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South Oxfordshire Local Plan

Habitats Regulations Assessment Report

HRA Report
Prepared by LUC
January 2018

Project Title: Habitats Regulations Assessment for South Oxfordshire Local Plan

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1 Introduction

- 1.1 LUC has been commissioned by South Oxfordshire District Council to carry out a Habitats Regulations Assessment (HRA) of its Local Plan. This report presents the methodology and findings of the HRA.

Background to the preparation of the new Local Plan

- 1.2 South Oxfordshire District Council (SODC) is producing a new Local Plan for the district, which will replace its Local Plan 2011 and Core Strategy. Once adopted, the Local Plan will set out policies and guidance for development of the district over the next 15 years (2018 to 2033, once published). This HRA is based on the current Submission version of the Local Plan.
- 1.3 SODC adopted its Local Plan 2011 in 2006, and then adopted its Core Strategy in December 2012; the Core Strategy included some 'saved' policies from the Local Plan 2011. The Core Strategy set out the Council's approach to development in the district up to 2027 and provided for the development of 5,214 new homes and 14.7 ha of employment land over the Plan period¹. At the time that the Core Strategy was adopted the Council was intending to produce a number of other Development Plan Documents (DPDs), which together with the Core Strategy would comprise the Local Plan for the district.
- 1.4 In April 2014 a Strategic Housing Market Assessment (SHMA) for Oxfordshire was published, setting out levels of housing need across the county up to 2031. The SHMA showed that up to 5,900 more homes would be required in South Oxfordshire than were provided for in the adopted Core Strategy. The Council therefore decided to review the existing plan and extend it to cover the period up to 2031; this was subsequently amended to 2033. Work on a Sites and General Policies DPD had commenced but was halted once the decision was made to review the Core Strategy. The intended content of that DPD has instead been incorporated into the new Local Plan.
- 1.5 The Council has rolled forward the strategic allocations and many of the policies from the adopted Core Strategy into the Local Plan. The main areas of change involve addressing how to distribute the additional housing required and planning for the associated infrastructure.
- 1.6 In June 2014 the Council consulted on an Issues and Scope document for the Local Plan 2031. This explained the background to the preparation of the new Local Plan and presented a number of broad options for the distribution of the additional housing required in South Oxfordshire. Consultation questions were also put forward relating to issues such as transport infrastructure and Traveller sites.
- 1.7 The Council then consulted on a refined options document in February 2015. The refined options document was supported by an HRA¹ that was also produced by LUC and commented on by Natural England and the Environment Agency. Later, in June 2016 the Council published its first preferred options document. This consultation focused on the headline issues for the Local Plan with the intention to add the detail later through a second preferred options consultation.
- 1.8 Consultation on the Second Preferred Options version of the Local Plan (Regulation 18 consultation) took place between March and May 2017. A previous version of this HRA was made available for comment alongside it.

¹ <http://www.southoxon.gov.uk/sites/default/files/HRA%20phase%201%20report.pdf>

- 1.9 The current version of the Local Plan, on which this HRA is based, is the Submission version. A previous version of this HRA was published to accompany the pre-submission consultation in October 2017), however this has subsequently been updated again following the public consultation (January 2018)
- 1.10 The Local Plan includes a vision for South Oxfordshire in 2033, objectives and a strategy for how these will be achieved, distribution of sites for development, and policies which will be used to assess planning proposals and applications. The Local Plan provides the broad strategic framework for growth; however some of the detail, such as the specific sites to be allocated for housing, will be finalised at the local level through Neighbourhood Development Plans (NDP).

The requirement to undertake Habitats Regulations Assessment of Development Plans

- 1.11 The requirement to undertake HRA of development plans was confirmed by the amendments to the Habitats Regulations published for England and Wales in July 2007 and updated in 2010² and again in 2012³. Therefore when preparing the new Local Plan, SODC is required by law to carry out a Habitats Regulations Assessment although consultants can undertake the HRA on its behalf. The requirement for authorities to comply with the Habitats Regulations when preparing a Local Plan is explained in Planning Practice Guidance.
- 1.12 The HRA refers to the assessment of the potential effects of a development plan on one or more European Sites, including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs):
- SPAs are classified under the European Council Directive 'on the conservation of wild birds' (79/409/EEC; 'Birds Directive') for the protection of wild birds and their habitats (including particularly rare and vulnerable species listed in Annex 1 of the Birds Directive, and migratory species); and
 - SACs are designated under the Habitats Directive and target particular habitats (Annex 1) and/or species (Annex II) identified as being of European importance.
- 1.13 Potential SPAs (pSPAs)⁴, candidate SACs (cSACs)⁵, Sites of Community Importance (SCIs)⁶ and Ramsar sites should also be included in the assessment.
- Ramsar sites support internationally important wetland habitats and are listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention, 1971).
- 1.14 For ease of reference during HRA, these designations are collectively referred to as European sites⁷ despite Ramsar designations being at the wider international level.
- 1.15 The overall purpose of the HRA is to conclude whether or not a proposal or policy, or whole development plan, would adversely affect the integrity of the site in question either alone or in combination with other plans. 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 meaning that where uncertainty or doubt remains, an adverse impact should be assumed.

² The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007. HMSO Statutory Instrument 2007 No. 1843. From 1 April 2010, these were consolidated and replaced by the Conservation of Habitats and Species Regulations 2010 (SI No. 2010/490). Note that no substantive changes to existing policies or procedures have been made in the new version.

³ The Conservation of Habitats and Species (Amendment) Regulations 2012. Statutory Instrument 2012 No. 1927.

⁴ Potential SPAs are sites that have been approved by Government and are currently in the process of being classified as SPAs.

⁵ Candidate SACs are sites that have been submitted to the European Commission, but not yet formally adopted.

⁶ SCIs are sites that have been adopted by the European Commission but not yet formally designated as SACs by the Government.

⁷ Often referred to as European sites, elsewhere; the two terms are used interchangeably.

Stages of the Habitats Regulations Assessment

1.16 **Table 1.1** below summarises the stages involved in carrying out a full HRA, based on various guidance documents^{8,9}.

Table 1-1 Stages in HRA

| Stage | Task | Outcome |
|---|--|--|
| Stage 1: Screening (the 'Significance Test') | Description of the plan. Identification of potential effects on European Sites. Assessing the effects on European Sites (taking into account potential mitigation provided by other policies in the plan). | 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 (the 'Integrity Test') | Gather information (plan and European Sites). Impact prediction. Evaluation of impacts in view of conservation objectives. Where impacts considered to affect qualifying features, identify alternative options. Assess alternative options. If no alternatives exist, define and evaluate mitigation measures where necessary. | Appropriate Assessment report describing the plan, European site baseline conditions, the adverse effects of the plan on the European site, how these effects will be avoided through, firstly, avoidance, and secondly, mitigation 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 | Identify and demonstrate 'imperative reasons of overriding public interest' (IROPI). Demonstrate no alternatives exist. Identify potential compensatory measures. | This stage should be avoided if at all possible. The test of IROPI and the requirements for compensation are extremely onerous. |

1.17 In assessing the effects of the Local Plan in accordance with Regulation 102 of the Conservation of Habitats and Species Regulations 2010, there are potentially two tests to be applied by the competent authority: a 'Significance Test', followed if necessary by an Appropriate Assessment which will inform the 'Integrity Test'. The relevant sequence of questions is as follows:

- Step 1: Under Reg. 102(1)(b), consider whether the plan is directly connected with or necessary to the management of the sites. If not –
- Step 2: Under Reg. 102(1)(a) consider whether the plan is likely to have a significant effect on the site, either alone or in combination with other plans or projects (the 'Significance Test'). [These two steps are undertaken as part of Stage 1: Screening shown in Table 1.1 above.] If Yes –
- Step 3: Under Reg. 102(1), make an Appropriate Assessment of the implications for the site in view of its current conservation objectives (the 'Integrity Test'). In so doing, it is mandatory under Reg. 102(2) to consult Natural England, and optional under Reg. 102(3) to take the opinion of the general public. [This step is undertaken during Stage 2: Appropriate Assessment shown in Table 1.1 above.]

⁸ *Planning for the Protection of European Sites. Guidance for Regional Spatial Strategies and Local Development Documents.* Department for Communities and Local Government (DCLG), August 2006.

⁹ *The HRA Handbook.* David Tyldesley & Associates, a subscription based online guidance document: <https://www.dtapublications.co.uk/handbook/>

- Step 4: In accordance with Reg.102(4), but subject to Reg.103, give effect to the land use plan only after having ascertained that the plan will not adversely affect the integrity of the European site.
- 1.18 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, reduce or abate 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 both the Government and European Commission.
- 1.19 The HRA should be undertaken by the 'competent authority' - in this case SODC, and LUC has been commissioned to do this on its behalf. The HRA also requires close working with Natural England as the statutory nature conservation body¹⁰ in order to obtain the necessary information and agree the process, outcomes and any mitigation proposals.

Previous HRA work

- 1.20 The South Oxfordshire Core Strategy was subject to HRA throughout its preparation and, while the HRA of the Local Plan is being undertaken as a separate exercise, there is a significant body of relatively recent HRA work and supporting evidence which can be drawn from. The HRA for the Core Strategy¹¹ assessed the potential for impacts on the following six European sites that all fall within 17 km of the four main towns in South Oxfordshire (Didcot, Thame, Wallingford and Henley-on-Thames):
- Aston Rowant SAC;
 - Chilterns Beechwoods SAC;
 - Cothill Fen SAC;
 - Hartslock Wood SAC;
 - Little Wittenham SAC; and
 - Oxford Meadows SAC.
- 1.21 Likely significant effects were not able to be ruled out during the screening stage of the HRA of the Core Strategy; therefore Appropriate Assessment was undertaken in relation to the following potential significant effects:
- Effects on Aston Rowant SAC, Chilterns Beechwoods SAC and Hartslock Wood SAC¹² as a result of increased air pollution from vehicle traffic linked to population growth at Henley-on-Thames, Thame and Wallingford;
 - Effects on Cothill Fen SAC in relation to reduced groundwater levels as a result of increased water demand from new development and water quality issues arising from wastewater discharges¹³;
 - Effects on Little Wittenham SAC in relation to increased visitor pressure arising from the expected population growth at Didcot and Wallingford; and
 - Effects on Oxford Meadows SAC in relation to air pollution from increased traffic volume on the A34, direct land take from the SAC to facilitate improvements to the A34¹⁴ and increased demand for water¹².

¹⁰ Regulation 5 of *The Conservation of Habitats and Species Regulations 2010*. HMSO Statutory Instrument 2010 No. 490.

¹¹ http://www.southoxon.gov.uk/sites/default/files/Appropriate%20Assessment_2.pdf

¹² The Core Strategy HRA only considered sites within 17km of the main towns and did not consider proximity to major roads until the Appropriate Assessment stage. The European sites screened in therefore differs from this HRA.

¹³ Since the Core Strategy HRA was written, the district's Water Cycle Strategy has progressed; the additional information has informed the screening of this HRA.

¹⁴ Not included in the South Oxfordshire Local Plan and covered by Vale of White Horse District Council's Core Policy 34

- 1.22 As a result of the work carried out during the Appropriate Assessment stage it was concluded that none of the above European sites would be significantly affected by the proposals in the Core Strategy either alone or in combination with other plans and policies. However, it was noted that the HRA would need to be updated as further policies within the Local Development Framework (LDF) were defined, particularly those associated with the allocation of housing developments within the larger villages. This recommendation is superseded by the requirement for HRA of the Local Plan which will replace the further LDF documents referred to in the HRA of the Core Strategy. The Local Plan includes policies for the distribution of the new housing requirement and these are assessed in full in this HRA.
- 1.23 SODC undertook HRA work in relation to the Local Plan 2031 Issues and Scope document, which was presented in Appendix 3 of the Sustainability Appraisal (SA) Scoping Report¹⁵. For each of the 12 European sites within 17 km of the district boundary, information was provided on the qualifying features, conservation objectives and potential implications for the Local Plan 2031 (as it was at the time). Consideration was also given to the potential impacts of other plans, such as Local Plans produced by neighbouring authorities. Because the Local Plan was at such an early stage it was not possible to begin assessing the likelihood of policies and proposals in the Plan having significant effects on the integrity of the European sites. However, the information set out in the document represents important evidence on which the HRA work for the Local Plan can be based and has been drawn on during the preparation of this report.
- 1.24 LUC was then appointed by SODC to carry out an HRA of the spatial distribution of housing for the level of growth identified in the former Core Strategy and four growth scenarios for the Local Plan 2031 (now 2033)¹⁶. Those growth scenarios and the spatial distribution have evolved into what is now the Local Plan.
- 1.25 The HRA of the spatial distribution strategy concluded that there would be no likely significant effects on European sites; however the HRA screening of the four growth scenarios identified uncertainty regarding whether there would be likely significant effects in relation to increased air pollution, increased recreation pressure and increased demand for water abstraction and treatment.
- 1.26 The report advised that at that stage in the assessment and plan making process, it was not possible to determine a scale of growth above which housing scenarios would be likely to have significant effects on European sites, although it was noted that higher levels of growth were more likely to result in likely significant effects. Therefore, in order to reach more certain conclusions during later stages of the HRA work for the Local Plan, it was advised that the following data would be required:
- Traffic data showing likely increases in Average Annual Daily Traffic (AADT) as a result of the Local Plan 2031 along the stretches of 'A' roads which lie within 200 m of Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, Kennet and Lambourn Floodplain SAC, Oxford Meadows SAC, River Lambourn SAC and Windsor Forest and Great Park SAC. Air quality modelling could also be required should the traffic projections reveal significant traffic increases in the vicinity of the European sites;
 - Information about levels of headroom at the sewage treatment works that serve the four main towns and 12 villages at which housing development is to be provided and about water availability in the relevant abstraction zones, in order to assess whether adverse effects could occur on the integrity of Burnham Beeches SAC, Cothill Fen SAC, Kennet and Lambourn Floodplain SAC, Little Wittenham SAC, Oxford Meadows SAC, River Lambourn SAC, Thames Basin Heaths SPA, and Windsor Forest and Great Park SAC; and
 - Depending on the outcome of consultation with Natural England, it was identified that it may also be necessary to obtain data about recreational use of European sites, for example via visitor surveys.

¹⁵ <http://www.southoxon.gov.uk/services-and-advice/planning-and-building/planning-policy/evidence-studies/sustainability-appraisal->

¹⁶ LUC (January 2015) *Habitats Regulations Assessment for South Oxfordshire District Council* - <http://www.southoxon.gov.uk/sites/default/files/HRA%20phase%201%20report.pdf>

- 1.27 In March 2017, LUC then carried out an HRA of the Second Preferred Options version of the Local Plan. Refinement of the Local Plan since the HRA of the Local Plan growth scenarios and additional information allowed some potential effects, for example those associated with changes to water quality or quantity to be screened out the assessment. However, there was insufficient information to rule out significant effects in relation to the following:
- Potential impacts due to recreation pressure at Little Wittenham SAC; and
 - Potential air pollution impacts at Aston Rowant SAC, Burnham Beeches SAC; Chilterns Beechwoods SAC; and Windsor Forest & Great Park SAC.
- 1.28 The HRA formed part of the consultation on the Second Preferred Options Local Plan and some comments (**Appendix 4**) were received in relation to the HRA.
- 1.29 A further iteration of the HRA was published alongside the pre-submission consultation (October 2017), and this was subsequently updated again following the completion of air dispersion modelling (January 2018).

Structure of the HRA report

- 1.30 This chapter (**Chapter 1**) has introduced the requirement to undertake HRA of the Local Plan. The remainder of the report is structured as follows:
- **Chapter 2: The Local Plan** summarises the content of the Submission version of the Local Plan, which is the subject of this report;
 - **Chapter 3: Screening Methodology** sets out the approach used and the specific tasks undertaken during the screening stage of the HRA;
 - **Chapter 4: Screening Findings** describes the findings of the screening stage of the HRA;
 - **Chapter 5: Appropriate Assessment** sets out the methodology and findings of the Appropriate Assessment stage of the HRA; and
 - **Chapter 6: Conclusions** summarises the HRA conclusions for the draft version of the Local Plan and describes the next steps to be undertaken.

2 The Local Plan

- 2.1 The Submission version of the South Oxfordshire Local Plan sets out the overall vision for South Oxfordshire, objectives and a strategy for how these will be met, distribution of sites for development, and policies which will be used to assess planning proposals and applications. These are summarised below.

Summary of the Local Plan

Local Plan vision

- 2.2 The strategic vision for South Oxfordshire District in 2033 presented in the Local Plan is as follows:

Our Vision for 2033

South Oxfordshire will remain a beautiful and prosperous place to live, for existing and future residents and it will be an attractive place for people to work and spend their leisure time.

By meeting our housing and employment need and the creation of new, sustainable and vibrant places, we will have provided enough homes and jobs for those wishing to live and work here. By planning for housing in our four towns of Didcot, Henley-on-Thames, Thame and Wallingford and in our villages, we will have ensured that all our communities thrive and that everyone has access to services within a short distance. New development meets the highest standards of design with necessary associated infrastructure.

We continue to direct development to the towns and larger villages. We will also strengthen the heart of the district by allocating new development at four strategic locations. This growth will support employment opportunities and deliver regeneration and infrastructure.

