Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 9.9.1: Habitat Regulations Assessment Report – Part 1

Book 5

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Table of Contents

1 Introduction 1

2 Methodology 2

3 Stage 1 – Qualifying Interest Features and Conservation Objectives 3

4 Stage 2 – Likely Significant Effect 23

5 Stage 3 – Appropriate Assessment 30

6 References 37

7 Glossary 39

Tables

Table 3.2.1: Attributes of Mole Gap to Reigate Escarpment SAC (Natural England 2014a) 4

Table 3.3.1: Attributes of Ashdown Forest SAC (Natural England 2019c) 10

Table 3.4.1: Attributes of Ashdown Forest SPA (Natural England 2019a) 12

Table 3.5.1: Attributes of the The Mens SAC (Natural England 2018b) 13

Table 3.6.1: Attributes of the Ebernoe Common SAC (Natural England 2019b) 16

Table 3.7.1: Attributes of the Thames Basin Heaths SPA (Natural England 2014d) 18

Table 3.8.1: Attributes of the Thursley, Ash, Pirbright and Chobham SAC (Natural England 2016) 20

Table 4.9.1: Likely significant effects screened in for appropriate assessment 29

Table 5.3.1: Conclusions of appropriate assessment 36

Table 7.1.1: Glossary of Terms 39

Annex

Annex 1 Screening Matrices

Annex 2 Integrity Matrices

Annex 3 Ecology Surveys to Support HRA

Annex 4 Sensitivity Testing using Transport Decarbonisation Plan

Annex 5 Designated site citations

Annex 6 Note on accuracy of dispersion model

Annex 7 Figures

1 Introduction

1.1 General

1.1.1 This document forms **ES Appendix 9.9.1: Habitat Regulations Assessment Report** (Doc Ref. 5.3) of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL) for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project').

1.1.2 This document provides the findings of the Habitat Regulations Assessment (HRA) process undertaken for the Project.

1.2 Purpose of this Report

1.2.1 The purpose of this report is to apply the legislative requirements of the Conservation of Habitats and Species Regulations 2017, as amended (the "Habitats Regulations") to the Project. The Habitats Regulations transposed into domestic law the requirements of Article 6(3) of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna ("the Habitats Directive"). Regulation 63(1) of the Habitats Regulations sets out the circumstances in which an appropriate assessment of a project is required:

"A competent authority, before deciding to...give any consent, permission or authorisation for a plan or project which (a) is likely to have a significant effect on a European site...(either alone or in combination with other plans or projects) and (b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives".

1.2.2 Regulation 63 applies the precautionary principle to relevant designated areas. By regulation 63(5) "i*n the light of the conclusions of the assessment, and subject to regulation 64, the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site…".* "European sites" include any Special Protection Area (SPA) and Special Area of Conservation (SAC). By regulation 84, these assessment provisions apply to any application for development consent.

1.2.3 A project is likely to have a significant effect so as to require an appropriate assessment if the risk of such an effect cannot be excluded on the basis of objective information. If an appropriate assessment is required, its task is to satisfy the competent authority that the project will not adversely affect the integrity of the site concerned.

1.2.4 Plans and projects for which it is not possible to conclude that there would be no adverse effect on the integrity of relevant sites may still be permitted if there are no alternatives and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead (regulation 64 of the Habitat Regulations). In such cases, any compensation measures necessary to ensure the overall coherence of the site network is protected must also be secured (regulation 68 of the Habitat Regulations).

1.2.5 As described further below, this report considers regulation 63 of the Habitat Regulations. Regulations 64 and 68 are not applicable in this case.

1.3 Scope

1.3.1 Key activities in the Project programme that are considered in this report are:

- site preparation and enabling works;
- construction phase; and
- operation.

1.3.2 No European sites or Ramsar sites lie wholly or partly within the Project site boundary.

1.3.3 It is a matter of UK Government policy and guidance that the following sites should also be subject to a HRA, where affected by a plan or project:

- proposed SACs;
- potential SPAs;
- Ramsar sites (both proposed and listed); and
- areas secured as sites compensating for damage to a European site.

1.3.4 No such sites are within the scope of this assessment and, as such, are not considered further in this report.

1.3.5 The scope of sites included in the assessment is based on whether there is a pathway for a potential effect. In this case such pathways are in relation to species for which the site is designated or habitats where the site is near to a road that may encounter increases in traffic flow as a result of the Project. This scope is based on the findings of the technical chapters of the ES (specifically **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1), **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1) and **ES Chapter 13: Air Quality** (Doc Ref. 5.1)) and consultation and engagement with Natural England (see **ES Appendix 9.3.1: Summary of Stakeholder Scoping Responses – Ecology and Nature Conservation**(Doc Ref. 5.3)). This includes designated sites that are within 200m of major roads where there would be increases in traffic flows and those designated for the presence of bats within the potential range of these mobile species. On this basis, the following seven sites were identified as requiring consideration for potential effects (distance/direction from Project site boundary provided in parenthesis):

- Mole Gap to Reigate Escarpment SAC (9.22 km north west);
- Ashdown Forest SAC (11.96 km south west);
- Ashdown Forest SPA (11.96 km south west);
- The Mens SAC (25.09 km south west);
- Ebernoe Common SAC (29.00 km south west);
- Thames Basin Heaths SPA (Ockham and Wisley SSSI and Chobham Common SSSI components only) (23.6 km north west); and
- Thursley, Ash, Pirbright and Chobham SAC (Chobham Common SSSI component only) (33.8 km north west).

1.3.6 Where it is adjacent to the M3, the Chobham Common SSSI is a component of both the Thursley, Ash, Pirbright and Chobham SAC and Thames Basin Heaths SPA. Figure 2 shows the location of these sites relative to the Project.

1.3.7 The sites to be considered have been agreed with Natural England during pre-submission engagement.

1.3.8 There is no potential for transboundary effects (see **ES Appendix 6.2.3 Transboundary Screening Matrix** (Doc Ref. 5.3)). The site does not support migratory bird species that may be associated with relevant sites in other EU States and whilst there is some evidence of bat migration to and from the UK for some species (Nathusius' pipistrelle, for example (PTES, 2020)), the presence of SACs in the surrounding landscape designated for bats are already in the scope of assessment.

2 Methodology

2.1.1 The approach to Habitats Regulations Assessment has been set out in caselaw and guidance issued by government and PINS[1]:

- All plans and projects (including planning applications) which are not directly connected with, or necessary for, the conservation management of a habitat site, require consideration of whether the plan or project is likely to have significant effects on that site. This consideration – typically referred to as the 'Habitats Regulations Assessment screening' – should take into account the potential effects both of the plan/project itself and in combination with other plans or projects. In the light of the precautionary principle, a project is "likely to have a significant effect" so as to require an appropriate assessment if the risk cannot be excluded on the basis of objective information and it might undermine a site's conservation objectives. A risk or a possibility of such an effect is enough to warrant the need for an appropriate assessment.
- If a proposed plan or project is considered likely to have a significant effect on a protected habitats site (either individually or in combination with other plans or projects) then an appropriate assessment of the implications for the site, in view of the site's conservation objectives, must be undertaken. The conservation objectives relate to each of the habitats and species for which the site was designated.
- An appropriate assessment must consider the direct and indirect effects on the designated features and conservation objectives, including the following principles:
  - An appropriate assessment must catalogue the entirety of habitat types and species for which a site is protected.
  - An appropriate assessment must identify and examine the implications of the proposed plan or project for the designated features present on that site, including for the typical species of designated habitats as well as the implications for habitat types and species present outside the boundaries of that site and functionally linked; insofar as those implications are liable to affect the conservation objectives of the site.
  - 'Appropriate' is not a technical term. It indicates that an assessment needs to be proportionate and sufficient to support the task of the competent authority in determining whether the plan or project will adversely affect the integrity of the site. What is required of the competent authority, therefore, is a case-specific assessment in which the applicable science is brought to bear with sufficient rigour on the implications of the project for the protected site concerned. An appropriate assessment must contain complete, precise and definitive findings and conclusions to ensure that there is no reasonable scientific doubt as to the effects of the proposed plan or project. It must be based on the best scientific knowledge in the field.
  - The competent authority may agree to the plan or project only if it is satisfied that there is no reasonable scientific doubt as to the absence of adverse effects on the integrity of the site concerned. The competent authority must determine whether the proposal will not adversely affect the integrity of the site(s). The integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated.
  - The duty to ascertain whether there will be no adverse effects on the integrity of the protected site does not need to be established to the standard of "absolute certainty". What is required is a sufficient degree of certainty to ensure that there is no reasonable doubt on the relevant question.
  - A competent authority must consult Natural England for the purposes of the assessment and must have regard to any representations that Natural England may wish to make within a reasonable time (as specified by the competent authority).

2.2 Process

2.2.1 The stages of HRA are described below, having regard to the guidance referred to above).

Stage 1 – Qualifying Interest Features and Conservation Objectives

2.2.2 Stage 1 is to collect information on the sites identified for considerationand their conservation objectives.

2.2.3 The qualifying interest features for the sites assessed in this report have been obtained via the citation details on the Joint Nature Conservation Committee (JNCC)/Natural England websites. The conservation objectives provide the basis for determining what is currently causing, or may cause, a significant effect, and for informing the scope of the assessments.

2.2.4 In addition to qualifying interest features, it is necessary to explore the environmental features and conditions required to maintain the integrity of the sites, as well as both current conditions and trends in environmental processes.

Stage 2 – Likely Significant Effect

2.2.5 The second stage is to determine whether there are any Likely Significant Effects (LSEs) on relevant sites as a result of the Project in the absence of mitigation/avoidance measures in accordance with the "People over Wind" ruling.[2] This is essentially a risk assessment to decide whether a more detailed assessment is required and, if so, the scope of the issues and features to be addressed. This involves identifying the potential pathways through which the Project could affect the interest features of relevant sites and then assessing, in broad terms, the magnitude of each impact to determine whether a significant effect is likely. In making this determination, the risk of an effect has been taken into account, not just on those sites within the administrative boundary of Crawley Borough Council (within which the airport sits), but, in line with best practice, considering potential ways in which the Project could impact upon other relevant sites.

2.2.6 The Habitats Regulations require that a decision to grant consent can only be made once the competent authority is satisfied that no adverse effects on the integrity of the relevant sites are likely, either alone and in-combination with other plans and projects. Therefore, the HRA process requires the identification of other plans and projects that might affect the interest features of the relevant sites in combination with the Project, and a decision as

[1] "See Appropriate assessment - GOV.UK (www.gov.uk), PINS Advice Note 10 (August 2022) Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects | National Infrastructure Planning (planninginspectorate.gov.uk), as well as R (Wyatt) v. Fareham Borough Council [2022] EWCA Civ 983 at [9] and R (Mynnyd y Gwynt) v. SSBEIS [2018] EWCA Civ 231 at [8], which summarise the effect of previous authorities at national and ECJ level.

[2] See Case C-323/17 "People over Wind" (in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site); and para. 3.15 of Advice Note 10 (Planning Inspectorate, 2022).

to whether there are any LSEs that might occur in-combination (collectively) that would not occur when the impacts of the Project are considered alone.

2.2.7 The process of identifying other consented or proposed developments and screening to create a shortlist of those having potential for cumulative effects with the Project is described in ES Chapter 20: Cumulative Effects and Inter-Relationships (Doc Ref. 5.1), This lists the shortlisted cumulative developments and the tier they have been assigned (reflecting the level of certainty regarding each development's likelihood of being realised) in accordance with Planning Inspectorate Advice Note 17 (Planning Inspectorate, 2019).

2.2.8 There is no formal screening stage under the Habitats Regulations, but for convenience the term is used here to refer to the consideration of whether the need for appropriate assessment under the Habitats Regulations has been triggered according to the application of the precautionary principle summarised above. Experience suggests that the best approach to addressing this is on a site-by-site basis.

2.2.9 The main purpose of this stage is to screen out those aspects of the Project which would not be likely to give rise to significant effects (either alone or in combination) and to screen out features of each relevant site that are not likely to be significantly affected. Judgments have been based on sound reasoning and within the context of best available knowledge of the various ways in which development of the nature proposed could impact on the interest features of the relevant sites. If likely significant effects cannot be excluded under the precautionary principle, then it is necessary to proceed to Stage 3 (appropriate assessment) for more detailed consideration.

Stage 3 – Appropriate Assessment

2.2.10 The appropriate assessment stage assesses the effects of the Project on the qualifying features of the site, in view of the conservation objectives of relevant sites. It determines whether a conclusion of no adverse effect on the integrity of the site in question can be reached for the Project alone and in-combination with other plans or projects.

2.2.11 Government guidance (DLUHC, 2019b) defines the integrity of a site as "…*the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated*".

Assessment years

2.2.12 The Habitats Regulations Assessment for the Project follows the same approach to assessment as the ES, detailed in ES Chapter 6: Approach to Environmental Assessment (Doc Ref. 5.1).

2.2.13 Potential effects as a result of construction could arise from works taking place between 2024 and 2038, representing the indicative construction period for the Project.

2.2.14 Potential effects as a result of the operation of the Project could occur from 2029 (the assumed opening year) once the infrastructure necessary to start dual runway operations is complete.

2.2.15 With respect to changes in operational air quality, 2032 is an interim assessment year as this is the year that the surface access improvements are anticipated to be fully operational and therefore represents the point at which traffic flows have increased most rapidly. Post 2032, the increase in traffic flows resulting from the Project is forecast to be much slower.

2.2.16 A further assessment year for operational emissions (2038) has been included on the basis that this is the year in which the Project is anticipated to be fully operational.

2.2.17 As such, the two assessment years (2032 and 2038) represent the anticipated worst-case scenario with respect to operational emissions resulting from the Project.

2.2.18 A further assessment year is included in the Project ES as a long-term forecast year (2047). No specific air quality assessment on ecology receptors for 2047 has been completed as by this period it is anticipated that the vehicle fleet will be almost fully electrified. As such, the previous assessment years are considered to be the worst-case scenarios and any residual impacts still experienced in 2047 are considered to be no worse than those considered in 2038 and so no change to those assessment conclusions are likely from an ecological receptor air quality assessment perspective.

3 Stage 1 – Qualifying Interest Features and Conservation Objectives

3.1 Introduction

3.1.1 SACs and SPAs are protected sites designated under the Habitats Directive, as transposed into the Habitats Regulations which refer to the Annexes of the Habitats Directive.

3.1.2 Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the habitat types and species identified in Annexes I and II of the Habitats Directive.

3.1.3 A sub-set of the Annex I habitat types are defined as being 'priority' because they are considered to be particularly vulnerable.

3.1.4 Citations for the relevant sites are provided in Annex 5 and the key features are described in this section.

3.2 Mole Gap to Reigate Escarpment Special Area of Conservation

3.2.1 The Mole Gap to Reigate Escarpment SAC stretches for eight miles between Leatherhead and Reigate and includes land in the district of Mole Valley. It covers approximately 892 hectares.

3.2.2 The citation for the site provides the following description of the SAC (Natural England, 2014a):

"Woodland, chalk grassland, chalk scrub and heathland form an interrelated mosaic at this site on the North Downs.

On the generally acidic plateau deposits of the crest of the Downs, the woodland is dominated by beech Fagus sylvatica, pedunculate oak Quercus robur, ash Fraxinus excelsior and yew Taxus baccata. On the lime-rich chalk slopes, the dominant trees are beech, ash and yew, together with field maple Acer campestre and common whitebeam Sorbus aria agg. and occasional large-leaved lime Tilia platyphyllos. Yew woodland has been formed both by invasion of chalk grassland and from development within beech woodland following destruction of the beech over-storey. Yew occurs in extensive stands, with, in places, an understorey of box

Buxus sempervirens. This site supports the only area of stable box scrub in the UK, on steep chalk slopes where the River Mole has cut into the North Downs Escarpment, creating the Mole Gap. Here natural erosion maintains the open conditions required for the survival of this habitat type.

The site supports a range of species-rich chalk grassland types on steep slopes, dominated by red fescue Festuca rubra, sheep's-fescue F. ovina, quaking-grass Briza media and, in taller areas, upright brome Bromopsis erecta, tor-grass Brachypodium pinnatum and slender falsebrome grass Brachypodium sylvaticum. Typical herbs include salad burnet Sanguisorba minor, yellow-wort Blackstonia perfoliata and field scabious Knautia arvensis. The site supports important populations of the nationally scarce musk orchid Herminium monorchis and man orchid Aceras anthropophorum, the former occurring in areas of shorter turf. A range of more widespread but local orchids are also present, including autumn lady's-tresses Spiranthes spiralis and green-winged orchid Orchis morio, as well as commoner species, such as pyramidal orchid Anacamptis pyramidalis, fragrant orchid Gymnadenia conopsea and bee orchid Ophrys apifera.

The acidic plateau deposits on Headley Heath support acidic heathland, dominated by heather Calluna vulgaris, bell heather Erica cinerea and dwarf gorse Ulex minor, often mixed with grasses such as wavy hair-grass Deschampsia flexuosa and common bent Agrostis capillaris. Chalk heath occurs on a small area of Headley Heath where the special conditions allow both acid and lime-loving plants to grow side by side.

An old chalk mine is used as a winter roost by several species of bats."

3.2.3 Qualifying features include a range of both habitats and species. Habitats include:

- *Taxus baccata* woods of the British Isles (Yew-dominated woodland)*;
- *Asperulo-Fagetum* beech forests (Beech forests on neutral to rich soils);
- European dry heaths;
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (Dry grasslands and scrublands on chalk or limestone);
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites). (Dry grasslands and scrublands on chalk or limestone, including important orchid sites); and
- Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.) (Natural box scrub).

3.2.4 The natural habitats and species denoted with an asterisk (*) above are 'priority habitats' in Annex I of the Directive as described above. The term 'priority' is also used in other contexts within ecology, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note, however, that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Directive or the Habitats Regulations.

3.2.5 The site is also designated for qualifying species, which include:

- Bechstein's bat *Myotis bechsteinii*; and
- great crested newt *Triturus cristatus*.

European Site Conservation Objectives for Mole Gap to Reigate Escarpment Special Area of Conservation (Natural England, 2014a)

3.2.6 The Conservation Objectives for a designated site set out the goals that are considered necessary to maintain or restore the qualifying features of a site to Favourable Conservation Status. Subject to natural change, the Conservation Objectives for the Mole Gap to Reigate Escarpment SAC are to "*ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species*
- *The structure and function (including typical species) of qualifying natural habitats*
- *The structure and function of the habitats of qualifying species*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely*
- *The populations of qualifying species, and,*
- *The distribution of qualifying species within the site."* (Natural England, 2014a).

3.2.7 The Supplementary Advice on Conserving and Restoring Site Features for the Mole Gap to Reigate Escarpment SAC (Natural England 2014a) sets out the attributes of the SAC that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute. Table 3.2.1 provides details of these, as set out in the Supplementary Advice.

Table 3.2.1: Attributes of Mole Gap to Reigate Escarpment SAC (Natural England 2014a)

Attributes	Target	Qualifying Features
Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: ▪ H2 *Calluna vulgaris – Ulex* minor heath ▪ Mosaics of H2 and acid grassland of type U1 *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland	H4030 European dry heaths
	Ensure the component vegetation communities of the feature are typical of the habitat type.	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites)

Attributes	Target	Qualifying Features
	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: ▪ W8 *Fraxinus excelsior – Acer campestre - Mercurialis perennis* woodland ▪ W12 *Fagus sylvatica – Rubus fruticosus* woodland	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
Vegetation community transitions	Maintain or restore as necessary areas of transition between this and communities which form other heathland-associated habitats, such as acid grassland, scrub and woodland.	H4030 European dry heaths H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites)
Vegetation structure: cover of dwarf shrubs	Maintain or restore as necessary an overall cover of dwarf shrub species which is typically between 25-90%.	H4030 European dry heaths
Vegetation composition: bracken cover	Maintain or restore as necessary a cover of dense bracken which is low, typically at <10%.	H4030 European dry heaths
Vegetation structure: cover of gorse	Maintain or restore as necessary cover of common gorse *Ulex europaeus* at <10%.	H4030 European dry heaths
Vegetation structure: tree cover	Maintain or restore as necessary the open character of the feature, with a typically scattered	H4030 European dry heaths
	and low cover of trees and scrub (<20% cover).	
Vegetation structure: heather age structure	Maintain or restore as necessary a diverse age structure of heather and dwarf gorse.	H4030 European dry heaths
Vegetation structure - age class	Maintain a population of Box (*Buxus sempervirens*) comprising plants at different life stages from seedlings to mature shrubs.	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites)
Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the feature, which will typically be between 75-90% of each woodland block.	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m3 per hectare of	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
	standing or fallen timber or 3-5 fallen trees >30cm per hectare, and >10 standing dead trees per hectare	
Vegetation structure - Woodland edge (graduated edge; buffered; mosaics with other habitats)	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
Vegetation: undesirable species	Restore the frequency and cover of the following undesirable species to <1% and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: Birch *Betula* spp, Oak *Quercus* spp, Sweet chestnut *Castanea sativa*, Bramble *Rubus fruticosus*, Rhododendron ponticum, *Gaultheria shallon*, ragwort, nettle, thistles and other injurious weeds, negative indicators such as foxglove *Digitalis purpurea*, rosebay willowherb *Chamerion angustifolium* and coarse grasses such as cocksfoot *Dactylis glomerata*.	H4030 European dry heaths
	Maintain or restore as necessary the frequency	H9130. Asperulo-Fagetum beech forests; Beech

Attributes	Target	Qualifying Features
	and cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: *Cotoneaster* spp, Butterfly bush *Buddleja davidii*, Tor grass *Brachypodium pinnatum*	forests on neutral to rich soils
Resilience of the feature to plant disease	Maintain the resilience of the feature to resist diseases such as box blight.	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub
Regeneration potential	Maintain the site's capacity for natural tree and shrub regeneration.	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub
	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and sufficient numbers in gaps, at the wood edge and/or as re-growth as appropriate.	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
Root zones of trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition.	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland

Attributes	Target	Qualifying Features
Key structural, influential and/or distinctive species	Maintain or restore as necessary the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: ▪ Constant and preferential plant species of the H2 Calluna vulgaris – Ulex minor heath and U1 *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland NVC vegetation types at this SAC	H4030 European dry heaths H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils
	Maintain the abundance of the typical species listed below to enable each of them to be a viable component of the Annex 1 habitat: Box *Buxus sempervirens* Hawthorn *Crataegus monogyna* Wild privet *Ligustrum vulgare* Yew *Taxus baccata* Beech *Fagus sylvatica* Common whitebeam *Sorbus aria*	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub
	Maintain the abundance of the typical species to enable each of them to be a viable component of the Annex 1 habitat: The constant and preferential plants of the W12 woodland type.	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland

Attributes	Target	Qualifying Features
Functional connectivity with wider landscape	Maintain or restore as necessary the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site.	H4030 European dry heaths
Adaptation and resilience	Maintain or restore as necessary the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.	H4030 European dry heaths H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites) H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils S1166. *Triturus cristatus*; Great crested newt
	Maintain the H9130 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland S1323. *Myotis bechsteinii* Bechstein`s bat
Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	H4030 European dry heaths H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites); Dry

Attributes	Target	Qualifying Features
		grasslands and scrublands on chalk or limestone (important orchid sites) H9130. *Asperulo-Fagetum* beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland S1166. *Triturus cristatus*; Great crested newt S1323. *Myotis bechsteinii* Bechstein`s bat H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub
Tree and shrub species composition	Maintain a canopy and understorey of which 95% is composed of site native trees and shrubs Maintain a diversity (at least 3 species) of site-native trees (e.g. beech, ash, oak, cherry, rowan, yew, hazel, holly, elder) across the site.	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland
Supporting off-site habitat	Maintain or restore where necessary the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature, particularly adjacent areas of permanent grassland.	H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites)

Attributes	Target	Qualifying Features
Supporting terrestrial habitat	Maintain or restore where necessary the quality of terrestrial habitat likely to be utilised by Great Crested Newts, with no fragmentation of habitat by significant barriers to newt dispersal.	S1166. *Triturus cristatus*; Great crested newt
Population abundance	Maintain the abundance of the population at a level which is at or above the typical carrying capacity of the site.	S1166. *Triturus cristatus*; Great crested newt
	Maintain the abundance of the breeding population at a level which is above the baseline population-size known or estimated at or soon after the time of SAC designation, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. Due to the difficulties in monitoring this species and the low numbers thought to be present a pragmatic target can be adopted in this case, that is to ensure that a viable population of the species is maintained at this site.	S1323. *Myotis bechsteinii* Bechstein`s bat
Population viability	Maintain the presence of great crested newt eggs in breeding ponds at/to a level which is likely to maintain the abundance of the population at or above its target level.	S1166. *Triturus cristatus*; Great crested newt

Attributes	Target	Qualifying Features
Supporting meta-populations	Maintain or restore as necessary the connectivity of the SAC population to any associated meta-populations (either within or outside of the site boundary).	S1166. *Triturus cristatus*; Great crested newt
Distribution of supporting habitat	Maintain or restore as necessary the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.	S1166. *Triturus cristatus*; Great crested newt S1323. *Myotis bechsteinii* Bechstein`s bat
Extent of supporting habitat	Maintain or restore as necessary the total extent of the habitat(s) which support the feature.	S1166. *Triturus cristatus*; Great crested newt
Cover of macrophytes	Maintain or restore where necessary a high cover of macrophytes, typically between 50-80%, in ponds.	S1166. *Triturus cristatus*; Great crested newt
Overall Habitat Suitability Index score	Maintain an overall Great Crested Newt Habitat Suitability Index score of no less than 0.8.	S1166. *Triturus cristatus*; Great crested newt
Permanence of ponds	Maintain the natural water regime of ponds.	S1166. *Triturus cristatus*; Great crested newt
Presence of fish	Ensure fish are absent in all breeding ponds.	S1166. *Triturus cristatus*; Great crested newt
Presence of ponds	Maintain or restore where necessary the number of ponds present within the site.	S1166. *Triturus cristatus*; Great crested newt
Shading of ponds	Ensure pond margins are generally free of shade	S1166. *Triturus cristatus*; Great crested newt

Attributes	Target	Qualifying Features
	(typically no more than 60% cover of the shoreline).	
Commuting routes from roost into surrounding habitat and foraging areas	Maintain the presence, structure and quality of any linear landscape features which function as habitually used routes along which bats navigate to foraging and swarming areas. Routes should remain unlit, functioning as dark corridors.	S1323. *Myotis bechsteinii* Bechstein`s bat
External condition of hibernation site	Maintain the structural integrity and weatherproofing of the known hibernation sites, with no significant shading of the main roost area by trees/vegetation or man-made structures.	S1323. *Myotis bechsteinii* Bechstein`s bat
Roost access	Maintain the number of access points to the roost at an optimal size and in an unlit and unobstructed state, with surrounding vegetation providing sheltered flyways without obstructing access	S1323. *Myotis bechsteinii* Bechstein`s bat
Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site.	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites)
		H4030 European dry heaths H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites) as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature.
Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the H9130 feature	H9130. *Asperulo-Fagetum* beech forests; Beech forests on neutral to rich soils H91J0. Taxus baccata woods of the British Isles; Yew-dominated woodland
	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	S1166. Triturus cristatus; Great crested newt S1323. *Myotis bechsteinii* Bechstein`s bat
Air quality	Maintain or 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).	H5110. Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.); Natural box scrub H9130. *Asperulo-Fagetum* beech forests; Beech (*Festuco-Brometalia*) (important orchid sites); Dry grasslands and scrublands on chalk or limestone (important orchid sites) H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland S1166. *Triturus cristatus*; Great crested newt forests on neutral to rich soils H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates S1323. *Myotis bechsteinii* Bechstein`s bat
Water quality and quantity	Where the feature is dependent on surface water and/or groundwater flow, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature, i.e. low nutrient status, pH <7.	H4030 European dry heaths
	Maintain high water quality in all ponds in the core area supporting the meta-population.	S1166. *Triturus cristatus*; Great crested newt
Illumination	Ensure artificial light is maintained to a level	H5110. Stable xerothermophilous

Attributes	Target	Qualifying Features
	which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.p.); Natural box scrub H9130. *Asperulo-Fagetum* beech forests; Beech forests on neutral to rich soils H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland

Site Improvement Plan – Mole Gap to Reigate Escarpment (Natural England, 2014b)

3.2.8 The Site Improvement Plan (SIP), prepared by Natural England, provides a high-level overview of the issues (both current and predicted) affecting the condition of the features on the site and outlines the priority measures required to maintain/improve their condition.

3.2.9 A brief review of the condition status of the underlying SSSI units was completed using MAGIC maps. Around half of the SAC is classified as favourable with some units being unfavourable recovering, one area of unfavourable declining and an area of unfavourable no change.

3.2.10 Over half of the site is in favourable condition. This is due to regeneration of native species, no negative indicators and the presence of species-rich grasslands. The units classified as unfavourable recovering are due to the presence of bracken and birch scrub still dominating large areas, extent of tor grass, and poor management resulting in undesirable species being dominant within the units.

3.2.11 One unit is classified as unfavourable declining due to a large proportion of the unit being occupied by dense scrub while one unit is classified as unfavourable no change as a result of an infestation of the invasive non-native scrub Wall Cotoneaster in several areas and lack of corrective works and inappropriate scrub control.

3.2.12 The current priority issues for the Mole Gap to Reigate Escarpment SAC are therefore:

- disease of natural box scrub;
- inappropriate scrub control;
- change in land management;
- public access/disturbance; and
- air pollution: risk of atmospheric nitrogen deposition.

3.2.13 Several actions are proposed to address the above priority issues.

3.2.14 The current position on site with regard to this is as follows (as described in the SIP with respect to these issues):

"The current situation for the SAC is that nitrogen deposition currently exceeds the site relevant critical load for ecosystem protection and therefore is a risk of harmful effects. However, the sensitive features are currently considered to be in a favourable condition on the site."

3.2.15 The following actions are proposed in the SIP to address this issue:

- further investigation of the potential atmospheric impacts on the site; and
- monitoring the indicators of increased nitrogen deposition, such as increased vigorous grass growth, increase in tor-grass and other grasses and a decrease in orchid species through the use of fixed-point quadrat surveys over five years.

3.3 Ashdown Forest Special Area of Conservation

3.3.1 The Ashdown Forest SAC was designated in 2005 and covers approximately 2,700 hectares.

3.3.2 The SAC is one of the largest single continuous blocks of lowland heath in the south east of England. The site supports important assemblages of invertebrates, including nationally rare species and birds of European importance.

3.3.3 A review of the condition of the underlying SSSI units was completed using information on the MAGIC website. The majority of Ashdown Forest has been identified as unfavourable recovering, with some areas of unfavourable declining and favourable condition.

3.3.4 The majority of the unfavourable recovering units are classified as such due to a range of reasons including high levels of bracken, deer browsing resulting in reduced bramble and other scrub species along with little tree regeneration. The units in unfavourable declining are classified as such because of high deer numbers resulting in little understorey, tree regeneration and sparse ground flora along with large areas of heathland with deep litter layers.

3.3.5 This site is not designated for any Annex 1 priority habitats.

3.3.6 The citation for the site provides the following description of the SAC (Natural England, 2018a):

"Ashdown Forest contains one of the largest single continuous blocks of lowland heath in south-east England, with both dry heaths and, in a larger proportion, wet heath. The wet heath element provides suitable conditions for several species of bog-mosses Sphagnum spp., bog asphodel Narthecium ossifragum, deergrass Trichophorum cespitosum, common cotton-grass Eriophorum angustifolium, marsh gentian Gentiana pneumonanthe and marsh clubmoss Lycopodiella inundata. The site supports important assemblages of beetles, dragonflies, damselflies and butterflies, including the nationally rare silver-studded blue Plebejus argus.

The dry heath in Ashdown Forest is dominated by heather Calluna vulgaris, bell heather Erica cinerea and dwarf gorse Ulex minor, with transitions to other habitats. It supports important lichen assemblages, including species such as Pycnothelia papillaria. This site supports the most inland remaining population of hairy greenweed Genista pilosa in Britain.

The damming of streams, digging for marl, and quarrying have produced several large ponds in a number of areas of the forest. Although often largely free of aquatic vegetation there may be localised rafts of broadleaved pondweed Potamogeton natans, beds of reedmace Typha latifolia and water horsetail Equisetum fluviatile. These species are particularly abundant in the marl pits. Some of the ponds have large amphibian populations, including the great crested newt Triturus cristatus."

3.3.7 The qualifying habitats for the Ashdown Forest SAC are:

- Northern Atlantic wet heaths with *Erica tetralix*; and
- European dry heaths.

3.3.8 The citation also confirms that the SAC supports great crested newt, although this is not a primary reason for site selection.

European Site Conservation Objectives for Ashdown Forest Special Area of Conservation (Natural England, 2018a)

3.3.9 Subject to natural change, the Conservation Objectives for Ashdown Forest SAC are to "*ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:;*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species*
- *The structure and function (including typical species) of qualifying natural habitats*
- *The structure and function of the habitats of qualifying species*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely*
- *The populations of qualifying species, and,*
- *The distribution of qualifying species within the site" (Natural England, 2018a).*

3.3.10 The Supplementary Advice on Conserving and Restoring Site Features for Ashdown Forest SAC (Natural England 2019c) sets out the attributes of the SAC that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute. Table 3.3.1 provides details of these, as set out in the Supplementary Advice.

