plans showing all Dartford warbler, nightjar and woodlark records within Ockham Common during the 2017 surveys, and showing the territory analysis of those records.

2018

B.3.8. Within Wisley Common, three confirmed nightjar territories were recorded. No other qualifying species were recorded within Wisley Common in 2018.

B.3.9. These nightjar territories were all located within the open heathland habitat. There were no records of nightjars within any woodland areas or the DCO boundary. Refer to Figure 2I of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for a plan showing all nightjar records within Wisley Common during the 2018 surveys, and showing the territory analysis of those records.

B.3.10. Within Ockham Common, the following qualifying species were recorded:

1. Two confirmed and one probable Dartford warbler territory; and,
2. Three confirmed nightjar territories.

B.3.11. These territories were all located within the open heathland habitat. There were no records of any qualifying species within any woodland areas or the DCO boundary. Refer to figures 2J and 2K of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for plans showing all Dartford warbler and nightjar records within Ockham Common during the 2018 surveys, and showing the territory analysis of those records.

Table B.4: Summary of the 2016, 2017 and 2018 breeding bird results for the Wisley Common and Ockham Common components of the SPA

Location within the SPA	Qualifying feature	Number of breeding territories		
		2016	2017	2018
Wisley Common	Dartford warbler	Absent (2016 survey did not cover whole of Wisley Common)	Breeding - Up to two territories, all outside DCO boundary	Absent
	Nightjar	Absent (2016 survey did not cover whole of Wisley Common)	Breeding – Up to three territories, all outside DCO boundary	Breeding – Three confirmed territories, all outside DCO boundary
	Woodlark	Absent (2016 survey did not cover whole of Wisley Common)	Breeding - One territory, outside DCO boundary	Absent
Ockham Common	Dartford warbler	Breeding - Up to five territories, all outside DCO boundary	Breeding - Up to four territories, all outside DCO boundary	Breeding – Up to three territories, all outside DCO boundary
	Nightjar	Breeding – Four confirmed territories, all outside DCO boundary	Breeding – Four confirmed territories, all outside DCO boundary	Breeding – Three confirmed territories, all outside DCO boundary
	Woodlark	Absent	Breeding - One territory, outside DCO boundary	Absent

B.4. Discussion

- B.4.1. The findings of the 2017 and 2018 survey were supported by the 2016 surveys, which focused on a smaller survey area within Wisley Common and may have missed some qualifying species territories (particularly woodlark due to the later commencement of the surveys).
- B.4.2. The 2J's 2017 and 2018 breeding bird data for Dartford warbler, nightjar and woodlark at Wisley Common and Ockham Common was broadly in-keeping with Atkins 2017 and 2018 breeding bird data:
1. In 2017 2J's recorded three Dartford warbler territories on Wisley Common and three Dartford warbler territories on Ockham Common. Atkins 2017 surveys recorded up to two Dartford warbler territories on Wisley Common and confirmed four Dartford warbler territories on Ockham Common. In 2018, 2J's recorded one Dartford warbler territory on Wisley Common and three Dartford warbler territories on Ockham Common. No Dartford warbler territories were recorded on Wisley Common during the 2018 surveys, and up to three Dartford warbler territories were recorded on Ockham Common;
 2. In 2017 2J's recorded three nightjar territories on Wisley Common and three nightjar territories on Ockham Common. Atkins 2017 surveys recorded up to three nightjar territories on Wisley Common and four confirmed nightjar territories on Ockham Common. In 2018, 2J's recorded three nightjar territories on Wisley Common and three nightjar territories on Ockham Common. Atkins 2018 surveys recorded three confirmed nightjar territories on Wisley Common and three confirmed nightjar territories on Ockham Common;
 3. In 2017 2J's recorded one woodlark territory on Wisley Common and two woodlark territories on Ockham Common. Atkins 2017 surveys recorded one woodlark territory on Wisley Common. During Atkins 2017 surveys, woodlarks were recorded flying between the two locations where 2J's recorded separate woodlark territories on Ockham Common. Based on Atkins observations, it was considered that these are likely to be birds from the same territory and therefore there was only one woodlark breeding territory on Ockham Common in 2017. No woodlarks were recorded in 2018 in Wisley Common or Ockham Common by 2J's or Atkins.
- B.4.3. It should be noted that 2J's recorded higher numbers of woodlark (3 territories in Wisley Common) in the previous years (2013-2016). However, the number of woodlarks that 2J's recorded had declined in 2017, and none were recorded in 2018. It is considered that this species has naturally declined at Wisley Common due to the heathland having grown in height since being cleared in 2010 (woodlarks require ground vegetation which is predominantly short (<5 cm) or medium (10-20cm) in height, with frequent patches of bare or sparsely-vegetated ground (as detailed in the Thames Basin Heaths supplementary advice in Appendix A)). This trend is also reflected in the increased numbers of nightjar in Wisley Common (three territories in 2017 and