Science Vale¹⁷ will have continued to grow as a world-renowned science, research and innovation led hub that attracts business and creates job opportunities, and delivers housing growth. Didcot will be a flourishing Garden Town, being both the gateway to and the heart of Science Vale. Roads and rail links will have been improved and pedestrian and cycle networks will have made it easier for people to get around, in particular to major employment sites.

Through careful management of the Oxford Green Belt we will have protected the important setting of Oxford whilst also making appropriate provision for housing, business growth and urban and rural regeneration. The North Wessex Downs and Chilterns Areas of Outstanding Natural Beauty will be protected and enhanced, whilst also allowing for appropriate and sustainable growth in places. Our rich and varied history is celebrated, protected and enhanced for the benefit of residents and visitors.

We will plan for new development at four strategic locations; Berinsfield, Chalgrove, Culham and Wheatley.

We will exceed people's high expectations in terms of healthy living, sustainable travel and the design of buildings, homes and public spaces. Everyone will have access to high quality leisure, retail and cultural facilities which will also attract visitors. South Oxfordshire will be a top tourist destination, helping our towns and villages to remain vibrant and prosperous. Communities will thrive, and through Neighbourhood Planning and community engagement, they will have their say on how their local area is shaped.

¹⁷ Science Vale is an area in Southern Oxfordshire, crossing the border of South Oxfordshire and the Vale of White Horse. It is one of the most successful science clusters in the UK. This activity is concentrated around the three centres for science at Harwell Campus, Culham Science Centre, and Milton Park, but is supported by a number of important settlements including Didcot, Wantage and Grove.

Strategic objectives

- 2.3 The Local Plan sets out eight Strategic objectives, which will need to be achieved to deliver the plan's strategic vision. The objectives also set out how the key sustainability issues facing the district will be addressed.

Objective 1 - Settlements

- OBJ 1.1: Support the settlement hierarchy, the growth and development of Didcot Garden Town, the delivery of new development in the heart of the district, the growth of our market towns and the vitality of our villages;
- OBJ 1.2: Support rural communities and 'their way of life', recognising that this is what attracts people to the district;
- OBJ 1.3: Meet identified housing needs by delivering high-quality, sustainable, attractive places for people to live and work; and
- OBJ 1.4: Focus growth in Science Vale through delivering homes and jobs, retail and leisure facilities and enhanced transport infrastructure.

Objective 2 - Housing

- OBJ 2.1: Deliver a wide range of housing options to cater for the housing needs of our community (including self-build and older person's accommodation);
- OBJ 2.2: Support the regeneration of housing and facilities to strengthen communities, and address identified poverty and social exclusion; and
- OBJ 2.3: Support meeting the economic and housing needs of the county as a whole, reflecting the special character of South Oxfordshire

Objective 3 - Economy

- OBJ 3.1: Improve employment opportunities and employment land provision, providing high quality local jobs to help retain more of its skilled residents in the local workforce;
- OBJ 3.2: Support business growth, especially in locations close to existing business areas, transport connections and broadband provision and which provide the opportunity to reduce commuting distances;
- OBJ 3.3: Ensure economic and housing growth are balanced, to support sustainable journeys to work, recognising we cannot determine where people work – some of whom will choose to travel to employment locations beyond our district, such as London, Reading and Oxford;
- OBJ 3.4: Support the retail and service sectors as well as low and high-tech industries;
- OBJ 3.5: Create the conditions whereby world-renowned and cutting edge industries choose to locate and grow their businesses here, contributing to a strong and successful economy, in line with the Strategic Economic Plan for Oxfordshire;
- OBJ 3.6: Inspire the next generation of workers by planning for high quality education facilities; and
- OBJ 3.7: Encourage tourism by protecting our built and natural assets, such as the Thames, and providing services and facilities for visitors.

Objective 4 - Infrastructure

- OBJ 4.1: Ensure that essential infrastructure is delivered to support our existing residents and services as well as growth; and
- OBJ 4.2: Make sustainable transport, walking and cycling an attractive and viable choice for people, whilst recognising that car travel and parking provision will continue to be important in this rural district.

Objective 5 - Design

- Deliver high quality, innovative, well designed and locally distinctive developments in sustainable locations in accordance with the South Oxfordshire Design Guide; and
- OBJ 5.2: Support development that respects the scale and character of our towns and villages, enhancing the special character of our historic settlements and the surrounding countryside.

Objective 6 - Community

- OBJ 6.1: Champion neighbourhood planning, empowering local communities to direct development within their area and provide support to ensure neighbourhood plans are deliverable, achievable and sustainable;
- OBJ 6.2: Provide access to high quality leisure, recreation, cultural, community and health facilities; and
- OBJ 6.3: Ensure all communities have access to the services and facilities they value, supporting access to sport and recreation and the health and wellbeing of everyone.

Objective 7 - Natural and built environment

- OBJ 7.1: Protect and enhance the natural environment, including biodiversity, the landscape, green infrastructure and our waterways, placing particular importance on the value of the Oxford Green Belt, our two Areas of Outstanding Natural Beauty and the River Thames; and
- OBJ 7.2: Conserve and enhance our rich and varied historic assets and their settings, celebrating these as some of our strongest attributes.

Objective 8 - Climate change

- OBJ 8.2: Minimise carbon emissions and other pollution such as water, air, noise and light, and increase our resilience to the likely impact of climate change, especially flooding.

Spatial strategy

- 2.4 The preferred strategy of SODC, as set out in the Local Plan, supports the delivery of new housing and economic growth and translates the Local Plan vision and objectives under inter-related spatial themes to:
- Support a strong network of vibrant settlements including the regeneration of town centres, making the whole district more sustainable, recognising the rural nature of South Oxfordshire and the impact of nearby major centres;
 - Support a movement strategy that strengthens connections to key places and enables initiatives to prosper, allows a choice of transport modes and manages traffic to improve environmental quality;
 - Create a thriving economy in urban and rural areas with a range of work opportunities including more high value jobs and enable the up-skilling of our workforce to support existing and new businesses;
 - Deliver sufficient new homes to meet the needs of our communities and economy supported by appropriate infrastructure, services and facilities; and
 - Maintain and enhance the built and natural environment and ensure good quality developments and change.
- 2.5 The Local Plan seeks to build upon the existing settlement hierarchy and actively create a pattern of development central to the area.
- 2.6 SODC has identified the need for between 15,950 and 18,150 homes during the plan period, to meet the district's own need, in addition to meeting some of Oxford City's unmet housing need. The Local Plan intends to make provision for at least 20,800 homes over the plan period, which will be met through a variety of supply sources as summarised in **Table 2.1**.

Table 2-1 Supply of homes to come forward 2011-2033

| Source of new homes | Net number of units |
|---|---------------------|
| Completions 2011-2017 | 3,397 |
| Commitments as of 31 March 2017 ¹⁸ | 9,887 |
| New strategic allocations | 6,575 |
| New Henley-on-Thames, Thame and Wallingford allocations | 1,155 |
| New allocations in the larger villages | 1,049 |
| Sites in the smaller villages (neighbourhood plans and infill sites) and windfall sites | 500 |
| Total | 22,563 |

- 2.7 For employment land, the Local Plan sets a target for at least an additional 35.9 hectares of B-class employment land to be provided over the plan period from 2011-2033.

Policies

- 2.8 Policies in the Local Plan are presented within the following sections:
- Delivering new homes;
 - Employment and economy;
 - Infrastructure;
 - Natural and historic environment;
 - Built environment;
 - Town centres and retailing; and
 - Community and recreational facilities.
- 2.9 The final section of the document sets out the Monitoring and Review Plan for the Local Plan.
- 2.10 Each policy of the Local Plan is summarised and assessed in **Appendix 3**.

Elements of the Local Plan assessed in this HRA

- 2.11 The quantum of development proposed in the Local Plan includes completed and committed development, i.e. development that already has planning permission. The policies that enabled those developments to be permitted have already been subject to HRA as part of the Core Strategy. The focus of this HRA is therefore the development that would be permitted under the new Local Plan policies. The overall quantum of development proposed by the plan also needs to be considered, however; so completed and committed developments have been taken into consideration in terms of their potential to have in-combination effects with the 'new' development quantum.
- 2.12 For clarity, **Table 2.2** sets out the quantum of development that has been taken into account in the main HRA assessment and that which has been considered only in terms of in-combination effects. The location of the proposed development is shown on **Figure 2.1**.

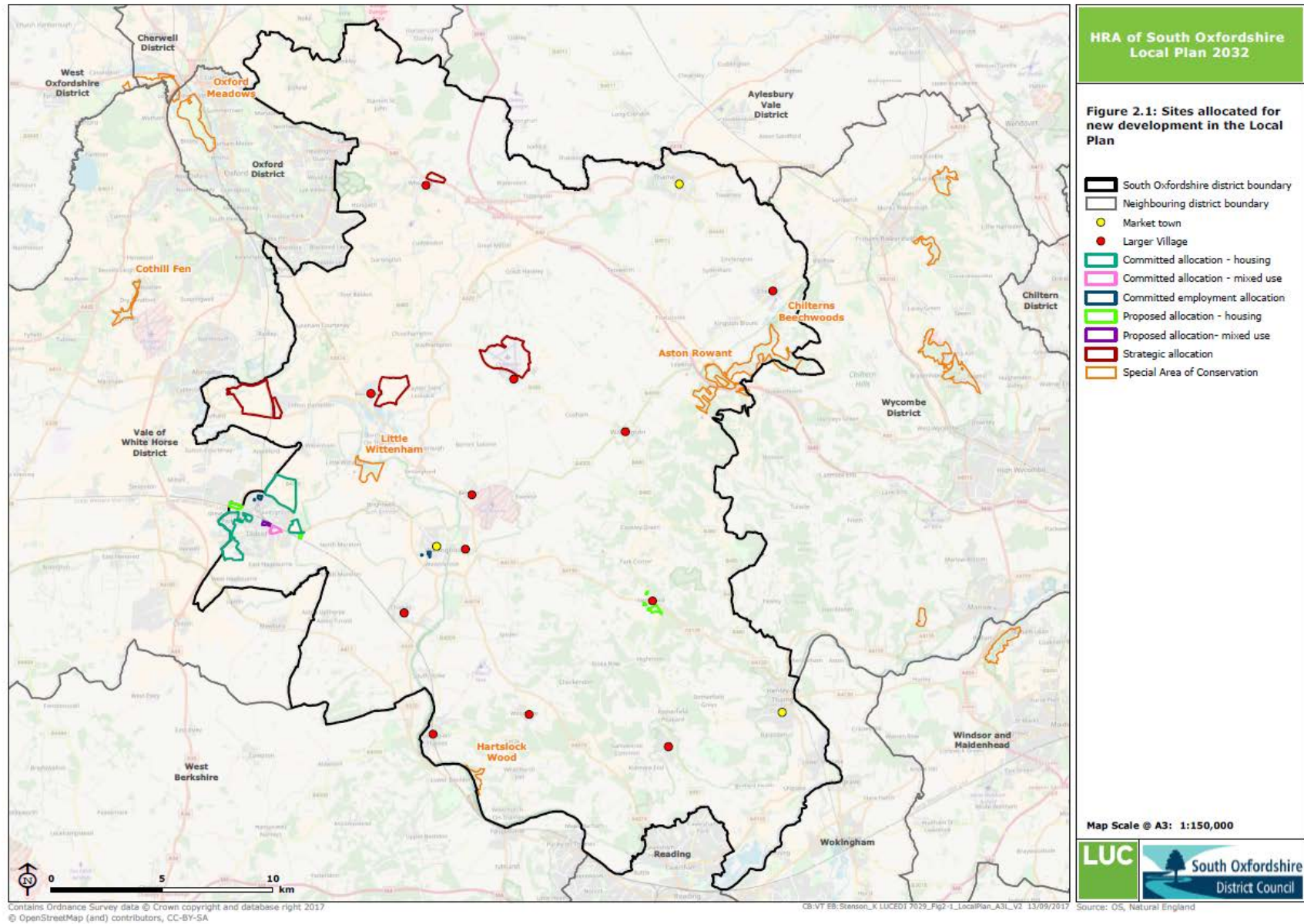
¹⁸ Sites under construction, with planning permission or resolution to grant planning permission and allocations carried forward from the Core Strategy

Table 2-2 Development quantum assessed in this HRA

| Type of development | Quantum assessed |
|---|---------------------|
| <i>Development that would be granted permission under new Local Plan policies (assessed throughout HRA)</i> | |
| Residential development: | 9,279 homes |
| • New strategic allocations | 6,575 |
| • New Henley, Thame and Wallingford allocations | 1,155 |
| • New allocations in the Larger Villages | 1,049 |
| • Sites in smaller villages and windfall sites | 500 |
| Gypsy and Traveller sites: | 10 pitches |
| • Gypsy and Traveller pitches | 10 |
| • Extensions to / replacements of existing sites | not specified |
| Employment development: | > 17.9 ha |
| • Henley-on-Thames | 1 ha |
| • Thame | 1.6ha |
| • Wallingford | 3.1 ha |
| • Crowmarsh Gifford | 0.28 ha |
| • Culham | 7.3 ha |
| • Chalgrove | 7.25 ha |
| • Berinsfield | 5.0ha |
| • Additional development at these sites or other locations | not specified |
| Retail development | 35,800 sq.m |
| • Food store (convenience goods) | 11,100 sq.m |
| • Non-food store (comparison goods) | 23,900 sq.m |
| <i>Development granted permission under previous policies (assessed for in-combination effects only)</i> | |
| Residential development: | 12,740 homes |
| • Completions 2011-2017 | 3,397 |
| • Commitments as of 31 March 2017 | 9,887 |
| Employment development: | 16.97 ha |
| • Didcot (safeguarded sites) ¹⁹ | 9.42 ha |
| • Wallingford (safeguarded sites) | 2.25 ha |
| • Culham (safeguarded sites) | 5.3 ha |

¹⁹ Note that 6.5ha of employment land in Didcot is considered to contribute South Oxfordshire's need, but is provided for by Vale of White Horse District Council's Core Strategy Policy 6 and has therefore been excluded from this table.

Figure 2-1 Sites allocated for new development in the Local Plan



Potential impacts of the Local Plan on European sites

- 2.13 **Table 2.3** below sets out the range of potential impacts that development of the type to be included in the Local Plan and related activities may have on European sites. This table has been prepared by LUC for use in informing HRA judgements, drawing on our experience of HRA and comments previously provided by Natural England relating to the potential impacts and activities that could affect European sites.

Table 2-3 Potential impacts and activities arising from implementation of the Local Plan that could adversely affect European sites

| Broad categories and examples of potential impacts on European sites | Examples of activities responsible for impacts |
|---|--|
| Physical loss <ul style="list-style-type: none"> Removal (including offsite effects, e.g. foraging habitat) Smothering Habitat degradation | Development (e.g. housing, employment, infrastructure, tourism) Structural alterations to buildings (bat roosts) Afforestation Tipping Cessation of or inappropriate management for nature conservation |
| Physical damage <ul style="list-style-type: none"> Direct mortality Sedimentation / silting Prevention of natural processes Habitat degradation Erosion Trampling Fragmentation Severance / barrier effect Edge effects Fire | Flood defences Dredging Recreation (e.g. motor cycling, cycling, walking, horse riding, water sports, caving) Development (e.g. infrastructure, tourism, adjacent housing etc.) Vandalism Arson Cessation of or inappropriate management for nature conservation |
| Non-physical disturbance <ul style="list-style-type: none"> Noise Vibration Visual presence Human presence Light pollution | Development (e.g. housing, industrial) Recreation (e.g. dog walking, water sports) Industrial activity Vehicular traffic Artificial lighting (e.g. street lighting) |
| Water table/availability <ul style="list-style-type: none"> Drying Flooding / stormwater Water level and stability Water flow (e.g. reduction in velocity of surface water) Barrier effect (on migratory species) | Water abstraction Drainage interception (e.g. reservoir, dam, infrastructure and other development) Increased discharge (e.g. drainage, runoff) |
| Toxic contamination <ul style="list-style-type: none"> Water pollution Soil contamination Air pollution | Oil / chemical spills Tipping Vehicular traffic Industrial waste / emissions |
| Non-toxic contamination <ul style="list-style-type: none"> Nutrient enrichment (e.g. of soils and water) Algal blooms Changes in salinity Changes in thermal regime Changes in turbidity Air pollution (dust) | Sewage discharge Water abstraction Industrial activity Flood defences Construction |

| Broad categories and examples of potential impacts on European sites | Examples of activities responsible for impacts |
|--|--|
| Biological disturbance <ul style="list-style-type: none"> • Direct mortality • Out-competition by non-native species • Selective extraction of species • Introduction of disease • Rapid population fluctuations • Natural succession | Development (e.g. housing areas with domestic and public gardens) Predation by domestic pets Introduction of non-native species (e.g. from gardens) Fishing Hunting Changes in management practices (e.g. grazing regimes, access controls, cutting / clearing) |