Table 3.3.1: Attributes of Ashdown Forest SAC (Natural England 2019c)

Attributes	Target	Qualifying Features
Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Functional connectivity to wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Key structural, influential and/or distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature ▪ Constant and preferential plant species of the M16 Erica tetralix – Sphagnum compactum wet heath ▪ Outstanding lichen and bryophyte assemblage • Populations of Plebejus argus (silver-studded blue) butterfly ▪ Heathland invertebrate assemblages associated with early successional habitats and slow flowing water through heathland.	H4030 European Dry Heaths
Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	H4010 Northern Atlantic wet heaths with Erica tetralix H4030 European Dry Heaths S1166 Great crested newt *Triturus cristatus*
Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type: M16 *Erica tetralix-Sphagnum compactum*	H4010 Northern Atlantic wet heaths with *Erica tetralix*
	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type: H2: Calluna vulgaris-Ulex minor heath	H4030 European Dry Heaths
Vegetation community transitions	Maintain any areas of transition between this and communities which form other heathland associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
	Maintain any areas of transition between this and communities which form other heathland associated habitats, such as dry and humid heaths, mires, acid grasslands, scrub and woodland.	H4030 European Dry Heaths
Vegetation composition: bracken cover	Restore a cover of dense bracken which is low, typically at <10%.	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Vegetation structure: cover of dwarf shrubs	Maintain an overall cover of dwarf shrub species which is typically between 25-90%	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Vegetation structure: cover of gorse	Cover of common gorse is low typically at <10%.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
	Maintain cover of common gorse *Ulex europaeus* and *U. gallii* at <25%.	H4030 European Dry Heaths
Vegetation structure: heather age structure	Restore a diverse age structure amongst the ericaceous shrubs typically found on the site.	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Vegetation structure: tree cover	Restore the open character of the feature, with a typically scattered and low cover of trees and scrub e.g. *Prunus spinosa*, *Betula, Pinus, Salix, Quercus* & *Rubus* spp., *Alnus glutinosa, Salix* sp. <15%. Up to 25% may be acceptable in specific areas if included within a management plan.	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Vegetation: undesirable species	Restore the frequency/cover of the following undesirable species to o <1% and prevent changes in	H4010 Northern Atlantic wet heaths with *Erica tetralix*

Attributes	Target	Qualifying Features
	surface condition, soils, nutrient levels or hydrology which may encourage their spread.	H4030 European Dry Heaths
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).	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	S1166 Great crested newt *Triturus cristatus*
Water quantity	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature	S1166 Great crested newt *Triturus cristatus*
Hydrology	At a site, unit and/or catchment level (as necessary, Maintain the natural hydrological regime to provide the conditions necessary to sustain the feature within the site.	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths

Attributes	Target	Qualifying Features
Water quality	Where the feature is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature.	H4010 Northern Atlantic wet heaths with *Erica tetralix* H4030 European Dry Heaths
	Maintain the quality of pond waters within the site as indicated by the presence of an abundant and diverse invertebrate community.	S1166 Great crested newt *Triturus cristatus*
Population abundance	Maintain the abundance of the population at a level which is above the 2008 baseline.	S1166 Great crested newt *Triturus cristatus*
Population viability	Maintain the presence of great crested newt eggs in breeding ponds at/to a level which is likely to maintain the abundance of the population at or above its target level.	S1166 Great crested newt *Triturus cristatus*
Supporting meta-populations	Maintain the connectivity of the SAC population to any associated metapopulations (either within or outside of the site boundary).	S1166 Great crested newt *Triturus cristatus*
Distribution of supporting habitat	M the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.	S1166 Great crested newt *Triturus cristatus*
Extent of supporting habitat	Maintain the total extent of the habitat(s) which support the feature at 112 ponds.	S1166 Great crested newt *Triturus cristatus*
Cover of macrophytes	Maintain a high cover of macrophytes, typically between 50-80%, within ponds.	S1166 Great crested newt *Triturus cristatus*
Overall Habitat Suitability Index score	For this SAC, Maintain an overall Great Crested Newt Habitat	S1166 Great crested newt *Triturus cristatus*

Attributes	Target	Qualifying Features
	Suitability Index score of no less than 0.8.	
Permanence of ponds	Maintain the permanence of water within ponds present within the site.	S1166 Great crested newt *Triturus cristatus*
Presence of fish and wildfowl	Ensure fish and wildfowl are absent from >75% of ponds as identified as suitable for greatcrested newts.	S1166 Great crested newt *Triturus cristatus*
Shading of ponds	Ensure pond perimeters are generally free of shade (typically no more than 60% cover of the shoreline).	S1166 Great crested newt *Triturus cristatus*
Supporting terrestrial habitat	Maintain the quality of terrestrial habitat likely to be utilised by Great Crested Newts, with no fragmentation of habitat by significant barriers to newt dispersal.	S1166 Great crested newt *Triturus cristatus*

Site Improvement Plan Ashdown Forest SAC (Natural England 2014e)

3.3.11 The SIP for the site includes the following priority issues:

- Change in land management threatening heathland habitat;
- Air pollution and the impact of atmospheric nitrogen;
- Public access disturbing European nightjar and Dartford Warbler populations; and
- Hydrological changes.

3.3.12 There are several proposed actions to address the above priority issues:

- Extension of grazing zones and the introduction of a specific grazing regimes;
- Control, reduce and ameliorate atmospheric nitrogen impact;
- Establish and implement an advice and education programme for visitors, including leaflets and signage; and
- Undertake hydrology/botanical surveys.

3.4 Ashdown Forest Special Protection Area

3.4.1 The Ashdown Forest SPA forms part of a complex of heathlands in southern England that support breeding bird populations of

European importance. It was classified in 1996 and covers approximately 3,200 hectares comprising lowland heathland and woodland. It has a different boundary to the SAC, but the two designations overlap.

3.4.2 The SPA qualifies by supporting populations of European importance of the following species during the breeding season:

- Dartford Warbler *Sylvia undata*, 29 pairs representing at least 1.8% of the breeding population in Great Britain (Count as at 1994); and
- Nightjar *Caprimulgus europaeus*, 35 pairs representing at least 1.0% of the breeding population in Great Britain (Two-year mean, 1991 & 1992).

European Site Conservation Objectives for Ashdown Forest Special Protection Area (Natural England, 2019a)

3.4.3 Subject to natural change, the Conservation Objectives for Ashdown Forest SPA are, to maintain or restore:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the populations of each of the qualifying features; and
- the distribution of the qualifying features within the SPA.

3.4.4 The Supplementary Advice on Conserving and Restoring Site Features for Ashdown Forest SPA (Natural England 2019a) sets out the attributes of the SPA that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute. Table 3.4.1 provides details of these, as set out in the Supplementary Advice.

Table 3.4.1: Attributes of Ashdown Forest SPA (Natural England 2019a)

Attribute	Target	Qualifying Features
Population abundance	Maintain the size of the breeding population at a level which is above 35 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	A224. *Caprimulgus europaeus*; European nightjar (Breeding)
	Restore the size of the breeding population to a level which is above 20 pairs whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	A302. *Sylvia undata*; Dartford warbler (Breeding)
Minimising disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting nesting, roosting, foraging, feeding, moulting and/or loafing birds so that the feature is not significantly disturbed.	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata*; Dartford warbler (Breeding)
Extent and distribution of supporting breeding habitat	Maintain the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding)	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata;* Dartford warbler (Breeding)
Air quality	Restore 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).	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata*; Dartford warbler (Breeding)
Connectivity with supporting habitats	Maintain the safe passage of birds moving between nesting and feeding areas	A224. *Caprimulgus europaeus*; European nightjar (Breeding)
Conservation measures	Restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to restore the structure, function and/or the supporting processes associated with the feature and its supporting habitats.	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata*; Dartford warbler (Breeding)
Food availability within supporting habitat	Maintain the distribution, abundance and availability of key prey items (e.g. moths, beetles) at preferred prey sizes.	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata*; Dartford warbler (Breeding)
Water quality/quantity	Where the supporting habitats of the SPA feature are dependent on surface water, maintain water quality and quantity at a standard which provides the necessary conditions to support the feature.	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata*; Dartford warbler (Breeding)
Predation	Reduce predation and disturbance caused by native and non-native predators.	A224. *Caprimulgus europaeus*; European nightjar (Breeding) A302. *Sylvia undata*; Dartford warbler (Breeding)
Landscape	Maintain the amount of open and unobstructed patches within nesting and foraging areas, including areas of clear fell, windfall, wide tracks, open forest and heath.	A224. *Caprimulgus europaeus*; European nightjar (Breeding)
	Maintain the amount of open and unobstructed terrain within and around at least 0.5 km of the site, and Restore dwarf shrub cover (ideally to be at between 25% and 90%overall). Maintain the connectivity of structurally diverse heath	A302. *Sylvia undata*; Dartford warbler (Breeding)

Attribute	Target	Qualifying Features
	and patches of dense gorse across the SPA.	
Vegetation characteristics	Maintain the mix of vegetation (optimal conditions normally with vegetation mostly of 20-60 cm with frequent bare patches of >2 m2, 10-20% bare ground and <50% tree/scrub cover overall; trees <2 m in height) throughout the nesting area.	A224. *Caprimulgus europaeus*; European nightjar (Breeding)
	Maintain optimal mix of vegetation (>50% heather, <25 trees/ha and 5-25% scrub of 0.5-3 m overall) throughout the nesting area.	A302. *Sylvia undata*; Dartford warbler (Breeding)

Site Improvement Plan Ashdown Forest SPA (Natural England 2014e)

3.4.5 The SIP for the Ashdown Forest SPA is the same as that for the SAC (paragraphs 3.3.11-12 above).

3.5 The Mens Special Area of Conservation

3.5.1 The Mens SAC is situated within the South Downs National Park and covers an area of 204.69 hectares.

3.5.2 It comprises an extensive area of mature beech *Fagus sylvatica* woodland that is rich in lichens, broyphytes, fungi and saproxylic invertebrates. It is one of the largest areas of Atlantic acidophilous beech forests in the south-eastern portion of this habitat's UK range. In addition, the woodland habitat supports a significant population of Barbastelle *Barbastella barbastellus* bats.

3.5.3 A review of the condition of the underlying SSSI units was completed using information on the MAGIC website. The majority of the SSSI units in the Mens SAC are in favourable condition with one unit in unfavourable declining condition due to poor forestry and woodland management.

3.5.4 The citation for the site provides the following description of the SAC (Natural England, 2014c):

'The Mens is an extensive area of mature beech Fagus sylvatica woodland rich in lichens, bryophytes, fungi and saproxylic (dead wood) invertebrates. It is developing a near-natural high forest structure, in response to only limited silvicultural intervention over the 20th century, combined with the effects of natural events such as the 1987 great storm. The site also supports an important population of barbastelle bat Barbastella barbastellus.'

3.5.5 Qualifying interest features include:

- Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*); and
- Barbastelle *Barbastella barbastellus*.

European Site Conservation Objectives for The Mens SAC (Natural England, 2018b)

3.5.6 Subject to natural change, the Conservation Objectives for the Mens SAC, are to "*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 Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species;*
- *The structure and function (including typical species) of qualifying natural habitats;*
- *The structure and function of the habitats of qualifying species;*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*
- *The populations of qualifying species, and,*
- *The distribution of qualifying species within the site"*

3.5.7 The Supplementary Advice on Conserving and Restoring Site Features for The Mens (Natural England 2018b) sets out the attributes of the SAC that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute. Table 3.5.1 provides details of these, as set out in the Supplementary Advice.

Table 3.5.1: Attributes of the The Mens SAC (Natural England 2018b)

Attribute	Target	Qualifying Features
Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: W14 Fagus sylvatica – *Rubus fruticosus* woodland W15 *Fagus sylvatica* – *Deschampsia flexuosa* woodland.	H9120. Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - canopy cover	Maintain a canopy of open grown native trees with free crowns over between 50-80% of the site as appropriate.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover between 10-30% of area.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 10% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils

Attribute	Target	Qualifying Features
Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically a minimum of 3 fallen lying trees >20 cm diameter per ha and 4 trees per ha allowed to die standing.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - ancient/veteran trees	Maintain at least a third of ancient/veteran trees in open locations or with open halo around them, with younger cohorts of successor trees (<100 years; 100-200 years) each present over 10% of the site.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - shrub layer	Maintain an understorey of shrubs and trees covering at least 20% of the site (this will vary with light levels, grazing and site objectives).	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer

Attribute	Target	Qualifying Features
		(*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Tree and shrub species composition	Restore a canopy and understorey of which 95% is composed of site native trees and shrubs, such as beech, oak, ash, holly and hazel.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Browsing and grazing by herbivores	Maintain browsing/grazing (eg by livestock) to sufficient levels to allow tree seedlings and saplings the opportunity to exceed browse height, and which Maintain the characteristic structure of the woodland feature.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Regeneration potential	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Key structural, influential and/or distinctive species	Maintain the abundance of the species/assemblages listed to enable each of them to be a viable component of the Annex I habitat feature	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer

Attribute	Target	Qualifying Features
	• Barbastelle bat • Outstanding lichen assemblage • Outstanding fungi assemblage • Outstanding invertebrate assemblage • Outstanding bryophyte assemblage	(*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils
Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the habitat.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils S1308. *Barbastella barbastellus*; Barbastelle bat
Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion); Beech forests on acid soils

Attribute	Target	Qualifying Features
Population abundance - maternity colony	Maintain a sustainable population, whilst accepting no deterioration from current levels which is above 80 breeding females, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	
Distribution of supporting habitat	Restore the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.	
Extent of supporting habitat	Restore the total extent of the habitats which support the feature at 203.28 hectares.	
Flightlines from roost into surrounding habitat and foraging areas	Restore the presence, structure and quality of any linear landscape features which function as flightlines. Flightlines should remain unlit, functioning as dark corridors.	S1308. *Barbastella barbastellus*; Barbastelle bat
Supporting off-site habitat (foraging areas)	Restore any core areas of feeding habitat outside of the SAC boundary that are critical to Barbastelles during their breeding period.	S1308. *Barbastella barbastellus*; Barbastelle bat
Woodland site - maternity colony	Restore the extent and structural diversity of supporting woodland habitat used for feeding and foraging.	S1308. *Barbastella barbastellus*; Barbastelle bat
Disturbance from human activity	Control and minimise human access to roost sites	S1308. *Barbastella barbastellus*; Barbastelle bat

Attribute	Target	Qualifying Features
Adaptation and resilience	Restore the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site.	S1308. *Barbastella barbastellus*; Barbastelle bat
Air quality	Restore 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).	S1308. *Barbastella barbastellus*; Barbastelle bat
Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	S1308. *Barbastella barbastellus*; Barbastelle bat
Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature.	S1308. *Barbastella barbastellus*; Barbastelle bat
Hydrology	At a site, unit and/or catchment level maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion); Beech forests on acid soils

Attribute	Target	Qualifying Features
Illumination	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion); Beech forests on acid soils

Site Improvement Plan – The Mens SAC (Natural England, 2015a)

3.5.8 The SIP for the site includes the following priority issues:

- forestry and woodland management;
- habitat connectivity;
- invasive species;
- change in land management;
- air pollution: risk of atmospheric nitrogen deposition; and
- public access/disturbance.

3.6 Ebernoe Common Special Area of Conservation

3.6.1 Ebernoe Common SAC is located within the South Downs National Park and covers 234.93 hectares. The majority of SSSI units within Ebernoe Common are in favourable condition with a small number in unfavourable recovering, primarily due to excessive holly in the understory and the impact of ash dieback.

3.6.2 The citation for the site provides the following description of the SAC (Natural England, 2019b):

"Ebernoe Common is a complex of ancient woodland blocks largely derived from ancient wood pasture. The northern and southern sections of the site contain woodland managed as high forest in more recent times. The site also contains 78 of the 100 ancient woodland indicator plants for south-eastern England.

Ebernoe Common is of national importance for colonies of barbastelle and Bechstein's bats, which use trees as summer maternity roosts where the female bats gather to give birth and rear their young. The bats also use the site as a foraging area and as flight paths for dispersal to their foraging territories both within and outside of the SSSI.

In addition to the reasons for notification, thirty three species of butterfly have been recorded on site, including purple emperor Apatura iris, brown hairstreak Thecla betulae, grizzled skipper Pyrgus malvae, and dingy skipper Erynnis tages. Stag beetles Lucanus cervus have also been recorded and their presence is indicative of a significant wood pasture invertebrate interest. A total of eleven other bat species have been recorded from the site, including Brandt's bat Myotis brandtii, whiskered bat Myotis mystacinus, Leisler's bat Nyctalus leisleri, and grey long-eared bat Plecotus austriacus."

3.6.3 Qualifying interest features include:

- Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*);
- Barbastelle *Barbastella barbastellus*; and
- Bechstein's bat *Myotis bechsteinii*.

European Site Conservation Objectives for Ebernoe Common Special Area of Conservation (Natural England, 2018c)

3.6.4 Subject to natural change, the Conservation Objectives for Ebernoe Common, are to *"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 Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species*
- *The structure and function (including typical species) of qualifying natural habitats*
- *The structure and function of the habitats of qualifying species*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely*
- *The populations of qualifying species, and,*
- *The distribution of qualifying species within the site." (Natural England, 2018c)*

3.6.5 The Supplementary Advice on Conserving and Restoring Site Features for Ebernoe Common (Natural England 2019b) sets out the attributes of the SAC that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute. Table 3.6.1 provides details of these, as set out in the Supplementary Advice.

Table 3.6.1: Attributes of the Ebernoe Common SAC (Natural England 2019b)

Attributes	Target	Qualifying Features
Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification types: W14 *Fagus sylvatica – Rubus fruticosus* woodland W15 *Fagus sylvatica –Deschampsia flexuosa* woodland	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - canopy cover	Maintain a canopy of open grown native trees with free crowns over between 50-90% of the site, except in Hoads Common which is wood pasture and where a canopy cover target is not suitable.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover between 10-30% of area.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m3 per hectare of standing or fallen timber or 3-5 fallen trees >30cm per hectare, and >10 standing dead trees per hectare.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - ancient/veteran trees	Restore at least a third of ancient/veteran trees in open locations or with open halo around them, with younger cohorts of successor trees (<100 years; 100-200 years) each present over 10% of the site.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - shrub layer	Maintain an understorey of shrubs and trees covering at least 20% of the site, excluding Hoads Common (this will vary with light levels, grazing and site objectives).	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/ wood-pasture types or scrub.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Tree and shrub species composition	Maintain a canopy and under-storey of which 95% is composed of site native trees and shrubs, such as beech, oak, ash, holly and hazel.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Browsing and grazing by herbivores	Maintain browsing/grazing (e.g. by livestock) to sufficient levels to allow tree seedlings and saplings the opportunity to exceed browse height, and	S1308 *Barbastella barbastellus* Barbastelle

Attributes	Target	Qualifying Features
	which Maintain the characteristic structure of the woodland feature.	S1323 *Myotis bechsteinii* Bechstein's bat
Regeneration potential	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Key structural, influential and/or distinctive species	Restore the abundance of the assemblages listed to enable each of them to be a viable component of the Annex I habitat feature: • Outstanding lichen assemblage • Outstanding fungi assemblage	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat
Hydrology	At a site, unit and/or catchment level (as necessary, Maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site.	S1308 *Barbastella barbastellus* Barbastelle S1323 *Myotis bechsteinii* Bechstein's bat

Site Improvement Plan – Ebernoe Common (Natural England, 2015b)

3.6.6 The SIP for the site includes the following priority issues:

- forestry and woodland management;
- off site habitat availability/management;
- habitat fragmentation;
- change in land management;
- hydrological changes;
- air pollution: risk of atmospheric nitrogen deposition; and
- public access/disturbance.

3.7 Thames Basin Heaths Special Protection Area

3.7.1 The Thames Basin Heaths SPA was designated in 2005 and covers an area of 8,311.06 hectares. It comprises a range of remnant heathland and woodland sites across northern Hampshire, Berkshire and Surrey that were once continuous but are now fragmented into separate blocks by development and farmland. The open heathland and mire habitats are interspersed with woodland (both coniferous and broadleaved) and dense scrub. The area of the SPA is covered by 14 Sites of Special Scientific Interest (SSSI). A review of the condition of the underlying SSSI units was completed using information on the MAGIC website. The majority of units within the 14 SSSIs are in favourable condition with areas that are in unfavourable recovering condition.

3.7.2 The SPA was designated under Article 4.1 of the Birds Directive (2009/147/EC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

- Dartford Warbler *Sylvia undata*, 445 pairs representing at least 27.8 % of the breeding population in Great Britain (Count as at 1999);
- Nightjar *Caprimulgus europaeus*, 264 pairs representing at least 7.8 % of the breeding population in Great Britain (Count mean 1998-99); and
- Woodlark *Lullula arborea*, 149 pairs representing at least 9.9 % of the breeding population in Great Britain (Count as at 1997).

3.7.3 The citation for the site provides the following description of the SPA (Natural England, 2014d):

"The Thames Basin Heaths SPA is a composite site that is located across the counties of Surrey, Hampshire and Berkshire in southern England. It encompasses all or parts of Ash to Brookwood Heaths Site of Special Scientific Interest (SSSI), Bourley and Long Valley SSSI, Bramshill SSSI, Broadmoor to Bagshot Woods and Heaths SSSI, Castle Bottom to Yateley and Hawley Commons SSSI, Chobham Common SSSI, Colony Bog and Bagshot Heaths SSSI, Eelmoor Marsh SSSI, Hazeley Heath SSSI, Horsell Common SSSI, Ockham and Wisley Commons SSSI, Sandhurst to Owlsmoor Bogs and Heaths SSSI and Whitmoor Common SSSI.

The open heathland habitats overlie sand and gravel sediments which give rise to sandy or peaty acidic soils, supporting dry heathy vegetation on well-drained slopes, wet heath on low lying shallow slopes and bogs in valleys. The site consists of tracts of heathland, scrub and woodland, once almost continuous, but now fragmented into separate blocks by roads, urban development and farmland. Less open habitats of scrub, acidic woodland and conifer plantations dominate, within which are scattered areas of open heath and mire. The site supports important breeding populations of a number of birds of lowland heathland,

especially nightjar Caprimulgus europaeus and woodlark Lullula arborea, both of which nest on the ground, often at the woodland/heathland edge, and Dartford warbler Sylvia undata, which often nests in gorse Ulex sp. Scattered trees and scrub are used for roosting.

Together with the nearby Ashdown Forest and Wealden Heaths SPAs, the Thames Basin Heaths form part of a complex of heathlands in southern England that support important breeding bird populations".

3.7.4 The Conservation Objectives for the SPA (Natural England, 2014d) are to "*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*;

- *The extent and distribution of the habitats of the qualifying features*
- *The structure and function of the habitats of the qualifying features*
- *The supporting processes on which the habitats of the qualifying features rely*
- *The population of each of the qualifying features, and*
- *The distribution of the qualifying features within the site"*

3.7.5 The Supplementary Advice on Conserving and Restoring Site Features for the Thames Basin Heaths SPA (Natural England 2014d) sets out the attributes of the SPA that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute. Table 3.7.1 provides details of these, as set out in the Supplementary Advice.

Table 3.7.1: Attributes of the Thames Basin Heaths SPA (Natural England 2014d)

Attribute	Target	Qualifying Features
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, woodlark and Dartford warbler and their supporting habitats	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler
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).	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler
Breeding Populations/Population abundance	Maintain the size of the breeding nightjar population at or above 264 'churring' males, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. 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.	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler
	Maintain or restore the size of the breeding Dartford Warbler population at or to a level which is at or above 445 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent	
Extent and distribution of supporting habitat for the breeding season	Maintain or restore the extent, distribution and availability of suitable breeding habitat which supports nightjar, woodlark and Dartford Warbler for all necessary stages of its breeding cycle (courtship, nesting, feeding).	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler
Vegetation characteristics	Maintain or restore the mix of vegetation (optimal 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. Within nesting and feeding areas,	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler

Attribute	Target	Qualifying Features
	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 andtrees. 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	
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, Woodlark and Dartford Warbler feature is not significantly disturbed	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler
Landscape	Maintain or restore the amount and continuity of open and unobstructed patches within nesting and foraging areas,	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark

Attribute	Target	Qualifying Features
	including areas of clear-fell, windfall, wide tracks, open spaces within forests and heath. 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. Maintain or restore the connectivity of structurally diverse heath and patches of dense gorse across the network of sites which comprise the SPA	A302 *Sylvia undata* Dartford Warbler
Predation	Reduce or restrict predation and disturbance caused by native and non-native predators.	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark A302 *Sylvia undata* Dartford Warbler
Food availability	Maintain or restore the distribution, abundance and availability of key prey items (e.g. moths, beetles) at prey sizes preferred by Nightjar.	A224 *Camprimulgus europaeus* European Nightjar A246 *Lullula aborea* Woodlark

Attribute	Target	Qualifying Features
	Maintain or restore the distribution, abundance and availability of key prey items (e.g. spiders, weevils, caterpillars) at prey sizes preferred by Woodlark. 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.	A302 *Sylvia undata* Dartford Warbler
Connectivity with supporting habitats	Maintain or restore the safe passage of birds moving between nesting and feeding areas	A224 *Camprimulgus europaeus* European Nightjar

Site Improvement Plan – Thames Basin Heaths SPA (Natural England, 2014f)

3.7.6 The SIP for the site includes the following priority issues:

- Public access disturbing European nightjar, Woodlark and Dartford Warbler populations;
- Undergrazing;
- Forestry and woodland management;
- Hydrological changes;
- Inappropriate scrub control;
- Invasive species;
- Wildfires;
- Air pollution and the impact of atmospheric nitrogen;
- The extent of populations and features unknown;
- Military; and
- Habitat fragmentation.

3.7.7 There are several proposed actions to address the above priority issues:

- Implementation of a wardening strategy and consistent access management strategies;
- Implementation of appropriate alternative management where grazing is not practical, alternative uses for materials arising from habitat management such as biomass to bioenergy;
- Undertake review of long-term forestry management policy in the complex to ensure suitable habitat conditions for Annex 1 birds are consistently maintained;
- Commission of hydrological studies and implement of mire restoration plans;
- Implement programme of scrub clearance to reverse effects of encroachment of heathland to follow on from investigation of sustainable uses of arisings;
- Invasive Species Control Programme;
- Completion of fire strategies and risk management plans for all sites and agree implementation in order to reduce fire risk;
- Site Nitrogen Action Plan;
- Establish sustainable long-term bird monitoring strategy which provides adequate coverage of all parts of both SPAs;
- Completion of integrated management plans for all military training sites in the complex; and
- Commission study to identify priorities for habitat management which reduces the adverse impacts of habitat fragmentation.

3.8 Thursley, Ash, Pirbright and Chobham Special Area of Conservation

3.8.1 The Thursley, Ash, Pirbright and Chobham SAC covers an area of 5,138 hectares. It covers the same geographical area as part of the Thames Basin Heaths SPA and comprises a range of remnant heathland and wetland transition sites across northern Hampshire and Surrey. In addition to its designation as an SAC, the qualifying habitats of the SAC providing supporting habitat for the interest feature birds of the SPA.

3.8.2 The citation for the site provides the following description of the SAC (Natural England, 2018d):

"The heathland is a series of large fragments of previously more continuous areas and is principally dominated by heather – dwarf gorse (Calluna vulgaris – Ulex minor) dry heathland. There are transitions to wet heath and valley mire, scrub, woodland and acid grassland, including types rich in annual plants. This habitat supports an important assemblage of animal species, including numerous rare and local invertebrate species, including the nationally rare white-faced darter Leuccorhinia dubia, as well as sand lizard Lacerta agilis and smooth snake Coronella austriaca.

This site supports the sole area of lowland northern Atlantic wet heath in south-east England. The wet heath at Thursley is mainly cross-leaved heath – bog-moss (Erica tetralix – Sphagnum compactum) and contains several rare plants, including great sundew Drosera anglica, bog hair-grass Deschampsia setacea, bog orchid Hammarbya paludosa and brown beak-sedge Rhynchospora fusca.

Depressions on peat substrates are widespread, both in bog pools, mires and in flushes where they occur as part of a mosaic associated with valley bog and wet heath. They show extensive representation of brown-beak sedge and are also important for great sundew and bog orchid Hammarbya paludosa."

3.8.3 The qualifying habitats for the Thursley, Ash, Pirbright and ChobhamSAC include:

- Depressions on peat substrates of the *Rhynchosporion*;
- Northern Atlantic wet heaths with *Erica tetralix*; and
- European dry heaths.

3.8.4 The Conservation Objectives for the SAC (Natural England 2018d) are "*to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*

- *The extent and distribution of qualifying natural habitats*
- *The structure and function (including typical species) of qualifying natural habitats, and*
- *The supporting processes on which qualifying natural habitats rely"*

3.8.5 The Supplementary Advice on Conserving and Restoring Site Features (Natural England, 2016) provides additional detail regarding the interest features and what helps contribute to overall integrity (Table 3.8.1).

Table 3.8.1: Attributes of the Thursley, Ash, Pirbright and Chobham SAC (Natural England 2016)

Attributes	Target	Qualifying Features
Vegetation community composition	Ensure the component vegetation communities of the H7150 feature are referable to and characterised by the following National Vegetation Classification types: M21 *Narthecium ossifragum - Sphagnum papilosum* valley mire M14 *Schoenus nigricans – Narthecium ossifragum* mire M1 *Sphagnum auriculatum* bog pool M2 *Sphagnum cuspidatum* bog pool M6 *Carex echinata – Sphagnum recurvum* mire.	H7150 Depressions on peat substrates of the *Rhynchosporion*
	Ensure the component vegetation communities of the H4030 feature are referable to and characterised by the following National Vegetation Classification type(s): *Calluna vulgaris-Ulex minor* heath H2, *Ulex minor-Agrostis curtisii* heath H3, with transitions to acid grasslands including *Festuca ovina-Agrostis capillaris-Rumex acetosella grassland* U1, *Deschampsia flexuosa* grassland U2, *Agrostis curitsii* grassland U3 and *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland U4.	H4030 European dry heaths
	Ensure the component vegetation communities of the H4010 feature are referable to and characterised by the following National Vegetation Classification type (s): M16	H4010 Northern Atlantic wet heaths with *Erica tetralix*

Attributes	Target	Qualifying Features
	Erica tetralix wet heath and/or as mosaics with wet grassland types such as M25 *Molinia caerulea-Potentilla erecta* mire	
Vegetation community transitions	Maintain (or restore where habitats are degraded) areas of transition between this and communities which form other heathland-associated habitats, such as 'humid' heath, wet heath, mire, acid grassland, scrub and woodland.	H4030 European dry heaths
	Maintain (or restore where habitats are degraded) any areas of transition between this and communities which form other heathland-associated habitats, such as dry and humid heath, mire, acid grassland, scrub and	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Vegetation structure: cover of dwarf shrubs	Maintain (or restore where habitats are degraded or neglected) an overall cover of dwarf shrub species which is typically between 25-90% (except in areas of acid grassland where grasses are naturally dominant).	H4030 European dry heaths
	Maintain (or restore where habitats are degraded) an overall cover of dwarf shrub species which is typically between 25- 75%.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Vegetation composition: bracken cover	Maintain (or restore where habitats are degraded or neglected) a cover of dense bracken which is low, typically at <5%.	H4030 European dry heaths
	Maintain cover of all gorse species at or below 25%, in each continuous block of dry heath.	H4030 European dry heaths
Vegetation structure: cover of gorse	Maintain a low cover of common gorse across the H4010 feature, typically at <10%.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Vegetation structure: tree cover	Maintain (or restore where habitats are neglected) the open character of the feature, with a scattered cover of trees and scrub at or below 10% cover in each continuous block of wet heath.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Vegetation structure: heather age structure	Maintain (or restore where habitats are degraded or neglected) a diverse age structure amongst the ericaceous shrubs typically found on the site.	H4030 European dry heaths
Key structural, influential and distinctive species	Maintain the abundance of the species listed below to enable each of them to be a viable component of the H7150 habitat: Flora; Heather *Calluna vulgaris,* cross-leaved heath *Erica tetralix*, purple moor-grass *Molinia caerulea*, common cotton-grass *Eriophorum angustifolium*, bog asphodel *Narthecium ossifragum*, white beak-sedge *Rhynchospora alba*, meadow thistle *Cirsium dissectum*, round-leaved sundew *Drosera rotundifolia*, intermediate sundew *D. intermedia*, bog myrtle *Myrica gale*, cranberry *Vaccinium oxycoccos*, royal fern *Osmunda regalis*, black bog-rush *Schoenus nigricans*, lesser bladderwort *Utricularia*	H7150 Depressions on peat substrates of the *Rhynchosporion*
	minor. Assemblage of mosses: *Calypogeia sphagnicola, Cephalozia macrostachya, Sphagnum auriculatum, S. cuspidatum, S. capillifolium, S. papillosum, S. magellanicum, S.tenellum*, Fauna; Raft *spider Dolomedes fimbriatus*, small red damselfly *Ceriagrion tenellum,* curlew *Numenius arquata*, Assemblage of reptiles including smooth snake *Coronella austriaca.*	
	Maintain (or restore where habitats are degraded) the abundance of the 'typical' species listed below to enable each of them to be a viable component of the H4030 Annex 1 habitat: Higher plants: Heather *Calluna vulgaris*, bell heather *Erica cinerea*, dwarf gorse *Ulex minor*, bilberry *Vaccinium myrtillus*, petty whin *Genista anglica*, sand sedge *Carex arenaria*, Assemblage of mosses; *Hypnum jutlandicum*, Dicranum scoparium, *Polytrichum juniperinum*, Assemblage of lichens; *Cladonia floerkeana, C. fimbriata, C. furcata, C. portentosa*, Fauna: Assemblage of native reptiles including smooth snake *Coronella austriaca*, and sand lizard *Lacerta agilis*. Silver-studded blue *Plebejus argus*, heath tiger-beetle *Cicindela sylvatica*, mottled beefly *Thyridanthrax fenestratus*,	H4030 European dry heaths

