

# **Habitats Regulations Assessment of the Cotswold Local Plan Full Review**

**HRA Screening and Appropriate Assessment  
for Reg.19 Consultation**

## **Cotswold District Council**

**Final report**

Prepared by LUC

July 2026

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# Chapter 1

## Introduction

**1.1** LUC has been commissioned to carry out a Habitats Regulations Assessment (HRA) of the emerging new Cotswold Local Plan.

**1.2** The purpose of the HRA is to determine whether the Local Plan policies and site allocations are likely to have significant effects on, or adverse effects on the integrity of, any sites designated as Special Protection Areas (SPAs), Special Areas of Conservation (SACs), or Ramsar sites.

**1.3** This HRA report sets out the assessment of the policies and site allocations proposed in the Regulation 19 (Reg.19) version of the Local Plan, and will be published for consultation alongside that plan.

## Context of the Local Plan Full Review

**1.4** The current Local Plan for Cotswold District was adopted in 2018 and covers the period 2011 to 2031.

**1.5** In 2020, Cotswold District Council began work on a Partial Update to the Local Plan, with consultation on the Local Plan Partial Update (LPPU) 'Issues and Options' (Reg.18) taking place in 2022.

**1.6** The Council is now proceeding with a full review of the Local Plan. The development strategy options were published for Reg.18 consultation in November 2025. Following the Reg.18 consultation, the Council has identified the preferred site allocations, which will be published for Reg.19 consultation in summer 2026. This HRA assesses the Reg.19 Local Plan (which is a full review of the adopted plan).

## Previous HRA work

**1.7** LUC prepared an HRA Scoping Report for the LPPU in 2022, to accompany the Issues and Options consultation. Natural England broadly agreed with the Habitats Sites and impact pathways scoped in and provided advice on additional issues to pick up in later iterations of the HRA (see Appendix D for how these have been addressed).

**1.8** In December 2023, LUC prepared a Scoping Report covering letter to accompany the consultation on the development needs up to 2041 and options

for how these may be delivered, as well as the partial update to policies. The letter acknowledged differences between the LPPU and (at the time parallel) Local Plan full review (e.g. extension of plan period) and provided an update on work undertaken since the HRA Scoping Report was prepared (e.g. to recreation mitigation strategies for some Habitats Sites). The covering letter stated that the proposed HRA methodology would remain valid for the Local Plan full review.

**1.9** The HRA Report (October 2025) that accompanied the Reg.18 consultation was a high-level screening of the development strategy options, which provided an indication of the impact pathways likely to be most relevant to each of the five options. This HRA builds upon the previous work and takes into account comments received on the Reg.18 HRA Report and subsequent discussions with Natural England (see Appendix D).

## **The requirement to undertake Habitats Regulations Assessment of development plans**

**1.10** The requirement to undertake HRA of development plans was confirmed by the amendments to the Habitats Regulations published for England and Wales in 2007 [\[See reference 1\]](#); which is now known as the Habitats Regulations 2017 (as amended) [\[See reference 2\]](#). When preparing the Local Plan, Cotswold District Council therefore required by law to carry out an HRA. The Council can commission consultants to undertake HRA work on its behalf, and this (the work documented in this report) is then reported to and considered by the Council as the 'competent authority'. It will consider this work and would usually only progress the Local Plan if they consider that the plan will not adversely affect the integrity [\[See reference 3\]](#) of any of the 'Habitats Sites', as defined below (the exception to this would be where 'imperative reasons of overriding public interest' can be demonstrated). The requirement for authorities to comply with the Habitats Regulations when preparing a development plan is also noted in the Government's online Planning Practice Guidance (PPG) [\[See reference 4\]](#).

**1.11** HRA refers to the assessment of the potential effects of a development plan on one or more sites afforded the highest level of protection in the UK: Special Protected Areas (SPAs) and Special Areas of Conservation (SACs). These were classified under European Union (EU) legislation, but since 1 January 2021, are protected in the UK by the Habitats Regulations 2017 (as amended) [\[See reference 5\]](#). Although the EU Directives from which the UK's Habitats Regulations originally derived are no longer binding, the Regulations

still make reference to the lists of habitats and species that the sites were designated for, which are listed in annexes to the EU Directives:

- SACs are designated for particular habitat types (specified in Annex 1 of the EU Habitats Directive [\[See reference 6\]](#)) and species (Annex II). The listed habitat types and species (excluding birds) are those considered to be most in need of conservation at a European level. Designation of SACs also has regard to the threats of degradation or destruction to which the sites are exposed and, before EU exit day, to the coherence of the 'Natura 2000' network of 'European sites'. After EU exit day, regard is had to the importance of such sites for the coherence of the UK's 'National Site Network'.
- SPAs are classified for rare and vulnerable birds (Annex I of the EU Birds Directive [\[See reference 7\]](#)), and for regularly occurring migratory species not listed in Annex I.

**1.12** The term 'European Sites' was previously commonly used in HRA to refer to 'Natura 2000' sites [\[See reference 8\]](#) and Ramsar sites (international designated under the Ramsar Convention). However, a Government Policy Paper [\[See reference 9\]](#) on changes to the Habitats Regulations 2017 post-Brexit states that:

- Any references to Natura 2000 in the 2017 Regulations and in guidance now refer to the new 'National Site Network';
- The National Site Network includes existing SACs and SPAs; and new SACs and SPAs designated under these Regulations; and
- Designated Wetlands of International Importance (known as Ramsar sites) do not form part of the national site network. Many Ramsar sites overlap with SACs and SPAs and may be designated for the same or different species and habitats.

**1.13** Although Ramsar sites do not form part of the new National Site Network, Government guidance [\[See reference 10\]](#) states that:

Any proposals affecting the following sites would also require an HRA because these are protected by government policy:

- Proposed SACs
- Potential SPAs
- Ramsar sites – wetlands of international importance (both listed and proposed)

- Areas secured as sites compensating for damage to a European site.”

**1.14** Furthermore, the NPPF [See reference 11] and practice guidance [See reference 12] currently state that competent authorities responsible for carrying out HRA should treat Ramsar sites in the same way as SACs and SPAs. The legislative requirement for HRA does not apply to other nationally designated wildlife sites such as Sites of Special Scientific Interest or National Nature Reserves.

**1.15** For simplicity, and in line with common usage, this report uses the term ‘Habitats Site’ to refer to all types of designated site within the ‘National Site Network’ for which Government guidance [See reference 13] requires an HRA.

**1.16** The overall purpose of an HRA is to conclude whether or not a proposal or policy, or a whole development plan, would adversely affect the integrity of the Habitats Site in question. This is judged in terms of the implications of the plan for a site’s ‘qualifying features’ (i.e. those Annex I habitats, Annex II species, and Annex I bird populations for which it has been designated). Significantly, HRA is based on the precautionary principle. Where uncertainty or doubt remains, an adverse effect should be assumed.

## Structure of this report

**1.17** This chapter (Chapter 1) has introduced the requirement to undertake HRA of the Cotswold Local Plan. The remainder of the report is structured as follows:

- Chapter 2 presents the aspects of the Reg.19 Local Plan that are relevant to this HRA.
- Chapter 3 describes the HRA methodology, which takes into account the requirements of the Habitats Regulations and relevant case law.
- Chapter 4 identifies the Habitats Sites requiring consideration in the HRA.
- Chapter 5 sets out the HRA Screening of the Local Plan policies and site allocations.
- Chapter 6 presents the Appropriate Assessment, for the impact pathways that could not be screened out.
- Chapter 7 summarises the HRA conclusions and describes the next steps to be undertaken.

**1.18** The following appendices supplement the information provided in the report chapters:

- Appendix A: details of the Habitats Sites considered in this HRA.
- Appendix B: site allocations assessed in the HRA.
- Appendix C: details of the HRA screening of each policy and site allocation.
- Appendix D: record of consultation and LUC responses.
- Appendix E: an assessment of the potential for site allocations to be functionally linked to the Severn Estuary.
- Appendix F: Air quality assessment.

## Chapter 2

### Cotswold Local Plan

**2.1** This chapter summarises the contents of the Draft (Regulation 19) Cotswold District Local Plan (June 2026), which is the subject of this report. The Plan sets out policies and proposals to meet the challenges facing the area over the period 2026-2043. The Regulation 19 Local Plan supersedes the earlier Regulation 18 draft, incorporating consultation feedback and presenting the final proposed plan for submission and examination.

**2.2** The Local Plan has been prepared taking account of the National Planning Policy Framework (NPPF) and other relevant national policy and guidance, alongside an evolving evidence base.

## Vision

**2.3** The Draft Local Plan presents a Spatial Vision for Cotswold District by 2043 as follows:

### Spatial Vision

By 2043, Cotswold District will be a resilient, inclusive, and forward-looking rural district that has responded to the climate crisis and ecological emergency, conserved and enhanced the Cotswolds National Landscape, delivered sustainable communities, and enabled a vibrant, low-carbon economy. Development will have been guided by a Spatial Strategy that prioritises environmental stewardship, social equity, and economic vitality, while respecting the District's unique landscape, heritage, and character. The roles of the District's settlements will be reinforced, with Cirencester continuing to function as the principal centre, supported by a network of market towns and villages that serve their rural hinterlands.

The Local Plan will have delivered a diverse range of housing, including a significant increase in socially rented smaller and more affordable homes, enabling residents of all ages and backgrounds to live securely and sustainably. This will include homes that respond to the needs of an ageing population, support younger people and key workers to remain in the District, and provide a mix of sizes and tenures that improve affordability and maintain a balanced community. New development sites will have matured into thriving communities, offering high-quality homes, employment

opportunities, and essential services, all supported by integrated infrastructure and sustainable transport networks.

The District will have transitioned to zero-carbon development, with new buildings and infrastructure designed to minimise energy and water use and maximise renewable energy generation. Biodiversity Net Gain will be embedded across all larger development, contributing to a richer natural environment and improved ecological resilience. Water resources will be carefully managed, with development responding to water stress, flood risk and the need to protect and enhance water quality.

The Local Plan will have helped to reduce transport emissions through investment in active travel infrastructure, public transport, and strategic growth focused around transport nodes and ensuring local services and facilities are close enough to access by walking, wheeling or cycling, and/or other sustainable transport modes. Communities will be healthier, more connected, and better supported by local services, green spaces, and digital infrastructure.

Cotswold District will continue to be 'Green to the Core,' with planning decisions consistently reflecting the long-term interests of people, place, and planet.

## Strategic objectives

**2.4** The Vision is supported by 6 Strategic Objectives. The Strategic Objectives set out in the Draft Local Plan are:

- SO1: Ensure infrastructure and services support sustainable communities
- SO2: Respond to the climate crisis through adaptation and mitigation
- SO3: Conserve and enhance the natural, built, and historic environment
- SO4: Deliver inclusive, healthy, and affordable housing
- SO5: Enable a vibrant, low-carbon local economy
- SO6: Promote sustainable transport use and connectivity

## Spatial strategy

**2.5** The Spatial Strategy (below) is underpinned by seven Core policies:

- Core Policy 1: Addressing Climate Change
- Core Policy 2: Meeting Housing Needs in Cotswold District: Strategic Sites
- Core Policy 2a: Stepped Housing Trajectory
- Core Policy 3: Meeting Housing Needs in Cotswold District: Non-Strategic Sites
- Core Policy 4: Settlement Hierarchy
- Core Policy 5: Meeting Business and Employment Needs in Cotswold District
- Core Policy 6: Infrastructure Delivery

**2.6** The Draft Local Plan also sets out three Area Strategies to support the appropriate development of different parts of the district, which are set out in Chapters 5-7 of the Draft Plan. The Area Strategies are as follows:

- Cirencester and Surrounding Villages Area Strategy
- South Cotswold Area Strategy
- North Cotswold Area Strategy

**2.7** District-wide policies are set out in Chapters 8-14 of the Draft Local Plan and cover Cotswold as a whole. These policies support the Spatial Strategy and Area Strategies, to deliver the Spatial Vision and Strategic Objectives.

## Cotswold Local Plan 2026 – 2043: Spatial Strategy

### Cirencester and Surrounding Villages - Strategy Area

- Cirencester is identified as the District's Main Settlement to reflect its status as the largest town within the District, where the majority of services and facilities are provided, along with the widest range of retail. It serves a wide hinterland of surrounding villages that rely upon it for day-to-day needs such as for shopping and leisure.
- Growth through strategic extensions in Cirencester will complement the existing settlement, forming high-quality sustainable development that provides appropriate services and facilities; with strong active travel connections linking the new neighbourhoods to Cirencester Town Centre, local schools, the National Cycle Network, and wider footpath routes. Sustainable travel connections will also link to nearby Kemble

Railway Station, which will be strengthened through careful infrastructure planning.

- growth through strategic extensions in and near the settlements of Siddington and Preston will be designed so the settlements retain their distinct identities separate from Cirencester while at the same time creating strong active travel connections between the development, Cirencester Town Centre and other nearby new developments in the South Cotswold Strategy area, and
- a new secondary school will be provided, covering both the need of new development in the Cirencester and Surrounding Villages Strategy Area as well as the need arising from development in the surrounding South Cotswold Strategy Area.

#### South Cotswold - Strategy Area

- four Strategic Site Allocations at Down Ampney, Fairford, Kemble and a new settlement south of Driffield form the basis of long-term growth in the Strategy Area, supported by 15 non-strategic site allocations across other towns and villages.
- growth at Down Ampney, Fairford, and Kemble will deliver well-planned, connected extensions that provide new homes, community infrastructure, and strong active travel links to existing settlements and key destinations, including Kemble Station.
- the new settlement to the south of Driffield will provide a sustainable new community of strategic scale, delivering homes, employment land, community facilities, transport connections and a comprehensive network of green and blue infrastructure.
- 12 non-strategic smaller-scale allocations across other settlements will support rural communities, while protecting and enhancing the area's historic environment, biodiversity and key assets including the Cotswold Lakes and River Thames corridors
- Tetbury, Fairford and Lechlade are recognised for their important role as the main service centres providing a wide range of services, facilities and employment opportunities for surrounding communities. Kemble is also recognised for its distinctive strategic function due to its railway station on the Swindon–Gloucester (Golden Valley) line, and
- it is especially important that growth in South Cotswold is high quality, sustainable and sensitive to landscape and environmental matters so

that it responds sensitively to the Cotswolds National Landscape and Special Landscape Areas, and the area's strong rural character.

#### North Cotswold - Strategy Area

- two Strategic Site Allocations in Moreton-in-Marsh and Mickleton form the basis of long-term growth in the Strategy Area. A further 16 non-strategic smaller scale site allocations are spread across other towns and villages.
- it is important that growth within these settlements is high quality and sustainable, but also supports the delivery of new services, facilities and infrastructure, including green and blue infrastructure to benefit the existing communities as and new residents
- Moreton-in-Marsh is recognised as an important settlement due to the role it plays within Cotswold District as the third largest settlement with one of only two railway stations in the District
- growth in Moreton-in-Marsh will complement the existing settlement, forming high-quality sustainable development, provide appropriate services and facilities with strong active travel connections linking the new neighbourhoods to the town centre (including providing for a new street through the development), the National Cycle Network, wider footpath routes, primary schools (existing and new) and a new secondary school. Growth should consider the Cotswolds National Landscape and Special Landscape Areas
- growth in Mickleton will reflect local character, and landscape context, supporting high quality place making for both new and existing residents and creating safe, direct and attractive walking and cycling routes linking the site to Mickleton village centre, schools, services and the surrounding countryside (including nearby Honeybourne Railway Station), and
- development in Mickleton will also establish a strong and enduring western edge to Mickleton, with development contained by a substantial landscape framework. The setting of the Cotswolds National Landscape and the adjoining Special Landscape Area will be safeguarded through generous buffers, sensitive layout, green and blue infrastructure and appropriate density.

## Policies

**2.8** In addition to Core Policies 1-6 referenced above, the Draft Local Plan contains the following policies, set out in sections as below. Core Policies 7-22 relate to the three Area Strategies.

- Cirencester and Surrounding Villages Area Strategy (five policies);
- South Cotswold Area Strategy (seven policies);
- North Cotswold Area Strategy (seven policies);
- Sustainable Construction and Renewable Energy (seven policies);
- Transport (eight policies);
- Housing (ten policies);
- Economy, Retail and Tourism (eleven policies);
- Historic Environment (seven policies);
- Natural Environment (ten policies);
- Building Healthy and Sustainable Communities (seven policies); and
- Monitoring and Implementation (one policy).

## Site allocations

**2.9** The Local Plan site allocations are shown in **Figure 2.1. Appendix B** provides a full list of site allocations assessed in the HRA.

## Residential

**2.10** Core Policy 2 sets out that the housing requirement for the Cotswold District is for 17,918 homes to be delivered in the Plan period between 2026 and 2043. The Plan makes provision for at least 18,911 dwellings by 2043.

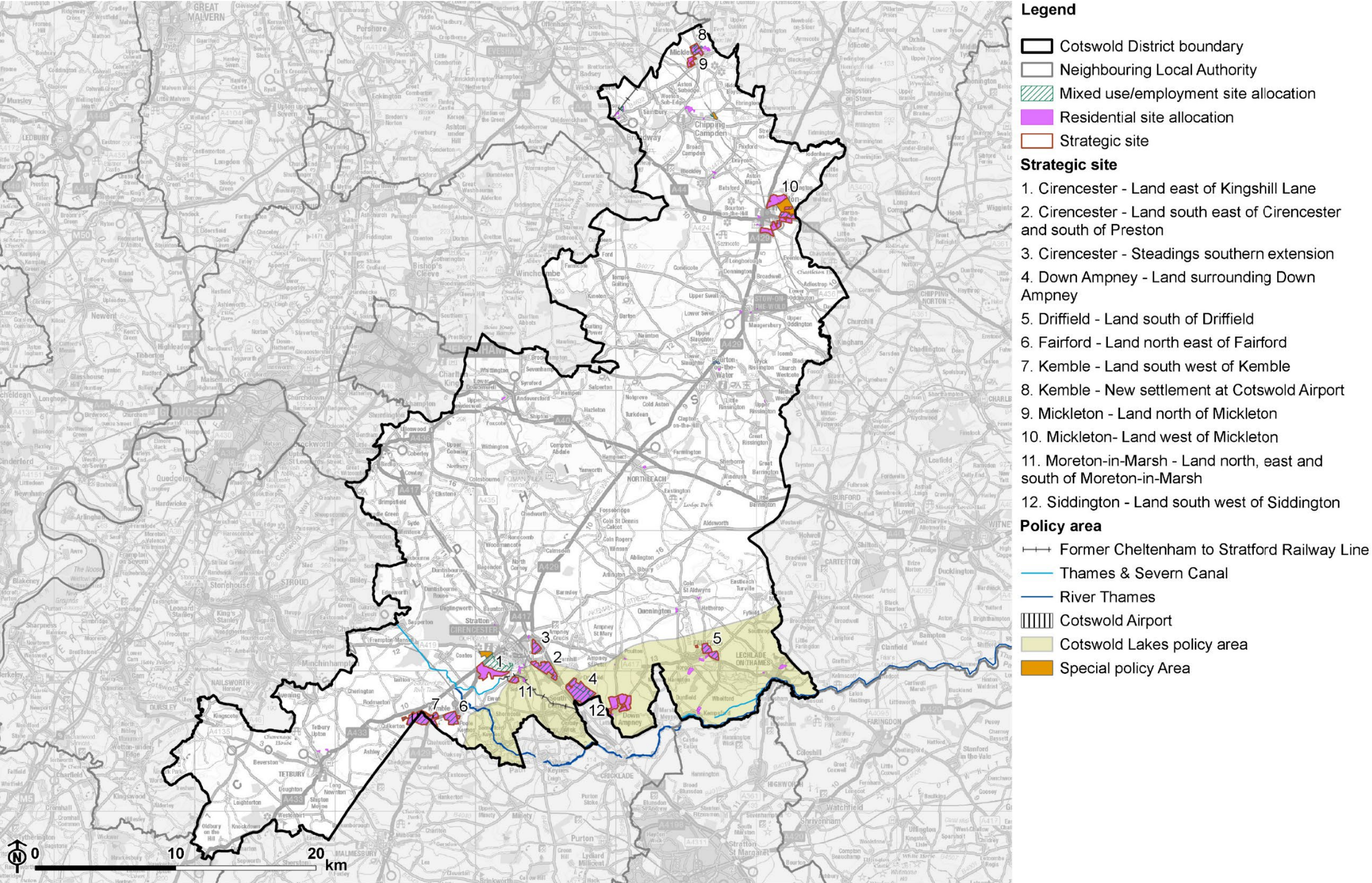
**2.11** Around 11,302 dwellings will be delivered through ten strategic allocations and one saved strategic allocation from the previous Local Plan 2011-2031. A further 1,468 dwellings will be delivered through non-strategic allocations (addressed in Core Policy 3). Additional dwellings will also be delivered through Neighbourhood Development Plans or the Development Management Process.

## Employment

**2.12** Core Policy 5 establishes that to meet the land requirement of 10.4 ha for office and R&R development, and 39.2 ha for industrial development over the Plan period (2026 to 2043), a further 29 ha is needed beyond known completions and commitments.

**2.13** The Plan identifies 36.9 ha for future development across 12 strategic employment allocations.

Figure 2.1: Local Plan site allocations



## Chapter 3

### Approach to HRA

**3.1** This chapter describes the approach that has been taken to the HRA of the Local Plan.

### Stages of HRA

**3.2** The HRA of development plans is undertaken in stages (as described below) and should conclude whether or not a proposal would adversely affect the integrity of the Habitats Site(s) in question.

**3.3** The outputs are reported to and considered by the Council, as the competent authority, before adopting the Plan.

**3.4** The HRA also requires close working with Natural England as the statutory nature conservation body [\[See reference 14\]](#) in order to obtain the necessary information, agree the process, outcomes and mitigation proposals. Non-statutory consultees may also be in a strong position to provide advice and information throughout the process, for example, the Environment Agency, which is required to undertake HRA for its existing licences and future licensing of activities. A record of consultation is provided in Appendix D.

### Requirements of the Habitats Regulations

**3.5** In assessing the effects of a development plan in accordance with Regulation 105 of the Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations'), there are potentially two tests to be applied by the competent authority: a 'Significance Test' followed, if necessary, by an Appropriate Assessment which would inform the 'Integrity Test'. The relevant sequence of questions is as follows:

- Step 1: Under Reg. 105(1)(b), consider whether the plan is directly connected with or necessary to the management of the sites. If not, proceed to Step 2.
- Step 2: Under Reg. 105(1)(a), consider whether the plan is likely to have a significant effect on a Habitats Site, either alone or in combination with other plans or projects (the 'Significance Test'). If yes, proceed to Step 3.

**3.6** [Steps 1 and 2 are undertaken as part of Stage 1: HRA Screening.]

- Step 3: Under Reg. 105(1), make an Appropriate Assessment of the implications for the Habitats Site in view of its current conservation objectives (the 'Integrity Test'). In so doing, it is mandatory under Reg. 105(2) to consult Natural England, and optional under Reg. 105(3) to take the opinion of the general public.

**3.7** [This step is undertaken during Stage 2: Appropriate Assessment.]

- Step 4: In accordance with Reg. 105(4), but subject to Reg. 107, give effect to the land use plan only after having ascertained that the plan would not adversely affect the integrity of a Habitats Site.

**3.8** [This step follows Stage 2 where a finding of 'no adverse effect' is concluded. If it cannot be, it proceeds to Step 5 as part of Stage 3 of the HRA process].

- Step 5: Under Reg. 107, if Step 4 is unable to rule out adverse effects on the integrity of a Habitats Site and no alternative solutions exist then the competent authority may nevertheless agree to the plan or project if it must be carried out for 'imperative reasons of overriding public interest' (IROPI).

**3.9** [This step is undertaken during Stage 3: Assessment where no alternatives exist, and adverse impacts remain taking into account mitigation].

## Typical stages

**3.10** The following sections summarise the stages and associated tasks and outcomes typically involved in carrying out a full HRA of a development plan, based on various guidance documents [\[See reference 15\]](#) [\[See reference 16\]](#) [\[See reference 17\]](#). This report presents the outputs of the tasks outlined below under Stage 1: HRA Screening and Stage 2: Appropriate Assessment.

### Stage 1: HRA Screening

**3.11** Task:

- Description of the development plan and confirmation that it is not directly connected with or necessary to the management of Habitats Sites.
- Identification of potentially affected Habitats Sites and their conservation objectives [\[See reference 18\]](#).

- Assessment of likely significant effects of the development plan alone or in combination with other plans and projects (without consideration of avoidance or reduction ('mitigation') measures) **[See reference 19]**.

### 3.12 Outcome:

- Where effects are unlikely, prepare a 'finding of no significant effect report'.
- Where effects judged likely, or lack of information to prove otherwise, proceed to Stage 2.

## **Stage 2: Appropriate Assessment (where Stage 1 does not rule out likely significant effects)**

### 3.13 Task:

- Information gathering (development plan and Habitats Sites) **[See reference 20]**.
- Impact prediction.
- Evaluation of development plan impacts in view of conservation objectives of Habitats Sites.
- Where impacts are considered to directly or indirectly affect qualifying features of Habitats Sites, identify how these effects will be avoided or reduced ('mitigation').

### 3.14 Outcome:

- Appropriate assessment report describing the plan, Habitats Site baseline conditions, the adverse effects of the plan on the Habitats Site, how these effects will be avoided or reduced, including the mechanisms and timescale for these mitigation measures.
- If effects remain after all alternatives and mitigation measures have been considered proceed to Stage 3.

## **Stage 3: Assessment where no alternatives exist and adverse impacts remain taking into account mitigation**

### 3.15 Task:

- Identify 'imperative reasons of overriding public interest' (IROPI).

- Demonstrate no alternatives exist.
- Identify potential compensatory measures.

### 3.16 Outcome:

- This stage should be avoided if at all possible. The test of IROPI and the requirements for compensation are extremely onerous.

**3.17** It is normally anticipated that an emphasis on Stages 1 and 2 of this process will, through a series of iterations, help ensure that potential adverse effects are identified and eliminated through the inclusion of mitigation measures designed to avoid or reduce effects. The need to consider alternatives could imply more onerous changes to a plan document. It is generally understood that so called ‘imperative reasons of overriding public interest’ (IROPI) are likely to be justified only very occasionally and would involve engagement with the Government.

## Case law

**3.18** This HRA has been prepared in accordance with relevant case law, including most notably the ‘*People over Wind*’ and ‘*Holohan*’ rulings from the Court of Justice for the European Union (CJEU).

**3.19** The *People over Wind*, *Peter Sweetman v Coillte Teoranta* (April 2018) judgment ruled that Article 6(3) of the Habitats Directive should be interpreted as meaning that mitigation measures should be assessed as part of an Appropriate Assessment and should not be taken into account at the Screening stage. The precise wording of the ruling is as follows:

“Article 6(3) .....must be interpreted as meaning that, 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 measures intended to avoid or reduce the harmful effects of the plan or project on that site.”

**3.20** In light of the above, the HRA Screening stage does not rely upon avoidance or mitigation measures to draw conclusions as to whether the Local Plan could result in likely significant effects on Habitats Sites, with any such measures being considered at the Appropriate Assessment stage as relevant.

**3.21** This HRA is also be undertaken in line with the *Holohan v An Bord Pleanala* (November 2018) judgment which stated that:

“Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that an ‘appropriate assessment’ must, on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site.”

**3.22** In undertaking HRA, LUC considers the potential for effects on species and habitats, including those not listed as qualifying features, to result in secondary effects upon the qualifying features of Habitats Sites, including the potential for complex interactions and dependencies. In addition, the potential for offsite impacts, such as through impacts to functionally linked land, and or species and habitats located beyond the boundaries of Habitats Sites, but which may be important in supporting the ecological processes of the qualifying features, is considered.

**3.23** Similarly, effects on both qualifying and supporting habitats and species on functionally linked land (FLL) or habitat are considered, in line with the High Court judgment in *RSPB and others v Secretary of State and London Ashford Airport Ltd* [2014 EWHC 1523 Admin] (paragraph 27), which stated that:

“There is no authority on the significance of the non-statutory status of the FLL. However, the fact that the FLL was not within a protected site does not mean that the effect which a deterioration in its quality or function could have on a protected site is to be ignored. The indirect effect was still protected. Although the question of its legal status was mooted, I am satisfied .... that while no particular legal status attaches to FLL, the fact that land is functionally linked to protected land means that the indirectly adverse effects on a protected site, produced by effects on FLL, are scrutinised in the same legal framework just as are the direct effects of acts carried out on the protected site itself. That is the only sensible and purposive approach where a species or effect is not confined by a line on a map or boundary fence. This is particularly important where the boundaries of designated sites are drawn tightly as may be the UK practice”.

**3.24** In addition to this, the HRA takes into consideration the ‘*Wealden*’ judgment from the CJEU.

**3.25** *Wealden District Council v Secretary of State for Communities and Local Government, Lewes District Council and South Downs National Park Authority* (2017) ruled that it was not appropriate to scope out the need for a detailed assessment for an individual plan or project based on the annual average daily traffic (AADT) figures detailed in the Design Manual for Roads and Bridges or the critical loads used by Defra or Environmental Agency without considering the in-combination impacts with other plans and projects.

**3.26** In light of this judgment, HRA therefore considers traffic growth based on the effects of development from a development plan in combination with other drivers of growth such as development proposed in neighbouring boroughs and demographic change.

**3.27** The HRA also takes into account the *Grace and Sweetman* (July 2018) judgment from the CJEU which stated that:

“there is a distinction to be drawn between protective measures forming part of a project and intended to avoid or reduce any direct adverse effects that may be caused by the project in order to ensure that the project does not adversely affect the integrity of the area, which are covered by Article 6(3), and measures which, in accordance with Article 6(4), are aimed at compensating for the negative effects of the project on a protected area and cannot be taken into account in the assessment of the implications of the project.”

“As a general rule, any positive effects of the future creation of a new habitat, which is aimed at compensating for the loss of area and quality of that habitat type in a protected area, are highly difficult to forecast with any degree of certainty or will be visible only in the future.”

“A mitigation strategy may only be taken into account at AA (a.6(3)) where the competent authority is “sufficiently certain that a measure will make an effective contribution to avoiding harm, guaranteeing beyond all reasonable doubt that the project will not adversely affect the integrity of the area.”

“Otherwise it falls to be considered to be a compensatory measure to be considered under a.6(4) only where there are: ‘imperative reasons of overriding public interest’”

**3.28** The Appropriate Assessment of the Local Plan therefore only considers the existence of measures to avoid or reduce its direct adverse effects (mitigation) if the expected benefits of those measures are beyond reasonable doubt at the time of the assessment.

## Screening methodology

**3.29** HRA Screening of the Local Plan has been undertaken in line with current available guidance and seeks to meet the requirements of the Habitats Regulations.

**3.30** The purpose of the Screening stage is to:

- Identify all aspects of the plan which would have no effect on a Habitats Site, so that that they can be eliminated from further consideration in respect of this and other plans.
- Identify all aspects of the plan which would not be likely to have a significant effect on a Habitats Site (i.e. would have some effect, because of links/connectivity, but which are not significant), either alone or in combination with other aspects of the same plan or other plans or projects, which therefore do not require Appropriate Assessment.
- Identify those aspects of the plan where it is not possible to rule out the risk of significant effects on a Habitats Site, either alone or in combination with other plans or projects. This provides a clear scope for the parts of the plan that will require appropriate assessment.

**3.31** A risk-based approach, involving the application of the precautionary principle, has been adopted in the assessment, such that a conclusion of ‘no significant effect’ is only reached where it is considered unlikely, based on current knowledge and the information available, that a policy or site allocation would have a significant effect on a Habitats Site.

**3.32** Screening assessment considers the potential for likely significant effects resulting from each policy and site allocation, without taking mitigation (e.g. embedded in policy) into account, in accordance with the 'People over Wind' judgment.

**3.33** For some types of impacts, the potential for likely significant effects can be determined on a proximity basis, using GIS data to determine the proximity of potential development locations to the Habitats Sites that are the subject of the assessment. However, there are many uncertainties associated with using set distances as there are very few standards available as a guide to how far impacts will travel. Therefore, where assumptions have been made or where additional information has been utilised to determine whether the Local Plan is likely to have a significant effect, these are set out in the HRA report.

**3.34 Chapter 5** sets out the screening of the Local Plan policies and site allocations, with further detail in **Appendix C**.

## Potential impacts of the Local Plan on Habitats Sites

**3.35** In our experience of HRA of Local Plans, and based on previous statutory consultee comments on HRAs undertaken elsewhere, the type of development (and related activities) that are permitted by Local Plans have the potential to result in the following broad types of impacts that could affect Habitats Sites:

- **Physical loss of or damage to habitats** e.g. from development or activities within the Habitats Sites themselves or at functionally-linked sites;
- **Non-physical disturbance** e.g. noise, vibration or light from construction or development in close proximity to sensitive species;
- **Air pollution** e.g. from dust, or changes in traffic volumes on roads close to sensitive habitats;
- **Recreation pressure and urban edge effects** e.g. dog walking, cycling, trampling, littering, fire, or predation by pets; and
- **Changes in water quality or quantity** e.g. direct pollution from run-off or accidental spills, changes in flow caused by abstraction, or increase nutrient loading from wastewater treatment.

**3.36** For each of the Local Plan policies and site allocations, consideration is given to the type of development or activity the policy could result in, impacts that could arise from that type of development or activity, and then whether there is an impact pathway to any Habitats Sites sensitive to that impact.

**3.37** Further consideration of the types of impact that could be relevant to the Local Plan and impact pathways to Habitats Sites is provided in **Chapter 5**.

## Identification of Habitats Sites which may be affected by the Local Plan

**3.38** To begin the search of Habitats Sites that could potentially be affected by the Local Plan, it is established practice in HRAs to consider Habitats Sites within the local planning authority area covered by a plan, and also within a buffer distance from the boundary of the plan area.

**3.39** A distance of 15km from the Local Plan area boundary has been used as a starting point to identify Habitats Sites that could be affected by impacts relating to the Local Plan. The use of this distance presents a precautionary approach to the Screening assessment; however, consideration is also given to Habitats Sites beyond this distance that may be functionally connected to the plan area, for example through hydrological pathways.

**3.40** Detailed information about each Habitats Site screened into the HRA is provided in **Appendix A**, described with reference to Standard Data Forms, for the SPAs and SACs, Information Sheets for the Ramsar sites [\[See reference 21\]](#), and Natural England's Site Improvement Plans [\[See reference 22\]](#). Natural England's conservation objectives [\[See reference 23\]](#) and any supplementary advice on conserving and restoring site features for the SPAs and SACs have also been reviewed. A summary of relevant information about those Habitats Sites within 15 km of the district's boundary and those with connectivity to the plan area (for example via river systems); and sites which may have functionally linked habitats is provided in **Chapter 4**.

### Functionally linked habitats

**3.41** The assessment also takes into account areas that may be functionally linked to the Habitats Sites. The term 'functional linkage' can be used to refer to the role or 'function' that land or other habitats beyond the boundary of a Habitats Site might fulfil in supporting the species populations for which the site was designated or classified. Such an area is therefore 'linked' to the site in question because it provides a (potentially important) role in maintaining or restoring a protected population at favourable conservation status.

**3.42** While the boundary of a Habitats Site will usually be drawn to include key supporting habitat for a qualifying species, this cannot always be the case where the population for which a site is designated or classified is particularly mobile. Individuals of the population will not necessarily remain in the site all the time. Sometimes, the mobility of qualifying species is considerable and may extend so far from the key habitat that forms the Habitats Site that it would be

entirely impractical to attempt to designate or classify all of the land or sea that may conceivably be used by the species. HRA therefore considers whether any qualifying species of nearby (or linked) Habitats Sites make use of functionally linked habitats, and the impacts that could affect those habitats.

## Assessment of ‘likely significant effect’

**3.43** As required under Regulation 105 of The Conservation of Habitats and Species Regulations 2017 (SI 2017/1012), as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (SI 2019/579), an assessment has been undertaken of the ‘likely significant effects’ of the policy approaches set out within the emerging Local Plan. The assessment has been undertaken to identify which policies would be likely to have a significant effect on Habitats Sites in Local Plan area (+15km). This assessment will need to be repeated with each HRA iteration of the Local Plan.

**3.44** A risk-based approach involving the application of the precautionary principle has been adopted in the assessment, such that a conclusion of ‘no significant effect’ will only be reached where it is considered very unlikely, based on current knowledge and the information available, that a proposal in the Local Plan would have a significant effect on the integrity of a Habitats Site.

## Interpretation of ‘likely significant effect’

**3.45** Relevant case law helps to interpret when effects should be considered as a Likely Significant Effect (LSE), when carrying out HRA of a development plan.

**3.46** In the Waddenzee case [\[See reference 24\]](#), the European Court of Justice ruled on the interpretation of Article 6(3) of the Habitats Directive (translated into Reg. 102 in the Habitats Regulations), including that:

- An effect should be considered ‘likely’, “if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site” (para 44);
- An effect should be considered ‘significant’, “if it undermines the conservation objectives” (para 48); and
- Where a plan or project has an effect on a site “but is not likely to undermine its conservation objectives, it cannot be considered likely to have a significant effect on the site concerned” (para 47).

**3.47** An opinion delivered to the Court of Justice of the European Union [See [reference 25](#)] commented that:

“The requirement that an effect in question be ‘significant’ exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on the site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.”

**3.48** This opinion (the ‘Sweetman’ case) therefore allows for the authorisation of plans and projects whose possible effects, alone or in combination, can be considered ‘trivial’ or de minimis; referring to such cases as those “which have no appreciable effect on the site”. In practice such effects could be screened out as having no likely significant effect; they would be ‘insignificant’.

**3.49** The HRA Screening assessment therefore considers whether the Local Plan policies could have likely significant effects either alone or in combination.

## In-combination effects

**3.50** Regulation 105 of the Habitats Regulations 2017 requires an Appropriate Assessment where “a land use plan is likely to have a significant effect on a Habitats Site (either alone or in combination with other plans or projects) and is not directly connected with or necessary to the management of the site”. Therefore, the Screening assessment must consider whether any impacts identified from the Local Plan may combine with other plans or projects to give rise to significant effects in-combination.

**3.51** If the HRA Screening determines that the Local Plan will have a particular type of effect (e.g. due to water pollution) on its own but it is not likely to be significant, the in-combination assessment at Screening stage would need to determine whether there may also be the same type of effect from other plans or projects that could combine with the Local Plan to produce a significant effect. If so, this likely significant effect arising from the Local Plan in combination with other plans or projects would then need to be considered through the Appropriate Assessment stage to determine if it would have an adverse effect on integrity of the relevant Habitats Site. However, if the Screening assessment concludes that there is no impact pathway by which development proposed in the Local Plan could affect the conditions necessary to maintain qualifying features of a Habitats Site, then there will be no in-

combination effects to assess at the Screening or Appropriate Assessment stage. This approach accords with recent guidance on HRA [\[See reference 26\]](#).

**3.52** If impact pathways are found to exist for a particular type of effect but it is not likely to be significant from the Local Plan alone, the in-combination assessment will identify which other plans and programmes could result in the same impact on the same Habitats Site. This focusses on planned growth (e.g. housing or employment) around the affected site, or along the impact corridor, for example, if impacts could arise as a result of changes to a waterway, then planned growth in local authorities along that waterway would be considered.

**3.53** Where required, the potential for in-combination impacts therefore focusses on plans prepared by local authorities that overlap with the Habitats Sites that are within the scope of the HRA. The findings of any associated HRA work for those plans would then be reviewed where available. Where relevant, any strategic projects in the area that could have in-combination effects with the Local Plan are also identified and reviewed.

**3.54** The online HRA Handbook suggests the following plans and projects may be relevant to consider as part of the in-combination assessment:

- Applications lodged but not yet determined, including refusals subject to an outstanding appeal or legal challenge;
- Projects subject to periodic review e.g. annual licences, during the time that their renewal is under consideration;
- Projects authorised but not yet started;
- Projects started but not yet completed;
- Known projects that do not require external authorisation;
- Proposals in adopted plans; and
- Proposals in draft plans formally published or submitted for final consultation, examination or adoption.

**3.55** The need for in-combination assessment also arises at the Appropriate Assessment stage, and a similar approach is taken.

## Appropriate Assessment methodology

**3.56** Following the Screening stage, if likely significant effects on the Habitats Site are unable to be ruled out, the plan-making authority is required under

Regulation 105 of the Habitats Regulations 2017 to make an 'Appropriate Assessment' of the implications of the plan for the Habitats Site, in view of their conservation objectives. European Commission Guidance states that the Appropriate Assessment should consider the impacts of the plan (either alone or in combination with other projects or plans) on the integrity of the Habitats Site with respect to their conservation objectives and to their structure and function.

## Assessing the effects on site integrity

**3.57** A site's integrity depends on it being able to sustain its 'qualifying features' (i.e. those Annex 1 habitats, Annex II species, and Annex 1 bird populations for which it has been designated) and to ensure their continued viability. The 'Holohan' judgement also clarifies that effects on species and habitats not listed as qualifying features, but which could result in secondary effects upon the qualifying features of Habitats Sites also need to be considered. The Appropriate Assessment, where required, then builds upon the information set out in Appendix A of this report, to consider the characteristics of supporting habitats and species that could be affected by impacts identified at the Screening stage.

**3.58** A high degree of integrity is considered to exist where the potential to meet a site's conservation objectives is realised and where the site is capable of self-repair and renewal with a minimum of external management support.

**3.59** A conclusion needs to be reached as to whether or not the Local Plan would adversely affect the integrity of the Habitats Site. As stated in the European Commission Guidance, assessing the effects on the site(s) integrity involves considering whether the predicted impacts of the Local Plan policies (either alone or in combination) have the potential to:

- Cause delays to the achievement of conservation objectives for the site;
- Interrupt progress towards the achievement of conservation objectives for the site;
- Disrupt those factors that help to maintain the favourable conditions of the site;
- Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site;
- Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem;

- Change the dynamics of relationships that define the structure or function of the site (e.g. relationships between soil and water, or animals and plants);
- Interfere with anticipated natural changes to the site;
- Reduce the extent of key habitats or the population of key species;
- Reduce the diversity of the site;
- Result in disturbance that could affect the population, density or balance between key species;
- Result in fragmentation; or
- Result in the loss of key features.

**3.60** The conservation objectives for each Habitats Site (**Appendix A**) are generally to maintain the qualifying features in favourable condition. The Site Improvement Plans for each Habitats Site provide an overview of the issues (both current and predicted) affecting the condition of the qualifying features on the site(s) and outline the priority measures required to improve the condition of the features. These have been drawn on to help to understand what is needed to maintain the integrity of the Habitats Site.

**3.61** For each Habitats Site where HRA Screening identified an uncertain or likely significant effect in relation to the Local Plan, the potential impacts are set out and judgements made (based on the information available) regarding whether the impact will have an adverse effect on the integrity of the site. Consideration has been given to the potential for mitigation measures to be implemented that could reduce the likelihood or severity of the potential impacts, such that there would not be an adverse effect on the integrity of the site.

## Chapter 4

### Relevant Habitats Sites

**4.1** This chapter summarises information about Habitats Sites that are:

- within 15km of the Cotswold district boundary;
- any sites beyond that distance with connectivity to the plan area (for example via river systems); and
- any sites for which functionally linked habitats (or land; FLL) may be relevant.

### Habitats Sites within or linked to the plan area

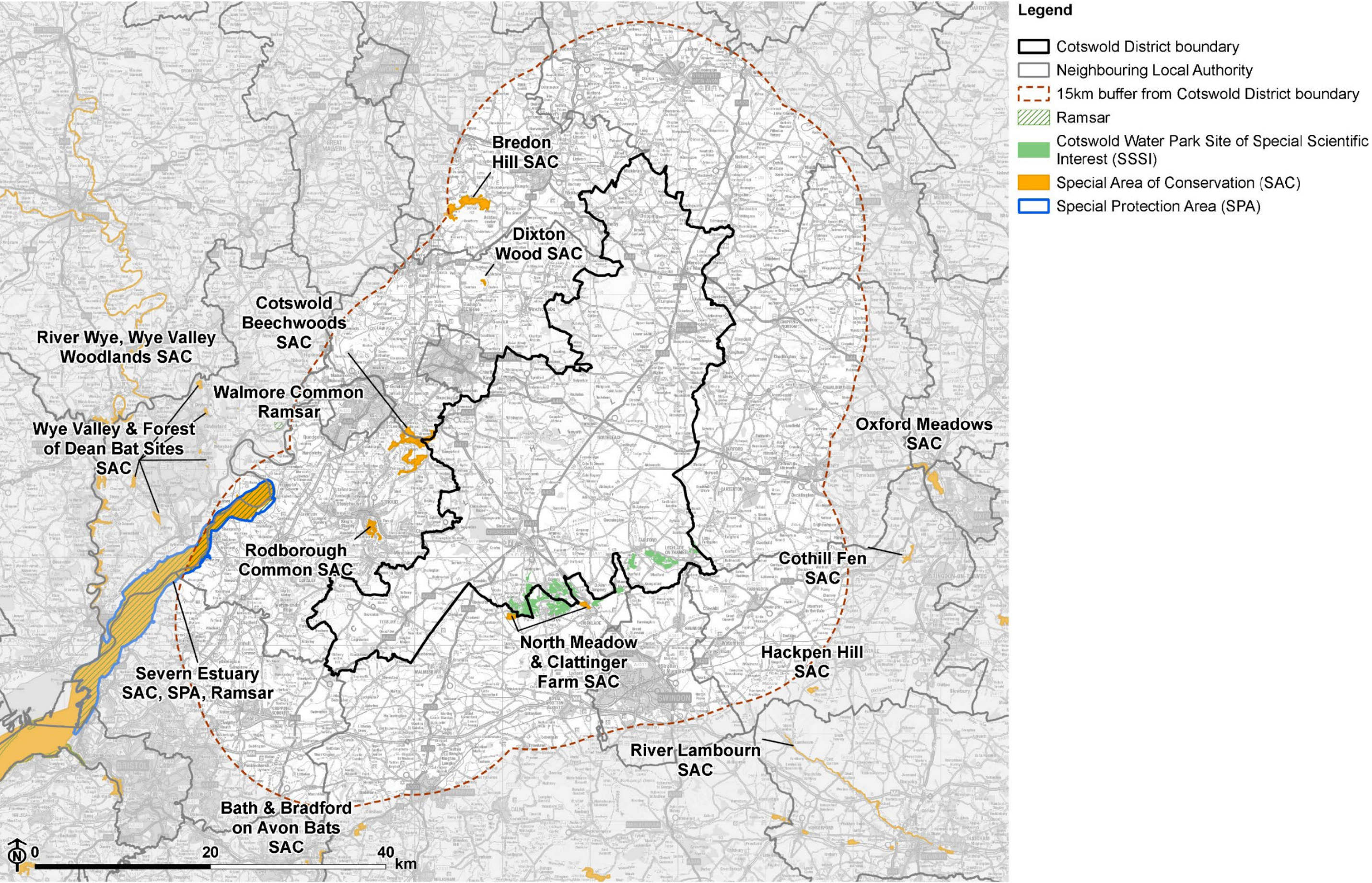
**4.2** The following Habitats Sites are within the plan area or within 15km of it (Figure 4.1), and are therefore scoped into the HRA:

- Cotswold Beechwoods SAC – partially within plan area;
- North Meadow and Clattinger Farm SAC – adjacent to south of plan area;
- Rodborough Common SAC – 2.7km west;
- Dixon Wood SAC – 7.1km west;
- Bredon Hill SAC – 10.1km west; and
- Severn Estuary SAC, SPA & Ramsar – 10.4km west.

**4.3** The following Habitats Site is beyond 15km from the Plan area but is hydrologically connected via the River Evenlode and River Thames:

- Oxford Meadows SAC – 23.9km east.

Figure 4.1: Location of Habitats Sites and Cotswold Water Park SSSI in relation to the Local Plan area



## Functionally linked habitats

**4.4** The following Habitats Sites have mobile species within their qualifying features, which may use habitats outside the designated Habitats Sites:

- Dixon Wood SAC: Violet click beetle;
- Bredon Hill SAC: Violet click beetle;
- Severn Estuary:
  - SAC: Sea lamprey, River lamprey, Twaite shad;
  - SPA: Gadwall, Greater white-fronted goose, Dunlin, Bewick's swan, Common shelduck, Common redshank, waterbird assemblage;
  - Ramsar: Gadwall, Greater white-fronted goose, Dunlin, Bewick's swan, Common shelduck, Common redshank; Atlantic salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad and eel.

**4.5** Further information on the potential for functionally linked habitats (also known as functionally linked land; FLL) associated with the species to be impacted by the Local Plan is set out below. In summary, FLL only needs to be considered in relation to birds of the Severn Estuary SPA/Ramsar and migratory fish of Severn Estuary SAC/Ramsar.

## Invertebrates

**4.6** Dixon Wood and Bredon Hill SACs are designated for violet click-beetle *Limoniscus violaceus*. Habitats located outside of these Habitats Sites may also contribute to maintaining the population of these species.

**4.7** The violet click beetle is very rare and therefore very little is known about the species. Violet click beetles tend to be found in decaying ash or beech trees and are likely to remain in the same trees all of their lives [\[See reference 27\]](#) and the dispersal abilities of this species is considered to be limited [\[See reference 28\]](#). FLL is therefore only likely if woodland within the Habitats Sites extends beyond the boundary of the site. For stag beetles, a precautionary distance of 2km is used to identify potential FLL [\[See reference 29\]](#). Stag beetles are likely to travel further than violet click beetles, which are likely to remain in the same tree all their lives; therefore, applying the same distance to violet click beetle would be unnecessarily precautionary; for violet click beetle, a distance of 500m is considered sufficient.

**4.8** Given the distance of these SACs from the Plan area (>7km), FLL relating to invertebrates does not need to be considered further in this HRA.

## Birds

**4.9** Severn Estuary SPA is designated for non-breeding bewick's swan *Cygnus columbianus bewickii*, common shelduck *Tadorna Tadorna*, gadwall *Anas strepera*, dunlin *Calidris alpina alpina*, common redshank *Tringa tetanus*, and greater white-fronted goose *Anser albifrons albifrons*. The Severn Estuary Ramsar site is designated for its assemblages of international importance which include: bewick's swan *Cygnus columbianus bewickii*, common shelduck *Tadorna Tadorna*, gadwall *Anas strepera*, dunlin *Calidris alpina alpina*, common redshank *Tringa tetanus*, and greater white-fronted goose *Anser albifrons albifrons*.

**4.10** The habitat preferences for qualifying bird species of Severn Estuary SPA and Ramsar includes farmland, grassland, lakes, ponds, wetlands and rivers. Therefore, FLL for qualifying bird species of Severn Estuary SPA and Ramsar is likely to comprise these habitats.

**4.11** To identify habitats used by birds from the Severn Estuary designated sites, Natural England has commissioned studies to identify land with proven or possible functional linkages to the SPA. These studies, by Link Ecology, have been undertaken in phases, for different areas of the estuary.

**4.12** Phase 5 of the study (Gloucestershire and Worcestershire) [\[See reference 30\]](#) confirmed that a number of the qualifying bird species of the Severn Estuary SPA/Ramsar travel away from the designated site and make use of habitats some distance from the SPA/Ramsar site in Gloucestershire and Worcestershire for grazing/roosting. Cotswold District is outside the core area of the study; however, Cotswold Lakes (formerly known as Cotswold Water Park and which are designated as the Cotswold Water Park Site of Special Scientific Interest (SSSI) that includes the lakes around South Cerney, Fairford and Lechlade), in particular, are identified as locations in which the species counts meet or exceed 1% (i.e. a significant proportion) of the SPA population for one or more species; although some species are more widespread across the district. The presence of these species in Cotswold District does not prove that the individuals originated from the SPA/Ramsar; however, the study states that there is likely to be connectivity with Cotswold Lakes and recommends that a separate review of potential functional linkage to Cotswold Lakes is carried out.

**4.13** It is also possible that birds moving between the Severn Estuary SPA/Ramsar and the Cotswold Water Park SSSI make use of habitats around the SSSI, for example arable fields. A review of available information on bird habitat preferences, functional linkages and habitats present in the plan area has been undertaken (see **Appendix E**), to inform an understanding of the bird species that might make use of FLL and where that could occur. The FLL assessment has identified that the following qualifying species of the SPA/Ramsar could rely on habitats within the plan area:

- Bewick's swan – wetlands; arable fields.
- Common shelduck – lakes.
- Gadwall – slow freshwater; flooded grassland.
- Greater white-fronted goose – wet grassland; arable fields.
- Lesser black-backed gull – landfills; farmland.
- Herring gull – urban landfills.
- Eurasian curlew – mudflats; wet grassland.
- Eurasian wigeon – shallow wetlands; grazed grassland.
- Northern shoveler – shallow wetlands; flooded fields.
- Spotted redshank – lagoons mudflats; flooded fields.
- Northern pintail – freshwater wetlands; inundated fields.
- Lapwing – wet grassland; arable farmland.