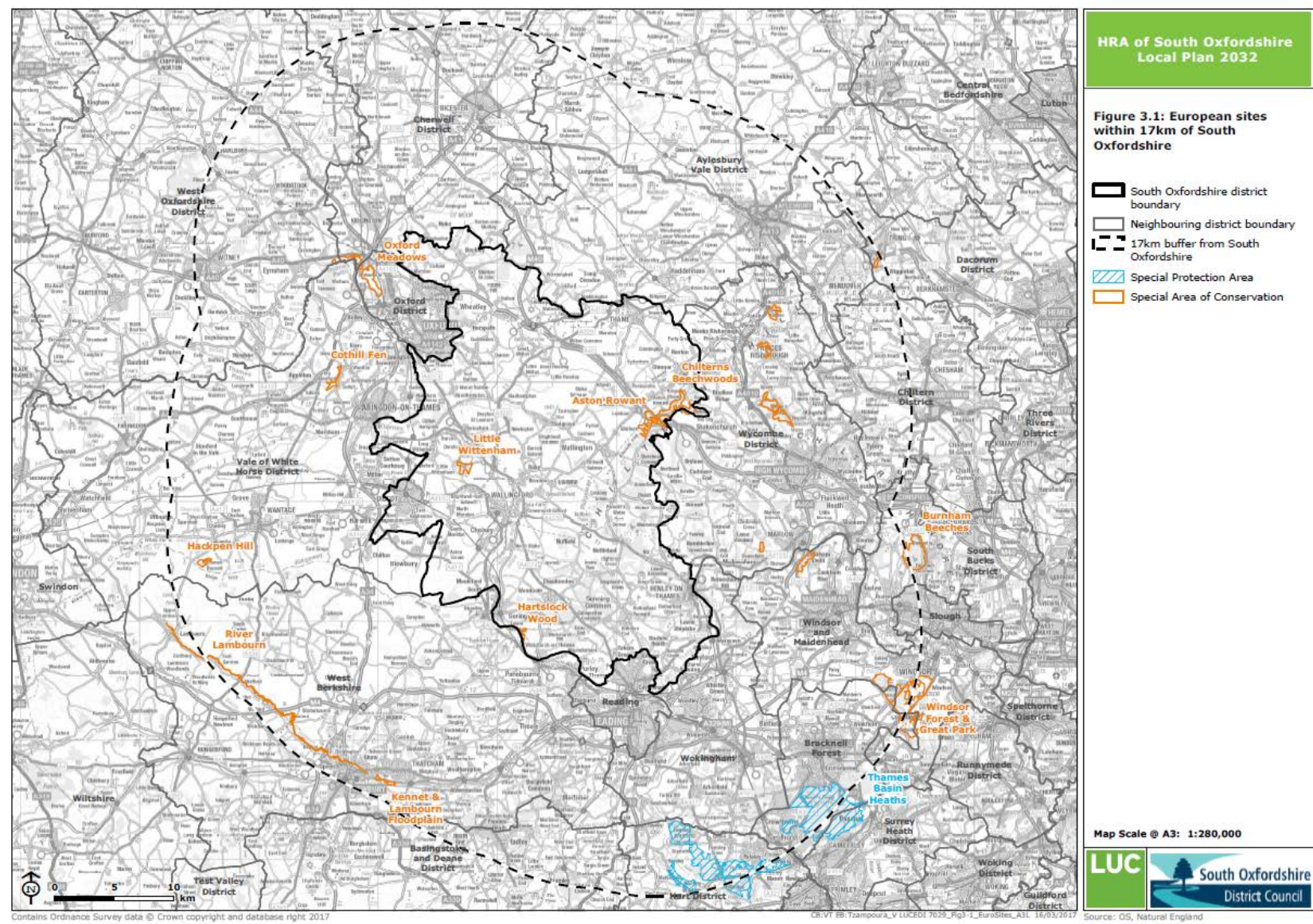
3 HRA Screening Methodology

- 3.1 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. The tasks that have been undertaken during the screening stage of the HRA are described in detail below.

European sites which may be affected by the Local Plan

- 3.2 The HRA of the Core Strategy took into account the six European sites that lie within 17 km of the four main towns in South Oxfordshire (Didcot, Thame, Wallingford and Henley-on-Thames). This buffer area was identified as appropriate at the time because the main growth areas in South Oxfordshire would be concentrated around the four main towns and, while smaller allocations would be made at the larger villages, detailed consideration of these would only be possible when allocations were made. The 17km buffer distance, which was subject to consultation with Natural England, reflected the average travel to work distance in the district and recognised the fact that the effects of development within South Oxfordshire may be transmitted to European sites outside of the district boundary.
- 3.3 The same buffer distance has been used during this current stage of HRA work and all of the 12 European sites within 17 km of the district boundary have been included in the assessment. Using a 17km buffer around the four main towns only (as was the case with the HRA of the Core Strategy) would not be appropriate as development outside of those areas is being assessed in this HRA. The buffer area of 17 km around the whole district is larger (and therefore more precautionary) than that used during the HRA of the Core Strategy and is considered appropriate for ensuring that all European sites that could potentially be significantly affected by development are identified and included in the assessment.
- 3.4 The following European sites fall within 17 km of South Oxfordshire District and have been included in the HRA:
- Aston Rowant SAC;
 - Burnham Beeches SAC;
 - Chilterns Beechwoods SAC;
 - Cothill Fen SAC;
 - Hackpen Hills SAC;
 - Hartslock Wood SAC;
 - Kennet and Lambourn Floodplain SAC;
 - Little Wittenham SAC;
 - Oxford Meadows SAC;
 - River Lambourn SAC;
 - Thames Basin Heaths SPA; and
 - Windsor Forest and Great Park SAC.
- 3.5 Detailed information about the location, qualifying features and vulnerabilities of the European sites included in the assessment is presented in **Appendix 1**. The locations of the European sites are mapped in **Figure 3.1**.

Figure 3-1 European sites within 17km of South Oxfordshire



Assessment of 'likely significant effects' of the Local Plan

- 3.6 As required under Regulation 102 of the Conservation of Habitats and Species Regulations 2010²⁰ (the 'Habitats Regulations'), an assessment has been undertaken of the 'likely significant effects' of the Local Plan. A screening matrix has been prepared in order to identify which policies or site allocations would be likely to have a significant effect on European sites in and around South Oxfordshire, without taking mitigation into account. Within the matrix, consideration has been given to the potential for the development proposed at each site to result in significant effects associated with:
- Physical loss of/damage to habitat;
 - Non-physical disturbance e.g. noise/vibration or light pollution;
 - Air pollution;
 - Increased recreation pressure; and
 - Changes to hydrological regimes.
- 3.7 The detailed screening matrix can be found in **Appendix 3** of this report and the findings are described in more detail in **Chapter 4**, where the potential to mitigate the possible significant effects identified is also considered.
- 3.8 This approach allows for consideration to be given to the cumulative impacts of the policies or site allocations as well as simply focussing on each individually.
- 3.9 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' has only been 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 European site.
- 3.10 A 'traffic light' approach has been used in the screening matrix to record the likely impacts of the policies and site allocations on European sites and their qualifying habitats and species, using the colour categories shown below.

| | |
|-------|--|
| Red | There are likely to be significant effects (Appropriate Assessment required). |
| Amber | There may be significant effects, but this is currently uncertain (Appropriate Assessment required). |
| Green | There are unlikely to be significant effects (Appropriate Assessment not required). |

Interpretation of 'likely significant effect'

- 3.11 Relevant case law helps to interpret when effects should be considered as a likely significant effect, when carrying out HRA of a land use plan.
- 3.12 In the Waddenzee case²¹, 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

²⁰ SI No. 2010/490

²¹ ECJ Case C-127/02 "Waddenzee" Jan 2004.

- 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).
- 3.13 A relevant opinion delivered to the Court of Justice of the European Union²² 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.”*
- 3.14 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 “that 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’.

Mitigation provided by the Local Plan

- 3.15 Some of the potential effects identified could be mitigated through the implementation of policies within the Local Plan itself. These include policies relating to the provision of improved sustainable transport links which could help to mitigate potential increases in air pollution associated with increased vehicle traffic, and the provision of green infrastructure within new developments which may help to relieve increases in visitor pressure at European sites.
- 3.16 This potential mitigation has been taken into consideration during the screening process and has influenced the screening assumptions set out below and screening conclusions (see **Chapter 4**). Where it has been possible to conclude that there would be no likely significant effects taking into account mitigation, then there is no need to carry out Appropriate Assessment.

Screening assumptions and information used in reaching conclusions about likely significant effects

- 3.17 The screening stage of the HRA has taken the approach of screening each Local Plan policy and site allocation individually.
- 3.18 For some types of impacts, screening for likely significant effects has been determined on a proximity basis, using GIS data to determine the proximity of potential development locations to the European 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, during the screening stage a number of assumptions have been applied in relation to assessing the likely significant effects on European sites that may result from the Local Plan, as explained below. These assumptions draw from the information gathered during the screening of earlier HRAs, as well as the conclusions of that work.

Physical loss of or damage to habitat

- 3.19 Any development resulting from the Local Plan will be located within South Oxfordshire district; therefore loss of habitat from within the boundaries of a European site can be ruled out in relation to those sites that lie entirely outside of South Oxfordshire (i.e. Burnham Beeches SAC, Cothill Fen SAC, Hackpen Hill SAC, Kennet and Lambourn Floodplain SAC,

²² Advocate General’s Opinion to CJEU in Case C-258/11 Sweetman and others v An Bord Pleanala 22nd Nov 2012.

Oxford Meadows SAC, River Lambourn SAC, Windsor Forest & Great Park SAC, and Thames Basin Heaths SPA). The potential for loss of habitat from within the boundaries of any European site that lies wholly or partially within the district (Aston Rowant SAC, Chilterns Beechwoods SAC, Hartslock Wood SAC, and Little Wittenham SAC) could occur if Local Plan proposals could result in development coming forward in those areas. However, in reality the legal protection afforded to European sites means that this is highly unlikely.

- 3.20 Loss of habitat from outside of the boundaries of a European site could also affect the integrity of that site if it occurs in an area used by the qualifying species of the site (e.g. for off-site breeding, foraging or roosting).
- 3.21 Several of the European sites included in the HRA have mobile species amongst their qualifying features that could travel outside of the site to make use of other areas of habitat. The European sites that have mobile species amongst their qualifying features are:
 - Chilterns Beechwoods SAC: stag beetle;
 - Little Wittenham SAC: great crested newt;
 - River Lambourn SAC: brook lamprey and bullhead;
 - Kennet and Lambourn Floodplain SAC: Desmoulins's whorl snail;
 - Windsor Forest and Great Park SAC: violet click beetle; and
 - Thames Basin Heaths SPA: Dartford warbler, nightjar and woodlark.
- 3.22 Where stag beetle is a qualifying feature of a site, the individuals may travel outside of the SAC boundary, although it is unlikely that they will travel far: it is generally only the male stag beetle that flies during the summer months, and the female beetle rarely flies.²³ The preferred habitat for stag beetles is old, established woodland, and the larvae feed on rotting tree matter.¹⁶ As the beetle larvae take years to develop, they have been vulnerable to tree clearance and the 'tidying up' of wood in parks and especially gardens.²⁴ Research²⁵ suggests that 2km may be an appropriate buffer inside which sites could be functionally connected, as this is the distance that males travel to females during the breeding season. Chilterns Beechwoods SAC is a composite of nine SSSIs. Bisham Woods SSSI, which is the part of the Chiltern Beechwoods SAC that supports the qualifying stag beetle population, is greater than 2km from the district boundary. Therefore potential loss of or damage to off-site habitats associated with Chilterns Beechwoods SAC can be screened out of further assessment.
- 3.23 Great crested newts will travel away from their breeding ponds, during the terrestrial phase of their lifecycle, but not large distances. 500 metres²⁶ is considered an appropriate buffer distance inside which great crested newts might be found, from their breeding location. The site listing for Little Wittenham SAC²⁷ states that great crested newts have been found to range several hundred metres into the site's woodland blocks. Research has found that great crested newts at Little Wittenham SAC migrate within woodland and do not over-winter in the arable farmland²⁸. All of the woodland within 500 metres of the ponds at Little Wittenham SAC is within the SAC boundary. Therefore potential loss of or damage to off-site habitats associated with Little Wittenham SAC can be screened out of further assessment.
- 3.24 The River Lambourn SAC (15km outside the district), Kennet and Lambourn Floodplain SAC (15km outside the district), and Windsor Forest and Great Park SAC (13km outside the district) have mobile qualifying features that are limited in range and are sufficient distance from potential development in South Oxfordshire that potential impacts on off-site habitats can be ruled out. Therefore, potential loss of or damage to off-site habitats associated with

²³ <https://www.royalparks.org.uk/parks/richmond-park/richmond-park-attractions/wildlife/stag-beetles>

²⁴ <http://www.arkive.org/stag-beetle/lucanus-cervus/>

²⁵ <http://onlinelibrary.wiley.com/doi/10.1111/j.1469-7998.2006.00282.x/abstract>

²⁶ <https://www.gov.uk/guidance/great-crested-newts-surveys-and-mitigation-for-development-projects>

²⁷ <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCODE=UK0030184>

²⁸ http://etheses.dur.ac.uk/6683/1/6683_3987.PDF

the River Lambourn SAC, Kennet and Lambourn Floodplain SAC, and Windsor Forest & Great Park SAC can be screened out of further assessment.

- 3.25 Thames Basin Heaths SPA is located approximately 13 km outside of the district. This is considered to be far enough that effects on its qualifying bird species can be ruled out in relation to the loss of or damage to off-site habitat used for breeding, foraging or roosting, particularly during breeding seasons. In coming to this judgement, we have made reference to the Thames Basin Heaths SPA Delivery Framework²⁹. This document has been endorsed by the Thames Basin Heaths Joint Strategic Partnership Board, the body established to agree arrangements for the long term protection of the SPA. The Framework advises that avoidance measures are necessary in relation to all residential development within a 'Zone of Influence' from 400 m to 5 km from the perimeter of the SPA and that applications for large scale development (over 50 houses) between 5 km and 7 km from the edge of the SPA should be assessed on a case by case basis. There is a presumption against development within 400 m of the SPA unless an Appropriate Assessment demonstrates that the development will not have an adverse effect on the integrity of the SPA. As the site is 13km from the district boundary, potential loss of or damage to off-site habitats associated with Thames Basin Heaths SPA can be screened out of further assessment.
- 3.26 **The physical loss of or damage to European site habitats (on-site or off-site) can therefore be screened out of further assessment, for all sites.**

Non-physical disturbance: noise, vibration and light pollution

- 3.27 Noise and vibration effects, e.g. during the construction of new housing development, are most likely to disturb bird species and are thus a key consideration with respect to European sites where birds are the qualifying features, although such effects may also impact upon some mammals and fish species.
- 3.28 Using a precautionary approach, we have assumed that the effects of noise, vibration and light are most likely to be significant if development takes place within 500 metres of a European site with qualifying features sensitive to these disturbances, or known off-site breeding, foraging or roosting areas.
- 3.29 Artificial lighting at night (e.g. from street lamps, flood lighting and security lights) is most likely to affect nocturnal species e.g. bats, and therefore have an adverse effect on the integrity of European sites where nocturnal species are a qualifying feature. None of the European sites within 17km of South Oxfordshire have bats as a qualifying feature. Although nightjar, which are a qualifying species of the Thames Basin Heaths SAC, are nocturnal the site is c.13km outside the district. Stag beetles, which are a qualifying feature of Chilterns Beechwoods SAC can be nocturnal. Adult male stag beetles do fly around dusk during May-August³⁰, but although they can be attracted by light it is not known to be a significant factor in stag beetle mortality. As noted above, the most commonly referred to threat to stag beetles is tree clearance and the 'tidying up' of wood in parks and especially gardens. Potential impacts due to lighting can therefore be screened out of further assessment.
- 3.30 Noise and vibration only have the potential to affect European sites that are within or immediately adjacent to the district boundary. Hartslock Wood SAC and Aston Rowant SAC are both designated for their habitats and are not therefore sensitive to noise and vibration. The qualifying species of Little Wittenham SAC (great crested newts) and Chilterns Beechwoods SAC (stag beetle) are not considered to be sensitive to noise and vibration.
- 3.31 **Therefore, impacts in relation to noise, vibration and light pollution can be screened out of further assessment, for all sites.**

²⁹ http://www.waverley.gov.uk/downloads/file/3503/thames_basin_heaths_spa_delivery_framework_2009_-_thames_basin_heaths_joint_strategic_partnership_board

³⁰ <http://www.ypte.org.uk/animal/beetle-stag-/53>

Air pollution

- 3.32 Air pollution is most likely to affect European 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.
- 3.33 In terms of vehicle traffic, nitrogen oxides (NO_x, i.e. NO and NO₂) are considered to be the key pollutants. Deposition of nitrogen compounds may lead to both soil and freshwater acidification, and NO_x can cause eutrophication of soils and water.
- 3.34 Based on the Highways Agency Design for Road and Bridges (DMRB) Manual Volume 11, Section 3, Part 1³¹ (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 200 m from the road itself. Where increases in traffic volumes are forecast, this 200 m buffer needs to be applied to the relevant roads in order to make a judgement about the likely geographical extent of air pollution impacts.
- 3.35 The DMRB Guidance for the assessment of local air quality in relation to highways developments provides criteria that should be applied at the screening stage of an assessment of a plan or project, 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.
- 3.36 Recent case law, known as the Wealden judgement³², has revised the method by which Natural England expects to see in-combination air pollution effects assessed. The implication of the judgement 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.
- 3.37 It has been assumed that only those roads forming part of the primary road network³³ (motorways and 'A' roads) might be likely to experience any significant increases in vehicle traffic as a result of development (i.e. greater than 1,000 AADT). As such, where a site is not within 200 m of a motorway or 'A' road, likely significant effects from traffic-related air pollution were ruled out.
- 3.38 The European sites around South Oxfordshire that are within 200 m of strategic roads are Aston Rowant SAC (M40), Burnham Beeches SAC (A355), Chilterns Beechwoods SAC (A404, A4010), Kennet and Lambourn Floodplain SAC (A4, A34), Oxford Meadows SAC (A34, A40), River Lambourn SAC (M4, A4, A339, A34, A338) and Windsor Forest and Great Park SAC (A332, A329).