2018, compared to one territory or less in previous years), as nightjar require vegetation mostly of 20-60 cm height, with areas of tree cover less than 2 m in height (as detailed in the Thames Basin Heaths supplementary advice in Appendix A). Out of the data provided by 2J's It is considered that the 2017 and 2018 data are most relevant.

B.4.4. Taking the 2016, 2017 and 2018 breeding bird survey results and 2J's 2017 and 2018 data into account, it is assumed that:

1. Three Dartford warbler territories occur within Wisley Common⁹¹ and four Dartford warbler territories occur within Ockham Common;
2. Three nightjar territories occur within Wisley Common and four nightjar territories occur within Ockham Common;
3. One woodlark territory occurs within Wisley Common (although it is noted that in previous years, up to three woodlark territories have occurred on Wisley Common) and one woodlark territory occurs within Ockham Common⁹².

B.4.5. All records of Dartford warbler, nightjar and woodlark territories were within the open heathland habitats.

⁹¹ It is noted that only one Dartford warbler territory was recorded within Wisley Common in 2018. However, it is assumed that they may occur in future years, so the 2017 baseline has been used.

⁹² It is noted that no woodlarks were recorded within Wisley Common or Ockham Common in 2018. However, it is assumed that they may occur in future years, so the 2017 baseline has been used.

Appendix C. Summary of HRA Screening results

- C.1.1.** The HRA Stage 1: Screening identified the following impacts as having potential to result in a likely significant effect on the Thames Basin Heaths SPA:

Habitat loss (temporary and permanent)

- C.1.2.** The loss of habitat as a result of the Scheme has the potential to have an adverse effect on the extent and distribution of the supporting habitats of the qualifying species of the Thames Basin Heaths SPA.

Degradation of habitats by changes in air quality and/ or water quality

- C.1.3.** Changes in air quality and/ or water quality as a result of the Scheme (either during construction and/ or operation) have the potential to have an adverse effect on the structure and function of the habitats of the qualifying species, and, in the case of hydrology, the supporting processes on which the habitats of the qualifying species rely.

Disturbance by changes in noise, recreational use and/ or lighting

- C.1.4.** Increases in noise levels as a result of the Scheme (either during construction and/ or operation) have the potential to have an adverse effect on the distribution of the qualifying species within the site, and also the population of the qualifying species.

- C.1.5.** Increases or changes in recreational use during the construction and operation of the Scheme has the potential to have an adverse effect on the distribution of the qualifying species within the site, and also the population of the qualifying species.

- C.1.6.** Increases in lighting levels as a result of the Scheme (either during construction and/ or operation) has the potential to have an adverse effect on the distribution of the qualifying species within the site, and also the population of the qualifying species. In addition, increases in lighting levels have the potential to have an adverse effect on the function of the habitats of the qualifying species (i.e. as an invertebrate food resource).