Attributes	Target	Qualifying Features
	heath grasper *Haplodrassus dalmatensis* .	
	Maintain (or restore where habitats are degraded) the abundance of the 'typical' species listed below to enable each of them to be a viable component of the H4010 Annex 1 habitat: Higher plants; Heather *Calluna vulgaris*, bell heather *Erica tetralix*, creeping willow *Salix repens*, dwarf gorse *Ulex minor*, sedges *Carex* spp. common cotton-grass *Eriophorum angustifolium*, purple moor-grass *Molinia caerulea*, marsh clubmoss *Lycopodiella inundatum*, brown beak-sedge *Rhynchospora fusca*, deer grass *Trichophorum cespitosum*, round-leaved sundew *Drosera rotundifolia*, intermediate sundew *D. intermedia*, marsh gentian *Gentiana pneumonanthe,* Assemblage of mosses; *Aulocomnium palustre, Sphagnum capillifolium, S. compactum*. Fauna; assemblage of native reptiles including smooth snake *Coronella austriaca*.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Invasive, non-native and/or introduced species	Ensure invasive, non-native and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H7150 feature.	H7150 Depressions on peat substrates of the *Rhynchosporion*
	Maintain the frequency/cover of the following undesirable	H4030 European dry heaths

Attributes	Target	Qualifying Features
	species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: Piri-piri burr *Acaena* spp., Rhododendron *Rhododendron ponticum*, Gaultheria *Gaultheria shallon*, Japanese knotweed *Fallopia japonica*, creeping thistle *Cirsium arvense*, foxglove *Digitalis purpurea*, willowherb *Epilobium* spp., creeping buttercup *Ranunculus repens*, ragwort *Senecio jacobaea*, dock *Rumex obtusifolius*, nettle *Urtica dioica*.	
	Maintain or restore where habitats are degraded) the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread: Rhododendron *Rhododendron ponticum*, gaultheria *Gaultheria shallon*, Japanese knotweed *Fallopia japonica*, creeping thistle *Cirsium arvense*, foxglove *Digitalis purpurea*, willowherb *Epilobium* spp. (excl. *E. palustre*), floating sweet-grass *Glyceria fluitans*, reed *Phragmites australis*, creeping buttercup *Ranunculus repens*, ragwort *Senecio jacobaea*, dock *Rumex obtusifolius*,	H4010 Northern Atlantic wet heaths with *Erica tetralix*

Attributes	Target	Qualifying Features
	nettle *Urtica dioica*, soft rush *Juncus effusus*	
Presence/cover of woody species	Maintain (or restore where habitats are degraded or suffering excessive disturbance) a low cover of exposed substrate of between 1-10% across the H7150 feature.	H7150 Depressions on peat substrates of the *Rhynchosporion*
Exposed substrate	Maintain (or restore where water supply has been modified) a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations). At a site, unit and/or catchment level, maintain (or restore where habitats are suffering from effects of drainage) natural hydrological processes to provide the conditions necessary to sustain the H7150 feature within the site.	H7150 Depressions on peat substrates of the *Rhynchosporion*
Hydrology	Maintain (or restore where habitats are suffering from changes in water flow or chemistry) the surface water and groundwater supporting the hydrology of the bog at a low nutrient status and within natural variation of pH levels.	H7150 Depressions on peat substrates of the *Rhynchosporion*
	At a site unit and/or catchment level as necessary, maintain or restore the natural hydrological regime to provide the conditions necessary to sustain the H4010 feature.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Water chemistry	Maintain (or restore where the resilience of the feature is degraded) the H7150 feature's ability, and that of its	H7150 Depressions on peat substrates of the *Rhynchosporion*

Attributes	Target	Qualifying Features
	supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.	
Water quality	Where the H4010 feature is dependent on surface water and/or groundwater, maintain or restore water quality and quantity to a standard which provides the necessary conditions to support the feature, ie permanently high water table, very low nutrient status, low base-status and low pH.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Adaptation and resilience	Maintain (or restore where the resilience of the feature is degraded) the H4030 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	H7150 Depressions on peat substrates of the *Rhynchosporion*
	Maintain the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the H7150 feature.	H4030 European dry heaths
	Maintain or restore the H4010 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Supporting off-site habitat	Restore the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site	H7150 Depressions on peat substrates of the *Rhynchosporion*

Attributes	Target	Qualifying Features
	on the Air Pollution Information System (www.apis.ac.uk).	
Air quality	Maintain (or restore where appropriate) the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the H7150 & H4030 feature.	H7150 Depressions on peat substrates of the Rhynchosporion H4030 European dry heaths H4010 Northern Atlantic wet heaths with *Erica tetralix*
Conservation Measures	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the H4030 habitat.	H7150 Depressions on peat substrates of the Rhynchosporion H4030 European dry heaths
	Maintain or restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the H4010 feature.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Soils, substrate and nutrient cycling	Maintain (or restore where habitats are fragmented or isolated) the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site, such as critical habitat 'corridors' and habitat patches.	H4030 European dry heaths

Attributes	Target	Qualifying Features
	Maintain or restore the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the H4010 habitat.	H4010 Northern Atlantic wet heaths with *Erica tetralix*
Functional connectivity with wider landscape	Maintain (or restore where habitats are degraded or neglected) a very low cover of scrub or trees (ie <1% of the area of any single stand).	H4030 European dry heaths
	Maintain (or restore where habitats are fragmented or isolated) the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	H4010 Northern Atlantic wet heaths with *Erica tetralix*

Site Improvement Plan – Thursley, Ash, Pirbright and Chobham SAC (Natural England, 2014f)

3.8.6 The SIP for the Thursley, Ash, Pirbright and Chobham SAC is the same as for the Thames Basin Heaths SPA.

4 Stage 2 – Likely Significant Effect

4.1.1 This section deals with the screening of likely significant adverse effects on the qualifying features, in view of the conservation objectives of the relevant sites as a result of the construction and operation of the Project. The environmental pathways that could lead to a significant effect may be summarised as:

- direct injury/killing of an interest feature species, loss or damage of habitats within a designated site or of nearby areas used by interest species, including functionally linked land;
- change in management regimes (eg grazing/mowing) of habitats within a designated site or of nearby areas used by interest species;

- urbanisation that results in over shadowing, reduction of sight lines or which hinders flight paths of interest species;
- changes in air quality from emissions to air from both air traffic and surface access traffic;
- changes in water quality through pollution to water courses;
- hydrological changes, including in the balance of saline and non-saline conditions;
- disturbance (activity, recreation, noise and lighting); and
- introduction or spread of non-native invasive species.

4.1.2 The possibility of the Project having a likely significant effect on any of the designated sites identified in Section 3 is discussed for each of these impact pathways in turn below.

4.1.3 Screening matrices for all the sites identified in Section 3 above are provided in Annex 1.

4.2 Direct Injury / Killing of an Interest Species, Loss or Damage of Habitats Used by Interest Species

4.2.1 As the Project is a minimum of 9 km away from the nearest relevant site, it would not result in any direct loss of any habitat within any of the designated sites considered.

Ashdown Forest SPA and Thames Basin Heaths SPA

4.2.2 Bird surveys undertaken during 2018/2019 (**ES Appendix 9.6.2: Ecology Survey Report** (Doc Ref. 5.3)) demonstrate that the Project site does not support any of the birds listed as interest features for Ashdown Forest SPA or Thames Basin Heaths SPA. Further, the Project site does not contain habitat that would support such birds (heathland, rotationally-managed coniferous woodland). A single Dartford warbler has been recorded briefly by the GAL Biodiversity Team within Land East of the Railway, one of the Gatwick Biodiversity Areas located to the east of the railway that runs through the airport, on one occasion in 2017. However, this was considered to be a bird on passage, and none have been recorded before or since (despite annual monitoring surveys of the Land East of the Railway by GAL). As such, there is no risk of collision and so no potential for a likely significant effect.

Ashdown Forest SAC

4.2.3 Given the distance from the Site to the Ashdown Forest SAC (11.96 km), there is no possibility of the great crested newt population that is an interest feature of the SAC being linked to the population of this species present on Site. As such, there is no possibility of the SAC population being impacted by the Project and, as such, it is considered there is no likely significant effect.

The Mens SAC, Ebernoe Common SAC and Mole Gap to Reigate Escarpment SAC

4.2.4 With respect to bat interest features at The Mens and Ebernoe Common SACs, Natural England along with other nature conservation organisations, working with local authorities, have produced draft guidelines (South Downs National Park Authority and Natural England, undated) for the assessment of potential effects on the SAC bat populations within Sussex (including The Mens and Ebernoe Common) at a landscape scale, recognising the importance of foraging/commuting habitat outwith the formal designated sites. Based on existing information (Bat Conservation Trust (BCT), 2018), the draft guidelines require that development up to 12 km from the SAC consider the potential for effects on the bats.

4.2.5 This distance mainly relates to Barbastelle bats, which have been recorded foraging up to 15 km from a roost (although the core foraging area is up to 12 km, hence the screening distance used in the draft guidelines) (South Downs National Park Authority & Natural England undated). Bechstein's bats forage in/close to woodland within which they roost, travelling usually no more than 1-3 km (Schofield and Morris, 2000; Fitzsimons *et.al.*, 2002; Dietz, 2009). Work on the HS2 development radio tracking this species also found the majority of foraging activity within 3 km of a roost, with a single male recorded foraging at 5 km (HS2, 2013). As such, for sites with this species present, anything over 5 km LSE can be excluded.

4.2.6 Given the above, and in view of the distance of the Project from their boundaries (9.22 km, 25.09 km, 29 km, respectively), the potential for a likely significant effect on the bat populations of the Mole Gap to Reigate Escarpment, The Mens and Ebernoe Common SACs can be excluded. However, during consultation, Natural England requested that consideration was given to the potential for effects on these interest features from the Project.

4.2.7 Surveys with respect to bats have been undertaken for the Project site and surrounding landscape during 2019, 2020, 2021 and 2022 and are presented in ES Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys (Doc Ref. 5.3). Barbastelle activity across the site was very low. Therefore, given the small numbers found, the Project site is not considered to provide a key area of habitat for the local population, including any bats from The Mens/Ebernoe Common SACs. As such, given the distance from the sites (24-29 km), and the distance this species has been recorded foraging away from them (up to 15 km), and because there is no loss of habitat considered likely to be used by the species outside the SAC, it is considered there is no likely significant effect.

4.2.8 Data with respect to Bechstein's bats (ES Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys (Doc Ref. 5.3)) show that the Project site is used by this species, with foraging/commuting areas focused along the River Mole corridor, Brockley Wood, Museum Field and a number of other woodland parcels. Whilst surveys suggest this species is relatively widespread around Gatwick, particularly to the west, all bats were male/non-breeding females with the trapping/radio tracking later in the year picking up younger bats, probably dispersing from a maternity colony in the nearby wider landscape.

4.2.9 The landscape-scale study completed in 2020/21 (ES Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys (Doc Ref. 5.3)) confirmed the presence of a number of maternity colonies in blocks of ancient woodland within 5 km of Gatwick, particularly to the west (Glover's Wood and Ifield Wood).

4.2.10 The radio tracking data in ES Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys (Doc Ref. 5.3) show that bats using the airport are associated with these colonies rather than those present within the surrounding SACs. As such, given the current evidence, any short-term effects due to habitat loss resulting from the Project on the Gatwick bat population would not constitute a likely significant effect on the SACs for any of the assessment years.

4.2.11 With respect to the potential for in-combination effects, Bechstein's bat was not confirmed to be present on any Tier 1 or 3 development site. However, bats from the *Myotis* genus were recorded and there is potential for some of those to be Bechstein's bats.

4.2.12 The majority of the Tier 1 and 3 developments are associated with existing built-up areas within Gatwick, Horley and Crawley which comprise urban habitats (see ES Chapter 20: Cumulative Effects and Inter-Relationships (Doc Ref. 5.1)) unlikely to be of value to Bechstein's bats. Based on the landscape scale study completed in 2020/21 (ES Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys (Doc Ref. 5.3)), the Bechstein's bats recorded on the Project site are considered to be part of a population centred around higher value habitat to the west of Gatwick. There are few developments proposed in this area and those that are proposed are small and unlikely to significantly

affect Bechstein's bat habitat. As such, cumulative effects on the wider population of this species from the Project and other proposed developments are considered unlikely.

4.2.13 Barbastelle bats were recorded at one development, Forge Wood, a large residential lead development approximately 1.6 km south of the Project site boundary. From the details published regarding the Tier 1 and 3 developments and those recorded for the Project, the low detection rate of barbastelle bats suggests they do not frequently utilise habitats in close proximity to urban areas, or that the population in the area is small. Larger areas of woodland within the surrounding landscape would not be affected by proposed developments. As such, cumulative likely significant effects on barbastelle are also considered unlikely.

4.2.14 Consequently, it is concluded that the effects of direct injury/killing and habitat loss on qualifying features and the conservation objectives of any of the relevant designated sites can be screened out both with respect to the Project alone and in-combination with other plans/projects.

4.3 Change in Habitat Management Regimes

4.3.1 The majority of the existing land immediately surrounding, and in the vicinity of, the Project site is agricultural land to the east and west with the towns of Horley and Crawley to the north and south, respectively.

4.3.2 The current management regimes for the relevant sites focus on maintaining the habitats for the qualifying interest features.

4.3.3 Given the distance from the Project site boundary to the relevant sites (the Project is a minimum of 9 km away from the nearest relevant site, MGRE SAC), the Project would result in no change to current management regimes of any feature of a SPA or SAC.

4.3.4 Given that there is no pathway for a Project alone effect, there is also no pathway for in-combination effects to occur.

4.3.5 Therefore, impacts occurring from a change in habitat management regimes can be screened out both with respect to the Project alone and in-combination with other plans/projects.

4.4 Urbanisation

4.4.1 Industrial development has the potential to overshadow areas of habitat within designated sites, or areas used by the interest features of such sites, as well as obstructing flight paths and lines of sight, reducing the appeal of the habitat or increasing the risk of fatalities through collisions.

4.4.2 The Project site is over 9 km from the nearest relevant site (the MGRE SAC). Therefore, no part of such sites would be visible from within the Project site such that there could be an increase in overshadowing of habitats within the relevant sites or that support interest features for such sites. There is no potential for the Project to overshadow any of the habitats for which the relevant sites considered here have been designated. The Project also does not involve the construction of buildings of a size that could impede flight lines.

4.4.3 Given that there is no pathway for a Project alone effect, there is also no pathway for in-combination effects to occur.

4.4.4 As such, impacts from urbanisation can be screened out both with respect to the Project alone and in-combination with other plans/projects.

4.5 Air Quality

4.5.1 The two air quality impacts that could arise in relation to the Project during construction are dust and increased traffic emissions, while those that could arise during operation are from increased traffic emissions.

4.5.2 The Air Pollution Information System (APIS) is a publicly available support tool for UK conservation and regulatory agencies, industry and local authorities to help assess the potential effects of air pollutants on habitats and species. It aims to enable a consistent approach to air pollution assessment across the UK. This specifically includes informing assessments required under the Habitats Regulations. Consequently, reference has been made to the information contained within the APIS website where relevant.

Construction Dust

4.5.3 The potential for dust release exists during the construction phase, with potential sources including site clearance, earthworks and vehicle movements.

4.5.4 For sensitive ecological receptors, the Institute of Air Quality Management (IAQM) guidance on the assessment of dust from demolition and construction sets out 50m as the distance from the site boundary and from the site traffic route(s) within which there could potentially be nuisance dust and PM_{10} effects.

4.5.5 The boundary of the closest relevant site is over 9 km away from the Project site (the Mole Gap to Reigate Escarpment SAC); therefore, there is no pathway for construction dust to reach any of the designated sites.

4.5.6 As such, the impact of construction dust on the designated sites can be screened out, as no likely significant effects are anticipated both with respect to the Project alone and in-combination with other plans/projects during the construction period.

Traffic – Construction and Operational

4.5.7 The major impacts of air pollutants on habitats in the UK as a result of traffic are increases in nitrogen deposition and acidification. According to the Highways Agency's Design Manual for Roads and Bridges (DMRB), the contribution of vehicle emissions from the roadside to local pollution levels is not significant beyond 200m from a road (Highways England *et al*, 2019). This is therefore the distance that has been used to determine whether relevant sites are likely to be significantly affected by traffic emissions associated with the Project.

Construction Traffic – All Sites

4.5.8 As set out in in ES Chapter 12: Traffic and Transport (Doc Ref. 5.1), no quantifiable increases in traffic on roads within 200m of the sites are anticipated as a result of construction-related traffic. Therefore, the effect from traffic-related pollution during the construction period is screened out from further assessment as it can be concluded that it would not have a likely significant effect on any of the designated sites both with respect to the Project alone and in-combination with other plans/projects.

Operational Traffic – The Mens SAC and Ebernoe Common SAC

4.5.9 Similarly, both The Mens and Ebernoe Common SACs are located more than 20 km from the Project site with no major road that may be used to travel to Gatwick nearby. As such, there is no potential for changes to vehicle emissions resulting from the operation of the Project due to increases in traffic within 200m of these sites and so such impacts can be screened out both with respect to the Project alone and in-combination with other plans/projects.

Operational Traffic – Approach to Assessment

4.5.10 As set out in in ES Chapter 12: Traffic and Transport (Doc Ref. 5.1), a detailed strategic traffic model has been created for the Project. Modelling has considered changes in traffic flows due to

the Project, ie those changes in Annual Average Daily Traffic (AADT) in a number of scenarios:

- 'Do minimum HRA' (DMHRA) – HRA baseline;
- 'Do minimum' (DM) – Future baseline without Project; and
- 'Do something' (DS) – Future baseline with Project.

4.5.11 "HRA baseline" is the traffic in the future assessment year: this excludes projected growth from local plans/ projects within 10km of the HRA sites, but includes projected background traffic growth from projects beyond 10km and Gatwick Business as Usual (BAU) demand. This is the "Do minimum HRA" scenario. This approach has been adopted to ensure that a comprehensive in-combination assessment is completed while also recognising the extent of the geographical coverage of the traffic model.

4.5.12 "Future Baseline without Project" is the traffic in the future assessment year excluding the Project. This comprises expected growth from local plans and projects within 10km, background traffic growth, and Gatwick BAU demand (i.e. the passenger throughput that would occur at the airport in the absence of the Project). It represents the "Do minimum" scenario;

4.5.13 "Future Baseline with Project" is the expected future traffic growth including the Project (i.e. including the passenger throughput facilitated by the Project) together with growth from local plans and projects within 10km and projected background traffic growth. This is the "Do Something" scenario.

4.5.14 Full details of these scenarios are described in Transport Assessment Annex B – Strategic Transport Modelling Report (Doc Ref. 7.4).

4.5.15 From these, the following comparisons are used to inform the appropriate assessment and to identify the potential for an adverse effect on integrity of the relevant site:

- Project alone assessment: DS minus DM; and
- Project in combination with other plans/projects: DS minus DMHRA.

4.5.16 Modelling of traffic flows has been undertaken for both 2032 and 2038. As set out above, 2032 is the assumed year of full opening of the surface access works and, as such, represents the point at which traffic flows have increased most rapidly. Beyond this year, traffic flows are anticipated to increase much more slowly. 2038 is considered as the year development works wouldbe completed for the Project. As explained in Section 2.2.18 above, during later years, the decarbonisation of the fleet would be such that any residual effect would be no worse than those considered here. As such, the 2032 and 2038 assessment years are considered to represent the worst-case scenario.

4.5.17 Modelling of emissions to air from changes in operational traffic flows associated with the Project has also then been completed. These consider changes to both the aerial concentration of nitrogen oxide NO_x and ammonia NH_3 as well as the rate of deposition of nutrient nitrogen from these two sources.

4.5.18 Data are presented below first from the Project 'alone' scenario (DS-DM) and then the in-combination scenario (DS-DMHRA) for both assessment years.

4.5.19 The overall trend in annual background nitrogen deposition has been downwards, ie decreasing each year (Dragosits *et al*. 2020). Therefore, the modelling includes a reduction in background nitrogen deposition due to the effect of general improvements to air quality of 1.12% per annum throughout the modelling period (i.e. up to 2038). This is taken from data presented for England in Table 4.2 of Annex 4 of the JNCC Report 665 Nitrogen Futures, taking a 2017 baseline compared to a 2030 BAU scenario (i.e. with no additional mitigation to nitrogen deposition beyond those already part of policy). The percentage decrease per annum was therefore derived as the change in predicted nitrogen deposition between the years divided by the number of years. The inclusion of such a reduction has been agreed with Natural England during consultation prior to the submission of this application.

4.5.20 Similar reductions have been used in several comparable assessments with respect to local plan Habitats Regulations Assessments near to the relevant sites, eg Bracknell Forest Council (WSP, 2021) and Guildford Borough Council (AECOM, 2019).

4.5.21 The threshold for the consideration of a potential effect on a designated site is where a modelled change in a pollutant as a result of the change in AADT between the DS/DM and DS/DMHRA (ie the with Project and in-combination) scenarios is >1% of the relevant critical load/level following Natural England's guidance (Natural England, 2018e) and DMRB (HE 2019).

4.5.22 The quantum of the AADT change is considered in the in-combination scenario where the contribution from the Project is either so small such that it can properly be ignored or where it is negative (i.e. where the Project results in a redistribution of traffic flows away from a road link).

4.5.23 This approach to the application of the Natural England guidelines was agreed with Natural England during consultation prior to the submission of this application.

4.5.24 Critical loads and critical levels are the thresholds below which effects do not occur, according to best available scientific knowledge. Critical loads relate to the quantity of a pollutant that is deposited within a habitat (in this case nitrogen deposition) expressed as kilograms per hectare per year. They are individual to a given habitat and expressed as a range with a lower and upper value. For the purposes of this assessment, the lower critical load is used to ensure the assessment is conservative.

4.5.25 Critical loads have been 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*'" However, an exceedance of one of the critical loads does not automatically imply that a significant effect will occur.

4.5.26 Critical levels relate to gaseous pollutants and are expressed as a concentration (in this case with respect to NO_x and NH_3). The critical level for NO_x is universal for all vegetation (30 $\mu g.m^{-3}$). That for NH_3 depends on whether lower plants (lichens and bryophytes) form a key component of the habitat (1 $\mu g.m^{-3}$ if they do, 3 $\mu g.m^{-3}$ if they do not). For the sites considered here, only the Thursley, Ash, Pirbright and Chobham SAC has the lower critical level.

4.5.27 The 1% of the critical load/level threshold is the point at which a more detailed assessment of the potential for effects should be undertaken; it does not automatically imply that an adverse effect will occur. That judgment requires more detailed assessment based on available scientific research and consideration of the conservation objectives of the site.

4.5.28 Although the potential effects of NO_x-derived nitrogen deposition are an established basis for assessment, there is no current guidance on how to include nitrogen deposition derived from ammonia (NH_3). In responding to consultation, Natural England acknowledged the absence of such guidance and requested that GAL use "…*the most appropriate information available at the time of the assessment"*. National Highways have developed an NH_3 emissions toolkit. The use of the National Highways tool is considered to represent best practice because it is based on the most recently available information on ammonia emission factors in the UK fleet. The toolkit is used by National Highways for all their current projects (e.g. the A66 DCO TR010062, NH 2022).

During further engagement, Natural England agreed that the use of the National Highways toolkit to calculate NH_3 emissions was acceptable.

4.5.29 All references to nitrogen deposition throughout are therefore the combination of that arising from both NO_x and NH_3.

Project Alone Operational Traffic 2032

Ashdown Forest SAC/SPA

4.5.30 The relevant lower critical load for the Ashdown Forest SAC (APIS 2022b)/SPA (APIS 2022c) is 10 kgN.ha^{-1}.yr^{-1}.

4.5.31 Traffic modelling for assessment year 2032 within Ashdown Forest SAC/SPA shows that changes in AADT through the site are low (Figure 3) with no changes in NOx, NH3 or nitrogen deposition >1% of the relevant critical load/level predicted (Figures 3, 4 and 5, respectively). As such, effects from emissions to air from changes in traffic flow arising from the Project alone in assessment year 2032 at this site can be screened out as not having a significant effect.

Thursley, Ash, Pirbright and Chobham SAC/TAPC SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA

4.5.32 The relevant lower critical load for the heathland habitats (i.e. those within 200m of the roads) within the Thurley, Ash, Pirbright and Chobham SAC/Thames Basin Heaths SPA (APIS 2022d) is 10 kgN.ha^{-1}.yr^{-1}.

4.5.33 Traffic flows past the Thurley, Ash, Pirbright and Chobham SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA are dominated by those on the M3 (Figure 6).

4.5.34 All changes in NO_x, NH_3 or nitrogen deposition are predicted to be <1% of the relevant critical load/level (Figures 7, 8 and 9, respectively). As such, effects from emissions to air from changes in traffic flow arising from the Project alone in assessment year 2032 at this site can be screened out as not having a significant effect.

Mole Gap to Reigate Escarpment SAC

4.5.35 The relevant lower critical load for the grassland habitats within the Mole Gap to Reigate Escarpment SAC is 15 kgN.ha^{-1}.yr^{-1} (APIS, 2022e).

4.5.36 With respect to the Mole Gap to Reigate Escarpment SAC, traffic modelling shows changes in AADT due to the NRP on nearby road links are generally negative (Figure 10), ie the Project results in a redistribution of traffic away from these areas.

4.5.37 All changes in NO_x, NH_3 or nitrogen deposition are predicted to be <1% of the relevant critical load/level (Figures 11, 12 and 13, respectively). As such, effects from emissions to air from changes in traffic flow arising from the Project alone in assessment year 2032 at this site can be screened out as not having a significant effect.

Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA

4.5.38 The relevant lower critical load for the heathland habitats (i.e. those within 200m of the roads) within the Ockham & Wisley Common SSSI component of the Thames Basin Heaths SPA is 10 kgN.ha^{-1}.yr^{-1} (APIS, 2022a).

4.5.39 Changes in AADT on road links around this site are small in comparison to the substantial existing traffic flows (Figure 14). Further modelling of the changes in air quality show that the change in NO_x concentration between the 'do minimum' and 'do something' scenarios is >0.3 µg.m^{-3} (i.e. >1% of the critical level of 30 µg.m^{-3}) (Figure 15) and the maximum nitrogen deposition rate is also >1% of the relevant critical load (10 kgN.ha^{-1}.yr^{-1}) (Figure 17) at several locations directly adjacent to the motorway.

4.5.40 On this basis, therefore, effects on the Thames Basin Heaths SPA due to changes in emissions from traffic arising from the Project alone in assessment year 2032 are screened in for further assessment (NO_x and nitrogen deposition only).

4.5.41 The change in NH_3 concentration at this site is <1% of the critical level (Figure 17). As such, effects from emissions of NH_3 to air from changes in traffic flow arising from the Project alone in assessment year 2032 at this site can be screened out as not having a significant effect.

Project Alone Operational Traffic 2038

Ashdown Forest SAC/SPA

4.5.42 Traffic modelling for 2038 within Ashdown Forest SAC/SPA shows that changes due to the Project are low (Figure 18) with no changes in NO_x, NH_3 or nitrogen deposition >1% of the relevant critical load/level predicted (Figures 19, 20 and 21, respectively). As such, effects from emissions to air from changes in traffic flow arising from the Project alone in assessment year 2038 at this site can be screened out as not having a significant effect.

Thursley, Ash, Pirbright and Chobham SAC/TAPC SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA

4.5.43 Traffic flows past the Thursley, Ash, Pirbright and Chobham SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA are also dominated by those on the M3 in assessment year 2038 (Figure 22).

4.5.44 All changes in NO_x, NH_3 or nitrogen deposition are predicted to be <1% of the relevant critical load/level (Figures 23, 24 and 25, respectively). As such, effects from emissions to air from changes in traffic flow arising from the Project alone in assessment year 2038 at this site can be screened out as not having a significant effect.

Mole Gap to Reigate Escarpment SAC

4.5.45 With respect to the Mole Gap to Reigate Escarpment SAC, traffic modelling shows changes in AADT due to the NRP in assessment year 2038 on nearby road links are generally negative (Figure 26), i.e. the Project results in a redistribution of traffic away from these areas. The only road link where this is not the case is the M25.

4.5.46 All changes in NO_x, NH_3 or nitrogen deposition are predicted to be <1% of the relevant critical load/level on road links (Figures 11, 12 and 13, respectively). As such, effects from emissions to air from changes in traffic flow arising from the Project alone in assessment year 2038 at this site can be screened out as not having a significant effect.

Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA

4.5.47 Changes in AADT on road links around this site are still small in assessment year 2038 compared to existing flows (Figure 30). Further modelling of the changes in air quality show that the change in NO_x concentration between the 'do minimum' and 'do something' scenarios is >0.3 µg.m^{-3} (i.e. >1% of the critical level of 30 µg.m^{-3}) (Figure 31) and the maximum nitrogen deposition rate is also >1% of the relevant critical load (10 kgN.ha^{-1}.yr^{-1}) (Figure 33) at several locations directly adjacent to the motorway.

4.5.48 On this basis, therefore, effects on the Thames Basin Heaths SPA due to changes in emissions from traffic arising from the Project alone in assessment year 2038 are screened in for further assessment (NO_x and nitrogen deposition only).

4.5.49 The change in NH_3 concentration at this site is <1% of the critical level (Figure 32). As such, effects from emissions of NH_3 to air from changes in traffic flow arising from the Project alone in assessment year 2038 at this site can be screened out as not having a significant effect.

In-combination Operational Traffic 2032

4.5.50 The in-combination scenario is determined by comparing the Do Something (DS) scenario with the Do Minimum HRA (DMHRA) scenario (Section 4.5.10 *et seq.*).

Ashdown Forest SAC/SPA

4.5.51 Traffic modelling for assessment year 2032 within Ashdown Forest SAC/SPA shows that changes in cumulative AADT are still low (Figure 2). For all of NO_x, NH_3 and nitrogen deposition, a small number of modelled points show a change in pollutant >1% of the relevant critical load/level (Figures 33, 36 and 37, respectively). However, all of these are located within the carriageway of the road rather than in any natural habitat. No changes within habitat are predicted to exceed 1% of the critical load/level. As such, effects from emissions to air from changes in traffic flow arising from the Project in combination with other plans and projects in assessment year 2032 at this site can be screened out as not having a significant effect.

Thursley, Ash, Pirbright and Chobham SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA

4.5.52 For the Thursley, Ash, Pirbright and Chobham SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA, the modelled cumulative NO_x concentration (Figure 38) is >1% of the relevant critical level. The NH_3 concentration is also >1% of the critical level (Figure 39). The resulting cumulative nitrogen deposition from the combined NO_x and NH_3 is also >1% of the relevant critical load (Figure 40). These impacts are therefore taken through for appropriate assessment below.

Mole Gap to Reigate Escarpment SAC

4.5.53 Given that traffic data for the Mole Gap to Reigate Escarpment SAC show that for the majority of road links, the contribution of the NRP to traffic flows is negative (Figure 10), there is thus no possibility of an in-combination effect along these links.

4.5.54 Modelled changes in NO_x and NH_3 do not show any exceedances of 1% of the relevant critical level in the cumulative scenario in assessment year 2032 (Figures 41 and 42, respectively).

4.5.55 Data for nitrogen deposition show an exceedance of the 1% threshold along the edge of the B2033 in assessment year 2032. However, the AADT on this link due to the NRP in assessment year 2032 is 36 and negative in assessment year 2038. As such any contribution to the cumulative AADT total from the NRP in this location is short lived and sufficiently small that it can be screened out as not significant.

Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA

4.5.56 Air quality modelling for this site shows the predicted change in NO_x concentration (Figure 44) and NH_3 concentration (Figure 45) and nitrogen deposition (Figure 46) are all >1% of the relevant critical load/level. Therefore, these impacts are taken through for appropriate assessment.

In-combination Operational Traffic 2038

Ashdown Forest SAC/SPA

4.5.57 Air quality modelling shows the predicted change in NO_x concentration (Figure 47) and nitrogen deposition (Figure 49) are both >1% of the relevant critical load/level. Therefore, this impact is taken through for appropriate assessment.

4.5.58 With respect to NH_3, this is also >1% of the critical level in several locations but only within the road itself – none are present within the habitats of the designated site (Figure 48). As such, effects from NH_3 emissions to air from changes in traffic flow arising from the Project in combination with other plans and projects in assessment year 2038 at this site can be screened out as not having a significant effect.

Thursley, Ash, Pirbright and Chobham SAC/Chobham Common SSSI component of the Thames Basin Heaths SPA

4.5.59 Air quality modelling shows the predicted change in NO_x concentration (Figure 50), NH_3 concentration (Figure 51) and nitrogen deposition (Figure 52) are all >1% of the relevant critical load/level. Therefore, these impacts are taken through for appropriate assessment.

Mole Gap to Reigate Escarpment SAC

4.5.60 Given that traffic data for the Mole Gap to Reigate Escarpment SAC show that for the majority of road links, the contribution of the Project to traffic flows in the cumulative scenario in assessment year 2038 is negative (Figure 10), there is no possibility of an in-combination effect along these links.

4.5.61 The only road link with an increase in AADT due to the Project in assessment year 2038 is along the M25. Modelled changes in NO_x, NH_3 and nitrogen deposition do not show any exceedances of 1% of the relevant critical level/load in the cumulative scenario in assessment year 2038 (Figures 53, 54 and 55, respectively).

4.5.62 On this basis, therefore, effects on the Mole Gap to Reigate Escarpment SAC due to changes in emissions from traffic arising in the cumulative scenario in assessment year 2038 can be screened out as not having a significant effect.

Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA

4.5.63 Air quality modelling for this site shows the predicted changes in NO_x concentration (Figure 56), NH_3 concentration (Figure 57) and nitrogen deposition (Figure 58) are all >1% of the relevant critical load/level.