**4.14** Given the likely functional linkage between Severn Estuary SPA, the Cotswold Lakes, and potentially other habitats within the District, Severn Estuary SPA and Ramsar have been scoped in for further assessment to determine whether the plan will result in likely significant effects on the qualifying bird species as a result of the loss of FLL.

## Fish

**4.15** The Severn Estuary SAC and Ramsar is designated for Atlantic salmon *Salmo salar*, sea trout *Salmon trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *Alosa fallax* and eel *Anguilla Anguilla*.

**4.16** All of these species are migratory and therefore have the potential to be dependent upon watercourses located outside the boundaries of the SAC and Ramsar but with functional hydrological connectivity.

**4.17** The Severn Estuary is a key migration route to their spawning grounds in the many tributaries that flow into the estuary. Salmon, river lamprey, twaite shad, allis shad, sea trout, eel, and sea lamprey are migratory and therefore have the potential to be dependent upon watercourses located outside the boundaries of the SAC/Ramsar but with functional hydrological connectivity. Brook lamprey and bullhead are reliant on a mosaic of aquatic habitats, potentially including areas outside of the relevant SAC/Ramsar boundaries.

**4.18** Significant functionally linked habitats are likely to be only larger tributaries of the Severn, as well as smaller ditches and rhines near to the Severn Estuary SAC/Ramsar.

**4.19** The River Frome (near Stroud) forms part of the boundary of Cotswold District, and the upper reaches of River Chelt (near Cheltenham) extend into the Plan area. Both rivers flow into the Severn, which means that the Severn Estuary SAC and Ramsar is hydrologically connected to the Plan area. Taking a precautionary approach, potential for effects on FLL associated with fish from the Severn Estuary SAC / Ramsar therefore require further assessment.

## Chapter 5

### HRA Screening

**5.1** This chapter sets out the assumptions applied to the HRA Screening of impacts and considers which of the Local Plan policies and site allocations could have a likely significant effect on a Habitats Site. Further details of the screening assessment are provided in **Appendix C**.

### Physical damage or loss of habitat

**5.2** Any development resulting from the Local Plan would take place within the District. Therefore, only Habitats Sites within or immediately adjacent to the District's boundary could be affected through physical damage or loss of habitat within the Habitats Site's boundaries. Only Cotswold Beechwoods SAC (small area of SAC is within the district) and North Meadow & Clattinger Farm SAC (immediately adjacent to District boundary) have the potential to be affected by physical damage and/or loss from development, directly.

**5.3** Habitat loss from development in areas outside of the Habitats Site boundaries may also result where development occurs within or immediately adjacent to potential FLL; i.e. rivers, lakes or adjacent habitats used by birds or fish from the Severn Estuary SAC, SPA or Ramsar.

**5.4** There are no site allocations within or immediately adjacent to Habitats Sites or rivers that could be used by fish from the Severn Estuary SAC, SPA or Ramsar site. However, the following policies allow for some rural and/or windfall development that could in theory be located within or immediately adjacent to Cotswold Beechwoods SAC or North Meadow and Clattinger Farm SAC, or FLL used by birds/fish from Severn Estuary SAC/SPA/Ramsar:

- Core Policy 27 Net Zero Carbon New Buildings.
- Core Policy 28 Renewable and Low Carbon Energy Generation, Storage and Transmission.
- Core Policy 45 Gypsy and Traveller Accommodation: defines the two locations for gypsy and traveller accommodation.
- Core Policy 46 New Employment Development: identifies broad locations for employment development (assessed in relation to site allocations) and permits some windfall development outside development boundaries.
- Core Policy 49 Development of Tourist Facilities and Visitor Attractions.

- Core Policy 50 Tourist and Visitor Accommodation.
- Core Policy 72 Social and Community Infrastructure.
- Development Policy 1 Affordable Housing on Rural Exception Sites: Sets out the circumstances in which windfall development would be permitted in rural areas.
- Development Policy 3 Dwellings for Rural Workers Outside Development Boundaries: Allows some small scale development within rural areas.
- Development Policy 6 Rural Diversification: permits development in rural areas.
- Development Policy 8 New Agricultural and Forestry Development: permits development in rural areas.
- Development Policy 9 Equestrian Related Development: permits development in rural areas.

**5.5** An assessment has also been undertaken of the suitability of the Local Plan site allocations to contain habitats used by birds from the Severn Estuary and be functionally linked to the Severn Estuary SPA/Ramsar (see **Appendix E**). This has identified that the following site allocations have high potential to be FLL:

- F53A - Land at Totterdown Hill, Horcott.
- F20A - Land south-east of Fairford.
- Strategic site: Fairford - Land north east of Fairford.

**5.6** The following site allocations have moderate potential to be FLL:

- Strategic site: Cirencester - Steadings southern extension.
- Strategic site: Cirencester - Land east of Kingshill Lane.
- Strategic site: Cirencester - Land south east of Cirencester and south of Preston.
- Strategic site: Siddington - Land south west of Siddington.
- Strategic site: Driffield - Land south of Driffield.
- Strategic site: Down Ampney - Land surrounding Down Ampney.
- SD15 – Siddington, Plummers Farm, east of Ashton Road.

- SD17 – Siddington, Land east of Siddington Road and west of Bluebell Drive.
- SD23 – Siddington, Land between disused canal and disused railway line, north of Park Way.
- F52/F39C - Land west of Terminus Cottage and Station Cottage.
- L19 - Land south of Butler's Court.
- L33 - Land south of Ferrers Park.

**5.7** All other site allocations have been assessed either as negligible/low potential, or were not subject to detailed assessment as they are not considered to be in locations where FLL is possible.

**5.8** In addition to the site allocations, the following policies permit development that could result in damage or loss of bird FLL:

- Core Policy 11 Special Policy Areas – Royal Agricultural University.
- Core Policy 15 Cotswold Airport.
- Core Policy 16 Thames and Severn Canal.
- Core Policy 17 The River Thames.
- Core Policy 18 Cotswold Lakes: Post Mineral Extraction After Use.

In summary, there is potential for likely significant effects at Cotswold Beechwoods SAC (directly), North Meadow & Clattinger Farm SAC (directly) and Severn Estuary SAC/SPA/Ramsar (indirectly, via bird/fish FLL) due to physical damage or loss habitats. These may be significant due to the Local Plan alone.

## Non-physical disturbance

**5.9** Noise and vibration effects, e.g. during the construction of new housing or other development, are most likely to disturb bird species and are thus a key consideration with respect to Habitats Sites where birds are the qualifying features, although such effects may also impact upon some mammals and fish species. Artificial lighting at night (e.g. from street lamps, flood lighting and security lights) is most likely to affect bat populations and some nocturnal bird species, and therefore have an adverse effect on the integrity of Habitats Sites where bats or nocturnal birds are a qualifying feature.

**5.10** It has been assumed (on a precautionary basis and based on our experience of previous HRAs and consultation with Natural England) that the effects of noise, vibration and light pollution are capable of causing an adverse effect if development takes place within 500m of a Habitats Site (or functionally linked habitat) with qualifying features sensitive to these disturbances.

**5.11** All Habitats Sites either do not support species likely to be significantly affected as a result of noise, vibration and light pollution and/or are located over 500m from the Plan area at the closest point.

**5.12** However, the following qualifying species may use functionally linked habitat within the Plan area:

- Bird species of Severn Estuary SPA and Ramsar.
- Migratory fish species of Severn Estuary SAC and Ramsar.

**5.13** Migratory fish species are unlikely to be significantly affected as a result of noise, vibration and light pollution resulting from the Local Plan and there are no site allocations within 500m of a river that is hydrologically connected to the Severn Estuary. This impact pathway is not considered further.

**5.14** Non-physical disturbance can also adversely affect birds at functionally linked habitats, if the disturbance is of a sufficient scale to harm the population of species at the linked Habitats Site (the Severn Estuary SPA/Ramsar). For birds, the key FLL within the district is Cotswold Water Park SSSI. There are other habitats that have potential to be FLL (see **Appendix E**), but these are common within the district and it is unlikely that localised urban edge effects from development at these habitats would have a significant effect on the SPA/Ramsar.

**5.15** The following site allocations and policy areas are within 500m of the Cotswold Water Park SSSI:

- Strategic site: Siddington - Land south west of Siddington.
- SD15 Plummers Farm, east of Ashton Road.
- R644 Driffield (part of strategic site: Land south of Driffield).
- Core Policy 17 The River Thames.
- Core Policy 18 Cotswold Lakes: Post Mineral Extraction After Use.

**5.16** In addition, the policies listed in paragraph 5.4 allow for some rural and/or windfall development that could in theory be located within 500m of Cotswold Water Park SSSI and could result in non-physical disturbance.

In summary, there is the potential for likely significant effects at Severn Estuary SAC/SPA/Ramsar (indirectly, via bird FLL) due to non-physical disturbance. These may be significant due to the Local Plan alone.

## Bird strike

**5.17** Wind turbines and aircraft have the potential to impact upon birds from the Severn Estuary SPA/Ramsar site, where the development is in areas where birds could be flying between, for example, Severn Estuary SPA/Ramsar and Cotswold Water Park SSSI (e.g. in proximity to functionally linked habitats; although the flight routes are not known).

**5.18** Wind turbine development could be permitted under the following policies:

- Core Policy 28: Renewable and Low Carbon Energy Generation, Storage and Transmission.
- Core Policy 29: Wind Energy Development.

**5.19** Airfield development could be permitted under the following:

- Core Policy 15 Cotswold Airport.

**5.20** Land use changes at sites in proximity to existing airfields (Cotswold Airport near Kemble, and RAF Fairford) also have the potential to increase the risk of bird strike to birds of the Severn Estuary SPA/Ramsar, for example the creation of new habitats within a development could attract birds.

There is the potential for likely significant effects at Severn Estuary SPA / Ramsar (via bird functionally linked habitats) as a result of bird strike. These are likely to be significant due to the Local Plan alone.

## Air pollution

**5.21** Air pollution is most likely to affect Habitats Sites where plant, soil and water habitats are the qualifying features, but some qualifying animal species may also be affected, either directly or indirectly, by any deterioration in habitat as a result of air pollution. Deposition of pollutants to the ground and vegetation can alter the characteristics of the soil, affecting the pH and nitrogen (N) availability that can then affect plant health, productivity and species

composition; dust can also smother habitats and increase the turbidity of water. All of the sites have plant species and/or water habitats as their qualifying feature.

## Vehicle emissions

**5.22** In terms of vehicle traffic, nitrogen deposition, acid deposition, nitrogen oxides (NO<sub>x</sub>, i.e. NO and NO<sub>2</sub>) and ammonia (NH<sub>3</sub>) are considered to be the key pollutants.

**5.23** Based on the Highways Agency Design Manual for Road and Bridges (DMRB) Document LA105: Air Quality [\[See reference 31\]](#), which was produced to provide advice regarding the design, assessment and operation of trunk roads (including motorways), it is assumed that air pollution from roads is unlikely to be significant beyond 200m from the road itself. Where increases in traffic volumes are forecast, this 200m buffer needs to be applied to the relevant roads in order to make a judgement about the likely geographical extent of air pollution impacts (the 'affected road network').

**5.24** The JNCC's 'Guidance on decision making thresholds for air pollution' [\[See reference 32\]](#) states that "For the purpose of decision-making, unless local circumstances support a wider zone, plan HRA should take account of the potential effects of traffic emissions on European sites located within 10 km of the plan boundary."

**5.25** The DMRB Guidance for the assessment of local air quality in relation to highways developments provides criteria that should be applied to ascertain whether there are likely to be significant impacts associated with routes or corridors. Based on the DMRB guidance, affected roads which should be assessed are those where:

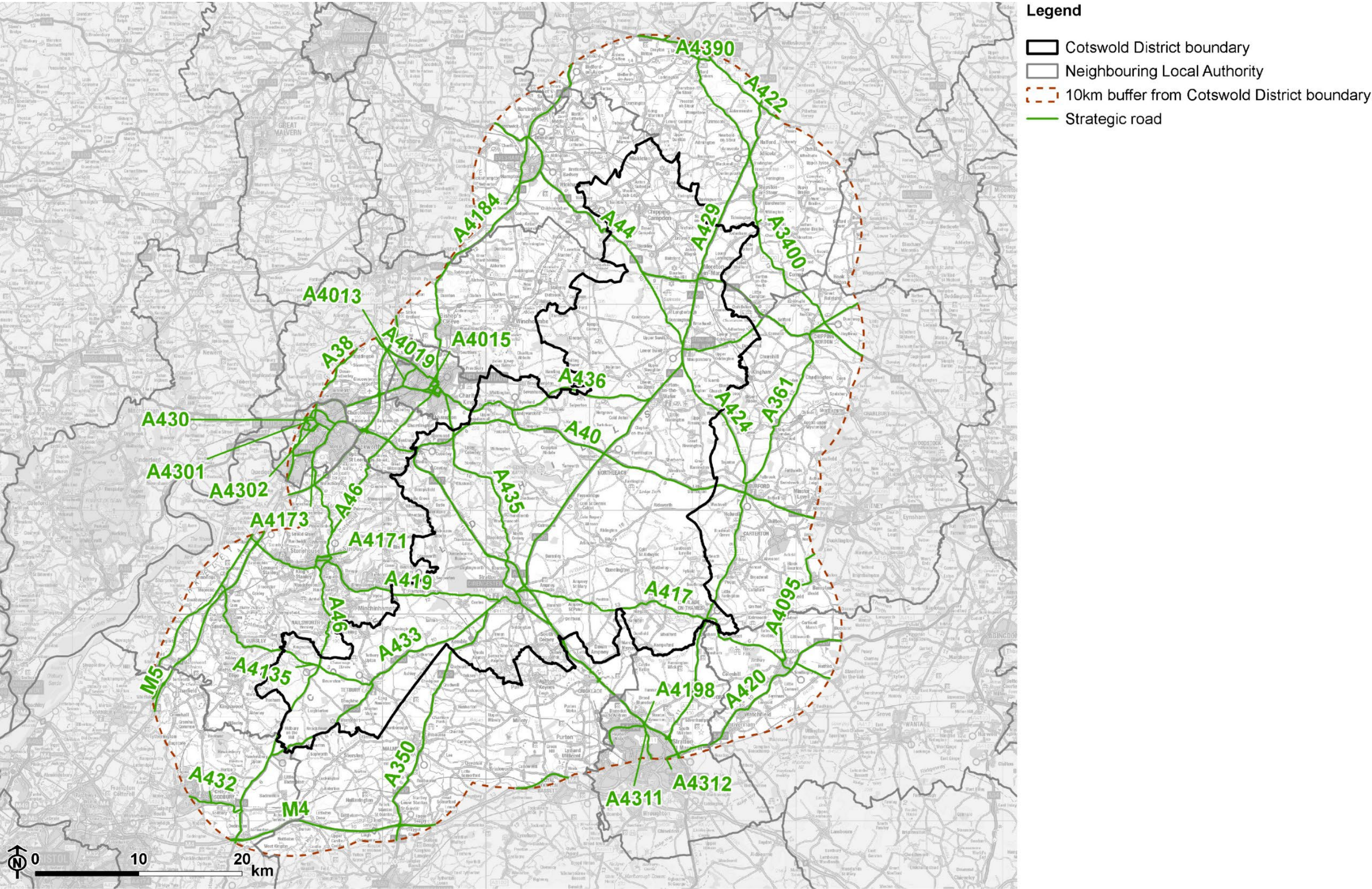
- Daily traffic flows will change by 1,000 AADT (Annual Average Daily Traffic) or more; or
- Heavy duty vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more; or
- Road alignment will change by 5 m or more.

**5.26** In line with the Wealden judgment [\[See reference 33\]](#), in-combination air pollution effects must be screened using the same criteria. The implication of the judgment is that, where the road traffic effects of other plans or projects are

known or can be reasonably estimated (including those of adopted plans or consented projects), then these should be included in road traffic modelling by the local authority whose local plan or project is being assessed. The screening criteria of 1,000 AADT should then be applied to the traffic flows of the plans in combination.

**5.27** It is usually only those roads forming part of the primary road network (motorways and 'A' roads) that might be likely to experience any significant increases in vehicle traffic as a result of development (i.e. greater than 1,000 AADT etc.), although there are exceptions; the affected road network is confirmed as part of the traffic assessment. The primary road network in Cotswold district is shown on **Figure 5.1**.

Figure 5.1: Key strategic roads within Cotswold District and within 10km



**5.28** Strategic roads within 200m of Habitats Sites and within 10km of the plan area are:

- Cotswold Beechwoods SAC: A46 (and potentially B4070).
- North Meadow and Clattinger Farm SAC: A419.
- Rodborough Common SAC: A46.

**5.29** All of the other Habitats Sites are situated over 10km from the plan area or 200m from strategic roads and have therefore been scoped out. Potential FLL within the plan area primarily comprise water habitats and arable fields (see paragraphs 4.13 & 4.17, and Appendix E), which are not highly sensitive to air pollution. It is unlikely that air pollution from vehicles would degrade these habitats to the extent that the population of birds/fish at Severn Estuary SAC/SPA/Ramsar would be affected. Therefore, there are no additional roads that need to be screened in to assess FLL.

**5.30** Development in any part of the district could contribute to traffic on the identified roads, in-combination, therefore all of the Local Plan site allocations could contribute to air pollution from vehicle emissions. The following policies are associated with the site allocations and overall quantum of development:

- Core Policy 2: Meeting Housing Needs in Cotswold District: Strategic Sites
- Core Policy 3: Meeting Housing Needs in Cotswold District: Non-Strategic Sites
- Core Policy 5: Meeting Business and Employment Needs in Cotswold District

**5.31** Traffic data that models the effects of the Local Plan on traffic flows, for roads within 200m of Habitats Sites, has been provided by City Science. Traffic flows have been modelled in relation to the baseline traffic flow in 2024, in relation to two scenarios:

- the future baseline traffic flow in 2043 with general background growth including other neighbouring Local Plans (i.e. without the development proposed in the Local Plan) – this informs the in-combination assessment; and
- the above, plus the development proposed within the Local Plan – this informs the assessment of the Local Plan alone.

**5.32** The data is summarised in **Table 5.1** below. Traffic flows on road links that exceed the screening threshold of 1,000 AADT are shown in bold.

**Table 5.1: Changes in traffic flow (AADT) for all vehicles, due to the Local Plan alone and in combination (Cotswold Beechwoods SAC)**

| Road                                      | Baseline traffic flow (2024)                            | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|-------------------------------------------|---------------------------------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| B4070 south of Birdlip                    | 9,748                                                   | 11,770                              | 12,855                          | 1,085                          | 3,107                                   |
| B4070 east of Sheeps-combe                | 2,535 (south of Calf Way)<br>10,021 (north of Calf Way) | 3,904<br>11,987                     | 4,518<br>13,059                 | 614<br>1,072                   | 1,983<br>3,038                          |
| Calf Way (off B4070 east of Sheeps-combe) | 8,574                                                   | 9,182                               | 9,646                           | 464                            | 1,073                                   |
| B4070 south of Sheeps-combe               | 2,422                                                   | 4,100                               | 4,754                           | 654                            | 2,332                                   |
| A46 at Cranham Corner                     | 6,829 (north of junction)<br>6,805 (south of junction)  | 7,628<br>7,687                      | 7,677<br>7,744                  | 49<br>57                       | 848<br>939                              |

**Table 5.2: Changes in traffic flow (AADT) for all vehicles, due to the Local Plan alone and in combination (North Meadow & Clattinger Farm SAC)**

| Road                                                                    | Baseline traffic flow (2024) | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|-------------------------------------------------------------------------|------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| A419 north of Cricklade (two carriage-ways, either side of High Street) | 21,710                       | 28,278                              | 31,154                          | 2,876                          | 9,444                                   |
|                                                                         | 28,102                       | 35,125                              | 39,709                          | 4,583                          | 11,607                                  |
|                                                                         | 28,717                       | 38,566                              | 41,749                          | 3,184                          | 13,032                                  |
|                                                                         | 28,102                       | 35,125                              | 39,709                          | 4,583                          | 11,607                                  |
| High Street, north of Cricklade (slip road onto A419)                   | 3,190                        | 3,673                               | 4,650                           | 977                            | 1,460                                   |
| The Street, north of Cricklade (parallel to A419)                       | 391                          | 890                                 | 4,226                           | 3,336                          | 3,836                                   |

**Table 5.3: Changes in traffic flow (AADT) for all vehicles, due to the Local Plan alone and in combination (Rodborough Common SAC)**

| Road                          | Baseline traffic flow (2024) | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|-------------------------------|------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| A46 Bath Road at Wood-chester | 18,589 (north of Selsey Rd)  | 20,036                              | 20,776                          | 740                            | 2,274                                   |
|                               | 17,397 (south of Selsey Rd)  | 18,871                              | 19,670                          | 800                            | 2,187                                   |

| Road                                                      | Baseline traffic flow (2024)                           | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|-----------------------------------------------------------|--------------------------------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| Selsey Road, Wood-chester                                 | 1,239                                                  | 1,745                               | 1,729                           | 6                              | 512                                     |
| Butterow Hill                                             | 4,038 (north of junction)<br>3,466 (south of junction) | 4,785<br>3,936                      | 4,984<br>3,896                  | 199<br>-40                     | 946<br>429                              |
| Rodbor-ough Common (Spine Road)                           | 10,589 (west of junction)<br>8,535 (east of junction)  | 11,921<br>9,195                     | 12,941<br>9,898                 | 1,021<br>703                   | 2,353<br>1,346                          |
| Unnamed road between Butterow Hill and Rodbor-ough Common | 1,573                                                  | 2,263                               | 2,578                           | 315                            | 1,005                                   |

**Table 5.4: Changes in traffic flow (AADT) for Heavy Duty Vehicles (HDVs), due to the Local Plan alone and in combination (Cotswold Beechwoods SAC)**

| Road                       | Baseline traffic flow (2024) | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|----------------------------|------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| B4070 south of Birdlip     | 201                          | 218                                 | 244                             | 25                             | 42                                      |
| B4070 east of Sheeps-combe | 225                          | 236                                 | 262                             | 26                             | 37                                      |

| Road                                       | Baseline traffic flow (2024) | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|--------------------------------------------|------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
|                                            | 104                          | 150                                 | 162                             | 12                             | 58                                      |
| Calf Way (off B4070 south of Sheeps-combe) | 140                          | 107                                 | 122                             | 15                             | -18                                     |
| B4070 south of Sheeps-combe                | 93                           | 143                                 | 155                             | 12                             | 61                                      |
| A46 at Cranham Corner                      | 246<br>266                   | 126<br>140                          | 134<br>148                      | 7<br>8                         | -112<br>-118                            |

**Table 5.5: Changes in traffic flow (AADT) for Heavy Duty Vehicles (HDVs), due to the Local Plan alone and in combination (North Meadow & Clattinger Farm SAC)**

| Road                                                  | Baseline traffic flow (2024)     | Future baseline traffic flow (2043) | Future baseline with Local Plan  | Change due to Local Plan alone | Change due to Local Plan in combination |
|-------------------------------------------------------|----------------------------------|-------------------------------------|----------------------------------|--------------------------------|-----------------------------------------|
| A419 north of Cricklade                               | 2,287<br>2,568<br>2,089<br>2,568 | 2,323<br>2,581<br>2,408<br>2,581    | 2,440<br>2,766<br>2,816<br>2,766 | 117<br>185<br>409<br>185       | 153<br>198<br>728<br>198                |
| High Street, north of Cricklade (slip road onto A419) | 161                              | 130                                 | 192                              | 63                             | 31                                      |

| Road                                              | Baseline traffic flow (2024) | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|---------------------------------------------------|------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| The Street, north of Cricklade (parallel to A419) | 55                           | 38                                  | 66                              | 29                             | 11                                      |

**Table 5.6: Changes in traffic flow (AADT) for Heavy Duty Vehicles (HDVs), due to the Local Plan alone and in combination (Rodborough Common SAC)**

| Road                                                     | Baseline traffic flow (2024) | Future baseline traffic flow (2043) | Future baseline with Local Plan | Change due to Local Plan alone | Change due to Local Plan in combination |
|----------------------------------------------------------|------------------------------|-------------------------------------|---------------------------------|--------------------------------|-----------------------------------------|
| A46 Bath Road at Wood-chester                            | 951                          | 922                                 | 943                             | 22                             | -5                                      |
|                                                          | 926                          | 900                                 | 922                             | 21                             | -8                                      |
| Selsey Road, Wood-chester                                | 25                           | 22                                  | 22                              | -1                             | -3                                      |
| Butterow Hill                                            | 128                          | 118                                 | 116                             | -2                             | -12                                     |
|                                                          | 175                          | 167                                 | 166                             | -1                             | -9                                      |
| Rodborough Common (Spine Road)                           | 310                          | 257                                 | 274                             | 17                             | -36                                     |
|                                                          | 228                          | 175                                 | 191                             | 16                             | -37                                     |
| Unnamed road between Butterow Hill and Rodborough Common | 79                           | 81                                  | 82                              | 1                              | 2                                       |

**5.33** Due to the changes in AADT exceeding the screening thresholds for a number of roads, AECOM have undertaken an air quality assessment (see **Appendix F**), to model nitrogen (N) deposition, nitrogen oxides (NO<sub>x</sub>), ammonia (NH<sub>3</sub>) and acid deposition. The modelling screens the predicted levels of these pollutants, due to the Local Plan alone and in-combination against the screening criteria of 1% of the critical load/level. There are no exceedances of the screening criteria for NO<sub>x</sub> or acid deposition, but some exceedances for nitrogen deposition and ammonia. The data in Table 5.7 has been provided by AECOM and shows the maximum distances from the roads that the screening criteria (1% of critical load/level) are exceeded, for nitrogen deposition and ammonia.

**Table 5.7: Maximum distance from road that exceeds 1% critical load**

| Habitats Site             | Road              | Transect | LP alone - N dep | LP alone - NH <sub>3</sub> | In comb. - N dep | In comb. - NH <sub>3</sub> |
|---------------------------|-------------------|----------|------------------|----------------------------|------------------|----------------------------|
| North Meadow & Clattinger | A419              | ET1      | 200m             | 200m                       | 200m             | 200m                       |
| Rodborough                | Spine Road w      | ET2      | -                | -                          | 0.04m            | 20m                        |
| Rodborough                | Spine Road e      | ET3      | -                | 0.03m                      | 0.03m            | 50m                        |
| Rodborough                | A46 / Selsey Road | ET7      | -                | -                          | -                | -                          |
| Cotswold Beechwoods       | B4070 Buckholt    | ET4      | 30m              | 40m                        | 90m              | 110m                       |
| Cotswold Beechwoods       | B4070 Birdlip     | ET5      | -                | -                          | 100m             | 120m                       |
| Cotswold Beechwoods       | B4070 Sheepscombe | ET6      | -                | -                          | 70m              | 80m                        |

**5.34** Other locations did not exceed the screening criteria.

**5.35** Likely significant effects are therefore predicted at the following locations:

- Cotswold Beechwoods SAC: B4070 at Buckholt, due to the Local Plan alone (and in combination); and on the B4070 at Birdlip and Sheepscombe, due to the Local Plan in combination with other plans and projects only.
- North Meadow & Clattinger Farm SAC: A419, due to the Local Plan alone (and in combination).

- Rodborough Common SAC: Rodborough Common (Spine Road), due to Local Plan alone for NH3 and in combination with other plans and projects for nitrogen deposition.

**5.36** The effect of these increases in nitrogen deposition and ammonia are set out in Chapter 6, with further detail available in **Appendix F**.

In summary, there is the potential for likely significant effects at Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, and Rodborough Common SAC (all directly), due to air pollution from vehicle emissions. These will be significant due to the Local Plan alone.

## Dust

**5.37** The effects of dust are most likely to be significant at qualifying features sensitive to dust, such as riparian and wetland habitats, or sites designated for habitats and plant species.

**5.38** The effects of dust deposition in terrestrial habitats are relevant to Cotswold Beechwoods SAC and North Meadow and Clattinger Farm SAC. The effects of dust deposition to the water environment are relevant to functionally linked habitat within the Cotswold District Boundary that is used by:

- Bird species of Severn Estuary SPA and Ramsar.
- Migratory fish species of Severn Estuary SAC and Ramsar.

**5.39** There are no major sources of operational dust emissions (e.g. minerals extraction) proposed in the Local Plan; however, construction work for new development can involve temporary dust emissions. Large particles will mostly deposit close to the source and the assumption is that the vast majority of dust deposition would occur within 100m, although some smaller particles may travel up to 200-500m **[See reference 34]**. Therefore, significant effects on Habitats Sites from dust are unlikely beyond 100m.

**5.40** As the effects are temporary and local, it is considered unlikely that dust deposition from construction would affect FLL to the extent that there was a likely significant effect at a Habitats Site.

**5.41** There are no site allocations within 100m of the SACs; however, the following policy area is:

- Core Policy 18 Cotswold Lakes: Post Mineral Extraction After Use – within 500m of North Meadow & Clattinger Farm SAC.

**5.42** Some rural and/or windfall development (associated with the policies listed in paragraph 5.4) could also in theory be located within 100m one of the SACs, but this would be small in scale and unlikely to result in likely significant effects due to dust.

There is the potential for likely significant effects at North Meadow & Clattinger Farm SAC (both directly), due to air pollution from dust. These may be significant due to the Local Plan alone or in combination.

## Recreation pressure and urban edge effects

**5.43** Recreational activities and human presence can result in significant effects on Habitats Sites as a result of erosion and trampling, or disturbance to sensitive features, such as birds through both terrestrial and water-based forms of recreation. The proximity of urban development to Habitats Sites can also result in significant effects due to fire and vandalism, as well an increase in invasive species and pet predation. For example, research has shown that habitats close to urban areas can have higher densities of mammalian predators such as foxes [See reference 35] and that there is an increase in the numbers of crows and magpies on sites with greater human activity [See reference 36].

**5.44** The Local Plan will result in housing growth and associated population increase, which will in turn increase visits to accessible greenspaces.

**5.45** Habitats Sites with qualifying bird species are likely to be particularly susceptible to recreational disturbances from walking, dog walking, angling, illegal use of off-road vehicles and motorbikes, wildfowling (shooting wildfowl), and water sports. An increase in recreational pressure from development therefore has the potential to disturb bird populations of SPA and Ramsar sites as a result of both terrestrial and water-based recreation.

**5.46** In addition, recreation can physically damage habitat as a result of trampling and also through erosion associated with boat wash (e.g. associated with increased boat moorings and traffic) and terrestrial activities such as use of vehicles.

## Recreation pressure

**5.47** Each Habitats Site will typically have a 'Zone of Influence' (ZOI) within which increases in population would be expected to result in likely significant effects at sensitive sites. ZOIs are usually established following targeted visitor surveys and the findings are therefore typically specific to each Habitats Site (and often to specific areas within a Habitats Site). ZOIs are typically based on the distance that 75% of visitors travel from.

**5.48** At Cotswold Beechwoods SAC, a ZOI of 15.4km is used, based on work by Stroud District Council [\[See reference 37\]](#). The ZOI for Rodborough Common SAC is 3.9km, also based on work by Stroud District Council [\[See reference 38\]](#).

**5.49** At Oxford Meadows SAC, a ZOI of 7km is suggested, based on 2025 work by LUC in the HRA Screening of the West Oxfordshire Local Plan [\[See reference 39\]](#). This is based on ZOIs of similar sites elsewhere.

**5.50** For North Meadow & Clattinger Farm SAC, the ZOI was established through work by Cotswold District Council and neighbouring authorities and is set out in the North Meadow & Clattinger Farm interim recreation mitigation strategy [\[See reference 40\]](#). The strategy states that: “The Clattinger Farm SSSI component of the SAC is managed by the Wiltshire Wildlife Trust. Access to the area is through a visitor centre and is carefully managed by the Trust. At North Meadow, which is Common Land, the public have access on foot over the whole area, unlike at Clattinger Farm where the Trust can open and close areas and routes. The habitats at Clattinger Farm are not considered to be subjected to damaging recreational pressures at present and the site is therefore not considered further in this Interim Mitigation Strategy”. For the North Meadow, Cricklade SSSI component of the SAC, the following ZOIs have been established:

- Year round users: 4.2km; and
- Seasonal summer visitors (snakes head fritillary season): 9.4km.

**5.51** At Severn Estuary SAC/SPA/Ramsar, a ZOI of 12.6km has been established through work by Stroud District Council [\[See reference 41\]](#) and South Gloucestershire Council [\[See reference 42\]](#).

**5.52** Where the ZOIs are based on visitor survey work and the Habitats Sites have mitigation strategies (all of the above except Oxford Meadows SAC), any residential development within the ZOI is considered to have a likely significant effect. Taking a precautionary approach, this assumption has also been applied to Oxford Meadows SAC.

**5.53** The following Habitats Sites have been scoped out of further assessment:

- Bredon Hill SAC – not identified as sensitive to recreation pressure within the SAC's Site Improvement Plan or Supplementary Advice for Conservation Objectives [See reference 43].
- Dixon Wood SAC – does not have public access.

**5.54** Recreational disturbance can also adversely affect qualifying features at functionally linked habitats, if the disturbance is of a sufficient scale to harm the population of species at the linked Habitats Sites. Potential FLL within the district may be used by:

- Bird species of Severn Estuary SPA and Ramsar (e.g. at Cotswold Water Park).
- Migratory fish species of Severn Estuary SAC and Ramsar (e.g. River Frome, River Chelt).

**5.55** A general increase in population due to new development would not be expected to cause a significant increase in recreational activity that could affect fish. Direct recreational activities in rivers, e.g. fishing, are carefully controlled or licensed; the effects of recreation pressure on fish habitat used by species from the Severn Estuary SAC and Ramsar are therefore screened out.

**5.56** Bird species are more susceptible to disturbance from recreation and therefore the effects of recreation pressure at the Cotswold Water Park (where functionally linked to the Severn Estuary SPA/Ramsar) have been scoped in as a precaution. Other bird FLL is primarily habitats without public access (e.g. arable fields) and does not need to be considered in relation to recreation pressure. While ZOIs for Habitats Sites are sometimes applied to their associated FLL, this is usually the case where the FLL is near to the Habitats Site and likely to be subject to similar recreation pressure. The Cotswold Lakes are c.29km from the Severn Estuary SPA/Ramsar and likely to have very different patterns of visitor travel and access. The SPA/Ramsar bird populations are also less sensitive to recreation pressure at FLL than from direct impacts within the SPA/Ramsar; i.e. recreation pressure at FLL is less likely to prevent the conservation objectives at the SPA/Ramsar from being met.

**5.57** There is no visitor survey information available for Cotswold Water Park SSSI, but it is a popular site for visitors. Taking a very precautionary approach, it is assumed that all of the residential site allocations in the south of the district could increase recreation pressure at the Cotswold Water Park SSSI. These site allocations are all within c.15km of the SSSI, whereas the site allocations in the north of the district are >30km and are not likely to increase recreation pressure at the SSSI (and therefore impact the Severn Estuary SPA/Ramsar bird species).

**5.58 Table 5.8** summarises the ZOIs used in this assessment.

**Table 5.8: Zones of Influence (ZOIs) used**

| Habitats Site                               | ZOI                                                         |
|---------------------------------------------|-------------------------------------------------------------|
| Cotswold Beechwoods SAC                     | 15.4km                                                      |
| North Meadow and Clattinger Farm SAC        | 4.2km year round / 9.4km seasonal visitors                  |
| Rodborough Common SAC                       | 3.9km                                                       |
| Oxford Meadows SAC                          | 7.0km                                                       |
| Severn Estuary SAC, SPA and Ramsar (direct) | 12.6km from Severn Estuary SAC/SPA/Ramsar                   |
| Severn Estuary SPA/Ramsar (via FLL)         | n/a (all residential site allocations in south of district) |

**5.59** The ZOI for Oxford Meadows SAC does not extend into the Cotswold District boundary and impacts on this site can be screened out.

**5.60** Only a very small area of the district is within the ZOI for Rodborough Common or the ZOI for Severn Estuary SAC/SPA/Ramsar, and there are no site allocations in these areas. Rural development / windfall (see paragraph 5.4) could in theory result in residential development within the ZOI/s but would be small scale. Impacts on these sites are screened in as a precaution.

**5.61** The following site allocations are within the ZOIs of Habitats Sites:

- Cotswold Beechwoods SAC: A2, C71, C81B, K7A, K15, T31B, T71A, K7B.; and strategic sites: Steadings southern extension, New settlement at Cotswold Airport, and Land south west of Kemble.
- North Meadow & Clattinger Farm SAC (4.2km): strategic sites: Land south of Driffield, and Land surrounding Down Ampney.
- North Meadow & Clattinger Farm SAC (9.4km): C81B, F20A, F29C, F52, F53A, R203A-C, R607, SD15, SD17, SD23; and strategic sites: Steadings southern extension, Land east of Kingshill Lane, Land south east of Cirencester and south of Preston, Land south west of Siddington, Land south of Driffield, Land surrounding Down Ampney, and Land north east of Fairford.

**5.62** Residential (or other overnight) development in these locations is associated with the following policies:

- Core Policy 2 Meeting Housing Needs in Cotswold District

- Core Policy 3 Meeting Housing Needs in Cotswold District
- Core Policy 49 Development of Tourist Facilities and Visitor Attractions
- Core Policy 50 Tourist and Visitor Accommodation

In summary, there is the potential for likely significant effects at Cotswold Beechwoods SAC (directly), North Meadow & Clattinger Farm (directly), Rodborough Common SAC (directly) and Severn Estuary SPA/Ramsar (directly; and indirectly via bird FLL), due to recreation pressure. These are likely to be significant due to the Local Plan in combination with other plans, for example residential development proposed in the Stroud, South Gloucestershire and Wiltshire Local Plan.

## Urban edge effects

**5.63** Urban edge effects (e.g. vandalism, litter, vermin or pet predation) occur where residential development is in close proximity to Habitats Sites. Similarly to non-physical disturbance, it is assumed that these effects are most likely to be significant where residential development is within 500m of a Habitats Site; i.e. within 500m of Cotswold Beechwoods SAC or North Meadow & Clattinger Farm SAC.

**5.64** There are no site allocations within 500m of Cotswold Beechwoods SAC or North Meadow & Clattinger Farm SAC. Windfall/rural development could fall within 500m of either SAC (associated with the policies list in paragraph 5.4); however, the small scale and rural nature of this development is unlikely to result in significant urban effects.

**5.65** Urban edge effects can also adversely affect birds at functionally linked habitats, if the impact is of a sufficient scale to harm the population of species at the linked Habitats Site (the Severn Estuary SPA/Ramsar). For birds, the key FLL within the district is Cotswold Water Park SSSI. There are other habitats that have potential to be FLL (see Appendix E), but these are common within the district and it is unlikely that localised urban edge effects at these habitats would have a significant effect on the SPA/Ramsar.

**5.66** The following site allocations and policy areas are within 500m of the Cotswold Water Park SSSI:

- Strategic site: Siddington - Land south west of Siddington.
- Strategic site: Land south of Driffield.

- SD15 Plummers Farm, east of Ashton Road.
- Core Policy 17 The River Thames.
- Core Policy 18 Cotswold Lakes: Post Mineral Extraction After Use.

**5.67** In addition, the policies listed in paragraph 5.4 allow for some rural and/or windfall development that could in theory be located within 500m of Cotswold Water Park SSSI and could result in urban edge effects.

In summary, there are no likely significant effects associated with urban edge effects at Cotswold Beechwoods SAC or North Meadow & Clattinger Farm SAC, as a result of urban edge effects. This impact has been screened out.

## Water quantity and quality

**5.68** All of the Habitats Sites have qualifying features that have some potential to be sensitive to changes in water quantity or quality. However, the Habitats Sites with the potential to be significantly affected by changes in water quantity or quality are likely to be sites that lie within the district or sites with wetland habitats or species, that are hydrologically connected to the district.

**5.69** The following Habitats Sites have wetland habitats, are sensitive to changes in water quality or quantity, and also have connectivity to the Plan area:

- Severn Estuary SAC, SPA and Ramsar – connected via River Frome, River Chelt and tributaries (Ozleworth Brook, Nailsworth Stream, Bretforton Brook and Broadway-Badsey Brook). Water is abstracted from the Severn to supply the district. FLL associated with this site's fish and bird species may also be affected by direct run-off, abstraction or discharge.
- Oxford Meadows SAC – connected via River Evenlode and River Thames. Water is abstracted from the Thames to supply the district and wastewater from Cotswold district is discharged into tributaries of the Thames, upstream of the SAC.
- North Meadow and Clattinger Farm SAC – connected via Cerney Wick Brook and River Churn. The sensitivity of the site to hydrological change is primarily related to the flooding regime [See reference 44], but water quality of flood waters (due to wastewater treatment or direct pollution) can affect the meadow habitats.

**5.70** In addition, Cotswold Beechwoods SAC is screened in as a precaution as it is within the district and could be affected by direct run-off, although it does not have wetland habitats.

**5.71** The following Habitats Sites are screened out:

- Rodborough Common SAC – lies close to but uphill from the River Frome and Nailsworth Stream, so no direct connectivity to the Plan area. The site has no wetland habitats.
- Dixon Wood SAC – moist clay soils support the qualifying features but there are no abstraction licences impacting the site [See reference 45] and no other hydrological connectivity.
- Bredon Hill SAC – moist soils support the qualifying features [See reference 46], but the site does not overlay the same aquifer/s as the Plan area; there is no other hydrological connectivity.

## Direct pollution

**5.72** Direct run-off or deposition of pollutants, for example during construction, could have a significant effect on a Habitats Site where development occurs immediately adjacent to or upstream of a site or FLL (if the pollution incident is sufficient to prevent birds/fish from a Habitats Site from using that habitat).

**5.73** There are no site allocations near to and upstream of Cotswolds Beechwoods SAC, North Meadow & Clattinger Farm SAC or Oxford Meadows SAC; although windfall/rural development could occur near to the SACs (associated with the policies in paragraph 5.4). The scale of impact from windfall development is likely to be small but is screened in as a precaution.

**5.74** Waterbodies in the Local Plan area that are potentially functionally linked to Habitats Sites are the Cotswold Water Park SSSI (Severn Estuary SPA/Ramsar birds) and the River Frome near Stroud and River Chelt near Cheltenham (Severn Estuary SAC/Ramsar fish).

**5.75** There are no site allocations in proximity to the River Frome. One site allocation at Andoversford (A2) is c.200m from the River Chelt. This single development, which is c.200m from the river and >20km upstream of the River Severn (and any windfall development) is unlikely to have a significant effect on SAC/Ramsar fish species. This impact pathway is not considered further.

**5.76** Development that is adjacent to the Cotswold Water Park SSSI could result in pollution that could indirectly affect Severn Estuary SPA/Ramsar bird species. The

following site allocations and policy areas have the potential to result in direct pollution at the Cotswold Water Park SSSI:

- Fairford: F53A, F20A, F39C, F52, and part of strategic site: Land north east of Fairford.
- Lechlade-on-Thames: L33.
- Cerney Wick: R644 (part of strategic site: Land south of Driffield).
- Core Policy 17 The River Thames.
- Core Policy 18 Cotswold Lakes: Post Mineral Extraction After Use.

**5.77** Windfall / rural development (see paragraph 5.4) in these areas or other locations near to the SSSI (e.g. Somerset Keynes) could also result in direct pollution that could affect Severn Estuary SPA/Ramsar bird species.

**5.78** Although direct pollution from individual development on the Cotswold Water Park SSSI is unlikely to be of a scale that is significant to the Severn Estuary SPA/Ramsar, the potential in-combination effects from multiple developments are screened in as a precaution.

There is the potential for likely significant effects at Cotswold Beechwoods SAC (directly), North Meadow & Clattinger Farm (directly), Oxford Meadows SAC (directly) and Severn Estuary SPA/Ramsar (indirectly, via bird FLL), due to direct pollution. These are likely to be significant due to the Local Plan alone (at the SACs) and in combination with other plans e.g. development in South Gloucestershire or Stroud Local Plans that is near the estuary (at the SPA/Ramsar).

## Wastewater treatment

**5.79** Thames Water manages wastewater collection and treatment for most of Cotswold District. Wessex Water is responsible for wastewater in the southwest corner of the district (around Tetbury); and Severn Trent Water is responsible for wastewater treatment in small areas along the western edge and north of the district (around Avening, Birdlip, and Chipping Campden).

**5.80** The following wastewater treatment works serve the district:

- Severn Trent Water (River Avon catchment): Blockley, Chipping Campden, Willersley, Mickleton. Hydrologically linked to the River Severn SAC/SPA/Ramsar (and FLL used by fish from the SAC/Ramsar).

- Thames Water (River Thames catchment): Ampney St Peter, Andoversford, Bourton on the Water, Broadwell, Cirencester, Fairford, Lechlade, Moreton-in-Marsh, Northleach. Hydrologically linked to Oxford Meadows SAC, North Meadow & Clattinger Farm SAC, and FLL used by birds of Severn Estuary SPA/Ramsar (Cotswold Water Park SSSI).
- Wessex Water (River Avon catchment): Tetbury. Hydrologically linked to the River Severn SAC/SPA/Ramsar (and FLL used by fish from the SAC/Ramsar).

**5.81** All of the Local Plan site allocations therefore have the potential to contribute to impacts from wastewater, as all of the wastewater treatment works serving the district are hydrologically connected to one or more Habitats Sites and/or bird FLL.

**5.82** Policies that could contribute to an increased demand for wastewater treatment are:

- Core Policy 2 Meeting Housing Needs in Cotswold District.
- Core Policy 3 Meeting Housing Needs in Cotswold District.
- Core Policy 5 Meeting Business and Employment Needs in Cotswold District.
- Core Policy 11 Special Policy Areas – Royal Agricultural University: Supports the expansion / redevelopment of the existing campus and sets out what a masterplan is expected.
- Core Policy 15 Cotswold Airport: supports aviation-related development (and safeguards existing uses).
- Core Policy 18 Cotswold Lakes: Post-Mineral Extraction After Use: permits leisure/recreation development on former mineral extraction sites.
- Core Policy 24: Special Policy Area – Campden BRI.
- Core Policy 25: Special Policy Area – Fire Service College.
- Core Policy 49 Development of Tourist Facilities and Visitor Attractions.
- Core Policy 50 Tourist and Visitor Accommodation.
- Core Policy 72 Social and Community Infrastructure.
- The policies that permit windfall development (see paragraph 5.4).

There is the potential for likely significant effects at North Meadow & Clattinger Farm SAC (directly), Oxford Meadows SAC (directly), Severn Estuary SAC (directly), SAC/Ramsar (indirectly; via fish FLL) and SPA/Ramsar (indirectly; via

bird FLL), due to wastewater treatment. These are likely to be significant due to the Local Plan alone.

## Water abstraction

**5.83** Water supply in the district is as follows:

- Thames Water: supplies most of the district.
- Bristol Water: supplies the southwest corner of the district, including Tetbury.
- Severn Trent Water: supplies some western parts of the district, including Chipping Campden, Cowley and Birdlip.

**5.84** Water supplied to Cotswold District comes from a mix of groundwater, rivers (Severn and Thames) and reservoirs. The Severn Estuary SAC/SPA/Ramsar and Oxford Meadows SAC are linked to the Plan area via surface waterbodies: Oxford Meadows SAC via the River Thames (Thames Water); and Severn Estuary SAC/Ramsar (and SPA indirectly) via the River Severn (Bristol Water & Severn Trent Water). Development could therefore increase abstraction that affects these sites. No water is supplied from water bodies in Cotswold Lakes and the tributaries of the River Severn/Thames are not a significant source of water supply; therefore, there are no likely significant effects on North Meadow & Clattinger Farm SAC or on bird FLL.

**5.85** The majority of the site allocations are in the Thames Water-served areas of the district; therefore, the impacts are most likely to be significant at Oxford Meadows SAC. The Severn Estuary is tidal but water volumes in the upstream river could affect its habitats via, for example, the salinity and nutrient balance; and there may be FLL used by fish in freshwater tributaries from which water is abstracted. Impacts on the Severn Estuary SAC/Ramsar have been screened in as a precaution. Abstraction is unlikely to impact the estuary to the extent that the SPA/Ramsar bird species are significantly affected.

**5.86** All of the Local Plan site allocations therefore have the potential to contribute to impacts from abstraction. The policies that would contribute to these impacts are as set out in paragraph 5.82.

There is the potential for likely significant effects at Oxford Meadows SAC and Severn Estuary SAC/Ramsar (directly, and indirectly via fish FLL), due to water abstraction. These are likely to be significant due to the Local Plan alone.

## Summary of screening findings

**5.87** The HRA screening was able to rule out likely significant effects in relation to the following impact pathways, which have therefore been screened out:

- Urban edge effects.

**5.88** All impact pathways were also screened out for the following two Habitats Sites:

- Bredon Hill SAC; and
- Dixon Wood SAC.

**5.89** The screening findings for all other impact pathways are summarised below. Impacts are listed as either 'no impact pathway', 'no likely significant effect' (there is an impact pathway but the scale is sufficiently small that significant effects can be ruled out from the Local Plan alone and in-combination), or 'likely significant effects'.

### Physical damage and loss of habitat:

- No impact pathway (screened out): Oxford Meadows SAC, Rodborough Common SAC and direct impacts at Severn Estuary SAC/SPA/Ramsar.
- Likely significant effects (screened in): Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, and Severn Estuary SAC/SPA/Ramsar (bird/fish FLL).

### Non-physical disturbance

- No impact pathway (screened out): Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, Oxford Meadows SAC, Rodborough Common SAC and direct impacts at Severn Estuary SAC/SPA/Ramsar.
- No likely significant effects (screened out): Severn Estuary SPA/Ramsar (fish FLL).
- Likely significant effects (screened in): Severn Estuary SAC/Ramsar (bird FLL).

### Bird strike

- No impact pathway (screened out): Oxford Meadows SAC, Rodborough Common SAC Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, Severn Estuary SAC (directly and fish FLL).

- Likely significant effects (screened in): Severn Estuary SPA/Ramsar (directly and bird FLL).

## Air pollution – vehicle emissions

- No likely significant effects (screened out): Oxford Meadows SAC, Severn Estuary SAC/SPA/Ramsar.
- Likely significant effects (screened in): Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC and Rodborough Common SAC.

## Air pollution – dust

- No impact pathway (screened out): Cotswold Beechwoods SAC, Oxford Meadows SAC, Rodborough Common SAC, Severn Estuary SAC/SPA/Ramsar (directly and fish FLL).
- No likely significant effects (screened out): Severn Estuary SPA/Ramsar (bird FLL).
- Likely significant effects (screened in): North Meadows & Clattinger Farm SAC.

## Recreation pressure

- No likely significant effects (screened out): Oxford Meadows SAC and Severn Estuary SAC/Ramsar (fish FLL).
- Likely significant effects (screened in): Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, Rodborough Common SAC, Severn Estuary SAC/SPA/Ramsar (directly and bird FLL).

## Water quality – direct pollution

- No impact pathway (screened out): Rodborough Common SAC.
- No likely significant effects: Severn Estuary SAC/SPA/Ramsar (directly and fish FLL).
- Likely significant effects (screened in): Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, Oxford Meadows SAC and Severn Estuary SPA/Ramsar (bird FLL).

## Water quality / quantity– wastewater treatment

- No impact pathway (screened out): Cotswold Beechwoods SAC and Rodborough Common SAC.
- Likely significant effects (screened in): North Meadow & Clattinger Farm SAC, Oxford Meadows SAC, Severn Estuary SAC/SPA/Ramsar (directly and bird/fish FLL).

## Water quality / quantity – abstraction

- No impact pathway (screened out): Cotswold Beechwoods SAC and Rodborough Common SAC.
- No likely significant effects (screened out): North Meadow & Clattinger Farm SAC and Severn Estuary SPA/Ramsar (bird FLL).
- Likely significant effects (screened in): Oxford Meadows SAC and Severn Estuary SAC/Ramsar (directly and fish FLL).