Spread of non-native invasive plant species

- C.1.7. Without appropriate mitigation measures in place, the movement of machinery and earthworks during construction could cause the spread of non-native invasive plant species within the SPA. This in turn could have an adverse effect on the habitat communities within the SPA that support the qualifying species.

Appendix D. Mitigation measures

Table D.1: Embedded measures within the Scheme

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
Regular water-spraying and sweeping of unpaved and paved roads to minimise dust and remove mud and debris	Construction	×	✓	×	×	×	×	×
Sheeting vehicles carrying dusty materials to prevent materials being blown from the vehicles whilst travelling	Construction	×	✓	×	×	×	×	×
Enforcing speed limits for vehicles on unmade surfaces to minimise dust entrainment and dispersion	Construction	×	✓	×	✓	×	×	×
Damping down of surfaces prior to their being worked on	Construction	×	✓	×	×	×	×	×
Storing dusty materials away from site boundaries and in appropriate containment (e.g. sheeting, sacks, barrels etc.).	Construction	×	✓	×	×	×	×	×
All works to be undertaken with regard to Pollution Prevention Guidelines ⁹³ (PPGs),	Construction	×	✓	✓	×	×	×	×

⁹³ Pollution Prevention Guidelines (PPGs) with particular reference to PPG1 (general guide to the prevention of water pollution), PPG3 (use and design of oil separators in surface water drainage systems), PPG5 (works near or liable to affect watercourses) and PPG6 (working at construction and demolition sites). The PPGs contain a mix of regulatory requirements and good practice advice. They have been withdrawn by the Environment Agency but are still considered good practice advice to avoid pollution of watercourses. All of the PPGs are available from <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx>

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
Guidance on Pollution Prevention (GPPs) ⁹⁴ and the Construction Industry Research and Information Association (CIRIA) C741 Environmental good practice on site handbook ⁹⁵ . These detail good practice advice for undertaking works which may have the potential to cause water pollution								
Areas which may generate contaminated water, such as oil storage areas, will be bunded and have water discharged to self-contained units with treatment facilities. There will be no discharge to groundwater.	Construction	×	×	✓	×	×	×	×
Tests will be undertaken to ensure contaminated material is identified, isolated and reworked or removed to special landfill to avoid any leachate problems.	Construction	×	×	✓	×	×	×	×
Prior to any piling, a risk assessment will be carried out to ensure the selected piling method does not introduce contamination pathways into the aquifer. Piling design will include mitigation in the form of substantial clear spacing between piles and appropriate piling installation methods. Where sheet piling is replacing existing retaining walls,	Construction	×	×	✓	×	×	×	×

⁹⁴ Pollution Prevention Guidelines (PPGs) are out of date and a review process is currently underway to replace them with Guidance for Pollution Prevention (GPPs). These documents are available at <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-pggs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>. GPPs provide environmental good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales only. For businesses in England, regulatory guidance is available from GOV.UK instead.

⁹⁵ Environmental Good Practice on Site Guide, CIRIA, Jan 2015, Edition 4.

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
the design will not exceed the extent and depth of any existing retaining walls (refer to the Environmental Statement Chapter 8: Road drainage and the water environment for further details).								
Floodplain working will be kept to a minimum (consultation with the lead local flood authorities (LLFAs) will be required to ensure sustainable drainage mitigation is incorporated into the design so as to not increase surface water flood risk) (refer to the Environmental Statement Chapter 8: Road drainage and the water environment for further details).	Construction	×	×	✓	×	×	×	×
No active dewatering of groundwater will take place. Where construction works extend below the water table, measures will be implemented such that groundwater levels are not adversely impacted outside of the DCO boundary.	Construction	×	×	✓	×	×	×	×
Use precast units where practicable, to minimise the use of wet cement.	Construction	×	×	✓	×	×	×	×
Works to be undertaken outside of watercourses and waterbodies wherever possible.	Construction	×	×	✓	×	×	×	×
A number of measures to reduce noise levels of machinery and tools will be put in	Construction	×	×	×	✓	×	×	×