4.5.64 On this basis, therefore, effects on the Thames Basin Heaths SPA due to changes in emissions from traffic arising in the cumulative scenario in 2038 are screened in for further assessment.

4.6 Water Quality/Hydrological Changes

4.6.1 The quality of the water entering the relevant sites is an important determinant of habitat condition and hence the species they support. Poor water quality can have a range of ecological impacts.

4.6.2 There are no hydrological links between the relevant sites considered here and the Project site, with the exception of the Mole Gap to Reigate Escarpment SAC.

4.6.3 A section of the River Mole runs through GAL land and is to be diverted in order to facilitate the proposed works. The River Mole then runs north west, where it eventually reaches the Mole Gap to Reigate Escarpment SAC. A 140m section runs through the SAC, before continuing to run adjacent to (but outwith) the SAC.

4.6.4 The Mole Gap to Reigate Escarpment SAC in this location is designated for its chalk grassland escarpment habitats, specifically, the *Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (*important orchid sites)*. As the River Mole sits at the bottom of the escarpment, there is no ecological pathway for the water to influence the chalk habitats on the site.

4.6.5 Given that there is no pathway for a Project alone effect, there is also no pathway for in-combination effects to occur.

4.6.6 As such, there is no potential for likely significant effects due to changes to the water environment from the Project on any SAC and this impact can therefore be screened out both with respect to the Project alone and in-combination with other plans/projects for all assessment years.

4.7 Disturbance

4.7.1 Disturbance can be caused by activity, recreation, noise and lighting. The Project site is more than 9 km from the nearest relevant site. As such, there is no potential for any direct disturbance on such sites and all such effects can be screened out as not significant.

4.7.2 With respect to indirect effects on bats using the site that might be associated with the surrounding SACs, data collected in 2019, 2020 and 2021 (ES Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys (Doc Ref. 5.3)) suggest that bats of all species are using the wider airport site, despite the degree of existing lighting/disturbance; Bechstein's bat, for example, have been radio-tracked moving over the airfield.

4.7.3 As described above, the population of Bechstein's bat present is not linked to the SACs, given the distance from the Project site. Therefore, no likely significant effects on the bats associated with the SACs are considered likely.

4.7.4 Given that there is no pathway for a Project alone effect, there is also no pathway for in-combination effects to occur.

4.7.5 On this basis, the potential for indirect disturbance on such sites and all such effects can be screened out both with respect to the Project alone and in-combination with other plans/projects for all assessment years.

4.8 Introduction or Spread of Non-native Invasive Species

4.8.1 The movement of people and traffic, as well as importation of material and plants to a site, can result in the introduction of non-native species to a site. While several non-native species are currently known to be present on the Project site, given the distance to the nearest relevant site, there is no pathway by which such species could be spread into such sites.

4.8.2 Given that there is no pathway for a Project alone effect, there is also no pathway for in-combination effects to occur.

4.8.3 The issue of introduction and spread of non-native species is therefore screened out both with respect to the Project alone and in-combination with other plans/projects.

4.9 Conclusion of Stage 2 Screening

4.9.1 At this stage, following the screening, no likely significant effects have been identified for any sites or interest features with respect to the following impacts: direct killing/injury; loss of/damage to habitat; change in habitat management; changes in air quality during construction (including from dust generation); water quality/hydrology; disturbance and introduction or spread of non-native invasive species. These conclusions apply both to the Project alone and in-combination with other plans/projects.

4.9.2 The screening of likely effects due to the Project alone with respect to changes in air quality during operation of the Project did not identify any such effects for Ashdown Forest SAC/SPA, Mole Gap to Reigate Escarpment SAC or Thursley, Ash, Pirbright and Chobham SAC.

4.9.3 The potential for likely significant effects was identified due to the Project alone with respect to the Ockham and Wisley Common SSSI component of the Thames Basin Heaths SPA due to changes in air quality during operation of the Project for both assessment years. As such, this impact is taken forward to Stage 3 Appropriate Assessment.

4.9.4 The screening of likely effects due to the Project in combination with other plans and projects with respect to changes in air quality during operation of the Project did not identify any such effects for the Mole Gap to Reigate Escarpment SAC.

4.9.5 The potential for likely significant effects was identified due to the Project in combination with other plans and projects with respect to the Ockham and Wisley Common SSSI and Chobham Common SSSI components of the Thames Basin Heaths SPA (for both assessment years), the Chobham Common SSSI component of the Thursley, Ash, Pirbright and Chobham SAC (for both assessment years) and Ashdown Forest SPA/SAC (for assessment year 2038) due to changes in air quality during operation of the Project. As such, these impacts are taken forward to Stage 3 Appropriate Assessment.

4.9.6 Table 4.9.1 summarises the effects screened in for further assessment.

Table 4.9.1: Likely significant effects screened in for appropriate assessment

Site	Alone/in combination	Assessment year	Likely significant effect screened in
Thames Basin Heaths SPA (Ockham & Wisley Common SSSI)	Alone	2032 and 2038	Air quality (NO_x and nitrogen deposition)
Ashdown Forest SAC	In Combination	2038	Air quality (NO_x and nitrogen deposition)
Ashdown Forest SPA	In Combination	2038	Air quality (NO_x and nitrogen deposition)
Thames Basin Heaths SPA (Chobham Common SSSI)	In combination	2032 and 2038	Air quality (NO_x, NH_3 and nitrogen deposition)
Thursley, Ash, Pirbright & Chobham SAC	In combination	2032 and 2038	Air quality (NO_x, NH_3 and nitrogen deposition)
Thames Basin Heaths SPA (Ockham & Wisley Common SSSI)	In combination	2032 and 2038	Air quality (NO_x and nitrogen deposition)

5 Stage 3 – Appropriate Assessment

5.1 Introduction

5.1.1 The Habitats Regulations set out that where a significant effect cannot be ruled out, the competent authority should make an appropriate assessment of the implications of the plan or project for the designated site in view of the conservation objectives of that site.

5.1.2 The following analysis therefore makes reference to the conservation objectives of the relevant sites, as necessary, and considers whether an adverse effect on integrity is possible due to the impacts of the Project alone, or in-combination with other plans/projects.

5.1.3 Integrity matrices are presented in Annex 2. These provide the overall conclusions of the Appropriate Assessment with respect to the integrity of the relevant designated sites.

5.1.4 The potential for the Project alone to result in an adverse effect on integrity is considered first, followed by the Project in combination with other plans and projects.

5.2 Project Alone

Air Quality and the Ockham & Wisley Commons SSSI Component of the Thames Basin Heaths SPA

5.2.1 For both 2032 and 2038, the 'alone' screening identified changes in both NO_x and NH_3 concentration and nitrogen deposition within the Ockham and Wisley Common SSSI component of the Thames Basin Heaths SPA along the M25 due to traffic emissions that exceeded the screening thresholds set out in Section 4.5.16 above. As the pattern of exceedance is similar, the analysis below addresses both years.

5.2.2 As set out previously, the Thames Basin Heaths SPA was designated for supporting populations of European importance of the following species:

- Dartford warbler;
- Nightjar; and
- Woodlark.

5.2.3 The Conservation Objectives for the SPA (as set out in Section 3.7.3 above) are to 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:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the population of each of the qualifying features; and,
- the distribution of the qualifying features within the SPA.

5.2.4 The Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA comprises areas of open heathland (circa 78 hectares) and Scots pine-dominated mixed woodland/plantation woodland (around 143 hectares). The woodland occurs in linear strips alongside both the A3 and M25. The site is owned by Surrey County Council (SCC) and is managed by the Surrey Wildlife Trust (SWT).

5.2.5 All three interest feature species have been recorded within the SSSI as summarised in Section 5 of the Secretary of State for Transport (SoST)'s Habitats Regulations Assessment of the M25 J10/A3 Wisley Interchange (SoST 2022). Broadly, this comprises three territories of Dartford warbler, one territory of woodlark and three territories of nightjar within Wisley Common and four territories of Dartford warbler, one territory of woodlark and four territories of nightjar within Ockham Common. The current population status of the interest feature birds within the SSSI has significantly increased since the point of both designation in 2005 and the SPA review undertaken in 2016. Populations of all three species are also higher than the targets set in the SWT 2010-2020 Wisley and Ockham Commons Management Plan (SWT 2010). Overall, the SPA interest features are considered to be in favourable condition (para 5.32 SoST 2022). The supporting habitats within the SSSI are considered to be in both favourable and unfavourable recovering condition following the implementation of the management plan by SWT (NE 2021).

5.2.6 In the Project alone-scenario, the area of the SPA covered by the exceedances is very similar in both assessment years, extending a maximum of 40 metres into the site from the edge of the M25 motorway. As such, whether these changes would result in an adverse effect on the integrity of the SPA is considered together in the analysis presented below.

5.2.7 In the location where the exceedances occur (40m into the site, Figures 15 and 17), the habitats present are all mature coniferous/mixed woodland (see botanical survey data presented in Section 3.1 of Annex 3). The woodland is referred to as the woodland buffer throughout the documentation for the J10DCO and this term is also used within this document. The buffer provides a physical barrier between the M25/A3 and the heathland habitats within the SSSI/SPA. The buffer varies in depth between 150 metres and 200 metres before any heathland habitat occurs (Section 3.1 of Annex 3).

5.2.8 The Supplementary Advice on Conserving and Restoring Site Features for the Thames Basin Heaths SPA (Natural England 2014d) sets out the attributes of the SPA that are required in order for the Conservation Objectives to be achieved. This includes targets with respect to each attribute (Table 3.6).

5.2.9 Of the various attributes, changes in air quality will not alter those relating to 'conservation measures' or 'disturbance caused by human activity' as these relate to the actions of humans rather than ecological processes.

5.2.10 To further determine the potential for an adverse effect on integrity due to changes in air quality, it is first necessary to properly characterise the woodland buffer with respect to its function within the SPA.

5.2.11 The Supplementary Advice sets out (on page 4) that the "principal habitats" supporting the qualifying features are "lowland heathland and rotationally-managed coniferous plantation woodland".

5.2.12 The Supplementary Advice sets out the characteristics of habitats for the qualifying features. They note the requirements of nightjar and woodlark (in Tables 1 and 2 of the Advice, respectively) for continuous management of coniferous plantation woodland by providing "*permanent open space and by rotational clear-fell and re-stocking, which can temporarily create suitable breeding habitat for up to 10 years*." Woodland is not described as a supporting habitat of Dartford warbler in Table 3 of the Advice.

5.2.13 It is necessary to consider therefore whether the woodland buffer comprises rotationally-managed coniferous plantation woodland ('managed woodland') or other woodland present within the SPA ('unmanaged woodland'), to enable a conclusion on whether the buffer supports the qualifying features underlying the designation of the site.

5.2.14 Surveys of the site by GAL (Section 3.1 of Annex 3) did not identify any areas of woodland managed in this manner within the

buffer with all woodland comprising entirely mature trees several decades in age.

5.2.15 The role of this woodland surrounding the SSSI in supporting the function of the SPA was discussed extensively at the Examination of the M25 J10/A3 Wisley Interchange DCO, in particular whether it represented 'supporting habitat' of the interest feature birds within the meaning of the Conservation Objectives for the site.

5.2.16 Surveys to inform that project also did not identify any managed woodland in the buffer. It was agreed with NE (Section 3.2.6/7, HE 2020) and ultimately concluded by the SoST in granting consent for the project that this woodland does not comprise managed woodland and is therefore not 'supporting habitat' for all species (para 5.82 of the SoST HRA (SoST 2022).

5.2.17 It is further necessary to consider whether the air quality attribute targets in Tables 1-3 of the Supplementary Advice are relevant to the unmanaged woodland. Within the Attributes column in Tables 1 to 3, air quality is identified as an attribute in relation to "supporting habitat". Whilst managed woodland is identified elsewhere in the Supplementary Advice as one of the "principal habitats supporting [the interest features]", unmanaged woodland is not. The Supporting and/or Explanatory Notes in respect of the air quality attribute targets within the Supplementary Advice refer to potential impacts on "*nesting, feeding or roosting habitats*". It follows that if unmanaged woodland is not nesting, feeding or roosting habitat for any of the interest feature birds then it is not "supporting habitat" in this context and thus the air quality attribute targets do not apply.

5.2.18 Woodland of any form is not described as a supporting habitat for Dartford warbler within the Supplementary Advice. Further, it is not listed as a 'broad habitat' for this species on APIS under the nutrient nitrogen entry. As such, no adverse effects on this species are predicted from increased nitrogen deposition into the woodland.

5.2.19 As regards the information within APIS, "coniferous woodland" is identified as a "broad habitat" for nightjar but APIS explains that the species is not "*sensitive due to nutrient nitrogen impacts on broad habitat*" (i.e. on coniferous woodland). For woodlark, the APIS nutrient nitrogen entry identifies that the species is sensitive due to nutrient nitrogen impacts on the "*coniferous woodland*" broad habitat. However, in the light of the content of the Supplementary Advice (discussed above) with respect to the difference between managed and unmanaged woodland and this species' habitat and feeding preferences, the "*coniferous woodland*" broad habitat is intended to refer only to managed woodland (ie to the habitat that is identified as a supporting habitat in the Supplementary Advice) and is not intended also to encompass unmanaged woodland.

5.2.20 In addition, and again by reference to the M25 J10/A3 Wisley Interchange DCO, it was found that that whilst the woodland buffer may contribute to a minor extent to the invertebrate foraging resource within the wider SPA, it does not support the qualifying bird species, based on surveys completed within the SSSI in 2016, 2017 and 2018 along with bird monitoring data gathered by the SWT with respect to the interest features (HE 2020).

5.2.21 This conclusion from that project regarding the lack of use/function of the woodland buffer by interest feature birds is consistent with and supported by recent surveys from 2022 completed by GAL for nightjar (Section 3.1 of Annex 3).

5.2.22 In addition to the air quality attribute targets, it is necessary to consider the food availability targets. These are "*maintain or restore the distribution, abundance and availability of key prey items (e.g. moths, beetles) at prey sizes preferred by nightjar*"; for woodlark the attribute target is the same except that the reference is to spiders, weevils and caterpillars rather than moths and beetles; and for Dartford warbler the reference is to beetles, spiders, caterpillars and bugs.

5.2.23 It should also be noted that clearance of woodland in the SPA (and a corresponding increase in heathland), as per the management plan for the site, resulted in an increase in the presence of the interest feature birds (evidence presented by SWT at the Examination of the J10 DCO, as summarised in the SoST's HRA for that project (SoST 2022)), suggesting that there is little or no dependence on the woodland in this area as a source of food for what are heathland bird species.

5.2.24 Further, as set out in the management plan for the site (SWT 2010), there are no current plans to restore heathland in the location of the buffer with all felling of woodland necessary already completed (as per SWT response at Deadline 10 of the J10 DCO, SWT 2020). Given the location of the buffer directly adjacent to some of the busiest roads in the country, it is not considered that it would be attempted, given the physical disturbance from passing vehicles, changes in hydrology associated with surface water runoff and the impact of salt-spray in winter all making such restoration unlikely to be successful.

5.2.25 As described above, neither woodlark nor Dartford warbler rely on the invertebrate resource within the SPA's unmanaged woodland. On this basis, increased nitrogen deposition within the woodland would not compromise the maintenance or restoration of "*the distribution, abundance and availability of key prey items*…" for these interest features.

5.2.26 Whilst nightjar may exploit to a minor degree the invertebrate resource within the SPA's unmanaged woodland, as noted above APIS states that the species is not sensitive to nutrient nitrogen impacts on the coniferous woodland broad habitat. There is little botanical diversity within the buffer with the understorey comprising dense stands of bracken and bramble. It is possible that the bracken supports a range of invertebrate species that nightjar may feed on including moths of the family Hepialidae, the small angle shades *Euplexia lucipara* and brown silver-line moths *Petrophora chlorosata* plus a number of Hemiptera bugs. Similarly, bramble supports species including shield bugs and other Hemiptera along with a range of moth species.

5.2.27 Aerial nitrogen deposition does not directly impact fauna; impacts are indirect via changes to the habitats that support them. Therefore, in order for there to be a change in the invertebrate abundance within the woodland buffer, there would need to be a botanical change as a result of nitrogen deposition. A range of studies have looked at the impact of nitrogen deposition on bracken, including in respect of relationships with herbivorous insects. Eautough Jones *et al*. (2011), for example, identified no difference in bracken herbivore abundance in response to nitrogen addition in a low ambient nitrogen deposition setting (8kgN.ha^{-1}.yr^{-1}, broadly similar to that experienced at the SSSI). Further, other studies have found bracken growth to be insensitive to nitrogen deposition (Gordon *et al*. 1999; Werkman *et al*. 1996). Therefore, botanical changes that may give rise to changes in prey abundance from that currently present are unlikely to occur.

5.2.28 On this basis, therefore, the insensitivity of the understorey species within the woodland in this location to nitrogen deposition supports the APIS description of nightjar not being "*sensitive due to nutrient nitrogen impacts on [coniferous woodland] broad habitat*". As such, the predicted change in both nitrogen deposition and NO_x concentration in this location would not have an adverse effect on any of the interest feature birds via changes in prey availability.

5.2.29 Therefore, on the basis of the above and principally that the role of the woodland is as a buffer between the heathland and the

M25/A3, rather than as a supporting habitat of interest feature birds within the SPA, it is considered that adverse effects on the integrity of the SPA from additional NO_x, NH_3 and nitrogen deposition arising from the Project alone can be ruled out.

5.3 Project In combination with other plans/projects

Air Quality and the Ashdown Forest SAC/SPA

5.3.1 Given the overlap between the Ashdown Forest SAC and SPA and that the habitats that form the SAC are those that support the interest feature birds of the SPA, the following analysis addresses the potential for impacts to both sites.

5.3.2 The qualifying interest features of the Ashdown Forest SPA are:

- nightjar; and
- Dartford warbler

5.3.3 The qualifying interest features of the Ashdown Forest SAC are:

- Northern Atlantic wet heaths with *Erica tetralix*; and
- European dry heaths.

5.3.4 In addition, great crested newt *Triturus cristatus* is present within the site as a qualifying feature, but not a primary reason for site selection.

5.3.5 The Conservation Objectives for the SPA are to maintain or restore:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the populations of each of the qualifying features; and
- the distribution of the qualifying features within the SPA.

5.3.6 Those of the SAC are, to maintain or restore:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species;
- the structure and function (including typical species) of qualifying natural habitats;
- the structure and function of the habitats of qualifying species;
- the supporting processes on which qualifying natural habitats and habitats of qualifying species rely;
- the populations of qualifying species; and
- the distribution of qualifying species within the SAC

5.3.7 Ashdown Forest is an extensive area of lowland heathland with woodland. It is of international importance for the heathland habitats it supports and the fauna (including the SPA interest feature birds) it supports. It is owned by the Ashdown Forest Trust and managed by the Conservators of Ashdown Forest.

5.3.8 The condition assessments of the underlying Ashdown Forest SSSI, available through NE's designated sites review, identify that 78% of the SSSI is in 'Unfavourable - Recovering' condition, 17% is in 'Favourable' condition and 5% is in 'Unfavourable – Declining' condition.

5.3.9 The air quality modelling for assessment year 2038 shows that the nitrogen deposition exceeds 1% of the critical load for nitrogen deposition and the critical level for NO_x at a number of locations either within the carriageway of the road (for most road links) or within 10 metres of the roadside along the A22 as it passes through the Forest (Figure 47 and Figure 49, respectively). Any modelling location within the actual road itself (ie on tarmac) is discounted from further assessment as this is not functional habitat and will never be restored as such. Therefore, the analysis focusses on whether there is the potential for an adverse effect on the SAC/SPA from impacts along the 10m strip along the A22 where an exceedance of the 1% threshold occurs. It should be noted that the exceedance only occurs in some places (Figures 47 and 48); it is not continuous along the length of the A22.

5.3.10 Any impact on the SPA would be via the supporting habitats rather than on the interest feature birds directly. As such, the analysis also focuses on the potential for effects on the heathland interest features of the SAC since any such effect would also impact the SPA.

5.3.11 The current habitat within 10 metres of the A22 is generally a mixture of bramble and bracken (Section 3.2 of Annex 3). No heathland occurs in this area currently. The closest area of heathland to the A22 is circa 750 metres north of Nutley. Here, it is still >20 metres from the road edge (i.e. double the distance from the road that the exceedance of the 1% occurs).

5.3.12 Given that there are no existing interest features within the area covered by the 1% exceedance (i.e. within 10 metres of the road), the attributes within the supplementary advice on the conservation objectives for the SAC (Natural England 2019c) relating to the habitats themselves do not apply; for example, there can be no change to the structure of the interest feature habitat if it does not occur in that area. Therefore, it is necessary to consider whether the 'restore' component of the conservation objectives would be relevant. It is not considered that heathland would be restored so close to a major road, with physical disturbance from passing vehicles, changes in hydrology associated with surface water run off and the impact of salt-spray in winter all making such restoration unlikely to be successful. It is often also desirable to allow an area of atypical habitat to occur within designated sites along major roads to act as a buffer to the interest feature habitats behind.

5.3.13 Further, the supplementary advice with respect to the conservation objectives for the SAC (Natural England 2019c) for both heathland habitats that are interest features note that "*active and ongoing conservation management is needed to protect, maintain or restore this feature at this site*". It then goes on to say that "*further details about the necessary conservation measures for this site can be provided by contacting Natural England*". Pre-submission discussions with Natural England confirmed that the key management measure required for this site is grazing. Given the restrictions on fencing within Common Land, it would be impossible to permanently fence along the roads. Therefore, there would be no possibility of restoring heathland using grazing.

5.3.14 The deposition of nitrogen nor gaseous NO_x do not directly impact fauna such as great crested newt (GCN). Assuming that GCN may be present within 10 metres of the A22 (itself unlikely, given there are no waterbodies that could support them within circa 100 metres of the road and the quality of habitat for this species present adjacent to the road is poor compared to the surrounding heathland), impacts to the species could therefore only occur through changes to the structure of the habitat that could, in turn, alter the prey abundance. All of the habitats within the area where the exceedances are modelled to occur comprise a mix of bramble and bracken.

5.3.15 These habitats are insensitive to increased nitrogen deposition. A range of studies have looked at the impact of nitrogen deposition on bracken, including in respect of relationships with herbivorous insects. Eautough Jones *et al*. (2011), for example, identified no difference in bracken herbivore abundance in response to nitrogen addition in a low ambient nitrogen deposition setting ($8kgN.ha^{-1}.yr^{-1}$, broadly similar to that experienced at the SAC). Further, other studies have found bracken growth to be insensitive to nitrogen deposition (Gordon *et al*. 1999; Werkman *et al*. 1996). Therefore, botanical changes that may give rise to changes in prey abundance from that currently present are

unlikely to occur. Bramble is an indicator of nutrient enrichment with abundance tending to increase where such enrichment occurs. As such, changes in nitrogen deposition in this location will not lead to changes in botanical composition.

5.3.16 This is supported by the Supplementary Advice published by Natural England with respect to the Conservation Objectives (Natural England 2019c) for this species that states (Table 3 pg27):

"The specific habitat requirements for this interest feature are not considered to be particularly sensitive to air quality impacts. It is the structure and function only of the terrestrial habitat that is of relevance to GCN. The aquatic habitat is also not likely to be specifically impacted by air quality habitats as inland lakes and ponds are largely phosphate limited."

5.3.17 With respect to the SPA, supplementary advice on the conservation objectives for the SPA (Natural England 2019d) list the supporting habitat for the interest feature species as heathland with areas of gorse for Dartford warbler and a mosaic of heathland, open woodland and recently-felled conifer plantations; it does not list bramble and bracken as supporting habitats for the interest feature birds. Therefore, the habitat present does not comprise functional habitat for the interest feature species.

5.3.18 Therefore, given that all of the exceedences of the 1% threshold occur either on the A22 carriageway or within 10 metres of it, and that the habitat present in this location does not comprise either the interest feature habitats of the SAC nor supporting habitats of the SPA interest feature birds, no adverse effect on the integrity of either the SAC or SPA is predicted due to the Project in combination with other plans/projects.

5.3.19 A similar scenario to that described here with exceedances predicted in close proximity to the roads through Ashdown Forest was assessed as part of the Habitats Regulations Assessment of the Tandridge Local Plan (AECOM 2018). That assessment did not identify any heathland habitats (as the supporting habitat for the interest feature birds and the habitats for which the site is designated an SAC) directly adjacent to the road. The Tandridge HRA also concluded that there would be no adverse effect on the integrity of the SAC/SPA following a similar rationale to that described above.

Air Quality and the Thursley, Ash, Pirbright and Chobham SAC

5.3.20 As set out previously, the interest feature habitats of the Thursley, Ash, Pirbright and Chobham SAC are:

- Depressions on peat substrates of the *Rhynchosporion*;
- Northern Atlantic wet heaths with *Erica tetralix*; and
- European dry heaths.

5.3.21 The Conservation Objectives for the SAC (Natural England 2018d) are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of the qualifying natural habitats;
- the structure and function (including typical species) of qualifying natural habitats; and
- the supporting processes on which qualifying natural habitats rely.

5.3.22 The relevant component SSSI is the Chobham Common SSSI. This site is managed by Surrey Wildlife Trust on behalf of Surrey County Council.

5.3.23 The current condition of the Chobham Common SSSI available through Natural England's designated sites review identifies that 57% of the SSSI is in 'Unfavourable - Recovering' condition, 43% is 'Favourable' in condition. The general cause of unfavourable status is inappropriate management, although that is generally being rectified through appropriate plans, hence the recovering status.

5.3.24 Data from air quality modelling with respect to the cumulative scenario for the Chobham Common SSSI component of the Thursley, Ash, Pirbright and Chobham SAC shows that the NO_x concentration and nitrogen deposition is predicted to exceed 1% of the relevant critical level/load at a range of locations within 20 metres of the M3 in both assessment years in the cumulative scenario (Figures 44, 46, 50 and, 52, respectively).

5.3.25 In these locations, the site comprises a mown embankment, possibly created during the building of the M3 (a similar feature occurs on the opposite side of the motorway). From historic aerial photography (Google Earth Pro), this area has been maintained as such since at least 2009. Natural England confirmed during pre-submission consultation that this area is maintained as mown for the purposes of a fire break between the heathland/gorse scrub of the Common proper and the M3. Historic aerial photography (Google Earth Pro) shows that prior to 2009, the area appeared to comprise mainly gorse/young woodland that was then cut down around 2009.

5.3.26 Surveys of the vegetation in this area undertaken on behalf of GAL (Section 3.3 of Annex 3) show it to be maintained at circa 20cm height and dominated by purple moor grass and bristle bent grassland with areas of dense gorse occurring frequently.

5.3.27 Birch-dominated woodland with frequent gorse occurred along the B386.

5.3.28 As such, none of the interest feature habitats for which the SAC is designated currently occur within the area covered by the 1% NO_x and nitrogen deposition exceedance.

5.3.29 The supplementary advice with respect to the conservation objectives for the site (Natural England 2016 – as set out in Annex 2 above) describes the attributes and targets necessary for the site to achieve the conservation objectives. Since the interest feature habitats do not currently occur within the area covered by the 1% exceedance for NO_x and nitrogen deposition, all of the attributes relating to the habitats themselves do not apply.

5.3.30 Purple moor grass-dominated areas are noted in the supplementary advice as being unfavourable, with appropriate management to restore heathland desirable. However, given that the area adjacent to the M3 is maintained as a fire break, there is no plan to restore heath through a more sensitive management regime. Notwithstanding this, it is still necessary to consider whether the 'restore' component of the conservation objectives would be relevant.

5.3.31 Given the function as a firebreak, it is not considered that heathland would ever be restored in this location. As set out in 5.3.12 above, such restoration is unlikely to be successful, were it to be attempted, since restoration of heathland management or gorse scrub would also prejudice any functioning of the area as a firebreak between the heathland and motorway.

5.3.32 Despite this, in the unlikely event that heathland were to be restored so close to the road, the largest increase in cumulative nitrogen deposition it might receive is predicted to be 0.78 $kgN.ha^{-1}.yr^{-1}$ directly adjacent to the edge of the M3 (grid ref 496803.85, 164707.99).

5.3.33 The increase in deposition of 0.78$kgN.ha^{-1}.yr^{-1}$ occurs at one modelled point, with the average increase in deposition across all

modelled points within Chobham Common being 0.08kgN.ha^{-1}.yr^{-1}.

5.3.34 The area covered by the exceedance of the 1% threshold for NOx and nitrogen deposition is circa 5.2ha or circa 0.1% of the total area of the SAC (5,154ha). On this basis, therefore, even if restored to heathland, it would still represent a very small proportion of the total area of the SAC.

5.3.35 An increase in nitrogen deposition >1% of the critical load is also predicted to occur directly adjacent to the junction of the B386, Chobham Road and Windsor Road in assessment year 2038. Of these, the contribution from the NRP to the cumulative AADT is negative along the B386 (both east and west of the junction) and only 7 AADT along Chobham Road to the north (Figure 21). As such, any contribution from the NRP in these locations is so small, it can properly be ignored.

5.3.36 There is one location circa 20 metres from the road predicted to exceed 1% of the critical load to the west of Windsor Road and south of the B386 (west), adjacent to the junction. The NRP contribution to the cumulative AADT in this location is 86 vehicles in assessment year 2038 (out of a total cumulative change in AADT of 1,908 vehicles, or 4.5% of the cumulative total). Although this is still a very small proportion of the total cumulative change, the potential for any adverse effect in this location is still considered.

5.3.37 The habitats present in this location are currently birch-dominated woodlands rather than any of the SAC interest feature habitats (Section 3.3 of Annex 3). Woodland is noted as being one of the habitats with which it is important to maintain transitions between the heath and adjacent habitat types, maintaining the overall mosaic of habitats across the landscape (Natural England 2016). The woodland around the roundabout appears to perform a similar buffering function to that described around the Ockham and Wisley Common SSSI above (Section 5.2.1 *et seq.*) since it is maintained along the majority of the B386, Chobham Road and Windsor Road in varying depths away from the carriageways. As such, it is highly unlikely to be restored to heathland.

5.3.38 In the unlikely event that it were restored in this location, the nitrogen deposition in this location is predicted to be 0.18 kgN.ha^{-1}.yr^{-1}. Given the analysis presented in Sections 5.3.37 – 5.3.39, no botanical change in the habitat type would be predicted.

5.3.39 The area covered by the exceedance measures circa 0.2ha, 0.004% of the SAC total area. As such, even if restored to heathland, this area would be a very small proportion of the SAC.

5.3.40 The air quality modelling shows the area covered by the exceedance of 1% of the critical level for NH3 in assessment years 2032 and 2038 is more extensive than that associated with NOx and nitrogen deposition, occurring up to circa 230 metres from the M3 (Figures 39 and 42). This is using a critical level for NH3 of 1µg.m-3, given the importance of the lichen and bryophyte populations of the wider Chobham Common. In practice NH3 concentrations are likely to reach background levels much closer to the edge of the road than this distance. Further discussion on the inherent limitations of the air quality modelling is at paragraph 5.3.72 of this report and in Annex 6. For present purposes, however, the analysis has been undertaken on the modelled numbers as presented.

5.3.41 Lichens and bryophytes form an integral component of the interest feature heathland habitats. They require areas of bare ground amongst heather and gorse to ensure they receive sufficient light to grow. This means that they tend to be absent from areas of mature heathlands with either a closed heather canopy or extensive purple moor grass thatch. They will, however, colonise areas of bare ground after fires, for example, that break up that canopy cover.

5.3.42 The critical level for NH_3 with respect to lower plants (lichens and bryophytes) was set at 1µg.m^{-3} rather than 3µg.m^{-3} for higher plants in 2007 because of research suggesting that the lichens and bryophytes were more sensitive than higher plants because of their epiphytic life form (ECE 2007).

5.3.43 As described above, the areas directly adjacent to the M3 comprise short-mown purple moor grass and gorse, managed as a fire break. In these areas, surveys undertaken by GAL (Section 3.3 of Annex 3) did not identify any lichen populations occurring – the area lacked sufficient bare ground with dense purple moor grass thatch and gorse occurring, preventing any light reaching the ground. As described above, these areas are highly unlikely to be restored to heathland, given the proximity of the M3. As such, the critical level for these locations would be set at 3 µg.m^{-3} and no exceedances would occur other than directly on the verge of the M3.

5.3.44 Also, the areas of birch woodland buffer that occur throughout the area will not support the species of bryophyte and lichen that are listed as typical assemblage species (Natural England 2016); although woodlands can support assemblages of lower plants that are of conservation interest, they are not an interest feature of this SAC. Therefore, the critical level for these locations would also be set at 3 µg.m^{-3} and no exceedances would occur.

5.3.45 To the east of Windsor Road, areas of dry heath occurred circa 60 metres from the M3 in an area circa 160 metres wide between the woodland adjacent to the B386 and the mown habitat adjacent to the M3. The heathland here is mature with dense purple moor grass thatch and little bare ground. Gorse scrub occurs frequently, often in dense patches. Although *Cladonia* spp. lichens were observed to occur in this area, these were individuals and very infrequent. Given the structure of the habitat, no assemblage of lichen/bryophytes are likely to colonise the heathland in this area meaning there can be no effect from changes in ammonia concentrations.

5.3.46 A small area of heathland also occurred to the west of the M3. This was observed to have more open ground and more diverse populations of lichens, despite being subject to the same background NH_3 concentration (circa 1.6 µg.m^{-3}). As such, it is likely that, given a more open structure, similar populations of lichens would occur in other locations, meaning that it is structure of habitat being the key determinant of lichen distribution, rather than ammonia concentration.