**5.90** The following policies and all of the plan's site allocations would contribute to one or more of these impact pathways:

- Core Policy 2 Meeting Housing Needs in Cotswold District: Strategic Sites: specifies the scale and location of new strategic housing.
- Core Policy 3 Meeting Housing Needs in Cotswold District: non-Strategic Sites: Specifies the scale and location of non-strategic housing.
- Core Policy 5 Meeting Business and Employment Needs in Cotswold District: specifies the scale and location of opportunities for economic growth to ensure that sufficient new jobs are provided across Cotswold in appropriate locations.
- Core Policy 11 Special Policy Areas – Royal Agricultural University: Supports the expansion / redevelopment of the existing campus and sets out what a masterplan is expected.
- Core Policy 15 Cotswold Airport: supports aviation-related development (and safeguards existing uses).
- Core Policy 16 Thames and Severn Canal: supports development impacting the Canal and towpath.
- Core Policy 17 The River Thames: supports proposals for increased moorings and development related to sport and recreation.

- Core Policy 18 Cotswold Lakes: Post-Mineral Extraction After Use: permits leisure/recreation development on former mineral extraction sites.
- Core Policy 23 Former Cheltenham to Stratford-Upon-Avon Railway Line: permits restoration and reinstatement of railway between Broadway and Honeybourne.
- Core Policy 24: Special Policy Area – Campden BRI: Identifies the type of development suitable at this site and sets out the expectations for masterplans at these locations.
- Core Policy 25: Special Policy Area – Fire Service College: Identifies the type of development suitable at this site and sets out the expectations for masterplans at these locations.
- Core Policy 27 Net Zero Carbon New Buildings: requires all new development to include on-site renewable energy – non-physical disturbance, bird strike.
- Core Policy 28 Renewable and Low Carbon Energy Generation, Storage and Transmission: permits renewable energy and energy storage development – non-physical disturbance, bird strike.
- Core Policy 45 Gypsy and Traveller Accommodation: defines the two locations for gypsy and traveller accommodation.
- Core Policy 46 New Employment Development: identifies broad locations for employment development (assessed in relation to site allocations) and permits some windfall development outside development boundaries.
- Core Policy 49 Development of Tourist Facilities and Visitor Attractions: policy supports proposals for facilities and attractions where they meet requirements – recreation pressure, air pollution, water quality/quantity, and location-based impacts e.g. loss of habitat.
- Core Policy 50 Tourist and Visitor Accommodation: permits new or extended hotels and serviced accommodation in settlement centres – recreation pressure, air pollution, water quality/quantity, and location-based impacts e.g. loss of habitat.
- Core Policy 72 Social and Community Infrastructure: permits new social and community facilities – air pollution, water quality/quantity, and location-based impacts e.g. loss of habitat.
- Development Policy 1 Affordable Housing on Rural Exception Sites: Sets out the circumstances in which windfall development would be permitted in rural areas.

- Development Policy 3 Dwellings for Rural Workers Outside Development Boundaries: Allows some small scale development within rural areas.
- Development Policy 6 Rural Diversification: permits development in rural areas.
- Development Policy 8 New Agricultural and Forestry Development: permits development in rural areas.
- Development Policy 9 Equestrian Related Development: permits development in rural areas.

## Chapter 6

### Appropriate Assessment

**6.1** The Appropriate Assessment provides a more detailed assessment of the likely significant effects identified during the Screening stage. It considers whether, once mitigation is taken into account, there will be adverse effects on the integrity of a Habitats Site.

**6.2** The main policy in the Local Plan that provides mitigation for impacts at Habitats Sites is Core Policy 60 Biodiversity and Geodiversity. This policy states that:

Development proposals will be supported where they protect and enhance sites internationally, nationally and/ or locally designated for their importance to natura conservation, ecological or geological value as well as non-designated sites of ecological or geological value. An ecological survey is required to be submitted with the application if the proposed development affects or has the potential to affect any site of biodiversity or geodiversity interest, including:

- any internationally designated Habitats Sites including Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site
- any nationally designated site, for example: SSSI's and National Nature Reserves
- any locally designated site, for example: Local Wildlife Sites
- priority habitats, and
- protected species:
- special on the Red Data list of threatened species
- habitats suitable for protected species or species on the Red Data list.

#### **Habitats Sites**

The highest level of protection will be given to Habitats Sites (formerly known as European Sites). Development will not be permitted if it would adversely affect the integrity of a Habitats Site either alone or in combination with other developments. Proposals having a harmful impact on the integrity of Habitats Sites that cannot be avoided or adequately mitigated will not be permitted.

To mitigate the impacts of development on the Cotswold Beechwoods SAC and the North Meadow and Clattinger Farm SAC, financial contributions can be

secured to fund the mitigation measures identified in the adopted strategies. Alternatively, applicants may submit their own shadow Habitats Regulations Assessment (HRA), demonstrating the likely recreational impacts arising from the development and setting out the mitigation measures that will be implemented for the lifetime of the development to address those impacts.

Mitigation will be required for all new development resulting in a net increase in housing and/or holiday accommodation within the identified Zones of Influence, as shown on the Policies Map and Figure 13.1, including Permitted Development which is required to comply with the Habitats Regulations.

### **Other Biodiversity and Geodiversity**

Development proposals which would result in significant harm to any other biodiversity or geodiversity interest will only be considered for approval after alternative sites that would result in less or no harm have been considered. In the absence of alternative available sites development proposals must include adequate mitigation measures. Where harm cannot be prevented or adequately mitigated against, appropriate compensation measures will be sought.

To ensure that mitigation or compensation measures take place, which may include Biodiversity Offsetting, these will be secured by conditions or planning obligations and will need to include financial support for continued maintenance.

If significant harm to biodiversity or geodiversity cannot be adequately mitigated against, or compensated for, permission will be refused.

The design of development should incorporate measures to improve the biodiversity and geodiversity of the development site. Such measures should include making a contribution to the network of biodiversity sites, including open spaces and green infrastructure and water bodies which make links between habitats and support wildlife. Measures should also attempt to link wildlife habitats together, improving access to, between and across them. These measures will be secured by conditions or planning obligations and many need to include a biodiversity management plan and financial support for continued maintenance.

A biosecurity protocol method statement will be required for all development proposals where there is potential to impact sites protected for biodiversity importance to ensure the introduction of invasive non-native species of both flora and fauna is prevented.

Measures to enhance biodiversity should be designed so as not to increase the risk from bird strike to the operation of aircraft at Kemble Airport and RAF Fairford. Where appropriate, the implementation of a bird hazard management plan will be secured by condition of planning obligation

### Irreplaceable Habitats

Development resulting in the loss or deterioration of irreplaceable habitats, according to the latest Defra Biodiversity Metric, will be refused, save for where exceptional circumstances are demonstrated and appropriate mitigation and compensation is provided, including but not limited to:

- Ancient Woodland
- Coastal and Floodplain Grazing Marsh
- Lowland Meadows
- Chalk Rivers/ Streams
- Ancient or Veteran Trees.

**6.3** A number of other policies also provide safeguards that are relevant to specific impact pathways. These are identified in the sections below.

## Physical damage and loss of habitat

**6.4** The HRA screening identified the potential for likely significant effects from damage or loss of habitat at Cotswold Beechwoods SAC (directly), North Meadow & Clattinger Farm SAC (directly) and Severn Estuary SAC/SPA/Ramsar (indirectly, via bird/fish FLL). These may be significant due to the Local Plan alone.

**6.5** Direct impacts would occur if development took place within or immediately adjacent to Cotswolds Beechwoods SAC or North Meadow & Clattinger Farm SAC. In practice, this would not be permitted due to Core Policy 60 (see paragraph 6.2), which states that “Development will not be permitted if it would adversely affect the integrity of a Habitats Site either alone or in combination with other developments”.

**6.6** Impacts on FLL would occur if development takes place at site allocations (or windfall development locations) that have moderate or high potential to be used by birds from Severn Estuary SPA/Ramsar, or windfall development immediately adjacent to watercourses hydrologically linked and used by fish from Severn Estuary SAC/Ramsar.

**6.7** Core Policy 60 provides some general protection to FLL via the protection of Habitats Sites themselves and biodiversity more generally, for example in relation to priority habitats. The policy also requires ecological surveys where development has the potential to affect Habitats Sites. Additional safeguards are provided within:

- Core Policy 65 Watercourses: “Development of land that contains or is close to, for example 10m, to a watercourse must protect and where possible, enhance the function and setting of the watercourse and its biodiversity. As a last resort development should provide mitigation for any unavoidable impacts. Development should include a 10m buffer zone along a watercourse to conserve and enhance biodiversity. Where a 10m wide buffer zone is not demonstrably possible, a suitable mitigation strategy will be required to prevent harm to biodiversity. Where possible the strategy should also include ecological enhancement to the watercourse.” This provides protection for habitats that could be FLL used by fish.
- Development Policy 10 Trees, Hedgerows and Woodlands: provides protection for ancient woodland, hedgerows and woodlands, which are one of the types of habitat that could be FLL used by birds.

**6.8** The policies are sufficient to avoid direct impacts from physical damage and loss of habitat, and impacts on FLL used by fish from Severn Estuary SAC/Ramsar. They are also sufficient to avoid adverse effects on bird FLL associated with Severn Estuary SPA/Ramsar from windfall development, as windfall development would be small scale and unlikely to contribute to significant in-combination effects, but any impacts associated with the sites alone would be mitigated by the policies; the general provisions in Core Policy 60 would be sufficient to ensure protection/enhancement/compensation of ecological features generally. Core Policy 65 (and to a lesser extent Development Policy 10) would also reduce the risk of impacts on FLL used by birds from Severn Estuary SPA/Ramsar.

**6.9** However, in relation to bird FLL associated with Severn Estuary SPA/Ramsar, adverse effects on integrity could occur, unless more targeted mitigation is provided in the Local Plan. The HRA recommended that policies or development frameworks for site allocations that have been identified as having moderate or high potential to be used by birds from Severn Estuary SPA/Ramsar (listed in **Appendix E** and **Chapter 7**) contain a requirement for ecological survey to determine the site’s suitability to be habitat used by Bewick’s swan, common shelduck, gadwall, greater white-fronted goose, lesser black-backed gull, herring gull, Eurasian curlew, Eurasian wigeon, northern shoveler, spotted redshank, northern pintail, or lapwing. If the site is of moderate or high suitability, over-wintering bird surveys will be required to confirm whether the site is likely to be functionally linked to the SPA/Ramsar. Sites that are functionally linked will require mitigation, which could include compensatory habitats

on or off site. This recommendation has been addressed in the Regulation 19 Local Plan in a general requirement for the strategic site allocations at the start of Appendix B of the Local Plan, and in the individual Site Development Templates for non-strategic site allocations in Appendix C of the Local Plan.

**6.10** The habitats that SPA/Ramsar birds are likely to use within the plan area are common and widespread; and all of the site allocations that have been identified as being of moderate or high potential to be FLL are arable fields. The nature of land use rotation on farmland is such that birds will readily use an available resource, even if available only temporarily; therefore, they are resilient and adaptable to some change. The suitability of sites for use by SPA/Ramsar bird species can change quickly, e.g. due to changes in land management, crops planted, and drainage. It is therefore appropriate for mitigation to be identified at the time of a planning application, so that survey information is up to date. Incorporation of this requirement for bird survey, and if necessary, mitigation within the Local Plan appendices, provides sufficient mitigation for potential in-combination effects of physical damage/loss of bird FLL on a site by site basis.

**6.11** It was also recommended that Policy 60 was revised to state: “The highest level of protection will be given to Habitat Sites (formerly known as European Sites). Development will not be permitted if it would adversely affect the integrity of a Habitats Site either alone or in combination with other developments, and directly or via functionally linked habitats.” This recommendation has been addressed in the Regulation 19 Local Plan.

There will be no adverse effects on the integrity of Cotswolds Beechwoods SAC or North Meadow & Clattinger Farm SAC; or Severn Estuary SAC/Ramsar via fish FLL; or Severn Estuary SPA/Ramsar via bird FLL, due to physical damage and loss of habitat.

## Non-physical disturbance

**6.12** The HRA screening identified the potential for likely significant effects from non-physical disturbance on bird species from Severn Estuary SPA/Ramsar (indirectly, at bird FLL). These may be significant due to the Local Plan alone.

**6.13** Impacts on FLL would occur if development takes place at allocated sites (or windfall development locations) that have moderate or high potential to be used by birds from Severn Estuary SPA/Ramsar or are within 500m of locations with moderate/high potential (including within 500m of Cotswold Water Park SSSI). These sites are identified in **Appendix E**.

**6.14** Core Policy 60 provides protection to FLL via the protection of Habitats Sites themselves and biodiversity more generally, for example in relation to priority habitats. The policy also requires ecological surveys where development has the potential to affect Habitats Sites. Additional safeguards are provided within:

- Core Policy 66: Pollution and Contaminated Land – states that development will only be permitted if it does not result in unacceptable risk to health or the natural environment from “generation of noise or light levels, or other disturbance such as spillage, flicker, vibration, dust or smell”.
- Development Policy 11 Dark Skies – Requires developments with external lighting to minimise light spill/trespass, avoid adverse effects on biodiversity and maintain dark corridors along watercourses, woodland edges and hedgerows.

**6.15** These are considered sufficient safeguards to avoid adverse effects from non-physical disturbance.

There will be no adverse effects on the integrity of Severn Estuary SAC/Ramsar via bird FLL, due to non-physical disturbance.

## Bird strike

**6.16** The HRA screening identified the potential for likely significant effects at Severn Estuary SPA/Ramsar (and near to associated bird functionally linked habitats) as a result of bird strike. These are likely to be significant due to the Local Plan alone.

**6.17** Wind turbines and aircraft permitted by the Local Plan have the potential to increase the risk of bird strike through collision where birds are flying between designated sites (e.g. Severn Estuary SPA/Ramsar and Cotswold Water Park SSSI), particularly where development is located within or close to functionally linked habitats, although specific flight routes are uncertain. Land use changes designed to enhance biodiversity at sites near to existing airfields in Kemble and Fairford may also attract birds and increase the risk of bird strike.

**6.18** Core Policy 60: Biodiversity and Geodiversity provides general protection for Habitats Sites and would ensure that development that would have an adverse effect on a Habitats Site would not be permitted. The policy also provides some mitigation for the risks associated with development near to existing airfields (within 13km, in line with the Council's guidance [\[See reference 47\]](#)), stating that: “Measures to enhance biodiversity should be designed so as not to increase the risk from bird strike to the operation of aircraft at Kemble Airport and RAF Fairford. Where

appropriate, the implementation of a bird hazard management plan will be secured by condition of planning obligation”.

**6.19** For clarity, it was recommended that Cotswold Airport and the similar risks from wind turbines are included within the wording of Policy 60, as shown: “Developments within 13km of Kemble Airport or RAF Fairford or those involving airfield development should be designed so as not to increase the risk from bird strike. Where appropriate, the implementation of a bird hazard management plan will be secured by condition or planning obligation. The siting of wind turbines should also be informed by ecological survey to identify and minimise the risks to birds” The last sentence related to wind turbines could also, or instead, be included in Core Policy 29 Wind Energy Development.

There will be no adverse effects on the integrity of Severn Estuary SPA/Ramsar via bird FLL due to bird strike.

For clarity, policy wording edits are recommended, but this will not affect the conclusions.

## Air pollution – vehicle emissions

**6.20** The HRA screening identified the potential for likely significant effects at Cotswold Beechwoods SAC, North Meadow & Clattinger Farm, and Rodborough Common SAC (all directly), due to air pollution from vehicle emissions. The assessment of the predicted increases in nitrogen deposition and ammonia on the Habitats Sites’ qualifying features has been carried out (**Appendix F**).

**6.21** The assessment has enabled adverse effects on integrity to be ruled out in relation to the following:

- North Meadow & Clattinger Farm SAC:
  - Ammonia levels remain below critical levels with the Local Plan and other 'in combination' sources of vehicle emissions.
- Rodborough Common SAC:
  - Screening thresholds not exceeded on the A46 / Selsey Road.
  - Nitrogen deposition effects on the two Spine Road transects have been ruled out as they are roadside only (0.03m) and habitats are likely to be degraded due to the presence of the road.

**6.22** However, it has not been possible to rule out adverse effects on integrity at:

- North Meadow & Clattinger Farm SAC:
  - Nitrogen deposition, due to the Local Plan alone and in combination; near the A419.
- Rodborough Common SAC:
  - Ammonia, due to the Local Plan in combination, at both transects on the Spine Road.
- Cotswold Beechwoods SAC
  - Nitrogen deposition and ammonia at all three transects on the B4070, due to the Local Plan alone at Buckholt and in combination at the other two transects.

**6.23** Policy 67 Air Quality, provides some mitigation for vehicle emissions by stating that:

### Core Policy 67: Air Quality

Development will not be permitted if air pollution impacts lead to significant adverse effects on health, the environment, or protected sites (as defined by the Environment Act 2021) or amenity, including residential amenity.

Applicants must have regard to the most up to date National Guidance and shall, where appropriate, prepare and submit an air quality assessment with their application.

Applicants should demonstrate that:

- any identified emissions will not lead to significant adverse effects on health, the environment or amenity
- development will not lead to an increase in emissions, degradation of air quality or increase in exposure to pollutants at or above the health-based air quality objective and interim targets referenced in the Local Management Technical Guidance (TG22), or latest version
- any impacts on the proposed use from existing poor air quality are appropriately mitigated
- the development promotes sustainable transport measures and use of low emission vehicles to reduce air quality impacts of vehicles, and

- the development is designed in a way to encourage non-habitable rooms on roadside facades (and habitable rooms as far from roads as possible) with consideration for the Design Code requirements for solar gain/ overheating.

Where development proposals would be subject to unacceptable air quality standards or would have an unacceptable impact on air quality standards they will be refused.

[...]

**6.24** This policy provides mitigation that may be appropriate for impacts arising from a single site; however, the assessed impacts may require a strategic rather than site-by-site approach.

**6.25** Some of the policies in the Local Plan are intended to reduce trips by car and will help to contribute towards a reduction in traffic:

- Core Policy 33 Sustainable Transport & Connectivity: sets out guidelines for the delivery of sustainable modes of transport in new development - relevant to air pollution.
- Core Policy 34 Assessing and Managing Transport Impacts: directs development near to key services and facilities and requires proposals to assess transport impacts - relevant to air pollution.
- Core Policy 35 Active Travel: Walking, Cycling & Wheeling: supports the provision of routes for active transport - relevant to air pollution and recreation pressure.
- Core Policy 37 Public Transport, Shared Transport and Interchanges: addresses how public transport links should be incorporated into development - relevant to air pollution.
- Core Policy 38 Our Kerbside Space and Parking: addresses parking requirements for development proposals, including space for secure cycle parking and electric cycle charging, as well as provision of electric car club schemes - relevant to air pollution.
- Core Policy 39 Electric and Low Emission Vehicles: promotes opportunities for the use of electric and low emission vehicles - relevant to air pollution.
- The Strategic Site Allocation Development Frameworks include Design Principles (in Appendix B of the Local Plan) which require delivery of active travel routes connecting the sites to nearby settlements, rail stations (Kemble) and cycle routes and a strong emphasis on enhancing walking and cycling plus

contributions to improving bus service frequency in some locations. Two strategic allocations (Steadings Southern Extension, Land south of Driffield) will provide a mobility hub that act as a focal point for modal interchange and support sustainable travel choices, and three (Steadings Southern Extension, Land south east of Cirencester and south of Preston and Land surrounding Down Ampney) will deliver bus routes through the site. All strategic allocations require additional proportional contributions to the relevant sub areas (Cirencester, Down Ampney, Driffield, Fairford, Kemble, Moreton-in-Marsh and Mickleton) and district wide mitigation requirements identified in the IDP.

- In addition, the Land south of Driffield strategic allocation refers to a sustainable transport outcome, which will require coordination and collaboration in delivery of shared infrastructure between the Land East of Cirencester and South of Preston, Down Ampney and Driffield sites; collectively providing a transport strategy with key links into Cirencester underpinned by active mode and public transport networks. Where one site is brought forward ahead of the others it will need to consider how this infrastructure is phased and attributed across the sites.

**6.26** The reduction in AADT forecasts taking into account the mitigation provided by these policies has been modelled by City Science, but is not large enough to result in AADTs below the screening threshold of 1,000 for vehicles and 200 for HDVs on the relevant roads referred to in paragraph 6.22. However, further air quality assessment is being undertaken to determine whether the critical levels/loads for nitrogen deposition and ammonia would still be exceeded taking this mitigation into account. If so, the need for further mitigation within the Local Plan policies and what this needs to comprise will be discussed with Natural England and agreed in a Statement of Common Ground prior to Submission of the Local Plan.

Adverse effects on the integrity of Cotswold Beechwoods SAC, North Meadow & Clattinger Farm, and Rodborough Common SAC due to air pollution from vehicle emissions are uncertain. The conclusions are pending updated air quality assessment and agreement of appropriate mitigation with Natural England.

## Air pollution – dust

**6.27** The HRA screening identified potential likely significant effects at North Meadow & Clattinger Farm SAC (directly), due to dust. These may be significant due to the Local Plan alone.

**6.28** Core Policy 60 (see paragraph 6.2) provides general protection for Habitats Sites and biodiversity more generally and Policy 67 provides more specific mitigation relevant to air quality (see paragraph 6.23). The following policy provides additional safeguards, in relation to dust at these Habitats Sites:

- Core Policy 66: Pollution and Contaminated Land – states that development will only be permitted if it does not result in unacceptable risk to health or the natural environment from “generation of noise or light levels, or other disturbance such as spillage, flicker, vibration, dust or smell”.

**6.29** These are considered sufficient safeguards to avoid adverse effects on integrity from air pollution due to dust.

There will be no adverse effects on the integrity of North Meadow & Clattinger Farm SAC, due to dust.

## Recreation pressure

**6.30** The HRA screening identified potential likely significant effects at Cotswold Beechwoods SAC (directly), North Meadow & Clattinger Farm SAC (directly), Rodborough Common SAC (directly) and Severn Estuary SPA/Ramsar (directly; and indirectly via bird FLL), due to recreation pressure. These are likely to be significant due to the Local Plan in combination with other plans, for example residential development allocated in the Stroud, South Gloucestershire or Wiltshire Local Plans.

**6.31** The following policies in the Local Plan contribute to mitigation from recreation pressure impacts:

- Core Policy 60 Biodiversity and Geodiversity: states that “To mitigate the impacts of development on the Cotswold Beechwoods SAC and the North Meadow and Clattinger Farm SAC, financial contributions can be secured to fund the mitigation measures identified in the adopted strategies. Alternatively, applicants may submit their own shadow Habitats Regulations Assessment (HRA), demonstrating the likely recreational impacts arising from the development and setting out the mitigation measures that will be implemented for the lifetime of the development to address those impacts. Mitigation will be required for all new development resulting in a net increase in housing and/or holiday accommodation within the identified Zones of Influence, as shown on the Policies Map and Figure 13.1, including Permitted Development which is required to comply with the Habitats Regulations.”

- Core Policy 68 Planning for Health and Wellbeing: includes a requirement for major developments to demonstrate how they have incorporated open/green spaces, which would help to alleviate recreation pressure on the Habitats Sites.
- Core Policy 70 Green and Blue Infrastructure: supports the implementation of well-considered, integrated Green and Blue Infrastructure into major development schemes.
- Core Policy 71 Management of Accessible Green Open Spaces in Residential Developments: States that “Large developments are expected to provide their own ANRG [Alternative Natural Recreational Greenspaces]. Where the sites are unable to provide ANRG capacity, the option remains for large developments to provide an off-site ANRG or purchase ANRG capacity from third party providers if available and within the catchment of the development. Where a large allocation requiring a bespoke ANRG has been subdivided into smaller sites for development, developers will be encouraged to work with one another to secure a bespoke ANRG solution. Where this is not possible the option remains for these sites to provide an off-site ANRG or purchase ANRG capacity from third party providers.” It also requires long-term management of the Accessible Green Open Spaces, where delivered in a development.
- Core Policy 6 Infrastructure Delivery: Ensures that new services and facilities are delivered alongside new housing and employment.

**6.32** There is additional information in the supporting text of Policy 60, which states: “Where Alternative Natural Recreational Greenspace (ANRG) and Strategic Access Management and Monitoring (SAMM) mitigation measures are required for residential development, the Council will follow a consistent approach to mitigation, based on the zone of influence (as identified on the Policies Map). The approach is set out in Core Policy 71. The zones of influence for the North Meadow SAC are defined as:

- a straight-line distance of between 0 and 4.2 kilometres from the SAC boundary. Within this zone, measures must be provided for all residential proposals for 1 or more net new dwellings to ensure that the integrity of the SAC is protected. Mitigation measures will be based on a combination of the provision of ANRG and SAMM measures and will be delivered prior to occupation and managed in perpetuity in accordance with the ANRG Management Plan, and
- a straight-line distance of between 4.2 and 9.4 kilometres from the SAC boundary. Within this zone, measures must be provided for all residential proposals for 1 or more net new dwellings to ensure that the integrity of the SAC is protected. For most developments, mitigation measures will be limited to SAMM measures, however larger developments may need to provide additional

mitigation in the form of ANRG as advised by Natural England on a case-by-case basis.”

**6.33** Only a very small area of the district is within the ZOI for Rodborough Common or the ZOI for Severn Estuary SAC/SPA/Ramsar. There are no site allocations in these areas, although rural development / windfall could in theory result in residential development within the ZOI/s. Safeguards within Core Policy 60, which states that “The design of development should incorporate measures to improve the biodiversity and geodiversity of the development site. Such measures should include making a contribution to the network of biodiversity sites, including open spaces and green infrastructure and water bodies which make links between habitats and support wildlife” are sufficient to avoid adverse effects on integrity at these Habitats Sites, due to recreation pressure associated with windfall development.

**6.34** Indirect impacts on Severn Estuary SPA/Ramsar, via functionally linked habitats could occur if visitor numbers significantly increase at Cotswold Water Park SSSI (other habitats that have been identified as having potential to be bird FLL are arable fields or other common habitats types without significant public access). The majority of the accessible lakes are managed by the Cotswold Lakes Trust, Gloucestershire Wildlife Trust and Wiltshire Wildlife Trust [\[See reference 48\]](#).

**6.35** The accessible lakes are well managed for visitor access to nature, with visitors encouraged to visit the site for its nature interest and to use designated paths [\[See reference 49\]](#); and access to some is restricted during bird nesting season [\[See reference 50\]](#). This management of access to the lakes within the SSSI means that there will be no adverse effects on the Severn Estuary SPA/Ramsar, via bird FLL at the SSSI.

**6.36** Impacts on Cotswold Beechwoods SAC have been identified as arising from residential development within 15.4km of the SAC; i.e. A2, C71, C81B, K7A, K15, T31B, T71A, K7B; and strategic sites: Steadings southern extension, New settlement at Cotswold Airport, and Land south west of Kemble.

**6.37** There is an existing mitigation strategy for recreation pressure at Cotswold Beechwoods SAC [\[See reference 51\]](#) which requires residential development within the 15.4km ZOI to:

- Contribute (per dwelling) to Strategic Access Management and Monitoring (SAMM); and
- Provide or contribute towards Suitable Alternative Natural Greenspace (SANG) – new accessible green space that will divert some of the trips arising from new development that would otherwise have gone to the SAC (e.g. local trips for dog walking).

**6.38** The majority of the residential development proposed on sites within the Cotswold Beechwoods SAC ZOI is also within the ZOI of North Meadow and Clattinger Farm SAC; therefore, a Recreation Mitigation Study has been prepared for CDC to identify the locations in which SANG could be provided [\[See reference 52\]](#).

**6.39** Impacts on North Meadow and Clattinger Farm SAC have been identified as arising from residential development within 9.4km of the SAC, i.e. C81B, F20A, F29C, F52, F53A, R203A-C, R607, SD15, SD17, SD23; and strategic sites: Steadings southern extension, Land east of Kingshill Lane, Land south east of Cirencester and south of Preston, Land south west of Siddington, Land south of Driffield, Land surrounding Down Ampney, and Land north east of Fairford.

**6.40** As for Cotswold Beechwoods SAC, there is an existing (interim) mitigation strategy [\[See reference 53\]](#), which has been revisited in the Cotswold SANG study (reference 52, as above), and mitigation is set out within Policy 60 (see paragraph 6.31-6.32). Based on the number of proposed homes to be delivered within the ZOIs for both SACs, the Recreation Mitigation Study identifies a need for 60.77ha of SANG and 70.08ha of ANRG. The majority of the new homes will be delivered by strategic site allocations, and it is expected that these will provide most, if not all, of the SANG and ANRG mitigation onsite. High level masterplanning to date has shown the following land available for SANG/ANRG at strategic sites:

- Cirencester: Land east of Kingshill Lane – no requirement for SANG/ANRG:
- Cirencester: Land south east of Cirencester and south of Preston – no requirement for SANG/ANRG;
- Cirencester: Steadings southern extension – 10.3ha SANG required; 26.6ha SANG proposed;
- Land surrounding Down Ampney – 29.18ha ANRG required; 32ha ANRG proposed;
- Land south of Driffield – 19.18ha ANRG required; 51.7ha ANRG proposed;
- Land northeast of Fairford – no requirement for SANG/ANRG;
- Land south west of Kemble – 17.93ha SANG required; 19.3ha SANG proposed; and
- Land southwest of Siddington – no requirement for SANG/ANRG.

**6.41** Between them, these sites have the capacity to provide sufficient SANG/ANRG for all of the allocated development within the ZOIs of the SACs. However, there is a need to secure an additional 18.84 ha of SANG for the 1,070 dwellings delivered by non-strategic residential and windfall development within the Cotswold Beechwoods

SAC ZOI. These sites are likely to be too small to deliver SANG or ANRG of sufficient scale on-site.

**6.42** The Recreation Mitigation Study states that “To maintain flexibility and support sustainable growth, financial contributions may therefore be secured in lieu of on-site provision and used to purchase units or capacity at a Strategic SANG or capacity at other mitigation sites.” It also states “a site to the south of the Kemble Strategic site allocation has been identified within the Masterplanning work to be available and capable of providing sufficient SANG capacity. It is located within the vicinity of the majority of the proposed development within the district and has a reasonable prospect of being delivered to meet the SANG needs. This site would be designated as a Strategic SANG, and, with the agreement of NE, would need to be brought up to SANG standard.”

**6.43** The evidence within the Recreation Mitigation Study, which has informed the identification of specific on-site SANG/ANRG requirements within strategic allocations, plus the identification of a Strategic SANG site enables residential development proposed in the Local Plan to avoid adverse effects on the integrity of Cotswold Beechwoods SAC and North Meadow & Clattinger Farm SAC.

There will be no adverse effects on the integrity of Cotswolds Beechwoods SAC, North Meadow & Clattinger Farm SAC; Rodborough Common SAC, or Severn Estuary SAC/Ramsar via bird FLL, due to recreation pressure.

## Water quality – direct pollution

**6.44** The HRA screening identified the potential for likely significant effects at Cotswold Beechwoods SAC (directly), North Meadow & Clattinger Farm SAC (directly), Oxford Meadows SAC (directly) and Severn Estuary SPA/Ramsar (indirectly, via bird FLL), due to direct water pollution. These are likely to be significant due to the Local Plan alone (at the SACs) and in combination with other plans/projects e.g. development near the estuary from the Stroud or South Gloucestershire Local Plans (at the SPA/Ramsar).

**6.45** Core Policy 60 (see paragraph 6.2) provides general protection for Habitats Sites and biodiversity more generally. The following policies provide specific safeguards, in relation to direct water pollution:

- Core Policy 65: Watercourses – states that “Development of land that contains or is close to, for example 10m, to a watercourse must protect and where possible, enhance the function and setting of the watercourse and its

biodiversity. As a last resort development should provide mitigation for any unavoidable impacts. Development should include a 10m buffer zone along a watercourse to conserve and enhance biodiversity. Where a 10m wide buffer zone is not demonstrably possible, a suitable mitigation strategy will be required to prevent harm to biodiversity. Where possible the strategy should also include ecological enhancement to the watercourse.” In addition, “Major development proposals which are located within 20m of a watercourse may need an accompanying Construction Management Plan. This will be dependent upon, and in agreement with, the Council before commencement of work to ensure that the watercourse will be satisfactorily protected from damage, disturbance or pollution.”

- Core Policy 64: Water Management Infrastructure – states that “Proposals will be permitted that...c) do not result in a demonstrable deterioration in water quality of the water environment, as required by the Water Framework Directive (WFD) (or its successor). Development should not prevent a waterbody achieving ‘Good’ Status for WFD, and where possible should lead to improvements to current WFD status. Where a need for improvement or a risk of deterioration in water quality is identified, the Council will require satisfactory improvement or mitigation measures to be implemented in full prior to occupation of the development, and d) incorporate integrated, suitable and multi-functional Sustainable Drainage Systems (SuDS) in all such development, unless demonstrably inappropriate. Proposals will be permitted that do not result in pollution of groundwater sources. Development proposals within Source Protection Zone 1 (SPZ1) will be designed to allow for contamination being encountered and for restrictions on deep penetrative foundation methods, together with avoidance of: deep borehole soakaways; foul sewage discharge to groundwater; direct discharge of hazardous substances to groundwater; discharge of trade effluent to ground water; and underground oil storage tanks.”
- Core Policy 66: Pollution and Contaminated Land – states that development will only be permitted if it does not result in unacceptable risk to health or the natural environment from “pollution of the air, land, surface water, or ground water sources”.
- Core Policy 63: Managing Flood Risk – requires developments to incorporate sustainable drainage systems.

**6.46** These are considered sufficient safeguards to avoid adverse effects from direct pollution.

There will be no adverse effects on the integrity of Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, Oxford Meadows SAC or Severn Estuary SPA/Ramsar, due to direct pollution.

## Water quality/quantity – abstraction and wastewater treatment

**6.47** The HRA screening identified the potential for likely significant effects at North Meadow & Clattinger Farm SAC (directly), Oxford Meadows SAC (directly), Severn Estuary SAC (directly), SAC/Ramsar (indirectly; via fish FLL) and SPA/Ramsar (indirectly; via bird FLL), due to wastewater treatment; and at Oxford Meadows SAC and Severn Estuary SAC/Ramsar (directly, and indirectly via fish FLL), due to water abstraction. These are likely to be significant due to the Local Plan alone.

**6.48** Water abstraction and the discharge of treated wastewater into waterbodies is controlled by environmental permitting by the Environment Agency; and water companies have a duty to deliver services while meeting their obligations under the Habitats Regulations and Water Framework Directive. To ensure that the infrastructure required to deliver water supply and wastewater treatment meet the expected demand (e.g. from the Local Plan and other development in the region), water companies produce Water Resources Management Plans and Drainage and Wastewater Management Plans. The statuses of these are:

- Severn Trent Water: WRMP24 published April 2025 [\[See reference 54\]](#), DWMP28 in progress [\[See reference 55\]](#).
- Thames Water: WRMP24 published October 2025 [\[See reference 56\]](#), SWMP28 in progress [\[See reference 57\]](#)
- Wessex Water (wastewater treatment only, within the district): DWMP28 in early stages of preparation [\[See reference 58\]](#)
- Bristol Water (water supply only, within the district): WRMP24 published in October 2024 [\[See reference 59\]](#)

**6.49** The WRMPs and DWMPs were produced before the location and quantum of development within the Local Plan was confirmed. The Council therefore needs to confirm that the development proposed to come forward in the Local Plan, and its phasing, can be accommodated by the water companies; and therefore that there will be no adverse effects on Habitats Sites (which could arise if the capacity was exceeded). The Council commissioned a Water Cycle Study (WCS) [\[See reference 60\]](#), which identifies existing infrastructure capacity and explores future water supply

and wastewater treatment needs and capacity. A WCS requires engagement with stakeholders and the Council has collaborated with water companies and requested comments on housing growth impacts on infrastructure, to ensure that the Local Plan aligns with infrastructure provision.

**6.50** The WCS explains that water supply is provided predominantly by Thames Water in the plan area. Bristol Water and Severn Trent Water also supply small areas. Thames Water provided a site-by-site assessment of potential allocations in their supply area. This identified 15 sites where further modelling by TW would definitely be required, and a further 20 where modelling may be required, in both cases, upgrades to the water supply network may be needed to accommodate development. The WCS concludes that upgrades to the local supply network would be funded as part of the developer infrastructure charge. Early engagement between developers, CDC and the water companies is recommended at the planning application stage to ensure upgrades are in place prior to occupation.

**6.51** In terms of wastewater treatment, the WCS found that five wastewater treatment works (WwTWs) are expected to have capacity for growth during the plan period and will not require further upgrades for capacity. Seven WwTWs are expected to exceed their permit limit during the Local Plan period or be close to their permit limit by the end of the plan period. Where an increase in capacity may be required, sufficient time is needed for the water company to plan and deliver the upgrade scheme. This would typically be planned for delivery in the next AMP period. i.e. a need to upgrade a WwTW would be identified in DWMP28 and delivered between 2030 and 2035. Therefore, these seven WwTWs that are already at their permit limit and do not have upgrades planned within this AMP period may constrain development within the first five years of the plan. Beyond 2030, there should be sufficient time once the Local Plan is adopted for water companies to provide additional capacity where required. None of the strategic site allocations will be coming forward before 2030 and CDC will be preparing Statements of Common Ground with the water companies to ensure the phasing of infrastructure delivery aligns with the phasing of site allocations within the Local Plan.

**6.52** The following policies within the Local Plan will also reduce the demand for water and ensure that required infrastructure is delivered prior to development:

- Core Policy 64: Water Management Infrastructure – sets out the requirement for adequate water and wastewater infrastructure associated with development, and states that any required infrastructure must be in place prior to the occupation of development or within a timeframe agreed by the Local Planning Authority. The policy defines a water efficiency standard of 100 litres per person per day for new dwellings. Non-residential development will be required to meet BREEAM water-efficiency credits or their latest equivalent.

- Core Policy 6 Infrastructure Delivery: sets out the mechanisms by which new services and facilities will be delivered alongside new housing.

There will be no adverse effects on the integrity of Oxford Meadows SAC and Severn Estuary SAC/Ramsar (directly and fish FLL) due to water abstraction as there are measures in place to ensure that the required water abstraction to meet planned growth in the Local Plan can be accommodated.

Adverse effects on the integrity of North Meadow & Clattinger Farm SAC, Oxford Meadows SAC, Severn Estuary SAC/SAC/Ramsar (bird/fish FLL) due to wastewater treatment are uncertain pending completion of Statements of Common Ground and confirmation from the water companies that sufficient upgrades in wastewater treatment capacity will be delivered prior to development at the strategic site allocations.

## Chapter 7

### Conclusions and next steps

**7.1** The HRA screening identified likely significant effects relation to physical damage and loss of habitat; non-physical disturbance; bird strike; air pollution from vehicle emissions and dust; recreation pressure; water quality from wastewater treatment and direct pollution; and water quantity.

**7.2** However, the Appropriate Assessment has been able to rule out adverse effects on the integrity of Habitats Sites due to physical damage and loss of habitat, non-physical disturbance, bird strike, dust, recreation pressure, direct water pollution and water abstraction by taking into account additional evidence and safeguards within the Local Plan policies.

**7.3** Adverse effects on integrity could not be ruled out for the following:

- Air pollution from vehicle emissions – further work, including consultation with Natural England, is required to inform the identification of mitigation, in relation to Cotswold Beechwoods SAC, North Meadow & Clattinger Farm SAC, and Rodborough Common SAC.
- Water quality (wastewater treatment) – requires agreed Statements of Common Ground with water companies that required wastewater treatment capacity upgrades will be delivered prior to development of strategic site allocations within the Local Plan.

**7.4** The work required to resolve these outstanding issues is set out below.

**7.5** This HRA will be published alongside the Local Plan, as part of the Regulation 19 consultation. If there are any issues arising from consultees' comments on the Reg.19 HRA or from further evidence work, this will be documented in an addendum to the HRA and/or Statements of Common Ground (as required), prior to Submission and/or during the Examination period. If there are main modifications to the plan, following Examination, these will be subject to HRA.

### Air quality assessment

**7.6** The modelled traffic forecasts including sustainable transport policies within the Local Plan and other interventions need to be incorporated into the air quality model to understand the potential influence of the mitigation on vehicle emissions over the plan period, and whether the critical levels/loads would still be exceeded for the three SACs identified above. Natural England will also need to be consulted to inform any

further mitigation the Local Plan might need to provide. Any further information and assessment will be documented in an addendum to this HRA, and agreements with Natural England will be documented in a Statement of Common Ground.

## **Wastewater treatment capacity**

**7.7** Seven WwTWs are expected to exceed their permit limit during the Local Plan period or be close to their permit limit by the end of the plan period. Where an increase in wastewater treatment capacity may be required, sufficient time is needed for the water company to plan and deliver the upgrade scheme. This would typically be planned for delivery in the next AMP period. i.e. a need to upgrade a WwTW would be identified in DWMP28 and delivered between 2030 and 2035. None of the strategic site allocations will be coming forward before 2030 and CDC will be preparing Statements of Common Ground with the water companies to ensure the phasing of wastewater treatment infrastructure delivery aligns with the phasing of site allocations within the Local Plan.

LUC

July 2026

## Appendix A

### Attributes of Habitats Sites considered in the HRA

**A.1** This appendix contains information about the Habitats Sites scoped into the HRA. Information about each site's area, the site descriptions, qualifying features and pressures and threats are drawn from Natural England's Site Improvement Plans (SIPs), Supplementary Advice Notes, and the Standard Data Forms or Ramsar Information Sheets available from the JNCC website. Site conservation objectives are drawn from Natural England's website and are only available for SACs and SPAs.

## Bredon Hill SAC

### Site description

**A.2** Bredon Hill is an outlier of the Cotswolds with remnants of wood pasture and many veteran trees. Their dead wood supports one of the three known populations of the Violet click beetle *Limoniscus violaceus*, in the UK.

### Qualifying features

**A.3** Annex II species that are a primary reason for selection of this site:

- 1079 Violet click beetle *Limoniscus violaceus*

### Conservation objectives

**A.4** 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 the habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

### Key vulnerabilities

**A.5** The main current threats to the site include:

- Forestry and Woodland Management - The lack of succession in veteran tree cohorts is an issue, as current planting will only benefit the beetles after about 400 years and it is uncertain how long tree surgery will prolong the veterans' lives. The beetle depends on the production of humid wood mould within decaying trees and the amount of available wood mould in the SAC is unknown.

- Feature Location/Extent/Condition Unknown - There is a current lack of information on the distribution across the site of the rare and secretive Violet click beetle.
- Disease - Ash die-back caused by the *Chalara fraxinea* fungus threatens the large number of current veteran ash trees and their replacements on which the Violet click beetle depends. Whilst the beetle is known to use other species elsewhere (eg Windsor), ash dominates the trees on Bredon Hill. The scale of this impact on the persistence and continuity of wood mould is uncertain and is likely to be beyond human control.
- Air Pollution: impact of atmospheric nitrogen deposition - Nitrogen deposition exceeds site relevant critical loads. This site is sensitive to nitrogen deposition.
- Climate Change - The likelihood of increased violent storm events and the viability of ash in a changed environment threatens the veteran ash trees on which the beetle depends.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

### A.6 Violet click beetle

- Habitat preferences – ancient and veteran trees
- Diet – wood mould

## Cotswold Beechwoods SAC

### Site description

**A.7** The Cotswold Beechwoods represent the most westerly extensive blocks of *Asperulo-Fagetum* beech forests in the UK.

**A.8** The woods are floristically rich, and rare plants include red helleborine *Cephalanthera rubra*, stinking hellebore *Helleborus foetidus*, narrow-lipped helleborine *Epipactis leptochila* and wood barley *Hordelymus europaeus*. There is a rich mollusc fauna. The woods are structurally varied, including blocks of high forest and some areas of remnant beech coppice.

### Qualifying features

**A.9** Annex 1 habitats that are a primary reason for the selection of this site:

- 9130 *Asperulo-Fagetum* beech forests

**A.10** Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites)

### Conservation objectives

**A.11** 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;
- The structure and function (including typical species) of qualifying natural habitats; and
- The supporting processes on which qualifying natural habitats rely.

### Key vulnerabilities

**A.12** The main current threats to the site include:

- Invasive Species - The dumping of garden waste and the consequent spread of invasive plants is an on-going threat. The spread of the non-native sycamore provides a challenge and has made particular use of canopy gaps created by storm damage. Although sycamore is considered an acceptable component of woodlands, including beechwoods, on the continent, in the Cotswold it tends to dominate understorey and canopy to the detriment of other (native) tree species.
- Deer - Deer browsing of regenerating trees (and possibly ground flora) remains a major threat to favourable condition throughout the beechwoods.
- Invasive Species - Grey squirrel numbers have increased sharply over the past decade or so and now cause significant damage to tree species, in particular beech. In places, this can lead to pole stage beech being systematically ring barked and killed.
- Disease - Although not known to be present in the Cotswold as yet, Chalara (ash disease) is a major future threat to the beechwoods.
- Public Access/Disturbance - . A particular increase has been the use of mountain bikes and horse-riding which use the woods far beyond the limited network of bridleways. This has created numerous additional trackways and so increasing the erosion of the ground flora and potentially opportunities for water erosion. Although the routes away from bridleways are not usually permitted, much of the SAC woodland is NNR or has public access by foot. Additionally, dog walking has increased within the SAC especially at Coopers Hill where car parking is available. This has become a particular issue where professional dog walkers release large numbers of dogs (up to 12) to run uncontrolled through the woods. This causes disturbance to wildlife as well as local nutrification through dog faeces.
- Changes in Species Distributions - There is a risk that global warming will increase the risk of drought to beech trees (which are shallow rooted).
- Air Pollution: impact of atmospheric nitrogen deposition - Nitrogen deposition exceeds site relevant critical loads. High atmospheric nitrogen levels could affect the SAC features through: changes in ground vegetation and mycorrhiza; nutrient imbalance; changes to soil fauna; increase in tall grasses; decline in diversity; increased mineralisation; N leaching; or surface acidification.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.13** The qualifying habitats rely upon soil quality and water quality/quantity.

## Dixton Wood SAC

### Site description

**A.14** Violet click beetle *Limoniscus violaceus* was discovered at Dixton Wood in 1998 and it has been found at the site on a single occasion subsequently. It is

**A.15** a small site with large number of ancient ash *Fraxinus excelsior* pollards, and supports a rich fauna of scarce invertebrate species associated with decaying timber on ancient trees.

### Qualifying features

**A.16** Annex II species that are a primary reason for selection of this site:

- 1079 Violet click beetle *Limoniscus violaceus*.

### Conservation objectives

**A.17** 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 the habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

### Key vulnerabilities

**A.18** The main current threats to the site include:

- Changes in Species Distributions - Because of its rarity and highly specialised ecology associated with decaying wood and leaf litter in tree cavities, specialist involvement is required for survey, monitoring and the provision of detailed habitat management advice.

- Forestry and Woodland Management - The beetle depends on the production of humid wood mould where it lives for part of its life cycle within decaying trees; this is typically found in veteran trees where they show signs of rot. The amount of suitable and available wood mould in the SAC is unknown. The lack of succession in veteran cohorts is an issue and it make the need for extending the life of the existing veteran trees even more important.
- Disease - Ash dieback disease *Chalara fraxinea* is a potential threat to the site. The Violet click beetle population at Dixon Wood is thought only to use ash trees.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

### A.19 Violet click beetle

- Habitat preferences – ancient and veteran trees
- Diet – wood mould

## North Meadow & Clattinger Farm SAC

### Site description

**A.20** North Meadow & Clattinger Farm Meadows SAC consists of a series of traditionally managed unimproved grasslands within the floodplain of the Upper Thames which continue to be managed as pasture and as hay-meadow.

**A.21** It contains a rich variety of species-rich grassland types including the rare MG4 community for which the SAC is designated as well as a number of notable plant species. These grasslands represent rare and scattered remnants of a much more widespread unimproved grassland habitat before agricultural intensification and extensive gravel quarrying locally were responsible for widespread losses of this habitat and its subsequent fragmentation.

### Qualifying features

**A.22** Annex I habitats that are a primary reason for selection of this site:

- 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)

### Conservation objectives

**A.23** 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;
- The structure and function (including typical species) of qualifying natural habitats; and
- The supporting processes on which qualifying natural habitats rely.

### Key vulnerabilities

**A.24** The main current threats to the site include:

- Inappropriate Water Levels - An effective WLMP needs to be in place in order to protect the integrity of the site. There have been several

unseasonal floods over the last six years which are beginning to cause changes and losses in the vegetation communities on the site.

- Water Pollution - Both sediment and nutrient input are of concern. A diffuse pollution plan is in place and catchment sensitive farming initiative covers the catchment. Diffuse pollution has the potential to affect aquatic habitats and species as well as habitat quality in areas of riverside habitat supporting *Vertigo moulinsiana*. Diffuse pollution is arising from highway runoff as well as from farmland. Pollution also results from overflowing sewers (a result of high groundwater levels infiltrating sewers) with ongoing/recurring incidents at numerous locations on the River Lambourn.
- Habitat Fragmentation - The two component SSSIs are located 8km apart. Inclusion and restoration of a number of intervening sites locally would increase the habitat, thereby making it more resilient to fluctuating water levels in the face of climate change. The NNR team at North Meadow has, over a number of years, been working to achieve this aim. Also, one option is that additional land should be included within the North Meadow SSSI for this purpose. This would help buffer the site, possibly provide space for adaptation in anticipation of the effects of climate change, and better manage visitor impacts. Clattinger forms part of a more extensive site which provides good opportunities for on-site management.
- Commons Management - Fencing is required to keep livestock from straying off site. North Meadow NNR is common land and it is the responsibility of neighbouring landowners to erect fences. There are a number of problems involved in achieving this.
- Public Access/Disturbance - There is increasing visitor pressure especially during the flowering time of Snake's-head Fritillary leading to localised damage on sites in the SAC.
- Water Pollution - The SAC's hay meadow vegetation communities are sensitive to elevated nutrient levels. With increasing flooding there is an increased risk of flood water carrying diffuse pollution onto the site and causing soil enrichment with negative consequences for the species richness of the meadows.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.25** The qualifying habitats rely upon soil quality and water quality/quantity.

## Oxford Meadows SAC

### Site description

**A.26** Oxford Meadows is one of two SACs that represent lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) in the Thames Valley. It includes vegetation communities that are perhaps unique in the world in reflecting the influence of long-term grazing and hay-cutting on lowland hay meadows. The site has benefited from the survival of traditional management, which has been undertaken for several centuries, and so exhibits good conservation of structure and function. The site is selected because Port Meadow is the larger of only two known sites in the UK for creeping marshwort *Apium repens*.

### Qualifying features

**A.27** Annex I habitats that are a primary reason for selection of this site:

- H6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)
- S1614 *Apium repens*: Creeping marshwort

### Conservation objectives

**A.28** 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.

## Key vulnerabilities

**A.29** The main current threats to the site include:

**A.30** Hydrological changes: A recent survey (August 2014) indicates the *Apium repens* population in Port Meadow has significantly declined in size. It is considered that this change may be associated directly or indirectly with hydrological changes possibly deeper, more prolonged and frequent flood episodes. Adjustment of the water level management is proposed as a means to help mitigate for these changes.

**A.31** Invasive species: The interest features for Oxford Meadows SAC are MG4 grassland and *Apium repens*. The *Apium repens* only occurs on Port Meadow SSSI. The concern is that *Crassula* will spread to the lower areas on Port Meadow where the *Apium repens* occurs and that it will swamp it out.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.32** The qualifying habitats rely upon soil quality and water quality/quantity.

## Rodborough Common SAC

### Site description

**A.33** Rodborough Common is the most extensive area of semi-natural dry grasslands surviving in the Cotswolds of central southern England, and represents CG5 *Bromus erectus* – *Brachypodium pinnatum* grassland, which is more or less confined to the Cotswolds.

**A.34** The site contains a wide range of structural types, ranging from short turf through to scrub margins, although short-turf vegetation is mainly confined to areas of shallower soils.

### Qualifying features

**A.35** Annex I habitats that are a primary reason for selection of this site

- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites)

### Conservation objectives

**A.36** 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 habitat;
- The structure and function (including typical species) of qualifying natural habitat; and
- The supporting processes on which qualifying natural habitat rely.

### Key vulnerabilities

**A.37** The main current threats to the site include:

- Undergrazing - Undergrazing is an issue due to the reliance on the rights of commoners to turn out cattle. The number of stock have dropped over the years to the point that additional cattle now need to be electric fenced on to the most species-rich areas on the slopes. It is the lower slopes that are the most species-rich and are suffering from a lack of grazing.