³¹ <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/ha20707.pdf>

³² Wealden District Council v. (1) Secretary of State for Communities and Local Government; (2) Lewes District Council; (3) South Downs National Park Authority and Natural England

³³ This was queried in a comment received during the Regulation 18 consultation on the previous draft of the HRA. An explanatory response is provided in Appendix 4.

- 3.39 However, the Site Improvement Plans for Kennet and Lambourn Floodplain SAC³⁴, Oxford Meadows SAC³⁵ and River Lambourn SAC²⁴ do not identify air pollution as a threat or pressure. While Site Improvement Plans provide an indication of the current threats and pressures at a site, and do not predict future changes, they do provide information on the aspects of the sites' ecology that are likely to be the most sensitive to development. The Kennet and Lambourn Floodplain SAC, Oxford Meadows SAC and River Lambourn SAC are all sites at which physical changes to the aquatic environment, invasive aquatic species or changes to land management are the main threats or pressures, despite the sites being situated close to major settlements (Oxford and Newbury) and the roads that serve them. These sites are therefore not considered to be particularly sensitive to air pollution.
- 3.40 Following consultation on the previous draft of this HRA report (Regulation 18 consultation), Natural England challenged the screening-out of air pollution effects at Oxford Meadows based on the Site Improvement Plan. Further consideration of the sensitivity of the site indicates that it should be possible to screen out the site on the basis of its low sensitivity to aerial N deposition (see **Appendix 4**); however, in light of subsequent information on traffic flows close to the site (see below), the site can be screened out on the basis of traffic flows.
- 3.41 SODC has commissioned Atkins to model the effects of the Local Plan on traffic flows within the district. Data from this work has enabled air pollution impacts relating to the Local Plan alone to be screened out for all sites, and impacts from the Local Plan in combination with other plans or projects to be screened out for Oxford Meadows SAC, as follows.
- 3.42 The roads considered and the availability of traffic data are shown in **Table 3.1**.

Table 3-1 The availability of traffic data for roads within 200m of sensitive European sites

| European site | Road | Distance from South Oxfordshire boundary (straight line distance) | Data availability |
|-----------------------------------|-------|---|--|
| Aston Rowant SAC | M40 | c.500m within boundary | These sections of the M40 and A34 are within the South Oxfordshire traffic model, therefore AADT data is available. However, as they are close to the edge of the district, the data should be treated with caution. |
| Oxford Meadows SAC | A34 | c.3km beyond boundary | |
| | A40 | c.4km beyond boundary | |
| Burnham Beeches SAC | A355 | c.19.5km beyond boundary | This is outside the modelled area, therefore Atkins have applied factors from the closest M40 site as a reasonable approximation to produce indicative AADT data. This data indicates forecast degree of change rather than absolute change. |
| Chilterns Beechwoods SAC | A404 | c.9km beyond boundary | |
| | A4010 | c.7km beyond boundary | |
| Windsor Forest and Great Park SAC | A322 | c.17km beyond boundary | |
| | A329 | c.21km beyond boundary | These roads are outside the traffic model – in some cases far beyond it – therefore AADT data is not available. Atkins have advised that data for the main strategic roads out of the district (the M40 and A34) provide a suitable indication of the degree of change in traffic flows that might be observed on other roads out of the district, in the direction of these SACs. |

- 3.43 The traffic model produced data for the following scenarios, as shown in **Table 3.2**:
- 2016 baseline, from traffic count data;
 - 2031 future baseline, from traffic model; and
 - 2031 baseline plus the Local Plan.

³⁴ <http://publications.naturalengland.org.uk/publication/4738329056641024>

³⁵ <http://publications.naturalengland.org.uk/publication/4942743310696448>

- 3.44 Any transport schemes that will come forward as part of the Local Plan³⁶ were included in the traffic model with other Local Plan development. Transport schemes that are identified in the Local Plan but may not come forward were either assessed separately in a 'with mitigation'³⁷ scenario, or excluded³⁸. As this additional 'mitigation' may not occur, it has not been taken into account here. The traffic data below therefore represents a worse case than may be achieved if all transport proposals are implemented.

Table 3-2 Estimated traffic flows (total AADT) for modelled scenarios

| Scenario | M40 near Aston Rowant SAC | A34 near Oxford Meadows SAC | A40 near Oxford Meadows SAC |
|---------------------------|---------------------------|-----------------------------|-----------------------------|
| 2016 baseline | 98,571 | 60,799 | 20,808 |
| 2031 future baseline | 107,360 | 66,970 | 22,861 |
| 2031 with Local Plan | 107,857 | 66,913 | 22,876 |
| Change without Local Plan | 8,789 | 6,171 | 2,053 |
| Change due to Local Plan | 497 | -57 | 15 |

- 3.45 Even when the data shown in **Table 3.2** is taken with a degree of caution, it shows that the change in traffic flows due to the Local Plan alone is likely to be significantly below the 1,000 AADT screening criteria (paragraph 3.35), for the roads adjacent to Aston Rowant SAC and Oxford Meadows SAC. As these are the sites nearest to South Oxfordshire, it is likely that the contribution from the Local Plan to traffic flows on the roads adjacent to the other sites is likely to be even smaller. Air pollution impacts relating to the Local Plan alone can therefore be screened out of further assessments.
- 3.46 For the roads adjacent to Oxford Meadows SAC, the data shows that the contribution from the South Oxfordshire Local Plan is likely to be negligible and may result in a reduction in traffic flows past the site. Therefore even if the in-combination effects of development are significant, the contribution of the plan to any such effect can reasonably be regarded as *de minimis*, and any in-combination effects at Oxford Meadows SAC have therefore been screened out from any further assessment³⁹.
- 3.47 Following the Wealden Judgement, in-combination effects relating to air pollution from the M40 at Aston Rowant SAC should be screened in, since traffic flows are expected to increase over the plan period by c.8,789 AADT plus contributions from the Local Plan.
- 3.48 No traffic data are available for the roads adjacent to Burnham Beeches SAC, Chilterns Beechwoods SAC and Windsor Forest & Great Park SAC, as they are located too far outside of the Atkins model network to be reasonably or reliably predicted. Although these locations lie within the initial screening radius of 17km, the actual distance which would need to be travelled to reach these locations by car from the plan area exceeds this distance for most routes e.g. Henley on Thames to Burnham Beeches is 17km as the crow flies, however the quickest route by car is 32km⁴⁰. It can therefore reasonably be expected that the contribution of growth within the local plan area to traffic flows at these locations

³⁶ Clifton Hampden Bypass, Culham to Didcot Thames River Crossing, Didcot Northern Perimeter Road, and Science Bridge.

³⁷ Benson Bypass, Stadhampton Bypass, Watlington Bypass, and Golden Balls Roundabout.

³⁸ A4130 Didcot to Wallingford Road Safety Improvements, Abingdon Southern Bypass, Didcot Central Corridor Improvements, Sandford Park and Ride, and Didcot Southern Spine Road.

³⁹ As agreed during meeting with Natural England, 2nd November, 2017

40 Google maps <https://www.google.co.uk/maps/dir/Henley-on-Thames/Farnham+Common/@51.5570679,-0.8280697,12z/data=!3m1!4b1!4m1!4m1!3m1m1!1s0x48768542ad0cb2ab:0x50b007c5953c9c7d!2m2!1d-0.902894!2d51.535764!1m5!1m1!1s0x48766451f9eebb71:0x62b6b9d2577b14ab!2m2!1d-0.6115895!2d51.559996!3e0>

would be *de minimis*, and as such they have been screened out from any further assessment⁴¹.

- 3.49 **Therefore, only the potential impacts of air pollution resulting from the Local Plan in combination with other plans or projects have been screened in, in relation to Aston Rowant SAC. Potential impacts of air pollution from all other European sites are screened out.**

Impacts of recreation

- 3.50 Recreation activities and human presence more generally can have an adverse impact on the integrity of a European site, for example as a result of disturbance of sensitive animal species, trampling of plant species or habitat erosion. Where development is likely to result in an increase in the local population, the potential for an increase in visitor numbers and the associated impacts at sensitive European sites have been considered.
- 3.51 We have assumed that all of the sites within the scope of the HRA have the potential to be vulnerable to recreation impacts such as erosion, trampling or species disturbance to some degree. Those European sites that are closest to, most accessible to or most attractive to the residents of the locations where development is proposed are most likely to be affected. The South Oxfordshire Open Space User Survey (2005) reported that 35% of people are prepared to travel for 15 minutes and 45% of people are prepared to travel by car to access natural and semi-natural greenspace⁴². Visitor surveys⁴³ at Little Wittenham SAC also identified that the majority of the visitors to the site live within 20 minutes driving time (i.e. including Abingdon, which is c.8km from the site).
- 3.52 It is difficult to convert these statistics into an average travel distance by all travel modes to access natural and semi-natural greenspace. As a benchmark, therefore, we have made reference to the 'Zone of Influence' identified by the Thames Basin Heaths SPA Delivery Framework⁴⁴. Whilst it is recognised that the other European sites scoped into this HRA have different designated features to Thames Basin Heaths SPA, the SPA Delivery Framework is primarily concerned with avoiding adverse recreational or urbanising effects from residential development and the buffer distances it defines are judged to provide a reasonable proxy for the distance from housing development within which likely significant recreational effects cannot be ruled out.
- 3.53 As set out above in relation to loss or damage of habitat, the Framework advises that there is a presumption against development within 400 m of the European site (assumed adverse effect on integrity unless site-specific Appropriate Assessment demonstrates otherwise), that avoidance measures are necessary in relation to all residential development within a Zone of Influence from 400 metres to 5km from the perimeter of the European site and that applications for large scale development (over 50 houses) between 5km and 7km from the edge of the European site should be assessed on a case by case basis. The potential for effects will depend upon the scale of development proposed and the features for which the site is designated; however, as a conservative estimate, it has been assumed that any development within 7km of a sensitive site could have impacts due to recreation. Where site-specific information indicates that development beyond 7km could produce recreation impacts, this will be taken into account; for example at Little Wittenham SAC, where development in Abingdon (Vale of White Horse District) could be relevant.
- 3.54 Aston Rowant SAC, Chilterns Beechwoods SAC, Hartslock Wood SAC and Little Wittenham SAC all lie wholly or partially within the district. Cothill Fen SAC is c.4.5km outside the district and Oxford Meadows SAC is c.2km outside the district. The other European sites are greater than 7km outside the district.

⁴¹ As agreed during meeting with Natural England, 2nd November, 2017

⁴² <http://www.southoxon.gov.uk/sites/default/files/Standards%20summary%20with%20justification.pdf>

⁴³ Earth Trust (2016) *Statement of Need for Improvements to the Earth Trust Centre*

⁴⁴ http://www.waverley.gov.uk/downloads/file/3503/thames_basin_heaths_spa_delivery_framework_2009_-_thames_basin_heaths_joint_strategic_partnership_board

- 3.55 Natural England's Site Improvement Plans record the threats and pressures relevant to each European site. Public access or disturbance are not identified as a current threat or pressure at the following sites, despite them lying close to large settlements:
- Aston Rowant SAC⁴⁵: c.7km from Thame;
 - Hartslock Wood SAC⁴⁶: <2km from Goring and Pangbourne;
 - Cothill Fen SAC⁴⁷: c.2.5km from Abingdon; or
 - Oxford Meadows SAC⁴⁸: in Oxford.
- 3.56 These sites all lie close to or beyond the South Oxfordshire District boundary. HRAs carried out of the neighbouring authorities' plans have concluded that their plans will not have a significant effect on these sites due to recreation pressure.
- 3.57 Following consultation on an earlier draft of this HRA report, as part of the Local Plan Second Preferred Options (Regulation 18) consultation, Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) provided comments suggesting that potential recreation impacts at Aston Rowant SAC and Cothill Fen SAC should be screened in for further assessment.
- 3.58 Subsequent discussions with Natural England officers, however, provided reassurance that the sites are not particularly sensitive to increases in recreation pressure, for the following reasons:
- Cothill Fen SAC: The site is not generally promoted for public access and is unlikely to attract visitors from a long distance. Development very close to the site could generate visitors (e.g. dog walkers from within c.1km away), but as the site is very wet, visitors naturally follow the boardwalk paths. The site is mainly considered to be sensitive to changes in groundwater or hydrology, not recreation; and
 - Aston Rowant SAC: The site's qualifying features are considered to be fairly resilient to recreation pressure, with changes to habitat management more likely to be an issue. Access to the site can be effectively managed as there are two relatively small car parks and only two main footpaths; there are no plans to increase parking capacity or change the access management policy.
- 3.59 BBOWT's comments and the views of Natural England are presented more fully in **Appendix 4**).
- 3.60 At Chiltern Beechwoods SAC, public access / disturbance is only identified in relation to the stag beetle population. The portion of the SAC that supports the stag beetle population (Bisham Woods SSSI) is greater than 7km from the district boundary. Public access or disturbance is, however, identified as a threat to the great crested newt population at Little Wittenham SAC⁴⁹.
- 3.61 **The impacts of recreation are therefore screened in in relation to Little Wittenham SAC, but screened out in relation to all other European sites.**

Water quantity and quality

- 3.62 European sites at which aquatic or wetland environments support qualifying features have the potential to be affected by changes in water quantity or quality. The European sites with aquatic or wetland habitats, or those identified as sensitive to changes in water quality or quantity are:
- Cothill Fen SAC: has calcium-rich springwater-fed fens that have been identified as sensitive to water pollution and hydrological changes²⁸;

⁴⁵ Site Improvement Plan for Aston Rowant SAC: <http://publications.naturalengland.org.uk/publication/4960794580090880>

⁴⁶ Site Improvement Plan for Hartslock Wood SAC: <http://publications.naturalengland.org.uk/publication/4874314121740288>

⁴⁷ Site Improvement Plan for Cothill Fen SAC: <http://publications.naturalengland.org.uk/publication/6482436405854208>

⁴⁸ Site Improvement Plan for Oxford Meadows SAC: <http://publications.naturalengland.org.uk/publication/4942743310696448>

⁴⁹ Site Improvement Plan for Little Wittenham SAC: <http://publications.naturalengland.org.uk/publication/6567758347108352>

- River Lambourn SAC and Kennet & Lambourn Floodplain SAC: river habitats that support qualifying invertebrate and fish species; identified as sensitive to water pollution and hydrological changes (including water levels, siltation and flood defences)⁵⁰;
 - Little Wittenham SAC: its ponds support great crested newts, but changes to water quality or quantity have not been identified as an issue at this site⁵¹; this site has therefore been screened out;
 - Oxford Meadows SAC: lowland hay meadows, identified as sensitive to hydrological changes⁵²; and
 - Thames Basin Heaths SPA: includes wetland heath that has been identified as sensitive to hydrological changes.⁵³
- 3.63 The types of development in the Local Plan that have the potential to affect water quality / quantity or flow regimes at sensitive European sites are:
- Residential or employment development that would involve a significant increase in demand for water supply and treatment; and
 - Infrastructure development that requires significant excavation in proximity to watercourses or groundwater.
- 3.64 Changes to demand for water supply and disposal impact upon the locations where water is abstracted or treated, whereas excavation impacts upon locations that are hydrologically connected to the development site.
- 3.65 Hydrological connectivity can occur in proximity to a river, where development would be upstream of a European site on the same river, or via groundwater where development has the potential to affect an aquifer that the European site lies over.
- 3.66 The potential for effects relating to water supply and disposal has been considered with reference to SODC's Water Cycle Study⁵⁴, which is based on the Local Plan Preferred Options document. Although the housing numbers in the Submission Draft of the Local Plan vary slightly, the relative distribution of development between the major settlements is similar and the overall numbers are lower than those assessed in the Water Cycle Study, therefore the assessment can be regarded as precautionary.
- 3.67 The Water Cycle Study has concluded that water supply will not be a constraint to development, although infrastructure upgrades may be required to enable development at Wallingford, Didcot, Chalgrove Airfield, Chinnor, Culham and Berinsfield.
- 3.68 The assessment of the water quality effects of increased pressure on waste water treatment facilities is summarised in **Table 3-3**.