5.3.47 On this basis, therefore, the habitats for which the SAC is designated do not occur in the locations where the exceedances are predicted to occur and as such, there would be no adverse effect on integrity of the site due to the Project in combination with other plans and projects.

Air Quality and the Chobham Common SSSI Component of the Thames Basin Heaths SPA

5.3.48 Modelling of the cumulative scenario showed that the NO_x and NH_3 concentrations and nitrogen deposition is predicted to exceed 1% of the relevant critical level/load at a range of locations adjacent to the M3. As set out above, the habitats present in the area directly adjacent to the M3 where the exceedance occurs comprise mown grassland/gorse maintained at circa 20cm height.

5.3.49 Table 3.6 above sets out the site attributes necessary for the three interest feature birds. Dartford warblers are small, insectivorous birds, resident in Britain and associated exclusively with heathland, favouring gorse with heather understorey for nesting. Being dependant on invertebrates as prey, they are strongly associated with heathland areas that provide year-round sources of such food, ie where there is sufficient habitat variation to do so. Dartford warblers have therefore been shown to have a strong affinity for heathland (Bibby 1979) and a negative association with woodland (van der Berg *et al.*, 2001).

5.3.50 Nightjars are summer visitors to the UK, arriving to breed around May and typically departing around August. They are also insectivorous, feeding on flying insects such as moths. They breed in open heathland and typically forage across heathland and early stage plantations, but require such foraging to be close to their nesting territories and will actively avoid foraging in established woodland (Sharps *et al*., 2015).

5.3.51 Woodlarks are associated with short vegetation for foraging (feeding mainly on spiders and beetles), interspersed with taller, dense vegetation for nesting, frequently tall heather or grass (Mallord *et al*., 2007). They also utilise recently-cleared areas of coniferous plantation woodland for nesting.

5.3.52 Functionally, therefore, the mown grassland/gorse that this area currently comprises is not habitat that would support the breeding, resting or feeding of interest feature birds.

5.3.53 As set out above, it is not considered that the area covered by the exceedances would ever be restored to heathland and in the event that it were, the exceedances are not sufficient to drive meaningful ecological change.

5.3.54 Habitat in the small area where there is an exceedance adjacent to the Windsor Road comprises birch woodland. It is not "*rotationally-managed coniferous woodland*" and therefore, the analysis with respect to why the woodland buffer around the Ockham and Wisley Common SSSI is not functional habitat above (Section 5.2.1 *et seq*.) is also relevant with respect to the woodland surrounding the junction of the B386, Chobham Road and Windsor Road.

5.3.55 Further, it is likely that proximity to the M3 and consequent disturbance would prejudice the use of this area by interest feature birds. Breeding bird surveys undertaken in 2016, 2017 and 2018 to inform the M25 J10/A3 Wisley Interchange Development Consent Order (DCO) (HE, 2019) did not record any of the interest feature species within the woodland that borders the A3/M25, only within the heathland. This is consistent with other survey work (including that presented in Section 3.1 of Annex 3 with respect to nightjar) completed for projects undertaken both on the Ockham and Wisley Commons SSSI and elsewhere across the wider SPA. A review of bird survey data for the Ockham and Wisley Commons SSSI to inform nearby development (EPR, 2015) found that the nearest SPA bird territories to either the A3 or M25 were approximately 300 metres from the roadside. Similar patterns in bird distribution data have been observed at Chobham Common SSSI along the M3 corridor (2Js Ecology monitoring data, as reported in Jacobs 2019).

5.3.56 Therefore, an adverse effect on the integrity of the SPA can be ruled out on the basis that:

- The habitat present does not comprise functional habitat that would support the interest feature birds;
- It is highly unlikely that such habitat would be restored in this location, given the proximity of the road;
- If it were restored, the exceedances are not sufficient to drive meaningful ecological change; and
- The proximity to the major roads is likely to deter interest feature birds from using these habitats.

Air Quality and the Ockham & Wisley Commons SSSI Component of the Thames Basin Heaths SPA

5.3.57 Exceedances of the 1% threshold, in particular for nitrogen deposition, at the Ockham and Wisley Commons SSSI component of the Thames Basin Heaths SPA are predicted in both 2032 and 2038 in the cumulative scenario.

5.3.58 In the cumulative scenario, nitrogen deposition would exceed 1% of the relevant lower critical load for the habitats within the SPA (10 kgN.ha^{-1}.yr^{-1} – taken from APIS) across an area of up to 200 metres to the west of the A3 on the approach to the Wisley Interchange at the M25 and less elsewhere (Figures 23 and 31).

5.3.59 In both of the assessment years 2032 and 2038 the increases in nitrogen deposition associated with the cumulative scenario only exceeds 1% of the minimum critical load within areas of the woodland buffer with the exception of a very small area of heathland at the end of both transects to the west of the A3.

5.3.60 The potential for adverse effects on the SPA due to impacts within the woodland buffer is discussed in Section 5.2 above. Although the extent of the exceedances is greater in both assessment years of the cumulative scenario than the alone scenario, the analysis as to why no adverse effect would occur, set out above, is still valid with respect to the cumulative scenario and so there is considered to be no change to the assessment conclusions in relation to such effects.

5.3.61 In both assessment years, some areas of heathland within the SPA would be subject to a change in nutrient nitrogen deposition of between 0.1 and 0.2 kgN.ha^{-1}.yr^{-1} , i.e. 1 – 2% of the minimum critical load in the cumulative scenario (Figures 59 and 60).

5.3.62 In addition to the impact of nitrogen on the heathland habitats, it is also relevant to consider the spatial extent of habitat that the exceedance occurs over. In 2032, circa 0.3 ha is potentially impacted out of total resource of 8,200 ha of heathland within the SPA – 0.0036% of the total resource. In 2038, the area is slightly larger 0.8 ha, but still very small as a percentage (0.0097%). Therefore, even if the upper-end of the cumulative contribution is realised, such a change would still be very small and have no effect on integrity.

5.3.63 Further, any retardation of the restore element of the air quality conservation objective has been investigated (based on an annual decrease of 1.12% from a background of 18.96kgN.ha^{-1}.yr^{-1}) and, for both assessment years, there is no difference between when the DMHRA scenario and the DS scenario achieve the air quality objective (10kg/ha/yr). Therefore, compared to the DMHRA scenario, the DS scenario does not delay achieving the air quality objective for the SPA.

5.3.64 No adverse effect on the integrity of the SPA is therefore predicted in the cumulative scenario, on the basis that:

- the effects, with minor exceptions, are limited to an area of woodland buffer proximate to the road (Sections 5.2.10);
- the woodland buffers around the site do not support interest features and therefore any impacts from nutrient nitrogen deposition on such habitats will not affect the interest features for which the SPA is designated (5.2.11 – 5.2.34);
- the spatial extent of heathland covered by an exceedance of 1% of the critical load is very small in both assessment years (Section 5.2.41); and
- functionally, any increase in nitrogen deposition would not delay the site's achievement of its air quality objective (Sections 5.2.42-5.2.43).

Conclusions of Appropriate Assessment

5.3.65 Table 5.3.1 summarises the conclusions of the appropriate assessment with respect to the adverse effect on integrity test.

Table 5.3.1: Conclusions of appropriate assessment

Site	Alone / in combination	Assessment year	Likely significant effect screened in	Adverse effect on integrity?
Thames Basin Heaths SPA (Ockham & Wisley Common SSSI)	Alone	2032 and 2038	Air quality (NO_x and nitrogen deposition)	No
Ashdown Forest SAC	In Combination	2038	Air quality (NO_x and nitrogen deposition)	No
Thames Basin Heaths SPA (Chobham Common SSSI)	In combination	2032 and 2038	Air quality (NO_x, NH_3 and nitrogen deposition)	No
Thursley, Ash, Pirbright & Chobham SAC	In combination	2032 and 2038	Air quality (NO_x, NH_3 and nitrogen deposition)	No
Thames Basin Heaths SPA (Ockham & Wisley Common SSSI)	In combination	2032 and 2038	Air quality (NO_x and nitrogen deposition)	No

Dose response relationships

5.3.66 Although not relied on as necessary with respect to the conclusion of no adverse effect on the integrity of any site as described above, it is possible to examine the relationship between the dose of additional nitrogen deposition and the response of various parameters (species richness, reduction in cover (or increase in grass cover) and resulting changes in broad habitat structure) for heathlands, as the habitat of interest for the relevant sites considered in this report. Caporn *et al*. (2016) undertook such an analysis, based on existing botanical data from surveys undertaken between 2002 and 2009.

5.3.67 This work described the effect of small incremental additions of nitrogen into habitats that already exceed the critical load. Habitats (including heathland) displayed a curvilinear relationship with nitrogen dose so that the rate of change in the parameters for a given increase in nitrogen deposition was not constant over the range of depositions studied.

5.3.68 The data presented in Table 21 of Caporn *et al*. (2016) shows that, based on the lowland heathlands surveyed, at a background nitrogen deposition rate of c. 15 $kgN.ha^{-1}.yr^{-1}$ (broadly that found across the relevant sites considered here – see Site Relevant Critical Load tool on APIS, www.apis.ac.uk), species richness in heathlands would not be expected to change by one species (since you cannot have 0.5 of a species), until an additional dose of c. 1.3 $kgN.ha^{-1}.yr^{-1}$.

5.3.69 Appendix 5 of Caporn *et al*. shows that, for an incremental increase of 0.1$kgN.ha^{-1}.yr^{-1}$ (slightly higher than predicted for any of the relevant sites here), one might observe an increase in grass cover of circa 0.4% under a background deposition rate of 15 $kgN.ha^{-1}.yr^{-1}$, a change that is highly unlikely to be measurable (the corresponding increase in grass cover for 0.5$kgN.ha^{-1}.yr^{-1}$ is 0.2%). As such, no detectible change with respect to the structure and function of any of the heathland assessed above would be predicted using the dose-response relationship.

Management and Modelling

5.3.70 Although not relied upon to reach a conclusion of no adverse effect on the integrity of any site in any instance, there is evidence that active management of sites will prevent nitrogen from being stored and/or increase the rate at which stored nitrogen is depleted. Lowland heathland is essentially an anthropogenic habitat where active management is necessary to prevent succession to woodland. The implementation of such management (through grazing, cutting, controlled burning etc.) has been found to remove nitrogen from heathland ecosystems or break up the continuous ground cover to enable an increase in species diversity Stevens *et al*. (2013). The management plan for the SSSI (SWT 2010) includes the implementation of controlled burning, cutting and grazing as a means of maintaining/improving habitat diversity. All of these management actions have been found to influence the response of habitats to nitrogen additions to varying degrees (Stevens *et al*., 2013). Therefore, although it is not necessary to take these measures into account given the previous analysis, the active management of the Ockham and Wisley Commons SSSI by the SWT will also help ameliorate any existing and future nitrogen deposition pressures.

5.3.71 In addition to the ecological effects, the air quality modelling for the Project itself is considered conservative in that, although it takes account of the change in fleet composition as far as the existing DfT Emissions allow, further testing using the Government's Transport Decarbonisation Plan has been carried out to illustrate the impact of decarbonising the fleet composition in line with that extant Government policy (see Annex 4). This shows that, with the predicted electrification of the fleet, emissions would decrease by as much as 75% in 2038 compared to the main modelling presented above. The impact of this would be to either remove any exceedances of the 1% thresholds currently predicted or to constrain them to only occurring adjacent to the roads. As such, the analysis presented above and the associated conclusion of no adverse effect on integrity are both highly conservative.

5.3.72 It is also important to recognise the inherent limitations with respect to the accuracy of air quality modelling from road sources. Whilst air quality models will show a level of change of a pollutant a considerable distance from a road, this is in part due to the way the algorithms in dispersion models work i.e. a theoretical infinite end point. For present purposes, the analysis presented above and associated conclusions are based on the modelled numbers as presented. Annex 6 explains this limitation to the modelling, in particular with respect to the derivation of both nitrogen deposition and NH3 concentrations from modelled NOx emissions and the subsequent inherent reliance on those NOx values. Therefore, exceedances of 1% of the critical load/level for both total nitrogen deposition and NOx/NH3 in locations where the modelled NOx is very small should be treated as functions of the model and are unlikely to ever be measurable and should be treated as having an imperceptible impact.

5.3.73 Finally, the AADT flows along the M25 and M3 are some of the largest in the country. As such, the changes in AADT predicted

both in the DS and DMHRA scenarios are very small increments of the existing flows, changing the traffic numbers by <1%. Such changes are unlikely to be perceptible.

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7 Glossary

7.1 Glossary of terms

Table 7.1.1: Glossary of Terms

Term	Description
APIS	Air Pollution Information System
AADT	Average Annual Daily Traffic
CEA	Cumulative Effects Assessment
CJEU	Court of Justice of the European Union
DCLG	Department for Communities and Local Government
DM	Do minimum traffic scenario
DMHRA	Do minimum Habitats Regulations Assessment traffic scenario
DMRB	Design Manual for Roads and Bridges
DS	Do something traffic scenario
EIA	Environmental Impact Assessment
ES	Environmental Statement
ExA	Examining Authority
GAL	Gatwick Airport Limited
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
NH_3	Ammonia
NO_x	Nitrogen oxide
NRP	Northern Runway Project
PEIR	Preliminary Environmental Information Report
pSAC	Proposed Special Area of Conservation
pSPA	Proposed Special Protection Area
SAC	Special Area of Conservation
SCC	Surrey County Council
SIP	Site Improvement Plan
SoST	Secretary of State for Transport
SPA	Special Protection Areas
SSSI	Site of Special Scientific Interest
SWT	Surrey Wildlife Trust

Annex 1

Screening Matrices

A1.1 Evidence for likely significant effects on their qualifying features is detailed in the footnotes to the screening matrices below.

Matrix Key:

✓ = Likely significant effect cannot be excluded

× = Likely significant effect can be excluded

C = construction

O = operation

A1.2 Where effects are not applicable to a particular feature they are greyed out.

Stage 1 Matrix A: Mole Gap to Reigate Escarpment SAC

Name of European Site	**Mole Gap to Reigate Escarpment SAC**											
Distance to Project site boundary	**9 km**											
European site features	**Land Take**		**Habitat Fragmentation**		**Aerial Emissions**		**Aqueous Emissions/Discharges**		**Noise and Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.)	×a	×a	×b	×b	×e	×f	×g	×g	×h	×h	×i	×i
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)	×a	×a	×b	×b	×e	×f	×g	×g	×h	×h	×i	×i

Name of European Site	Mole Gap to Reigate Escarpment SAC											
*important orchid sites												
Taxus baccata woods of the British Isles *priority feature	×a	×a	×b	×b	×e	×f	×g	×h	×h	×h	×i	×i
European dry heaths	×a	×a	×b	×b	×e	×f	×g	×g	×h	×h	×i	×i
Asperulo-fagetum beech forests	×a	×a	×b	×b	×e	×f	×g	×g	×h	×h	×i	×i
Great crested newt	×a	×a	×c	×c	×e	×f	×g	×g	×h	×h	×i	×i
Bechstein's bat	×a	×a	×d	×d	×e	×f	×g	×g	×h	×h	×i	×i

Evidence Supporting Conclusions

a.	Nearest element of the Project is >9 km from site; unlike some other bat species, Bechstein's bat have been recorded foraging relatively close to roosts (usually between 1 and 3 km) (Schofield & Morris, 2000; Fitzsimons et.al., 2002; Dietz, 2009).; work on the HS2 development radio tracking this species found the majority of foraging activity within 3 km of a roost with a single male recorded foraging at 5 km (HS2, 2013). On this basis, there is no evidence to suggest that Bechstein's bats from the SAC would be foraging in any habitat to be lost and therefore no potential for effects of habitat fragmentation on this species.
b.	Nearest element of the Project is >9 km from site; no potential for fragmentation to affect habitats.
c.	Nearest element of the Project is >9 km from site; no potential for effects on species populations within the SAC.
d.	Nearest element of the Project is >9 km from site; unlike some other bat species, Bechstein's bat have been recorded foraging relatively close to roosts (usually between 1 and 3 km) (Schofield & Morris, 2000; Fitzsimons et.al., 2002; Dietz, 2009).; recent work on the HS2 development radio tracking this species found the majority of foraging activity within 3 km of a roost with a single male recorded foraging at 5 km (HS2, 2013). On this basis, there is no evidence to suggest that Bechstein's bats from the SAC would be foraging in any habitat to be lost and therefore no potential for effects of habitat fragmentation on this species.
e.	Site >9 km from Project; no potential for aerial emissions during construction work on site to affect habitats within SAC. Any generators etc. would be small scale and therefore, the potential zone of influence would be considerably smaller than this.
f.	Potential effects on habitats screened out as unlikely on the basis that no change in any pollutant predicted to be >1% of relevant critical load/level.
g.	Nearest element of the Project is >9 km from site; no potential for effects from aqueous emissions/discharges.
h.	Nearest element of the Project is >9 km from site; no potential for noise / vibration effects on species populations within SAC (including on flight lines to/from SAC as Bechstein's not known to travel such distances from roosts.
i.	Nearest element of the Project is >9 km from site; therefore, no potential for lighting effects on species/habitats within SAC.

Stage 1 Matrix B: Ashdown Forest SAC

Name of European Site	**Ashdown Forest SAC**											
Distance to Project site boundary	**12 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Northern Atlantic wet heaths with *Erica tetralix*	×a	×a	×b	×b	×d	✓e	×f	×f	×g	×g	×g	×g
European dry heaths	×a	×a	×b	×b	×d	✓e	×f	×f	×g	×g	×g	×g
Great crested newt	×a	×a	×c	×c	×d	✓e	×c	×c	×c	×c	×c	×c

Evidence Supporting Conclusions

a.	Site 12 km from Project; no potential for direct habitat loss.
b.	Site 12 km from Project; no potential for fragmentation to affect habitats.
c.	Site 12 km from Project in direct line; no potential for effects on species populations within SAC.
d.	Nearest element of the Project is 12 km from site; no potential for effects from aerial emissions during construction work on site to affect habitats within SAC.
e.	Changes in traffic numbers >1,000 AADT and in air quality predicted to be >1% of relevant critical load in in-combination scenario in 2038 assessment year.
f.	Site 12 km from Project; no potential for aqueous discharges to affect habitats within SAC.
g.	Site is 12 km from Project; no potential for noise / vibration / lighting effects on species populations or habitats within SAC.

Stage 1 Matrix C: Ashdown Forest SPA

Name of European Site	**Ashdown Forest SPA**											
Distance to Project site boundary	**12 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Dartford Warbler	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f
Nightjar	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f

Evidence Supporting Conclusions

a.	Site 12 km from Project; no potential for direct species habitat loss.
b.	Site 12 km from Project; no potential for fragmentation to affect habitat.
c.	Nearest element of the Project is 12 km from site; no potential for effects from aerial emissions during construction work on site to affect habitats within SPA.
d.	Changes in traffic numbers >1,000 AADT and in air quality predicted to be >1% of relevant critical load in in-combination scenario in 2038 assessment year.
e.	Site 12 km from Project; no potential for aqueous discharges to affect species or habitats within SPA.
f.	Site is 12 km from Project; no potential for noise / vibration / lighting effects on species populations within SPA.

Stage 1 Matrix D: The Mens SAC

Name of European Site	**The Mens SAC**											
Distance to Project site boundary	**25 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (or *Ilici-Fagenion*)	×a	×a	×b	×b	×c	×d	×e	×e	×f	×f	×f	×f
Barbastelle *Barbastella barbastellus*	×a	×a	×b	×b	×c	×d	×e	×e	×f	×f	×f	×f

Evidence Supporting Conclusions

a.	Site 25 km from Project; no potential for direct species habitat loss. No evidence of Barbastelle present on site.
b.	Site 25 km from Project; no potential for fragmentation to affect habitat. No evidence of Barbastelle present on site.
c.	Nearest element of the Project is 25 km from site; no potential for effects from aerial emissions during construction work on site to affect habitats within SAC.
d.	Nearest element of the Project is 25 km from site; no potential for effects from operational aerial emissions to affect habitats within SAC.
e.	Site 25 km from Project; no potential for aqueous discharges to affect species or habitats within SAC.
f.	Site is 25 km from Project; no potential for noise / vibration / lighting effects on species or habitats within SAC.

Stage 1 Matrix E: Ebernoe Common SAC

Name of European Site	**Ebernoe Common SAC**											
Distance to Project site boundary	**29 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (or *Ilici-Fagenion*)	×a	×a	×b	×b	×c	×d	×e	×e	×f	×f	×f	×f
Barbastelle *Barbastella barbastellus*	×a	×a	×b	×b	×c	×d	×e	×e	×f	×f	×f	×f
Bechstein's bat *Myotis bechsteinii*	×a	×a	×b	×b	×c	×d	×e	×e	×f	×f	×f	×f

Evidence Supporting Conclusions

a.	Site 29 km from Project; no potential for direct species habitat loss. No evidence of Barbastelle present on site. Nearest element of the Project is >9 km from site; unlike some other bat species, Bechstein's bat have been recorded foraging relatively close to roosts (usually between 1 and 3 km) (Schofield & Morris, 2000; Fitzsimons et.al., 2002; Dietz, 2009).; recent work on the HS2 development radio tracking this species found the majority of foraging activity within 3 km of a roost with a single male recorded foraging at 5 km (HS2, 2013). On this basis, there is no evidence to suggest that Bechstein's bats from the SAC would be foraging in any habitat to be lost and therefore no potential for effects of habitat fragmentation on this species.
b.	Site 29 km from Project; no potential for fragmentation to affect habitat. No evidence of Barbastelle present on site. Nearest element of the Project is >9 km from site; unlike some other bat species, Bechstein's bat have been recorded foraging relatively close to roosts (usually between 1 and 3 km) (Schofield & Morris, 2000; Fitzsimons et.al., 2002; Dietz, 2009).; recent work on the HS2 development radio tracking this species found the majority of foraging activity within 3 km of a roost with a single male recorded foraging

	at 5 km (HS2, 2013). On this basis, there is no evidence to suggest that Bechstein's bats from the SAC would be foraging in any habitat to be lost and therefore no potential for effects of habitat fragmentation on this species.
c.	Nearest element of the Project is 29 km from site; no potential for effects from aerial emissions during construction work on site to affect habitats within SAC.
d.	Nearest element of the Project is 29 km from site; no potential for effects from aerial emissions during operations to affect habitats within SAC.
e.	Site 29 km from Project; no potential for aqueous discharges to affect species or habitats within SAC.
f.	Site is 29 km from Project; no potential for noise / vibration / lighting effects on species or habitats within SAC.

Stage 1 Matrix F: Thames Basin Heaths SPA

Name of European Site	**Thames Basin Heaths SPA**											
Distance to Project site boundary	**23.6 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Dartford Warbler	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f
Nightjar	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f
Woodlark	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f

Evidence Supporting Conclusions

a.	Site 23.6 km from Project; no potential for direct species habitat loss.
b.	Site 23.6 km from Project; no potential for fragmentation to affect habitat.
c.	Nearest element of the Project is 30.6 km from site; no potential for effects from aerial emissions during construction work on site to affect habitats within SPA.
d.	Changes in traffic numbers >1,000 AADT and in air quality predicted to be >1% of relevant critical load both alone and in in-combination scenarios.
e.	Site 23.6 km from Project; no potential for aqueous discharges to affect species or habitats within SPA.
f.	Site is 23.6 km from Project; no potential for noise / vibration / lighting effects on species populations within SPA.

Stage 1 Matrix G: Thursley, Ash, Pirbright and Chobham SAC

Name of European Site	**Thursley, Ash, Pirbright and Chobham SAC**											
Distance to Project site boundary	**33.8 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Depressions on peat substrates of the *Rhynchosporion*;	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f

Name of European Site	Thursley, Ash, Pirbright and Chobham SAC											
Northern Atlantic wet heaths with *Erica tetralix*;	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f
European dry heaths	×a	×a	×b	×b	×c	✓d	×e	×e	×f	×f	×f	×f

Evidence Supporting Conclusions

a.	Site 33.8 km from Project; no potential for direct species habitat loss.
b.	Site 33.8 km from Project; no potential for fragmentation to affect habitat.
c.	Nearest element of the Project is 33.8 km from site; no potential for effects from aerial emissions during construction work on site to affect habitats within SPA.
d.	Changes in traffic numbers >1,000 AADT and in air quality predicted to be >1% of relevant critical load both alone and in in-combination scenarios.
e.	Site 33.8 km from Project; no potential for aqueous discharges to affect species or habitats within SPA.
f.	Site is 33.8 km from Project; no potential for noise / vibration / lighting effects on species populations within SPA.

Annex 2

Integrity Matrices

✓ = Adverse effect on integrity cannot be excluded

✕ = Adverse effect on integrity on can be excluded

C = construction

O = operation

Stage 2 Matrix A: Ashdown Forest SAC

Name of European Site	**Ashdown Forest SAC**											
Distance to Project site boundary	**12 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions – Surface access**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Northern Atlantic wet heaths with *Erica tetralix*						✕a						
European dry heaths						✕a						
Great crested newt						✕b						

Evidence Supporting Conclusions

a.	No adverse effect on Site. Location where exceedances predicted to occur either in carriageway or within 20m. All habitats in these areas are either bracken or woodland and, as such, do not support interest feature habitats.
b	No adverse effect on species. Species not sensitive to impacts of nitrogen deposition directly. Indirect effects will not occur on broad habitats supporting this species.

Stage 2 Matrix B: Ashdown Forest SPA

Name of European Site	Ashdown Forest SPA											
Distance to Project site boundary	12 km											
European site features	Land take		Habitat fragmentation		Aerial emissions – Surface access		Aqueous emissions		Noise & Vibration		Lighting	
	C	*O*	*C*	*O*	*C*	*O*	*C*	*O*	*C*	*O*	*C*	*O*
Dartford Warbler						×a						
Nightjar						×a						

Evidence Supporting Conclusions

a.	No adverse effect on Site. Location where exceedances predicted to occur either in carriageway or within 20m. All habitats in these areas are either bracken or woodland and, as such, do not support interest feature species.

Stage 2 Matrix C: Thames Basin Heaths SPA

Name of European Site	Thames Basin Heaths SPA											
Distance to Project site boundary	23.6 km											
European site features	Land take		Habitat fragmentation		Aerial emissions – Surface access		Aqueous emissions		Noise & Vibration		Lighting	
	C	*O*	*C*	*O*	*C*	*O*	*C*	*O*	*C*	*O*	*C*	*O*
Dartford Warbler						×a						
Nightjar						×a						
Woodlark						×a						

Evidence Supporting Conclusions

a.	No adverse effect on integrity - the effects, with minor exceptions, are limited to an area of woodland buffer proximate to the road. Also, the woodland buffers around the site do not support interest features and therefore any impacts from nutrient nitrogen deposition on such habitats will not affect the interest features for which the SPA is designated and the modelled increase in nitrogen deposition with respect to the more sensitive heathland habitats is highly unlikely to result in any change in species richness and any increase in grass cover is likely to be unmeasurably small.

Stage 2 Matrix D: Thursley, Ash, Pirbright and Chobham SAC

Name of European Site	Thursley, Ash, Pirbright and Chobham SAC											
Distance to Project site boundary	**33.8 km**											
European site features	**Land take**		**Habitat fragmentation**		**Aerial emissions – Surface access**		**Aqueous emissions**		**Noise & Vibration**		**Lighting**	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Depressions on peat substrates of the *Rhynchosporion*;						×a						
Northern Atlantic wet heaths with *Erica tetralix*;						×a						
European dry heaths						×a						

Evidence Supporting Conclusions

a.	No adverse effect on integrity. Exceedances occur directly adjacent to the main roads. Habitats in this area are not interest feature habitats and are maintained as a fire break adjacent to the M3.

Annex 3

Ecology Surveys to Support HRA

Habitats Regulations Assessment Report
Annex 3: Ecology Surveys to Support HRA

July 2023

Table of Contents

1 Introduction 1

2 Methods 1

3 Results 2

4 References 4

5 Glossary 4

Table

Table 3.1.1 Nightjar Survey Results at Wisley Common 3

Table 5.1.1:Glossary of Terms 4

Figures

Figure 3.1.1a: Nightjar Survey Results 30/06/2022

Figure 3.1.1b: Nightjar Survey Results 13/07/2022

Figure 3.1.1c: Nightjar Survey Results 18/08/2022

1 Introduction

1.1.1 This annex provides the details of survey work undertaken to support the analysis of potential effects of the proposed Northern Runway Project (the Project) on European designated sites. It forms Annex 3 of the Habitat Regulations Assessment Report (**ES Appendix 9.9.1** (Doc Ref. 5.3).

1.1.2 The surveys completed relate to the following sites:

- Wisley and Ockham Common site of Special Scientific Interest (SSSI) within the Thames Basin Heaths (TBH) Special Protection Area (SPA);
- Ashdown Forest SPA and Special Area of Conservation (SAC); and
- Chobham Common SSSI component of the Thursley Ash Pirbright and Chobham (TAPC) SAC and TBH SPA.

1.1.3 The aim of the surveys was to characterise certain areas of the sites that had been screened in for appropriate assessment following air quality modelling with respect to the presence or otherwise of interest feature habitats and species.

1.1.4 With respect to the Wisley and Ockham Common SSSI, the following surveys were completed:

- Botanical transects and characterisation of wider heathland botany; and
- Nightjar survey.

1.1.5 The botanical, and wider heathland botany surveys aimed to map the floristic composition of habitats near to the A3 and M25, with particular reference to the plant species that dominate with observed species identified in the field. The overarching goal of these surveys was to describe how the habitats change moving away from the roads (ie the transition from woodland to heathland).

1.1.6 The aim of the nightjar surveys was to determine the presence/absence of nightjars *Caprimulgus europaeus* within Wisley and Ockham Common SSSI, with particular reference to their use of woodland adjacent to the A3/M25.

1.1.7 With respect to Ashdown Forest SAC/SPA, the following surveys were completed:

- Botanical walk-over

1.1.8 The botanical walkover survey aimed to establish the presence or absence of heathland habitat, as the main interest features of the SAC and supporting habitat of the birds of the SPA along a section of the A22 road.

1.1.9 With respect to Chobham Common SSSI, the following survey was completed:

- Botanical walk-over

1.1.10 The botanical walkover survey aimed to establish the presence or absence of heathland habitat along a section of the M3 motorway. It also aimed to map the location of any areas of any lichens.

2 Methods

2.1 Wisley and Ockham Common SSSI

Botanical Transect Surveys

2.1.1 Transects were conducted within heathland, and woodland bordering heathland, present at Wisley Common (north west (NW) of the A3 and south west (SW) of the M25) utilising the quadrat method. Five quadrats (Q1-5) were taken along each transect. Heathland quadrats were $2m^2$, and woodland edge habitats with canopy cover utilised $10m^2$ quadrats.

2.1.2 Four heathland transects (A, B, C and D) and seven woodland edge transects (A-G) were completed on 29th July 2021, by a suitably qualified botanist following the National Vegetation Classification (NVC) methodology and guidelines (Rodwell, 2006). Briefly, all the plant species within each quadrat were identified and their 'DOMIN' cover (percentage each species covered the area within the quadrat). Habitats were then assigned based on these data.

Wider Heathland Botany

2.1.3 Botanical transect extensions (A2, B2, C2 and D2), with an emphasis on vascular plants and lichens, were conducted within heathland and woodland bordering heathland present at Wisley Common (NW of the A3 and SW of M25) on 31st May 2022 by a suitably qualified botanist following the same NVC methodology.

2.1.4 These transects were all linear extensions continuing in the same direction as A, B, C and D with the exception of the latter half of D2 which was angled 90 degrees from the first half to maximise the coverage of suitable heathland. A2 continued into damp heathland; B2 comprised mostly woodland; and C2 and D2 comprised sections of managed heathland with areas of recent birch clearance and where several *Cladonia* lichen species were identified.

Nightjar Surveys

2.1.5 These surveys were carried out in accordance with the national nightjar survey methodology (Conway *et al*. 2007).

2.1.6 Three visits were undertaken; all at dusk, between the hours of 21.00-23.00. Surveys were undertaken by suitably experienced ornithologists.

2.1.7 The visits were undertaken between June and August 2022. The visits were carried out between the following dates:

- visit one; 30th June 2022;
- visit two; 13th July 2022; and
- visit three; 19th August 2022.

2.1.8 Surveys were only carried out in calm (less than Beaufort force 4), mild and dry conditions, to ensure that there was the greatest possibility of encountering birds when conditions were optimal for both territorial activity and feeding. Cold and windy conditions or periods of prolonged rainfall are likely to suppress invertebrate prey abundance and, therefore, nightjar feeding activity and reduce the amount of nightjar territorial and breeding behaviour.

2.1.9 The locations of all churring male nightjar were recorded, with special attention given to simultaneously churring males. All other observations of calling birds (both males and females) or birds seen flying were also recorded.

2.2 Ashdown Forest SAC/SPA

Botanical walkover

2.2.1 A walkover of a section of Ashdown Forest alongside the A22, Uckfield, Sussex was undertaken on 16th January 2023 by experienced ecologists. Habitats within the site were classified, mapped and described in the field, with respect to the presence of heathland habitat.

2.3 Chobham Common SSSI

Botanical walkover

2.3.1 A walkover of a section of Chobham Common alongside the M3 and near to the B386/Chobham Common Roundabout Car Park was undertaken on 22nd May 2023 by experienced ecologists. Habitats within the site were classified, mapped and described in the field, with respect to the presence of heathland habitat. The distribution of any lichens identified was also mapped.

2.4 Limitations

2.4.1 Most ecological data remain valid for only short periods due to the inherently transient nature of the subject. The survey results contained in this report are considered accurate for two years, assuming no significant considerable changes to the site conditions.

2.4.2 Although the botanical walkover of Ashdown Forest was undertaken outside of the main survey season for plants (April to September), the aim of the walkover was to confirm the presence/absence of heathland habitats which is possible in winter. As such, there are no perceived limitations to the survey.