- Public Access/Disturbance - The common is very close to Stroud and recreational use has greatly increased over the past few decades. This has created many new paths and parking areas which cause soil compaction to the detriment of the surrounding sward. Dog faeces is a particular issue which also damages the sward. New and proposed housing continues to add to the problem.
- Air Pollution: risk of atmospheric nitrogen deposition - Nitrogen deposition exceeds the site-relevant critical load for ecosystem protection and hence there is a risk of harmful effects, but the sensitive features are currently considered to be in favourable condition on the site.

### Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.38** The qualifying habitats rely upon soil quality and water quality/quantity.

## Severn Estuary SAC

### Site description

**A.39** The Severn Estuary is located between Wales and England in south-west Britain. It is a large estuary with extensive intertidal mud-flats and sand-flats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. The subtidal seabed is rock and gravel with subtidal sandbanks. The site also supports reefs of the tube forming worm *Sabellaria alveolata*.

**A.40** The estuary's classic funnel shape, unique in the UK, is a factor causing the Severn to have one of the highest tidal ranges in the world. A consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK. The tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide-swept sand and rock. The species-poor intertidal invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders and fish.

**A.41** The site is of importance during the spring and autumn migration periods for waders, as well as in winter for large numbers of waterbirds, especially swans, ducks and waders. The fish fauna is very diverse with more than 110 species identified. The site is of particular importance for migratory fish.

### Qualifying features

**A.42** Annex I habitats that are a primary reason for selection of this site:

- 1130 Estuaries
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

**A.43** Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- 1110 Sandbanks which are slightly covered by sea water all the time
- 1170 Reefs

**A.44** Annex II species that are a primary reason for selection of this site:

- 1095 Sea lamprey *Petromyzon marinus*
- 1099 River lamprey *Lampetra fluviatilis*
- 1103 Twaite shad *Alosa fallax*

## Conservation objectives

**A.45** 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.

## Key vulnerabilities

**A.46** The main current threats to the site include:

- Public Access/Disturbance - Public access and recreation (including third party activities) may have an impact on bird species sensitive to disturbance, causing displacement from feeding, roosting and moulting areas, and if severe could affect long term survival and population numbers and distributions within the Estuary.
- Physical Modification - Modification to water courses and barriers to Annex II migratory fish (and those included in the fish assemblage) in the tributary rivers are preventing completion of the life cycle and potentially altering the hydrodynamics of the site.
- Impacts of Development - Strategic planning issue. More rigorous assessment of cumulative, in-combination and offsite impacts (drainage, disturbance, runoff, impacts on managed realignment etc) on sensitive bird

species and other habitats and species may be required, given the range of planned development within and adjacent to the Estuary (including residential, transport, energy and other industrial developments).

- Coastal Squeeze - As sea levels rise, man-made defences are constraining the natural roll back of estuarine habitats, causing squeeze and loss of habitat and having impacts on species dependent upon those habitats (birds: feeding/ roosting, and fish: feeding/ nursery and shelter areas).
- Change in Land Management - Changes in management and use of grassland and saltmarsh habitat within and bordering the estuary. Changes in ownership and other land practices can result in changes in management and use of land (e.g. changes in grazing practice) which affects species composition, habitat availability, and quality of saltmarsh habitats and use of land for other activities that may cause damage or disturbance.
- Changes in Species Distributions - There is a risk of significant changes in estuarine populations (including declines in some SPA bird populations) in parts of the Estuary resulting from climate change and other man-made and natural modifications to on and offsite environments. In many cases the causes of the changes to species distribution are unknown.
- Water Pollution - There is uncertainty over water quality in the Estuary due to diffuse (including agricultural) or direct pollution (e.g. industrial, sewage treatment works, thermal, radioactive).
- Air Pollution: impact of atmospheric nitrogen deposition - Activities around the Estuary include fertiliser application, potentially dairy and poultry production, road traffic, industry (including power stations), and shipping which are all sources of nitrogen pollution. Nitrogen deposition exceeds site relevant critical loads, with potential impacts on vegetation structure and diversity.
- Marine Consents and Permits: minerals and waste - The cumulative impacts of aggregate extraction, maintenance dredging and disposal can have adverse impacts on features. While most activity is regulated under marine licences, cumulative effects are not always fully considered.
- Fisheries: Recreational marine and estuarine - Further information is required on the levels and location of activity and potential impact of recreational bait digging and recreational fishing/angling. There are unknown impacts in the vicinity of potentially sensitive roosting and feeding areas, and on intertidal reef habitats.

- Fisheries: Commercial marine and estuarine - Dredges (inc. hydraulic), benthic trawls and seines are categorised as 'red' for the reef features (specifically the sub-feature *Sabellaria* spp. reef) as part of Defra's revised approach to commercial fisheries management in European Marine Sites (EMS).
- Invasive Species - There are recent reports of marine invasive non-native species (the Australian barnacle *Austrominius modestus*, Mitten crab *Eriocheir sinensis*, and the Pacific Oyster *Crassostrea gigas*) in the Estuary (or the Bristol Channel). These could have an impact on native species and habitats but the abundance and impact in the Severn Estuary of these species is unclear.
- Marine Litter - The marine environment is a sink for man-made litter which often originates from rivers. Impacts are not fully understood.
- Marine Pollution Incidents - Marine pollution incidents and responses to such incidents have the potential for significant negative impacts on the site and its features.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.47** The qualifying habitats rely upon water quality/quantity.

### **A.48** River lamprey

- Habitat preferences – freshwater and wetlands
- Diet – aquatic fauna

### **A.49** Sea lamprey

- Habitat preferences – marine, although spawns in freshwater rivers, requiring clean gravel or silt/sand for borrowing juveniles.
- Diet – aquatic fauna

### **A.50** Twaite shad

- Habitat preferences – marine, although spawns in freshwater rivers, requiring deep pools.
- Diet – aquatic fauna

## Severn Estuary SPA

### Site description

**A.51** As for Severn Estuary SAC.

### Qualifying features

- A037 *Cygnus columbianus bewickii*; Bewick's swan (Non-breeding)
- A048 *Tadorna tadorna*; Common shelduck (Non-breeding)
- A051 *Anas strepera*; Gadwall (Non-breeding)
- A149 *Calidris alpina alpina*; Dunlin (Non-breeding)
- A162 *Tringa totanus*; Common redshank (Non-breeding)
- A394 *Anser albifrons albifrons*; Greater white-fronted goose (Non-breeding)
- Waterbird assemblage:
  - Bewick's swan;
  - Greater white-fronted goose;
  - Common shelduck;
  - Gadwall;
  - Dunlin; and
  - Common redshank.

### Conservation objectives

**A.52** 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.

## Key vulnerabilities

**A.53** Severn Estuary Site Improvement Plan covers both the Severn Estuary SPA and Severn Estuary SAC. See Severn Estuary SAC for further information.

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.54** The qualifying habitats rely upon water quality/quantity.

### **A.55** Bewick's swan

- Habitat preference – freshwater, farmland, coastal, wetlands
- Diet – potatoes, grain, aquatic plants and grasses

### **A.56** Common shelduck

- Habitat preference – coastal areas, inland reservoirs and gravel workings.
- Diet – invertebrates, small shellfish and aquatic snails

### **A.57** Gadwall

- Habitat preference – marshes, lakes, and on migration also rivers and estuaries.
- Diet – leaves, shoots, mostly while swimming with head under water.

### **A.58** Dunlin

- Habitat preference – tundra, moor, heath, and on migration estuaries and coastal habitat.
- Diet - insects, snails and worms.

### **A.59** Common redshank

- Habitat preference – rivers, wet grassland, moors and estuaries.
- Diet - invertebrates, especially earthworms, crane fly larvae (inland) crustaceans, molluscs, marine worms (estuaries).

**A.60** Greater white-fronted goose

- Habitat preference – farmland grassland marine and intertidal wetland
- Diet - grass, clover, grain, winter wheat and potatoes.

## Severn Estuary Ramsar

### Site description

**A.61** The estuary's classic funnel shape, unique in Britain, is a factor causing the Severn to have the second-largest tidal range in the world (after the Bay of Fundy, Canada). This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide swept sand and rock. The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders.

**A.62** A further consequence of the large tidal range is the extensive intertidal zone, one of the largest in the UK, comprising mudflats, sand banks, shingle, and rocky platforms.

**A.63** Glassworts and annual sea-blite colonise the open mud, with beds of all three species of eelgrass *Zostera* occurring on more sheltered mud and sandbanks. Large expanses of common cord-grass also occur on the outer marshes. Heavily grazed saltmarsh fringes the estuary with a range of saltmarsh types present. The middle marsh sward is dominated by common saltmarsh-grass with typical associated species. In the upper marsh, red fescue and saltmarsh rush become more prominent.

### Qualifying features

#### Criterion 1

**A.64** Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities.

**A.65** Habitats Directive Annex I features present on the Ramsar site include H1110 Sandbanks which are slightly covered by sea water all the time, H1130 Estuaries, H1140 Mudflats and sandflats not covered by seawater at low tide, and H1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).

#### Criterion 3

**A.66** Due to unusual estuarine communities, reduced diversity and high productivity.

## Criterion 4

**A.67** This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon *Salmo salar*, sea trout *Salmo trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *Alosa fallax*, and eel *Anguilla anguilla*.

**A.68** It is also of particular importance for migratory birds during spring and autumn.

## Criterion 5

**A.69** Assemblages of international importance:

- Species with peak counts in winter:
  - 70919 waterfowl (5 year peak mean 1998/99-2002/2003).

## Criterion 6

**A.70** Species/populations occurring at levels of international importance:

- Bewick's swan *Cygnus columbianus bewickii*;
- Common shelduck *Tadorna tadorna*;
- Gadwall *Anas strepera*;
- Dunlin *Calidris alpina alpina*;
- Common redshank *Tringa tetanus*; and
- Greater white-fronted goose *Anser albifrons albifrons*.

## Criterion 8

**A.71** The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon *Salmo salar*, sea trout *Salmo trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *Alosa fallax*, and eel *Anguilla anguilla* use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary.

**A.72** The site is important as a feeding and nursery ground for many fish species particularly allis shad *Alosa alosa* and twaite shad *Alosa fallax* which feed on mysid shrimps in the salt wedge.

## Conservation objectives

**A.73** None available.

## Key vulnerabilities

- Dredging
- Erosion
- Recreational/tourism disturbance (unspecified)

## Non-qualifying habitats and species on which the qualifying habitats and/or species depend

**A.74** See Severn Estuary SPA

## Appendix B

### Site allocations assessed in the HRA

**Table B.1: Site allocations assessed in the HRA**

| Site ID                        | Address                                                           | Parish               | Use         | Number of homes                |
|--------------------------------|-------------------------------------------------------------------|----------------------|-------------|--------------------------------|
| Strategic site allocations     |                                                                   |                      |             |                                |
| -                              | Cirencester - Steadings southern extension                        | Cirencester          | Mixed use   | 779 (585 over plan period)     |
| -                              | Preston - Land south east of Cirencester and south of Preston     | Preston              | Mixed use   | 1,368 over plan period         |
| -                              | Preston - Land east of Kingshill Lane                             | Preston              | Mixed use   | 613 over plan period           |
| -                              | Down Ampney - Land surrounding Down Ampney                        | Down Ampney          | Mixed use   | 1,658 over plan period         |
| -                              | Driffield - Land south of Driffield                               | Driffield            | Mixed use   | 1,132 (1,090 over plan period) |
| -                              | Fairford - Land north-east of Fairford                            | Fairford             | Mixed use   | 1,141 over plan period         |
| -                              | Kemble - Land south-west of Kemble                                | Kemble               | Mixed use   | 1,020 over plan period         |
| -                              | Mickleton - Land north and west of Mickleton                      | Mickleton            | Mixed use   | 1,238 over plan period         |
|                                | Moreton-in-Marsh - Land north, east and south of Moreton-in-Marsh | Moreton-in-Marsh     | Residential | 2,217 over plan period         |
|                                | Siddington - Land south west of Siddington                        | Siddington           | Mixed use   | 372 over plan period           |
| Non-Strategic site allocations |                                                                   |                      |             |                                |
| A2                             | Land to rear of Templefields and Crossfields                      | Andovers-ford        | Residential | 52                             |
| B56                            | Land off Mallard Crescent                                         | Bourton-on-the-Water | Residential | 53                             |
| BK11                           | Former Station Road Allotments                                    | Blockley             | Residential | 40                             |
| BK14A                          | The Limes, Station Road                                           | Blockley             | Residential | 8                              |
| C71                            | Land adjacent 'Donside', off Barn Way                             | Cirencester          | Residential | 10                             |

Appendix B Site allocations assessed in the HRA

| Site ID    | Address                                                            | Parish                                | Use         | Number of homes |
|------------|--------------------------------------------------------------------|---------------------------------------|-------------|-----------------|
| C81B       | Land west of Gardner Way                                           | Cirencester                           | Residential | 31              |
| CC10A      | Land east of Chandlers, Station Road                               | Chipping Campden                      | Residential | 8               |
| CC66B      | Land north-west of Aston Road                                      | Chipping Campden                      | Residential | 10              |
| CC68       | Land north-east of Aston Road                                      | Chipping Campden                      | Residential | 150             |
| F20A       | Land south-east of Fairford                                        | Fairford                              | Residential | 53              |
| F39C / F52 | Land west of Terminus Cottage and Station Cottage                  | Fairford                              | Residential | 30              |
| F53A       | Land at Totterdown Hill, Horcott                                   | Fairford                              | Residential | 150             |
| L19        | Land south of Butler's Court                                       | Lechlade-on-Thames                    | Residential | 15              |
| L33        | Land south of Ferrers Park                                         | Lechlade-on-Thames                    | Residential | 150             |
| M28B       | Land west of Aldi                                                  | Moreton-in-Marsh                      | Residential | 20              |
| M74A       | Land South of Moreton and West of Fosse Way (Eastern Part of Site) | Moreton-in-Marsh                      | Residential | 44              |
| MK11A      | Land east of Stratford Road (Site A)                               | Mickleton                             | Residential | 76              |
| MK2B/C     | Land north-east of Mickleton                                       | Mickleton                             | Residential | 40              |
| MK7        | Land between Summerville Ltd. and Stratford Road                   | Mickleton                             | Residential | 33              |
| R203A-C    | Land to rear of the Knoll, Whelford Road                           | Kempsford                             | Residential | 149             |
| R591       | Former Godwin Pumps factory Springfield Road, Quenington           | Coln St Aldwyns, Hatherop, Quenington | Residential | 47              |
| R607       | Land north of London Road                                          | Poulton                               | Residential | 10              |
| R670       | Glebe Farm Yard, Hatherop                                          | Coln St Aldwyns, Hatherop, Quenington | Residential | 12              |

Appendix B Site allocations assessed in the HRA

| Site ID | Address                                                                | Parish           | Use         | Number of homes |
|---------|------------------------------------------------------------------------|------------------|-------------|-----------------|
| S14B    | Land off Oddington Road (A436) (remaining land after 23/01513/FUL)     | Stow-on-the-Wold | Residential | 10              |
| S55B    | Land adjoining Tall Trees, Oddington Road                              | Stow-on-the-Wold | Residential | 8               |
| S68     | The Hollies, Lower Swell Road                                          | Stow-on-the-Wold | Residential | 35              |
| SD15    | Plummers Farm, east of Ashton Road                                     | Siddington       | Residential | 35              |
| SD17    | Land east of Siddington Road and west of Bluebell Drive                | Siddington       | Residential | 5               |
| SD23    | Land between disused canal and disused railway line, north of Park Way | Siddington       | Residential | 22              |
| T31B    | Land adjacent to Blind Lane                                            | Tetbury          | Residential | 44              |
| T71A    | Land north-west of Highfield Cottage                                   | Tetbury          | Residential | 50              |
| UR1A    | Upper Rissington Business Park                                         | Upper Rissington | Residential | 26              |
| W4B     | Land between Colin Lane and future Heritage Railway                    | Willersey        | Residential | 40              |

## Appendix C

### Screening of policies and site allocations

#### Policies

##### Policies screened out

##### No new development / activities

**C.1** The following policies have been screened out of further assessment (no Appropriate Assessment is required) as they will not result in new development / activities.

- Core Policy 1 Addressing Climate Change: sets out principles for development to ensure it mitigates and is resilient to climate change.
- Core Policy 2a: Stepped Housing Trajectory Sets out when homes will be delivered over the plan period but will not itself result in development.
- Core Policy 4 Settlement Hierarchy: classifies settlements according to their role and service function, as well as ensuring development is built in appropriate locations.
- Core Policy 6 Infrastructure Delivery: sets out the mechanisms by which new services and facilities will be delivered alongside new housing and employment.
- Core Policy 7 Cirencester and Surrounding Villages Area Strategy: Identifies site allocations in the area, but will not directly result in new development - development in this area has been assessed in relation to the site allocations and overall quantum of development set out in Core Policies 2, 3 & 5.
- Core Policy 8 Cirencester and Surrounding Villages Area Strategic Infrastructure: identifies the strategic cycle links, transport hubs, highway improvements, land to support a new GP surgery, Suitable Alternative Natural Greenspace, primary schools and secondary schools that will be delivered by sites allocated for development – assessed as part of the site allocations.

- Core Policy 9 Safeguarding of Land for Strategic Infrastructure Schemes in the Cirencester and Surrounding Villages Area: safeguards land for projects that are associated with other development plans (transport).
- Core Policy 10 Cirencester Central Area Strategy: Identifies character areas and opportunity areas within the designated Cirencester Central Area but will not directly result in new development – development in this area has been assessed in relation to the site allocations and overall quantum of development set out in Core Policies 2, 3 & 5.
- Core Policy 12 South Cotswold Strategy Area: Identifies site allocations in the area, but will not directly result in new development - development in this area has been assessed in relation to the site allocations and overall quantum of development set out in Core Policies 2, 3 & 5.
- Core Policy 13 South Cotswold Strategic Infrastructure Delivery: identifies the strategic infrastructure requirements that will be delivered by sites allocated for development – assessed as part of the site allocations.
- Core Policy 19 North Cotswold Strategy Area Identifies site allocations in the area, but will not directly result in new development - development in this area has been assessed in relation to the site allocations and overall quantum of development set out in Core Policies 2, 3 & 5.
- Core Policy 20 North Cotswold Strategic Infrastructure Delivery: identifies the strategic infrastructure that will be delivered by sites allocated for development – assessed as part of the site allocations.
- Core Policy 21 Safeguarding of Land for Strategic Infrastructure Schemes in the North Cotswold Area: policy safeguards existing uses and will not itself result in new development.
- Core Policy 22 Gloucester and Cheltenham Green Belt: policy safeguards Green Belt and will not directly result in development.
- Core Policy 29 Wind Energy Development: policy sets out requirements for wind energy development proposals but will not directly result in new development – new renewables development has been assessed under Core Policy 25 Renewable and Low Carbon Energy Generation, Storage and Transmission.
- Core Policy 30 Roof-Mounted and Ground-Mounted Solar Panels: sets out requirements for solar panels but will not directly result in new development – new renewables development has been assessed under Core Policy 28 Renewable and Low Carbon Energy Generation, Storage and Transmission.

- Core Policy 31 Community Renewable Energy Schemes: supports community renewables schemes but will not directly result in new development – new renewables development has been assessed under Core Policy 28 Renewable and Low Carbon Energy Generation, Storage and Transmission.
- Core Policy 32 Low Carbon Heat Networks: sets out requirements for low carbon heat networks but will not directly result in new development – new renewables development has been assessed under Core Policy 28 Renewable and Low Carbon Energy Generation, Storage and Transmission.
- Core Policy 33 Sustainable Transport & Connectivity: requires developments to provide sustainable modes of travel but will not directly result in new development.
- Core Policy 34 Assessing and Managing Transport Impacts: requires development to be located near to key services and facilities and requires proposals to assess transport impacts.
- Core Policy 35 Active Travel: Walking, Cycling & Wheeling: supports the provision of routes for active transport.
- Core Policy 36 Healthy, Safe and Inclusive Design: provides guidelines for design.
- Core Policy 37 Public Transport, Shared Transport and Interchanges: addresses how public transport links should be incorporated into development.
- Core Policy 38 Our Kerbside Space and Parking: addresses parking requirements for development proposals.
- Core Policy 39 Electric and Low Emission Vehicles: promotes opportunities for the use of electric and low emission vehicles.
- Core Policy 40 Aerodrome Safeguarding: safeguards the operation of aerodrome sites.
- Core Policy 41 Standards for New Residential Development: sets out development standards/housing mix, not quantum.
- Core Policy 42 Affordable Housing: policy defines affordable housing mix not quantum.

- Core Policy 43 Self-build and Custom-build Housing: Aims to increase opportunities for self-build and custom-build housing as part of larger residential developments but does not itself result in new development.
- Core Policy 47 Safeguarding Employment Sites: policy safeguards existing uses.
- Core Policy 48 Ancillary Uses on Employment Sites: guidance on when ancillary uses will be permitted, does not itself result in new development.
- Core Policy 51 Town Centre Uses: policy defines appropriate uses, not quantum.
- Core Policy 52 New Local Centres: policies identifies the strategic allocations that will include local services, but does not itself result in development.
- Core Policy 53 The Historic Environment: policy sets out measures to protect designated heritage assets.
- Core Policy 54 Listed Buildings: sets out requirement for development to conserve the significance, character and setting of listed buildings.
- Core Policy 55 Conservation Areas: policy sets out measures to preserve and enhance Conservation Areas.
- Core Policy 56 Non-Designated Heritage Assets: policy will not result in new development.
- Core Policy 57 Archaeological Assets: policy will not result in new development.
- Core Policy 58 Registered Parks and Gardens: policy will not result in new development.
- Core Policy 59 The Conservation of Non-Domestic Historic Buildings (Designated and Non-Designated Heritage Assets): policy will not result in new development.
- Core Policy 60 Biodiversity and Geodiversity: policy will not result in new development but provides mitigation.
- Core Policy 61 Local Green Spaces: policy establishes Local Green Space designations, will not result in new development.
- Core Policy 62 Landscape: policy will not result in new development but provides mitigation.

- Core Policy 63 Managing Flood Risk: policy will not result in new development but provides mitigation.
- Core Policy 64 Water Management Infrastructure: policy will not result in new development but provides mitigation.
- Core Policy 65 Watercourses: policy will not result in new development but provides mitigation.
- Core Policy 66 Pollution and Contaminated Land: policy will not result in new development but provides mitigation.
- Core Policy 67 Air Quality: policy will not result in new development but provides mitigation.
- Development Policy 10 Trees, Hedgerows, and Woodlands: policy will not result in new development but provides mitigation.
- Development Policy 11 Dark Skies: policy will not result in new development but provides mitigation.
- Core Policy 68 Planning for Health and Well-Being: policy seeks to promote improved health outcomes through development but will not result in new development.
- Core Policy 69 Good Design Outcomes and Process: policy sets out design expectations but will not result in new development.
- Core Policy 69a Good Design Outcomes and Process for Strategic Allocations: policy sets out design expectations but will not result in new development.
- Core Policy 70 Green Infrastructure: policy will not result in new development but provides mitigation.
- Core Policy 71 Management of Accessible Green Open Spaces in Residential Developments: policy will not result in new development but provides mitigation.
- Core Policy 74 Monitoring and Implementation: policy will not result in new development.

### **New development / activities but no likely significant effects**

**C.2** The following policies will result in some new development / activities, but these are not likely to have significant effects on Habitats Sites, alone or in combination with other plans/projects, for example due to their scale, and

therefore have been screened out of further assessment; no Appropriate Assessment is required:

- Core Policy 26 Future-Fitting and Decarbonisation of Existing Buildings: sets out how buildings of modern and traditional construction can be designed and adapted to be energy efficient and incorporate renewable energy technologies. The micro-renewables encouraged by this policy would be small scale (e.g. single building) and unlikely to result in significant effects.
- Core Policy 44: Specialist Accommodation: permits specialise or supporting house development that would be small in scale.
- Development Policy 2: Community-led Housing: development would be small in scale and within existing settlements.
- Development Policy 4 Removal of Occupancy Conditions: policy removes individual buildings from residential use.
- Development Policy 5 Replacement Dwellings: development would be small in scale e.g. single dwelling.
- Development Policy 7 Conversion of Rural Buildings: policy sets out principles for conversion of existing rural buildings.
- Core Policy 73 Telecommunications Infrastructure: development would be small in scale.

### Policies screened in

**C.3** The following policies are considered likely to have significant effects on Habitats Sites and have therefore been screened in for further consideration in the Appropriate Assessment.

**C.4** The main policies that determine the overall quantum of development associated with the Local Plan and therefore may be associated with likely significant effects relating to number of residents (e.g. recreation pressure), travel (air pollution) and water consumption/treatment are:

- Core Policy 2 Meeting Housing Needs in Cotswold District: Strategic Sites: Specifies the scale and location of new strategic housing.
- Core Policy 3 Meeting Housing Needs in Cotswold District: non-Strategic Sites: Specifies the scale and location of non-strategic housing.

- Core Policy 5 Meeting Business and Employment Needs in Cotswold District: Specifies the scale and location of opportunities for economic growth.

**C.5** These policies have associated site allocations, which have also been assessed (see **Appendix B** and the site allocation screening, below). Some policies define a specific location for development but are a policy area rather than site allocation. These have been assessed in a similar way to site allocations, i.e. the specific location of development has been considered. Depending on where they are, these policies could contribute to location-based impacts such as loss of habitat, non-physical disturbance, or direct pollution; as well as contributing to in-combination impacts e.g. relating to water use/treatment:

- Core Policy 11 Special Policy Areas – Royal Agricultural University: Supports the expansion / redevelopment of the existing campus and sets out what a masterplan is expected.
- Core Policy 15 Cotswold Airport: supports aviation-related development (and safeguards existing uses).
- Core Policy 16 Thames and Severn Canal: supports development impacting the Canal and towpath.
- Core Policy 17 The River Thames: supports proposals for increased moorings and development related to sport and recreation.
- Core Policy 18 Cotswold Lakes: Post-Mineral Extraction After Use: permits leisure/recreation development on former mineral extraction sites.
- Core Policy 23 Former Cheltenham to Stratford-Upon-Avon Railway Line: permits restoration and reinstatement of railway between Broadway and Honeybourne.
- Core Policy 24 Campden BRI Special Policy Areas: Identifies the type of development suitable at this site and sets out the expectations for masterplanning at this location.
- Core Policy 25: Fire Services College Moreton-in-Marsh: Identifies the type of development suitable at this site and sets out the expectations for masterplanning at this location.

**C.6** Several policies permit specific types of development, which would contribute to the impact pathways summarised below:

- Core Policy 27 Net Zero Carbon New Buildings: requires all new development to include on-site renewable energy – non-physical disturbance, bird strike.
- Core Policy 28 Renewable and Low Carbon Energy Generation, Storage and Transmission: permits renewable energy and energy storage development – non-physical disturbance, bird strike.
- Core Policy 49 Development of Tourist Facilities and Visitor Attractions: policy supports proposals for facilities and attractions where they meet requirements – recreation pressure, air pollution, water quality/quantity, and location-based impacts e.g. loss of habitat.
- Core Policy 50 Tourist and Visitor Accommodation: permits new or extended hotels and serviced accommodation in Town and Local Centres – recreation pressure, air pollution, water quality/quantity, and location-based impacts e.g. loss of habitat.
- Core Policy 72 Social and Community Infrastructure: permits new social and community facilities – air pollution, water quality/quantity, and location-based impacts e.g. loss of habitat.

**C.7** The remainder of the policies that have been screened permit development in unspecified rural locations. Although the scale of development is generally small, the rural location of development means that these policies could result in loss of habitat, non-physical disturbance, or direct pollution, which could have likely significant effects (due to the sites alone, if in a sensitive location):

- Core Policy 45 Gypsy and Traveller Accommodation: defines the two locations for gypsy and traveller accommodation.
- Core Policy 46 New Employment Development: identifies broad locations for employment development (assessed in relation to site allocations) and permits some windfall development outside development boundaries.
- Development Policy 1 Affordable Housing on Rural Exception Sites: Sets out the circumstances in which windfall development would be permitted in rural areas.
- Development Policy 3 Dwellings for Rural Workers Outside Development Boundaries: Allows some small scale development within rural areas.
- Development Policy 6 Rural Diversification: permits development in rural areas.
- Development Policy 8 New Agricultural and Forestry Development: permits development in rural areas.

- Development Policy 9 Equestrian Related Development: permits development in rural areas.

## Policies providing potential mitigation

**C.8** Mitigation cannot be considered at the screening stage. However, it is useful to identify the policies that include safeguards and mitigation at the screening stage, as this information, along with the screening for likely significant effects will be taken into consideration at the next stage (Appropriate Assessment).

**C.9** The following policies may contribute to mitigation for impacts associated with the Plan:

- Core Policy 6 Infrastructure Delivery: sets out the mechanisms by which new services and facilities will be delivered alongside new housing and employment – relevant to recreation pressure, wastewater treatment and water abstraction.
- Core Policy 33 Sustainable Transport & Connectivity: sets out guidelines for the delivery of sustainable modes of transport in new development- relevant to air pollution.
- Core Policy 34 Assessing and Managing Transport Impacts: directs development near to key services and facilities and requires proposals to assess transport impacts- relevant to air pollution.
- Core Policy 35 Active Travel: Walking, Cycling & Wheeling: supports the provision of routes for active transport- relevant to air pollution and recreation pressure.
- Core Policy 36 Healthy, Safe and Inclusive Design: provides guidelines for street design- relevant to recreation pressure and urban edge effects
- Core Policy 37 Public Transport, Shared Transport and Interchanges: addresses how public transport links should be incorporated into development- relevant to air pollution.
- Core Policy 38 Our Kerbside Space and Parking: addresses parking requirements for development proposals- relevant to air pollution
- Core Policy 39 Electric and Low Emission Vehicles: promotes opportunities for the use of electric and low emission vehicles- relevant to air pollution.

- Core Policy 60 Biodiversity and Geodiversity: policy provides general protection and mitigation for habitat loss
- Core Policy 62 Landscape: includes requirements to restore, manage and enhance existing habitats and where appropriate create new habitats- relevant to physical loss of or damage to habitats.
- Core Policy 63 Managing Flood Risk addresses the sequential approach and mitigation for minimising flood risk and providing resilience to flooding - relevant to water quality.
- Core Policy 64 Water Management Infrastructure: addresses requirements for adequate water and wastewater infrastructure associated with development- relevant to water quality and quantity.
- Core Policy 65 Watercourses: sets out that development in close proximity to a watercourse must protect or enhance the function of the watercourse and its biodiversity-relevant to water quality and physical loss of or damage to habitats.
- Core Policy 66 Pollution and Contaminated Land: ensures that development will not have an unacceptable impact on public health or the natural environment- relevant to non-physical disturbance, dust, water quality.
- Core Policy 67 Air Quality: requires applicants to demonstrate that there will be no significant adverse effects from emissions, on health or the environment – relevant to air pollution.
- Core Policy 68 Planning for Health and Wellbeing: includes a requirement for developments to demonstrate how they have incorporated open/green spaces- relevant to recreation pressure.
- Core Policy 70 Green and Blue Infrastructure: requires major developments to provide multifunctional green infrastructure, and to protect existing features e.g. trees and hedgerows- relevant to recreation pressure.
- Development Policy 8 New Agricultural and Forestry Development: addresses mitigation for new or extended agricultural and forestry development- relevant to physical loss of or damage to habitats.
- Development Policy 10 Trees, Hedgerows, and Woodlands: Requires the conservation and enhancements of natural assets affected by development- relevant to physical loss of or damage to habitats.

- Development Policy 11 Dark Skies: Requires developments with external lighting to minimise light spill/trespass, avoid adverse effects on biodiversity and maintain dark corridors along watercourses, woodland edges and hedgerows- relevant to non-physical disturbance.

**C.10** The site development briefs (site-based policies) also set out requirements for each site allocation and may include, for example: requirements for infrastructure (green space, transport etc) and environmental protection. These have been taken into account in the Appropriate Assessment, where relevant.

## Site allocations

**C.11** The following site allocations meet screening criteria ('development site could have a significant impact if...') for the assessed impact pathways.

### Physical damage and loss of habitat

**C.12** Screening criteria:

- Development occurs within or immediately adjacent to a Habitats Site.
- Development occurs within or immediately adjacent to FLL used by
  - Fish of Severn Estuary SAC/Ramsar - River Frome (near Stroud) and River Chelt (near Cheltenham).
  - Birds of Severn Estuary SPA/Ramsar – sites identified as being of moderate or high potential to be bird FLL (see also **Appendix E**).

**C.13** Site allocations meeting screening criteria:

- Within or immediately adjacent to a Habitats Site: none.
- Immediately adjacent to fish FLL: none.
- Within or immediately adjacent to bird FLL:
  - Strategic site: Cirencester - Steadings southern extension.
  - Strategic site: Cirencester - Land east of Kingshill Lane.
  - Strategic site: Cirencester - Land south east of Cirencester and south of Preston.
  - Strategic site: Siddington - Land south west of Siddington.
  - Strategic site: Driffield - Land south of Driffield.

- Strategic site: Down Ampney - Land surrounding Down Ampney.
- Strategic site: Fairford - Land north east of Fairford.
- SD15 – Siddington, Plummers Farm, east of Ashton Road.
- SD17 – Siddington, Land east of Siddington Road and west of Bluebell Drive.
- F53A - Land at Totterdown Hill, Horcott.
- F20A - Land south-east of Fairford.
- F52 - Land west of Terminus Cottage and Station Cottage.
- F39C - Land west of Terminus Cottage and Station Cottage.
- L19 - Land south of Butler's Court.
- L33 - Land south of Ferrers Park.

## Non-physical disturbance

### C.14 Screening criteria:

- Development occurs within 500m of a Habitats Site with qualifying features susceptible to impacts from noise, vibration or light.
- Development occurs within 500m of FLL that supports qualifying features susceptible to impacts from noise, vibration or light:
  - Birds of Severn Estuary SPA/Ramsar – sites identified as being of moderate or high potential to be bird FLL and/or within 500m of locations with moderate/high potential (see also **Appendix E**).

### C.15 Site allocations meeting screening criteria:

- Within 500m of a Habitats Site: none.
- Within 500m of bird FLL:
  - Strategic site: Cirencester - Steadings southern extension.
  - Strategic site: Cirencester - Land east of Kingshill Lane.
  - Strategic site: Cirencester - Land south east of Cirencester and south of Preston.
  - Strategic site: Siddington - Land south west of Siddington.
  - SD15 – Siddington, Plummers Farm, east of Ashton Road.

- SD17 – Siddington, Land east of Siddington Road and west of Bluebell Drive.
- Strategic site: Driffield - Land south of Driffield.
- Strategic site: Down Ampney - Land surrounding Down Ampney.
- F53A - Land at Totterdown Hill, Horcott.
- F20A - Land south-east of Fairford.
- Strategic site: Fairford - Land north east of Fairford.
- F52 - Land west of Terminus Cottage and Station Cottage.
- F39C - Land west of Terminus Cottage and Station Cottage.
- L19 - Land south of Butler's Court.
- L33 - Land south of Ferrers Park.

## Air pollution – vehicle emissions

### C.16 Screening criteria:

- Development increases traffic flows by at least 1,000 AADT or 200HDV (alone or in combination) on roads within 10km of the district and within 200m of a Habitats Site; i.e. the following roads:
  - Cotswold Beechwoods SAC: A46 (and potentially B4070).
  - North Meadow and Clattinger Farm SAC: A419.
  - Rodborough Common SAC: A46.

### C.17 Site allocations meeting screening criteria:

- All site allocations and windfall development.

## Air pollution – dust

### C.18 Screening criteria:

- Development occurs within 100m of a Habitats Site.

### C.19 Site allocations meeting criteria:

- None.

## Recreation pressure

### C.20 Screening criteria:

- Residential development proposed within one of the following zones of influence (ZOIs):
  - 15.4km of Cotswold Beechwoods SAC.
  - 4.2km of North Meadow and Clattinger Farm SAC (ZOI for year round visitors); or
  - 9.4km of North Meadow and Clattinger Farm SAC (ZOI for seasonal visitors).
  - 3.9km of Rodborough Common SAC.
  - 7.0km of Oxford Meadows SAC.
  - 12.6km of Severn Estuary SAC, SPA and Ramsar.
  - n/a (all residential development in the south of district - FLL used by birds of Severn Estuary SPA/Ramsar)

### C.21 Site allocations meeting screening criteria:

- Within 15.4km of Cotswold Beechwoods SAC: A2, C71, C81B, K7A, K15, T31B, T71A, K7B; and strategic sites: Steadings southern extension, New settlement at Cotswold Airport, and Land south west of Kemble.
- Within 4.2km of North Meadow and Clattinger Farm SAC (ZOI for year round visitors): strategic sites Land south of Driffield, and Land surrounding Down Ampney.
- Within 9.4km of North Meadow and Clattinger Farm SAC (ZOI for seasonal visitors): C81B, F20A, F29C, F52, F53A, R203A-C, R607, SD15, SD17, SD23; and strategic sites: Steadings southern extension, Land east of Kingshill Lane, Land south east of Cirencester and south of Preston, Land south west of Siddington, Land south of Driffield, Land surrounding Down Ampney, and Land north east of Fairford.
- Within 3.9km of Rodborough Common SAC: none.
- Within 7.0km of Oxford Meadows SAC: none.
- Within 12.6km of Severn Estuary SAC, SPA and Ramsar: none.
- FLL used by birds of Severn Estuary SPA/Ramsar: all residential development in the south of district.

## Water quality – direct pollution

### C.22 Screening criteria:

- Development is near to and uphill/upstream of Cotswold Beechwoods SAC.
- Development is near to or upstream of River Thames or tributaries, and upstream of North Meadow & Clattinger Farm SAC or Oxford Meadows SAC.
- Development is near to or upstream of River Severn or tributaries, and Severn Estuary SAC/SPA/Ramsar (direct impacts and fish FLL).
- Development is near to or upstream of Cotswold Water Park SSSI (bird FLL, Severn Estuary SAC/Ramsar).

### C.23 Site allocations meeting criteria:

- Near/upstream of Cotswold Beechwoods SAC: none.
- Near/upstream of River Thames or tributaries, and upstream of North Meadow & Clattinger Farm SAC or Oxford Meadows SAC: none.
- Near/upstream of River Severn or tributaries, and Severn Estuary SAC/SPA/Ramsar: A2.
- Near/upstream of Cotswold Water Park SSSI:
  - Fairford: F53A, F20A, F39C, F52, and part of strategic site: Land north east of Fairford.
  - Lechlade-on-Thames: L33.
  - Cerney Wick: R644 (part of strategic site: Land south of Driffield).

## Water quality / quantity – wastewater treatment

### C.24 Screening criteria:

- Development requires wastewater treatment that discharges into the River Avon (Severn Trent Water and Wessex Water) or River Thames (Thames Water) catchments.

### C.25 Site allocations meeting criteria:

- All site allocations.

## Water quality / quantity – abstraction

### **C.26** Screening criteria:

- Development requires water supplied from the River Thames (Thames Water) or River Severn (Bristol Water & Severn Trent Water) catchments.

### **C.27** Site allocations meeting criteria:

- All site allocations.

## Appendix D

### Record of consultation

**D.1** Table D.1 sets out comments received during consultation on previous iterations of the HRA, and how those have been addressed.

Table D.1: Record of HRA consultation comments and LUC response

| Consultee, date, consultation stage                                                     | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | LUC response                                                                                  |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Natural England<br>February 2022<br>LPPU Issues and Options<br>Consultation<br>(Reg.18) | <p><i>Have we correctly identified the European sites that should be scoped-in to the HRA of the Local Plan Partial Update (see Chapter 3 and Appendix A)?</i></p> <p>For the most part yes – please see detailed comments below</p> <p><i>Have we correctly identified the sensitivities of the scoped-in European sites to potential impacts from the Local Plan Partial Plan Update (see Chapter 4 and Appendix B)?</i></p> <p>Yes – subject to detailed comments below</p> <p><i>Is the proposed approach to HRA of the Local Plan Partial Update reasonable (see Chapters 2 and 4)</i></p> <p>Yes – subject to detailed comments below</p>                                                                                                                         | Noted – Natural England in broad agreement with scope of HRA                                  |
| Natural England<br>February 2022<br>LPPU Issues and Options<br>Consultation<br>(Reg.18) | <p>2.23 – Definition of terms - ‘recreation impacts’ – We propose that the council distinguishes recreation impacts from urban effects. Arson, fly tipping, litter and vandalism may be argued to be separate from recreation issues. Stroud DC’s Regulation 19 HRA report provides an example where this approach has been used. The document is in the Stroud DC Examination Library on their website:</p> <p><a href="https://www.stroud.gov.uk/environment/planning-and-building-control/planning-strategy/stroud-district-local-plan-review/local-plan-examination/examination-library">https://www.stroud.gov.uk/environment/planning-and-building-control/planning-strategy/stroud-district-local-plan-review/local-plan-examination/examination-library</a></p> | Urban effects separated from recreation impacts in later HRA reports (including this report). |

| Consultee, date, consultation stage                                                                | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | LUC response                                                                                                                                  |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                    | <p>4.10 - Severn Estuary Special Protection Area (SPA) – reference to functional linkages with Cotswold Water Park. We would welcome further dialogue with the Council on this subject in the light of the report’s status as a preliminary assessment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Further work has been completed on this study, since 2022; the HRA references the most up to date work.</p>                                |
| <p>Natural England<br/>February 2022<br/>LPPU Issues and Options<br/>Consultation<br/>(Reg.18)</p> | <p>4.30 - Highways Agency “Design Manual for Road and Bridges (DMRB) Document LA105: Air Quality” – this paragraph refers to what is otherwise known as the ‘affected road network’.</p> <p>Table 4.1: European sites which are situated within 200 m of a strategic road and their corresponding SSSI units condition</p> <p>With regard to SSSI unit condition we draw the Council’s attention to the fact that air quality data available on APIS – <a href="http://www.apis.ac.uk">www.apis.ac.uk</a> - (Site Relevant Critical Load) data is NOT currently reflected in the SSSI condition assessment summary information. A number of additional information sources on this theme are evolving at the time of writing. We would welcome continued dialogue with the Council to ensure the partial review reflects the most up to date relevant information and evidence.</p> <p>Table 4.2: AADT data provided by Cotswold DC for those European sites within 200m of a strategic road.</p> <p>Natural England notes the nil return for the Cotswold Beechwoods SAC and A46. We therefore draw your attention to Stroud DC’s Reg19 HRA findings in the light of the Wealden judgement. Paragraphs 8.41-8.43 refer (link to HRA report above). The Council should check whether any cumulative increase in traffic associated with the Cotswold District plan review needs further consideration.</p> | <p>Traffic data has been updated for the Reg.19 Local Plan and takes into account the impacts of the Local Plan alone and in combination.</p> |

| Consultee, date, consultation stage                                                     | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | LUC response                                                                                                                                                        |
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| Natural England<br>February 2022<br>LPPU Issues and Options<br>Consultation<br>(Reg.18) | <p>Recreational disturbance</p> <p>4.48 A review of the European sites and their recreational ZOI determined that the following European sites do not have a recreational ZOI that extends into the CDC boundary and can therefore be scoped out of further assessment: ■ Bredon Hill SAC; ■ Oxford Meadows SAC; and ■ Severn Estuary SAC, SPA and Ramsar.</p> <p>NB Current Severn Estuary SAC/SPA/Ramsar Site recreation commission by the Gloucestershire local planning authorities – No Zone of influence (ZOI) has yet been determined. However the plan review should recognise that visitor surveys are due to be completed by the end of March and a report is expected April/May 2022. The visitor survey report is expected to define the extent of the ZOI.</p> | Further work has been completed on this study, since 2022; the HRA references the most up to date work.                                                             |
| Natural England<br>February 2022<br>LPPU Issues and Options<br>Consultation<br>(Reg.18) | Table 4.4 – inclusion of Dixon Wood SAC (recreation pressure) – NB To our knowledge no public rights of way exist within this SAC. The Council may screen out this SAC from recreation considerations accordingly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Dixon Wood SAC scoped out for recreation pressure on this basis.                                                                                                    |
| Natural England<br>December 2025<br>Local Plan full review Preferred Options (Reg.18)   | Natural England wait to be consulted at the appropriate assessment stage, which should include any necessary mitigation required for the above protected sites and their functionally linked habitat. Regarding site allocation, Natural England advises that mitigation and avoidance measures identified through the HRA should be secured through policies in the Plan. Where mitigation or avoidance is not possible the site should not                                                                                                                                                                                                                                                                                                                                | The HRA accompanying this stage was a high-level screening of five spatial options. Full HRA (screening and appropriate assessment) has been undertaken for Reg.19. |

| Consultee, date, consultation stage                                                   | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | LUC response                                                                     |
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|                                                                                       | be allocated. Natural England advises that a full and comprehensive HRA is required for all Local Plans. Without a HRA as described above, Natural England would see this as a soundness issue going forwards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |
| Natural England<br>December 2025<br>Local Plan full review Preferred Options (Reg.18) | The HRA screening conclusion identifies recreational mitigation strategies in place to mitigate the impact pathway of recreational pressure on protected sites. The HRA screening also identifies that there is likely to be further work required (Section 6.4). Natural England are currently in conversation with the relevant Local Authority's for the Cotswold Beechwoods SAC recreational mitigation strategy; this is due to concerns with its implementation, as it is currently set out. Further discussions are due to take place.                                                                                                                                                                                                               | A SANG strategy has been undertaken to identify additional strategic mitigation. |
| Natural England<br>February 2026<br>Review of strategic sites                         | Many of the strategic sites are located near the Cotswold Water Park SSSI and the North Meadow and Clattinger Farm SAC. There must be provision and adherence to the highest quality mitigation. We will expect to see the highest quality drainage and water quality management.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Noted – Appropriate Assessment takes this into account                           |
| Natural England<br>February 2026<br>Review of strategic sites                         | NE has identified a significant number of additional residential units in the area up to 9.4km from North Meadow and Clattinger Farm SAC. The level of additional development coming forward within the 9.4km zone of interest is of a scale over 5,135 additional units Strategic Sites (up to 2043) to c. 12,698 dwellings. This is in comparison to the 486 units set out in the current mitigation strategy (2023-2028: <a href="https://www.cotswold.gov.uk/media/hmvfdoos/north-meadow-sac-mitigation-strategy-final-2023.pdf">https://www.cotswold.gov.uk/media/hmvfdoos/north-meadow-sac-mitigation-strategy-final-2023.pdf</a> ) for which mitigation measures have been designed. This significant increase in Strategic Sites will have a likely | A SANG strategy has been undertaken to identify additional strategic mitigation  |

| Consultee, date, consultation stage                                    | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                            | LUC response                                                                                                                                                                                                                                                                                                                                                                          |
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|                                                                        | <p>adverse effects on the SAC in-combination and perhaps alone in the absence of suitable mitigation.</p> <p>Natural England advise the Council that, through its HRA, you will need to consider additional mitigation measures (above those set out in the Interim Strategy) to ensure that the Council can be certain of avoiding harm to the SAC and that allocation promoters can demonstrate delivery of suitable measures in a timely manner.</p> |                                                                                                                                                                                                                                                                                                                                                                                       |
| <p>Natural England<br/>February 2026<br/>Review of strategic sites</p> | <p>We have no specific comment to make regarding the Severn Estuary and Recreational Disturbance.</p> <p>We draw your attention to Natural England's evidence on FLL for the Severn Estuary SPA:<br/>NECR401 -<br/><a href="https://publications.naturalengland.org.uk/publication/5694125407207424">https://publications.naturalengland.org.uk/publication/5694125407207424</a></p>                                                                    | <p>This has been taken into account in the assessment of FLL</p>                                                                                                                                                                                                                                                                                                                      |
| <p>Natural England<br/>February 2026<br/>Review of strategic sites</p> | <p>[the letter then provides commentary on potential impact pathways associated with the strategic allocations that CDC asked NE to consider. The points relevant to the HRA are summarised below]</p> <ul style="list-style-type: none"> <li>■ <b>Land North of Ampney Crucis</b> – [n/a, site not allocated in Reg.19 plan]</li> <li>■ <b>Steadings Southern Extension</b> – within ZOI of Cotswold Beechwoods SAC, mitigation required.</li> </ul>   | <p>The sensitivity of North Meadow and Clattinger Farm SAC to nutrient enriched flood water is noted. The screening assessment has been updated in the Reg.19 HRA to screen in this impact pathway.</p> <p>The recreation and water quality mitigation requirements suggested have been taken into account in the Appropriate Assessment, and a SANG strategy prepared, as above.</p> |

| Consultee, date, consultation stage | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | LUC response                                                                                                                                                                      |
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|                                     | <ul style="list-style-type: none"> <li>■ <b>Land at Driffield</b> – partially within outer ZOI of North Meadow, SAMM required and may require ‘Infrastructure Mitigation Measures’. There is potential hydrological connectivity (during flooding) between the proposal site and North Meadow and Clattinger Farm SAC. Nutrient enriched flood water is an issue for this SAC (European Site Conservation Objectives for North Meadow and Clattinger Farm SAC). The promoter should provide evidence (eg that suitable areas of land are available) to confirm that surface water from the development area will be managed through appropriate SuDs to avoid pollutants. Mitigation for recreational impacts and water quality impacts will be required for this site. The proposal site is within 1.5km of Cotswold Water Park SSSI, and is hydrologically connected to the SSSI. This site could therefore impact on the water quality of the nearby SSSI lakes. We would expect confirmation of details of how critical construction works will avoid damage to the SSSI. How run-off will be controlled (eg SuDs and suitable land availability to confirm these can be delivered) to prevent pollutants entering the lake, details of storage of materials, how any lighting will be controlled, how certain activities will be limited in time, location or noise level to minimise the risk of disturbance to SSSI birds.</li> <li>■ <b>Land North-East of Fairford</b> - partially within outer ZOI of North Meadow and Clattinger Farm SAC, SAMM required. This allocation is hydrologically linked to the Cotswold Water Park SSSI, and we would advise there is the potential for the site to be hydrologically linked to</li> </ul> | <p>Impacts on Cotswold Water Park SSSI have been considered in relation to FLL and potential indirect impacts on the Severn Estuary SPA/Ramsar (rather than the SSSI itself).</p> |

| Consultee, date, consultation stage | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | LUC response |
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|                                     | <p>the SAC through watercourses. The promoter should provide evidence (eg that suitable areas of land are available) to confirm that surface water from the development area will be managed through appropriate SuDs to avoid pollutants.</p> <ul style="list-style-type: none"> <li>■ <b>Land South-West of Kemble</b> – within inner ZOI of North Meadow and Clattinger Farm SAC, will require SANG and SAMM. This should be secured in the policy wording and the location of the SANG identified on a concept plan and in the Local Plan as an allocation. The site is within close proximity (between 2-3km) to the Cotswold Water Park SSSI. However, we do not consider it to be hydrologically connected to the SSSI, or within a flood zone. There are potential impacts on the SSSI and its interested features from this allocation in terms of disturbance. Information should be provided by the promoter on how impacts on the SSSI and its interest features will be avoided or mitigated.</li> <li>■ <b>Land North, East and South of Moreton-in-Marsh</b> – [no comments relevant to HRA]</li> <li>■ <b>Land South of Preston</b> – within outer ZOI of North Meadow and Clattinger Farm SAC, SAMM required. The northern parcels, and some southern parcels, of the allocation are hydrologically connected to the SSSI. The proposal site is within 1.9km of Cotswold Water Park SSSI. This proposal could impact on the water quality of the nearby SSSI lakes. There is also potential hydrological connectivity (during</li> </ul> |              |

| Consultee, date, consultation stage                                             | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | LUC response                                                                                             |
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|                                                                                 | <p>flooding) between the proposal site and North Meadow and Clattinger Farm SAC. Nutrient rich flood water is an issue for this SAC (European Site Conservation Objectives for North Meadow and Clattinger Farm SAC). We would expect confirmation of details of how critical construction works will avoid damage to the SSSI. How run-off will be controlled (eg SuDs and suitable land availability to confirm these can be delivered) to prevent pollutants entering the lake, details of storage of materials, how any lighting will be controlled, how certain activities will be limited in time, location or noise level to minimise the risk of disturbance to SSSI birds. The proposed development should also detail how high quality water quality measures and drainage measures should feature in the proposal during the operational phase. There are potential impacts on the SSSI and its interested features from this allocation in terms of disturbance to birds. Information should be provided on how impacts on the SSSI and its interest features will be avoided or mitigated.</p> <p>■ <b>Land surrounding Siddington</b> – [n/a, site not allocated in Reg.19 plan]</p> |                                                                                                          |
| <p>Natural England<br/>March 2026<br/>Review of additional site allocations</p> | <p>Following our written advice, NE also attended a face-to-face meeting to discuss mitigation measures for water quality, quantity and recreational disturbance. Natural England will continue to engage with the following actions when consulted:</p> <p>■ Cotswold DC are going to complete a statement of Common Ground to be reviewed by April 26.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>The SANG strategy and FLL work have been completed and the findings incorporate into this report.</p> |

| Consultee, date, consultation stage                                             | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | LUC response                                     |
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|                                                                                 | <ul style="list-style-type: none"> <li>■ A SANG strategy for North Meadow and Clattinger Farm SAC is going to be completed.</li> <li>■ Further bird survey work (relating to the Severn Estuary SPA/Ramsar) on FLL will be undertaken.</li> </ul> <p>Natural England will engage further with you in this process.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                  |
| <p>Natural England<br/>March 2026<br/>Review of additional site allocations</p> | <p>NE has identified a significant number of additional residential units in the area up to 9.4km from North Meadow and Clattinger Farm SAC. The level of additional development coming forward within the 9.4km zone of interest is of a scale over 5,135 additional units Strategic Sites (up to 2043) to c. 12,698 dwellings. This is in comparison to the 486 units set out in the current mitigation strategy (2023-2028) for which mitigation measures have been designed. This significant increase in Strategic Sites will have a likely adverse effects on the SAC in combination and perhaps alone in the absence of suitable mitigation. Natural England advise the Council that, through its HRA, you will need to consider additional mitigation measures (above those set out in the Interim Strategy) to ensure that the Council can be certain of avoiding harm to the SAC and that allocation promoters can demonstrate delivery of suitable measures in a timely manner.</p> <p>Allocations for the Cotswold Local Plan may fall into the Zone of Influence (ZOI) for the Cotswold Beechwoods SAC. The Local Plan should include the correct mitigation, in line with the Recreational Mitigation Strategy for this site.</p> | <p>Noted (repeats earlier advice, see above)</p> |

| Consultee, date, consultation stage                                    | Comments (relevant excerpts)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | LUC response                                                                                                                                             |
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|                                                                        | As part of our response to the Strategic Sites for the Cotswold Pre. Reg.18, we have shared the report “Identification of land with actual or possible functional linkages with the Severn Estuary SPA Phase 5 (Gloucestershire and Worcestershire)” with Cotswold District Council to assist with the preparation of the Habitats Regulation Assessment for the forthcoming Regulation 19 submission. We are aware that you may be engaging in further work to evidence possible impacts on FLL from the allocations.                                                                                                                                                                                                                                                                   | Noted (repeats earlier advice, see above)                                                                                                                |
| Natural England<br>March 2026<br>Review of additional site allocations | Natural England makes our assessment of a development’s likely significant impacts using our recently published set of mapped Impact Risk Zones (IRZs) for SSSI/SAC/SPA/Ramsar sites. These IRZs are available for viewing on <a href="http://www.magic.gov.uk">www.magic.gov.uk</a> and can be downloaded from Natural England Open Data Geoportal. For guidance on how to access and use the Impact Risk Zones see the link to user guide - SSSI IRZ User Guidance MAGIC.pdf ( <a href="http://defra.gov.uk">defra.gov.uk</a> ). IRZs are specifically tailored to each SSSI (which can either be notified for geological or biological reasons) and highlight the types of development that would have the most impact. This should not be used as a screening tool for HRA purposes. | Noted – reference to the IRZs in establishing potential indirect effects on the Severn Estuary SPA/Ramsar via Cotswold Water Park SSSI have been removed |

## Appendix E

### Functionally linked land assessment

#### Assessment approach

**E.1** A desk-based study has been undertaken to identify potential impacts from proposed site allocations on offsite habitat used by the qualifying bird species of Severn Estuary SPA/Ramsar site; i.e. functionally linked land (FLL).