Table 3-3 Summary of Water Cycle Study findings on water quality

| Waste water treatment works (& other main settlements served) | Discharges to | Predicted impact of development |
|--|----------------------|---|
| Benson (& Crowmarsh) | Howbery Ditch | Capacity available to serve the proposed growth |
| Chalgrove | Haseley Brook | Major extension or rebuild of works required |
| Chinnor | Kingsey Cuttle Brook | Capacity available to serve the proposed growth |

⁵⁰ Site Improvement Plan for River Lambourn SAC and Kennet & Lambourn Floodplain SAC
<http://publications.naturalengland.org.uk/publication/4738329056641024>

⁵¹ Site Improvement Plan for Little Wittenham SAC <http://publications.naturalengland.org.uk/publication/6567758347108352>

⁵² Site Improvement Plan for Oxford Meadows SAC <http://publications.naturalengland.org.uk/publication/4942743310696448>

⁵³ Site Improvement Plan for Thames Basin Heaths SPA <http://publications.naturalengland.org.uk/publication/6249258780983296>

⁵⁴ JBA Consulting (2017) South Oxfordshire District Council – Water Cycle Study, Phase 1 & 2 Final Report

| Waste water treatment works (& other main settlements served) | Discharges to | Predicted impact of development |
|--|-----------------------|--|
| Cholsey (& Wallingford) | Cholsey Brook | Tightening of permits and infrastructure upgrades required to accommodate growth |
| Culham | Clifton Hampden Ditch | Tightening of permits and infrastructure upgrades required to accommodate growth |
| Didcot | Moor Ditch | Capacity available to serve the proposed growth |
| Goring (& Woodcote) | River Thames | Capacity available to serve the proposed growth |
| Henley-on-Thames | Fawley Court Stream | Capacity available to serve the proposed growth |
| Nettlebed | Groundwater | Not assessed (groundwater discharge) |
| Sonning Common | Groundwater | Not assessed (groundwater discharge) |
| Thame | Scotsgrove Brook | Capacity available to serve the proposed growth |
| Watlington | Pyrton Stream | Capacity available to serve the proposed growth |
| Wheatley | River Thame | Capacity available to serve the proposed growth |

- 3.69 None of the European sites that are sensitive to changes in water quality or quantity are downstream of those treatment works where water quality has been identified as a significant issue.
- 3.70 With regards to flow capacity, infrastructure improvements are required at all waste water works to accommodate the proposed growth, however major constraints have been identified at Chalgrove, Didcot, Thame and Wheatley.
- 3.71 In addition, the European sites fed by groundwater are not at risk from abstraction, as confirmed by the Environment Agency in response to the previous (2015) HRA work (see also **Appendix 4**):
- “Water supply for Kennet and Lambourn Floodplain and River Lambourn is from the chalk of the Kennet catchment. Under CAMS this aquifer has no available resource - so no new source of water will come from this catchment.”*
- 3.72 **Potential water quality and hydrological impacts have therefore been screened out for all sites⁵⁵.**

Identification of other plans and projects which may have ‘in-combination’ effects

- 3.73 Regulation 102 of the Amended Habitats Regulations 2010 requires an Appropriate Assessment where “a land use plan is likely to have a significant effect on a European 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”.
- 3.74 The first stage in identifying ‘in-combination’ effects involves identifying which other plans and projects in addition to the South Oxfordshire Local Plan may affect the European sites that were the focus of this assessment. There are a large number of potentially relevant plans and projects which could be considered; therefore the review at this stage focused on planned spatial growth within the authorities adjacent to or near South Oxfordshire. **Appendix 2** lists the plans that were reviewed, outlining the components of each plan that

⁵⁵ Please note that the previous version of the HRA (consulted on with the Local Plan Second Preferred Options) incorrectly stated here that several European sites would be screened in for the assessment of potential water quantity and quality impacts. This should have been updated once information from the water cycle study was available; the rest of the HRA report did correctly proceed with all sites screened out.

could have an impact on nearby European sites and considering the findings of the accompanying HRA work (where available).

- 3.75 The purpose of the review of other plans was to identify any components that could have an impact on the European sites within and around South Oxfordshire that could also be significantly affected by the Local Plan, e.g. proposals for development near to these sites which could have implications in terms of increased traffic, water use and recreation pressures and infrastructure development. The potential for the effects of these plans to combine with the effects of the Local Plan has been considered in the next chapter and will continue to be assessed where necessary during further iterations of the HRA (if required).
- 3.76 HRAs of the following neighbouring local authorities' plans found no significant effects on European sites, either alone or in combination with other plans:
- Aylesbury Vale District Council;
 - Cherwell District Council;
 - Oxfordshire County Council (Local Transport Plan and Waste Core Strategy only);
 - Oxford City Council;
 - Reading Borough Council.
 - Vale of White Horse District Council;
 - Wycombe District Council;
 - Wokingham Borough Council; and
 - West Berkshire Council.
- 3.77 The following authority is yet to conclude the HRA work for their current plan:
- Oxfordshire County Council (Waste Site Allocations DPD only).

4 HRA Screening Assessment

- 4.1 As described in **Chapter 3**, a screening assessment has been carried out in order to identify the likely significant effects of the Local Plan on the European sites in and around the district. The full screening matrix used for this assessment can be found in **Appendix 3** and the findings are summarised in **Table 4.1** and the sections below. This HRA report has taken the approach of screening each policy and site allocation individually, which is consistent with current guidance. In reality, however, the Local Plan policies will combine to deliver the overall scale of development within the district and the in-combination effects of the policies together have therefore been taken into consideration where relevant.

Table 4-1 Summary of HRA screening findings for each policy: likelihood* of air and recreation effects

| Policy | Air | Rec. | Policy | Air | Rec. | Policy | Air | Rec. |
|---------|-----|------|--------|-----|------|--------|-----|------|
| STRAT1 | n/a | n/a | H3 | n/a | | H20 | n/a | n/a |
| STRAT2 | | | H4 | n/a | | H21 | n/a | n/a |
| STRAT3 | | | H5 | n/a | | H22 | n/a | n/a |
| STRAT4 | n/a | n/a | H6 | n/a | | EMP1 | | n/a |
| STRAT5 | n/a | n/a | H7 | n/a | | EMP2 | n/a | n/a |
| STRAT6 | n/a | n/a | H8 | n/a | | EMP3 | n/a | n/a |
| STRAT7 | n/a | | H9 | n/a | n/a | EMP4 | n/a | n/a |
| STRAT8 | n/a | | H10 | n/a | n/a | EMP5 | n/a | n/a |
| STRAT8i | n/a | n/a | H11 | n/a | n/a | EMP6 | n/a | n/a |
| STRAT9 | n/a | | H12 | n/a | n/a | EMP7 | n/a | n/a |
| STRAT10 | n/a | | H13 | n/a | n/a | EMP8 | n/a | n/a |
| STRAT11 | n/a | n/a | H14 | n/a | | EMP9 | n/a | n/a |
| HEN1 | n/a | n/a | H15 | n/a | | EMP10 | n/a | n/a |
| TH1 | n/a | n/a | H16 | n/a | | EMP11 | n/a | n/a |
| WAL1 | n/a | n/a | H17 | n/a | n/a | EMP12 | | |
| H1 | n/a | n/a | H18 | n/a | n/a | EMP13 | | n/a |
| H2 | n/a | | H19 | n/a | n/a | EMP14 | | |

*Green = Unlikely significant effects; Orange = Uncertain effects; n/a = impact is not relevant to the policy

Table continued overleaf...

...continued

| Policy | Air | Rec. | Policy | Air | Rec. | Policy | Air | Rec. |
|--------|-----|------|--------|-----|------|--------|-----|------|
| INF1 | n/a | n/a | ENV6 | n/a | n/a | DES5 | n/a | n/a |
| TRANS1 | | n/a | ENV7 | n/a | n/a | DES6 | n/a | n/a |
| TRANS2 | n/a | n/a | ENV8 | n/a | n/a | DES7 | n/a | n/a |
| TRANS3 | n/a | n/a | ENV9 | n/a | n/a | DES8 | n/a | n/a |
| TRANS4 | n/a | n/a | ENV10 | n/a | n/a | DES9 | n/a | n/a |
| TRANS5 | n/a | n/a | ENV11 | n/a | n/a | DES10 | n/a | n/a |
| TRANS6 | n/a | n/a | ENV12 | n/a | n/a | TC1 | n/a | n/a |
| TRANS7 | n/a | n/a | EP1 | n/a | n/a | TC2 | | n/a |
| INF2 | n/a | n/a | EP2 | n/a | n/a | TC3 | n/a | n/a |
| INF3 | n/a | n/a | EP3 | n/a | n/a | CF1 | n/a | n/a |
| INF4 | n/a | n/a | EP4 | n/a | n/a | CF2 | | n/a |
| ENV1 | n/a | n/a | EP5 | n/a | n/a | CF3 | | n/a |
| ENV2 | n/a | n/a | DES1 | n/a | n/a | CF4 | n/a | n/a |
| ENV3 | n/a | n/a | DES2 | n/a | n/a | CF5 | n/a | n/a |
| ENV4 | n/a | n/a | DES3 | n/a | n/a | | | |
| ENV5 | n/a | n/a | DES4 | n/a | n/a | | | |

Significant effects likely

- 4.2 **None of the policies or site allocations** in the Local Plan is considered **likely** to result in significant effects on the European sites in and around South Oxfordshire.

Significant effects unlikely

- 4.3 Significant effects are considered **unlikely** in relation to **most of the Local Plan policies**, either because the policies will not result in new development or because the scale, nature or location of the development proposed will not have an effect on European sites. In some cases the policies also provide mitigation for the impacts of other policies in the plan.
- 4.4 The following 70 policies are screened out either because:
- They will not result directly in development, i.e. they set out criteria for development that will be determined under other more specific policies, which have been screened separately for their impacts on European sites; or
 - The development they will result in has been assessed in relation to an overarching policy, e.g. because air pollution is the only relevant impact type and only in-combination effects need to be considered in relation to it.
 - STRAT1 - The Overall Strategy;
 - STRAT4 - Didcot Garden Town;
 - STRAT5 - Strategic Allocationst;
 - STRAT6 - Culham Science Centre;
 - STRAT8i: Berinsfield Local Green Space;
 - STRAT11: Green Belt
 - HEN1 - The Strategy for Henley-on-Thames;
 - TH1 - The Strategy for Thame;
 - H1 – Delivering New Homes;
 - H9 – Affordable Housing;
 - H10 – Exception Sites;
 - H11 –Housing Mix;
 - H12 – Self-Build and Custom Housing;
 - H13 – Specialist Housing for Older People;
 - H18 – Replacement Dwellings;
 - H21 – Extensions to Dwellings;

- WAL1 - The Strategy for Wallingford;
- H22 – Loss of Existing Residential Accommodation in Town Centres;
- H20 – Rural Workers’ Dwellings;
- H19 – Re-Use of Rural Buildings;
- EMP2 – Range, Size and Mix of Employment Premises;
- EMP3 – Retention of Employment Land;
- EMP4 –Employment Land in Didcot;
- EMP5 – New Employment Land in Henley-on-Thames;
- EMP6 – New Employment Land in Thame;
- EMP7 – New Employment Land in Wallingford;
- EMP8 – New Employment Land in Crowmarsh Gifford;
- EMP9 – New Employment Land at Chalgrove;
- INF1 – Infrastructure Provision;
- TRANS2 – Promoting Sustainable Transport and Accessibility;
- TRANS3 – Safeguarding of Land for Strategic Transport Schemes;
- TRANS4 – Transport Assessments, Transport Statements and Travel Plans;
- TRANS5 – Consideration of Development Proposals;
- TRANS6 – Rail;
- TRANS7 – Development Generating New Lorry Movements;
- INF2 – Electronic Communications;
- INF3 – Telecommunications Technology;
- INF4 – Water Resources;
- ENV1 – Landscape and Countryside;
- ENV2 – Biodiversity - Designated Sites, Priority Habitats and Species;
- ENV3 – Biodiversity - Non Designated Sites, Habitats and Species;
- ENV4 – Watercourses;
- ENV5 – Green Infrastructure in New Developments;
- ENV6 – Historic Environment;
- ENV7 –Listed Buildings;
- ENV8 – Conservation Areas;
- ENV9 – Archaeology and Scheduled Monuments;
- ENV10 – Historic Battlefields, Registered Parks and Gardens, and Historic Landscapes;
- ENV11 – Pollution: Impact from Existing and/or Previous Land Uses on Development (Potential Receptors of Pollution);
- ENV12 – Pollution: Impact of Development on Human Health, the Natural Environment and/or Local Amenity (Sources);
- EP1 – Air Quality;
- EP2 – Hazardous Substances;
- EP3 - Waste Collections and Recycling;
- EP4 - Flood Risk;
- EP5 – Minerals Safeguarding Areas;
- DES1 – Delivering High Quality Development;
- DES2 – Enhancing Local Character;
- DES3 – Design and Access Statements;
- DES4 – Masterplans for Allocated Sites and Major Developments;
- DES5 – Outdoor Amenity Space;
- DES6 – Residential Amenity;
- DES7 - Public Art;
- DES8 – Efficient Use of Resources;
- DES9 – Promoting Sustainable Design;
- DES10 – Renewable Energy;
- TC1 – Retail in Towns and Villages;
- TC3 – Retail frontages and Town Centre Boundaries;
- CF1 – Safeguarding Community Facilities;
- CF4 – Existing Open Space, Sport and Recreation Facilities; and

- CF5 – Open Space, and Sport and Recreation in New Residential Development.

- 4.5 Several of the policies in the plan will result in development of a type that could increase traffic and therefore have the potential to cause air pollution effects at sensitive European sites, but are of a scale that is unlikely to result in significant effects:
- EMP13 – Caravan and Camping Sites;
 - EMP14 - Retention of Visitor Accommodation;
 - CF2 – Provision of Community Facilities and Services; and
 - CF3 – New Open Space, Sport and Recreation Facilities.
- 4.6 In addition to these, several policies will result in development of a type that could increase visitor numbers at Little Wittenham SAC and therefore have the potential to cause recreational pressure effects, but are of a scale or in a location that is unlikely to result in significant effects for either air pollution or recreation:
- STRAT10 – Land at Wheatley Campus, Oxford Brookes University (screened out due to location);
 - H5 – Land to the West of Priests Close, Nettlebed (screened out due to location);
 - H6 - Land at Joyce Grove, Nettlebed (screened out due to location)
 - H7 – Land to the South and West of Nettlebed Service Station (screened out due to location);
 - H14 – Provision for Gypsies, Travellers and Travelling Showpeople (screened out due to scale);
 - H15 – Safeguarding Gypsy, Traveller and Travelling Showpeople Sites (screened out due to scale);
 - H16 – Infill Development (screened out due to scale);
 - EMP13 – Caravan and Camping Sites (screened out due to scale); and
 - EMP14 – Retention of Visitor Accommodation (screened out due to scale).
- 4.7 Several policies also permit development outside of allocated areas and could therefore result in physical loss or damage to European site habitats, however mitigation within the Local Plan means that this would be unlikely:
- STRAT2 – The Need for New Development in South Oxfordshire;
 - STRAT3 – The Unmet Housing Requirements from Oxford City;
 - EMP11 – Development in the Countryside and Rural Areas;
 - EMP12 – Tourism;
 - EMP13 – Caravan and Camping Sites; and
 - EMP1 - The Amount and Distribution of New B-Class Employment Land.
- 4.8 Of the policies listed above, the following also provide mitigation for impacts arising from other policies in the plan:
- TRANS1: requires that impacts on the strategic and local road network are mitigated (air pollution mitigation);
 - TRANS2: encourages sustainable transport (air pollution mitigation);
 - TRANS4: encourages sustainable transport and reductions in car use (air pollution mitigation);
 - TRANS5: encourages sustainable transport (air pollution mitigation);

- TRANS7: allows significant increases in lorry movements where this would not result in adverse environmental effects (air pollution mitigation);
- ENV2: provides protection for internationally designated sites (mitigation for all impacts);
- ENV5: requires development to contribute towards the provision of additional green infrastructure (recreation impact mitigation);
- ENV12: requires that development does not have a significant adverse effect on the environment, including air pollution (air pollution mitigation);
- EP1: requires development to comply with the Air Quality Action Plan, national guidance, and local transport plan (air pollution mitigation);
- DES8: requires development to comply with the Air Quality Action Plan (air pollution mitigation);
- CF5: requires residential development to provide or contribute towards accessible open space (recreation impact mitigation);

Significant effects uncertain

- 4.9 For a number of the Local Plan proposals it was concluded that there **may** be a significant effect on one or more European sites, **although this is uncertain**. Therefore, in line with the precautionary approach being applied in the HRA, until significant effects can be ruled out they are identified as likely significant effects.
- 4.10 The following policies were identified as having uncertain effects:
- STRAT2 – The Need for New Development in South Oxfordshire (air pollution and recreation);
 - STRAT3 – The Unmet Housing Requirements from Oxford City (air pollution and recreation);
 - STRAT7 – Land Adjacent to Culham Science Centre (recreation);
 - STRAT8 – Land at Berinsfield (recreation);
 - STRAT9 – Land at Chalgrove Airfield (recreation);
 - H2 – New Housing in Didcot (recreation);
 - H3 – Housing in the Towns of Henley-on-Thames, Thame and Wallingford (recreation, but only in relation to development at Wallingford);
 - H4 – Housing in Larger Villages (recreation, but only in relation to development at Cholsey and Crowmarsh Gifford);
 - H8 – Housing in Smaller Villages (recreation);
 - EMP1 – The Amount and Distribution of New B-Class Employment Land (air pollution);
 - EMP12 – Tourism (air pollution);
 - TRANS1 – Supporting Strategic Transport Investment (air pollution); and
 - TC2 – Amount and Location of New Retail Floorspace (air pollution).