3 Results

3.1 Wisley and Ockham Common SSSI

Botanical Transect Surveys

Transect A

3.1.1 Q1 classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland. Q2-Q5 classified as M24 - *Cirsio-Molinietum* mire (*Juncus acutiflorus-Erica tetralix* subcommunity).

3.1.2 Honeysuckle *Lonicera periclymenum* and bracken dominant with some purple moor grass and English oak *Quercus robur* canopy in Q1. The canopy ended by Q2, along with the loss of associated bracken and honeysuckle. Common heather, cross-leaved heath *Erica tetralix* and bryophyte spp. associated with bare ground, introduced in Q2, persisted into Q5. Gorse was only present in Q2. Purple moor grass persisted throughout the transect, increasing in dominance in Q3-Q5. Soft rush *Juncus effusus*, alder buckthorn *Frangula alnus* and one sphagnum sp. were present in moderate amounts in Q4 only alongside open water. Coverage of common, and cross-leaved heather were relatively consistent from Q4-Q5; (few) individual Scot's pine *Pinus sylvestris* present in Q5.

Transect B

3.1.3 Q1-Q5 all classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland.

3.1.4 Q1 was dominated by enchanter's nightshade *Circaea lutetiana;* Sycamore *Acer pseudoplatanus*, remote sedge *Carex remota*, pale willowherb *Epilobium roseum*, wood avens *Geum urbanum*, raspberry *Rubus idaeus* and bryophyte spp. associated with bare ground, of moderate coverage (DOMIN 4-5); few individual alder *alnus glutinosa* present. Alder was only present in low numbers in Q1, and then in low numbers (DOMIN 4) in Q5. There was a canopy of English oak in Q1 only. Sycamore increased into Q2, and then decreased in Q3, with no further recordings from this point in the transect. Enchanter's nightshade was present in Q1, decreasing into Q2 with no more recordings from this point. Remote sedge, pale willowherb, wood avens and raspberry were only present in Q1. Bracken (Q2-Q5) and bramble (Q2-Q3) greatly and moderately increasing in dominance from Q2-Q3, respectively. Bracken dominated into Q4 alongside moderate honeysuckle, the two of which persisted into Q5 where heavily encroaching birch overtook as the dominant flora. Moderate bryophyte spp. also resumed in Q5 associated with bare ground.

Transect C

3.1.5 Q1, Q2 and Q4 classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland (*Pinus sylvestris* plantation). Q3 and Q5 classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland.

3.1.6 Bracken dominated throughout the transect (Q1, Q3-Q5: DOMIN 10; Q2: DOMIN 9). There was a canopy of at least one species at all quadrat points along the transect, Q1, Q2, Q4: Scot's pine; Q3 silver birch and English oak; Q5: English oak. There was a moderate coverage of bryophyte spp., only in Q2, associated with bare ground, and a high coverage of honeysuckle in Q4 only.

Transect D

3.1.7 Q1 and Q3 classified as W24 - *Rubus fruticosus agg. - Holcus lanatus* underscrub. Q2 classified as W16 - *Quercus-Betula-Deschampsia flexuosa* woodland. Q4 and Q5 classified as W16 - *Quercus-Betula-Deschampsia flexuosa* woodland (*Pinus sylvestris* plantation).

3.1.8 Canopies were present in Q2 comprising silver birch, and Q4 and Q5 comprising Scot's pine. Bramble was present throughout, with a high, but decreasing degree of coverage from Q1-Q5 with the exception of Q4 from which it was absent. Purple moor grass was recorded in Q2, Q3 and Q5 with highest coverage (DOMIN 10) in Q3. Common heather and cross-leaved heath appeared only in Q5. Bryophytes (other spp.) were recorded in Q2 and Q4 in association with bare ground and in relatively high coverage (DOMIN 7).

Transect E

3.1.9 Q1-Q4 (OS Grid Refs: TQ 07973 58951; TQ 08004 58927; TQ 08034 58912; TQ 08061 58890) classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland (*Pinus sylvestris* plantation). Q5 (OS Grid Ref: TQ 08098 58890) classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland.

3.1.10 Bracken dominated throughout the transect, with its lowest representation in Q4. Bramble had a moderate presence in Q1, Q2 and Q5. Q2-Q5 had canopy cover, with Scot's pine in Q2-Q4 and silver birch in Q5. Q1 and Q5 had moderate cover of bare ground, and Q4 had a high percentage of bare ground with a moderate bryophyte (other spp.) coverage.

Transect F

3.1.11 Q1-Q5 all classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland *(Pinus sylvestris* plantation)

3.1.12 Bracken was present throughout this transect, with highest coverage in Q2-Q4 and moderate coverage in Q1 and Q5. There were (very) few rowan *Sorbus aucuparia* recorded in Q1, as part of the canopy alongside silver birch (also recorded in Q3 and Q5) and Scot's pine (recorded across all quadrats). Bryophytes (other spp.) were recorded across the whole with high coverage in Q1, alongside lichens, and with a moderate coverage in Q2-Q4 in association with bare ground also recorded across the whole transect. There was a high coverage of bramble (DOMIN 9) in Q2 alone, and similarly isolated moderate presence of Holly *Ilex aquifolium* in Q4.

Transect G

3.1.13 Q1-Q5 all classified as W10 - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland *(Pinus sylvestris* plantation).

3.1.14 Honeysuckle and bracken were present throughout Transect G with highest coverage of honeysuckle in Q2, Q3 and Q5, and

bracken in Q1, Q2 and Q5 with otherwise moderate coverage of both. All quadrats had canopy cover, with downy birch *Betula pubescens* present in Q1 and Q5, sweet chestnut present only in Q4, and Scot's pine present throughout the transect. Bramble (Q3-Q5), and holly (Q3 and Q5) emerged as the transect progressed, with broad buckler fern *Dryopteris dilata* only appearing in Q5.

Wider Heathland Botany

Transect A2

3.1.15 All quadrats were wet heath habitat classified as M25 *Molinia caerulea – Potentilla erecta* mire throughout. This appeared to be an extension of the M24 habitat identified in some quadrats of transect A in 2021. Purple moor grass *Molinia caerulea* was dominant, there was some invasive birch *Betula sp.*, sweet chestnut *Castanea sativa*, bracken *Pteridium* and some Bryophytes including *Sphagnum sp.*. No lichens were observed in quadrats or elsewhere in the transect.

Transect B2

3.1.16 The first quadrat was dry heathland with a vegetation type best described as intermediate between H10 *Calluna vulgaris-Erica cinerea* heath and the M25 damp heathland habitat identified in transect A2. Common Heather *Calluna vulgaris* was the most common heathland taxa identified here but there was some invasion of birch *Betula sp.*, and early stages of bramble *Rubus fruticosus agg.*, incursion. Therefore, the habitat in and around this quadrat was considered as deteriorating due to insufficient management. There were significant areas of bare ground and bryophytes but, as in A2, no lichens.

3.1.17 The remaining four quadrats of this transect covered areas of W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, a common type of sub-climax vegetation on the acidic soils of the west Surrey heath. There was some tendency toward W7 *Alnus glutinosa-Fraxinus excelsior* woodland in the wetter areas. No terrestrial *Cladonia* or other lichens were present.

Transect C2

3.1.18 This transect comprised open heathland habitat throughout. The first quadrat fell on higher and drier ground classified as H10 *Calluna vulgaris-Erica cinerea* heath. The second quadrat displayed the highest compositional quality where common heather *Calluna* dominated with 50% cover of one lichen species *Cladonia portentosa*, the commonest multi-branching *Cladonia* on dry heath land in southern England. Quadrats 1 and 3 were taken over by bracken, potentially indicating evidence of past fires in the area. The lower and damper Quadrats 4 and 5 were identified as M25 *Molinia caerulea-Potentilla erecta* mire, albeit degraded by the previous colonisation of birch. These habitat types were consistent with those elsewhere on the Wisley Common site.

Transect D2

3.1.19 Quadrats reflected dry, open heathland of NVC type H10 *Calluna vulgarisi-Erica cinerea* throughout. Samples at quadrat 1 and 3 comprised upwards of 50% bare ground, and quadrat 4 displayed 50% colonisation by bracken. Quadrats 2 and 5 showed 50% common heather *Calluna* so this habitat was of higher compositional quality. Coverage by lichens was typically around 10% across the transect, varying from none in Quadrat 3 to 25% in Quadrat 4. Six species of *Cladonia* were identified across the quadrats, but in Quadrat 1 the two species *C. coniocraea* and *C. fimbriata* appeared in very low quantities and were associated with decayed wooden debris. The remaining four *Cladonia spp.* in Quadrats 2, 4 and 5 were all species growing directly on the soil and were present in equal quantity.

Nightjar Surveys

3.1.20 Data from the nightjar surveys found birds present across the heathland habitats on site. None were recorded within the woodland present adjacent to the M25/A3 (Figure 3.1.1a-c).

Table 3.1.1 Nightjar Survey Results at Wisley Common

Date	Nightjar Sightings	Weather Condition
30/06/2022	22:03 One nightjar heard churring east of Pond Farm	Temperature: 15°C, Cloud: 50%, Wind: 2, south-westerly
	22:49 One nightjar heard churring to the south of site	
	23:04 One nightjar heard churring to the south-west of site	
	23:04 One nightjar heard churring to the south-west of site	
13/07/2022	21:41 One nightjar seen in flight near the centre of the site	Temperature: 22°C, Cloud: 20%, Wind: 1, westerly
	21:57 One nightjar heard churring to the south-west of site	
	22:04 Two nightjars, one seen flying, one heard churring near the centre of the site	
19/08/2022	22:08 One nightjar heard churring to the south-east of site	
	22:12 One nightjar heard churring to the south of site	
	22:23 One nightjar heard churring to the east of site	
	22:35 One nightjar heard churring east of Pond Farm	
	19:15 One nightjar heard churring to the south-west of site	Temperature: 20°C, Cloud: 30%, Wind:1, westerly
	19:17 One nightjar heard churring to the west of site	
	19:28 One nightjar heard churring to the south-west of site	
	19:35 One nightjar heard churring near the centre of the site	
	19:38 One nightjar heard churring near the centre of the site	
	19:46 One nightjar heard churring near the centre of the site	
	19:50 One nightjar heard churring to the east of site	
	19:51 One nightjar heard churring to the east of site	
	20:01 to 20:09 One nightjar heard churring to the north-east of site	
	20:17 One nightjar heard churring to the north-east of site	
	20:54 One nightjar heard churring to the south-west of site	
	21:08 One nightjar heard churring to the west of site	
	21:15 One nightjar heard churring to the west of site	

3.2 Ashdown Forest SAC/SPA

Botanical walkover

3.2.1 A small area of heathland was identified in one location along the A22, approximately 88m south of the western half of the Milbrook West Car Park (OS Grid Ref: TQ 43843 29779).

3.2.2 This area of heathland is approximately 15 metres from the roadside.

3.2.3 The approximate plant cover comprised common heather *Calluna vulgaris (*DOMIN 6*)* which was typically interspersed with very minimal amounts of bracken *Pteridium aquilinum* (DOMIN 1). There were occasional young gorse *Ulex europaeus* (DOMIN 3) and perennial ryegrass *Lolium perenne* (DOMIN 7).

3.2.4 No other areas of heathland were identified in proximity to the A22 with the majority of habitats comprising dense bramble scrub and bracken.

3.3 Chobham Common SSSI

Botanical walkover

3.3.1 The walkover survey of Chobham Common SSSI focused within habitats alongside the M3 motorway and around the Chobham Common Roundabout Car Park. The area directly adjacent to the motorway (both to the north- and south-bound sides) comprised areas of short-mown habitats managed as a firebreak between the gorse/heath, away from the motorway. This area was maintained at circa 20cm height and was dominated by purple moor grass *Molinia caerulea* and bristle bent *Agrostis curtisii* with areas of dense (but short mown) gorse *Ulex europeaus* occurring frequently. Very small patches of cross-leaved heather and bell heather also occurred rarely across the area.

3.3.2 Small areas of bare ground were present where mowing had hit areas of raised ground. Very rarely, *Cladonia* sp. lichens occurred in small numbers in these areas.

3.3.3 Adjacent to the Chobham Common Roundabout Car Park and the B386, the habitat was dominated by silver birch woodland with gorse occurring frequently in the understory.

4 References

Conway G., Wotton S., Henderson I., Langston R., Drewitt A., and Currie F. (2007) Status and distribution of European Nightjars *Caprimulgus earopaeus* in the UK in 2004. Bird Study 54(1).

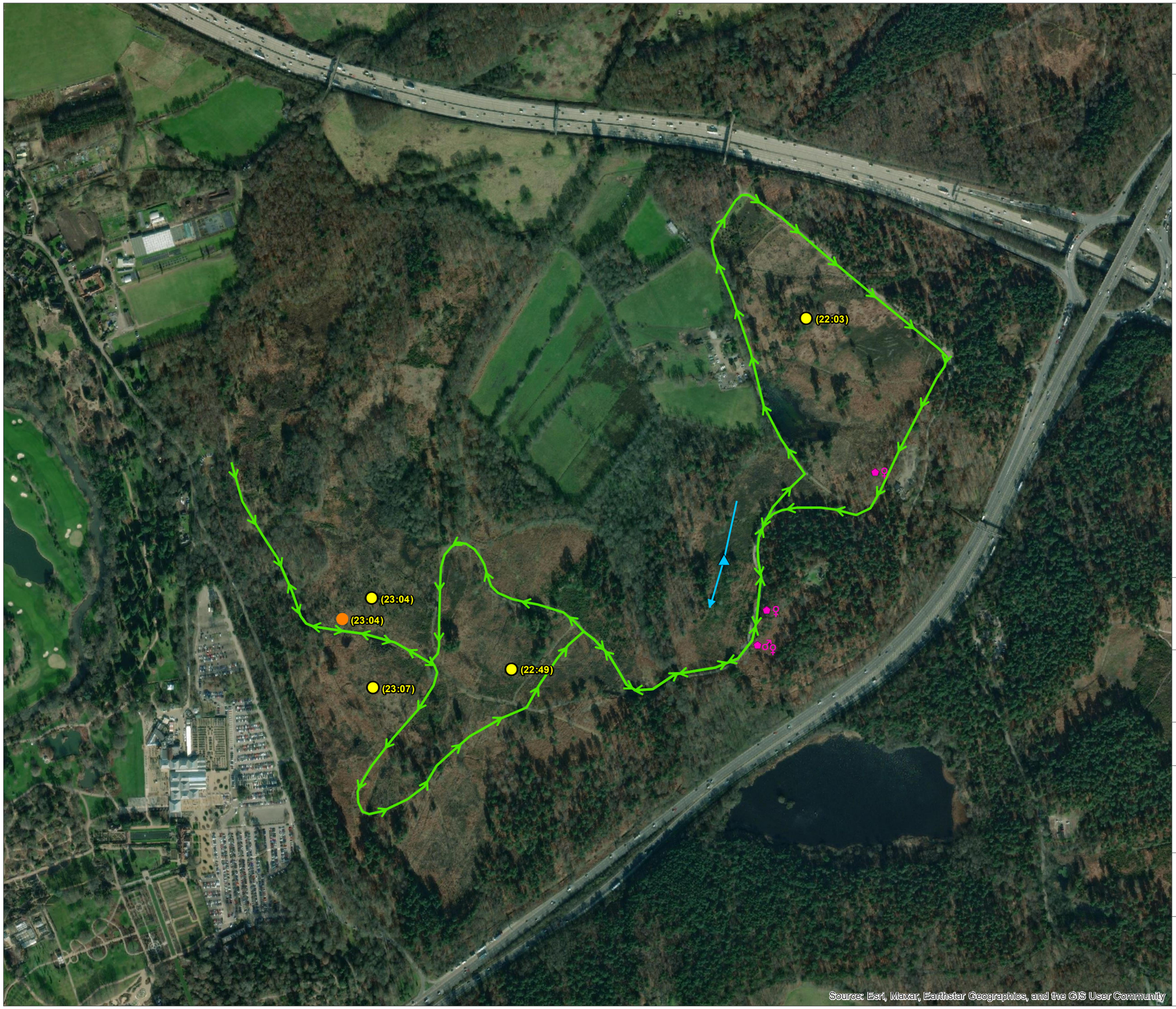
Joint Nature Conservation Committee (JNCC) (2006) National Vegetation Classification (NVC) User's Handbook. J.S, Rodwell. JNCC.

5 Glossary

5.1 Glossary of terms

Table 5.1.1:Glossary of Terms

Term	Description	
DOMIN	A scale ranking of species dominance by percentage of plant cover.	
	Cover	**DOMIN**
	91–100%	10
	76–90%	9
	51–75%	8
	34–50%	7
	26–33%	6
	11–25%	5
	4–10%	4
	<4% (many individuals)	3
	<4% (several individuals)	2
	<4% (few individuals)	1
NW	north west	
SAC	Special Area of Conservation	
SPA	Special Protection Area	
SSSI	Site of Special Scientific Interest	
SW	south west	



LONDON GATWICK

KEY

- Churring Nightjar
- Different Nightjar in flight (same time)
- Noctule bat
- Glow Worm (Lamphris noctiluca) - female
- Glow Worm (Lamphris noctiluca) - male + female
- Noctule flight line

DOCUMENT

Habitats Regulations Assessment

DRAWING TITLE

Nightjar Survey Results 30/06/2022

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3.1.1a	For ES Issue
	DRAWN BY: MP	PM / CHECKED BY: NB

SCALE @ A3 1:6,000

0 50 100 200 m

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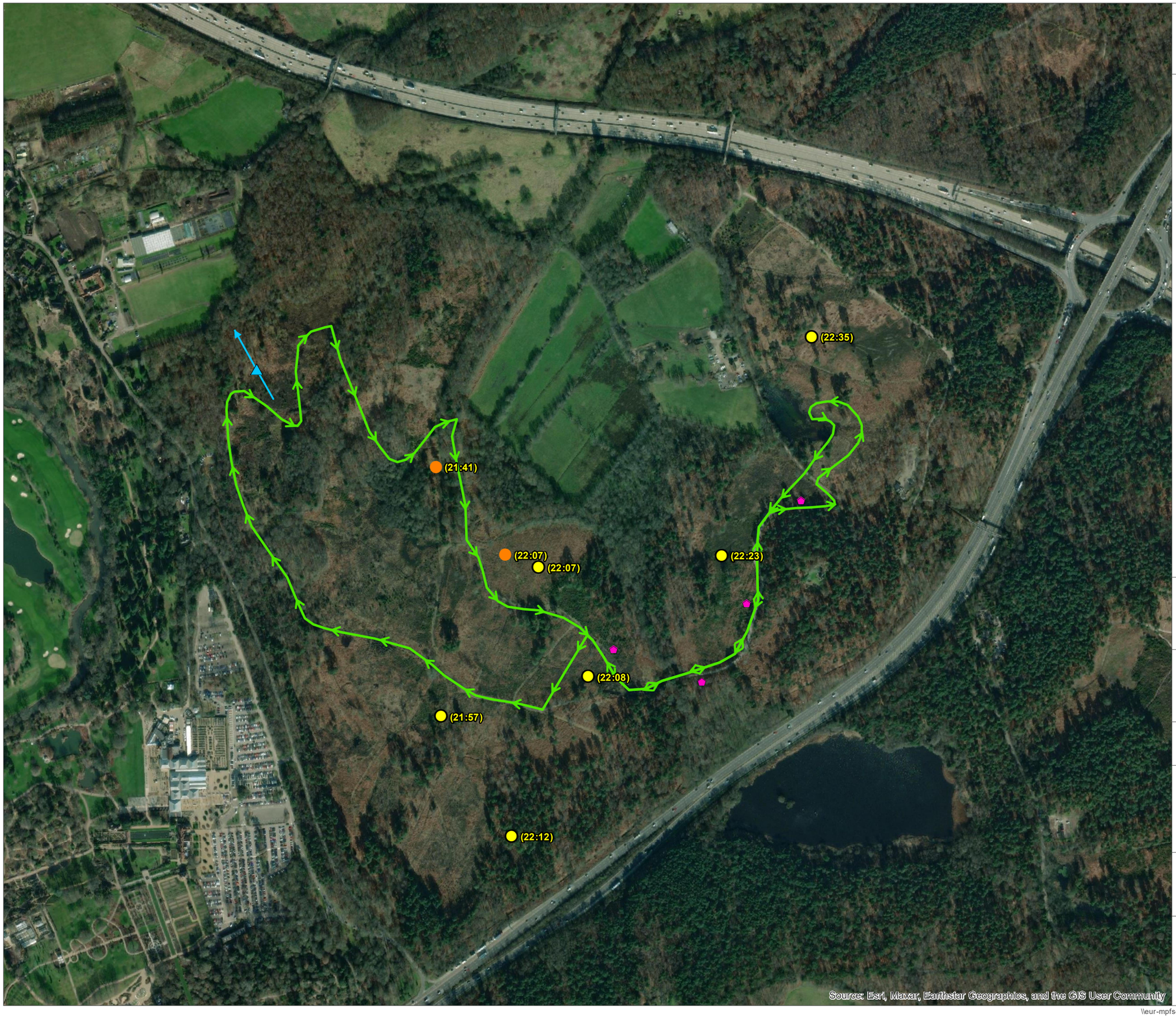

LONDON GATWICK

KEY

- Churring Nightjar
- Different Nightjar in flight (same time)
- Noctule bat
- Glow Worm (Lamphris noctiluca)
- Noctule flight line

DOCUMENT

Habitats Regulations Assessment

DRAWING TITLE

Nightjar Survey Results
13/07/2022

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
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	DRAWN BY: MP	PM / CHECKED BY: NB

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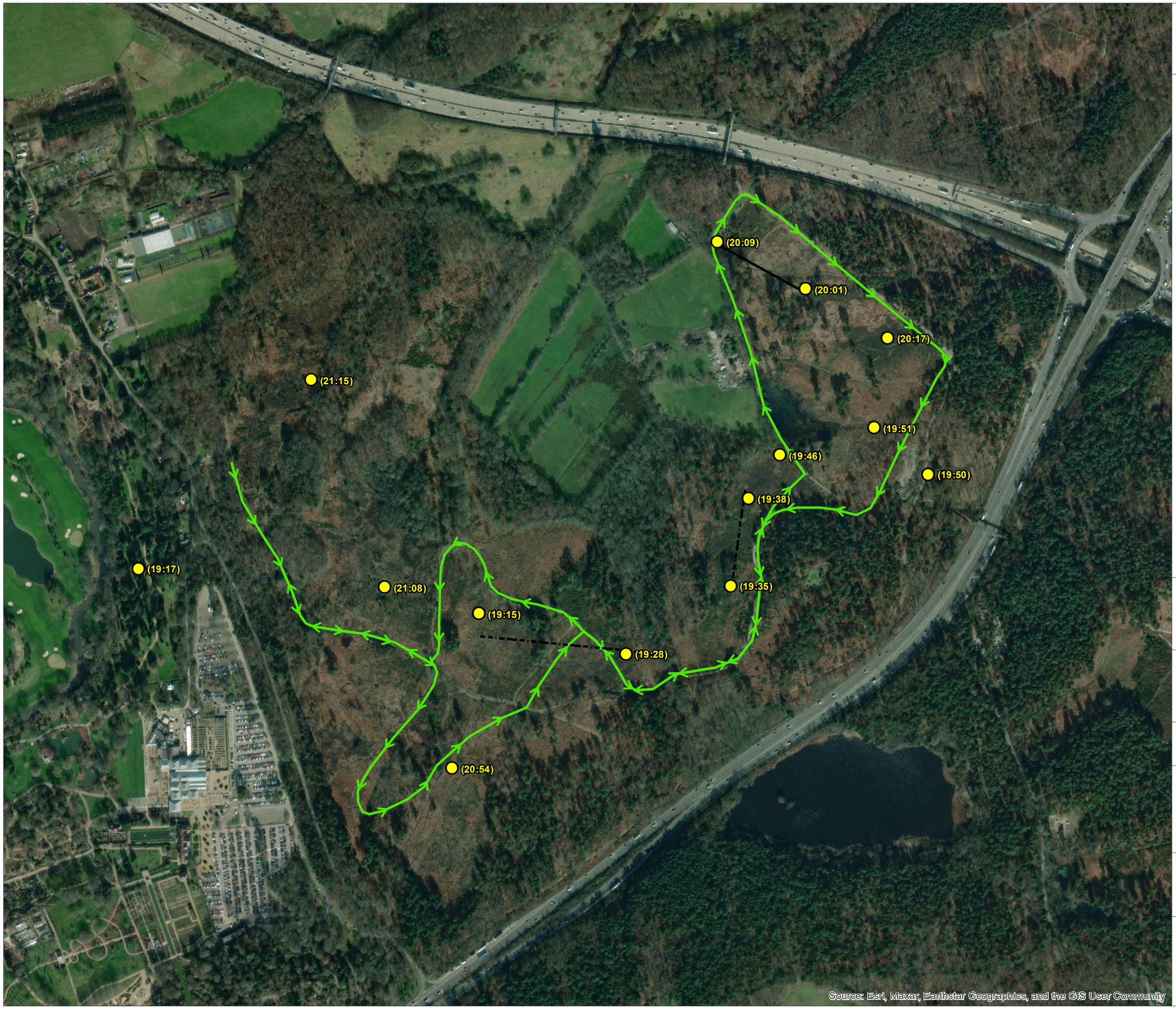

LONDON GATWICK

KEY

Churring Nightjar

Link Lines

Differente

Same

DOCUMENT

Habitats Regulations Assessment

DRAWING TITLE

Nightjar Survey Results
18/08/2022

DATE

July 2023

ORIENTATION	DRAWING NO.	REVISION
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	DRAWN BY: MP	PM / CHECKED BY: NB

SCALE @ A3 1:6,000

0 50 100 200 m

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Annex 4

Sensitivity Testing using Transport Decarbonisation Plan

ARUP

Gatwick Airport Northern Runway Project

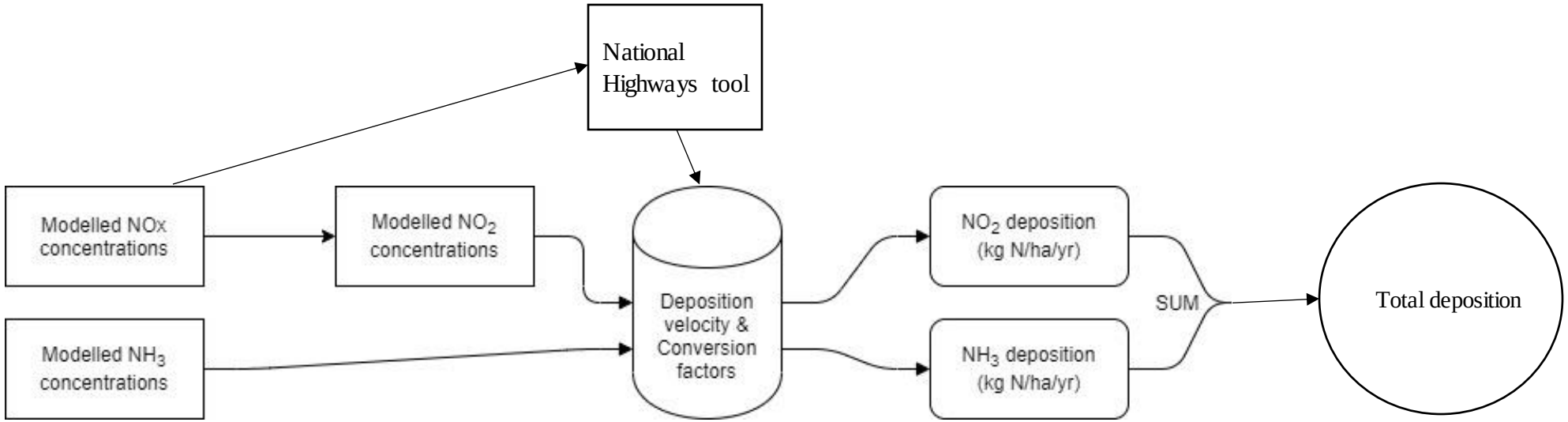
Air Quality Assessment Results for HRA Sites - Transport Decarbonisation Plan Sensitivity Test

Environmental Statement

1 November 2022

ARUP

Assessment process



NOx – oxides of nitrogen
NO_2 – nitrogen dioxide
NH_3 – ammonia

ARUP

Calculation of impacts

Main assessment:

- Do-Minimum scenario (i.e. future baseline with committed developments)
- Do-Something scenario (i.e. future baseline with committed developments and Northern Runway Project (NRP))
- Difference between the scenarios provides the NRP impact.
- This assessment is produced for the Environmental Statement HRA section.

Cumulative assessment (in-combination):

- Do-Minimum HRA scenario (i.e. future baseline without committed developments)
- Do-Something scenario (i.e. future baseline with committed developments and NRP) – This is the same as in the main assessment.
- Difference between the scenarios provides the impact of NRP in-combination with committed developments.
- This assessment is only produced for the HRA.

Nitrogen deposition impacts

- Should the predicted change in nitrogen deposition be less than 1% of the lower critical load for a site, then no significant effects are anticipated.
- In other cases, the assessment of significance is undertaken by the ecologists.

ARUP

Emissions calculations and prediction of pollutant concentrations

Transport Decarbonisation Plan

- Mileage splits for 2038 were obtained from three Transport Decarbonisation Plan scenarios*: Technology, Vehicle Led and Mode Balanced Decarbonisation

- Data on the percentage split between combustion and electric vehicles was provided
- Percentages were applied to the traffic data for calculating emissions
- Electric HGVs cannot be accounted for in the Defra Emissions Factors Toolkit, therefore have been assumed to be zero emission.

	% Petrol/ Diesel	% Electric
Car	18	82
LGV	25	75
HGV	40	60

The table below presents an example of the difference in NO_x emissions as a result of the Transport Decarbonisation Plan on the A3 in Thames Basin Heath SPA for the 2038 DS scenario

	NOx Emissions (g/m²/s)		Difference
	Core	Transport Decarbonisation Plan	
A3	0.151383	0.03736	-75%

*https://www.gov.uk/government/publications/common-analytical-scenarios-databook

ARUP

Emissions calculations and prediction of pollutant concentrations

NOx emissions

Calculated using Defra's Emissions Factors Toolkit (EFT) for the latest available year (i.e., 2032 and 2038, respectively for non-London roads and 2030 for London roads).

Asesssment scenario	Emission factors and backgrounds
2029	2029 EFT emission factors (split for London and England non-London) and 2029 predicted background NOx concentrations.
2032	2032 EFT emission factors (England non-London) and 2030 predicted background NOx concentrations.
2038	2038 EFT emission factors (England non-London) and 2030 predicted background NOx concentrations.
2047	2047 EFT emission factors (England non-London) and 2030 predicted background NOx concentrations.

ARUP

Emissions calculations and prediction of pollutant concentrations

NH_3 emissions

Calculated using the National Highways tool which uses emission factors for different types of vehicles and road types obtained from the EFT, based on the National Atmospheric Emissions Inventory (NAEI) fleet composition;

Pollutant concentrations

Modelled NOx concentrations for road transport sources adjusted based on model verification exercise
No other modelled concentrations have been adjusted.

The background nitrogen deposition will be decreased by 1.12% per annum based on JNCC Nitrogen Futures report.

Definitions

Critical Level

Critical levels are defined as concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge[5]. As **critical levels** are the gaseous **concentration** of a pollutant, their units are in **µg/m^3**.

Critical Load

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[1]. The **critical load** relates to the quantity of pollutant **deposited** from air to the ground, and as such, their units are in **kg N/ha/yr**.

We have applied the nitrogen deposition criterion of 1% of the lower critical load.