**E.2** The methodology draws primarily on desk-based evidence and existing datasets. Existing evidence from published information including HRAs prepared by neighbouring authorities and Natural England datasets relating to FLL for the Severn Estuary SPA/Ramsar have been used to inform professional judgement regarding likely functional relationships [See reference 61, 62, 63, 64, 65].

**E.3** Consideration has been given to the ecological characteristics of relevant bird species, including their known use of arable crops and improved pasture, and their propensity to move between the SPA and inland sites. The assessment recognises that functional linkage may be seasonal, intermittent or variable between years, and that land does not need to be used continuously to be considered functionally linked.

**E.4** The desk-based study takes a sequential approach, whereby if a site's suitability for qualifying bird species is considered negligible or low for a specific reason (e.g. distance or habitat type) no further investigations for that site have been carried out.

**E.5** If, following the initial review of distance and habitat, a site's potential suitability for qualifying bird species could not be ruled out, a more detailed assessment including mapping of existing relevant bird records may be required. Where this is the case, this is considered in the main body of the HRA report (Chapters 5 & 6).

**E.6** The initial desk study has involved the following:

- A review of existing information on functional linkages with the Severn Estuary SPA/Ramsar.
- Identification of the Severn Estuary SPA/Ramsar qualifying bird species that are susceptible to the loss of the habitat types affected; and ruling out those species unlikely to utilise the habitat types located within the sites (e.g. species restricted to marine habitats).

- A review of aerial imagery and Magic Map to identify the main habitat types and land use within each site allocation and establish their potential value for the qualifying bird species.
- Recognition of factors likely to affect suitability of sites for bird species, including openness, size, shape, proximity of negative factors such as tall boundary features and urban environs, and potential existing source of disturbance.
- Consideration of the site's location within the landscape. For example, is there direct functional connectivity that could be used as flight lines between the site allocations and the Habitats sites? Are there landscape scale features which would reduce the suitability of the site, e.g. urban areas located along flight lines?
- A review of the site's location within flood risk zones, because many of the SPA bird species favour sites which do or do not flood.

**E.7** Following the establishment of typical habitat preferences for each species, each proposed site listed in the Local Plan with the potential to be functionally linked between the Severn Estuary SPA and Ramsar site and the Cotswold Water Park SSSI was assessed for its suitability in supporting the qualifying bird species listed above. The assessment has been based on a number of parameters, as described below. Typically, proposed site allocation display varying combinations of the parameters outlined below and findings on suitability for SPA and Ramsar site qualifying birds have therefore been subject to professional judgement.

### Habitat suitability rating criteria

**E.8** Site with high suitability to be used by SPA/Ramsar species:

- Large sites' area of suitable habitat (e.g. lowland farmland, heathland, wetland, woodland) capable of supporting significant numbers of SPA birds; absence of any notable negative factors such as public rights of way (PRoW) and edge features; land parcel functionally linked with wider habitat and directly linked to SPA via green corridor; site may be prone to flooding (although note absence of flooding favoured by common quail and stone-curlew); typically close to SPA.

**E.9** Site with moderate suitability to be used by SPA/Ramsar species:

- Sites support large areas of functionally linked suitable habitat capable of attracting numbers of SPA birds which by themselves are unlikely to be significant, but which may contribute to supporting significant numbers of birds in-combination with other sites. Likely to be further from SPA, and with presence of some limiting factors.

**E.10** Site with low suitability to be used by SPA/Ramsar species:

- Smaller or fragmented sites; habitats present may be suitable for supporting low numbers of SPA birds on occasion but limited by negative factors such as size, distance from SPA; absence of sight lines and reductions in 'openness' as a result of edge features such as trees, scrub, and buildings; edge features likely to be close to centre of site; suitability may be compromised by existing recreational use; may be isolated within urban areas.

**E.11** Site with negligible suitability to be used by SPA/Ramsar species:

- Habitats present are entirely unsuitable for SPA birds, for example existing developed land or small urban infill sites.

## Existing information on functional linkages

**E.12** The Severn Estuary SPA and Ramsar site is located approximately 10 km west of Cotswold district. Natural England Research Report NECR401 confirms that the Severn Estuary SPA relies on a wider network of habitats beyond its designated boundary to support its qualifying bird species and waterbird assemblage [See reference 66]. Due to the highly mobile nature of many SPA and Ramsar site species, particularly during the wintering and passage periods, functionally linked land plays a critical role in providing feeding, roosting, staging and, in some cases, breeding habitat.

**E.13** NECR401 identifies numerous inland wetland and floodplain sites within the Severn and Avon Vales that either demonstrate proven functional linkage to the SPA or have the potential to support SPA and Ramsar site species under specific environmental conditions, such as flooding, disturbance or adverse weather. The report emphasises that functional linkage may be intermittent or seasonal, but nonetheless ecologically meaningful in maintaining SPA populations at favourable conservation status.

**E.14** This approach is consistent with wider evidence collated by Natural England from other estuarine systems, where existing bird records have been used to understand movement patterns and establish functional buffer distances around designated sites, improving understanding of how qualifying species utilise inland supporting habitats beyond SPA boundaries [See reference 67, 68].

**E.15** The Cotswold Water Park SSSI is partly within the Cotswold district, and comprises a complex mosaic of open water bodies, wet grassland, marginal habitats and gravel pit lakes that collectively support nationally important populations of wintering and passage waterbirds. The lakes – a series of shallow and deep open

waters – are also supported by a range of other habitats including sparsely-vegetated islands, gravel bars and shorelines, reedbed, marsh, wet ditches, rush pasture, semi-natural and improved grasslands and woodland. This provides valuable nesting, resting and feeding conditions for nationally important populations of birds in the breeding and non-breeding seasons [\[See reference 69\]](#).

**E.16** The Cotswolds Water Park SSSI supports species assemblages that overlap with those for which the Severn Estuary SPA and Ramsar site is designated, including wetland species, dabbling and diving ducks and migratory waders. Of the qualifying species of the Severn Estuary SPA and Ramsar site, the following species are considered to be of special interest to the Cotswold Water Park SSSI:

- non-breeding
  - shoveler *Spatula clypeata*,
  - gadwall *Mareca strepera*,
  - pochard *Aythya ferina*,
  - tufted duck *A. fuligula*,
  - great crested grebe *Podiceps cristatus*,
  - lesser black-backed gull *Larus fuscus*;
- breeding
  - great crested grebe *Podiceps cristatus*
  - little egret *Egretta garzetta*
  - little ringed plover *Charadrius dubius*

**E.17** Other habitats within the Cotswold district are also considered to provide FLL for SPA and Ramsar qualifying species. These locations may act as stepping-stone habitats for qualifying species, facilitating movement, dispersal and temporary use between the Severn Estuary SPA/Ramsar site and Local Plan site allocations.

**E.18** Based on the findings of Natural England commissioned Report NECR401 and associated supporting evidence [\[See reference 70\]](#), the following locations within Cotswold District are identified as areas that may function as Functionally Linked Land (FLL) and/or stepping-stones for qualifying species of the Severn Estuary SPA and Ramsar site, and are therefore relevant to consideration within Habitats Regulations Assessment:

- River Thames (Upper Thames) floodplain including Lechlade-on-Thames, Downington, Upper Thames meadows.

- River Evenlode corridor including Moreton-in-Marsh fringe, Lower Evenlode floodplain.
- Churn Valley (Upper River Churn).
- Isolated lakes, reservoirs and restored gravel pits outside CWP.
- Severn Springs, Gloucestershire.

**E.19** The River Thames floodplain includes Lechlade-on-Thames, Downington, Upper Thames meadows. The habitat includes floodplain grasslands which are critical to SPA species including Lapwing, Curlew, Wigeon and Teal. This area is therefore considered to be FLL during flooded periods.

**E.20** While the River Evenlode corridor contains limited areas of floodplain pasture capable of supporting occasional use by certain SPA/Ramsar qualifying species, any functional linkage to the Severn Estuary is considered precautionary and of low significance, and the Upper Churn Valley is not considered to comprise Functionally Linked Land due to its enclosed character, limited habitat extent and lack of evidence of functionally meaningful use.

**E.21** Isolated lakes, reservoirs and restored gravel pits within Cotswold district, although non-floodplain and artificial in origin, may nevertheless function as stepping-stone habitats for certain Severn Estuary SPA/Ramsar qualifying species. Such sites may be used intermittently for roosting, resting or refuge during wintering and passage movements, thereby facilitating dispersal and connectivity between the designated site and inland habitats. While these sites are not considered to represent functionally essential supporting habitat in isolation, they may contribute to a wider ecological network.

**E.22** Seven Springs, Gloucestershire, is not considered to constitute Functionally Linked Land for the Severn Estuary SPA or Ramsar site, due to its upland location, enclosed landscape character and lack of suitable open floodplain or wet grassland habitats required by SPA qualifying species, and in the absence of evidence demonstrating regular or functionally significant use by those species.

**E.23** A site-specific assessment of site allocations will therefore be undertaken within the Habitats Regulations Assessment to determine whether functional linkage exists and whether development could affect the integrity of the designated site.

## Bird habitat preferences

**E.24** Identification of the Severn Estuary SPA/Ramsar qualifying bird species that are susceptible to the loss of the habitat types affected; and ruling out those species

unlikely to utilise the habitat types located within the sites (e.g. species restricted to marine habitats).

**E.25** Bird habitat preferences have been cross-referenced against the habitat types present within each proposed site allocation to determine the suitability of proposed sites for use by qualifying bird species. Habitat types present within the proposed site allocations are confined to arable land parcels, grasslands and developed lands.

**E.26** Known habitat preferences are summarised below, which have been taken from the RSPB and British Trust for Ornithology websites. This considers whether each bird species is susceptible to the loss of habitats located within the proposed site allocations.

**E.27** The stated ‘season’ relates to the how that species is designated at the SPA/Ramsar, e.g. wintering or breeding season.

**E.28** This assessment is informed by a review of all SPA/Ramsar qualifying bird species, with species ruled out where functional linkage to Cotswold District can reasonably be excluded based on known habitat preferences or behaviour, for example where species are reliant on deep open water, coastal or intertidal habitats, or where available inland habitats such as arable land are unlikely to support relevant feeding, roosting or movement.

**E.29** The assessment focuses on those qualifying species of the Severn Estuary SPA and Ramsar site. Qualifying species and habitat preferences, key vulnerabilities and core areas of FLL to be considered are outlined below.

### Bewick’s Swan, *Cygnus columbianus bewickii*

- Qualifying feature of Severn Estuary SPA and Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During the winter, Bewick’s Swans primarily use lowland wetlands, estuaries and associated flooded landscapes for roosting, while foraging widely on inland wet grassland and arable land.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – relies on inland feeding areas away from core roost sites, including grassland and arable habitats.
- **Core area within which FLL could occur:** Although the literature does not define a specific distance over which Bewick’s Swans move between roosting

and foraging areas, the species is well documented as highly mobile and capable of long-distance flight [See reference 71]. During the winter period, Bewick's Swans routinely forage on inland pasture and arable land away from estuarine roosts, using the wider lowland landscape to meet their ecological requirements. Given the absence of a defined movement threshold and the known inland feeding ecology of the species, it is considered reasonable to include the Cotswold district within the broader core area in which functionally linked land could occur.

## Common shelduck, *Tadorna tadorna*

- Qualifying feature of Severn Estuary SPA and Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During winter, Shelduck mainly use estuarine and coastal habitats for feeding and moulting, but also exploit inland waterbodies, wet grasslands and floodplain habitats where available.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – may use inland wetlands and flooded grassland as supporting habitats away from estuaries.
- **Core area within which FLL could occur:** The literature does not define a consistent or routine distance over which Common Shelduck commute between estuarine roosting and inland foraging areas. Tracking studies indicate that most winter movements occur within relatively localised areas associated with estuaries, although occasional longer exploratory movements exceeding 40 km have been recorded [See reference 72]. Common Shelduck are highly mobile and capable of long-distance flight and are known to utilise inland freshwater and grazing habitats under certain conditions, particularly where suitable coastal resources are constrained. In the absence of a defined movement threshold and given the species' mobility and potential use of inland habitats, it is considered precautionary to include the Cotswold district within the broader core area in which functionally linked land for Common Shelduck could occur.

## Gadwall, *Anas strepera*

- Qualifying feature of Severn Estuary SPA and Ramsar site.
- **Season:** Wintering

- **Species Habitat Preference (relative to season of designation):** In winter, Gadwall predominantly use freshwater lakes, reservoirs, flooded gravel pits and sheltered estuarine waters, favouring shallow open water and associated marginal habitats.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Occasionally – the Gadwall is a dabbling duck strongly associated with wetlands, lakes and reservoirs. This species is occasionally known to use grassland when it is flooded, damp, or immediately adjacent to wetlands.
- **Core area within which FLL could occur:** Satellite-tracking studies in the UK demonstrate that Gadwall regularly move between freshwater wetland systems within a single winter, with recorded movements of at least 20 km between core areas of use [See reference 73]. Gadwall may occasionally use wet grassland or flooded fields in close proximity to waterbodies, but it does not routinely feed or roost on dry grassland or arable land. Functional linkage for this species is therefore most plausibly associated with standing open water and wetland habitats, rather than terrestrial agricultural land.

### Dunlin, *Calidris alpina alpina*

- Qualifying feature of Severn Estuary SPA and Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** Primarily coastal during the winter season, including mudflats in bays and river estuaries.
- **Species susceptible to loss of offsite habitat as a result of the plan:** No – Dunlin is a coastal and estuarine wader and is a strong coastal species that is functionally dependent on estuarine and intertidal habitats and does not make meaningful use of inland grassland or arable land. It is therefore highly unlikely to be functionally linked to the site allocations habitats within Cotswold district, either directly or via stepping-stone habitats, and can be confidently ruled out of further functional linkage assessment.
- **Core area within which FLL could occur:** Functionally linked land for wintering Dunlin is likely to be restricted to areas close to estuarine feeding grounds within the SPA and Ramsar site that are used for roosting, rather than extending across wider inland areas.

### Common redshank, *Tringa totanus*

- Qualifying feature of Severn Estuary SPA and Ramsar site.

- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** In winter, Redshanks flock to mudflats around the UK's coasts where they predate on crustaceans and other invertebrates. As spring arrives and insects begin to emerge, they head to the saltmarshes and inland wet grasslands, with the aim of raising chicks.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes – may utilise grassland close to wetlands.
- **Core area within which FLL could occur:** Small numbers of Common redshank may occasionally use inland wetlands or floodplain sites, however, such use is typically limited, highly site-specific and closely associated with the estuary system [See reference 74]. Evidence from wintering studies demonstrates that the vast majority of Redshank remain functionally tied to estuaries, with inland sites supporting only a minor proportion of the population. Accordingly, functionally linked land for Common Redshank is likely to be restricted to clearly defined roosting or foraging sites close to the estuary that are demonstrably and regularly used, rather than extending across wider inland areas.

## Greater white-fronted goose, *Anser albifrons albifrons*

- Qualifying feature of Severn Estuary SPA and Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** Great White-fronted Geese roost communally on estuaries, coastal lagoons or large open water bodies and undertake regular daily movements inland to forage. Foraging takes place predominantly on wet grassland, floodplain grazing marsh and improved pasture, and occasionally on arable land such as stubble or winter cereals.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes. they rely heavily on inland feeding habitats outside designated sites, particularly grassland and floodplain habitats functionally linked to estuarine or open-water roosts.
- **Core area within which FLL could occur:** highly mobile wintering species that typically roosts on estuarine or open-water habitats but relies on inland floodplain grasslands and agricultural land for foraging. Birds routinely undertake daily commuting flights between roosting and feeding areas, often over distances of many kilometres, and may make use of a network of feeding

sites within a wintering season. Therefore, it is considered reasonable to include the Cotswold district within the broader core area in which functionally linked land could occur.

**E.30** Species/populations identified subsequent to designation for possible future consideration, noteworthy fauna and European populations of importance **[See reference 75]**

### Lesser black-backed gull, *Larus fuscus graellsii*

- Species/populations identified subsequent to designation for possible future consideration of Severn Estuary Ramsar site.
- **Season:** Breeding
- **Species Habitat Preference (relative to season of designation):** While breeding, adults forage widely over a broad marine and terrestrial landscape, including intertidal areas, farmland (pasture and arable), landfill sites, urban areas and inshore waters.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes. they depend on a network of off-site foraging habitats beyond colony boundaries, including improved and flooded grassland.
- **Core area within which FLL could occur:** Functionally Linked Land may extend well beyond SPA boundaries **[See reference 76]**, and may include coastal, estuarine, agricultural and urban habitats that are regularly used for feeding during the breeding season.

### Ringed plover

- Species/populations identified subsequent to designation for possible future consideration of Severn Estuary Ramsar site, and supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering and passage
- **Species Habitat Preference (relative to season of designation):** Ringed plover mostly breed on beaches around the coast, but they have also now begun breeding inland in sand and gravel pits and former industrial sites. Many UK birds live here all year round, but birds from Europe winter in Britain, and birds from Greenland and Canada pass through on migration.

- **Species susceptible to loss of offsite habitat as a result of the plan:** No – does not make meaningful use of inland grassland, arable land or wetland sites as part of its wintering or passage ecology.
- **Core area within which FLL could occur:** Ringed Plover does not have a defined or standardised home range in UK conservation guidance. The species is characterised by localised habitat use, with feeding and roosting typically occurring within the same coastal or estuarine area. Movements during both breeding and non-breeding seasons are small-scale, and there is no evidence for routine long-distance commuting to inland habitats. Any functionally linked land would therefore be limited, site-specific and confined to areas immediately adjacent to the estuary, rather than occurring across a wider landscape.

### Eurasian teal, *Anas crecca*

- Species/populations identified subsequent to designation for possible future consideration of Severn Estuary Ramsar site, and supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering and passage
- **Species Habitat Preference (relative to season of designation):** During winter and passage, Eurasian Teal primarily use estuarine and coastal wetland habitats, feeding on intertidal mudflats, saltmarsh creeks, coastal lagoons and sheltered coastal waters, particularly at night.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes – often depends on freshwater wetlands and grazing marsh located outside SPA boundaries for roosting and, in some cases, for feeding.
- **Core area within which FLL could occur:** Local to sub-regional (estuary-focused). Functionally Linked Land for Eurasian Teal is most likely to occur within the same estuarine system and adjacent floodplain, typically comprising nearby freshwater wetlands, grazing marsh and managed waterbodies within a few kilometres of the estuary.

### Herring gull, *Larus argentatus argentatus*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** Breeding
- **Species Habitat Preference (relative to season of designation):** Herring Gulls use a broad range of coastal, estuarine and terrestrial habitats.

- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes – during the breeding season, Herring Gulls depend on a network of off-site foraging habitats beyond the nesting location, including inland grassland and agricultural areas.
- **Core area within which FLL could occur:** GPS-tracking studies demonstrate that Herring Gulls routinely forage at distances of 10–30 km or more from principal roost sites, utilising both coastal and inland habitats [See reference 77]. Functionally Linked Land for Herring Gull therefore may extend well beyond the estuary boundary, typically encompassing coastal habitats, inland farmland, landfill sites, urban areas and freshwater bodies within a wide foraging radius from principal roost sites.

### Little egret, *Egretta garzetta*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** peak counts in spring/autumn
- **Species Habitat Preference (relative to season of designation):** Little Egrets feed mainly in shallow coastal and estuarine habitats, including intertidal mudflats, saltmarsh creeks, tidal channels and lagoons, where they take small fish and invertebrates in shallow water. They also make frequent use of freshwater wetlands, such as drainage ditches, flooded fields, grazing marsh, pools and river margins, particularly when estuarine feeding opportunities are limited by tide or disturbance.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Possibly - uses wet grassland, floodplain habitats and shallow freshwater wetlands and is capable of moving between coastal and inland sites via a network of stepping-stone habitats, however it is unlikely when habitats are dry, enclosed or disconnected from wetland networks.
- **Core area within which FLL could occur:** Local to estuary-scale (generally limited). Functionally Linked Land for Little Egret is most likely to occur within the same estuarine system and adjacent floodplain, typically comprising nearby freshwater wetlands, grazing marsh, ditches and roosting habitat within a few kilometres of the estuary.

### Ruff, *Philomachus pugnax*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** peak counts in spring/autumn

- **Species Habitat Preference (relative to season of designation):** During spring and autumn passage, Ruff show a strong preference for shallow freshwater and brackish wetlands rather than exposed intertidal mudflats. Favoured habitats include flooded grazing marsh, wet grassland, waterlogged fields, ditches, pools, lagoons and the margins of estuaries and freshwater bodies.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes. dependent on off-site inland grassland during passage.
- **Core area within which FLL could occur:** Local to sub-regional. During spring and autumn passage, Ruff relies heavily on inland wet grassland and shallow freshwater wetlands outside the Severn Estuary boundary, indicating potential for functionally linked land where such habitats support migration stopover feeding and roosting.

### Whimbrel, *Numenius phaeopus*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** Whimbrel predominantly use coastal and estuarine habitats, favouring intertidal mudflats, sandflats, saltmarsh edges, tidal creeks and shorelines, where they feed on invertebrates such as worms, crustaceans and molluscs. Birds also make opportunistic use of coastal grassland, short turf, rough grazing and occasionally inland wetlands for feeding and roosting, particularly during stopover periods or at high tide.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Occasionally – primarily associated with the estuary, however, opportunistic use of grassland and arable habitats, typically in close proximity to estuaries and coastal environments.
- **Core area within which FLL could occur:** During spring and autumn passage, Whimbrel uses the Severn Estuary primarily for intertidal foraging, with limited reliance on adjacent coastal grassland and roosting habitat, indicating that any functionally linked land is likely to be local in extent and closely associated with the estuary.

### Eurasian curlew *Numenius arquata arquata* (breeding)

- Noteworthy species of Severn Estuary Ramsar site.

- **Season:** Breeding
- **Species Habitat Preference (relative to season of designation):** In winter, Curlew use estuarine mudflats extensively but also range widely across inland wet grassland, floodplain habitats and arable land for foraging.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – frequently reliant on inland terrestrial habitats away from core estuarine areas.
- **Core area within which FLL could occur:** Within the NECR483 report, a functionally linked land buffer of 15km is established for the Curlew. For breeding Curlew, Functionally Linked Land may occur over a relatively large spatial extent, reflecting the species' use of multiple habitat types within the breeding landscape [\[See reference 78\]](#).

### Common greenshank, *Tringa nebularia*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** Spring/autumn
- **Species Habitat Preference (relative to season of designation):** During passage, Greenshank primarily uses coastal and estuarine wetlands, favouring intertidal mudflats, muddy shorelines, tidal creeks, lagoons and saltmarsh pools, where it feeds on aquatic invertebrates, small fish and crustaceans.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes, individuals use off-site freshwater wetlands and coastal grassland as alternative feeding or roosting areas.
- **Core area within which FLL could occur:** During spring and autumn passage, Common Greenshank uses the Severn Estuary primarily for intertidal foraging, with limited functional reliance on adjacent coastal and freshwater wetlands, indicating that any functionally linked land is likely to be local in extent and directly associated with the estuary [\[See reference 79\]](#).

### Eurasian wigeon, *Anas penelope*

- Species/populations identified subsequent to designation for possible future consideration of Severn Estuary Ramsar site, and supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering

- **Species Habitat Preference (relative to season of designation):** During winter and passage, wigeon primarily use estuarine and coastal habitats, including intertidal mudflats, saltmarsh, tidal creeks and shallow coastal waters, which provide feeding and loafing opportunities. The species is also strongly associated with grazing marsh, low-lying pasture, floodplain grassland and freshwater wetlands, where birds feed extensively on grasses and aquatic vegetation, often grazing terrestrially during daylight or at high tide.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes – dabbling duck with strongly terrestrial feeding habits. May utilise floodplain pastures, wet grasslands and freshwater bodies within the wider Severn and Avon Vales.
- **Core area within which FLL could occur:** Within the NECR483 report, a functionally linked land buffer of 2km is established for the Wigeon. Eurasian wigeon wintering on the Severn Estuary rely on a network of estuarine and inland floodplain habitats, with functionally linked land extending across grazing marsh and freshwater wetlands within the wider Severn landscape.

### Northern shoveler, *Anas clypeata*

- Species/populations identified subsequent to designation for possible future consideration of Severn Estuary Ramsar site, and supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During winter, northern shoveler favours shallow wetlands and calm waters, including freshwater marshes, lagoons, pools, flooded grassland, and sheltered estuarine margins.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes – may utilise freshwater wetlands, flooded fields, grazing marsh and pools adjacent to estuarine systems.
- **Core area within which FLL could occur:** Localised and habitat-specific within the wider estuarine hinterland. Functionally Linked Land for northern shoveler is most likely to occur within shallow freshwater and brackish wetlands close to the estuary, including coastal grazing marsh, wet grassland and managed waterbodies used for feeding and roosting, particularly at high tide.

## Common pochard, *Aythya farina*

- Species/populations identified subsequent to designation for possible future consideration of Severn Estuary Ramsar site, and supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During winter, pochard is strongly associated with deep, still or slow-moving freshwater habitats that support diving behaviour, including lakes, reservoirs, flooded gravel pits and large wetlands with high nutrient status.
- **Species susceptible to loss of offsite habitat as a result of the plan:** No – susceptible to loss of off-site lakes, reservoirs and wetlands.

## Water rail, *Rallus aquaticus*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** In winter, Water rail is strongly associated with dense wetland vegetation, particularly reedbeds, sedge beds, wet ditches, marshes and flooded margins with shallow water or muddy substrates.
- **Species susceptible to loss of offsite habitat as a result of the plan:** No – susceptible to loss of off-site discrete patches of dense wetland vegetation (e.g. reedbeds, wet margins, ditches and managed wetlands).

## Spotted redshank, *Tringa erythropus*

- Noteworthy species of Severn Estuary Ramsar site.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** Spotted redshank favours shallow estuarine and coastal wetlands, including mudflats, creeks, saline lagoons, saltmarsh pools and sheltered bays.
- **Species susceptible to loss of offsite habitat as a result of the plan:** Yes – may utilise flooded grassland close to estuaries.
- **Core area within which FLL could occur:**

## Northern pintail, *Anas acuta*

- Supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During winter, Pintail utilise estuaries and large freshwater bodies for roosting while foraging across floodplain wetlands and suitable inland feeding habitats, including agricultural land.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – may depend on inland feeding areas away from primary roost sites, including agricultural land.
- **Core area within which FLL could occur:** Within the NECR483 report, a functionally linked land buffer of 2km is established for the Pintail. Functionally Linked Land for northern pintail is most likely to comprise wet grassland, grazing marsh, floodplain wetlands and shallow waterbodies in close proximity to the Severn Estuary SPA.

## Lapwing, *Vanellus Vanellus*

- Supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During winter and passage, lapwing shows a strong preference for open, low-lying habitats including estuarine margins, saltmarsh, wet grassland, grazing marsh, floodplain pasture and damp arable fields.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – reliant on wet grassland, grazing marsh and floodplain farmland.
- **Core area within which FLL could occur:** Lapwing is a regular wintering and passage species in the Severn Estuary, strongly dependent on floodplain grassland and wet agricultural habitats, and has a home range of more than 15km.

## Mallard, *Anas platyrhynchos*

- Supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering

- **Species Habitat Preference (relative to season of designation):** During winter, mallard primarily uses shallow inshore waters, estuarine creeks, saltmarsh edges, grazing marsh, freshwater ditches, ponds and flooded pasture. .
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – may depend on floodplain grazing marsh, wetlands, ditches and farmland used for feeding and roosting.
- **Core area within which FLL could occur:** Estuarine margins and associated lowland wetlands and floodplains. Functionally Linked Land for mallard is most likely to occur within the Severn Estuary floodplain, including coastal and floodplain grazing marsh, freshwater and brackish ditches, ponds, slow-flowing watercourses and adjacent agricultural land.

### Tufted Duck, *Aythya fuligula*

- Supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** During winter, Pintail utilise estuaries and large freshwater bodies for roosting while foraging across floodplain wetlands and suitable inland feeding habitats, including agricultural land.
- **Species susceptible to loss of off-site habitat as a result of the plan:** Yes – may depend on inland feeding areas away from primary roost sites.
- **Core area within which FLL could occur:** Sheltered estuarine waters and associated inland open water habitats. Functionally Linked Land for tufted duck is most likely to occur within the Severn Estuary hinterland, including reservoirs, docks, flooded gravel pits, large ponds and slow-flowing rivers connected ecologically to the estuary.

### Grey Plover, *Pluvialis squatarola*

- Supported European population of importance for Severn Estuary SPA.
- **Season:** Wintering
- **Species Habitat Preference (relative to season of designation):** Tufted duck is a diving duck that favours calm, open water in winter, including lakes, reservoirs, flooded gravel pits, docks, slow-flowing rivers and sheltered estuarine waters.

- **Species susceptible to loss of off-site habitat as a result of the plan:** No – sensitive to loss of inland waterbodies such as reservoirs, flooded pits, ponds and slow rivers.
- **Core area within which FLL could occur:** Intertidal–coastal interface within and adjacent to the estuary. Functionally Linked Land for Grey Plover is most likely to occur close to feeding areas, typically within the wider Severn Estuary coastal zone, encompassing upper shorelines, flood embankments, saltmarsh fringes and adjacent open coastal land used at high tide.

**E.31** The species that will be taken forwards for further consideration are those that may potentially rely on land within the Cotswold district that have been allocated within the Local Plan for development. This land includes arable fields, grassland, urban and already developed land, and scrub or small woodland patches.

**E.32** Based on the above species information, the following qualifying species of the Severn Estuary SPA and Ramsar site will be considered for further assessment. The list below summarises the principal on-site habitats used by each qualifying species, together with typical off-site supporting habitats (functionally linked land) that may be utilised for feeding, roosting or loafing within the wider ecological network.

- Bewick's swan – wetlands; arable fields.
- Common shelduck – estuaries; saltmarsh lagoons (outside the district); and lakes (within the district).
- Gadwall – slow freshwater; flooded grassland.
- Greater white-fronted goose – wet grassland; arable fields.
- Lesser black-backed gull – coasts (outside the district); and landfills or farmland (within the district).
- Herring gull – coasts (outside the district); urban landfills (within the district).
- Eurasian curlew – mudflats; wet grassland.
- Eurasian wigeon – shallow wetlands; grazed grassland.
- Northern shoveler – shallow wetlands; flooded fields.
- Spotted redshank – lagoons mudflats; flooded fields.
- Northern pintail – freshwater wetlands; inundated fields.
- Lapwing – wet grassland; arable farmland.

## Assessment of site allocations

**E.33** A review of the proposed development within the Local Plan identified the following site allocations which will need to be considered further for functionally linked land.

**E.34** Assessment of site allocations included reference to the Habitat Suitability Criteria, as well as flood risk information which has been included to count for species such as Northern shoveler and Spotted redshank which rely on flooded field and grasslands.

### K7A and B Kemble - Kemble - New settlement at Cotswold Airport



- **Distance from Habitat Site:** This site is located 4.18km from the SSSI and 23.13km from the SPA and Ramsar site at the closest point
- **Size:** 156ha
- **Habitats present:** The site comprised an airfield, including commercial buildings and a runway. To the east of the site, a small arable field is disconnected from the airfield by a single carriageway road.

- **Use of the site:** The site was used for commercial and flying use.
- **Habitat suitability:** Negligible – due to the high disturbance associated with the function of the land as an airfield and the arable nature of the site, the site was considered of negligible suitability for qualifying bird species.

## K15 Kemble and Ewen

[Adjacent to Cotswold Airport and shown on image above.]

- **Distance from Habitat Site:** This site is located 3.51km from the SSSI and 25.95km from the SPA and Ramsar site at the closest point
- **Size:** 16.28ha
- **Habitats present:** The site comprised a small arable field to the southeast of an airfield. The small arable field is disconnected from the airfield by a single carriageway road which bounds the western and northern extent of the site and is bounded to the east and south by woodland.
- **Use of the site:** The site was used for agriculture.
- **Habitat suitability:** Low – due to small size of the site, the disturbance associated with the neighbouring airfield and the arable nature of the site, the site was considered of low suitability for qualifying bird species.

## Strategic site: Land south west of Kemble



- **Distance from Habitat Site:** This site is located 2.6km from the SSSI and 25km from the SPA and Ramsar site at the closest point
- **Size:** 68.71ha
- **Habitats present:** The site comprised of eight large arable field, surrounded by other arable fields and a residential and industrial areas to the northwest and southwest of the site respectively.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Low – due to the extensive areas of arable land and the surrounding residential and commercial development, the site was considered of low suitability for qualifying bird species.

## Strategic site: Cirencester - Steadings southern extension



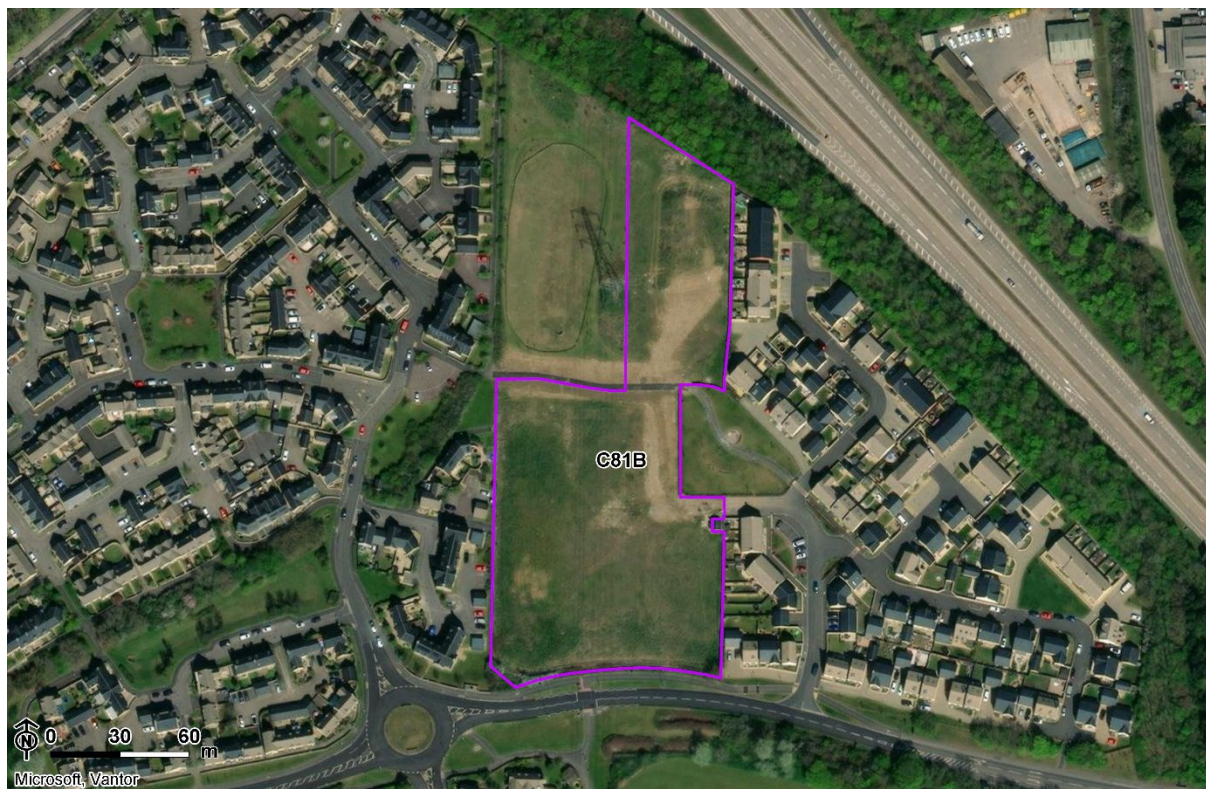
- **Distance from Habitat Site:** This site is located 1.5km from the SSSI and 26.82km from the SPA and Ramsar site at the closest point
- **Size:** 116.5ha
- **Habitats present:** The site comprised of ten small, medium and large arable fields, surrounded by other arable fields and a residential area to the northeast. Several farm roads are also present within the fields, as well as electricity pylons.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 2km of the CWP and has extensive areas of arable land. However, it is of very low flood risk [See reference 80] and is surrounded by dense residential development and therefore has been considered of moderate suitability for qualifying bird species.

## C71 - Land adjacent 'Donside', off Barn Way



- **Distance from Habitat Site:** This site is located 4.79km from the SSSI and 27.46km from the SPA and Ramsar site at the closest point
- **Size:** 0.33ha
- **Habitats present:** The site comprised of a sealed entrance road and small vegetated parcels of scrub and woodland. The site was surrounded by residential development and opening into arable land to the west.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Low – due to the small size, scrub and woodland vegetation, and surrounding extensive areas of arable land and residential development, the site was considered of low suitability for qualifying bird species.

## C81B - Land west of Gardner Way



- **Distance from Habitat Site:** This site is located 3.55km from the SSSI and 30km from the SPA and Ramsar site at the closest point
- **Size:** 1.60ha
- **Habitats present:** The site comprised of 2 small, grassed fields, within a dense residential area. To the north, the site is bounded by a 40m strip of woodland which forms part of the highway buffer. An electricity pylon is also located with the site.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Low – due to the small size, boundary features which increase the risk of predation, and the surrounding residential, the site was considered of low suitability for qualifying bird species.

## Strategic site: Cirencester - Land east of Kingshill Lane



- **Distance from Habitat Site:** This site is located 2.5km from the SSSI and 28.6km from the SPA and Ramsar site at the closest point
- **Size:** 41.93ha
- **Habitats present:** The site comprised of 5 small and medium arable fields, bound to the northeast by a dual carriageway highway, and by other arable fields and smaller local roads in all other directions. In the wider landscape, the area was characterised by residential development. Several woodland belts were also identified within the site, creating additional boundary features.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 2km of the CWP and has extensive areas of arable land. However, it is of very low flood risk and is bounded by hedgerow boundaries which promotes predation and therefore has been considered of moderate suitability for qualifying bird species.

## Strategic site: Cirencester - Land south east of Cirencester and south of Preston



- **Distance from Habitat Site:** This site is located 1.8km from the SSSI and 30.56km from the SPA and Ramsar site at the closest point
- **Size:** 100ha
- **Habitats present:** The site comprised of 15 small, medium and large arable fields, surrounded by other arable fields and scattered residential development. A dual carriageway highway runs immediately to the north and a single carriageway to the south. All fields are bounded by hedgerows and trees, and several patches of woodland.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 2km of the CWP and has extensive areas of arable land. The site is of low flood risk with a small tributary to the northwest of the site allocation, and the field boundaries which promotes predation. This has been considered of moderate suitability for qualifying bird species.

## Strategic site: Siddington - Land south west of Siddington



- **Distance from Habitat Site:** This site is located <500m from the SSSI and 29.34km from the SPA and Ramsar site at the closest point
- **Size:** 21.66ha
- **Habitats present:** The site comprised of one medium arable field, surrounded by other arable fields and scattered residential infrastructure. Two roads are also present around the site boundary to the west and east.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 500m the CWP. However, it is of very low flood risk, is a relatively small area of arable land providing limited potential habitat and has high levels of disturbance due to roads and surrounding residential areas. Therefore, the site was considered of moderate suitability for qualifying bird species.

## SD15 – Siddington, Plummers Farm, east of Ashton Road



- **Distance from Habitat Site:** This site is located <500m from the SSSI and 30.1km from the SPA and Ramsar site at the closest point
- **Size:** 3.17ha
- **Habitats present:** The site comprised of one small field, surrounded by arable fields and residential infrastructure. The site is bounded by hedgerows and trees, and roads are also present around north and west edges of the site.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 500m the CWP. However, it is of very low flood risk, is a relatively small area of arable land providing limited potential habitat and field boundaries which promotes predation. Therefore, the site was considered of moderate suitability for qualifying bird species.

## SD23 – Siddington, Land between disused canal and disused railway line, north of Park Way



- **Distance from Habitat Site:** This site is located 1km from the SSSI and 29.69km from the SPA and Ramsar site at the closest point
- **Size:** 5.68ha
- **Habitats present:** The site comprised of three small field, and a dirt road accessway. The site is bounded by hedgerows and trees, and within a wider residential and commercial area.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 1km of the CWP. However, the site is relatively small, is of very low flood risk and is bounded by hedgerow boundaries which promotes predation and therefore has been considered of moderate suitability for qualifying bird species.

## SD17 – Siddington, Land east of Siddington Road and west of Bluebell Drive



- **Distance from Habitat Site:** This site is located 1.57km from the SSSI and 30.5km from the SPA and Ramsar site at the closest point
- **Size:** 0.63ha
- **Habitats present:** The site comprised of a small section of field, adjacent to a main road and residential neighbourhood. The site is bounded by hedgerows and trees to the west, and a gate to the east which separates the site from the wider residential area.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation is located within 2km of the CWP. However, the site is relatively small providing limited potential habitat, is of very low flood risk and is bounded by hedgerow boundaries which promotes predation and therefore has been considered of moderate suitability for qualifying bird species.

## Strategic site: Driffield - Land south of Driffield



- **Distance from Habitat Site:** This site is located 600m from the SSSI and 36.56km from the SPA and Ramsar site at the closest point
- **Size:** 199.4ha
- **Habitats present:** The site comprised of 18 small, medium and large arable fields, bounded by a highway to the south, and other arable fields in all other directions. The wider area was characterised by arable fields and agricultural use with scattered residential development. All fields were bounded by hedgerows and several belts of woodland are within the site.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation being located less than 1km from the CWP and presented large areas of arable land providing extensive potential habitat. The site is of low flood risk, is bounded by hedgerows which promotes predation and is surrounded by residential and commercial development. Therefore, the site was considered of high suitability for qualifying bird species.

## Strategic site: Down Ampney - Land surrounding Down Ampney



- **Distance from Habitat Site:** This site is located 1.3km from the SSSI and 34.3km from the SPA and Ramsar site at the closest point
- **Size:** 135.4ha
- **Habitats present:** The site comprised of 13 small, medium and large arable fields, with a large residential development in between the fields. The wider area was characterised by arable fields and agricultural use with scattered residential development. Add fields were bounded by hedgerows and several belts of woodland are within the site.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site allocation being located less 1km of the CWP and presented large areas of arable land providing extensive potential habitat. The site if of low flood risk, is bounded by hedgerows which promotes predation and is surrounded by residential and commercial development. Therefore, the site was considered of high suitability for qualifying bird species.

## R203A-C - Land to rear of the Knoll, Whelford Road



- **Distance from Habitat Site:** This site is located 2km from the SSSI and 42.5km from the SPA and Ramsar site at the closest point
- **Size:** 2.52ha
- **Habitats present:** The site comprised of 3 small fields, adjacent to a main road, wider arable fields and a residential neighbourhood. The site is bounded by hedgerows and trees. An airport and supporting infrastructure was located to the northwest.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Low - the site allocation is located within 2km of the CWP, however is of very low flood risk, is a relatively small area of land and experience high levels of disturbance due to the airport and surrounding residential and commercial development. Therefore, the site was considered of low suitability for qualifying bird species.

## F53A - Land at Totterdown Hill, Horcott



- **Distance from Habitat Site:** This site is located adjacent to the SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 12.81ha
- **Habitats present:** The site comprised of 3 arable fields bounded by hedgerows and trees. The wider area is characterised by arable land and residential development. The site is located immediately adjacent to revivors which are part of the CWP SSSI.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** High - the site allocation is located immediately adjacent to the CWP and arable in nature. It is of very low flood risk and was considered of high suitability for qualifying bird species.

## F20A - Land south-east of Fairford



- **Distance from Habitat Site:** This site is located adjacent SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 5.75ha
- **Habitats present:** The site comprised of 2 arable fields bounded by hedgerows and trees. The wider area is characterised by arable land and residential development. The site is located immediately adjacent to revivors which are part of the CWP SSSI.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** High - the site allocation is located immediately adjacent to the CWP and arable in nature. It is of very low flood risk and was considered of high suitability for qualifying bird species.

## Strategic site: Fairford - Land north east of Fairford



- **Distance from Habitat Site:** This site is located adjacent SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 71.26ha
- **Habitats present:** The site comprised of eight medium and large arable field within a wider arable and residential area. The site is located immediately adjacent to revivors which are part of the CWP SSSI.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** High - the site allocation is located immediately adjacent to the CWP and arable in nature. It is of very low flood risk and was considered of high suitability for qualifying bird species.

## F52 - Land west of Terminus Cottage and Station Cottage



- **Distance from Habitat Site:** This site is located 200m from the SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 1.486ha
- **Habitats present:** The site comprised of a small, grassed field within a wider residential area, bounded by hedgerows and trees. The site is located immediately adjacent to revivors which are part of the CWP SSSI.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site was located within 500m of the CWP and is characterized by relatively small, grassed field. It is of very low flood risk and is surrounded by residential land. There, it was considered of moderate suitability for qualifying bird species.

## F39C - Land west of Terminus Cottage and Station Cottage

(image as above)

- **Distance from Habitat Site:** This site is located 200m from the SSSI and >45km from the SPA and Ramsar site at the closest point

- **Size:** 1.84ha
- **Habitats present:** The site comprised of a small, grassed field within a wider residential area, bounded by hedgerows and trees. The site is located immediately adjacent to revivors which are part of the CWP SSSI.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site was located within 500m of the CWP and is characterized by relatively small, grassed field. It is of very low flood risk and is surrounded by residential land. There, it was considered of moderate suitability for qualifying bird species.

## R607 - Land north of London Road



- **Distance from Habitat Site:** This site is located 4.73km from the SSSI and 37km from the SPA and Ramsar site at the closest point
- **Size:** 1.06ha
- **Habitats present:** The site comprised of a small field, adjacent to a main road, arable land and residential neighbourhood.
- **Use of the site:** The site was used for agricultural use.

- **Habitat suitability:** Negligible - due to the small area of developed land and the disturbance surrounding the site, the site was considered of negligible suitability for qualifying bird species.

## L19 - Land south of Butler's Court



- **Distance from Habitat Site:** This site is located 380m from the SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 0.954ha
- **Habitats present:** The site comprised of a small, grassed field, adjacent to a main road and residential neighbourhood.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site is located within 500m of the CWP and is characterized by a relatively small area of land. The site experience disturbance due surrounding residential and commercial development. Therefore, the site was considered of moderate suitability for qualifying bird species.

## L33 - Land south of Ferrers Park



- **Distance from Habitat Site:** This site is located 1.57km from the SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 10.01ha
- **Habitats present:** The site comprised of a medium sized, grassed field, adjacent to a main road and residential neighbourhood.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Moderate – the site is located within 500m of the CWP and is characterized by a relatively small area of land. The site experience disturbance due surrounding residential and commercial development. Therefore, the site was considered of moderate suitability for qualifying bird species.

## R591 - Former Godwin Pumps factory Springfield Road, Quenington



- **Distance from Habitat Site:** This site is located 9.85km from the SSSI and 30.5km from the SPA and Ramsar site at the closest point
- **Size:** 1.98ha
- **Habitats present:** The site comprised of a developed land.
- **Use of the site:** The site was used for commercial use.
- **Habitat suitability:** Negligible - due to the already developed land the site was considered of negligible suitability for qualifying bird species.

## R670 - Glebe Farm Yard, Hatherop



- **Distance from Habitat Site:** This site is located 4.57km from the SSSI and >45km from the SPA and Ramsar site at the closest point
- **Size:** 1.44ha
- **Habitats present:** The site comprised of a developed land.
- **Use of the site:** The site was used for commercial use.
- **Habitat suitability:** Negligible - due to the already developed land the site was considered of negligible suitability for qualifying bird species.

## T71A - Land north-west of Highfield Cottage



- **Distance from Habitat Site:** This site is located 11.20km from the SSSI and 19.81km from the SPA and Ramsar site at the closest point
- **Size:** 2.15ha
- **Habitats present:** The site comprised of a small, grassed field, adjacent to a residential neighbourhood. The site is bounded by hedgerows and trees and within a wider arable area.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Low - due to the relatively small area of land and the disturbance within the site due surrounding residential development, the site was considered of low suitability for qualifying bird species.