5 Appropriate Assessment

Appropriate Assessment approach

- 5.1 Following the screening stage, if likely significant effects on European sites are unable to be ruled out, the plan-making authority is required under Regulation 102 of the Habitats Regulations 2010 to make an 'Appropriate Assessment' of the implications of the plan for European sites, in view of their conservation objectives. EC Guidance⁵⁶ 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 European sites with respect to their conservation objectives and to their structure and function.
- 5.2 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. 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.
- 5.3 An Appropriate Assessment has therefore been undertaken for all of the European sites in and around South Oxfordshire (+17km) where likely significant effects from the Local Plan were identified (or were not able to be ruled out) during the screening stage.
- 5.4 At the screening stage, it was not possible to rule out likely significant effects with respect to:
- Recreation impacts at Little Wittenham SAC arising from the Local Plan in combination with other plans or projects; and
 - Air pollution impacts at Aston Rowant SAC arising from the Local Plan in combination with other plans or projects.
- 5.5 As described in **Chapter 1**, a conclusion needs to be reached as to whether or not the Local Plan would adversely affect the integrity of a European site. As stated in the EC 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;

⁵⁶ *Assessment of plans and projects significantly affecting European sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* European Commission Environment DG, November 2001.

- Result in disturbance that could affect the population, density or balance between key species;
 - Result in fragmentation; and
 - Result in the loss of key features.
- 5.6 The conservation objectives for each European site (listed in **Appendix 2**) are generally to maintain the qualifying features in favourable condition. The Site Improvement Plans for each European site provide a high level overview of the issues (both current and predicted) affecting the condition of the European 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 European sites.
- 5.7 For each European site where an uncertain likely significant effect was identified at the screening stage in relation to the Local Plan, the potential impacts have been set out below 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.

In-combination effects with other plans, policies and programmes

- 5.8 As discussed previously, the Local Plan has the potential for in-combination effects arising from the following:
- Already-consented development that has been counted within the overall figures for the supply of housing and employment land (Local Plan policies STRAT2 and EMP1);
 - Development proposed within South Oxfordshire neighbourhood plans, where it exceeds the allocation in the Local Plan (for example the emerging Benson Neighbourhood Plan);
 - Development proposed by Vale of White Horse District that would result in increased population in Abingdon and therefore visits to Little Wittenham SAC; and
 - Development proposed by neighbouring authorities that would result in increases in traffic on the M40 within 200 metres of Aston Rowant SAC.
- 5.9 **Appendix 2** summarises the quantum of development proposed in relevant plans and the findings of any HRA work that has been undertaken.
- 5.10 None of the completed HRAs for neighbouring authorities' plans have identified significant effects either alone or in-combination with other plans. In some cases (Oxfordshire County waste site allocations), however, the HRA work has not been completed for the current plans.
- 5.11 In-combination effects have been considered in the Appropriate Assessment, below.

Air pollution impacts

Policies potentially contributing to air pollution impacts in-combination

- 5.12 The policies that have been assessed as having uncertain potential for air pollution impacts are those that could increase traffic flows on roads that pass within 200 metres of a sensitive European site. **Table 5.1** summarises those policies and the nature and quantum of development associated with them.

Table 5-1 Development with the potential for air pollution effects

| Policy | Development that the policy provides for |
|---|--|
| STRAT2 - The Need for New Development in South Oxfordshire and STRAT3 - The Unmet Housing Requirements from Oxford City (total housing supply) | 9,671 homes (in addition to the 12,740 already consented) Located at: - Strategic allocations - Market towns - Larger villages - Smaller villages / other |
| EMP1 - The Amount and Distribution of New B-Class Employment Land | ≥20.23 ha of B-class employment land (in addition to the 16.97 ha already consented) Located at: - Henley-on-Thames (1ha) - Thame (1.6ha) - Wallingford (3.1ha) - Crowmarsh Gifford (0.28ha) - Culham (2ha) - Chalgrove (7.25ha) - Berinsfield (5ha) |
| EMP11 - Development in the Countryside and Rural Areas | Unspecified (small scale) |
| EMP12 - Tourism | Unspecified (small scale) |
| TRANS1 - Supporting Strategic Transport Investment | Unspecified infrastructure improvements, and 13 safeguarded highways improvement schemes: - A4010 North Moreton - A4074/B4014 (Golden Ball) junction improvements - Abingdon southern bypass - Benson bypass - Clifton Hampden bypass - A new Thames road crossing between Culham and Didcot Garden Town - Didcot Central Corridor - Didcot Southern Spine Road - Didcot Northern Perimeter - Sandford park & ride - Science Bridge, Didcot - Stadhampton bypass - Watlington bypass |
| TC2 - Amount and Location of New Retail Floorspace | 11,100 sq.m food store 24,700 sq.m non-food store |

- 5.13 The total increase in traffic arising from all of these policies (the whole Local Plan) in combination with other plans or projects could increase traffic flows and therefore have an air pollution impact at the M40 passing through Aston Rowant SAC.
- 5.14 Plans and projects that could have an air pollution impact in combination with the Local Plan include:
- Neighbouring authorities' plans or projects; and
 - Neighbourhood plans for towns and villages within South Oxfordshire, where the quantum of development exceeds that allocated within the Local Plan (for example the emerging Benson Neighbourhood Plan).
- 5.15 The HRA screening (as set out in paragraphs 3.32-3.49) has concluded that increases in traffic due to the Local Plan alone will be sufficiently small that significant air pollution impacts will not occur at most European sites. However, on the M40 adjacent to Aston Rowant SAC, increases in traffic due to other plans or projects will be sufficiently large that they would increase traffic by more than 1,000 AADT, even without the South Oxfordshire

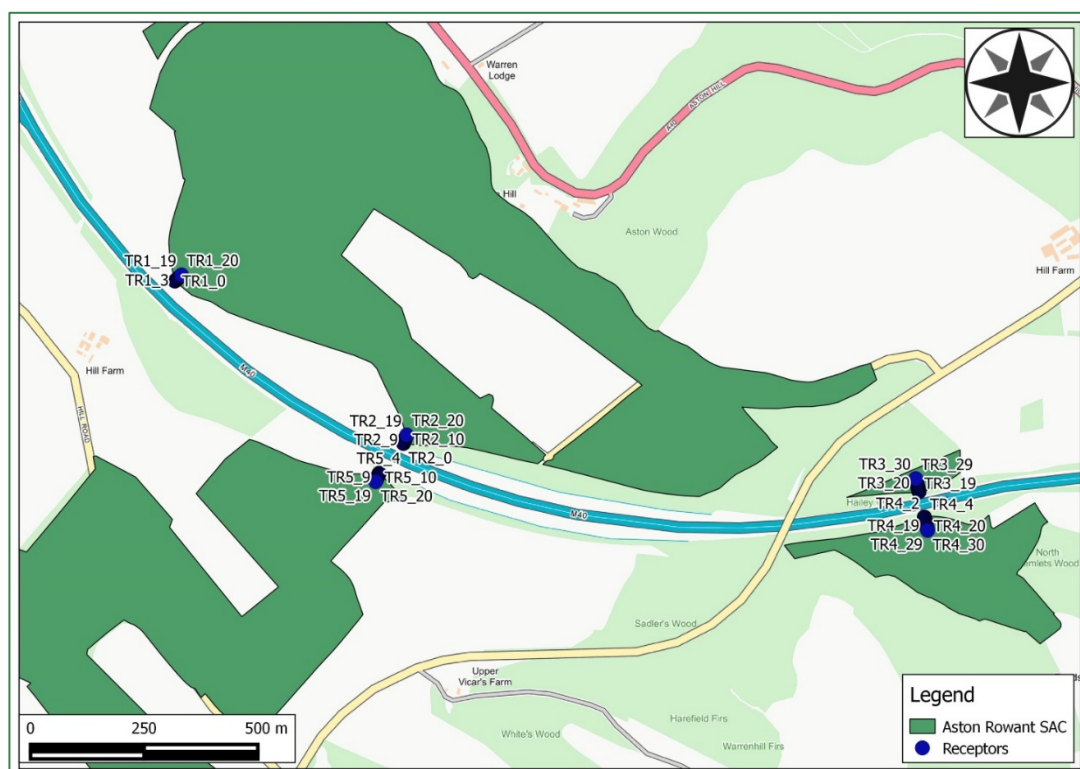
Local Plan. At Aston Rowant, South Oxfordshire's Local Plan is estimated to increase traffic on the M40 by c.5% of the overall increase expected on the road.

- 5.16 The difficulty with sensitive European sites adjacent to strategic roads is that traffic on the roads may come from a number of planning authorities' areas, particularly on major roads such as the M40 (next to Aston Rowant SAC), which links the West Midlands conurbations and strategic routes to the north of England and to Wales, with the M25 and London and the South East. In this context, the contribution from each authority may be small even if relatively close to the European site. Identifying responsibility for assessing the impacts of air pollution on European sites such as this, and leading the development of appropriate mitigation, should therefore ideally be undertaken at a strategic regional or even national level, rather than by the first authority to prepare an HRA. This has been the case in relation to Epping Forest SAC⁵⁷, for example.
- 5.17 Following the Wealden Judgement, Natural England is currently preparing guidance on the assessment of in-combination air pollution effects which should help to direct HRAs in respect of this issue, however that guidance is not expected to be published until later in 2018. In the absence of this guidance, both the Council and Natural England therefore agreed that the in-combination air pollution impacts should remain screened in and be assessed further through an air quality model which is provided at **Appendix 5**, the results of which are summarised below.

Air quality model

- 5.18 Concentrations have been modelled along five transects on either side of the M40 based on results of the South Oxfordshire traffic model (as shown in **Table 3.2**). The transect locations are shown in **Figure 5-1** below. Concentrations have been predicted at 1m intervals along the five transects, from the SAC boundary closest to the road, up to 20m from the boundary.

Figure 5-1 - Aston Rowant SAC and Location of Transect Receptors



- 5.19 Concentrations of NO_x have been predicted for the following scenarios, with the air quality effects of the Submission Local Plan assessed alone and in-combination with other plans:

⁵⁷ <http://eppingforest.consultationonline.co.uk/wp-content/uploads/sites/5/2016/08/2016-09-01-Draft-OAHN-MoU-v8.pdf>

- Model verification year (2016);
 - 2031 without the Local Plan;
 - 2031 with the Local Plan; and
 - 2031 with the Local Plan + in-combination plans.
- 5.20 In addition to predictions using emissions data published by Defra, a sensitivity analysis has been undertaken that assumes higher NO_x emissions from diesel vehicles. The sensitivity analysis provides a worst case assessment of future impacts (see **Appendix 5** for further details on uncertainty).
- 5.21 Online guidance published by Defra and the Environment Agency has been used in the first instance to screen out impacts that will have an insignificant effect⁵⁸. The guidance explains that regardless of the baseline environmental conditions, a process can be considered as insignificant if the long-term (annual mean) process contribution is less than 1% of the long-term environmental standard.
- 5.22 It should be recognised that this criterion determines when an impact can be screened out as not significant. It does not imply that there will be damage to a habitat above this threshold, or that impacts will necessarily be significant above this criterion, merely that there is a potential for significant impacts to occur that should be considered using a detailed assessment methodology, such as a detailed dispersion modelling study (as has been carried out for this assessment in any event) in association with a qualified ecologist to consider the likelihood of an adverse effect on the integrity of the habitat. A position statement published by the Institute of Air Quality Management (IAQM)⁵⁹ suggest that only impacts clearly above 1% should be treated as potentially significant, rather than impacts that are about 1%, or slightly higher⁶⁰.
- 5.23 For the purposes of this assessment, where concentrations and/or deposition rates are predicted to increase by 1% or less of the assessment criteria, the potential for significant impacts have been discounted, and no further assessment carried out. However, (when round up/down to the nearest whole percent) where concentrations and/or deposition rates are predicted to increase by more than 1% of the assessment criteria, the total concentrations and deposition rates (road contribution + background) have been compared with the relevant critical level/loads

Nitrogen oxides (NO_x)

- 5.24 Current background levels for NO_x in the local area are currently well below the Critical Level of 30µg/m³, and are expected to fall further over the plan period, as shown in **Table 5-2**. These are based on a 1x1km grid square analysis carried out by DEFRA.

Table 5-2: Estimated Annual Mean Background Concentrations in 2016 and 2031 (µg/m³)

| Year | NO _x |
|-----------------------|-----------------|
| 2016 | 16.8-20.3 |
| 2030 | 11.2-13.5 |
| Critical Level | 30 |

- 5.25 However in the vicinity of the road itself, the Critical Level is currently being exceeded at all transects (range 36.7 - 78.7µg/m³) due to current levels of traffic related NO_x. By 2031, in the absence of growth the background annual mean NO_x concentrations are predicted to reduce significantly due to improvements in the environmental performance of diesel engines and will fall below the Critical Level across increasing areas of the SAC. However

⁵⁸ DEFRA and EA (2016) Air Emissions Risk Assessment for your Environmental Permit

⁵⁹ The IAQM is the professional body for air quality practitioners.

⁶⁰ IQAM (2016) Position Statement - Effect of Air Quality Impacts on Sensitive Habitats

continued exceedences of the Critical Level are predicted in some locations at up to 20m from the SAC boundary.

- 5.26 The model shows that effects of the plan alone would not result in an increase greater than the screening criterion (>1% of the Critical Level) of NO_x levels at any of the transects, and it can therefore be concluded that the plan would not have any likely significant effects on the Aston Rowant SAC alone.

Table 5-3: Predicted Contribution of NO_x at the closest transects due to the Local Plan in 2031

| Receptor | Predicted Road Contribution of Annual Mean NO _x (µg/m ³) | % of Screening Criterion ^a |
|----------------------------|---|---------------------------------------|
| TR1_0 | 0.1 | 0 |
| TR2_0 | 0.1 | 0 |
| TR3_0 | 0.1 | 0 |
| TR4_0 | 0.1 | 0 |
| TR5_0 | 0.1 | 0 |
| Screening Criterion | | 1 |

- 5.27 When the in-combination effects of growth on traffic are modelled, the effects would result in an exceedance of the screening criterion on four of the five transects, as shown in **Table 5-4** below.

Table 5-4: Predicted exceedance of NO_x screening criteria on transect due to the Local Plan in 2031

| Transect | Maximum distance at which screening criterion is exceeded/m | Maximum % of Screening Criterion ^a |
|----------|---|---|
| TR1 | 8 | 2 |
| TR2 | 18 | 2 |
| TR3 | 22 | 2 |
| TR4 | 20 | 3 |
| TR5 | 0 | 1 |

- 5.28 Within those areas of the SAC where the screening criterion is exceeded, the predicted total NO_x concentrations in 2031 will exceed the Critical Level of 30µg/m³ at all transect receptors for both the baseline scenario and for the in-combination scenario, with predicted annual mean NO_x concentrations ranging from 34.1µg/m³ to 55.2µg/m³. The maximum in-combination increase in annual mean NO_x concentrations is 0.8µg/m³, which is an increase of 3% of the Critical Level of 30 µg/m³.

Nitrogen deposition

- 5.29 Background N deposition fluxes are currently exceeding the Critical Load for the local area, and will continue to exceed it in 2031, as shown in **Table 5-5**.

Table 5-5: Estimated Annual Mean Background N Deposition in 2016 and 2031

| Year | Nutrient Nitrogen (kg/ha/yr) | Acid Nitrogen (keq/ha/yr) |
|----------------------|------------------------------|---------------------------|
| 2016 | 29.30 | 2.093 |
| 2031 | 20.14 | 1.439 |
| Critical Load | 10 | 1.369 |

- 5.30 The predicted contributions of growth (both alone and in-combination) on N deposition are so small at all transect receptors that they are not measurable i.e. <0.01kg/ha/yr, and are

therefore well below the screening criteria for both nutrient and acid N deposition; **it can therefore be concluded that the Local Plan would have no likely significant effects upon Aston Rowant SAC through nutrient or acid N deposition, either alone or in combination.**

Mitigating factors

- 5.31 It should be noted that the predicted impacts represent a worst-case scenario with regard to the emissions used. In reality, the introduction of progressively cleaner vehicles into the UK fleet is likely to result in a significant reduction in NO_x emissions from diesel vehicles between 2016 and 2031.
- 5.32 The model has also assumed that the M40 is at grade with the surrounding area, including the Aston Rowant SAC. A significant proportion of the M40 is actually within a cutting as the road passes through the SAC. Modelling the road at grade would likely result in a precautionary assessment of concentrations at parts of the SAC where it lies above a cutting as the distance between the emissions source and the receptor is increased, also, entrainment and recirculation of emissions within the cutting would result in a reduced impact outside the cutting.
- 5.33 The cutting is also heavily vegetated by a dense belt of scrub which would act as a buffer by intercepting and absorbing much of the NO_x from the air before it could reach the SAC^{61,62,63}, therefore concentrations in the SAC which have been buffered by these belts of scrub are likely to be lower than shown by the model, and the 1% screening threshold is likely to be breached over a much smaller area of the SAC than predicted by the model (if at all).