[1]http://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788050

ARUP

2038 Results

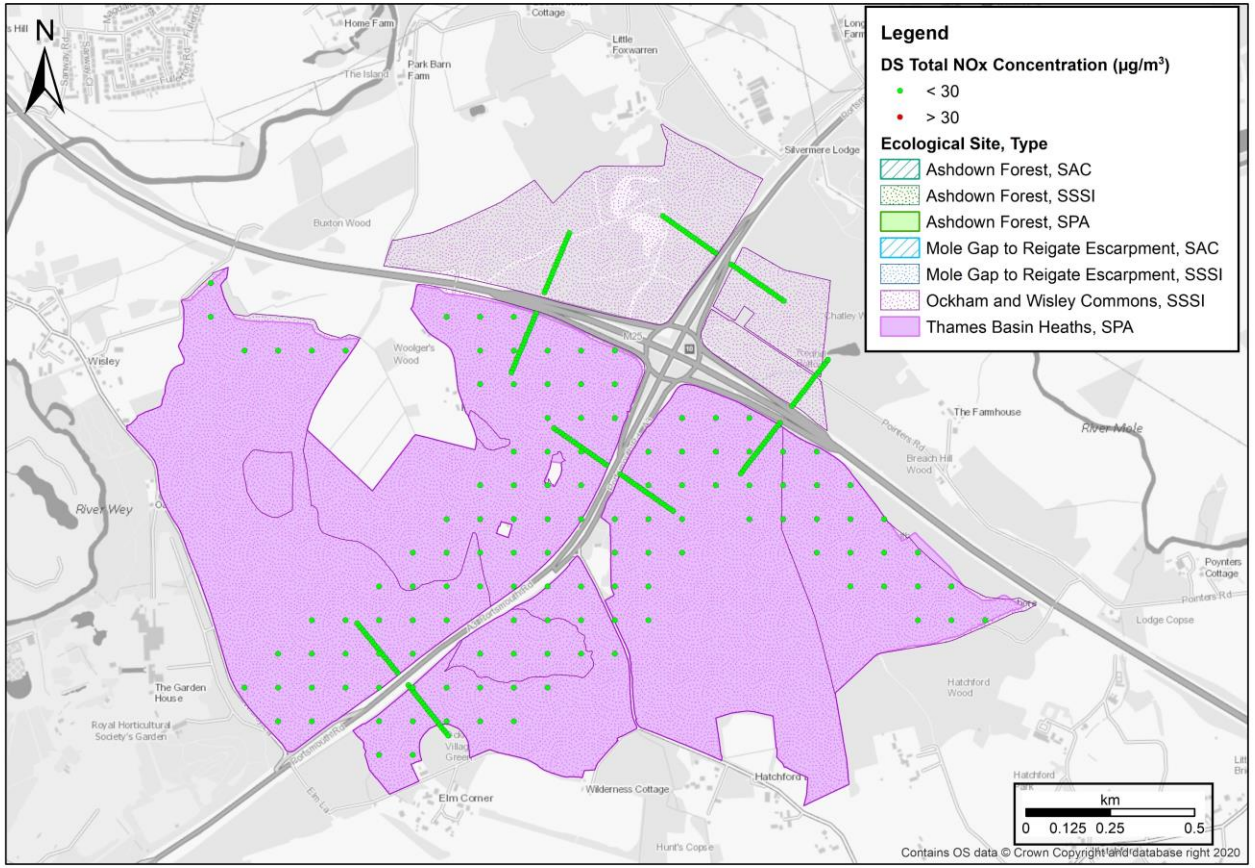
ARUP

Thames Basin Heaths SPA

NO_x concentrations

Green: < 30 µg/m^3
Red: > 30 µg/m^3

Do Something



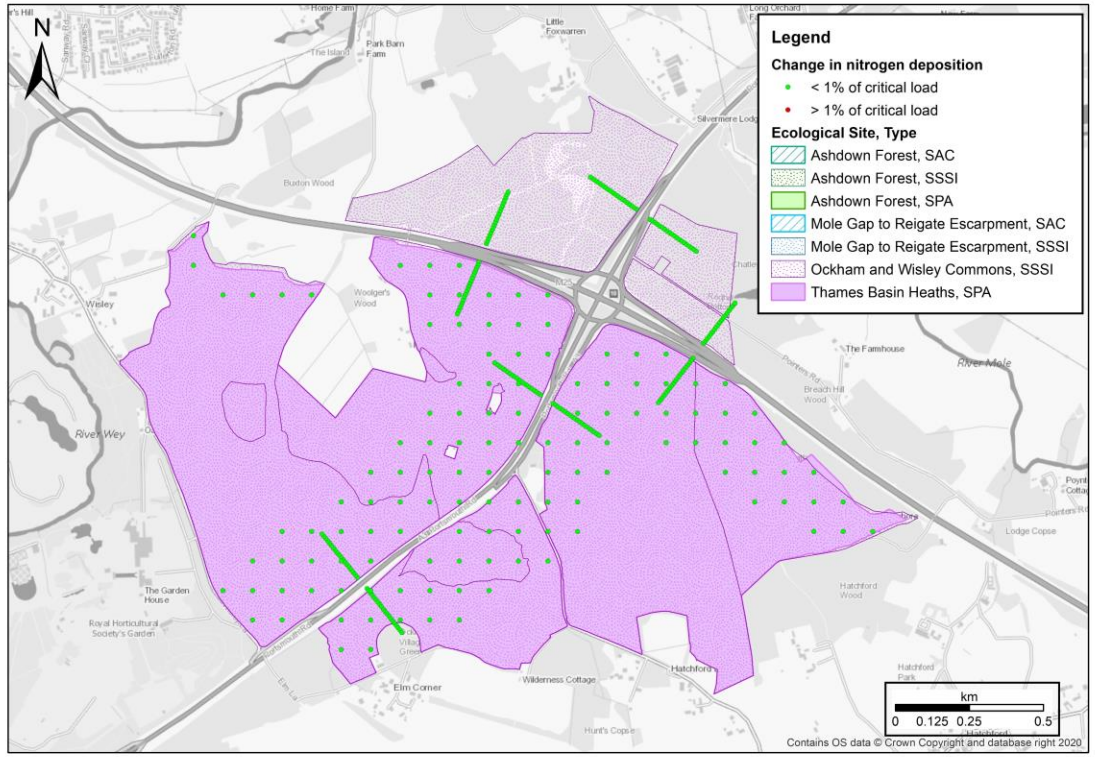
ARUP

Thames Basin Heaths SPA

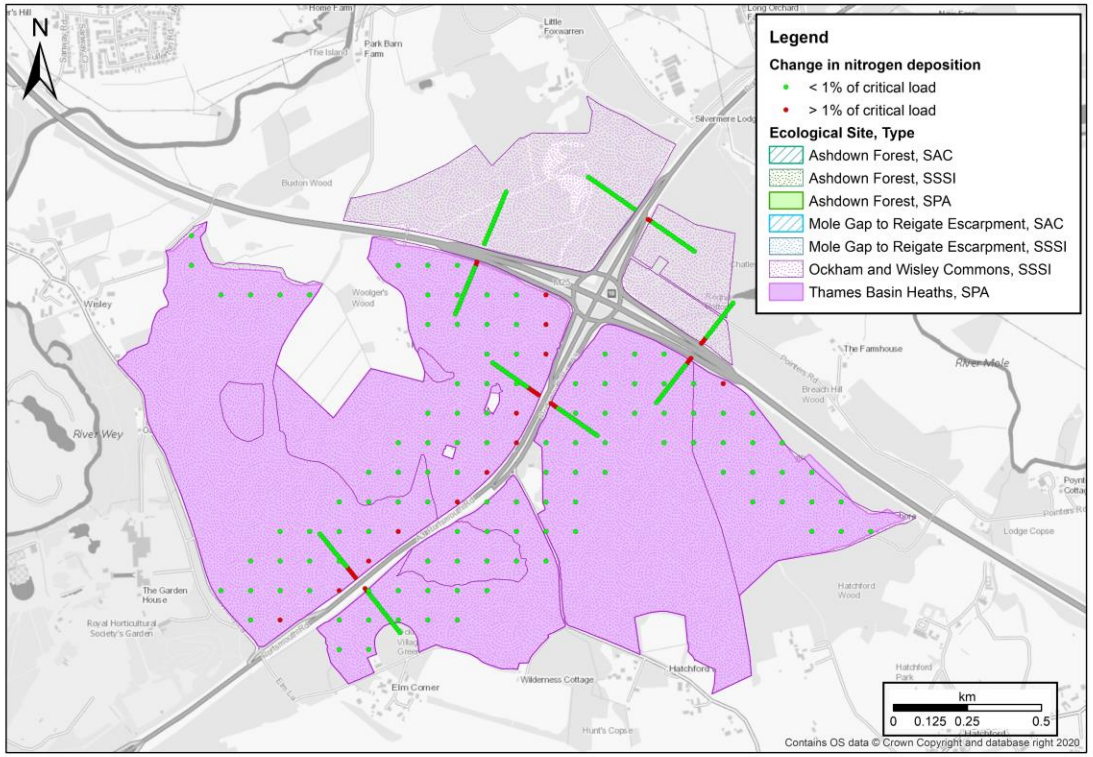
Nitrogen deposition

Green: < 1% of min CL
Red: > 1% of min CL

Main Assessment



Cumulative Assessment



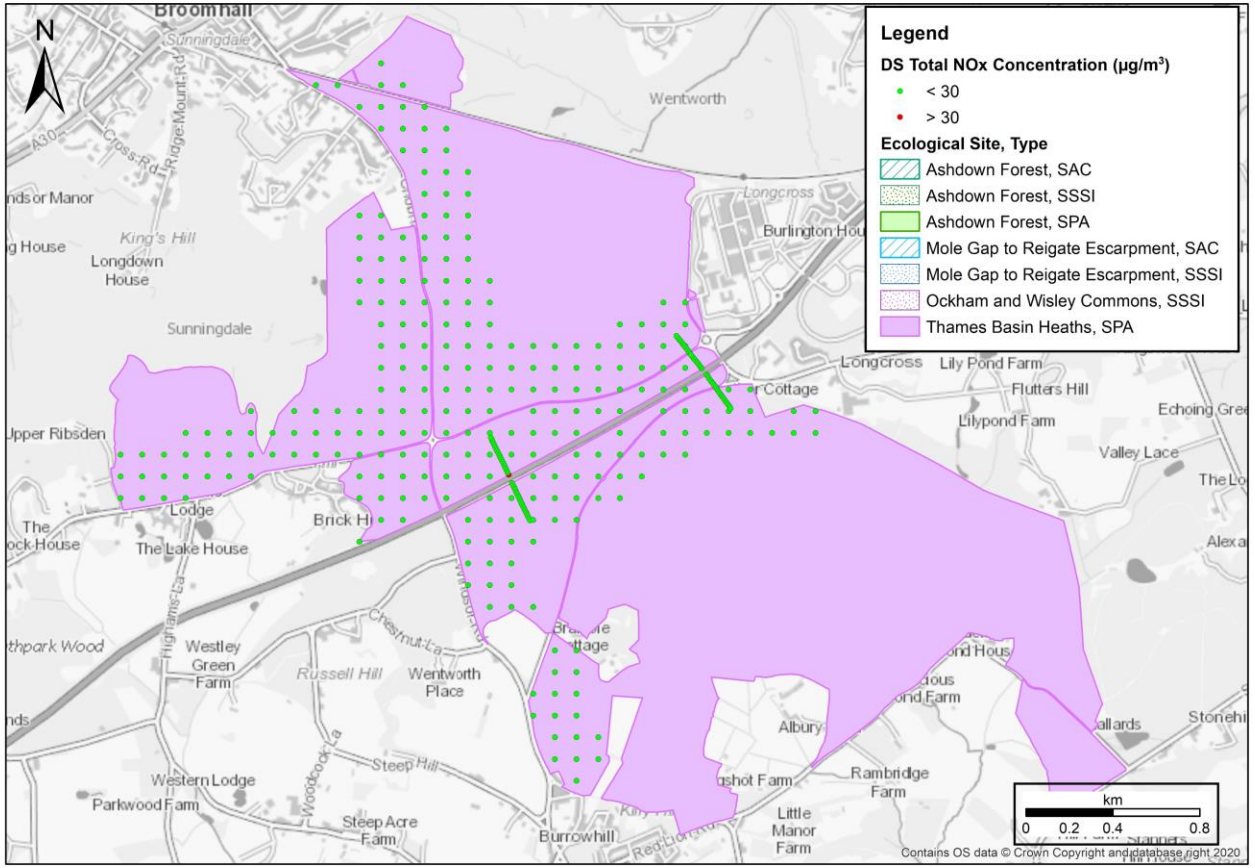
ARUP

Thursley, Ash, Pirbright & Chobham SAC

NO_x concentrations

Green: < 30 µg/m^3
Red: > 30 µg/m^3

Do Something



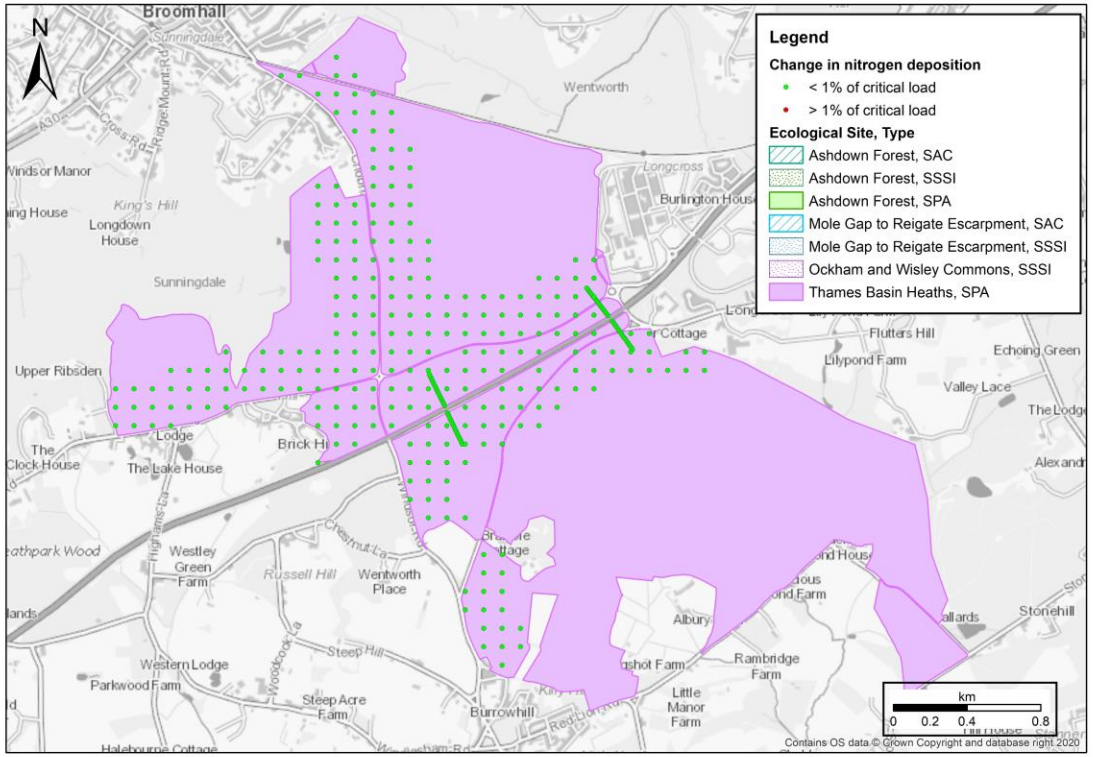
ARUP

Thursley, Ash, Pirbright & Chobham SAC

Nitrogen deposition

Green: < 1% of min CL
Red: > 1% of min CL

Main Assessment



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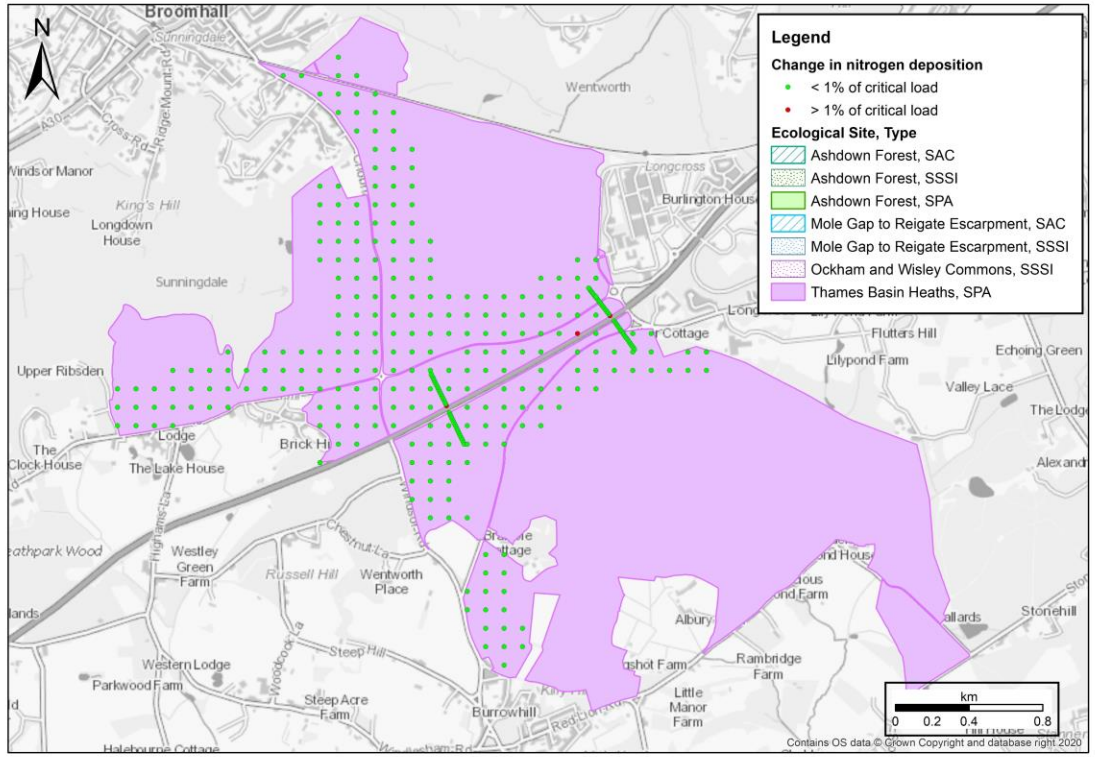


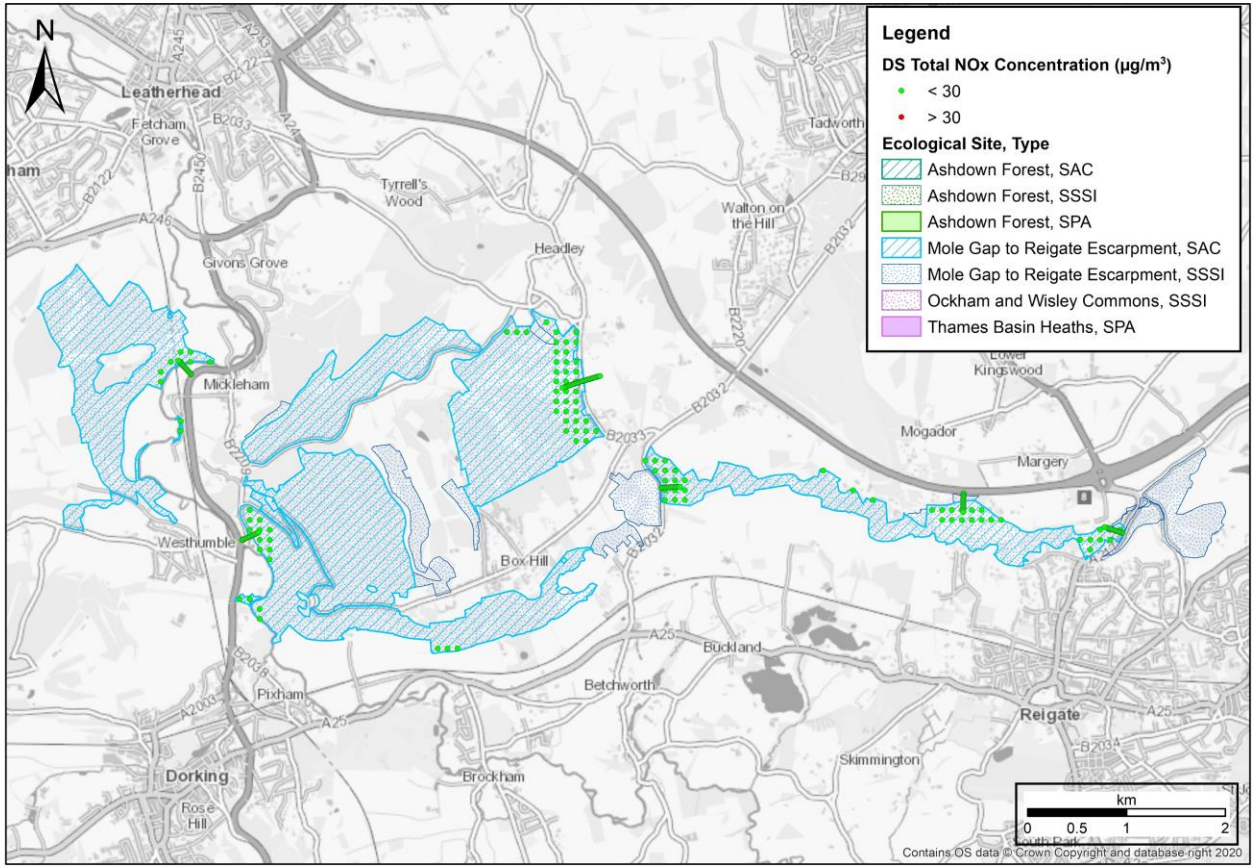
ARUP

Mole Gap to Reigate Escarpment SAC

NO_x concentrations

Green: < 30 µg/m^3
Red: > 30 µg/m^3

Do Something



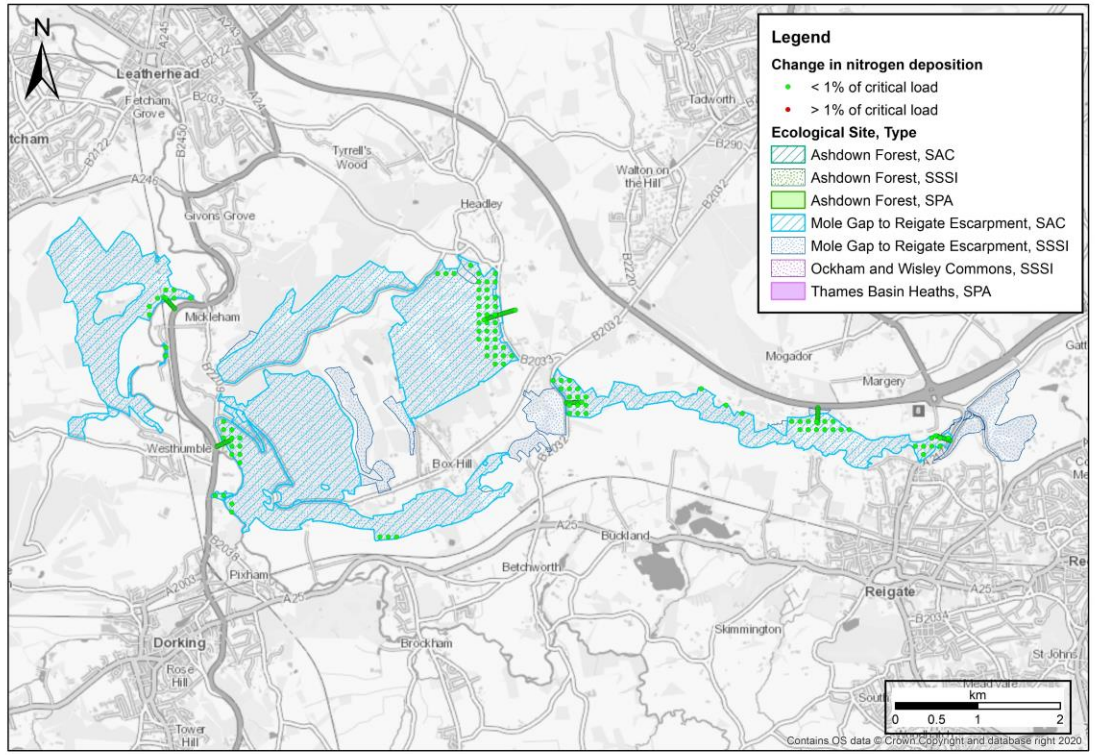
ARUP

Mole Gap to Reigate Escarpment SAC

Nitrogen deposition

Green: < 1% of min CL
Red: > 1% of min CL

Main Assessment



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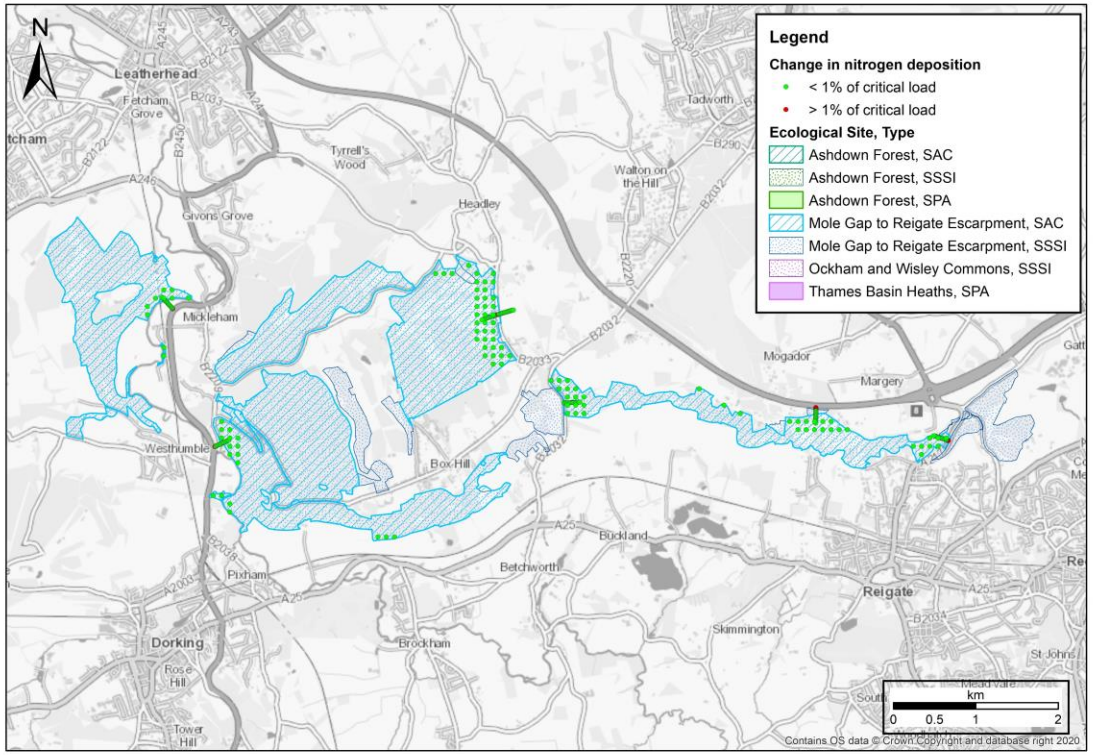


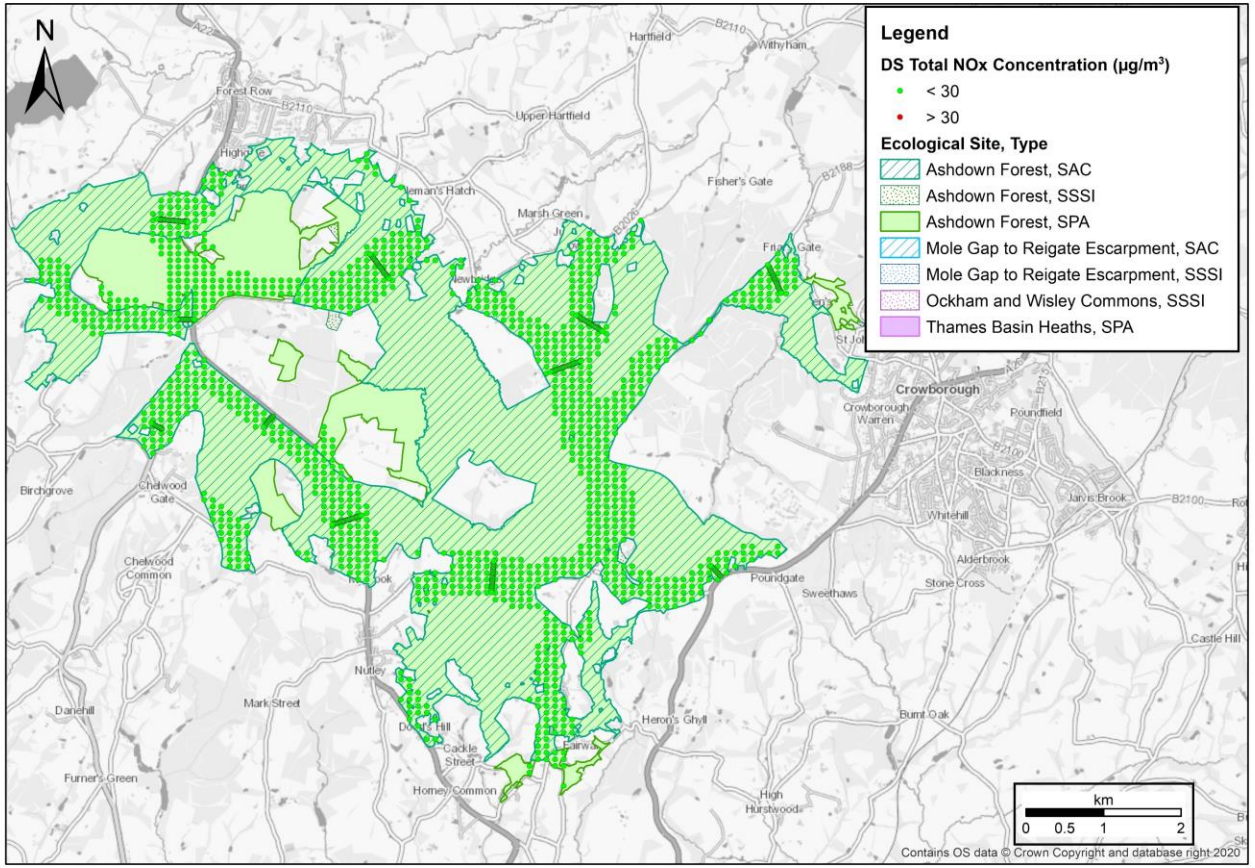
ARUP

Ashdown Forest SAC & SPA

NO_x concentrations

Green: < 30 µg/m^3
Red: > 30 µg/m^3

Do Something



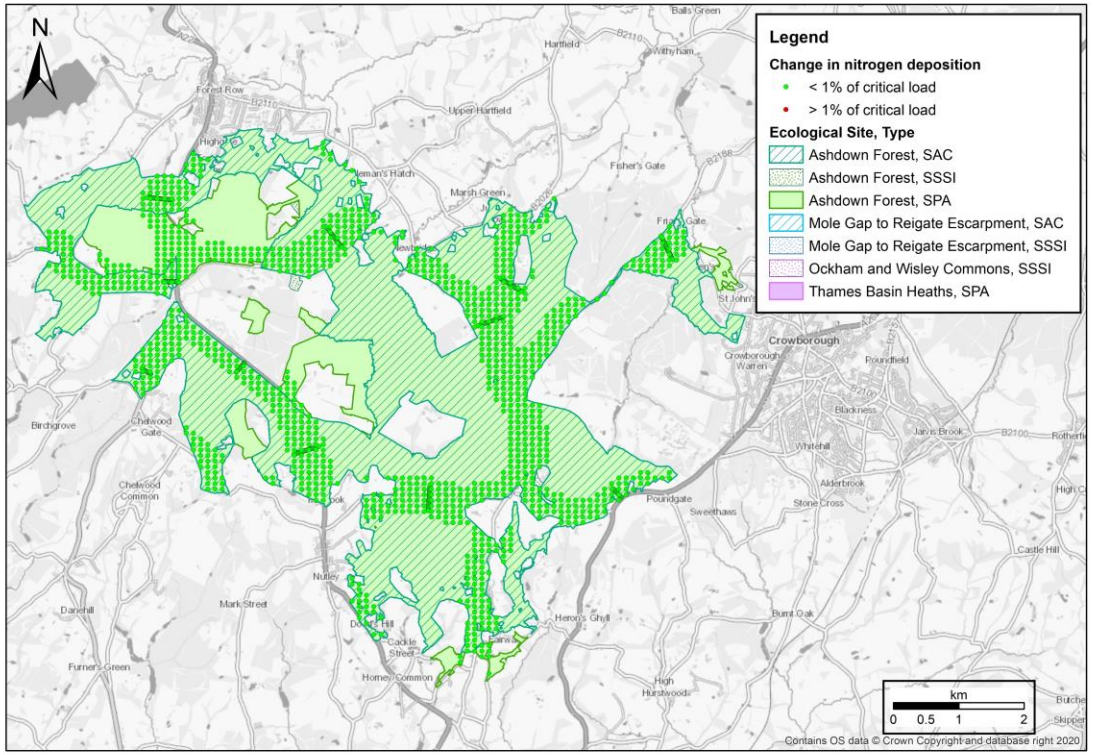
ARUP

Ashdown Forest SAC & SPA

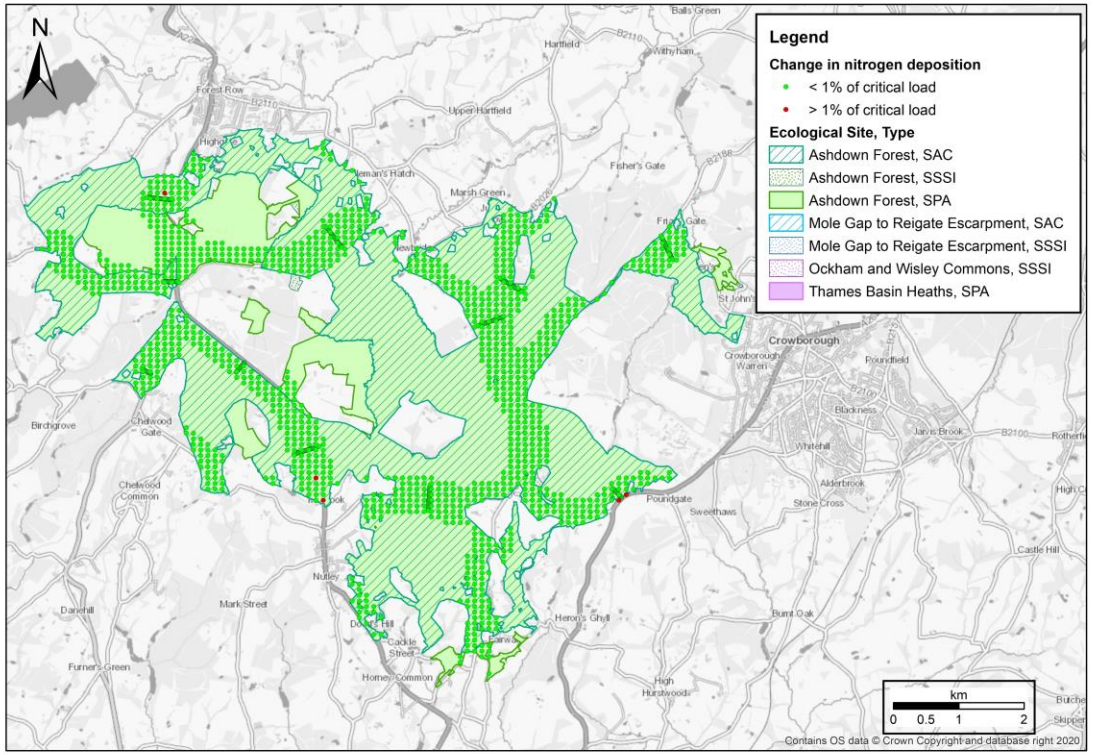
Nitrogen deposition

Green: < 1% of min CL
Red: > 1% of min CL

Main Assessment



Cumulative Assessment



ARUP

ARUP

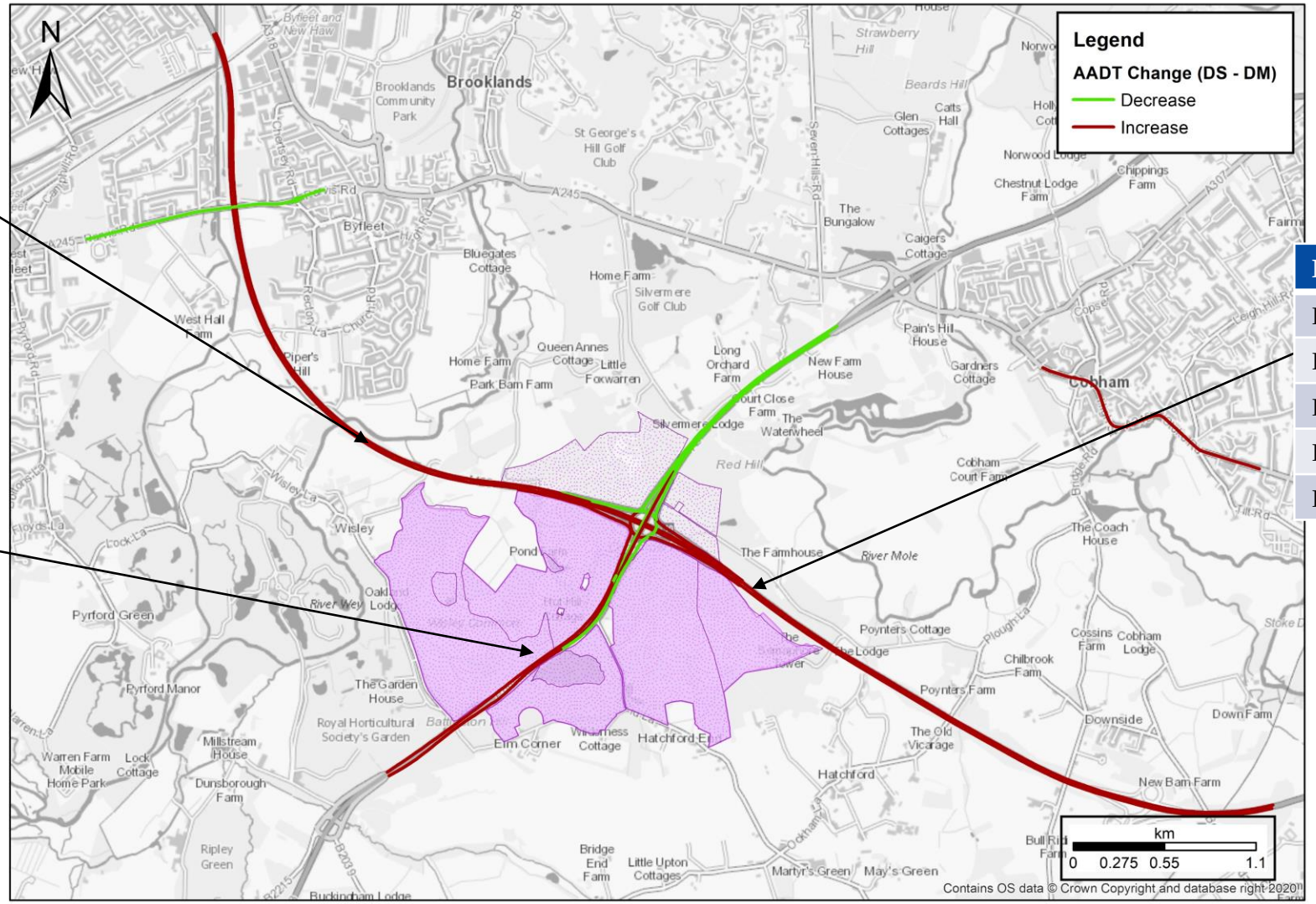
2038 Traffic data (annual average daily traffic (AADT))