## T31B - Land adjacent to Blind Lane



- **Distance from Habitat Site:** This site is located 12.57km from the SSSI and 20.11km from the SPA and Ramsar site at the closest point
- **Size:** 2.01ha
- **Habitats present:** The site comprised of a small, grassed field, adjacent to a residential neighbourhood. The site is bounded by hedgerows and trees and within a wider arable area.
- **Use of the site:** The site was used for agricultural use.
- **Habitat suitability:** Low - due to the relatively small area of land and the disturbance within the site due to surrounding residential development, the site was considered of low suitability for qualifying bird species

## Remaining site allocations:

**E.35** It is acknowledged that birds do not move through the landscape in straight lines and may use a series of intermediate or stepping-stone habitats, such as the Cotswold Water Park, the Upper Thames floodplain and other smaller wetland features, during wider movements between inland areas and the Severn Estuary SPA and Ramsar site. However, all remaining site allocations are located more than

30 km to the north or north-east of the Severn Estuary and lie well beyond the cluster of identified stepping-stone habitats that could plausibly support functionally linked movements. These allocations are outside the broad spatial relationship between the Severn Estuary and the Cotswold Water Park SSSI and do not form part of a coherent network of wetlands or open habitats that could reasonably facilitate onward movement by SPA/Ramsar qualifying species.

**E.36** As a result, while stepping-stone use is recognised in principle, the distance of these allocations from the designated site, combined with the absence of intervening stepping-stone habitats linking them to the Severn Estuary, means they are not considered to lie within a realistic movement pathway for functionally linked species.

**E.37** Consequently, these site allocations are not considered to give rise to functionally linked effects and do not require further assessment in relation to the Severn Estuary SPA and Ramsar site.

**E.38** The desk-based review of the site allocations identified that based on a precautionary approach, 14 site allocations have moderate and three site allocations have a high potential to support significant numbers of SPA and Ramsar qualifying bird species, either alone or cumulatively with other sites.

**E.39** The sites identified above provides suitable offsite foraging habitat for qualifying bird species in the form of arable fields, which are common and widespread in the district. These site was not considered to support habitats or features notable value, rarity or which populations are likely to be dependent on in isolation the importance of this site for these species is likely to be low when compared with the extensive areas of habitat of greater suitability both within the district and the wider land areas surrounding these Habitat Sites. As a result, the potential for the loss of offsite habitat to adversely affect these species relates primarily to the cumulative effect of reducing the extent of feeding areas. Given the dependency of these species on offsite arable fields and grasslands, inclusion and implementation of appropriate safeguards and mitigation will be required in Local Plan to provide certainty that there will be no adverse effect on the integrity of the SPA and Ramsar site.

### Loss of habitat

**E.40** This assessment confirms that there is potential for Functional Linked Land (FLL) within Cotswold District in relation to the Severn Estuary SPA and Ramsar site. The Cotswold Water Park (CWP) SSSI represents the principal area of FLL within the District, providing extensive and well-connected wetland habitats capable of supporting foraging, roosting and resting functions for SPA/Ramsar qualifying bird species beyond the designated site boundary.

**E.41** In addition to the CWP SSSI, a number of other sites across the district provide more limited but locally important habitat that may also be used by qualifying species, particularly during periods of high tide, disturbance, or seasonal movement. Collectively, these sites contribute to the wider network of functionally linked habitats associated with the Severn Estuary.

**E.42** The assessment identifies that several site allocations are of medium to high value for SPA/Ramsar qualifying species. Accordingly, likely significant effects cannot be ruled out in the absence of mitigation. It is therefore concluded that appropriate mitigation measures are required for relevant allocations to avoid or reduce impacts on functionally linked habitats and to ensure no adverse effect on the integrity of the Severn Estuary SPA/Ramsar site, in accordance with the Habitats Regulations.

## Mitigation – loss of habitat

**E.43** To provide certainty that the loss of offsite functional habitat will not adversely affect the integrity of the Severn Estuary SPA and Ramsar site, it is recommended that the following safeguard measures are implemented at the project level:

- Wintering, migratory and breeding bird surveys are required for sites with high and moderate suitability to support these qualifying species to determine their individual and cumulative importance for these species and inform mitigation proposals.
- A commitment to mitigation is required within the Local Plan dependent on the findings of bird surveys. This will need to take into account the cumulative numbers of SPA birds affected by the allocations as they come forward for development. In the unlikely but possible event that cumulative numbers of SPA birds affected are likely to exceed thresholds of significance (i.e. >1% of the associated European Site), appropriate mitigation in the form of habitat creation and management in perpetuity, either on-site or offsite, or through the provision of strategic sites for these species elsewhere within the district, will be required. If required, mitigation will need to create and manage suitably located habitat which maximises feeding productivity for these SPA species, and such mitigatory habitat would need to be provided and be fully functional prior to development which would affect significant numbers of SPA birds. Due to the common and widespread nature of the habitats present within the site allocations it is considered with certainty that mitigation can be successfully achieved through the creation of alternative habitat of equal or greater value should a significant number of qualifying birds be found to utilise the site. This

approach has been approved at recent Examination in Public for other coastal Local Authorities, including the North Essex Authorities.

## Non-physical disturbance

**E.44** This assessment has considered the potential for non-physical disturbance effects on Severn Estuary SPA and Ramsar qualifying bird species arising through the use of Functionally Linked Land (FLL) within the district, during both the construction and operational phases of development. Non-physical disturbance pathways include increases in human activity, noise, visual disturbance and artificial lighting, which may affect the suitability of supporting habitats used by qualifying species for foraging, resting and loafing.

**E.45** It has been assumed that the effects of noise, vibration and light are most likely to be significant within a distance of 500 m. There is also evidence of 300 m being used as a distance up to which certain bird species can be disturbed by the effects of noise [[See reference 81](#)]; however, it has been assumed (on a precautionary basis) that the effects of noise, vibration and light pollution are capable of causing an adverse effect if development takes place within 500 m of a Habitats site, or in this case FLL which supports qualifying features of the SPA and Ramsar site that are sensitive to these disturbances.

**E.46** The desk-based review also identified 17 site allocations within 2.5km of the Cotswold Water Park, as FLL of the SPA and Ramsar site, which may be impacted by the Local Plan via non-physical disturbances such as noise and light. These site allocations are those assessed as having moderate or high potential to be FLL, i.e.:

- Strategic site: Cirencester - Steadings southern extension.
- Strategic site: Cirencester - Land east of Kingshill Lane.
- Strategic site: Cirencester - Land south east of Cirencester and south of Preston.
- Strategic site – Cirencester.
- Strategic site: Siddington - Land south west of Siddington.
- SD15 – Siddington, Plummers Farm, east of Ashton Road.
- SD17 – Siddington, Land east of Siddington Road and west of Bluebell Drive.
- Strategic site: Driffield - Land south of Driffield.
- Strategic site: Down Ampney - Land surrounding Down Ampney.

- F53A - Land at Totterdown Hill, Horcott.
- F20A - Land south-east of Fairford.
- Strategic site: Fairford - Land north east of Fairford.
- F52 - Land west of Terminus Cottage and Station Cottage.
- F39C - Land west of Terminus Cottage and Station Cottage.
- L19 - Land south of Butler's Court.
- L33 - Land south of Ferrers Park.

**E.47** The assessment confirms that areas of FLL within the district, including the Cotswold Water Park SSSI and other identified supporting habitats, may be utilised by SPA/Ramsar qualifying species outside the designated site boundary. Disturbance within these areas has the potential to result in temporary or sustained displacement, increased energy expenditure, or reduced habitat use, even where no direct physical habitat loss occurs.

**E.48** During the construction phase, disturbance may arise from short-term increases in noise, visual activity and lighting, particularly where works coincide with sensitive overwintering or migratory periods. During the operational phase, longer-term effects may result from increased recreational pressure, regular human presence, traffic noise and permanent lighting associated with development. For site allocations identified as being of medium to high value for SPA/Ramsar qualifying species through functional linkage, likely significant effects from non-physical disturbance cannot be ruled out, either alone or in combination with other plans and projects, in the absence of mitigation.

**E.49** It is therefore concluded that mitigation measures are required for relevant allocations to address both construction- and operational-phase non-physical disturbance impacts on functionally linked habitats.

## **Mitigation – non-physical disturbance**

## Appendix F

**F.1** To provide certainty that non-physical disturbance will not adversely affect the integrity of the SPA and Ramsar Site, it is recommended that Local Plan policies relating to development near FLL (i.e. the above site allocations, plus windfall) contain a requirement to demonstrate that noise, vibration and light will be minimised, where the ecological surveys have identified that SPA/Ramsar bird species are present nearby.

### Air Quality Assessment

**F.2** The documents in this appendix are:

- Cotswold District Council Special Areas of Conservation Air Quality Modelling, AECOM, July 2026; and
- Air Quality Appropriate Assessment, LUC, July 2026.

## **AECOM air quality assessment report**

# Cotswold District Council Special Areas of Conservation Air Quality Modelling

Cotswold District Council

July 2026

## Quality information

| Prepared by            | Checked by                       | Verified by                      | Approved by                      |
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## Revision History

| Revision | Revision date              | Details | Authorized | Name             | Position           |
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| 2        | 21 <sup>st</sup> July 2026 | Final   | PF         | Patrick Froggatt | Associate Director |
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# 1. Introduction

- 1.1 The Cotswold Local Plan sets out the strategic planning framework to guide development within Cotswold District Council (CDC) over the plan period. The Plan identifies housing, employment and supporting infrastructure growth and establishes policies against which planning applications will be assessed. In accordance with the Conservation of Habitats and Species Regulations, the potential for development proposed within the Local Plan to result in adverse effects on European designated sites must be assessed through the Habitats Regulations Assessment (HRA) process.
- 1.2 CDC has commissioned this air quality assessment to inform the Appropriate Assessment of the HRA. The assessment focuses on the potential effects of traffic-related air pollutant emissions associated with development and forecast traffic growth on ecologically sensitive sites located within and adjacent to the Local Plan area.
- 1.3 The designated ecological sites considered within this assessment comprise three Special Areas of Conservation (SAC): Cotswold Beechwoods SAC, North Meadow and Clattinger Farm SAC and Rodborough Common SAC. These sites support habitats that are sensitive to atmospheric nitrogen enrichment and acidification, including dry grassland steppes, humid mesophile grassland and broad-leaved woodland. Many qualifying features are particularly sensitive to elevated concentrations of nitrogen oxides and ammonia, and to increased nitrogen deposition.
- 1.4 This assessment considers four key pollutants known to adversely affect sensitive ecosystems: ammonia (NH<sub>3</sub>), oxides of nitrogen (NO<sub>x</sub>), total nitrogen deposition and total acid deposition. Pollutant concentrations and deposition rates have been predicted at ecological receptor locations positioned along transects extending up to 200 metres from affected road links within the designated sites, consistent with established guidance for assessing traffic-related impacts on European sites.
- 1.5 The following scenarios have been modelled:
  - Baseline Scenario: represents air quality conditions in the selected base year using verified traffic data and contemporary background pollutant concentrations;
  - Future Baseline Scenario: represents the future assessment year using baseline traffic flows but applying projected vehicle emission factors and background pollutant concentrations from the future assessment year to account for anticipated improvements in the vehicle fleet;
  - Do Minimum (DM): future assessment year including forecast traffic growth and committed development, but excluding development allocations proposed within the Cotswold Local Plan; and
  - Do Something (DS): future assessment year including forecast traffic growth, committed development and the development allocations proposed within the Cotswold Local Plan.
- 1.6 The results of the modelling are assessed against established NO<sub>x</sub> and NH<sub>3</sub> critical levels, and nitrogen and acid deposition critical loads, at ecological receptor locations within each designated site. The purpose of the assessment is to determine whether development proposed within the Cotswold Local Plan, alone or in combination with other plans and projects, could result in an adverse effect on the integrity of the designated sites and to inform the Appropriate Assessment of the HRA.

## 2. Policy Context

### Clean Air Strategy

- 2.1 In 2019, the UK government released its Clean Air Strategy 2019 (Defra, 2019) as part of its 25 Year Environment Plan (Defra, 2018). The Strategy sets out measures to reduce emissions of ammonia (NH<sub>3</sub>) from agriculture and oxides of nitrogen (NO<sub>x</sub>) from combustion processes, including road transport. These measures aim to reduce nitrogen deposition to sensitive ecosystems and improve public health.
- 2.2 The Strategy recognises that nitrogen deposition remains a significant pressure on protected habitats, including SACs and supports actions to reduce emissions from transport and agricultural sources.

### Environment Act

- 2.3 The Environment Act 2021 (HM Government, 2021) amends the Environment Act 1995 (HM Government, 1995). On 9<sup>th</sup> November 2021, the Act received Royal Assent after being first introduced to Parliament in January 2020 to address environmental protection and the delivery of the Government's 25 Year Environment Plan (Defra, 2018). It includes provisions to establish a post-Brexit set of statutory environmental principles to ensure environmental governance through an environmental watchdog, the Office for Environmental Protection (OEP).
- 2.4 The Secretary of State must publish a review report every five years (as a minimum and with yearly updates to Parliament). The 25 Year Environment Plan will be adopted as the first Environmental Improvement Plan (EIP) of the Environment Act 2021, with long-term legally binding targets being finalised by Defra<sup>1</sup>.

### Critical Levels

- 2.5 Annual mean critical levels of NO<sub>x</sub> and NH<sub>3</sub> are summarised in Table 2-1. These critical levels are concentrations above which adverse effects on ecosystems may occur based on present knowledge. The critical level for NO<sub>x</sub> is taken from the EU Ambient Air Quality Directive 2008/50/EU (EU Directives, 2008) which has also been set as the Air Quality Strategy (AQS) objective for the protection of vegetation and ecosystems and has been incorporated into English legislation.
- 2.6 The EU Directive (EU Directives, 2008) states that the sampling point to determine compliance should be sited more than 20 km away from agglomerations or more than 5 km away from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50,000 vehicles per day, which means that a sampling point must be sited in such a way that is representative of an area of at least 1,000 km<sup>2</sup>. Applying the critical level for NO<sub>x</sub> to designated nature conservation sites that are located close to busy roads is therefore precautionary.
- 2.7 The critical levels for NH<sub>3</sub> have not been incorporated into legislation and are a recommendation made by the United Nations Economic Commission for Europe (UNECE) Executive Body for the Convention on Long-Range Transboundary Air Pollution (CLRTAP) (UNECE, 2013).

**Table 2-1: Annual Mean Critical Levels (NO<sub>x</sub> and NH<sub>3</sub>)**

| Pollutant                             | Critical Level                                                                          |
|---------------------------------------|-----------------------------------------------------------------------------------------|
| Oxides of nitrogen (NO <sub>x</sub> ) | 30 µg/m <sup>3</sup>                                                                    |
| Ammonia (NH <sub>3</sub> )            | 3 µg/m <sup>3</sup> for higher plants<br>1 µg/m <sup>3</sup> for lichens and bryophytes |

<sup>1</sup> <https://www.gov.uk/government/news/update-on-progress-on-environmental-targets>

## Habitat Regulation Assessment

- 2.8 Although the UK has left the European Union, the requirement to undertake an HRA remains under the Conservation of Habitats and Species Regulations 2017 (as amended) (HM Government, 2017).
- 2.9 The HRA process applies the precautionary principle to European sites. Plans and projects may only be permitted where it can be ascertained that they will not adversely affect the integrity of a European site, either alone or in combination with other plans and projects.
- 2.10 The first stage of HRA is screening for Likely Significant Effects (LSE). Where LSEs cannot be ruled out, the assessment proceeds to Appropriate Assessment. Traffic-related air pollution is a recognised pathway of impact where development results in changes in traffic flows on roads within 200 metres of European sites, in accordance with Natural England guidance.
- 2.11 The Cotswold Local Plan proposes housing, employment and supporting development across settlements within the district. The dispersed spatial strategy may influence traffic flows on road links within or adjacent to designated ecological sites. As such, LSE relating to atmospheric nitrogen pollution cannot be excluded, and the SACs and Sites of Special Scientific Interest (SSSI) considered within this assessment are subject to Appropriate Assessment in respect of this impact pathway.

## Cotswold District Local Plan (2011-2031)

- 2.12 The Cotswold District Local Plan was adopted on 3<sup>rd</sup> August 2018 and forms the statutory development plan for CDC (Cotswold District Council, 2018). The Plan covers the period 2011–2031 and sets out strategic and development management policies to guide development.
- 2.13 The Local Plan's vision supports the following priorities, which are set out in CDC's corporate strategy:
  - Provide quality services at the lowest possible cost to Council Taxpayers.
  - Protect and enhance the local environment whilst supporting economic growth.
  - Champion issues which are important to local people.
- 2.14 Policy EN8 (Biodiversity and Geodiversity: Features Habitats and Species) confirms that development and will only be permitted where it can be demonstrated that there will be no adverse effect on habitats and internationally protected species. Policy EN9 (Biodiversity and Geodiversity: Designated Sites) seeks to conserve and enhance biodiversity and avoid harm to designated sites.
- 2.15 Policy DS1 (Development Strategy), Policy EN1 (Built, Natural and Historic Environment), Policy EN5 (Cotswolds Area of Outstanding Natural Beauty) embed an ecosystems approach within plan-making and decision-taking, recognising the importance of natural capital and the benefits derived from internationally important habitats within CDC.

## Regional and Transport Policy Context

- 2.16 CDC declared a climate emergency in July 2019 and made a commitment to reduce carbon emissions to net zero by 2045. Like many rural regions, CDC has high levels of transport-related carbon emissions, which are around 60% higher per person than England's average (Cotswold District Council, 2023).
- 2.17 CDC produced a Transport Decarbonisation Study to provide an evidence base to support the identification and development of a range of interventions that support decarbonisation and future revisions to the local plan (Cotswold District Council, 2023).
- 2.18 The study concluded that there is no single solution which will deliver net zero transport in CDC. CDC will continue to consider all options across all modes to ensure that progress is made towards reducing mileage primarily through encouraging low carbon transport choices and switching to zero emission fuels. Low carbon planning was identified as a priority opportunity for reducing transport carbon emissions at all place types within Cotswold District

- 2.19 The Cotswolds local transport strategy is managed by Gloucestershire County Council under their overarching Gloucestershire Local Transport Plan (LTP) (2020–2041) (Gloucestershire County Council, 2021). This is the strategic framework guiding transport improvements, environmental protection, and infrastructure development across the county. It prioritises sustainable travel, economic growth, and community wellbeing to reduce carbon emissions and adapt to climate change.
- 2.20 Key Policies of relevance to this assessment include:
- **LTP PD 0.1 - Reducing Transport Carbon Emissions & Adapting to Climate Change:** Focuses on minimising carbon emissions from transportation and preparing the network for extreme weather events.
  - **LTP PD 0.2 - Local Environmental Protection:** Aims to mitigate traffic impacts on local communities, including reducing congestion and addressing nitrogen dioxide (NO<sub>2</sub>) levels in designated Air Quality Management Areas (AQMAs).
  - **LTP PD 0.4 – Integration with Land Use Planning and New Development:** Ensures that new housing and commercial developments are designed around sustainable travel options to minimise the burden on existing roads.

### Cotswold District Council Air Quality Action Plan 2011

- 2.21 Under Part IV of the Environment Act 1995 (HM Government, 1995), local authorities are required to review and assess air quality within their jurisdictions and to prepare Air Quality Action plans (AQAPs) where AQMAs are declared.
- 2.22 CDC have adopted their AQAP (Cotswold District Council, 2011) to address exceedances of NO<sub>2</sub> objectives, primarily associated with road traffic emissions, or to ensure ongoing good air quality within the district. These plans and strategies include measures to encourage sustainable transport, reduce vehicle emissions, promote behavioural change, and integrate air quality considerations into spatial planning and infrastructure delivery.
- 2.23 The measures set out within the AQAP are relevant to the wider policy context of this assessment, as it aims to improve air quality across the region and support the reduction of road traffic emissions that may affect sensitive ecological receptors within designated sites.

### Cotswolds National Landscape Management Plan (2025–2030)

- 2.24 The Cotswolds National Landscape (CNL) Management Plan (Cotswolds National Landscape, 2025) is a statutory plan, which sets out the vision, outcomes and policies for the management of the CNL for the period 2025-2030.
- 2.25 The plan contains a comprehensive summary of the key issues facing the CNL. The current 2025 to 2030 framework focuses on three interlinked priorities: mitigating the climate emergency, reversing nature's decline and the ecological crisis, and improving public health and societal well-being.
- 2.26 The strategy recognises the importance of addressing climate change and improving environmental quality across the district. CNL has declared a climate emergency and is working towards achieving net zero emissions by 2050 or sooner.
- 2.27 The strategy identifies transport emissions, domestic energy use and agricultural activities as key contributors to greenhouse gas emissions within CNL. In response, CDC aims to support initiatives that promote sustainable transport, encourage active travel and improve air quality across the district.
- 2.28 The strategy also highlights the role of planning policy, infrastructure investment and partnership working in delivering environmental improvements and supporting the transition to a low-carbon economy.
- 2.29 Development policies apply not only to projects within the Cotswolds National Landscape boundaries but also to its "setting". Proposals outside the boundary can be scrutinised if their scale, design, or nature negatively impact the scenic beauty of the CNL. Furthermore, any proposal must conserve and enhance the area's natural beauty. It must reflect local settlement patterns, building scales, and use local materials (such as Cotswold limestone).

## Other Guidance Documents

- 2.30 Best practice and advice / guidance contained within documents from Natural England (Natural England, 2018), the Institute of Air Quality Management (IAQM) (IAQM, 2020), the Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2021) and National Highways (Design Manual for Roads and Bridges DMRB LA105) (DMRB, 2024) have been used to determine the methodology applied, and in the accompanying ecological interpretation of the results.
- 2.31 These documents provide guidance on the assessment of traffic-related air pollution effects on designated ecological sites and the interpretation of modelled nitrogen concentrations and deposition in relation to critical levels and critical loads.

## 3. Methodology

3.1 This section presents the information and methodology used to produce the outputs contained in this report in relation to air quality within CDC. The following sources of information and data have been used to form the basis of this air quality assessment:

- Department for Environment, Food and Rural Affairs (Defra)'s Air Quality Background Concentration Maps based on a 2021 base year (Defra, 2024);
- Defra's Vehicle Emissions Factors Toolkit (EFT) v14.1 (Defra, 2026);
- Emission rates as published in the Calculator for Road Emissions of Ammonia (CREAM) V2A tool (Air Quality Consultants, 2025);
- Modelled nitrogen and acid deposition data and ammonia background concentrations from the Air Pollution Information System (APIS, 2026); and
- Traffic count and speed data provided by City Science for 2024 and 2043.

3.2 The modelling assessment was conducted following methodology within Defra's LAQM.TG(22) Technical Guidance (Defra, 2025), and guidance contained within documents from Natural England (Natural England, 2018), the IAQM (IAQM, 2020) and the CIEEM (CIEEM, 2021).

### Pollutants of Interest

3.3 The pollutants of interest with regard to sensitive ecosystems for which critical levels and critical loads exist and which are included in the air quality modelling and assessment of impacts on the SACs are NO<sub>x</sub>, NH<sub>3</sub>, and nitrogen and acid deposition. Modelling of these pollutants is undertaken to assess the air quality impacts of planned development in the Local Plan on the SACs alone and 'in combination' with those related to surrounding authorities.

3.4 Whilst emissions of NO<sub>x</sub> from road vehicles are regulated according to Euro standards, emissions of NH<sub>3</sub> are not. This means that emissions of NH<sub>3</sub> from individual vehicle types are highly uncertain, particularly as measurements are rarely made (as this is not required for regulatory purposes). The uncertainty associated with the predicted nitrogen deposition rates from NH<sub>3</sub> is also greater than for NO<sub>x</sub>, with the NH<sub>3</sub> derived nitrogen deposition rates representing an upper estimate.

3.5 There is currently no tool publicly available for the assessment of road traffic emissions of NH<sub>3</sub> from National Highways, Defra, Natural England, or other nature conservation bodies. However, there is evidence that exclusion of NH<sub>3</sub> from assessments leads to an underestimate of deposited nitrogen (Air Quality Consultants, 2025).

3.6 The methodology used to model ammonia concentrations from road traffic, using ADMS Roads (v5.1) (Cambridge Environmental Research Consultants, 2025), and the subsequent contribution to nitrogen deposition within the SACs (described below), is considered the most appropriate approach to adopt at this time. The methodology has been applied by AECOM in several Appropriate Assessments to inform HRAs including that for Tunbridge Wells Borough, Mid Sussex and Test Valley District Councils.

### Nitrogen Oxides

3.7 Defra's EFT provides NO<sub>x</sub> emissions rates for local authorities to use for Local Air Quality Management (LAQM) assessments. The EFT is also used for other purposes including Environmental Impact Assessments (EIAs) and HRAs. Version 14.1 of the EFT (Defra, 2026) includes consideration of the basic vehicle fleet mix for roads in England (excluding London) up to 2050. The basic vehicle fleet splits are based on data provided by DfT / Highways England (now National Highways) and the National Atmospheric Emissions Inventory (NAEI). The composition of Euro emission standards and distribution of vehicle sizes / weights in Version 14.1 of the EFT enables data to be used up to 2050; however, EFT v14.1 includes a note that it should be used with care beyond 2040, due to limitations relating to the supporting tools.

- 3.8 The Supporting LAQM tools provided by Defra, including the Background Mapping Data, NO<sub>2</sub> Adjustment for NO<sub>x</sub> Sector Removal Tool and the NO<sub>x</sub> to NO<sub>2</sub> Calculator, currently support assessment years between 2021 and 2040 inclusive. Consequently, where air quality assessments consider future assessment years beyond 2040, the emissions factors for 2040 represent the latest available data within the EFT framework. For the purposes of this assessment, the Local Plan future assessment year of 2043 has therefore been represented using EFT v14.1 emissions factors for 2040, consistent with Defra guidance. This approach is considered appropriate as the emissions projections within the EFT already incorporate anticipated improvements in vehicle emission standards and fleet turnover up to 2040. The use of 2040 emission factors for the 2043 assessment year is considered a reasonable and precautionary representation of future road traffic emissions as emissions are expected to further reduce between 2040 and 2043, making this approach worst case.
- 3.9 Detailed dispersion modelling of road traffic emissions of NO<sub>x</sub> has been undertaken using the latest version of ADMS Roads (v5.1) (Cambridge Environmental Research Consultants, 2025), combined with the EFT v14.1 emission rates. The model has been used to predict annual mean NO<sub>x</sub> concentrations at ecological receptor locations within the designated sites.

## Ammonia

- 3.10 In February 2020, Air Quality Consultants developed and published the CREAM tool, 'in order to allow tentative predictions regarding trends in traffic-related ammonia emissions over time'. The tool is based on remotely sensed pollutant measurements, published real-world fuel consumption data, and ambient measurements of ammonia recorded in Ashdown Forest (2014-2016).
- 3.11 The report that was published alongside the CREAM tool states that:
- "It should be recognised that these emissions factors remain uncertain. Using them to make future year predictions will clearly be an improvement on any assessment which omits ammonia. They are also considered to be more robust than the emissions factors contained in the EEA Guidebook, which risk significantly under-predicting ammonia emissions. The emissions factors contained in the CREAM model can be considered to provide the most robust estimate of traffic-related ammonia possible at the present time, but they may be updated in the future as more information becomes available."*
- 3.12 The CREAM tool was updated in February 2025 (CREAM v2A) (Air Quality Consultants, 2025) to cover a wider vehicle fleet and the latest ammonia emission factors. AECOM has applied these emission factors to estimate emissions in the SACs. As with the EFT, emissions for the 2043 assessment year have been represented using the latest available emission factors within the tool framework for 2040.
- 3.13 The latest version of ADMS Roads (v5.1) (Cambridge Environmental Research Consultants, 2025) has been employed to model the dispersion of emissions of NH<sub>3</sub> from road traffic, consistent with the approach for modelling emissions of NO<sub>x</sub>.

## Traffic Data and Fleet

- 3.14 Traffic data for the assessment were provided by the transport consultants and includes annual average daily traffic (AADT) flows, average speeds and the proportion of heavy-duty vehicles (HDVs) for each road link included in the study area. These road links were selected as those located within 200 m of designated ecological sites and therefore where road traffic emissions may influence air quality at sensitive ecological receptors.

## Receptors

- 3.15 Pollutant concentrations and deposition rates have been modelled along defined transects within the SACs within 200 m of affected roads. This approach aligns with the National Highways DMRB guidance LA105 (DMRB, 2024) and Natural England guidance (Natural England, 2018). As noted in the guidance, the greatest impacts from changes in road traffic emissions will be at locations closest to the roadside nearest to emissions sources. Pollutant concentrations fall off away from the road edge to approximately background levels beyond 200 m. Consideration of the road network within 200 m of the SACs and SSSI is therefore considered robust as background

concentrations utilised in the assessment will account for all other sources that are not defined explicitly in the model.

- 3.16 The transects are situated at key locations where the greatest impacts upon the SACs are likely to occur. The locations are presented in Figure 3-1 to Figure 3-5. The receptors are situated at the closest point to the road within the SACs up to 200 m from the roadside. Concentrations and deposition rates at all receptors are predicted at the ground surface (0m height), representing the worst-case potential location of nitrogen-sensitive habitats.

## Model Setup

- 3.17 As detailed above, road traffic emissions of NO<sub>x</sub> were derived using the latest version of Defra's EFT at the time of the assessment (v14.1), and associated guidance and tools (Defra, 2026). Road traffic emissions of NH<sub>3</sub> were derived using emission rates from CREAM v2A (Air Quality Consultants, 2025).
- 3.18 Detailed dispersion modelling was undertaken using the current version of ADMS-Roads (v5.1) to model concentrations of NO<sub>x</sub> and NH<sub>3</sub> using the parameters in Table 3-1 for the following scenarios:
- Base (2024): 2024 AADT, 2024 emission factors (latest available year), 2024 vehicle fleet.
  - Future Base (2043): 2024 AADT, 2040 emission factors (latest available year), 2040 projected vehicle fleet, and 2040 background concentrations (the latest projected year available from Defra);
  - Do Minimum (2043): 2043 AADT without Local Plan but with all committed development, 2040 emission factors, 2040 projected vehicle fleet, and 2040 background concentrations; and
  - Do Something (2043): 2043 AADT with Local Plan and all committed development using 2040 emission factors, 2040 projected vehicle fleet, and 2040 background concentrations.
- 3.19 To support the assessment of the potential impact of the planned development in the Local Plan scenarios, a 'future baseline' and future year 'do minimum' scenario were modelled. The 'do minimum' scenario includes the influence of development in neighbouring local authorities, whereas the 'future baseline' does not. This future baseline is a hypothetical scenario as it applies improvements in vehicle emissions standards to the baseline vehicle fleet without allowing for any traffic growth. However, such an approach enables the 'in combination' effect of development and traffic growth to be seen unobscured by improvements in emissions technology / performance.
- 3.20 The difference between the 'do something' and the 'do minimum' scenarios provides the impact of the planned development within the Local Development Plan, alone. The difference between the 'do something' and the 'future baseline' scenarios provides a thorough and precautionary assessment of the impact of the planned development within the Local Plan 'in combination', as the 'future baseline' accounts for no future growth.

**Table 3-1: General ADMS-Roads Model Conditions**

| <b>Variables</b>                                   | <b>ADMS-Roads Model Input</b>                                              |
|----------------------------------------------------|----------------------------------------------------------------------------|
| Surface roughness at source                        | 0.3 m                                                                      |
| Surface roughness at Meteorological Site           | 0.3 m                                                                      |
| Minimum Monin-Obukhov length for stable conditions | 10 m                                                                       |
| Terrain types                                      | Flat                                                                       |
| Receptor location                                  | x, y coordinates determined by GIS, z = 0 m                                |
| Emissions                                          | NO <sub>x</sub> – Defra's EFT v14.1<br>NH <sub>3</sub> – CREAM v2A         |
| Meteorological data                                | 1 year (2024) hourly sequential data from Fairford                         |
| Receptors                                          | Ecological transects                                                       |
| Model output                                       | Long-term (annual) mean NO <sub>x</sub> and NH <sub>3</sub> concentrations |

Figure 3-1: Modelled Road Network and Ecological Receptor Transects – ET1

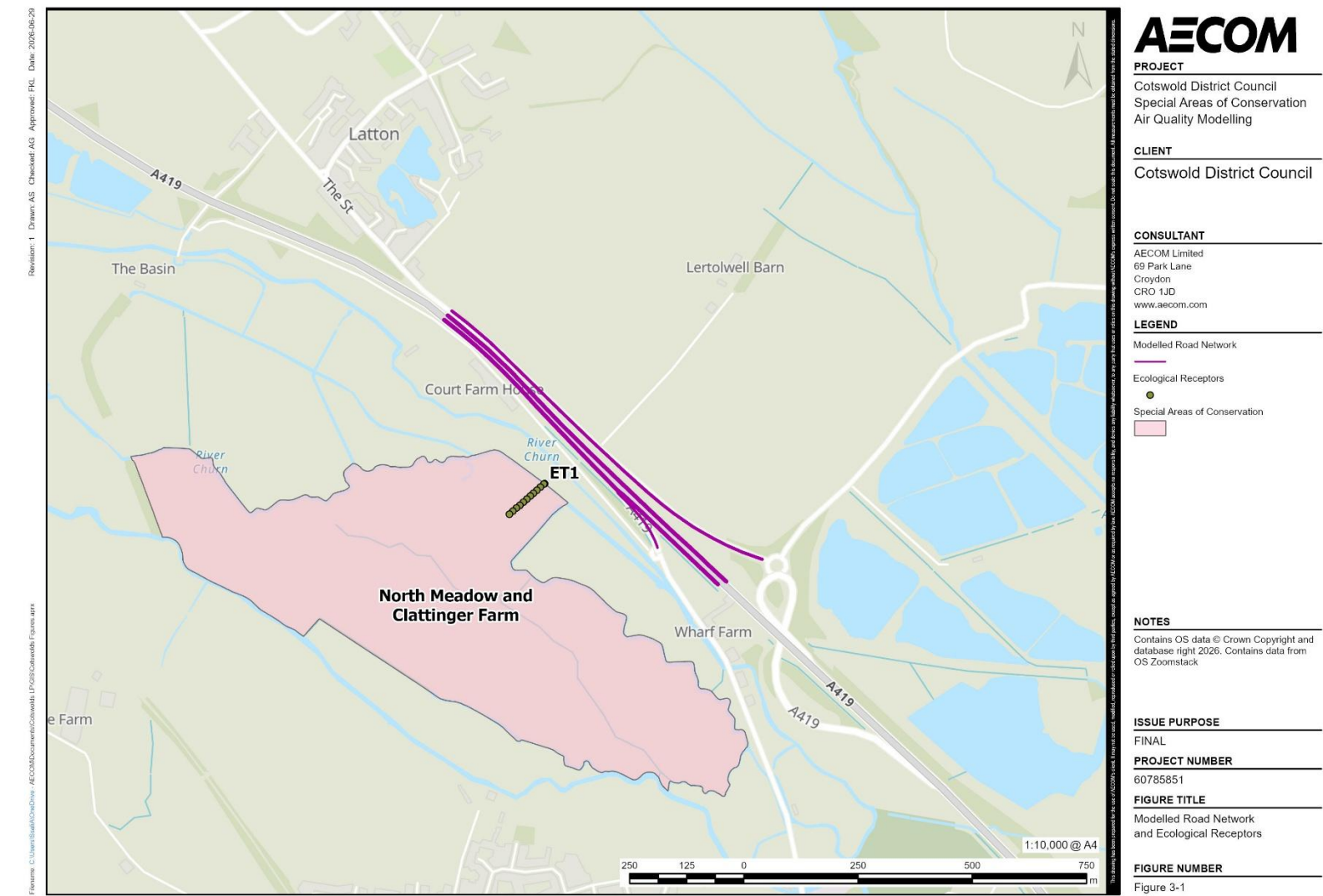
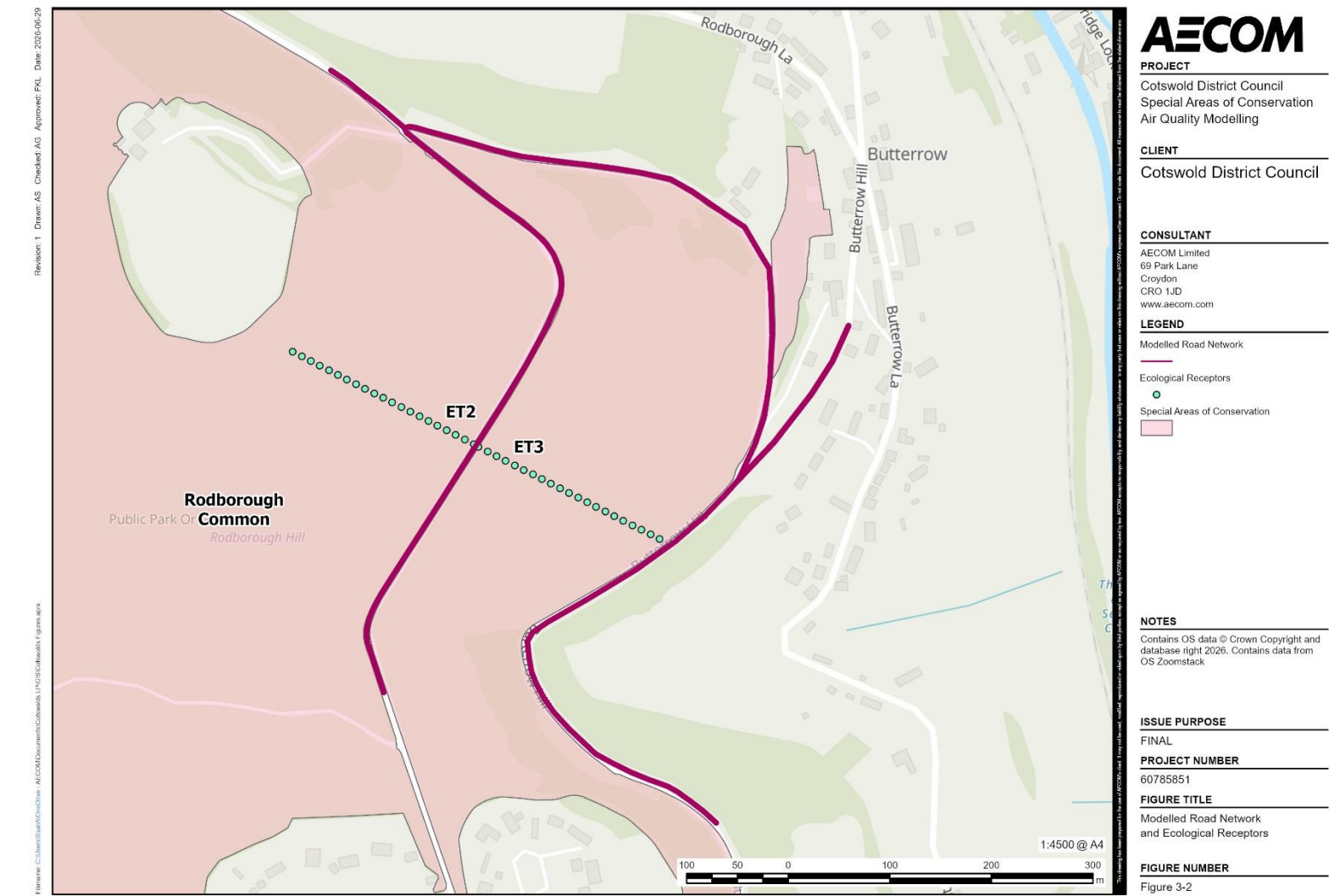


Figure 3-2: Modelled Road Network and Ecological Receptor Transects – ET2 and ET3



Revision: 1 Drawn AS Checked AG Approved FHL Date: 2006-06-20

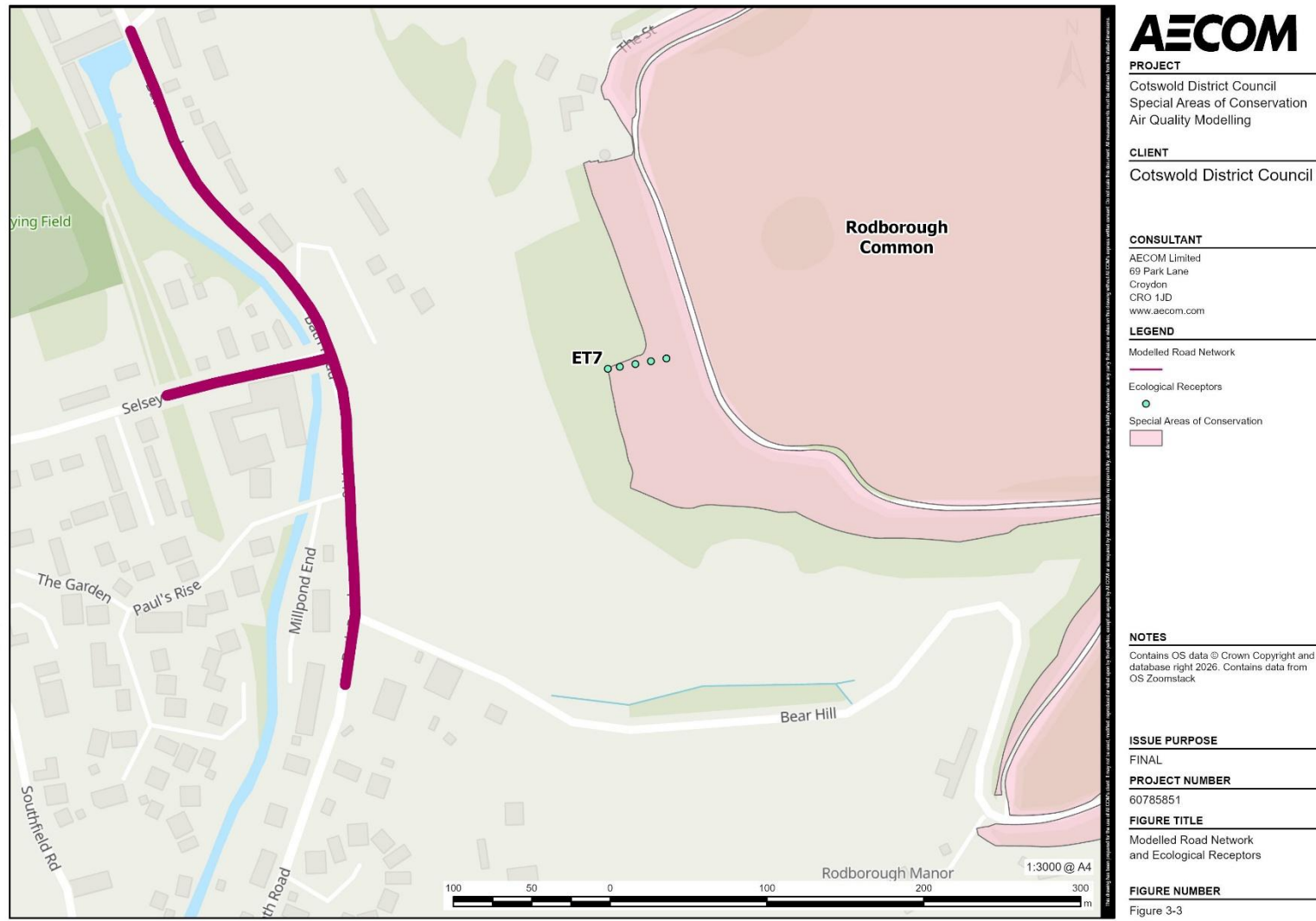


Figure 3-4: Modelled Road Network and Ecological Receptor Transects – ET4

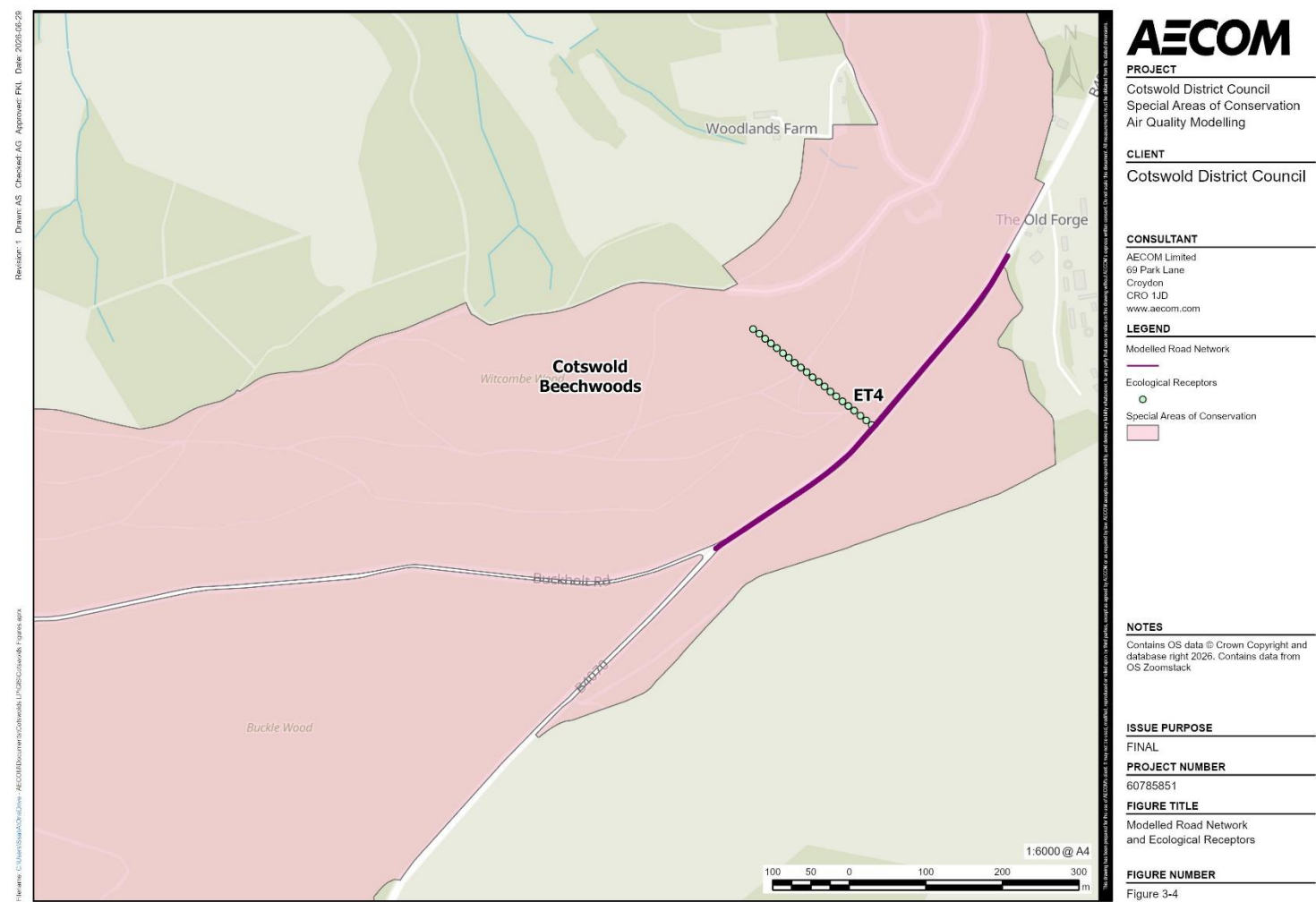
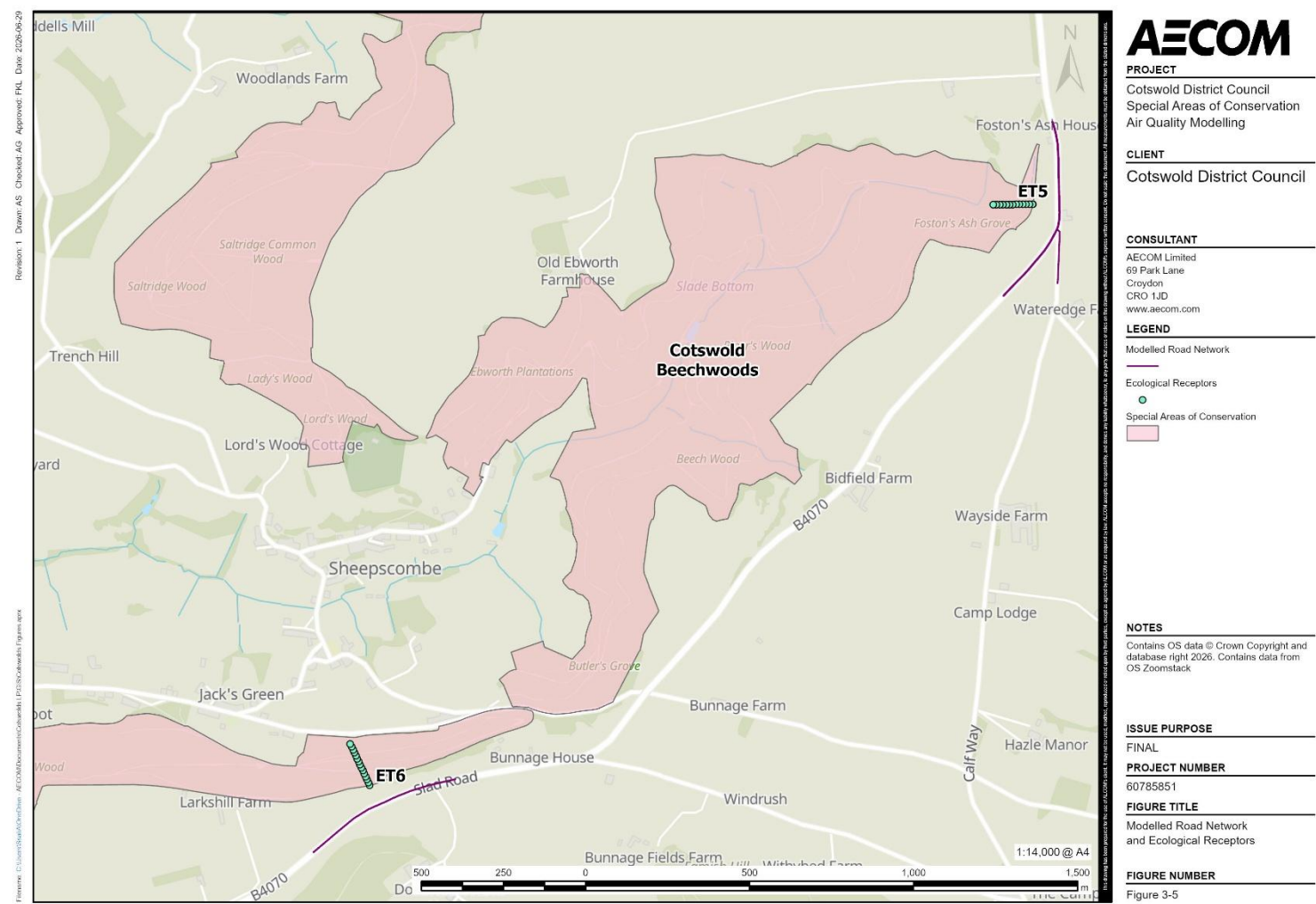


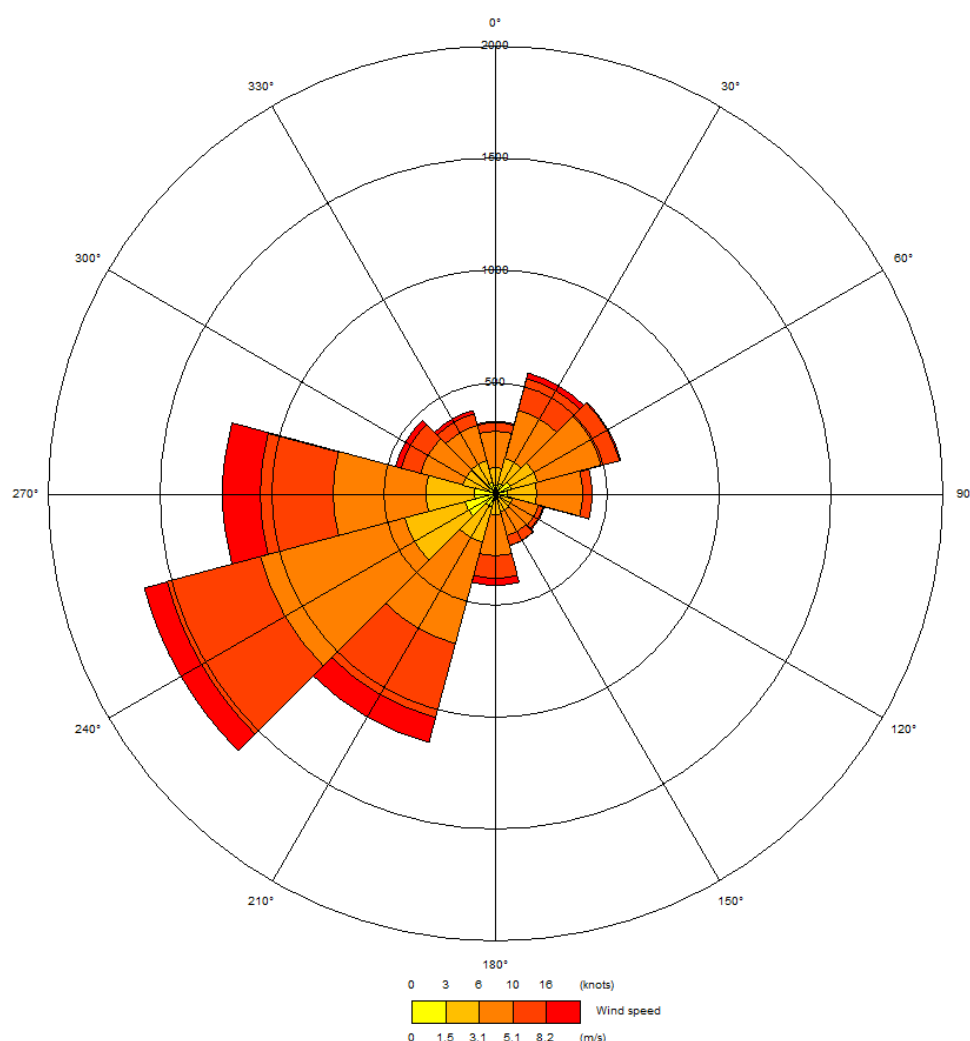
Figure 3-5: Modelled Road Network and Ecological Receptor Transects – ET5 and ET6



## Meteorological Data

- 3.21 One year (2024) of hourly sequential observation data from Fairford meteorological station, located approximately 12.0 km northwest of the nearest SAC and approximately 38.5 km southeast of the most distant SAC, has been used in this assessment. These data were chosen as the most suitable and representative data of local conditions in the baseline year.
- 3.22 Figure 3-6 shows that the dominant direction of wind was from the south-west, as is typical for the UK.