Effects on site integrity

Juniperus communis formations on heaths or calcareous grasslands

- 5.34 Juniper is a dioecious evergreen conifer found on basic and acidic soils in a wide range of habitats, including chalk downland, heather moorland, oceanic heaths, rocky slopes and in *Betula*, *Quercus* and *Pinus* woods.
- 5.35 In the UK, its distribution is restricted to two areas of the country and two broad habitat types. The majority of populations occur on acidic substrates in heathland or acid grassland habitats in northern England and Scotland. In southern England juniper scrub may develop on a range of calcareous grassland types on thin chalk soils, while more closed juniper stands with a rich scrub flora correspond to NVC type W21d *Crataegus monogyna* – *Hedera helix* scrub, *Viburnum lantana* sub-community. Where juniper is not dominant the scrub contains a rich assemblage of other shrubs, mainly of the family Rosaceae.
- 5.36 Juniper is typically found on low nitrogen soils and has been classified as having a relatively low Ellenburg factor (an indicator value of 3 on a scale of 1 to 9). However, it is understood to be relatively tolerant of a wide range of nutrient levels. Fertilizer trials in Scotland by the Forestry Commission⁶⁴ found that on poor to medium upland brown earths at Moray, applications of phosphorus at 60kg/ha had no significant effect on survival or growth of planted junipers. On nutrient deficient peaty podzols at Lochaber, various low applications of N, P and K had no effect on survival of planted junipers but application of N at 150kg/ha significantly improved height growth and root collar diameter growth. The other nutrients by themselves had no effect but K (100kg/ha) with N increased height growth, and P (90kg/ha) with N increased root collar diameter growth. The comparatively small effect of fertilizers points to juniper being well-adapted to nutrient-poor conditions. This is supported

⁶¹ Xu, Y. (2008) Modelling the effects of roadside trees, results and conclusions. Report for the London Borough of Harrow. AEA, Harwell, Oxon

⁶² Air pollution removal by urban trees and shrubs in the United States (2006). David J. Nowak, Daniel E. Crane, Jack C. Stevens. *Urban Forestry & Urban Greening* Vol. 4, pp115–123

⁶³ Freer-Smith, P.H., Beckett, K.P. and Taylor, G. (2005). Deposition velocities to *Sorbus aria*, *Acer campestre*, *Populus deltoides* x *trichocarpa* 'Beaupre', *Pinus nigra* and x *Cupressocyparis leylandii* for coarse, fine and ultra-fine particles in the urban environment. *Environmental Pollution* Vol.133, pp157–167

⁶⁴ Broome, A.C. (2003) *Growing juniper; propagation and establishment practices*. Information Note No. 50, Forest Commission, Edinburgh

by the findings of Grubb et al.⁶⁵ that growth on calcareous soils is limited by available light rather than P and N.

- 5.37 Transects 1 and 2 run through areas of calcareous grassland habitat which potentially support juniper formations. When the in-combination effects of growth are assessed, the annual mean screening criterion is exceeded for up to 8m into the SAC, however this small area is dominated by a wide hedgerow, which forms the SAC boundary. It is therefore unlikely that this small part of the SAC currently supports juniper, or that it would in the future, and this area could therefore reasonably be regarded as 'site fabric'. The screening criterion is exceeded for up to 18m into the SAC at Transect 2; this would potentially affect an estimated 0.02ha of calcareous grassland which is understood to support juniper communities.

Asperulo-Fagetum Beech Forest

- 5.38 This habitat type occurs on circumneutral to calcareous soils and mostly corresponds to NVC type W12 *Fagus sylvatica* – *Mercurialis perennis* woodland. In addition, some of the more calcareous stands of NVC type W14 *Fagus sylvatica* – *Rubus fruticosus* woodland are also included. The main concentrations shown occur in the lowlands of southern Britain, along the Downs, in the Weald and the Chilterns, down the Hampshire Hangers and into the New Forest, and westward through the Cotswolds, Wye Valley and to the coalfields of south-east Wales.
- 5.39 A series of studies on beech woodlands in Switzerland has demonstrated that they are sensitive to N deposition, with a range of significant ecological effects recorded including increased susceptibility to pest and pathogens^{66,67,68,69}, a reduction in root and stem growth⁷⁰, changes in flowering patterns, seed and litterfall production and decomposition⁷¹, and lower mycelium density⁷².
- 5.40 Transects 3, 4 and 5 are all within areas of beech woodland. The screening criterion is exceeded for up to 22m into the SAC at Transect 3 and for up to 20m at Transect 4, while there would be no exceedance on Transect 5; this could potentially affect an estimated 0.83ha of *Asperulo-Fagetum* Beech Forest habitat. This equates to approximately 0.65% of the SAC potentially affected by increasing NO_x levels due to the in-combination effects of growth.

Ecological effects of NO_x

- 5.41 It is typically the secondary effects of increasing NO_x concentration i.e. the resulting N deposition, which are likely to trigger a significant ecological effect, rather than the direct effects of the increasing NO_x concentrations. However the model indicates that at Aston Rowant, whilst the increasing NO_x concentrations would breach the 1% Process Contribution threshold, this would not result in any measurable N deposition. This Appropriate Assessment therefore focuses on the direct ecological effects of increasing NO_x concentrations, rather than the effects of N deposition.
- 5.42 Most studies on NO_x relate to the physiological responses of individual plants / species, rather than the effects on wider vegetation communities, habitat condition or ecosystem functions. NO_x can affect plants by directly entering via the stomata, resulting in phytotoxic

⁶⁵ Grubb, P.J., Lee, W.G., Kollmann, J. & Wilson, J.B. (1996) Interaction of irradiance and soil nutrient supply on growth of seedlings of ten European tall-shrub species and *Fagus sylvatica*. *Journal of Ecology*, **84**, 827–840

⁶⁶ Westling, O. (1991) Nitrate in soil water *Miljöatlas*. pp 1-20

⁶⁷ Flückiger, W. and Braun, S. (1999) Nitrogen and its effects on growth, nutrient status and parasite attacks in beech and Norway Spruce *Water, Air and Soil Pollution* Vol.116, pp99-110

⁶⁸ Flückiger, W. and Braun, S. (1998) Nitrogen deposition in Swiss forests and its possible relevance for leaf nutrient status, parasite attacks and soil acidification *Environmental Pollution* Vol.102, pp69-76

⁶⁹ Flückiger, W. and Braun, S. (2004) Wie geht es unserem Wald? Ergebnisse aus Dauerbeobachtungsflächen von 1984 bis 2004 67

⁷⁰ Flückiger, W. and Braun, S. (2011) Auswirkung erhöhter Stickstoffelastung auf die Stabilität des Waldes

⁷¹ Vanguelova, E. and Pitman, R. (2011) Impacts of Short Rotation Forestry on Soil Sustainability In McKay, H. (ed.) *Short Rotation Forestry: review of growth and environmental impacts* 212pp

⁷² Braun, S., Thomas, V.F.D., Quiring, R. and Flückiger, W. (2010) Does nitrogen deposition increase forest production? The role of phosphorus *Environmental Pollution* 158 2043-2052

effects; lower plants such as lichens and bryophytes are particularly vulnerable to direct exposure to the gas.

- 5.43 The effects of elevated NO_x concentrations on vegetation can be broadly categorised as:
- growth effects: particularly increased biomass, changes in root to shoot ratio and growth of more competitive species, but also including growth suppression of some species;
 - physiological effects: e.g. CO₂ assimilation and stomatal conductivity; and
 - biochemical effects: e.g. changes in enzyme activity and chlorophyll content (probably through the effects of increased N, as demonstrated in lichens, but also documented in higher plants)⁷³.
- 5.44 Growth effects have been recorded at lower annual average concentrations, while biochemical or physiological effects have generally been demonstrated in vascular plants from exposure to much higher annual average concentrations^{74,75}.
- 5.45 The Critical Level does not discriminate between the role of N deposition and NO_x in the air. It is a precautionary general threshold, not specific to a particular habitat, plant species or impact pathway, below which there is currently a high degree of confidence that adverse effects on vegetation will not arise. For many habitats, increases in NO_x above the standard 30ug/m³ threshold do not necessarily result in an ecological response. For example, a recent study of the effects of atmospheric N on saltmarsh found that it was the level of N deposition relative to the Critical Load which was more important than the concentration of NO_x relative to the Critical Level⁷⁶.

Conservation objectives

- 5.46 The potential effects of increasing NO_x identified by the model on the qualifying features of the SAC have been considered in light of the available scientific evidence and the conservation objectives for Ashton Rowant SAC.
- 5.47 Both of the qualifying features are understood to currently be in favourable condition at the SAC, as recent condition assessments have recorded all units as being in favourable condition⁷⁷. The following objectives have therefore been considered in the context of maintaining, rather than achieving favourable conservation status of the qualifying features.

The extent and distribution of qualifying natural habitats

- 5.48 The potential effects of atmospheric N on juniper populations and beech forest habitats are relatively subtle, typically relating to the structure, function and supporting processes (see below), however there is no evidence that these effects could result in a change in the extent or distribution of these habitats.

The structure and function (including typical species) of qualifying natural habitats

- 5.49 Research has shown that increasing NO_x concentrations can affect the growth, physiology and biochemistry of plants. At Aston Rowant SAC, the total NO_x concentrations could reach 55.2µg/m³ when assuming a worst case scenario and taking background levels of NO_x into account. At these concentrations, effects on growth such as increased biomass, changes in root to shoot ratio, growth of more competitive species, and growth suppression of some species could occur, however physiological and biochemical changes are considered to be unlikely as the evidence indicates that they are triggered at much higher concentrations.

⁷³ Tiwari, 2008. Lichens as an Indicator for Air Pollution: A Review. Indian Journal of Pollution Control, 1, 8-17

⁷⁴ Das K, Dey U, Bhaumik R, Datta JK and Mondal NK. 2011. A comparative study of lichen biochemistry and air pollution status of urban, semi-urban and industrial area of Hooghly and Burdwan district, West Bengal. Journal of Stress Physiology & Biochemistry Vol 7, No. 4 pp311-323

⁷⁵ Wellburn AR. 1990. Why are atmospheric oxides of nitrogen usually phytotoxic and not alternative fertilisers? New Phytologist 115 pp 395-429

⁷⁶ Boorman LA and Hazelden J. (2012) Impacts of Additional Aerial Inputs of Nitrogen to Saltmarsh and Transitional Habitats. CCW Science Report No: 995, Countryside Council for Wales, Bangor, Wales

⁷⁷ <https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteCode=S1002737&ReportTitle=Aston Rowant SSSI>

- 5.50 These growth effects would be likely to become noticeable over the long-term, most likely manifesting themselves as changes in species composition and habitat structure. Indeed the M40 has been operational through the SAC since 1974 and the habitats at Aston Rowant would have been exposed to high concentrations of NO_x throughout that period, therefore it is expected that any long-term impacts on the structure and function of the habitats within the site would have been identified through habitat condition monitoring. Condition assessments at the SAC indicate that the unit potentially affected by the elevated NO_x concentrations (Unit 4) has remained in favourable condition over a period of at least 11 years, which indicates that there has been no significant ecological response to the prolonged exposure to elevated concentrations of NO_x, or that any response has been so subtle as to not materially affect the condition targets for the habitats, which Natural England use to establish compliance with the conservation objectives. Given that SAC is still understood to be in favourable condition, and that the overall NO_x concentrations are expected to continue to fall over time despite the effects of growth on increased traffic flows, it is considered highly unlikely that the structure or function of the qualifying features would not be maintained.

The supporting processes on which qualifying natural habitats rely

- 5.51 Research has shown that N deposition can result in significant changes to soil chemistry, resulting in eutrophication and acidification of the soil, which can in turn result in changes to the composition of vegetative communities over time. There is no evidence that increasing NO_x would have similar effects on soil chemistry or other processes where it does not result in deposition, therefore it is considered that the effects of growth would not affect the supporting processes on which the qualifying habitats rely.

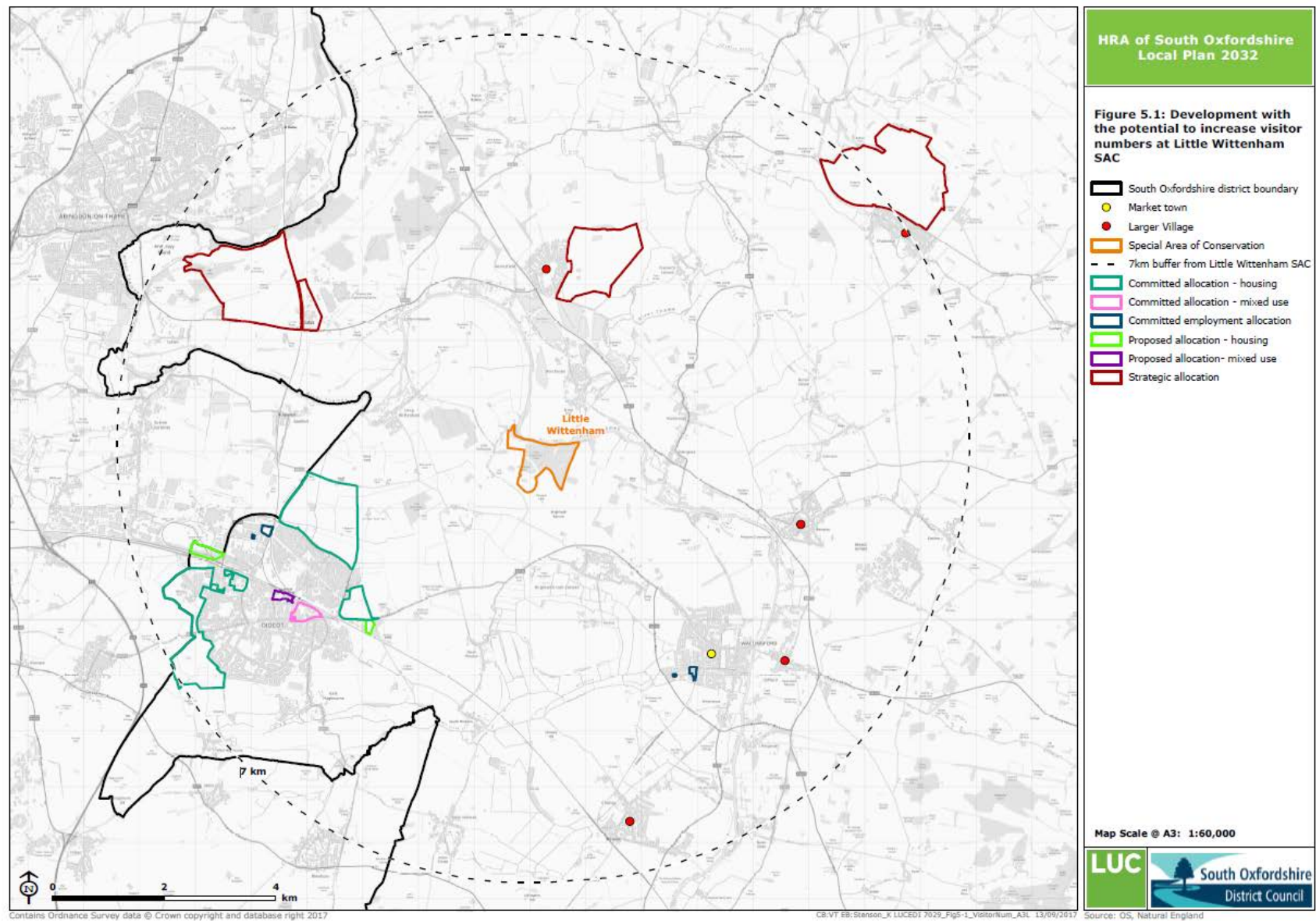
Conclusions on site integrity

- 5.52 Although the screening threshold for NO_x would be breached across approximately 0.85ha of the SAC, this would not result in significant N deposition anywhere on the site and as such the potential for adverse effects is significantly reduced. In the absence of any deposition, the predicted total NO_x concentrations are considered unlikely to be high enough to result in physiological or biochemical effects. While the effects of changes to growth rates are technically possible, in the long-term it is expected that such effects would result in notable changes to habitat condition, however no such changes have been recorded within the potentially affected parts of the site during 11 years of condition monitoring. **It is therefore considered that the ecological effects of the predicted NO_x concentrations would either be negligible, or that any small effects would be highly unlikely to result in a deterioration in the condition of the qualifying features, and as such it is concluded that the in-combination effects of planned growth would not result in an adverse effect on the integrity of the Aston Rowant SAC.**

Recreation impacts

- 5.53 The policies identified as having uncertain impacts on Little Wittenham SAC, due to increased visitor numbers, are those that will result in new homes within c.7km of the SAC. Some of the policies provide for housing across the whole district, in which case only a proportion of the new homes they will result in have the potential to be close to Little Wittenham SAC. Where the policies allocate development in a specific location, however, all of the new homes provided for by the policy may be within 7km. **Figure 5.1** shows the strategic allocations, proposed allocations, market towns and larger villages within or in close proximity to 7km of the SAC.

Figure 5-2 Development with the potential to increase visitor numbers at Little Wittenham SAC



- 5.54 An estimate of the new homes that are likely to result from the policies identified is summarised in **Table 5.2**.