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
<p>place to minimise construction impacts on ecological receptors. These will include:</p> <ul style="list-style-type: none"> • 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 to 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 to be shut down when not in use or where this is impracticable, throttled down to a minimum; • 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 BS5228-1; • Where appropriate, temporary noise barriers or other noise containment measures installed to minimise construction noise levels; 								

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
<ul style="list-style-type: none"> 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. 								
Where piling is required, the piling method will 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.	Construction	×	×	×	✓	×	×	×
As part of the Precautionary Method for Working, prior to all works commencing, a check for non-native invasive plants will be undertaken. Any non-native invasive plants will either be avoided or removed by a suitably qualified specialist.	Construction	×	×	×	×	×	×	✓
Where deep foundations extending below the groundwater table are designed to be part of the Scheme, these will be designed in accordance with industry standards, considering the site-specific water level and flow monitoring data obtained from intrusive	Construction and operation	×	×	✓	×	×	×	×

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
ground investigation. Piling design will include mitigation in the form of substantial clear spacing between piles and appropriate piling installation methods. Where sheet piling is replacing existing retaining walls, the design will not exceed the existing extent and depth of the retaining wall (refer to the Environmental Statement Chapter 8: Road drainage and the water environment for further details).								
Design of operational Scheme lighting to minimise light spill outside Scheme footprint.	Construction and operation	×	×	×	×	×	✓	×
The design of the drainage system complies with all current standards and Sustainable Urban Drainage Systems (SuDS) best practice techniques to ensure that sustainability is a key drainage design criterion. A combination of attenuation ponds and attenuation ditches will be incorporated into the design to ensure that any surface water within the highway is contained (refer to the Environmental Statement Chapter 8: Road drainage and the water environment for further details).	Operation	×	×	✓	×	×	×	×
Where low points of the highway do not correlate with known outfalls, a soakaway will be provided. These will provide storm water attenuation, storm water treatment and groundwater recharge (refer to the	Operation	×	×	✓	×	×	×	×

Embedded measure	Stage	Scheme-wide impact that the embedded measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
Environmental Statement Chapter 8: Road drainage and the water environment for further details).								
The proposed drainage design will ensure that the runoff from the Scheme is attenuated before reaching the watercourse for a 1 in 100 annual probability event (refer to the Environmental Statement Chapter 8: Road drainage and the water environment for further details).	Operation	×	×	✓	×	×	×	×

Table D.2: HRA-specific mitigation measures

HRA-specific mitigation measure (to be included and secured through the Construction Environmental Management Plan)	Stage	SPA impact that the HRA-specific measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
The final Scheme design option selected is the option that includes the smallest amount of land take from the SPA (see Section 1 of Habitat Regulations Assessment Stages 3-5: Assessment of Alternatives, consideration of the IROPI and compensatory measures (application document TR010030/APP/5.3)).	Construction	✓	✗	✗	✗	✗	✗	✗
A ban on construction workers having pets on site will ensure that an increase in dog walkers within the SPA does not occur as a result of the construction of the Scheme.	Construction	✗	✗	✗	✗	✓	✗	✗
The Scheme includes new noise barriers at M25 junction 10, and low noise road surfacing along the A3. The new noise barriers will be of a similar specification to existing noise barriers but will be more extensive in their coverage. Refer to Figure 9 of 5.3 Habitats Regulations Assessment Figures (application document TR010030/APP/5.3) for changes in noise barrier extent resulting from the Scheme.	Operation	✗	✗	✗	✓	✗	✗	✗
Provision of publicly accessible Replacement Land outside the SPA, which will draw some recreational users away from the SPA.	Operation	✗	✗	✗	✗	✓	✗	✗
Provision of signage at the main entrance points to the Ockham and Wisley Commons	Operation	✗	✗	✗	✗	✓	✗	✗

HRA-specific mitigation measure (to be included and secured through the Construction Environmental Management Plan)	Stage	SPA impact that the HRA-specific measure will mitigate for						
		Habitat loss	Changes in air quality	Changes in hydrology and/or water quality	Noise	Recreational disturbance	Lighting	Spread of invasive plants
SSSI component of the SPA, informing recreational users of recommended routes which will draw visitors away from the most sensitive locations.								