**Figure 3-6: Wind Rose, Fairford Airport Meteorological Data, 2024**



## Background Data

- 3.23 Background concentrations of NO<sub>2</sub> and NO<sub>x</sub> for 2024 and 2040 were extracted from Defra's 2021-based 1x1 km background maps (Defra, 2024). The background concentrations used correspond to the grid square within which the closest ecological transect point to the road is located. Contributions from explicitly modelled source sectors were removed from the NO<sub>2</sub> and NO<sub>x</sub> background concentrations, in accordance with Defra guidance (Defra, 2025)<sup>2</sup>. 2040 is the latest year for which background maps are published and, as concentrations of NO<sub>2</sub> and NO<sub>x</sub>

<sup>2</sup> The Defra background maps for NO<sub>x</sub> concentrations are split into source sectors, such as in-square primary road emissions (those within the 1km square in question). When modelling roads, in order to prevent double-counting of emissions, it is necessary to use the Defra NO<sub>2</sub> adjustment for NO<sub>x</sub> Sector Removal tool to remove the required amount of NO<sub>x</sub> background concentration and convert to an appropriate background NO<sub>2</sub> concentration that does not contain explicitly modelled emissions.

are predicted to reduce further in the future, this is considered to be a worst-case representation of conditions in 2043.

- 3.24 The data presented in Table 3-2 show that the concentrations are predicted to decrease between 2024 and 2040.

**Table 3-2: Defra Mapped Background Pollutant Concentrations**

| Transects | SAC/SSSI Name                         | Grid Square (X, Y) | Annual Mean Concentrations (µg/m³) |                      |                      |                      |
|-----------|---------------------------------------|--------------------|------------------------------------|----------------------|----------------------|----------------------|
|           |                                       |                    | 2024 NO <sub>x</sub>               | 2024 NO <sub>2</sub> | 2040 NO <sub>x</sub> | 2040 NO <sub>2</sub> |
| ET1       | North Meadow and Clattinger Farm, SAC | 409500, 194500     | 6.4                                | 5.1                  | 4.3                  | 3.5                  |
| ET2       | Rodborough Common SAC                 | 385500, 203500     | 7.1                                | 5.7                  | 4.9                  | 3.9                  |
| ET3       | Rodborough Common SAC                 | 385500, 203500     | 7.1                                | 5.7                  | 4.9                  | 3.9                  |
| ET4       | Cotswolds Beechwoods SAC              | 392500, 213500     | 6.4                                | 5.1                  | 4.4                  | 3.5                  |
| ET5       | Cotswolds Beechwoods SAC              | 391500, 211500     | 6.2                                | 5.0                  | 4.2                  | 3.4                  |
| ET6       | Cotswolds Beechwoods SAC              | 389500, 209500     | 6.2                                | 5.0                  | 4.2                  | 3.4                  |
| ET7       | Rodborough Common SAC                 | 384500, 202500     | 6.7                                | 5.4                  | 4.6                  | 3.7                  |

## Ecological Data

- 3.25 APIS provides 'a searchable database and information on pollutants and their impacts on habitats and species'. Areas within 200 m of the relevant roads within the Cotswold Beechwoods SAC are predominantly forest, whilst those within 200 m of relevant roads within North Meadow and Clattinger Farm SAC and Rodborough Common SAC are grassland. Data for forest or grassland habitat have been applied for each transect in the study area depending on the predominant habitat present at that receptor location. This includes critical loads of nitrogen and the average nitrogen and acid deposition rates to the habitat, as presented in Table 3-3.
- 3.26 Background concentrations of ammonia were also sourced from 5x5 km modelled maps available from APIS, whereas background concentrations of NO<sub>x</sub> and NO<sub>2</sub> were sourced from Defra's latest 1x1 km maps, thereby accounting for all sources that are not explicitly defined in the model.
- 3.27 In order to create a robust and scientifically agreed projection for background nitrogen deposition trends in the UK, even allowing for growth, the JNCC commissioned the Nitrogen Futures project, which reported in 2020 (JNCC, 2020). The JNCC Nitrogen Futures project investigated whether a net improvement in nitrogen deposition (including expected development over the same period) was expected to occur to 2030 under a range of scenarios ranging from the most cautious scenario (Business As Usual, BAU, reflecting simply existing emission reduction commitments / measures already in place) to much more ambitious scenarios that would require varying amounts of additional, currently uncommitted, measures from the UK government and devolved administrations.
- 3.28 The report concluded that '*The scenario modelling predicts a substantial decrease in risk of impacts on sensitive vegetation by 2030, under the most likely future baseline [a scenario called '2030 NAPCP+DA (NECR NO<sub>x</sub>)']. This is estimated to achieve the UK Government's Clean Air Strategy (CAS) target for England, defined as a 17% decrease in total reactive N deposition onto protected priority sensitive habitats, with a predicted 18.9% decrease [for England] from a 2016 base year'. The report predicted a fall in nitrogen deposition by 2030 under every modelled scenario, including the most cautious (2030 BAU). For the BAU scenario, nitrogen deposition*

was forecast to decrease between 2017 and 2030 from 277.1 kt N to 239.5 kt N (i.e. a reduction of 37.6 kt N).

- 3.29 In Annex 5 of the report, background nitrogen deposition at the Ashdown Forest SAC was discussed as a case study. The report predicted a 1-2 kgN/ha/yr reduction in background nitrogen deposition to low growing vegetation (i.e. the heathland interest feature) at the SAC between 2016 and 2030, depending on the scenario, and noted that *'The emission reductions predicted between the 2017 and 2030 baseline scenarios cover a range of sectors, including road transport, and so improvements are predicted to occur over the whole site, including the worst-affected roadside locations'*. This was the case under all modelled scenarios.
- 3.30 In summary, the Nitrogen Futures study forecast a minimum rate of improvement in background nitrogen of 0.07 kgN/ha/yr at Ashdown Forest, with other forecasts indicating a greater rate of reduction. In line with the forecast for Ashdown Forest and, therefore, taking a precautionary approach, this study applies a projected decrease in background nitrogen of 0.07 kgN/ha/yr each year. The corresponding decrease is also reflected in the total average acid deposition rate for nitrogen in the future scenarios (reduction of 0.005 keq/ha/yr N each year.).
- 3.31 Over the 18-year period from 2024 to 2040, this equates to a reduction in the APIS background nitrogen deposition rate presented in Table 3-3 (2024-2040) of 1.12 kgN/ha/yr for the 2040 model scenarios. This decrease is also reflected in the total average acid deposition rate for nitrogen in the 2040 scenarios (reduction of 0.08 keq/ha/yr N).
- 3.32 No other changes to the APIS data have been made from those presented in Table 3-3 below (2022-2024) for any modelled scenario. It is noted that from monitoring evidence, increases in vehicle numbers over time are more than offset by improvements in the emissions of the newer vehicles and the removal of older vehicles, leading to future reductions in emissions.
- 3.33 In 2018, the Court of Justice of the European Union (CJEU) ruled in cases C-293/17 and C-294/17 (often dubbed the Dutch Nitrogen cases). One aspect of that ruling concerned the extent to which autonomous measures (i.e. improvements in baseline nitrogen deposition that are not attributable to the Local Plan) can be taken into account in Appropriate Assessment. The CJEU ruled that it was legally compliant to take such autonomous measures into account provided the benefits were not 'uncertain' (paras. 130&132). Note that previous case law on the interpretation of the Habitats Directive has clarified that 'certain' does not mean absolute certainty but *'where no reasonable scientific doubt remains'*<sup>3</sup>.

**Table 3-3: APIS Data for Ecological Transects for 2022-2024**

| Transect      | Background N<br>Dep Rate<br>kgN/ha/yr | Critical Load N<br>Dep kgN/ha/yr | Background Acid<br>Dep Rate<br>keq/ha/yrN | Critical Load N<br>Acid Dep<br>MinCLMaxN<br>keq/ha/yr | Background<br>Ammonia (µg/m³) |
|---------------|---------------------------------------|----------------------------------|-------------------------------------------|-------------------------------------------------------|-------------------------------|
| ET1_Grassland | 14.21                                 | 10 – 20                          | 1.05                                      | 4.856                                                 | 1.64                          |
| ET2_Grassland | 14.43                                 | 10 – 20                          | 1.07                                      | 4.856                                                 | 1.46                          |
| ET3_Grassland | 14.43                                 | 10 – 20                          | 1.07                                      | 4.856                                                 | 1.46                          |
| ET4_Forest    | 24.80                                 | 10 – 15                          | 1.82                                      | 11.042                                                | 1.40                          |
| ET5_Forest    | 24.34                                 | 10 – 15                          | 1.78                                      | 11.042                                                | 1.33                          |
| ET6_Forest    | 23.72                                 | 10 - 15                          | 1.75                                      | 11.042                                                | 1.34                          |
| ET7_Grassland | 14.45                                 | 10 - 20                          | 1.07                                      | 4.856                                                 | 1.44                          |

Note: Average nitrogen deposition rate (kgN/ha/yr) projected to decrease by 1.12 kgN/ha/yr from base year to future year (i.e. 0.07 x 16 years = 1.12 kgN/ha/yr). This results in a corresponding decrease in acid deposition of 0.08 keq/ha/yr N.

<sup>3</sup> Case C-239/04 Commission v Portugal [2006] ECR 10183, para. 24; Holohan et al vs. An Bord Pleanála (C-461/17), para. 33

## Verification

- 3.34 Model verification is the process by which the performance of the model is assessed to identify any discrepancies between modelled and measured concentrations at air quality monitoring sites within the study area.
- 3.35 There are no appropriately located local air quality monitoring stations within the model domain with which to make a comparison between modelled and measured concentrations. Therefore, verification factors have been used based upon professional judgement and experience of similar projects. Verification factors of 1.5 for NO<sub>x</sub> and 1.0 for NH<sub>3</sub> have been applied based on previous verification and validation of the EFT and CREAM tools, respectively.

## Deposition Velocities

- 3.36 Deposition of nitrogen from road traffic-derived NH<sub>3</sub> and NO<sub>2</sub> was estimated using the Air Quality Technical Advisory Group (AQTAG) deposition velocities that are cited in the 2020 IAQM guidance (IAQM, 2020), as shown in Table 3-4. In this assessment, the most appropriate habitat type (forest or heathland/short vegetation) has been applied for each transect receptor based on APIS classifications and site knowledge. This ensures that the deposition velocities for NO<sub>2</sub> and NH<sub>3</sub> reflect the correct habitat, improving accuracy.
- 3.37 The modelling methodology does not account for any depletion of concentrations of NO<sub>x</sub>, NO<sub>2</sub> or NH<sub>3</sub> following the deposition of nitrogen from these species. This therefore presents a precautionary assessment of the impacts of the Local Plan relative to the critical levels and loads.

**Table 3-4: Nitrogen Deposition Velocities and Conversion Rates**

| Pollutant       | Habitat   | Nitrogen Deposition Conversion Rates                  | Deposition Velocity |
|-----------------|-----------|-------------------------------------------------------|---------------------|
| NO <sub>2</sub> | Forest    | 1 µg/m <sup>3</sup> NO <sub>2</sub> = 0.29 kgN/ha/yr  | 0.003 m/s           |
| NO <sub>2</sub> | Grassland | 1 µg/m <sup>3</sup> NO <sub>2</sub> = 0.145 kgN/ha/yr | 0.0015 m/s          |
| NH <sub>3</sub> | Forest    | 1 µg/m <sup>3</sup> NH <sub>3</sub> = 7.8 kgN/ha/yr   | 0.03 m/s            |
| NH <sub>3</sub> | Grassland | 1 µg/m <sup>3</sup> NH <sub>3</sub> = 5.2 kgN/ha/yr   | 0.02 m/s            |

## 4. Results

- 4.1 The model results are set out in Table A-3, Table A-4, Table A-5 and Table A-6, in Annex A3. The impacts associated with these concentrations and deposition rates and the predicted changes brought about by the proposed Local Plan have been assessed by a qualified and experienced ecologist, taking into account the sensitivity of the ecological sites, as well as the wider range of factors influencing the condition of the habitats. Full details are set out and discussed within the HRA.

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## 6. Annexes

## A.1 Traffic Data

Table A-1: Traffic Data provided by the City Science for modelled links

| Link ID     | Baseline (2024) |      |             | Future Base (2043) |      |             | Do Minimum (2043) |      |             | Do Something (2043) |      |             |
|-------------|-----------------|------|-------------|--------------------|------|-------------|-------------------|------|-------------|---------------------|------|-------------|
|             | AADT            | HDV  | Speed (kph) | AADT               | HDV  | Speed (kph) | AADT              | HDV  | Speed (kph) | AADT                | HDV  | Speed (kph) |
| 26008_65408 | 1176            | 2.7% | 78.9        | 1176               | 2.7% | 78.9        | 1970              | 3.9% | 78.4        | 2240                | 3.6% | 78.2        |
| 26022_65408 | 5136            | 2.3% | 70.8        | 5136               | 2.3% | 70.8        | 5953              | 1.8% | 68.2        | 6635                | 1.8% | 66.2        |
| 26022_65895 | 4652            | 1.9% | 76.4        | 4652               | 1.9% | 76.4        | 5803              | 2.0% | 73.9        | 6204                | 2.1% | 73.4        |
| 56307_65896 | 1333            | 4.9% | 65.1        | 1333               | 4.9% | 65.1        | 2055              | 3.4% | 64.2        | 2448                | 3.1% | 63.9        |
| 56311_65408 | 4254            | 2.0% | 44.3        | 4254               | 2.0% | 44.3        | 4614              | 1.4% | 33.5        | 4742                | 1.6% | 32.2        |
| 65408_26008 | 1358            | 5.3% | 79.5        | 1358               | 5.3% | 79.5        | 1934              | 3.8% | 78.9        | 2278                | 3.6% | 78.6        |
| 65408_26022 | 4885            | 2.2% | 69.3        | 4885               | 2.2% | 69.3        | 6034              | 2.2% | 65.2        | 6424                | 2.3% | 64.8        |
| 65408_56311 | 4319            | 1.3% | 53.7        | 4319               | 1.3% | 53.7        | 4568              | 1.0% | 53.1        | 4904                | 0.9% | 52.3        |
| 65895_26022 | 5096            | 2.2% | 74.7        | 5096               | 2.2% | 74.7        | 5967              | 1.7% | 71.9        | 6651                | 1.7% | 70.2        |
| 65896_56307 | 1089            | 2.6% | 65.4        | 1089               | 2.6% | 65.4        | 2045              | 3.6% | 64.7        | 2306                | 3.4% | 64.5        |
| 28080_56222 | 6006            | 1.9% | 44.4        | 6006               | 1.9% | 44.4        | 6645              | 1.8% | 43.6        | 7249                | 1.7% | 43.0        |
| 28143_56223 | 8352            | 5.8% | 55.5        | 8352               | 5.8% | 55.5        | 9093              | 4.7% | 54.2        | 9506                | 4.7% | 53.6        |
| 28143_56224 | 560             | 2.2% | 34.4        | 560                | 2.2% | 34.4        | 702               | 1.6% | 34.3        | 674                 | 1.6% | 34.3        |
| 28143_56227 | 9699            | 4.7% | 46.8        | 9699               | 4.7% | 46.8        | 10531             | 4.6% | 45.1        | 10918               | 4.4% | 44.3        |
| 28146_28189 | 2425            | 3.0% | 50.5        | 2425               | 3.0% | 50.5        | 2636              | 2.6% | 50.3        | 2644                | 2.6% | 50.3        |
| 28146_56222 | 3719            | 4.4% | 50.7        | 3719               | 4.4% | 50.7        | 4317              | 2.4% | 50.1        | 4757                | 2.5% | 49.8        |
| 28188_28189 | 1139            | 4.9% | 33.3        | 1139               | 4.9% | 33.3        | 1283              | 3.9% | 32.9        | 1193                | 4.1% | 33.0        |
| 28189_28146 | 1041            | 5.2% | 52.0        | 1041               | 5.2% | 52.0        | 1299              | 3.8% | 51.5        | 1251                | 3.8% | 51.5        |
| 28189_28188 | 2899            | 4.1% | 36.9        | 2899               | 4.1% | 36.9        | 3502              | 3.3% | 35.9        | 3792                | 3.1% | 35.5        |
| 28189_56222 | 584             | 5.1% | 51.5        | 584                | 5.1% | 51.5        | 691               | 4.2% | 51.1        | 666                 | 4.3% | 50.8        |
| 56222_28080 | 4583            | 4.2% | 51.0        | 4583               | 4.2% | 51.0        | 5275              | 2.6% | 50.3        | 5693                | 2.6% | 49.9        |
| 56222_28146 | 4816            | 1.4% | 44.7        | 4816               | 1.4% | 44.7        | 4878              | 1.4% | 44.4        | 5141                | 1.4% | 44.0        |
| 56222_28189 | 989             | 5.0% | 54.4        | 989                | 5.0% | 54.4        | 1572              | 3.3% | 53.8        | 1911                | 2.8% | 53.7        |

|             |       |       |       |       |       |       |       |      |       |       |      |       |
|-------------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|
| 56223_28143 | 9044  | 4.8%  | 53.7  | 9044  | 4.8%  | 53.7  | 9778  | 4.8% | 52.4  | 10164 | 4.6% | 51.7  |
| 56224_28143 | 679   | 1.9%  | 29.8  | 679   | 1.9%  | 29.8  | 1043  | 1.1% | 26.6  | 1077  | 1.0% | 26.2  |
| 56227_28143 | 8890  | 5.6%  | 50.2  | 8890  | 5.6%  | 50.2  | 9504  | 4.6% | 49.2  | 9858  | 4.7% | 48.6  |
| 62949_65376 | 21710 | 10.5% | 105.2 | 21710 | 10.5% | 105.2 | 28278 | 8.2% | 101.4 | 31154 | 7.8% | 98.9  |
| 62954_65372 | 154   | 16.3% | 65.1  | 154   | 16.3% | 65.1  | 292   | 5.5% | 64.2  | 1977  | 1.9% | 62.6  |
| 65372_62954 | 237   | 12.7% | 61.6  | 237   | 12.7% | 61.6  | 598   | 3.6% | 61.0  | 2249  | 1.2% | 60.6  |
| 65376_65508 | 28102 | 9.1%  | 110.1 | 28102 | 9.1%  | 110.1 | 35125 | 7.3% | 108.7 | 39709 | 7.0% | 103.0 |
| 65377_65376 | 3190  | 5.1%  | 60.8  | 3190  | 5.1%  | 60.8  | 3673  | 3.5% | 59.8  | 4650  | 4.1% | 58.6  |
| 65498_62953 | 28717 | 7.3%  | 103.7 | 28717 | 7.3%  | 103.7 | 38566 | 6.2% | 95.2  | 41749 | 6.7% | 92.4  |
| 65508_62960 | 28102 | 9.1%  | 103.6 | 28102 | 9.1%  | 103.6 | 35125 | 7.3% | 98.6  | 39709 | 7.0% | 94.7  |

## A.2 Modelled Ecological Receptor Locations

Table A-2: Modelled Ecological Receptor Locations

| Receptors  | SAC Name                             | X co-ordinate (m) | Y co-ordinate (m) |
|------------|--------------------------------------|-------------------|-------------------|
| ET1_97.98m | North Meadow and Clattinger Farm SAC | 409576.08         | 194863.87         |
| ET1_100m   |                                      | 409574.55         | 194862.55         |
| ET1_110m   |                                      | 409567.01         | 194855.99         |
| ET1_120m   |                                      | 409559.46         | 194849.43         |
| ET1_130m   |                                      | 409551.91         | 194842.87         |
| ET1_140m   |                                      | 409544.37         | 194836.30         |
| ET1_150m   |                                      | 409536.82         | 194829.74         |
| ET1_160m   |                                      | 409529.27         | 194823.18         |
| ET1_170m   |                                      | 409521.72         | 194816.62         |
| ET1_180m   |                                      | 409514.18         | 194810.06         |
| ET1_190m   |                                      | 409506.63         | 194803.50         |
| ET1_200m   |                                      | 409499.08         | 194796.94         |
| ET2_0.04m  | Rodborough Common SAC                | 385225.05         | 203768.50         |
| ET2_10m    |                                      | 385216.18         | 203773.02         |
| ET2_20m    |                                      | 385207.27         | 203777.56         |
| ET2_30m    |                                      | 385198.36         | 203782.10         |
| ET2_40m    |                                      | 385189.45         | 203786.64         |
| ET2_50m    |                                      | 385180.54         | 203791.18         |
| ET2_60m    |                                      | 385171.63         | 203795.72         |
| ET2_70m    |                                      | 385162.72         | 203800.26         |
| ET2_80m    |                                      | 385153.80         | 203804.80         |
| ET2_90m    |                                      | 385144.89         | 203809.34         |
| ET2_100m   |                                      | 385135.98         | 203813.88         |
| ET2_110m   |                                      | 385127.07         | 203818.42         |
| ET2_120m   |                                      | 385118.16         | 203822.96         |
| ET2_130m   |                                      | 385109.25         | 203827.50         |
| ET2_140m   |                                      | 385100.34         | 203832.04         |
| ET2_150m   |                                      | 385091.43         | 203836.58         |
| ET2_160m   |                                      | 385082.52         | 203841.12         |
| ET2_170m   |                                      | 385073.61         | 203845.66         |
| ET2_180m   |                                      | 385064.70         | 203850.20         |
| ET2_190m   |                                      | 385055.79         | 203854.74         |
| ET2_200m   |                                      | 385046.88         | 203859.28         |

| Receptors | SAC Name              | X co-ordinate (m) | Y co-ordinate (m) |
|-----------|-----------------------|-------------------|-------------------|
| ET3_0.03m | Rodborough Common SAC | 385229.83         | 203765.67         |
| ET3_10m   |                       | 385238.71         | 203761.15         |
| ET3_20m   |                       | 385247.62         | 203756.61         |
| ET3_30m   |                       | 385256.53         | 203752.07         |
| ET3_40m   |                       | 385265.44         | 203747.53         |
| ET3_50m   |                       | 385274.35         | 203742.99         |
| ET3_60m   |                       | 385283.26         | 203738.45         |
| ET3_70m   |                       | 385292.17         | 203733.91         |
| ET3_80m   |                       | 385301.08         | 203729.37         |
| ET3_90m   |                       | 385309.99         | 203724.83         |
| ET3_100m  |                       | 385318.90         | 203720.29         |
| ET3_110m  |                       | 385327.81         | 203715.75         |
| ET3_120m  |                       | 385336.72         | 203711.21         |
| ET3_130m  |                       | 385345.63         | 203706.67         |
| ET3_140m  |                       | 385354.54         | 203702.13         |
| ET3_150m  |                       | 385363.45         | 203697.59         |
| ET3_160m  |                       | 385372.36         | 203693.05         |
| ET3_170m  |                       | 385381.27         | 203688.51         |
| ET3_180m  |                       | 385390.18         | 203683.97         |
| ET3_190m  |                       | 385399.09         | 203679.43         |
| ET3_200m  |                       | 385408.00         | 203674.89         |
| ET4_0.5m  | Rodborough Common SAC | 392029.88         | 213605.06         |
| ET4_10m   |                       | 392022.50         | 213611.03         |
| ET4_20m   |                       | 392014.73         | 213617.33         |
| ET4_30m   |                       | 392006.96         | 213623.62         |
| ET4_40m   |                       | 391999.19         | 213629.91         |
| ET4_50m   |                       | 391991.42         | 213636.21         |
| ET4_60m   |                       | 391983.64         | 213642.50         |
| ET4_70m   |                       | 391975.87         | 213648.79         |
| ET4_80m   |                       | 391968.10         | 213655.09         |
| ET4_90m   |                       | 391960.33         | 213661.38         |
| ET4_100m  |                       | 391952.56         | 213667.67         |
| ET4_110m  |                       | 391944.79         | 213673.97         |
| ET4_120m  |                       | 391937.02         | 213680.26         |
| ET4_130m  |                       | 391929.24         | 213686.55         |
| ET4_140m  |                       | 391921.47         | 213692.85         |
| ET4_150m  |                       | 391913.70         | 213699.14         |
| ET4_160m  |                       | 391905.93         | 213705.43         |
| ET4_170m  |                       | 391898.16         | 213711.73         |
| ET4_180m  |                       | 391890.39         | 213718.02         |

| Receptors   | SAC Name                 | X co-ordinate (m) | Y co-ordinate (m) |
|-------------|--------------------------|-------------------|-------------------|
| ET4_190m    | Cotswolds Beechwoods SAC | 391882.61         | 213724.31         |
| ET4_200m    |                          | 391874.84         | 213730.61         |
| ET5_79m     |                          | 391365.84         | 211478.45         |
| ET5_80m     |                          | 391364.84         | 211478.43         |
| ET5_90m     |                          | 391354.84         | 211478.26         |
| ET5_100m    |                          | 391344.84         | 211478.08         |
| ET5_110m    |                          | 391334.84         | 211477.91         |
| ET5_120m    |                          | 391324.85         | 211477.73         |
| ET5_130m    |                          | 391314.85         | 211477.56         |
| ET5_140m    |                          | 391304.85         | 211477.39         |
| ET5_150m    |                          | 391294.85         | 211477.21         |
| ET5_160m    |                          | 391284.85         | 211477.04         |
| ET5_170m    |                          | 391274.85         | 211476.86         |
| ET5_180m    |                          | 391264.86         | 211476.69         |
| ET5_190m    |                          | 391254.86         | 211476.51         |
| ET5_200m    |                          | 391244.86         | 211476.34         |
| ET6_60.4m   | Cotswolds Beechwoods SAC | 389344.09         | 209706.86         |
| ET6_70m     |                          | 389340.03         | 209715.56         |
| ET6_80m     |                          | 389335.81         | 209724.62         |
| ET6_90m     |                          | 389331.58         | 209733.68         |
| ET6_100m    |                          | 389327.35         | 209742.75         |
| ET6_110m    |                          | 389323.13         | 209751.81         |
| ET6_120m    |                          | 389318.90         | 209760.87         |
| ET6_130m    |                          | 389314.68         | 209769.93         |
| ET6_140m    |                          | 389310.45         | 209779.00         |
| ET6_150m    |                          | 389306.22         | 209788.06         |
| ET6_160m    |                          | 389302.00         | 209797.12         |
| ET6_170m    |                          | 389297.77         | 209806.19         |
| ET6_180m    |                          | 389293.54         | 209815.25         |
| ET6_190m    |                          | 389289.32         | 209824.31         |
| ET6_200m    |                          | 389285.09         | 209833.38         |
| ET7_162.03m | Rodborough Common SAC    | 384509.50         | 202889.30         |
| ET7_170m    |                          | 384517.35         | 202890.69         |
| ET7_180m    |                          | 384527.20         | 202892.42         |
| ET7_190m    |                          | 384537.05         | 202894.16         |
| ET7_200m    |                          | 384546.90         | 202895.90         |

## A.3 Modelled Ecological Receptor Results

**Table A-3: Total Annual Mean NO<sub>x</sub> Concentrations (µg/m<sup>3</sup>)**

| Receptor   | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET1_97.98m | 11.51     | 4.78             | 4.87            | 4.91              | 0.5%                                                    | 0.2%                                                   |
| ET1_100m   | 11.42     | 4.77             | 4.86            | 4.90              | 0.4%                                                    | 0.2%                                                   |
| ET1_110m   | 11.01     | 4.73             | 4.82            | 4.86              | 0.4%                                                    | 0.1%                                                   |
| ET1_120m   | 10.65     | 4.70             | 4.78            | 4.82              | 0.4%                                                    | 0.1%                                                   |
| ET1_130m   | 10.33     | 4.68             | 4.75            | 4.78              | 0.4%                                                    | 0.1%                                                   |
| ET1_140m   | 10.05     | 4.65             | 4.72            | 4.75              | 0.3%                                                    | 0.1%                                                   |
| ET1_150m   | 9.79      | 4.63             | 4.69            | 4.72              | 0.3%                                                    | 0.1%                                                   |
| ET1_160m   | 9.57      | 4.61             | 4.67            | 4.70              | 0.3%                                                    | 0.1%                                                   |
| ET1_170m   | 9.36      | 4.59             | 4.65            | 4.68              | 0.3%                                                    | 0.1%                                                   |
| ET1_180m   | 9.17      | 4.58             | 4.63            | 4.65              | 0.3%                                                    | 0.1%                                                   |
| ET1_190m   | 9.00      | 4.56             | 4.61            | 4.63              | 0.2%                                                    | 0.1%                                                   |
| ET1_200m   | 8.84      | 4.55             | 4.59            | 4.62              | 0.2%                                                    | 0.1%                                                   |
| ET2_0.04m  | 18.51     | 5.84             | 5.87            | 5.94              | 0.3%                                                    | 0.2%                                                   |
| ET2_10m    | 11.50     | 5.25             | 5.27            | 5.29              | 0.1%                                                    | 0.1%                                                   |
| ET2_20m    | 9.94      | 5.12             | 5.14            | 5.15              | 0.1%                                                    | 0.1%                                                   |
| ET2_30m    | 9.23      | 5.07             | 5.07            | 5.09              | 0.1%                                                    | 0.0%                                                   |
| ET2_40m    | 8.81      | 5.03             | 5.04            | 5.05              | 0.1%                                                    | 0.0%                                                   |
| ET2_50m    | 8.54      | 5.01             | 5.01            | 5.02              | 0.0%                                                    | 0.0%                                                   |
| ET2_60m    | 8.35      | 4.99             | 5.00            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET2_70m    | 8.20      | 4.98             | 4.99            | 4.99              | 0.0%                                                    | 0.0%                                                   |
| ET2_80m    | 8.09      | 4.97             | 4.98            | 4.98              | 0.0%                                                    | 0.0%                                                   |
| ET2_90m    | 8.00      | 4.96             | 4.97            | 4.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_100m   | 7.93      | 4.96             | 4.96            | 4.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_110m   | 7.86      | 4.95             | 4.96            | 4.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_120m   | 7.81      | 4.95             | 4.95            | 4.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_130m   | 7.77      | 4.94             | 4.95            | 4.95              | 0.0%                                                    | 0.0%                                                   |
| ET2_140m   | 7.73      | 4.94             | 4.94            | 4.95              | 0.0%                                                    | 0.0%                                                   |
| ET2_150m   | 7.69      | 4.94             | 4.94            | 4.94              | 0.0%                                                    | 0.0%                                                   |
| ET2_160m   | 7.66      | 4.94             | 4.94            | 4.94              | 0.0%                                                    | 0.0%                                                   |
| ET2_170m   | 7.64      | 4.93             | 4.94            | 4.94              | 0.0%                                                    | 0.0%                                                   |
| ET2_180m   | 7.61      | 4.93             | 4.93            | 4.94              | 0.0%                                                    | 0.0%                                                   |
| ET2_190m   | 7.59      | 4.93             | 4.93            | 4.93              | 0.0%                                                    | 0.0%                                                   |
| ET2_200m   | 7.57      | 4.93             | 4.93            | 4.93              | 0.0%                                                    | 0.0%                                                   |
| ET3_0.03m  | 21.42     | 6.08             | 6.12            | 6.21              | 0.4%                                                    | 0.3%                                                   |
| ET3_10m    | 13.17     | 5.39             | 5.41            | 5.45              | 0.2%                                                    | 0.1%                                                   |
| ET3_20m    | 11.09     | 5.22             | 5.23            | 5.26              | 0.1%                                                    | 0.1%                                                   |

| Receptor    | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET3_30m     | 10.11     | 5.14             | 5.15            | 5.17              | 0.1%                                                    | 0.1%                                                   |
| ET3_40m     | 9.55      | 5.09             | 5.10            | 5.12              | 0.1%                                                    | 0.0%                                                   |
| ET3_50m     | 9.18      | 5.06             | 5.07            | 5.08              | 0.1%                                                    | 0.0%                                                   |
| ET3_60m     | 8.93      | 5.04             | 5.05            | 5.06              | 0.1%                                                    | 0.0%                                                   |
| ET3_70m     | 8.74      | 5.03             | 5.03            | 5.04              | 0.1%                                                    | 0.0%                                                   |
| ET3_80m     | 8.61      | 5.01             | 5.02            | 5.03              | 0.1%                                                    | 0.0%                                                   |
| ET3_90m     | 8.50      | 5.01             | 5.01            | 5.02              | 0.0%                                                    | 0.0%                                                   |
| ET3_100m    | 8.43      | 5.00             | 5.01            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET3_110m    | 8.37      | 5.00             | 5.00            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET3_120m    | 8.34      | 4.99             | 5.00            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET3_130m    | 8.33      | 4.99             | 5.00            | 5.00              | 0.0%                                                    | 0.0%                                                   |
| ET3_140m    | 8.34      | 4.99             | 5.00            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET3_150m    | 8.37      | 5.00             | 5.00            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET3_160m    | 8.43      | 5.00             | 5.01            | 5.01              | 0.0%                                                    | 0.0%                                                   |
| ET3_170m    | 8.54      | 5.01             | 5.02            | 5.03              | 0.0%                                                    | 0.0%                                                   |
| ET3_180m    | 8.73      | 5.03             | 5.04            | 5.04              | 0.1%                                                    | 0.0%                                                   |
| ET3_190m    | 9.09      | 5.06             | 5.07            | 5.08              | 0.1%                                                    | 0.0%                                                   |
| ET3_200m    | 9.89      | 5.13             | 5.15            | 5.15              | 0.1%                                                    | 0.0%                                                   |
| ET7_162.03m | 7.73      | 4.70             | 4.71            | 4.71              | 0.0%                                                    | 0.0%                                                   |
| ET7_170m    | 7.67      | 4.69             | 4.70            | 4.70              | 0.0%                                                    | 0.0%                                                   |
| ET7_180m    | 7.61      | 4.69             | 4.69            | 4.70              | 0.0%                                                    | 0.0%                                                   |
| ET7_190m    | 7.55      | 4.68             | 4.69            | 4.69              | 0.0%                                                    | 0.0%                                                   |
| ET7_200m    | 7.50      | 4.68             | 4.68            | 4.69              | 0.0%                                                    | 0.0%                                                   |
| ET4_0.5m    | 16.98     | 5.17             | 5.34            | 5.43              | 0.9%                                                    | 0.3%                                                   |
| ET4_10m     | 10.73     | 4.65             | 4.72            | 4.76              | 0.4%                                                    | 0.1%                                                   |
| ET4_20m     | 9.13      | 4.52             | 4.56            | 4.58              | 0.2%                                                    | 0.1%                                                   |
| ET4_30m     | 8.39      | 4.46             | 4.49            | 4.51              | 0.2%                                                    | 0.1%                                                   |
| ET4_40m     | 7.96      | 4.42             | 4.45            | 4.46              | 0.1%                                                    | 0.0%                                                   |
| ET4_50m     | 7.68      | 4.40             | 4.42            | 4.43              | 0.1%                                                    | 0.0%                                                   |
| ET4_60m     | 7.48      | 4.38             | 4.40            | 4.41              | 0.1%                                                    | 0.0%                                                   |
| ET4_70m     | 7.32      | 4.37             | 4.38            | 4.39              | 0.1%                                                    | 0.0%                                                   |
| ET4_80m     | 7.20      | 4.36             | 4.37            | 4.38              | 0.1%                                                    | 0.0%                                                   |
| ET4_90m     | 7.11      | 4.35             | 4.36            | 4.37              | 0.1%                                                    | 0.0%                                                   |
| ET4_100m    | 7.03      | 4.34             | 4.35            | 4.36              | 0.1%                                                    | 0.0%                                                   |
| ET4_110m    | 6.96      | 4.34             | 4.35            | 4.35              | 0.0%                                                    | 0.0%                                                   |
| ET4_120m    | 6.90      | 4.33             | 4.34            | 4.35              | 0.0%                                                    | 0.0%                                                   |
| ET4_130m    | 6.86      | 4.33             | 4.34            | 4.34              | 0.0%                                                    | 0.0%                                                   |
| ET4_140m    | 6.81      | 4.32             | 4.33            | 4.34              | 0.0%                                                    | 0.0%                                                   |

| Receptor  | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-----------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET4_150m  | 6.78      | 4.32             | 4.33            | 4.33              | 0.0%                                                    | 0.0%                                                   |
| ET4_160m  | 6.75      | 4.32             | 4.32            | 4.33              | 0.0%                                                    | 0.0%                                                   |
| ET4_170m  | 6.72      | 4.32             | 4.32            | 4.32              | 0.0%                                                    | 0.0%                                                   |
| ET4_180m  | 6.69      | 4.31             | 4.32            | 4.32              | 0.0%                                                    | 0.0%                                                   |
| ET4_190m  | 6.67      | 4.31             | 4.32            | 4.32              | 0.0%                                                    | 0.0%                                                   |
| ET4_200m  | 6.65      | 4.31             | 4.32            | 4.32              | 0.0%                                                    | 0.0%                                                   |
| ET5_79m   | 7.03      | 4.30             | 4.31            | 4.32              | 0.1%                                                    | 0.0%                                                   |
| ET5_80m   | 7.02      | 4.30             | 4.31            | 4.32              | 0.1%                                                    | 0.0%                                                   |
| ET5_90m   | 6.92      | 4.29             | 4.30            | 4.31              | 0.1%                                                    | 0.0%                                                   |
| ET5_100m  | 6.85      | 4.28             | 4.29            | 4.30              | 0.1%                                                    | 0.0%                                                   |
| ET5_110m  | 6.79      | 4.28             | 4.29            | 4.29              | 0.1%                                                    | 0.0%                                                   |
| ET5_120m  | 6.73      | 4.27             | 4.28            | 4.29              | 0.0%                                                    | 0.0%                                                   |
| ET5_130m  | 6.69      | 4.27             | 4.28            | 4.28              | 0.0%                                                    | 0.0%                                                   |
| ET5_140m  | 6.65      | 4.27             | 4.27            | 4.28              | 0.0%                                                    | 0.0%                                                   |
| ET5_150m  | 6.62      | 4.26             | 4.27            | 4.27              | 0.0%                                                    | 0.0%                                                   |
| ET5_160m  | 6.59      | 4.26             | 4.27            | 4.27              | 0.0%                                                    | 0.0%                                                   |
| ET5_170m  | 6.56      | 4.26             | 4.26            | 4.27              | 0.0%                                                    | 0.0%                                                   |
| ET5_180m  | 6.54      | 4.26             | 4.26            | 4.27              | 0.0%                                                    | 0.0%                                                   |
| ET5_190m  | 6.51      | 4.25             | 4.26            | 4.26              | 0.0%                                                    | 0.0%                                                   |
| ET5_200m  | 6.50      | 4.25             | 4.26            | 4.26              | 0.0%                                                    | 0.0%                                                   |
| ET6_60.4m | 6.47      | 4.25             | 4.27            | 4.27              | 0.1%                                                    | 0.0%                                                   |
| ET6_70m   | 6.43      | 4.25             | 4.26            | 4.27              | 0.1%                                                    | 0.0%                                                   |
| ET6_80m   | 6.40      | 4.25             | 4.26            | 4.26              | 0.1%                                                    | 0.0%                                                   |
| ET6_90m   | 6.37      | 4.24             | 4.25            | 4.26              | 0.0%                                                    | 0.0%                                                   |
| ET6_100m  | 6.35      | 4.24             | 4.25            | 4.25              | 0.0%                                                    | 0.0%                                                   |
| ET6_110m  | 6.33      | 4.24             | 4.25            | 4.25              | 0.0%                                                    | 0.0%                                                   |
| ET6_120m  | 6.32      | 4.24             | 4.25            | 4.25              | 0.0%                                                    | 0.0%                                                   |
| ET6_130m  | 6.31      | 4.24             | 4.25            | 4.25              | 0.0%                                                    | 0.0%                                                   |
| ET6_140m  | 6.30      | 4.24             | 4.24            | 4.25              | 0.0%                                                    | 0.0%                                                   |
| ET6_150m  | 6.29      | 4.24             | 4.24            | 4.24              | 0.0%                                                    | 0.0%                                                   |
| ET6_160m  | 6.28      | 4.24             | 4.24            | 4.24              | 0.0%                                                    | 0.0%                                                   |
| ET6_170m  | 6.27      | 4.24             | 4.24            | 4.24              | 0.0%                                                    | 0.0%                                                   |
| ET6_180m  | 6.27      | 4.24             | 4.24            | 4.24              | 0.0%                                                    | 0.0%                                                   |
| ET6_190m  | 6.26      | 4.24             | 4.24            | 4.24              | 0.0%                                                    | 0.0%                                                   |
| ET6_200m  | 6.26      | 4.24             | 4.24            | 4.24              | 0.0%                                                    | 0.0%                                                   |

**Table A-4: Total Annual Mean NH<sub>3</sub> Concentrations (µg/m<sup>3</sup>)**

| Receptor   | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET1_97.98m | 1.93      | 1.90             | 1.97            | 2.02              | 11.6%                                                   | 4.5%                                                   |
| ET1_100m   | 1.93      | 1.90             | 1.97            | 2.01              | 11.4%                                                   | 4.5%                                                   |
| ET1_110m   | 1.91      | 1.88             | 1.94            | 1.98              | 10.5%                                                   | 4.1%                                                   |
| ET1_120m   | 1.88      | 1.86             | 1.92            | 1.96              | 9.7%                                                    | 3.8%                                                   |
| ET1_130m   | 1.87      | 1.84             | 1.90            | 1.93              | 9.0%                                                    | 3.5%                                                   |
| ET1_140m   | 1.85      | 1.83             | 1.88            | 1.91              | 8.4%                                                    | 3.3%                                                   |
| ET1_150m   | 1.84      | 1.82             | 1.86            | 1.89              | 7.8%                                                    | 3.1%                                                   |
| ET1_160m   | 1.82      | 1.80             | 1.85            | 1.88              | 7.3%                                                    | 2.9%                                                   |
| ET1_170m   | 1.81      | 1.79             | 1.84            | 1.86              | 6.9%                                                    | 2.7%                                                   |
| ET1_180m   | 1.80      | 1.78             | 1.82            | 1.85              | 6.4%                                                    | 2.5%                                                   |
| ET1_190m   | 1.79      | 1.77             | 1.81            | 1.84              | 6.0%                                                    | 2.4%                                                   |
| ET1_200m   | 1.78      | 1.77             | 1.80            | 1.82              | 5.7%                                                    | 2.2%                                                   |
| ET2_0.04m  | 2.19      | 2.03             | 2.06            | 2.07              | 4.3%                                                    | 0.9%                                                   |
| ET2_10m    | 1.74      | 1.68             | 1.69            | 1.69              | 1.8%                                                    | 0.4%                                                   |
| ET2_20m    | 1.64      | 1.60             | 1.61            | 1.61              | 1.2%                                                    | 0.3%                                                   |
| ET2_30m    | 1.59      | 1.56             | 1.57            | 1.57              | 0.9%                                                    | 0.2%                                                   |
| ET2_40m    | 1.57      | 1.54             | 1.55            | 1.55              | 0.8%                                                    | 0.2%                                                   |
| ET2_50m    | 1.55      | 1.53             | 1.53            | 1.54              | 0.7%                                                    | 0.2%                                                   |
| ET2_60m    | 1.54      | 1.52             | 1.52            | 1.52              | 0.6%                                                    | 0.1%                                                   |
| ET2_70m    | 1.53      | 1.51             | 1.52            | 1.52              | 0.6%                                                    | 0.1%                                                   |
| ET2_80m    | 1.52      | 1.51             | 1.51            | 1.51              | 0.5%                                                    | 0.1%                                                   |
| ET2_90m    | 1.51      | 1.50             | 1.50            | 1.51              | 0.5%                                                    | 0.1%                                                   |
| ET2_100m   | 1.51      | 1.50             | 1.50            | 1.50              | 0.4%                                                    | 0.1%                                                   |
| ET2_110m   | 1.50      | 1.49             | 1.50            | 1.50              | 0.4%                                                    | 0.1%                                                   |
| ET2_120m   | 1.50      | 1.49             | 1.49            | 1.50              | 0.4%                                                    | 0.1%                                                   |
| ET2_130m   | 1.50      | 1.49             | 1.49            | 1.49              | 0.4%                                                    | 0.1%                                                   |
| ET2_140m   | 1.50      | 1.49             | 1.49            | 1.49              | 0.3%                                                    | 0.1%                                                   |
| ET2_150m   | 1.49      | 1.49             | 1.49            | 1.49              | 0.3%                                                    | 0.1%                                                   |
| ET2_160m   | 1.49      | 1.48             | 1.49            | 1.49              | 0.3%                                                    | 0.1%                                                   |
| ET2_170m   | 1.49      | 1.48             | 1.49            | 1.49              | 0.3%                                                    | 0.1%                                                   |
| ET2_180m   | 1.49      | 1.48             | 1.48            | 1.48              | 0.3%                                                    | 0.1%                                                   |
| ET2_190m   | 1.49      | 1.48             | 1.48            | 1.48              | 0.3%                                                    | 0.1%                                                   |
| ET2_200m   | 1.49      | 1.48             | 1.48            | 1.48              | 0.3%                                                    | 0.1%                                                   |
| ET3_0.03m  | 2.37      | 2.17             | 2.22            | 2.23              | 5.3%                                                    | 1.0%                                                   |
| ET3_10m    | 1.84      | 1.76             | 1.78            | 1.78              | 2.4%                                                    | 0.5%                                                   |
| ET3_20m    | 1.71      | 1.66             | 1.67            | 1.67              | 1.6%                                                    | 0.3%                                                   |
| ET3_30m    | 1.65      | 1.61             | 1.62            | 1.62              | 1.3%                                                    | 0.3%                                                   |

| Receptor    | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET3_40m     | 1.61      | 1.58             | 1.59            | 1.59              | 1.1%                                                    | 0.2%                                                   |
| ET3_50m     | 1.59      | 1.56             | 1.57            | 1.57              | 1.0%                                                    | 0.2%                                                   |
| ET3_60m     | 1.57      | 1.55             | 1.56            | 1.56              | 0.9%                                                    | 0.2%                                                   |
| ET3_70m     | 1.56      | 1.54             | 1.55            | 1.55              | 0.8%                                                    | 0.2%                                                   |
| ET3_80m     | 1.55      | 1.53             | 1.54            | 1.54              | 0.8%                                                    | 0.2%                                                   |
| ET3_90m     | 1.55      | 1.53             | 1.53            | 1.53              | 0.7%                                                    | 0.2%                                                   |
| ET3_100m    | 1.54      | 1.52             | 1.53            | 1.53              | 0.7%                                                    | 0.1%                                                   |
| ET3_110m    | 1.54      | 1.52             | 1.53            | 1.53              | 0.7%                                                    | 0.1%                                                   |
| ET3_120m    | 1.54      | 1.52             | 1.53            | 1.53              | 0.7%                                                    | 0.1%                                                   |
| ET3_130m    | 1.53      | 1.52             | 1.53            | 1.53              | 0.7%                                                    | 0.1%                                                   |
| ET3_140m    | 1.54      | 1.52             | 1.53            | 1.53              | 0.7%                                                    | 0.1%                                                   |
| ET3_150m    | 1.54      | 1.52             | 1.53            | 1.53              | 0.8%                                                    | 0.1%                                                   |
| ET3_160m    | 1.54      | 1.53             | 1.53            | 1.53              | 0.8%                                                    | 0.1%                                                   |
| ET3_170m    | 1.55      | 1.53             | 1.54            | 1.54              | 0.9%                                                    | 0.1%                                                   |
| ET3_180m    | 1.56      | 1.54             | 1.55            | 1.55              | 1.0%                                                    | 0.1%                                                   |
| ET3_190m    | 1.59      | 1.56             | 1.57            | 1.57              | 1.2%                                                    | 0.0%                                                   |
| ET3_200m    | 1.64      | 1.61             | 1.62            | 1.62              | 1.7%                                                    | 0.0%                                                   |
| ET7_162.03m | 1.51      | 1.49             | 1.50            | 1.50              | 0.5%                                                    | 0.2%                                                   |
| ET7_170m    | 1.50      | 1.49             | 1.49            | 1.50              | 0.5%                                                    | 0.2%                                                   |
| ET7_180m    | 1.50      | 1.49             | 1.49            | 1.49              | 0.5%                                                    | 0.2%                                                   |
| ET7_190m    | 1.49      | 1.48             | 1.49            | 1.49              | 0.4%                                                    | 0.2%                                                   |
| ET7_200m    | 1.49      | 1.48             | 1.48            | 1.49              | 0.4%                                                    | 0.2%                                                   |
| ET4_0.5m    | 2.15      | 2.01             | 2.13            | 2.20              | 18.2%                                                   | 6.5%                                                   |
| ET4_10m     | 1.71      | 1.65             | 1.70            | 1.72              | 7.5%                                                    | 2.7%                                                   |
| ET4_20m     | 1.59      | 1.56             | 1.59            | 1.60              | 4.8%                                                    | 1.7%                                                   |
| ET4_30m     | 1.54      | 1.51             | 1.53            | 1.55              | 3.5%                                                    | 1.3%                                                   |
| ET4_40m     | 1.51      | 1.49             | 1.51            | 1.52              | 2.8%                                                    | 1.0%                                                   |
| ET4_50m     | 1.49      | 1.47             | 1.49            | 1.49              | 2.3%                                                    | 0.8%                                                   |
| ET4_60m     | 1.47      | 1.46             | 1.47            | 1.48              | 2.0%                                                    | 0.7%                                                   |
| ET4_70m     | 1.46      | 1.45             | 1.46            | 1.47              | 1.7%                                                    | 0.6%                                                   |
| ET4_80m     | 1.45      | 1.44             | 1.45            | 1.46              | 1.5%                                                    | 0.5%                                                   |
| ET4_90m     | 1.45      | 1.44             | 1.45            | 1.45              | 1.3%                                                    | 0.5%                                                   |
| ET4_100m    | 1.44      | 1.43             | 1.44            | 1.44              | 1.2%                                                    | 0.4%                                                   |
| ET4_110m    | 1.44      | 1.43             | 1.44            | 1.44              | 1.0%                                                    | 0.4%                                                   |
| ET4_120m    | 1.43      | 1.43             | 1.43            | 1.43              | 0.9%                                                    | 0.3%                                                   |
| ET4_130m    | 1.43      | 1.42             | 1.43            | 1.43              | 0.9%                                                    | 0.3%                                                   |
| ET4_140m    | 1.43      | 1.42             | 1.43            | 1.43              | 0.8%                                                    | 0.3%                                                   |
| ET4_150m    | 1.42      | 1.42             | 1.42            | 1.43              | 0.7%                                                    | 0.3%                                                   |

| Receptor  | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-----------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET4_160m  | 1.42      | 1.42             | 1.42            | 1.42              | 0.6%                                                    | 0.2%                                                   |
| ET4_170m  | 1.42      | 1.41             | 1.42            | 1.42              | 0.6%                                                    | 0.2%                                                   |
| ET4_180m  | 1.42      | 1.41             | 1.42            | 1.42              | 0.5%                                                    | 0.2%                                                   |
| ET4_190m  | 1.42      | 1.41             | 1.42            | 1.42              | 0.5%                                                    | 0.2%                                                   |
| ET4_200m  | 1.41      | 1.41             | 1.41            | 1.42              | 0.5%                                                    | 0.2%                                                   |
| ET5_79m   | 1.39      | 1.38             | 1.39            | 1.39              | 1.5%                                                    | 0.5%                                                   |
| ET5_80m   | 1.39      | 1.38             | 1.39            | 1.39              | 1.5%                                                    | 0.5%                                                   |
| ET5_90m   | 1.38      | 1.37             | 1.38            | 1.38              | 1.4%                                                    | 0.5%                                                   |
| ET5_100m  | 1.37      | 1.37             | 1.37            | 1.38              | 1.2%                                                    | 0.4%                                                   |
| ET5_110m  | 1.37      | 1.36             | 1.37            | 1.37              | 1.1%                                                    | 0.4%                                                   |
| ET5_120m  | 1.37      | 1.36             | 1.37            | 1.37              | 1.0%                                                    | 0.3%                                                   |
| ET5_130m  | 1.36      | 1.36             | 1.36            | 1.37              | 0.9%                                                    | 0.3%                                                   |
| ET5_140m  | 1.36      | 1.35             | 1.36            | 1.36              | 0.9%                                                    | 0.3%                                                   |
| ET5_150m  | 1.36      | 1.35             | 1.36            | 1.36              | 0.8%                                                    | 0.3%                                                   |
| ET5_160m  | 1.36      | 1.35             | 1.36            | 1.36              | 0.7%                                                    | 0.2%                                                   |
| ET5_170m  | 1.35      | 1.35             | 1.35            | 1.36              | 0.7%                                                    | 0.2%                                                   |
| ET5_180m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.6%                                                    | 0.2%                                                   |
| ET5_190m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.6%                                                    | 0.2%                                                   |
| ET5_200m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.6%                                                    | 0.2%                                                   |
| ET6_60.4m | 1.36      | 1.36             | 1.37            | 1.37              | 1.5%                                                    | 0.4%                                                   |
| ET6_70m   | 1.36      | 1.36             | 1.36            | 1.37              | 1.2%                                                    | 0.3%                                                   |
| ET6_80m   | 1.36      | 1.35             | 1.36            | 1.36              | 1.1%                                                    | 0.3%                                                   |
| ET6_90m   | 1.35      | 1.35             | 1.36            | 1.36              | 0.9%                                                    | 0.3%                                                   |
| ET6_100m  | 1.35      | 1.35             | 1.36            | 1.36              | 0.8%                                                    | 0.2%                                                   |
| ET6_110m  | 1.35      | 1.35             | 1.35            | 1.36              | 0.7%                                                    | 0.2%                                                   |
| ET6_120m  | 1.35      | 1.35             | 1.35            | 1.36              | 0.6%                                                    | 0.2%                                                   |
| ET6_130m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.6%                                                    | 0.2%                                                   |
| ET6_140m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.5%                                                    | 0.1%                                                   |
| ET6_150m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.5%                                                    | 0.1%                                                   |
| ET6_160m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.4%                                                    | 0.1%                                                   |
| ET6_170m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.4%                                                    | 0.1%                                                   |
| ET6_180m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.3%                                                    | 0.1%                                                   |
| ET6_190m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.3%                                                    | 0.1%                                                   |
| ET6_200m  | 1.35      | 1.35             | 1.35            | 1.35              | 0.3%                                                    | 0.1%                                                   |