ARUP

Thames Basin Heaths SPA

M25 North of Junction 10	
DM	216,827
DMHRA	219,782
DS	217,848
Diff (Main)	1,021
Diff (Cumulative)	-1,934

A3	
DM	120,209
DMHRA	116,099
DS	120,385
Diff (Main)	176
Diff (Cumulative)	4,286



M25 South of Junction 10	
DM	205,342
DMHRA	205,346
DS	207,562
Diff (Main)	2,220
Diff (Cumulative)	2,216

Displaying AADT change for Main assessment

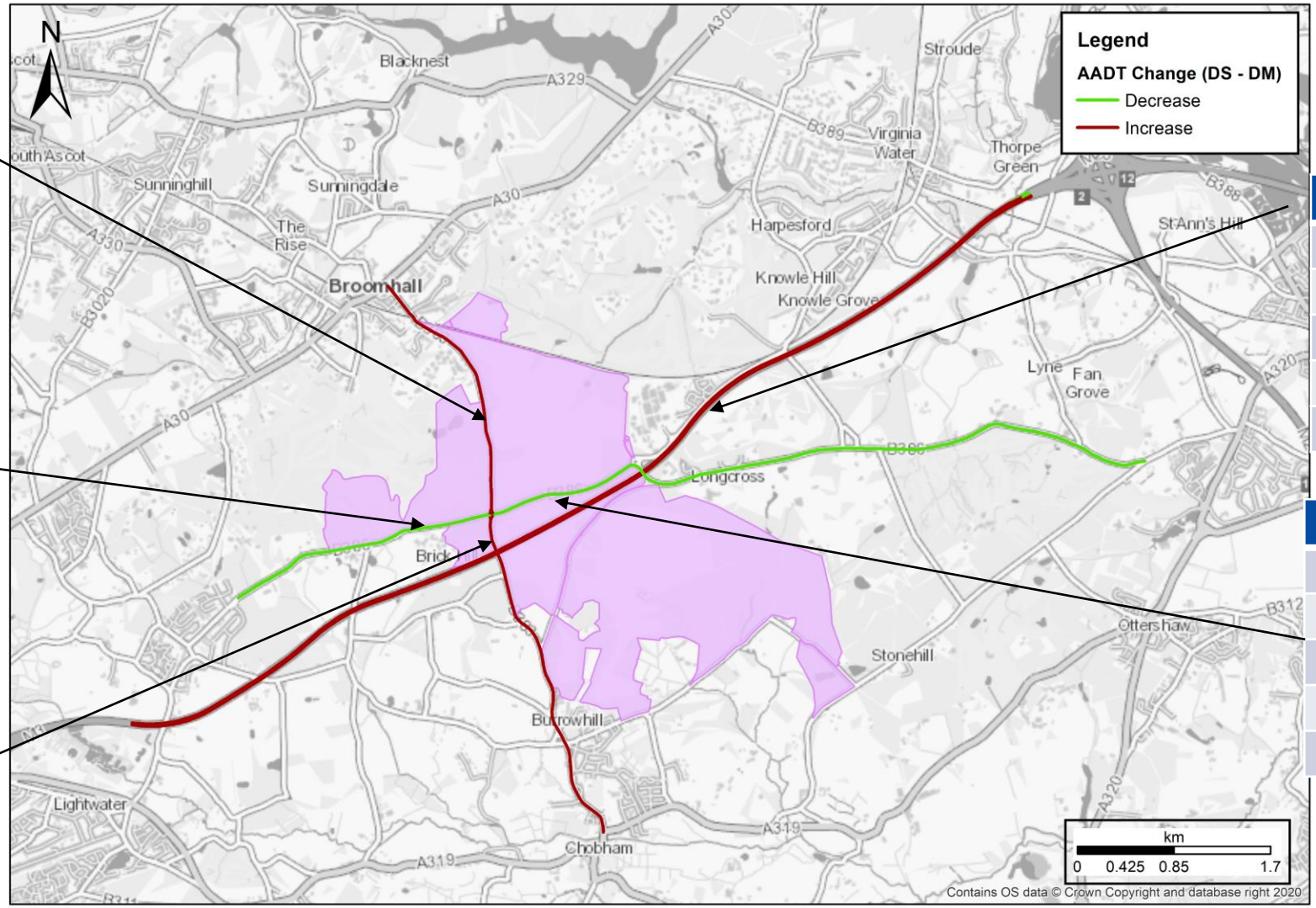
ARUP

Thursley, Ash, Pirbright & Chobham SAC

Chobham Road	
DM	24,407
DMHRA	23,764
DS	24,414
Diff (Main)	7
Diff (Cumulative)	650

B386 (west)	
DM	9,426
DMHRA	8,501
DS	9,410
Diff (Main)	-16
Diff (Cumulative)	909

Windsor Road	
DM	21,771
DMHRA	23,593
DS	23,679
Diff (Main)	86
Diff (Cumulative)	1,908



M3	
DM	183,314
DMHRA	180,634
DS	183,803
Diff (Main)	489
Diff (Cumulative)	3,169

B386 (east)	
DM	18,172
DMHRA	17,087
DS	18,119
Diff (Main)	-53
Diff (Cumulative)	1,032

Displaying AADT change for Main assessment

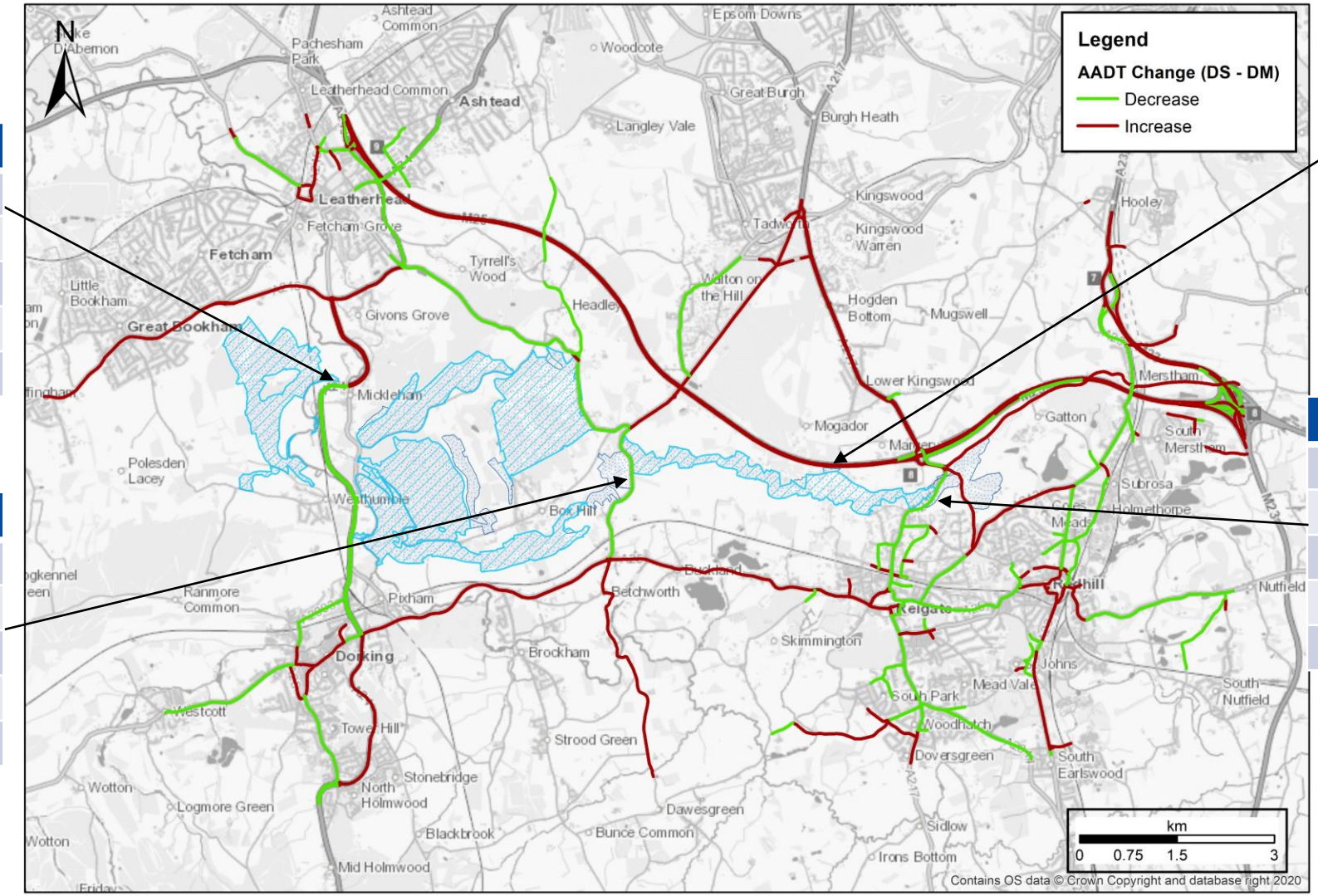
ARUP

Mole Gap to Reigate Escarpment SAC

A24	
DM	31,753
DMHRA	30,525
DS	31,769
Diff (Main)	-4
Diff (Cumulative)	1,224

B2032	
DM	16,542
DMHRA	15,661
DS	16,459
Diff (Main)	-83
Diff (Cumulative)	798

Displaying AADT change for Main assessment



M25	
DM	203,015
DMHRA	202,762
DS	205,489
Diff (Main)	2,474
Diff (Cumulative)	2,726

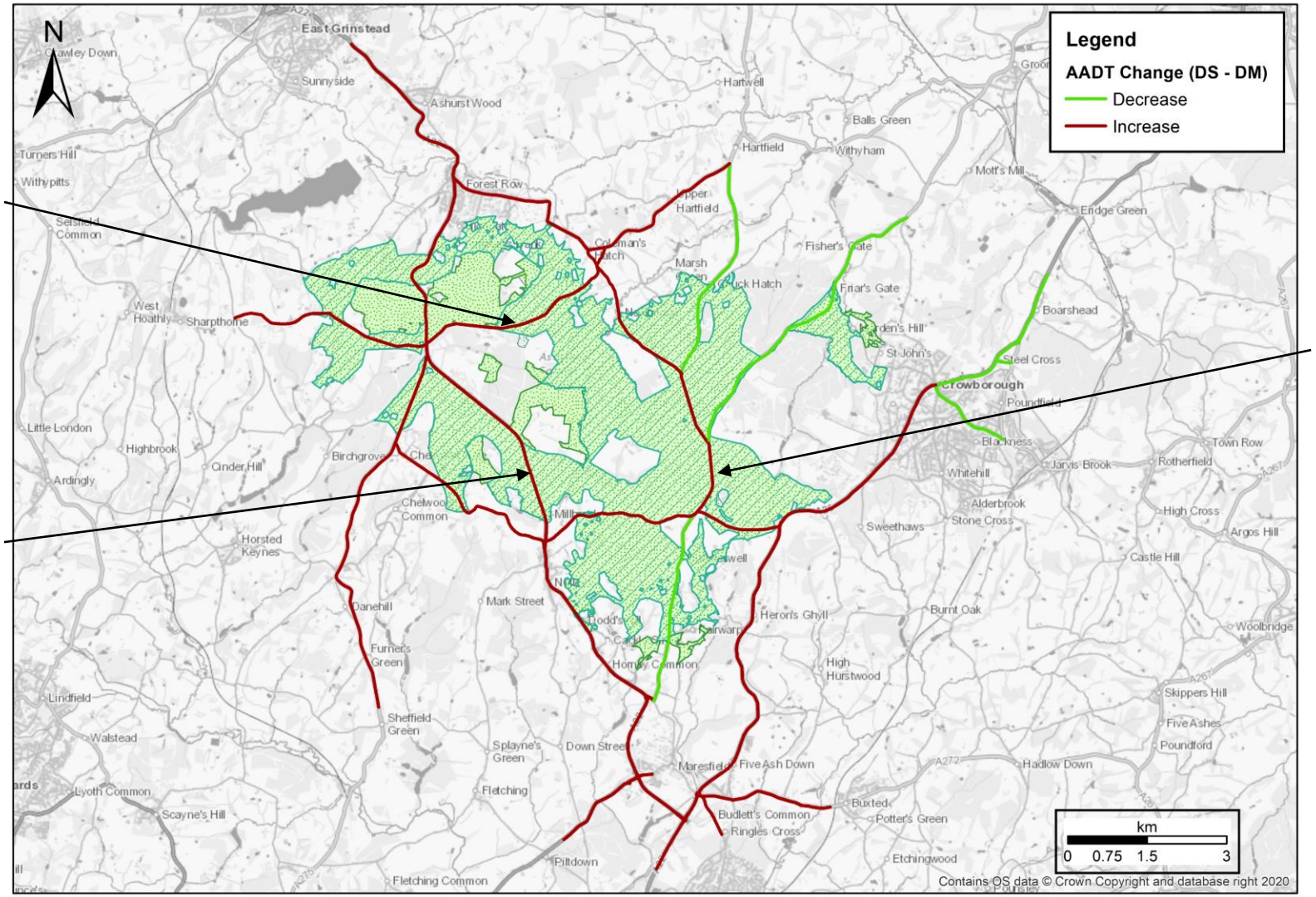
A217	
DM	26,419
DMHRA	24,075
DS	25,985
Diff (Main)	-433
Diff (Cumulative)	1,910

ARUP

Ashdown Forest SAC & SPA

B2110	
DM	2,769
DMHRA	2,489
DS	2,797
Diff (Main)	28
Diff (Cumulative)	308

A22	
DM	19,636
DMHRA	18,538
DS	19,815
Diff (Main)	179
Diff (Cumulative)	1277



B2026	
DM	8,031
DMHRA	7,100
DS	8,032
Diff (Main)	1
Diff (Cumulative)	932

Displaying AADT change for Main assessment

Annex 5

Designated site citations

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	Ashdown Forest
Unitary Authority/County:	East Sussex
SAC status:	Designated on 1 April 2005
Grid reference:	TQ451306
SAC EU code:	UK0030080
Area (ha):	2729.00
Component SSSI:	Ashdown Forest SSSI

Site description:
Ashdown Forest contains one of the largest single continuous blocks of lowland heath in south-east England, with both dry heaths and, in a larger proportion, wet heath. The wet heath element provides suitable conditions for several species of bog-mosses *Sphagnum* spp., bog asphodel *Narthecium ossifragum*, deergrass *Trichophorum cespitosum*, common cotton-grass *Eriophorum angustifolium*, marsh gentian *Gentiana pneumonanthe* and marsh clubmoss *Lycopodiella inundata*. The site supports important assemblages of beetles, dragonflies, damselflies and butterflies, including the nationally rare silver-studded blue *Plebejus argus*.

The dry heath in Ashdown Forest is dominated by heather *Calluna vulgaris*, bell heather *Erica cinerea* and dwarf gorse *Ulex minor*, with transitions to other habitats. It supports important lichen assemblages, including species such as *Pycnothelia papillaria*. This site supports the most inland remaining population of hairy greenweed *Genista pilosa* in Britain.

The damming of streams, digging for marl, and quarrying have produced several large ponds in a number of areas of the forest. Although often largely free of aquatic vegetation there may be localised rafts of broadleaved pondweed *Potamogeton natans*, beds of reedmace *Typha latifolia* and water horsetail *Equisetum fluviatile*. These species are particularly abundant in the marl pits. Some of the ponds have large amphibian populations, including the great-crested newt *Triturus cristatus*.

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- European dry heaths
- Northern Atlantic wet heaths with *Erica tetralix*. (Wet heathland with cross-leaved heath)

Qualifying species: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Great crested newt *Triturus cristatus*

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0030080
Date of registration: 14 June 2005
Signed: [redacted]
On behalf of the Secretary of State for Environment, Food and Rural Affairs

EU Directive 79/409 on the Conservation of Wild Birds:
Special Protection Area

ASHDOWN FOREST (EAST SUSSEX)

The Ashdown Forest proposed Special Protection Area (pSPA) is an extensive area of common land on mainly sandy soils between East Grinstead and Crowborough in East Sussex. It comprises a mosaic of wet and dry heath, valley bog and woodland, and supports several uncommon plants, a rich invertebrate fauna and nationally important numbers of breeding nightjar and Dartford warbler. The boundary of the pSPA is coincident with that of the Ashdown Forest Site of Special Scientific Interest.

The site qualifies for designation under Article 4.1 of the EU Birds Directive by regularly supporting nationally important breeding populations of two Annex 1 species. The site supports 35 pairs of nightjar *Caprimulgus europaeus* (1991-92 survey), representing 1.1% of the British population, and 20 pairs of Dartford warbler *Sylvia undata* (1994 survey), representing 2.1% of the British population. Other regularly occurring Annex 1 species include woodlark *Lullula arborea*, hen harrier *Circus cyaneus* and great grey shrike *Lanius excubitor*.

The diverse range of heathland and woodland habitats on the site supports an important assemblage of breeding species, some of which have declined in England over recent years. Notable species regularly breeding on the site include hobby *Falco subbuteo*, tree pipit *Anthus trivialis*, redstart *Phoenicurus phoenicurus*, stonechat *Saxicola torquata* and wood warbler *Phylloscopus sibilatrix*, in addition to nightjar and Dartford warbler.

SPA Citation
ICC
May 1994

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	Ebernoe Common
Unitary Authority/County:	West Sussex
SAC status:	1) Ebernoe Common was designated as a SAC on 1 April 2005. 2) Extensions to the Ebernoe Common SAC were designated on 10 December 2009
Grid reference:	SU977273
SAC EU code:	UK0012715
Area (ha):	234.05
Component SSSI:	Ebernoe Common SSSI

Site description:
Ebernoe Common has an extensive block of beech *Fagus sylvatica* high forest and former wood-pasture over dense holly *Ilex aquifolium* with a very rich epiphytic lichen flora, including *Agonimia octospora* and *Catillaria atropurpurea*. The beech woodland is associated with other woodland types, open glades and pools, which contribute to a high overall diversity. A maternity colony of **Barbastelle bats** *Barbastella barbastellus* utilises a range of tree roosts in the site, usually in dead tree stumps, but the species appears to be present throughout the year, with individuals utilising a range of roost sites in tree holes and under bark. The site also holds a maternity colony of **Bechstein's bats** *Myotis bechsteinii*, mainly roosting in old woodpecker holes in the stems of live mature sessile oak *Quercus petraea* trees.

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*). (Beech forests on acid soils)

Qualifying species: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Barbastelle bat *Barbastella barbastellus*
- Bechstein's bat *Myotis bechsteinii*

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0012715
Date of registration: **10 December 2009**

Signed: [redacted]

On behalf of the Secretary of State for Environment, Food and Rural Affairs

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	Mole Gap to Reigate Escarpment
Unitary Authority/County:	Surrey
SAC status:	Designated on 1 April 2005
Grid reference:	TQ199533
SAC EU code:	UK0012804
Area (ha):	887.68
Component SSSI:	Mole Gap to Reigate Escarpment SSSI

Site description:

Woodland, chalk grassland, chalk scrub and heathland form an interrelated mosaic at this site on the North Downs.

On the generally acidic plateau deposits of the crest of the Downs, the woodland is dominated by beech *Fagus sylvatica*, pedunculate oak *Quercus robur*, ash *Fraxinus excelsior* and yew *Taxus baccata*. On the lime-rich chalk slopes, the dominant trees are beech, ash and yew, together with field maple *Acer campestre* and common whitebeam *Sorbus aria* agg. and occasional large-leaved lime *Tilia platyphyllos*. Yew woodland has been formed both by invasion of chalk grassland and from development within beech woodland following destruction of the beech over-storey. Yew occurs in extensive stands, with, in places, an understorey of box *Buxus sempervirens*. This site supports the only area of stable box scrub in the UK, on steep chalk slopes where the River Mole has cut into the North Downs Escarpment, creating the Mole Gap. Here natural erosion maintains the open conditions required for the survival of this habitat type.

The site supports a range of species-rich chalk grassland types on steep slopes, dominated by red fescue *Festuca rubra*, sheep's-fescue *F. ovina*, quaking-grass *Briza media* and, in taller areas, upright brome *Bromopsis erecta*, tor-grass *Brachypodium pinnatum* and slender false-brome grass *Brachypodium sylvaticum*. Typical herbs include salad burnet *Sanguisorba minor*, yellow-wort *Blackstonia perfoliata* and field scabious *Knautia arvensis*. The site supports important populations of the nationally scarce musk orchid *Herminium monorchis* and man orchid *Aceras anthropophorum*, the former occurring in areas of shorter turf. A range of more widespread but local orchids are also present, including autumn lady's-tresses *Spiranthes spiralis* and green-winged orchid *Orchis morio*, as well as commoner species, such as pyramidal orchid *Anacamptis pyramidalis*, fragrant orchid *Gymnadenia conopsea* and bee orchid *Ophrys apifera*.

The acidic plateau deposits on Headley Heath support acidic heathland, dominated by heather *Calluna vulgaris*, bell heather *Erica cinerea* and dwarf gorse *Ulex minor*, often mixed with grasses such as wavy hair-grass *Deschampsia flexuosa* and common bent *Agrostis capillaris*. Chalk heath occurs on a small area of Headley Heath where the special conditions allow both acid and lime-loving plants to grow side by side.

An old chalk mine is used as a winter roost by several species of bats.

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- *Taxus baccata* woods of the British Isles. (Yew-dominated woodland)*
- *Asperulo-Fagetum* beech forests. (Beech forests on neutral to rich soils)
- European dry heaths
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (Dry grasslands and scrublands on chalk or limestone).
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites). (Dry grasslands and scrublands on chalk or limestone, including important orchid sites)*
- Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.p.). (Natural box scrub)

Qualifying species: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Bechstein's bat *Myotis bechsteinii*
- Great crested newt *Triturus cristatus*

Annex I priority habitats are denoted by an asterisk (*).

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0012804
Date of registration: 14 June 2005
Signed: [redacted]
On behalf of the Secretary of State for Environment, Food and Rural Affairs

EC Directive 79/409 on the Conservation of Wild Birds
Special Protection Area (SPA)

Name: Thames Basin Heaths

Unitary Authority/County: Bracknell Forest; Hampshire; Surrey; Windsor and Maidenhead.

Site description: The Thames Basin Heaths SPA is a composite site that is located across the counties of Surrey, Hampshire and Berkshire in southern England. It encompasses all or parts of Ash to Brookwood Heaths Site of Special Scientific Interest (SSSI), Bourley and Long Valley SSSI, Bramshill SSSI, Broadmoor to Bagshot Woods and Heaths SSSI, Castle Bottom to Yateley and Hawley Commons SSSI, Chobham Common SSSI, Colony Bog and Bagshot Heaths SSSI, Eelmoor Marsh SSSI, Hazeley Heath SSSI, Horsell Common SSSI, Ockham and Wisley Commons SSSI, Sandhurst to Owlsmoor Bogs and Heaths SSSI and Whitmoor Common SSSI.

The open heathland habitats overlie sand and gravel sediments which give rise to sandy or peaty acidic soils, supporting dry heathy vegetation on well-drained slopes, wet heath on low-lying shallow slopes and bogs in valleys. The site consists of tracts of heathland, scrub and woodland, once almost continuous, but now fragmented into separate blocks by roads, urban development and farmland. Less open habitats of scrub, acidic woodland and conifer plantations dominate, within which are scattered areas of open heath and mire. The site supports important breeding populations of a number of birds of lowland heathland, especially nightjar *Caprimulgus europaeus* and woodlark *Lullula arborea*, both of which nest on the ground, often at the woodland/heathland edge, and Dartford warbler *Sylvia undata*, which often nests in gorse *Ulex* sp. Scattered trees and scrub are used for roosting.

Together with the nearby Ashdown Forest and Wealden Heaths SPAs, the Thames Basin Heaths form part of a complex of heathlands in southern England that support important breeding bird populations.

Size of SPA: The SPA covers an area of 8274.72 ha.

Qualifying species:
The site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:

Annex 1 species	Count and season	Period	% of GB population
Nightjar *Caprimulgus europaeus*	264 churring males – breeding	1998/99	7.8%
Woodlark *Lullula arborea*	149 pairs – breeding	1997	9.9%
Dartford warbler *Sylvia undata*	445 pairs – breeding	1999	27.8%

Non-qualifying species of interest: Hen harrier *Circus cyaneus*, merlin *Falco columbarius*, short-eared owl *Asio flammeus* and kingfisher *Alcedo atthis* (all Annex I species) occur in non-breeding numbers of less than European importance (less than 1% of the GB population).

Status of SPA:
Thames Basin Heaths was classified as a Special Protection Area on 9 March 2005.

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name: The Mens

Unitary Authority/County: West Sussex

SAC status: Designated on 1 April 2005

Grid reference: TQ023234

SAC EU code: UK0012716

Area (ha): 203.28

Component SSSI: The Mens SSSI

Site description:
The Mens is an extensive area of mature beech *Fagus sylvatica* woodland rich in lichens, bryophytes, fungi and saproxylic (dead wood) invertebrates. It is developing a near-natural high forest structure, in response to only limited silvicultural intervention over the 20th century, combined with the effects of natural events such as the 1987 great storm. The site also supports an important population of barbastelle bat *Barbastella barbastellus.*

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*). (Beech forests on acid soils)

Qualifying species: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Barbastelle bat *Barbastella barbastellus*

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0012716
Date of registration: 14 June 2005
Signed: [redacted]
On behalf of the Secretary of State for Environment, Food and Rural Affairs

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	Thursley, Ash, Pirbright and Chobham
Unitary Authority/County:	Surrey
SAC status:	Designated on 1 April 2005
Grid reference:	SU914411
SAC EU code:	UK0012793
Area (ha):	5138.00
Component SSSI:	Ash to Brookwood Heaths SSSI, Chobham Common SSSI, Colony Bog and Bagshot Heath SSSI, Thursley, Hankley and Frensham Commons SSSI

Site description:
The heathland is a series of large fragments of previously more continuous areas and is principally dominated by heather – dwarf gorse (*Calluna vulgaris – Ulex minor*) dry heathland. There are transitions to wet heath and valley mire, scrub, woodland and acid grassland, including types rich in annual plants. This habitat supports an important assemblage of animal species, including numerous rare and local invertebrate species, including the nationally rare white-faced darter *Leuccorhinia dubia*, as well as sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca*.

This site supports the sole area of lowland northern Atlantic wet heath in south-east England. The wet heath at Thursley is mainly cross-leaved heath – bog-moss (*Erica tetralix – Sphagnum compactum*) and contains several rare plants, including great sundew *Drosera anglica*, bog hair-grass *Deschampsia setacea*, bog orchid *Hammarbya paludosa* and brown beak-sedge *Rhynchospora fusca*.

Depressions on peat substrates are widespread, both in bog pools, mires and in flushes where they occur as part of a mosaic associated with valley bog and wet heath. They show extensive representation of brown-beak sedge and are also important for great sundew and bog orchid *Hammarbya paludosa*.

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Depressions on peat substrates of the *Rhynchosporion*
- European dry heaths
- Northern Atlantic wet heaths with *Erica tetralix*. (Wet heathland with cross-leaved heath)

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0012793
Date of registration: 14 June 2005
Signed: [redacted]
On behalf of the Secretary of State for Environment, Food and Rural Affairs

Annex 6

Note on accuracy of dispersion model

ARUP

File Note

Project title	GAL - NRP
Job number	267398-00
File reference	
cc	
Prepared by	Arup – Air quality
Date	June 2023
Subject	Natural England – modelling accuracy

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1.1 Model accuracy

NOx, NO_2 and NH_3 impacts from roads are unlikely to be discernible from background pollutant concentrations at distances of greater than 200m from the road edge. Pollutant concentrations from road traffic reduce rapidly from the roadside due to mixing of the plume over this distance.

A report published by the Department for Environment, Food and Rural Affairs (Defra) on the changes in NO_2 concentrations with increased distance from roads[1], acknowledges that beyond 50m from the road, NO_2 concentrations approach background levels. Therefore, at 100m or more from the road, the difference between the total concentration, including any contribution from the road, and the background concentration should be as close to zero as will make virtually no difference.

The consideration of transects for the ecological assessment out to 200m from the road, represents a more precautionary approach than the 100m set out in Defra's report.

Whilst air quality models will still show a level of change beyond 200m, this is in part due to the way the algorithms in dispersion models work i.e. theoretical infinite end point. As discussed above, actual monitoring indicates that the road component will be undiscernible from the background closer to the road than the 200m point (ie within 100m).

It is important, therefore, to recognise the limitations of models and to use the outputs appropriately. For instance, traffic flows of less than 1,000 AADT are not used in a DMRB assessment as they are typically below the confidence that can be attributed to a traffic model. In the same way that changes of less than 1% of NO_2 (0.4µg/m³) and NOx (0.3µg/m³) are considered imperceptible.

Therefore, for differences in modelled NOx changes between with and without the scheme, are typically scoped out where they are less than 1% of 30µg/m³ NOx threshold for vegetation. This is the same principal applied to the assessment of both the impacts on human health and determining compliance with mandatory limit values.

[1] https://laqm.defra.gov.uk/documents/FallOffWithDistanceReptJuly08.pdf

Given modelled NOx is the basis for total N deposition (from NOx and NH_3), where the changes of NOx are imperceptible, the changes in total N deposition should be treated in an equally cautious manner as results will be well below the accuracy of modelling which would represent a perceptible effect and hence should be treated as having an imperceptible impact.