Appendix E. HRA integrity matrix: Thames Basin Heaths Special Protection Area

- E.1.1. Likely significant effects have been identified for the Thames Basin Heaths SPA.
- E.1.2. This site has been subject to further assessment in order to establish if the Nationally Significant Infrastructure Project could have an adverse effect on its integrity. Evidence for the conclusions reached on integrity is detailed within the footnotes to the matrices below.

Name of European site and designation: Thames Basin Heaths Special Protection Area Designated for its breeding populations of Dartford warbler, Nightjar and Woodlark																
EU Code: UK9012141																
NSIP is situated within Thames Basin Heaths Special Protection Area																
European site features	Adverse effect on integrity															
Effect	Habitat Loss		Degradation of habitats by changes in air quality		Degradation of habitats by changes in water quality		Disturbance by changes in noise		Disturbance by changes in recreational use		Disturbance by changes in lighting		Spread of non-native invasive plants		In combination effects	
Stage of Development	C ⁹⁶	O ⁹⁷	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Feature 1 A224 Caprimulgus europaeus; European nightjar (breeding)	✓a	b	xc	xd	xe	xe	xf	xg	xh	xi	xj	xj	xk	l	xm	xm
Feature 2 A246 Lullula arborea; woodlark (breeding)	✓a	b	xc	xd	xe	xe	xf	xg	xh	xi	xj	xj	xk	l	xm	xm
Feature 3 A302 Sylvia undata; Dartford warbler (breeding)	✓a	b	xc	xd	xe	xe	xf	xg	xh	xi	xj	xj	xk	l	xm	xm

Evidence supporting conclusions

- a. The permanent loss of mixed woodland habitat from the SPA could have an adverse effect on the conservation objectives to 'maintain the extent and distribution of the habitats of the qualifying species' and 'maintain or restore the distribution, abundance and availability of key prey items'. This represents an adverse effect on the integrity of the Thames Basin Heaths SPA as it cannot be ruled out without any reasonable scientific doubt that this would have an indirect negative impact on the SPA qualifying species (refer to paragraphs 7.2.7 to 7.2.24 of this SIAA).