**Table A-5: Total Annual Mean Nitrogen Deposition Rates (kg N/ha/yr)**

| Receptor   | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET1_97.98m | 16.10     | 14.50            | 14.87           | 15.11             | 6.1%                                                    | 2.4%                                                   |
| ET1_100m   | 16.07     | 14.48            | 14.84           | 15.08             | 6.0%                                                    | 2.3%                                                   |
| ET1_110m   | 15.92     | 14.36            | 14.70           | 14.92             | 5.5%                                                    | 2.2%                                                   |
| ET1_120m   | 15.79     | 14.27            | 14.58           | 14.78             | 5.1%                                                    | 2.0%                                                   |
| ET1_130m   | 15.67     | 14.18            | 14.47           | 14.66             | 4.8%                                                    | 1.9%                                                   |
| ET1_140m   | 15.57     | 14.10            | 14.37           | 14.55             | 4.4%                                                    | 1.7%                                                   |
| ET1_150m   | 15.48     | 14.03            | 14.29           | 14.45             | 4.1%                                                    | 1.6%                                                   |
| ET1_160m   | 15.39     | 13.97            | 14.21           | 14.36             | 3.9%                                                    | 1.5%                                                   |
| ET1_170m   | 15.32     | 13.91            | 14.13           | 14.28             | 3.6%                                                    | 1.4%                                                   |
| ET1_180m   | 15.25     | 13.86            | 14.07           | 14.20             | 3.4%                                                    | 1.3%                                                   |
| ET1_190m   | 15.18     | 13.82            | 14.01           | 14.14             | 3.2%                                                    | 1.2%                                                   |
| ET1_200m   | 15.13     | 13.77            | 13.96           | 14.07             | 3.0%                                                    | 1.2%                                                   |
| ET2_0.04m  | 18.99     | 16.34            | 16.52           | 16.57             | 2.3%                                                    | 0.5%                                                   |
| ET2_10m    | 16.19     | 14.48            | 14.55           | 14.57             | 0.9%                                                    | 0.2%                                                   |
| ET2_20m    | 15.56     | 14.06            | 14.11           | 14.13             | 0.6%                                                    | 0.2%                                                   |
| ET2_30m    | 15.28     | 13.87            | 13.91           | 13.92             | 0.5%                                                    | 0.1%                                                   |
| ET2_40m    | 15.11     | 13.76            | 13.79           | 13.80             | 0.4%                                                    | 0.1%                                                   |
| ET2_50m    | 15.00     | 13.69            | 13.72           | 13.73             | 0.4%                                                    | 0.1%                                                   |
| ET2_60m    | 14.92     | 13.64            | 13.66           | 13.67             | 0.3%                                                    | 0.1%                                                   |
| ET2_70m    | 14.87     | 13.60            | 13.62           | 13.63             | 0.3%                                                    | 0.1%                                                   |
| ET2_80m    | 14.82     | 13.57            | 13.59           | 13.60             | 0.3%                                                    | 0.1%                                                   |
| ET2_90m    | 14.78     | 13.55            | 13.56           | 13.57             | 0.2%                                                    | 0.1%                                                   |
| ET2_100m   | 14.75     | 13.52            | 13.54           | 13.55             | 0.2%                                                    | 0.1%                                                   |
| ET2_110m   | 14.73     | 13.51            | 13.52           | 13.53             | 0.2%                                                    | 0.1%                                                   |
| ET2_120m   | 14.71     | 13.49            | 13.51           | 13.51             | 0.2%                                                    | 0.1%                                                   |
| ET2_130m   | 14.69     | 13.48            | 13.50           | 13.50             | 0.2%                                                    | 0.0%                                                   |
| ET2_140m   | 14.67     | 13.47            | 13.49           | 13.49             | 0.2%                                                    | 0.0%                                                   |
| ET2_150m   | 14.66     | 13.46            | 13.48           | 13.48             | 0.2%                                                    | 0.0%                                                   |
| ET2_160m   | 14.65     | 13.45            | 13.47           | 13.47             | 0.2%                                                    | 0.1%                                                   |
| ET2_170m   | 14.63     | 13.45            | 13.46           | 13.46             | 0.2%                                                    | 0.0%                                                   |
| ET2_180m   | 14.63     | 13.44            | 13.45           | 13.46             | 0.2%                                                    | 0.0%                                                   |
| ET2_190m   | 14.62     | 13.43            | 13.45           | 13.45             | 0.1%                                                    | 0.0%                                                   |
| ET2_200m   | 14.61     | 13.43            | 13.44           | 13.44             | 0.1%                                                    | 0.0%                                                   |
| ET3_0.03m  | 20.15     | 17.12            | 17.34           | 17.40             | 2.8%                                                    | 0.6%                                                   |
| ET3_10m    | 16.86     | 14.92            | 15.02           | 15.05             | 1.3%                                                    | 0.3%                                                   |
| ET3_20m    | 16.03     | 14.37            | 14.44           | 14.46             | 0.9%                                                    | 0.2%                                                   |
| ET3_30m    | 15.64     | 14.11            | 14.16           | 14.18             | 0.7%                                                    | 0.2%                                                   |

| Receptor    | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET3_40m     | 15.41     | 13.96            | 14.01           | 14.02             | 0.6%                                                    | 0.1%                                                   |
| ET3_50m     | 15.26     | 13.86            | 13.90           | 13.92             | 0.5%                                                    | 0.1%                                                   |
| ET3_60m     | 15.16     | 13.80            | 13.83           | 13.84             | 0.5%                                                    | 0.1%                                                   |
| ET3_70m     | 15.09     | 13.75            | 13.78           | 13.79             | 0.4%                                                    | 0.1%                                                   |
| ET3_80m     | 15.03     | 13.71            | 13.74           | 13.75             | 0.4%                                                    | 0.1%                                                   |
| ET3_90m     | 14.99     | 13.68            | 13.71           | 13.72             | 0.4%                                                    | 0.1%                                                   |
| ET3_100m    | 14.96     | 13.66            | 13.70           | 13.70             | 0.4%                                                    | 0.1%                                                   |
| ET3_110m    | 14.94     | 13.65            | 13.68           | 13.69             | 0.4%                                                    | 0.1%                                                   |
| ET3_120m    | 14.92     | 13.64            | 13.67           | 13.68             | 0.4%                                                    | 0.1%                                                   |
| ET3_130m    | 14.92     | 13.64            | 13.67           | 13.68             | 0.4%                                                    | 0.1%                                                   |
| ET3_140m    | 14.92     | 13.64            | 13.68           | 13.68             | 0.4%                                                    | 0.1%                                                   |
| ET3_150m    | 14.94     | 13.65            | 13.69           | 13.70             | 0.4%                                                    | 0.1%                                                   |
| ET3_160m    | 14.96     | 13.68            | 13.71           | 13.72             | 0.4%                                                    | 0.0%                                                   |
| ET3_170m    | 15.01     | 13.71            | 13.75           | 13.76             | 0.5%                                                    | 0.0%                                                   |
| ET3_180m    | 15.09     | 13.76            | 13.81           | 13.82             | 0.5%                                                    | 0.0%                                                   |
| ET3_190m    | 15.24     | 13.87            | 13.93           | 13.93             | 0.6%                                                    | 0.0%                                                   |
| ET3_200m    | 15.57     | 14.10            | 14.19           | 14.19             | 0.9%                                                    | 0.0%                                                   |
| ET7_162.03m | 14.87     | 13.62            | 13.64           | 13.65             | 0.3%                                                    | 0.1%                                                   |
| ET7_170m    | 14.85     | 13.61            | 13.62           | 13.63             | 0.3%                                                    | 0.1%                                                   |
| ET7_180m    | 14.82     | 13.59            | 13.60           | 13.61             | 0.2%                                                    | 0.1%                                                   |
| ET7_190m    | 14.80     | 13.57            | 13.59           | 13.59             | 0.2%                                                    | 0.1%                                                   |
| ET7_200m    | 14.77     | 13.56            | 13.57           | 13.58             | 0.2%                                                    | 0.1%                                                   |
| ET4_0.5m    | 32.20     | 28.62            | 29.56           | 30.08             | 14.6%                                                   | 5.2%                                                   |
| ET4_10m     | 27.84     | 25.70            | 26.09           | 26.30             | 6.0%                                                    | 2.1%                                                   |
| ET4_20m     | 26.72     | 24.95            | 25.20           | 25.34             | 3.9%                                                    | 1.4%                                                   |
| ET4_30m     | 26.20     | 24.61            | 24.79           | 24.89             | 2.8%                                                    | 1.0%                                                   |
| ET4_40m     | 25.90     | 24.41            | 24.55           | 24.64             | 2.3%                                                    | 0.8%                                                   |
| ET4_50m     | 25.70     | 24.27            | 24.39           | 24.46             | 1.9%                                                    | 0.7%                                                   |
| ET4_60m     | 25.56     | 24.18            | 24.28           | 24.34             | 1.6%                                                    | 0.6%                                                   |
| ET4_70m     | 25.45     | 24.11            | 24.20           | 24.25             | 1.4%                                                    | 0.5%                                                   |
| ET4_80m     | 25.36     | 24.05            | 24.13           | 24.17             | 1.2%                                                    | 0.4%                                                   |
| ET4_90m     | 25.30     | 24.01            | 24.08           | 24.11             | 1.1%                                                    | 0.4%                                                   |
| ET4_100m    | 25.24     | 23.97            | 24.03           | 24.06             | 0.9%                                                    | 0.3%                                                   |
| ET4_110m    | 25.19     | 23.94            | 23.99           | 24.02             | 0.8%                                                    | 0.3%                                                   |
| ET4_120m    | 25.15     | 23.91            | 23.96           | 23.99             | 0.8%                                                    | 0.3%                                                   |
| ET4_130m    | 25.12     | 23.89            | 23.93           | 23.96             | 0.7%                                                    | 0.3%                                                   |
| ET4_140m    | 25.09     | 23.87            | 23.91           | 23.93             | 0.6%                                                    | 0.2%                                                   |
| ET4_150m    | 25.06     | 23.86            | 23.89           | 23.91             | 0.6%                                                    | 0.2%                                                   |

| Receptor  | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-----------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET4_160m  | 25.04     | 23.84            | 23.87           | 23.89             | 0.5%                                                    | 0.2%                                                   |
| ET4_170m  | 25.02     | 23.83            | 23.86           | 23.87             | 0.5%                                                    | 0.2%                                                   |
| ET4_180m  | 25.01     | 23.81            | 23.84           | 23.86             | 0.5%                                                    | 0.2%                                                   |
| ET4_190m  | 24.99     | 23.80            | 23.83           | 23.84             | 0.4%                                                    | 0.1%                                                   |
| ET4_200m  | 24.98     | 23.80            | 23.82           | 23.83             | 0.4%                                                    | 0.1%                                                   |
| ET5_79m   | 24.90     | 23.59            | 23.67           | 23.71             | 1.2%                                                    | 0.4%                                                   |
| ET5_80m   | 24.89     | 23.58            | 23.66           | 23.70             | 1.2%                                                    | 0.4%                                                   |
| ET5_90m   | 24.83     | 23.54            | 23.61           | 23.65             | 1.1%                                                    | 0.4%                                                   |
| ET5_100m  | 24.78     | 23.51            | 23.57           | 23.60             | 1.0%                                                    | 0.3%                                                   |
| ET5_110m  | 24.73     | 23.47            | 23.54           | 23.56             | 0.9%                                                    | 0.3%                                                   |
| ET5_120m  | 24.69     | 23.45            | 23.51           | 23.53             | 0.8%                                                    | 0.3%                                                   |
| ET5_130m  | 24.66     | 23.43            | 23.48           | 23.51             | 0.8%                                                    | 0.3%                                                   |
| ET5_140m  | 24.64     | 23.41            | 23.46           | 23.48             | 0.7%                                                    | 0.2%                                                   |
| ET5_150m  | 24.61     | 23.40            | 23.44           | 23.46             | 0.6%                                                    | 0.2%                                                   |
| ET5_160m  | 24.59     | 23.38            | 23.42           | 23.44             | 0.6%                                                    | 0.2%                                                   |
| ET5_170m  | 24.57     | 23.37            | 23.41           | 23.43             | 0.6%                                                    | 0.2%                                                   |
| ET5_180m  | 24.55     | 23.36            | 23.40           | 23.41             | 0.5%                                                    | 0.2%                                                   |
| ET5_190m  | 24.54     | 23.35            | 23.38           | 23.40             | 0.5%                                                    | 0.2%                                                   |
| ET5_200m  | 24.53     | 23.34            | 23.37           | 23.39             | 0.5%                                                    | 0.2%                                                   |
| ET6_60.4m | 23.91     | 22.72            | 22.81           | 22.84             | 1.2%                                                    | 0.3%                                                   |
| ET6_70m   | 23.88     | 22.71            | 22.78           | 22.81             | 1.0%                                                    | 0.3%                                                   |
| ET6_80m   | 23.86     | 22.69            | 22.75           | 22.78             | 0.9%                                                    | 0.3%                                                   |
| ET6_90m   | 23.84     | 22.68            | 22.73           | 22.75             | 0.7%                                                    | 0.2%                                                   |
| ET6_100m  | 23.82     | 22.67            | 22.71           | 22.73             | 0.6%                                                    | 0.2%                                                   |
| ET6_110m  | 23.81     | 22.66            | 22.70           | 22.72             | 0.6%                                                    | 0.2%                                                   |
| ET6_120m  | 23.80     | 22.65            | 22.69           | 22.70             | 0.5%                                                    | 0.1%                                                   |
| ET6_130m  | 23.79     | 22.65            | 22.68           | 22.69             | 0.5%                                                    | 0.1%                                                   |
| ET6_140m  | 23.79     | 22.64            | 22.67           | 22.68             | 0.4%                                                    | 0.1%                                                   |
| ET6_150m  | 23.78     | 22.64            | 22.67           | 22.68             | 0.4%                                                    | 0.1%                                                   |
| ET6_160m  | 23.77     | 22.63            | 22.66           | 22.67             | 0.4%                                                    | 0.1%                                                   |
| ET6_170m  | 23.77     | 22.63            | 22.66           | 22.66             | 0.3%                                                    | 0.1%                                                   |
| ET6_180m  | 23.76     | 22.63            | 22.65           | 22.66             | 0.3%                                                    | 0.1%                                                   |
| ET6_190m  | 23.76     | 22.63            | 22.64           | 22.65             | 0.3%                                                    | 0.1%                                                   |
| ET6_200m  | 23.76     | 22.62            | 22.64           | 22.65             | 0.2%                                                    | 0.1%                                                   |

**Table A-6: Total Annual Mean Nitrogen Acid Deposition Rates (keq/ha/yr)**

| Receptor   | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET1_97.98m | 1.12      | 1.03             | 1.06            | 1.08              | 0.9%                                                    | 0.4%                                                   |
| ET1_100m   | 1.12      | 1.03             | 1.06            | 1.07              | 0.9%                                                    | 0.3%                                                   |
| ET1_110m   | 1.11      | 1.02             | 1.05            | 1.06              | 0.8%                                                    | 0.3%                                                   |
| ET1_120m   | 1.11      | 1.02             | 1.04            | 1.05              | 0.8%                                                    | 0.3%                                                   |
| ET1_130m   | 1.10      | 1.01             | 1.03            | 1.04              | 0.7%                                                    | 0.3%                                                   |
| ET1_140m   | 1.09      | 1.01             | 1.02            | 1.04              | 0.7%                                                    | 0.3%                                                   |
| ET1_150m   | 1.09      | 1.00             | 1.02            | 1.03              | 0.6%                                                    | 0.2%                                                   |
| ET1_160m   | 1.08      | 1.00             | 1.01            | 1.02              | 0.6%                                                    | 0.2%                                                   |
| ET1_170m   | 1.08      | 0.99             | 1.01            | 1.02              | 0.5%                                                    | 0.2%                                                   |
| ET1_180m   | 1.08      | 0.99             | 1.00            | 1.01              | 0.5%                                                    | 0.2%                                                   |
| ET1_190m   | 1.07      | 0.99             | 1.00            | 1.01              | 0.5%                                                    | 0.2%                                                   |
| ET1_200m   | 1.07      | 0.98             | 1.00            | 1.00              | 0.4%                                                    | 0.2%                                                   |
| ET2_0.04m  | 1.30      | 1.16             | 1.18            | 1.18              | 0.3%                                                    | 0.1%                                                   |
| ET2_10m    | 1.13      | 1.03             | 1.04            | 1.04              | 0.1%                                                    | 0.0%                                                   |
| ET2_20m    | 1.10      | 1.00             | 1.01            | 1.01              | 0.1%                                                    | 0.0%                                                   |
| ET2_30m    | 1.08      | 0.99             | 0.99            | 0.99              | 0.1%                                                    | 0.0%                                                   |
| ET2_40m    | 1.07      | 0.98             | 0.98            | 0.99              | 0.1%                                                    | 0.0%                                                   |
| ET2_50m    | 1.06      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET2_60m    | 1.06      | 0.97             | 0.98            | 0.98              | 0.0%                                                    | 0.0%                                                   |
| ET2_70m    | 1.06      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_80m    | 1.05      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_90m    | 1.05      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_100m   | 1.05      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_110m   | 1.05      | 0.96             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_120m   | 1.05      | 0.96             | 0.96            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET2_130m   | 1.05      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_140m   | 1.05      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_150m   | 1.04      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_160m   | 1.04      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_170m   | 1.04      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_180m   | 1.04      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_190m   | 1.04      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET2_200m   | 1.04      | 0.96             | 0.96            | 0.96              | 0.0%                                                    | 0.0%                                                   |
| ET3_0.03m  | 1.37      | 1.22             | 1.23            | 1.24              | 0.4%                                                    | 0.1%                                                   |
| ET3_10m    | 1.17      | 1.06             | 1.07            | 1.07              | 0.2%                                                    | 0.0%                                                   |
| ET3_20m    | 1.13      | 1.02             | 1.03            | 1.03              | 0.1%                                                    | 0.0%                                                   |

| Receptor    | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-------------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET3_30m     | 1.10      | 1.01             | 1.01            | 1.01              | 0.1%                                                    | 0.0%                                                   |
| ET3_40m     | 1.09      | 1.00             | 1.00            | 1.00              | 0.1%                                                    | 0.0%                                                   |
| ET3_50m     | 1.08      | 0.99             | 0.99            | 0.99              | 0.1%                                                    | 0.0%                                                   |
| ET3_60m     | 1.07      | 0.98             | 0.99            | 0.99              | 0.1%                                                    | 0.0%                                                   |
| ET3_70m     | 1.07      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_80m     | 1.07      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_90m     | 1.06      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_100m    | 1.06      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_110m    | 1.06      | 0.97             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_120m    | 1.06      | 0.97             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_130m    | 1.06      | 0.97             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_140m    | 1.06      | 0.97             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_150m    | 1.06      | 0.97             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_160m    | 1.06      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_170m    | 1.07      | 0.98             | 0.98            | 0.98              | 0.1%                                                    | 0.0%                                                   |
| ET3_180m    | 1.07      | 0.98             | 0.99            | 0.99              | 0.1%                                                    | 0.0%                                                   |
| ET3_190m    | 1.08      | 0.99             | 0.99            | 0.99              | 0.1%                                                    | 0.0%                                                   |
| ET3_200m    | 1.10      | 1.01             | 1.01            | 1.01              | 0.1%                                                    | 0.0%                                                   |
| ET7_162.03m | 1.06      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET7_170m    | 1.06      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET7_180m    | 1.05      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET7_190m    | 1.05      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET7_200m    | 1.05      | 0.97             | 0.97            | 0.97              | 0.0%                                                    | 0.0%                                                   |
| ET4_0.5m    | 2.19      | 2.04             | 2.10            | 2.14              | 0.9%                                                    | 0.3%                                                   |
| ET4_10m     | 1.94      | 1.83             | 1.86            | 1.87              | 0.4%                                                    | 0.1%                                                   |
| ET4_20m     | 1.88      | 1.78             | 1.80            | 1.81              | 0.2%                                                    | 0.1%                                                   |
| ET4_30m     | 1.85      | 1.76             | 1.77            | 1.78              | 0.2%                                                    | 0.1%                                                   |
| ET4_40m     | 1.83      | 1.74             | 1.75            | 1.76              | 0.1%                                                    | 0.1%                                                   |
| ET4_50m     | 1.82      | 1.73             | 1.74            | 1.75              | 0.1%                                                    | 0.0%                                                   |
| ET4_60m     | 1.81      | 1.73             | 1.73            | 1.74              | 0.1%                                                    | 0.0%                                                   |
| ET4_70m     | 1.81      | 1.72             | 1.73            | 1.73              | 0.1%                                                    | 0.0%                                                   |
| ET4_80m     | 1.80      | 1.72             | 1.72            | 1.73              | 0.1%                                                    | 0.0%                                                   |
| ET4_90m     | 1.80      | 1.71             | 1.72            | 1.72              | 0.1%                                                    | 0.0%                                                   |
| ET4_100m    | 1.80      | 1.71             | 1.72            | 1.72              | 0.1%                                                    | 0.0%                                                   |
| ET4_110m    | 1.79      | 1.71             | 1.71            | 1.72              | 0.1%                                                    | 0.0%                                                   |
| ET4_120m    | 1.79      | 1.71             | 1.71            | 1.71              | 0.0%                                                    | 0.0%                                                   |
| ET4_130m    | 1.79      | 1.71             | 1.71            | 1.71              | 0.0%                                                    | 0.0%                                                   |
| ET4_140m    | 1.79      | 1.70             | 1.71            | 1.71              | 0.0%                                                    | 0.0%                                                   |

| Receptor  | 2024 Base | 2043 Future Base | 2043 Do Minimum | 2043 Do Something | Change Future Base – Do Something as % of Critical Load | Change Do Minimum – Do Something as % of Critical Load |
|-----------|-----------|------------------|-----------------|-------------------|---------------------------------------------------------|--------------------------------------------------------|
| ET4_150m  | 1.79      | 1.70             | 1.71            | 1.71              | 0.0%                                                    | 0.0%                                                   |
| ET4_160m  | 1.79      | 1.70             | 1.70            | 1.71              | 0.0%                                                    | 0.0%                                                   |
| ET4_170m  | 1.78      | 1.70             | 1.70            | 1.70              | 0.0%                                                    | 0.0%                                                   |
| ET4_180m  | 1.78      | 1.70             | 1.70            | 1.70              | 0.0%                                                    | 0.0%                                                   |
| ET4_190m  | 1.78      | 1.70             | 1.70            | 1.70              | 0.0%                                                    | 0.0%                                                   |
| ET4_200m  | 1.78      | 1.70             | 1.70            | 1.70              | 0.0%                                                    | 0.0%                                                   |
| ET5_79m   | 1.77      | 1.68             | 1.69            | 1.69              | 0.1%                                                    | 0.0%                                                   |
| ET5_80m   | 1.77      | 1.68             | 1.69            | 1.69              | 0.1%                                                    | 0.0%                                                   |
| ET5_90m   | 1.77      | 1.68             | 1.69            | 1.69              | 0.1%                                                    | 0.0%                                                   |
| ET5_100m  | 1.76      | 1.68             | 1.68            | 1.69              | 0.1%                                                    | 0.0%                                                   |
| ET5_110m  | 1.76      | 1.68             | 1.68            | 1.68              | 0.1%                                                    | 0.0%                                                   |
| ET5_120m  | 1.76      | 1.67             | 1.68            | 1.68              | 0.1%                                                    | 0.0%                                                   |
| ET5_130m  | 1.76      | 1.67             | 1.68            | 1.68              | 0.0%                                                    | 0.0%                                                   |
| ET5_140m  | 1.76      | 1.67             | 1.68            | 1.68              | 0.0%                                                    | 0.0%                                                   |
| ET5_150m  | 1.75      | 1.67             | 1.67            | 1.68              | 0.0%                                                    | 0.0%                                                   |
| ET5_160m  | 1.75      | 1.67             | 1.67            | 1.67              | 0.0%                                                    | 0.0%                                                   |
| ET5_170m  | 1.75      | 1.67             | 1.67            | 1.67              | 0.0%                                                    | 0.0%                                                   |
| ET5_180m  | 1.75      | 1.67             | 1.67            | 1.67              | 0.0%                                                    | 0.0%                                                   |
| ET5_190m  | 1.75      | 1.67             | 1.67            | 1.67              | 0.0%                                                    | 0.0%                                                   |
| ET5_200m  | 1.75      | 1.67             | 1.67            | 1.67              | 0.0%                                                    | 0.0%                                                   |
| ET6_60.4m | 1.70      | 1.62             | 1.63            | 1.63              | 0.1%                                                    | 0.0%                                                   |
| ET6_70m   | 1.70      | 1.62             | 1.63            | 1.63              | 0.1%                                                    | 0.0%                                                   |
| ET6_80m   | 1.70      | 1.62             | 1.62            | 1.63              | 0.1%                                                    | 0.0%                                                   |
| ET6_90m   | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_100m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_110m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_120m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_130m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_140m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_150m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_160m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_170m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_180m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_190m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |
| ET6_200m  | 1.70      | 1.62             | 1.62            | 1.62              | 0.0%                                                    | 0.0%                                                   |



## LUC Appropriate Assessment of air quality impacts

**F.3** This appendix sets out the Appropriate Assessment of Air Quality (AQ) resulting from the Cotswold Local Plan on North Meadow and Clattinger SAC, Rodborough Common SAC and Cotswold Beechwoods SAC. This assessment draws on air pollutant modelling provided in Cotswold District Council SAC Air Quality Modelling (AECOM, 2026).

### Methodology

**F.4** In order to assess the potential impact of the AQ exceedances at these Habitats Sites, the method includes the following:

- Desktop assessment of the SAC habitats present in the affected areas, condition of habitats and vulnerability/sensitivity to the AQ pollutants;
- Calculation of the approximate area of the SAC which is potentially impacted by the exceedances.

**F.5** This assessment is set out with reference to Natural England's standing advice for the assessment of air pollution and development [\[See reference 82\]](#), as follows:

- Check if emissions will reach a protected site – set out in AECOM's report and referenced in this section.
- Check relevant 'critical loads' and 'critical levels' – set out in AECOM's report and referenced in this section.
- Check if agricultural developments can use an emissions reduction approach - not relevant in the case of the Local Plan.
- Consider the proposal in combination with other projects – set out in AECOM's report and referenced in this section.
- Complete a detailed air quality assessment – set out in this section. This stage includes: checking protected site details; considering whether total concentration of pollutants (predicted environmental contribution) will exceed critical loads, consideration of trends in background air quality, considering whether there will be an adverse effect alone or in combination, and what mitigation may be required.

**F.6** A desktop assessment was conducted to determine whether sensitive qualifying features may exist within 200m of a road which has been identified to exceed the

screening criteria. Whilst National Vegetation Classification (NVC) survey data is not available for these SACs, a broad assessment of the qualifying habitats within each SAC was undertaken using the following data sources:

- Aerial photography (Google Earth);
- Natural England designated sites information; and
- Defra's MAGIC mapping.

**F.7** The following Conservation Objective is standard for all SACs:

“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.”

**F.8** To provide additional information about each individual SAC, Site Improvement Plans (SIP) and other supplementary advice has been reviewed in the context of understanding whether air quality poses a potential threat to each Habitats Site meeting its Conservation Objectives. A review of the site condition has also been undertaken, based on available information from Natural England on the underlying SSSI Units, to better understand whether the site's ability to meet its Conservation Objectives has already been impacted by poor air quality.

## Summary of relevant air quality data

**F.9** The data provided by AECOM for nitrogen deposition and ammonia (see Table A-3 and A-4 in the Air Quality Modelling Report) is summarised below. There were no exceedences of the screening thresholds for nitrogen oxides or acid deposition. For each pollutant, data the furthest distance from the centre of the road ('Dist.') at which

there is an exceedance of AQ screening criteria (change in 1% of the critical load/level) is shown, and what the change in pollution is, as a % of the pollutants' critical load/level ('% CL').

**F.10** Critical Loads (CL) are defined by United Nations Economic Commission for Europe (UNECE) [See reference 83] as “a quantitative estimate of exposure ... below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge”. The critical loads data on which exceedance calculations are based are derived from empirical or steady-state mass balance methods, which are used to define critical loads for the long term. Exceedance of critical loads is an indication that an ecosystem is at risk from potential harmful effects in the long-term. Therefore, exceedance is not a quantitative estimate of damage to the environment; it does not necessarily mean that harmful or adverse effects have already occurred or may be observed, but that there is a risk of damage in the long-term.

### North Meadow and Clattinger Farm SAC

**F.11** A419 (transect ET1):

- Nitrogen deposition: screening threshold (1% critical load) exceeded to 200m due to Local Plan alone, and 200m due to Local Plan in combination. Total concentration exceeds the critical load (10) at all points on the transect (100-200m from road).
- Ammonia: screening threshold not exceeded due to Local Plan alone, and in combination. Total concentration does not exceed the critical load (3) at any point on the transect (100-200m from road).

**F.12** The assessment therefore considers impact of nitrogen deposition only, as ammonia levels remain below critical levels with the Local Plan in combination with other plans/projects. The nitrogen deposition exceedance of the screening criteria is due to the Local Plan alone (and in combination).

### Rodborough Common SAC

**F.13** Spine Road west (transect ET2):

- Nitrogen deposition: screening threshold not exceeded due to Local Plan alone, and only at roadside (0.04m) due to Local Plan in combination. Total concentration exceeds the critical load (10) at roadside.

- Ammonia: screening threshold is not exceeded due to the Local Plan alone, but is exceeded to 20m due to the Local Plan in combination. Total concentration exceeds the critical load (1) at all of these points on the transect (0-20m from road).

**F.14 Spine Road east (transect ET3):**

- Nitrogen deposition: screening threshold is not exceeded due to the Local Plan alone, but is exceeded to roadside (0.03m) due to Local Plan in combination. Total concentration exceeds the critical load (10) at roadside.
- Ammonia: screening threshold exceeded at roadside (0.03m) due to the Local Plan alone, and to 50m due to the Local Plan in combination. Total concentration exceeds the critical load (1) at all of these points on the transect.

**F.15 A46 / Selsey Road (transect ET7):**

- Nitrogen deposition: screening thresholds are not exceeded due to the Local Plan alone or in combination.
- Ammonia: screening thresholds are not exceeded due to the Local Plan alone or in combination.

**F.16** The assessment therefore considers the two transects on the Rodborough Common Spine Road, but excludes the A46/Selsey Road transect. With the exception of one roadside transect point, these exceedances of the screening criteria are due to the Local Plan in combination.

## **Cotswold Beechwoods SAC**

**F.17 B4070 at Buckholt (transect ET4):**

- Nitrogen deposition: screening thresholds are exceeded to 30m due to the Local Plan alone, and to 90m due to the Local Plan in combination. Total concentration exceeds the critical load (10) at all of these points on the transect.
- Ammonia: screening thresholds are exceeded to 40m due to the Local Plan alone, and to 110m due to the Local Plan in combination. Total concentration exceeds the critical load (1) at all of these points on the transect.

**F.18 B4070 at Birdlip (transect ET5):**

- Nitrogen deposition: screening thresholds are not exceeded due to the Local Plan alone, but are exceeded to 100m due to the Local Plan in combination. Total concentration exceeds the critical load (10) at all of these points on the transect (80-100m from road).

- Ammonia: screening thresholds are not exceeded due to the Local Plan alone, but are exceeded to 120m due to the Local Plan in combination. Total concentration exceeds the critical load (1) at all of these points on the transect (80-120m from road).

**F.19** B4070 at Sheepscombe (transect ET6):

- Nitrogen deposition: screening thresholds are not exceeded due to the Local Plan alone, but are exceeded to 70m due to the Local Plan in combination. Total concentration exceeds the critical load (10) at all of these points on the transect (60-70m from road).
- Ammonia: screening thresholds are not exceeded due to the Local Plan alone, but are exceeded to 80m due to the Local Plan in combination. Total concentration exceeds the critical load (1) at all of these points on the transect (60-80m from road).

**F.20** The assessment therefore considers the impacts at all three transects. The B4070 at Buckholt exceeds the screening criteria due to the Local Plan alone, but the other two are due to the Local Plan in combination only.

## Assessment of Habitats Sites

### North Meadow and Clattinger Farm SAC

**F.21** Qualifying features of the SAC:

- 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)

**F.22** SIP and supplementary advice for conservation objectives:

- Natural England's SIP (dated 21/11/2014) does not include air pollution as a pressure or threat to the site.

**F.23** Site Condition Assessment:

- The potential for AQ exceedance of thresholds occurs within SSSI Unit 1, which lies within 200m of the A419. This unit is in 'unfavourable- declining' condition (assessed in 2025) due to hydrological impacts (flooding) and recreational pressures (trampling, nutrient enrichment and erosion), which impacts the vegetation community. Therefore, indicating no existing issues in relation to air pollution.

**F.24** Habitat potentially impacted:

- The qualifying habitats for North Meadow and Clattinger Farm SAC is lowland hay meadows, which appears to be located within the part of the SAC which lies within the exceedance zone.
- The NVC community present within the SAC is MG4 *Alopecurus pratensis* – *Sanguisorba officinalis* characterised by species-rich swards containing frequent red fescue *Festuca rubra*, crested dog's-tail *Cynosurus cristatus*, meadow foxtail *Alopecurus pratensis*, great burnet *Sanguisorba officinalis*, meadowsweet *Filipendula ulmaria* and meadow buttercup *Ranunculus acris*. The site also supports over 90% of the surviving UK population of snakes-head fritillary *Fritillaria meleagris* plant which is Nationally Scarce.
- Although the SIP does not indicate air pollution as a particular threat to this SAC, the conservation status assessment for lowland hay meadows by JNCC (2018) ranks 'mixed air source pollution, air-borne pollutants (J03) as a 'high' pressure and threat, due to the nutrient nitrogen critical load for the habitat being exceeded across over 25% of the habitat area at a national level in the UK.

**F.25** Area of SAC affected:

- The screening criteria for nitrogen deposition are exceeded to 200m from the road and the total concentration of nitrogen deposition is exceeded at all points on the transects. The SAC is 97.98m from the road, so the affected area is 97.98m-200m from the road.
- This area includes c.1.9ha, or c.1.8% of the total SAC area.
- Based on the desk study, this part of the SAC is likely to support the qualifying habitat (lowland hay meadows).

**F.26** Ability to meet Conservation Objectives:

- Source attribute data from APIS demonstrates that the background trend in local contribution of vehicle emissions to air pollution between 2012-2018 (the years for which the data is available) has fallen, whilst local contributions of other sources such as agriculture, livestock and fertiliser application have risen. The nitrogen deposition expected as a result of the plan, 15.1 kgN/ha/yr, exceeds the CL of 10-20 kgN/ha/yr. However, the levels of NH<sub>3</sub> concentration expected as a result of the plan, 2.0 µg/m<sup>3</sup> do not exceed the CL of 3 µg/m<sup>3</sup> for this habitat (due to absence of bryophytes/ lichens as part of the qualifying habitat composition, as per APIS CL data).
- The potential impacts associated with nitrogen deposition on neutral grasslands are as follows [See reference 84]:

- “Increases in proportion of productive grasses at expense of fine leaved grasses.
  - Reduces species richness, especially among forbs.
  - Possible reductions in productivity.
  - Changes in species composition.
  - Loss of rare or endangered species.
  - Loss of annuals and forbs will have implications for sustainability, due to the short lived nature of the seed bank and the isolation of many of these small areas of grassland.
  - Loss of floral diversity, especially forbs/ herbs can reduce nutritional quality, nutrient levels, for grazing animals and increased prevalence of more common species such as perennial ryegrass *Lolium perenne*, Timothy grass *Phleum pratense*, cocks-foot *Dactylis glomerata*, broad-leaved dock *Rumex obtusifolius*.”
- This has potential to influence the extent, distribution, structure and function of the lowland hay meadow grassland and therefore, the ability for the site to meet its Conservation Objectives.

Conclusion:

Adverse effects on the integrity of North Meadow and Clattinger Farm SAC, due to nitrogen deposition, cannot be ruled out.

## Rodborough Common SAC

### F.27 Qualifying features of the SAC:

- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites)

### F.28 SIP and supplementary advice for conservation objectives:

- Natural England’s SIP (dated 06/05/2015) identifies that the site is at risk of ‘air pollution impacts as a result of atmospheric nitrogen deposition’, which could affect the calcareous grassland. The SIP sets out a measure for further investigation of the potential impacts of this. This indicates that nitrogen deposition is the key issue for NE at Rodborough Common.

- Additionally, supplementary advice from NE sets out more detail on the potential air quality impacts on the SAC, stating the following: “This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.”
- The supplementary advice goes on to state that: “While the critical loads for Nitrogen and acidity are currently within the acceptable range and nitrogen oxides and sulphur dioxide are below the maximum acceptable limits for this habitat, ammonia levels are currently above the acceptable level for sensitive lichen containing habitat (Ave1.83µgNH<sub>3</sub>/m<sup>3</sup> per year, limit set at 1µgNH<sub>3</sub>/m<sup>3</sup> per year).”
- The relevant target is to “Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load of Level values given for this feature of the site on the Air Pollution Information System ([www.apis.ac.uk](http://www.apis.ac.uk))”.

#### **F.29 Site Condition Assessment:**

- The potential for AQ exceedance of thresholds occurs within SSSI Units 1 and 2, which are both in ‘Favourable’ condition according to the last assessment undertaken in 2020. The condition assessment states that “Today Units 1-3 and the site overall is in Favourable Condition. Most of the management threats identified in the 2014 assessment are being tackled but remain i.e. a need for continued grazing intensity on all three units and the need for scrub clearance on all three units. In addition, Unit 1 has a condition threat of recreational impact on the plateau.” This indicates no existing issues directly in relation to air pollution, however the management required could be a result of contribution of air pollution impacts on vegetation communities. This theory is supported by the information from APIS on impacts of nitrogen pollution on calcareous grasslands which states in relation to modifying impacts from nitrogen deposition, that:
- “These systems require specific management to prevent natural succession to woodlands (Dierschke 1985). Grazing, mowing or harvesting can help to offset N enrichment, as losses from gaseous emissions or leaching of inorganic N are relatively small. Similarly grazing or mowing will help maintain a more open canopy structure keeping the robust grasses in check.
- Grazing management: too low grazing intensity will exacerbate effects of N stimulated nitrophilous grass growth.
- More frequent mowing or harvesting will help to remove N.

- These soils are P limited so changing P availability will increase the impact of N on growth, eutrophication effects via competition for other limiting resources, changing the balance between species and ecosystem stability.”

**F.30** Habitat potentially impacted:

- A broad assessment of the qualifying habitats within the SAC was taken using the desk based sources described in paragraph F.6.
- The qualifying habitats for Rodborough Common SAC is semi-natural dry grasslands and scrubland facies on calcareous substrates, which appears to be located within the part of the SAC which lies within the exceedance zone.
- The NVC community is CG5 *Bromus erectus* – *Brachypodium pinnatum* grassland.

**F.31** Area of SAC affected:

- The exceedance of screening thresholds for nitrogen deposition is only at the roadside (0.03m), due to the Local Plan in combination. Roadside habitats (up to c.10m) typically contain degraded habitats i.e. lower value habitats, due to the general presence of the road and its associated salt spray, dust, runoff, and altered drainage or soils; in some cases road verges unofficial tracks may also be present. A localised increase in nitrogen deposition to 0.03m of the road will not have an adverse effect on the integrity of the SAC.
- The screening thresholds for ammonia are exceeded to 20m to the west and 50m to the east of the Spine Road, due to the Local Plan in combination. There is also an exceedance at the roadside, to the east, but this is to 0.03m and is discounted as for nitrogen deposition, above. The total concentration of ammonia exceeds the critical load for all points on the transect, therefore the affected area is up to 20m from the road to the west and up to 50m to the east.
- This area includes c.8.7ha, or 7.9% of the total SAC area.
- Based on the desk study, this part of the SAC is likely support the qualifying habitat (Semi-natural dry grasslands and scrubland facies on calcareous substrates).

**F.32** Ability to meet Conservation Objectives:

- Despite source attribute data from APIS demonstrating that the background trend in local contribution of vehicle emissions to air pollution between 2012-2018 (the years for which the data is available) has fallen, local contributions of other sources such as agriculture, livestock and fertiliser application have risen. The nitrogen deposition expected as a result of the plan, up to a maximum of

17.4 kgN/ha/yr for ET3, exceeds the CL of 10-20 kgN/ha/yr. Additionally, the levels of NH<sub>3</sub> concentration expected as a result of the plan, 2.2 ug/m<sup>3</sup> also exceeds the CL of 1 ug/m<sup>3</sup> (recognising this lower CL due to presence of bryophytes/lichens as part of qualifying habitat, as per APIS CL data). There is no background source information available for ammonia.

- The potential impacts associated with nitrogen deposition (including from ammonia) on calcareous grasslands are as follows:
  - “Reduces species richness and/or species diversity/changes species composition
  - Loss of subordinate vascular plants e.g. Thyme *Thymus*
  - Loss of rare or endangered species.
  - Loss of characteristic calcicolous mosses and lichens at risk from shading and N accumulation.
  - Increase in non-native calcifuge species
  - Increase in cat’s ear plant *Hypochaeris radicata* (Carroll et al 1997). Negative effects on nitrogen fixing legumes.
  - Increased risk of drought effects.
  - Loss of annuals and forbs will have implications for recovery, due to the short lived nature of the seed bank (Bossuyt et al 2005).”
- This has potential to influence the extent, distribution, structure and function of the lowland hay meadow grassland and therefore, the ability for the site to meet its Conservation Objectives.

#### Conclusion:

Adverse effects on the integrity of Rodborough Common SAC, due to ammonia, cannot be ruled out.

## Cotswold Beechwoods SAC

### F.33 Qualifying features of the SAC:

- 9130 *Asperulo-Fagetum* beech forests; and
- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites).

**F.34** SIP and supplementary advice for conservation objectives:

- Natural England's SIP (dated 30/03/2015) identifies that the site is at risk of 'air pollution impacts as a result of atmospheric nitrogen deposition', which could affect the beech forests and calcareous grassland. The SIP sets out a measure to control, reduce and ameliorate atmospheric nitrogen impacts. This indicates that nitrogen deposition is the key issue for NE at Chilterns Beechwoods.
- Additionally, supplementary advice from NE sets out more detail on the potential air quality impacts on the SAC, stating the following: "This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it."
- The supplementary advice goes on to state that: "Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH<sub>3</sub>), oxides of nitrogen (NO<sub>x</sub>) and sulphur dioxide (SO<sub>2</sub>), and critical loads for nutrient nitrogen deposition and acid deposition. Concentrations are currently within maximum limits set for this habitat."
- The relevant target is to "Maintain the concentrations and deposition of air pollutants at within 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](http://www.apis.ac.uk)).".

**F.35** Site Condition Assessment:

- The potential for AQ exceedance of thresholds occurs within SSSI Units 4 and 11, which are designated due to the presence of lowland beech woodland.
- Unit 4 was assessed in 2009 as being in 'Favourable' condition, with lack of veteran trees and open glades, structural diversity and increasing prevalence of sycamore being the only threat to condition.
- Unit 11 was assessed in 2019 as being in 'Unfavourable-Recovering' condition, with similar poor management, lack of veteran trees, and thus poor structural diversity and recreational pressure being the key issues.

**F.36** Habitat potentially impacted:

- A broad assessment of the qualifying habitats within the SAC was taken using the desk based sources described in paragraph F.6.

- The qualifying habitats for Cotswold Beechwoods SAC, *Asperulo-Fagetum* beech forests, and non qualifying calcareous grassland habitat appears to be located within the parts of the SAC which lie within the exceedance zones.
- The NVC community for the beechwoods is likely to be either W12 *Fagus sylvatica* – *Mercurialis perennis* woodland, or W14 *Fagus sylvatica* – *Rubus fruticosus* woodland due to the calcareous soil characteristics.

**F.37** Area of SAC affected:

- At Buckholt, the exceedance of screening criteria is to 30m due to the Local Plan alone and to 90 in combination, for nitrogen; and to 40m alone and 110m in combination, for ammonia. The total concentrations are exceeded at all transect points (which start at roadside).
- At Birdlip, the exceedance of screening criteria is to 100 in combination, for nitrogen; and to 120m in combination, for ammonia. The total concentrations are exceeded at all transect points (which start at 80m from the road).
- At Sheepscombe, the exceedance of screening criteria is to 70 in combination, for nitrogen; and to 80m in combination, for ammonia. The total concentrations are exceeded at all transect points (which start at 60m from the road).
- This area includes c.12.8ha (2.26% of the SAC), due to the Local Plan alone, and c.13.9ha (2.36% of the SAC), due to the Local Plan in combination.
- Based on the desk study, this part of the SAC is likely support the qualifying habitat (*Asperulo-Fagetum* beech forests and Semi-natural dry grasslands and scrubland facies on calcareous substrates).

**F.38** Ability to meet Conservation Objectives:

- Despite source attribute data from APIS demonstrating that the background trend in local contribution of vehicle emissions to air pollution between 2012-2018 (the years for which the data is available) has fallen, local contributions of other sources such as agriculture, livestock and fertiliser application have risen. The nitrogen deposition expected as a result of the plan, up to a maximum of 30.1 kgN/ha/yr for ET4, far exceeds the CL of 10-20 kgN/ha/yr for the Local Plan alone. Additionally, the levels of NH<sub>3</sub> concentration expected as a result of the plan, 2.1 µg/m<sup>3</sup> also exceeds the CL of 1 µg/m<sup>3</sup> (recognising this lower CL due to presence of bryophytes/lichens as part of qualifying habitat, as per APIS CL data). The CL for ET5 and ET6 in relation to nitrogen deposition and ammonia are also exceeded. There is no background source information available for ammonia.

- The potential impacts associated with nitrogen deposition (including ammonia) on beech woodlands are as follows:
- “Nitrogen deposition on forest ecosystems can lead to increased sensitivity to natural stress, impacts on roots, reduced species diversity of the ground vegetation, reduced growth, and an unbalanced nutritional status due to eutrophication and acidification (Erisman and de Wries 2000). Changes in forest ground flora have been clearly documented as a result of enhanced N deposition near farms (Pitcairn et al. 1998) and are also expected to occur in regions with high wet deposition of ammonium and nitrate.”
- Specific impacts on beech woodlands have been identified through research presented by APIS, with species specific responses to nitrogen deposition reported as follows:
  - “Destabilisation; faster growth, reduced investments in roots leading to increased risk of drought stress (Anders et al., 2002) and increased risk of uprooting. Damage to mature beech in the 1999 storm in Switzerland positively correlated with leaf Nitrogen (Meyer et al., 2008)
  - Winter desiccation; increased defoliation by leaf feeders; increased pathogen infection, though evidence is reported predominantly for beech.
  - Increase in bark lesions *Nectria coccinea* linked to sap feeding insect woolly beech scale, (beech bark disease) (Westling et al 1992)
  - Increase in canker *Nectria ditissima*, associated with reduced potassium (Fluckiger & Braun, 1988)
  - Reduction in shoot and stem growth worst on alkaline and acid soils (Fluckiger & Braun, 2011)
  - Increase in pathogenic fungi *Apiognomonia errabunda* and *Phomopsis spp* on both alkaline and acid soils (Fluckiger & Braun, 1999)
  - Increase in beech aphid *Phyllaphis fagi* (Fluckiger & Braun, 1998)
  - Increase in damage to beech nuts by *Cydia amplana* non sucking insect (Fluckiger & Braun, 2004)
  - Flowering patterns, seed and litterfall production (+) and decomposition (-) (Vanguelova and Pitman, 2009)
  - Lower mycelium density (Braun et al., 2010)”
- This has potential to influence the extent, distribution, structure and function of the lowland hay meadow grassland and therefore, the ability for the site to meet its Conservation Objectives.

**Conclusion:**

Adverse effects on the integrity of Cotswold Beechwoods SAC, due to nitrogen deposition and ammonia, cannot be ruled out.

## Conclusions and next steps

**F.39** The assessment of air quality impacts on qualifying features has enabled adverse effects on integrity to be ruled out in relation to the following:

- North Meadow & Clattinger Farm SAC:
  - Ammonia levels on the A419 transect remain below critical levels with the Local Plan and other 'in combination' sources of vehicle emissions.
- Rodborough Common SAC:
  - Screening thresholds (more than 1% change in critical load/level) not exceeded on the A46 / Selsey Road.
  - Nitrogen deposition effects on the two Spine Road transects have been ruled out as they are roadside only (0.03m) and habitats are likely to be degraded due to the presence of the road.

**F.40** However, it has not been possible to rule out adverse effects on integrity at:

- North Meadow & Clattinger Farm SAC:
  - Nitrogen deposition, due to the Local Plan alone and in combination; near the A419.
- Rodborough Common SAC:
  - Ammonia, due to the Local Plan in combination, at both transects on the Spine Road.
- Cotswold Beechwoods SAC:
  - Nitrogen deposition and ammonia at all three transects on the B4070, due to the Local Plan alone at Buckholt and in combination at the other two transects.

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