⁹⁶ Construction

⁹⁷ Operation

- b. The habitat loss will take place during the construction stage (see a.).
- c. Qualifying species will not be subject to significant effects from air pollution during construction. Changes in air quality as a result of the Scheme (changes in vehicle movements and increased construction traffic) will lead to increases in nitrogen deposition of less than 1% and will be below existing baseline levels. Therefore, emissions during construction will not have a negative impact on the condition of the habitats within the SPA, nor an adverse effect on the integrity of the Thames Basin Heaths SPA (refer to paragraphs 7.2.35 to 7.2.40 of this SIAA).
- d. Predicted increases in nitrogen deposition of greater than 1% of the critical load are restricted to within the first 12 m of the operational road boundary. All other estimated increases in nitrogen deposition within the SPA can be considered not to be significant, and in many locations, nitrogen deposition will be reduced. Any increases predicted as a result of the operation of the Scheme in 2022 are below the current baseline nitrogen deposition levels. Therefore, it can be concluded with confidence that changes to air quality as a result of the operation of the Scheme will have no adverse effects on the integrity of the SPA, in respect of the SPA qualifying species (refer to paragraphs 7.2.41 to 7.2.54 of this SIAA).
- e. The SPA habitat will not be subject to significant effects of degradation from changes in water quality during construction or operation. Standard and appropriate design and mitigation measures will be put in place to minimise the risk of sediment and/or other contaminants entering watercourses or groundwater and affecting the quality of water and the surrounding heathland upon which the qualifying species rely. Therefore, it can be concluded with confidence that changes to water quality as a result of the construction and/or operation of the Scheme will have no adverse effects on the integrity of the SPA, in respect of the SPA qualifying species (refer to paragraphs 7.2.56 to 7.2.66 of this SIAA).
- f. The construction activities will generally be at lower noise levels than the existing background noise levels within the heathland areas where the qualifying species occur. Although these construction activities will still be audible against the existing ambient sound levels at the location of the qualifying species territories, they will be more easily masked by other closer noise sources. Although there will be minor increases (up to 3 dB) as a result of continuous construction noises, the qualifying species are less likely to be startled by loud irregular noises (such as dropping objects at heights) because of their distance from the DCO boundary. Louder activities, such as bridge demolition, will be extremely short-term and localised. Therefore, there will be no adverse effects on the integrity of the SPA, in respect of the SPA qualifying species, as a result of construction noise (refer to paragraphs 7.2.72 to 7.2.81 of this SIAA).
- g. The operational road traffic noise levels within the heathland areas where the qualifying species occur are subject to changes in background noise levels of less than 3 dB. This is considered a negligible long-term change (refer to DMRB 11:3:7) and will not have an impact on the density of qualifying species within the SPA. Therefore, there will be no adverse effects on the integrity of the SPA, in respect of the SPA qualifying species, as a result of operational noise (refer to paragraphs 7.2.82 to 7.2.89 of this SIAA).

- h. Due to the works taking place within the SPA, and no enhanced access to the SPA during construction, it is possible to state with confidence that recreational usage of the SPA will not increase during the construction works. Due to there being no increase in recreational disturbance as a result of the construction of the Scheme, there will be no adverse effects on the integrity of the SPA, in respect of the SPA qualifying species, as a result of increased recreational disturbance during construction (refer to paragraphs 7.2.100 to 7.2.104 of this SIAA).
- i. The operational Scheme will not improve direct access to Wisley or Ockham Common, nor will it change the existing car parking options for recreational visitors to either of these Commons. Therefore, the operation of the Scheme is not expected to result in changes to the numbers of visitors to the Thames Basin Heaths SPA, or the way in which visitors gain access to the SPA. In addition, new routes within the SPA that avoid the sensitive heathland areas will allow visitors to increase their current walking route options and are therefore likely to lead to some visitors being drawn away from the sensitive heathland areas. Due to there being no increase in recreational disturbance as a result of the operational Scheme, there will be no adverse effects on the integrity of the SPA, in respect of the SPA qualifying species, as a result of increased recreational disturbance once operational (refer to paragraphs 7.2.105 to 7.2.116 of this SIAA).
- j. Light spill will be minimised by embedded design measures, with the provision of directional lighting to avoid light spill outside the DCO boundary both during construction and operation. The absence of changes in lighting, either during construction or operation, will ensure that there is no adverse effect on the integrity of the SPA, in respect of the SPA qualifying species, as a result of lighting changes (refer to paragraphs 7.2.117 and 7.2.118 of this SIAA).
- k. The embedded measures will ensure that the construction activities do not cause the spread of non-native invasive plant species. Therefore, it can be concluded with confidence that there will not be any spread of non-native invasive plant species within the SPA (and therefore no associated adverse effects on the integrity of the SPA) as a result of the construction of the Scheme (refer to paragraphs 7.2.119 and 7.2.120 of this SIAA).
- l. The potential to spread non-native invasive plants will only take place during the construction stage (see k.).
- m. Qualifying species will not be subject to in combination effects from other plans and projects during construction or operation, as all local authorities have a Local Plan HRA to ensure their plans and projects avoid adverse effects on the SPA. Therefore, there will be no adverse effect on the integrity of the SPA, in respect of the SPA qualifying species, as a result of in combination effects (refer to Tables 10 and 11 of this SIAA).

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