Table 5-6 New homes within c.7km of Little Wittenham SAC

| Policy | Number of new homes policy provides for | Proportion of these new homes within or near 7km of Little Wittenham SAC |
|--|---|---|
| STRAT2 - The Need for New Development in South Oxfordshire and STRAT3 - The Unmet Housing Requirements from Oxford City (total housing supply) | At least 9,671 new homes (in addition to the 12,740 completions / commitments) | As distributed between the sites listed below Up to c.9,924 new homes (plus a proportion of the completed / committed homes) |
| STRAT7 - Land Adjacent to Culham Science Centre | ≤3,500 new homes | All ≤3,500 new homes |
| STRAT8 - Land at Berinsfield | ≤1,700 new homes | All ≤1,700 new homes |
| STRAT9 - Land at Chalgrove Airfield | ≤3,000 new homes | This site lies on the 7km buffer, therefore the whole allocation has been considered ≤3,000 new homes |
| H2 - New Housing in Didcot | 644 new homes (in addition to the 5,859 completions / commitments) | All 644 new homes |
| H3 - Housing in the Towns of Henley-on-Thames, Thame and Wallingford | 1,155 new homes | Homes in Wallingford only c.295 new homes |
| H4 - Housing in the Larger Villages | 1,041 new homes | Homes in Crowmarsh Gifford and Cholsey only 285 new homes |
| H8 - Housing in the Smaller Villages | 500 new homes | Unknown ≤500 new homes |

- 5.55 South Oxfordshire is expected to have an average household size of 2.18⁷⁸ by the end of the plan period. The new homes resulting from the Local Plan will therefore accommodate an increase in population of up to c.21,650 within c.7km of Little Wittenham SAC. The current population in the same area is approximately 63,375⁷⁹, based on 2011 census data. The Local Plan alone therefore seeks to accommodate a population increase of approximately 34% since 2011, within c.7km of Little Wittenham SAC (including Chalgrove).
- 5.56 Little Wittenham SAC currently receives c.150,000 visits each year⁸⁰. An increase of 34%, in line with the estimated population increase, would therefore result in an additional c.51,000 visits per year. The Earth Trust, which manages Little Wittenham SAC, has undertaken visitor surveys and estimates that visits to the site will increase by 11% by 2020 and 36% by 2030⁴⁵. The increase in population due to the Local Plan alone is estimated to be within the increase planned for by the Earth Trust.

⁷⁸ <http://www.whitehorsedc.gov.uk/sites/default/files/Oxfordshire%20Population%20Forecasts%20to%202026.pdf>

⁷⁹ Based on 2011 census data for Output Areas population weighted centroids within 7km from Little Wittenham SAC, plus the population of Chalgrove; calculated using GIS

⁸⁰ Earth Trust (2016) *Statement of Need for Improvements to the Earth Trust Centre*

- 5.57 The Earth Trust has submitted a planning application⁸¹ for facilities to accommodate the expected increase in visitors that Natural England has been consulted on and raised no objection to. Natural England stated:
- “Little Wittenham Special Area of Conservation is designated for having the best studied population of Great Crested Newts in the UK. The proposals could increase visitor pressure on the SAC; however Great Crested Newts are not particularly sensitive to visitor pressure, and the Earth Trust manage visitors to limit access to the SAC.”*
- 5.58 Recreation impacts from the Local Plan alone (therefore including all of its policies and site allocations alone or in combination with each other) have therefore been screened out and no Appropriate Assessment is required.
- 5.59 The increase in local population arising from the Local Plan in combination with other plans or projects, however, could result in visitor numbers that exceed those planned for. In addition to new development allocated in the Local Plan, visitor numbers could increase due to:
- Developments completed / committed since the Core Strategy - 6,200 homes at Didcot, 428 at Benson (see below), plus a small number at other sites;
 - Development in Abingdon (within c.20 minutes’ drive from Little Wittenham SAC) – the Vale of White Horse Local Plan 2031 Part 1⁸² allocates 1,000 homes in Abingdon, while the draft Part 2 document has identified a further site (Dalton Barracks) for 1,2000 dwellings; and
 - Development allocated by the emerging Benson Neighbourhood Plan - 571 homes, of which 241 are already consented, resulting in 188 more than allocated in the Local Plan.
- 5.60 These additional c.7,800 homes would accommodate a population of c.17,000. The current population within the same area (within 7km of Little Wittenham SAC plus Chalgrove and Abingdon) is c.96,179⁸³, therefore the new homes could result in a c.17% increase in population in the vicinity of Little Wittenham SAC, or c.26,500 additional visits per year. The contribution from the Local Plan in combination with other plans is estimated to be c.51% or c.76,500 additional visitors to the SAC per year.
- 5.61 The increase in visitor numbers at Little Wittenham SAC from the Local Plan in combination with other plans or projects could result in disturbance to or damage to the habitats of the site’s qualifying species, great crested newts.
- 5.62 Little Wittenham SAC is designated for its great crested newt population, which is supported by two main ponds, although the newts have also been found to travel several hundred metres into the surrounding woodland. The woodland lies entirely within the SAC, in addition to some grassland, and the SAC is part of a larger area managed by the Earth Trust.
- 5.63 The Earth Trust restricts access to the most sensitive areas of the SAC⁸⁴ by maintaining a signed network of paths and a pond viewing area⁸⁵, within the woodland. The Earth Trust’s site as a whole, however, experiences a level of visitor numbers that places pressure on the site. Erosion, disturbance (e.g. to nesting birds) and pressure on infrastructure including parking are all an issue for the wider site⁸⁶ and therefore limit the extent to which an increase in visitor numbers could be accommodated in areas of the site away from the SAC.
- 5.64 The Earth Trust’s planning application⁸⁷ to SODC for improvements to the visitor centre and parking at the site is aimed at relieving some of the effects of increases in visitor numbers.

⁸¹ South Oxfordshire District Council planning application reference P16/S3133/FUL

⁸² Core Policy 4: <http://www.whitehorsedc.gov.uk/services-and-advice/planning-and-building/planning-policy/new-local-plan-2031-part-1-strategic-sites>

⁸³ Based on 2011 census data for Output Areas population weighted centroids

⁸⁴ http://www.southoxon.gov.uk/sites/default/files/Appropriate%20Assessment_2.pdf

⁸⁵ http://www.earthtrust.org.uk/Libraries/Documents/Little_Wittenham_Nature_Reserve_Walk.sflb.ashx

⁸⁶ Earth Trust (2016) *Statement of Need for Improvements to the Earth Trust Centre*

⁸⁷ SODC planning reference P16/S3133/FUL

The work would facilitate access to the site as a whole, however the ecological study submitted with the planning application has concluded the following:

"There is potential for increased recreational pressure at Little Wittenham SAC due to the proposed development. However, the Earth Trust carefully manages public access to limit access to the Little Wittenham Special Area of Conservation and directs visitors instead to the Wittenham Clumps and other land within its ownership. Great crested newts are not particularly sensitive to recreational pressure. Natural England considered that 100% of the site was in favourable condition in 2010. It is therefore considered that the proposed development will not have a significant effect on the Special Area of Conservation and that an appropriate assessment is not necessary."

- 5.65 The planning application has been given permission (resolution to grant subject to agreement of s106) and, as stated previously (paragraph 4.15), Natural England has raised no objection to the proposals.
- 5.66 The increase in local population that would arise as a result of the Local Plan alone is 34%, within the 35% increase in visitors planned for by the Earth Trust. However, the Local Plan in combination with other plans could result in visitor pressure that has not yet been planned for: an increase of c.51% or c.76,500 additional visitors to the SAC per year.
- 5.67 LUC discussed the potential impact of these additional visits on great crested newts with Natural England's current and former SSSI officers⁸⁸ for the site, in July 2017. They provided the following information:
- The site is already heavily used by the public, however this is not believed to be causing a problem for the great crested newt population;
 - Conditions assessments have concluded that the site is being responsibly managed for newts and the habitats on site are in good condition for the newts;
 - Public access and disturbance are listed as a threat on the site's Site Improvement Plan (relates to the risk of increased numbers of dog walkers regularly letting dogs off the lead and them getting into the ponds, which can introduce invasive species and change the turbidity of the water). The potential measure associated with this threat is to conduct audits to determine the best locations for signed access routes and construct new access routes; and
 - The Earth Trust has already started to manage the woodland to make the pond area less accessible to avoid disturbance, although there is not yet any specific management plan agreed with Natural England.
- 5.68 LUC then discussed future management plans with the Earth Trust⁸⁹. They confirmed that, although there is officially no public access to the newt ponds and visitors are discouraged from the area, some people do visit the ponds using the paths that the Earth Trust maintains for its own management access. The Earth Trust will continue to discourage access to the ponds and informally monitor the situation (there are no current plans to update previous detailed monitoring of the ponds). If access to the ponds becomes an issue in the future, it would be possible to fence off the ponds to prevent access; however, the preferred strategy would be to dig additional ponds for newts, to boost the robustness of the population.
- 5.69 The Earth Trust has a Woodland Management Plan⁹⁰, developed in consultation with Natural England. The plan sets out how woodland at the site is to be managed, including woodland within the SAC. The plan is currently being updated and will continue to set out measures aimed at protecting the great crested newt population, including management of the woodland around the ponds to provide terrestrial habitat for newts. At least 10% of any felled timber will be left on the ground as hibernacula and there will be a principle of non-

⁸⁸ Carly Pettett (current SSSI officer) and Alison Muldal (SSSI officer for several years until recently)

⁸⁹ Chris Parker, Head Land Manager for the Earth Trust

⁹⁰ http://www.earthtrust.org.uk/Libraries/Documents/Earth_Trust_-_Woodland_Management_Plan.sflb.ashx

intervention for forestry management around the pond, with the exception of occasional coppicing.

- 5.70 One of the aims of the Earth Trust's planning application to improve facilities and access for visitors was to alter the points where visitors access the site and the distribution of visitors, to reduce pressure on the more sensitive sites, including the SAC. Wittenham Clumps will continue to be the main draw to the site, and the SAC woodland is close to the Clumps. However, at present, around half of the visitors to Little Wittenham park at a small car park closest to the SAC, so the Earth Trust intends to provide an alternative larger car park, to encourage visitors away from the SAC⁹¹. Improvements are also being made to signed routes, to encourage visitors to use other parts of the site.
- 5.71 It is therefore considered that the great crested newt population is of low sensitivity to recreational pressure and that sufficient measures are in place to manage visitor numbers to Little Wittenham SAC such that they do not have an adverse effect on the site.
- 5.72 The risk that the increase in population will cause significant increases in visitor numbers at Little Wittenham SAC will also be mitigated to an extent by the following Local Plan policies:

Policy ENV5: Green Infrastructure in new developments

Development will be expected to contribute towards the provision of additional Green Infrastructure and protect and enhance existing Green Infrastructure.

Proposals should:

- *protect, conserve and where possible, enhance the district's green infrastructure;*
- *provide an appropriate level of green infrastructure where a requirement has been identified for additional provision either within the Green Infrastructure Strategy, the relevant Neighbourhood Development Plan, or the Habitats Regulations Assessment;*
- *avoid the loss, fragmentation, severance or a negative impact on the function of green infrastructure;*
- *provide appropriate mitigation where there would be an adverse impact on green infrastructure; and*
- *provide an appropriate replacement where it is necessary for development to take place on areas of green infrastructure,*

All green infrastructure provision should be designed to meet the quality standards set out within the Green Infrastructure Strategy or the relevant Neighbourhood Development Plan, or the Didcot Garden Town Masterplan. Consideration should also be given to inclusive access using such guides as the Fieldfare Trust "Countryside for All – A good practice guide to Disabled People's Access in the Countryside" and the South Oxfordshire Design Guide.

- 5.73 SODC has also prepared a greenspace strategy with Vale of White Horse District Council. The South and Vale Green Infrastructure Strategy⁹² provides additional planning guidance within the two districts on how the green infrastructure network can be safeguarded and improved, to better benefit local communities and biodiversity. The strategy recognises the role that green infrastructure (GI) can play in reducing the effects of recreation at other sites but identifies a current deficit in the provision of accessible natural greenspace, in both districts.
- 5.74 The strategy includes the following planning principles that would contribute towards mitigation of recreation impacts on Little Wittenham SAC:

GI should be embedded into the layout of new development alongside the design of the built environment and grey infrastructure from the start of the masterplanning process.

⁹¹ Explained in the Design and Access Statement submitted with the planning application:

http://www.southoxon.gov.uk/ccm/support/dynamic_serve.jsp?ID=766260233&CODE=9CE0623E0FDB59B07E3EEF81370A5EC3

⁹² Chris Blandford Associates (2017) South and Vale Green Infrastructure Strategy

Development should provide or contribute towards the provision of on- or off-site GI as appropriate in locations with identified deficiencies, including arrangements for on-going management and maintenance of green spaces.

The amount and quality of GI of different types that is required by a development to ensure residents have the opportunity to interact with nature, and encourage recreation, sports and healthier lifestyles, should reflect Natural England's standards for accessible natural greenspace and the standards for open space provision recommended in the Councils' Open Space, Sports and Recreation Studies.

And:

Policy CF5 - Open Space, Sport and Recreation in new residential development

New residential development will be required to provide or contribute towards accessible open space, and play facilities in line with the most up to date standards set out in the Open Space Strategy, including:

- *Amenity greenspace (including parks and gardens)*
- *Allotments*
- *Equipped children's play areas*

New residential development will be required to provide or contribute towards accessible sport and recreation facilities, including playing pitches, in line with the council's most up to date Leisure Strategy, and Sport England guidance.

The provision of open space, sport, recreation and play facilities, and playing pitches is expected to be delivered on site, unless this is demonstrated not to be feasible.

Provision for the future long-term maintenance and management of the open space and facilities will be sought and must be agreed as part of the planning application..

- 5.75 SODC's Open Space Strategy⁹³ sets the standards for provision for more formal areas of recreational open space close to new developments, as summarised in **Table 5-7**.

Table 5-7 – South Oxfordshire Open Space Standards

| Open space type | Quantity per 1,000 population | Accessibility | Quality |
|--|--|---|--|
| Parks and Gardens & Amenity Green Space | 1.4ha per 1000 in the Towns and Larger Villages | 710m for Parks and Gardens 480m for Amenity Green Space | Green Flag Standard |
| Children's Play and provision for young people | <ul style="list-style-type: none"> • 0.25 ha per 1,000 of Designated Equipped Playing Space • 0.3ha per 1,000 for teenage/MUGA provision | <ul style="list-style-type: none"> • 400m for LEAP • 1000m for NEAP • 1000m for teenage facilities | <ul style="list-style-type: none"> • New LEAPs and NEAPs should meet the Fields In Trust standards as relevant to the individual site • New youth provision should reflect current best practice, and also take into account the needs expressed by local young people |
| Allotments | 0.4 ha per 1000 | 1000m | Allotments should be secure with gates and fencing providing suitable and accessible areas for growing, and where applicable an |

⁹³ Nortoft (2017) Sports Facilities, Local Leisure Facilities and Playing Pitch Study. Part 5: Open Spaces Study

| Open space type | Quantity per 1,000 population | Accessibility | Quality |
|-----------------|-------------------------------|---------------|--|
| | | | adequate water supply and car parking. |

- 5.76 Therefore, it is possible to conclude that the increase in visitor numbers arising from the South Oxfordshire Local Plan, either alone or in combination with other plans, would not have an adverse effect on the integrity of Little Wittenham SAC.

6 Conclusions

- 6.1 The HRA of the South Oxfordshire Submission Local Plan (September 2017) has been undertaken in accordance with currently available guidance and based on a precautionary approach as required under the Habitats Regulations. The HRA and Appropriate Assessment conclusions are summarised below.
- 6.2 At this stage in the Local Plan preparation, the HRA has concluded that adverse effects on the integrity of European sites around South Oxfordshire from policies and site allocations in the Local Plan will not occur in relation to:
- Physical loss or damage to on- or off-site habitat;
 - Noise/vibration and light pollution; or
 - Changes to water quality or quantity.
- 6.3 An Appropriate Assessment of the potential effects of the plan on the Aston Rowant SAC through increased aerial pollution has been carried out. While the in-combination effects of growth would result in increased NO_x concentrations across part of the SAC, these would not result in any N deposition on the SAC, and the predicted NO_x concentrations are considered unlikely to have an adverse effect on the qualifying features based on long-term trends and past monitoring at the SAC. Natural England have been consulted on this Appropriate Assessment and are satisfied that increasing traffic would not have an adverse effect on the integrity of the Aston Rowant SAC⁹⁴.
- 6.4 Impacts on Little Wittenham SAC due to increases in visitor numbers were able to be screened out for the Local Plan alone, as the expected increases due to the Local Plan are within those planned for by the Earth Trust, which manages the site. An Appropriate Assessment was carried out to determine whether increases in visitor number due to the Local Plan in combination with other plans or projects would have an adverse effect on the integrity of Little Wittenham SAC. Following discussions with Natural England and the Earth Trust, the assessment has concluded that there will be no adverse effects on the site's integrity, due to the low sensitivity of the great crested newt population to recreation disturbance, and the responsible management of the site and its habitats by the Earth Trust.
- 6.5 It is therefore concluded that the Local Plan would not have any adverse effects on the Natura 2000 network of sites, either alone or in combination with other plans and projects.

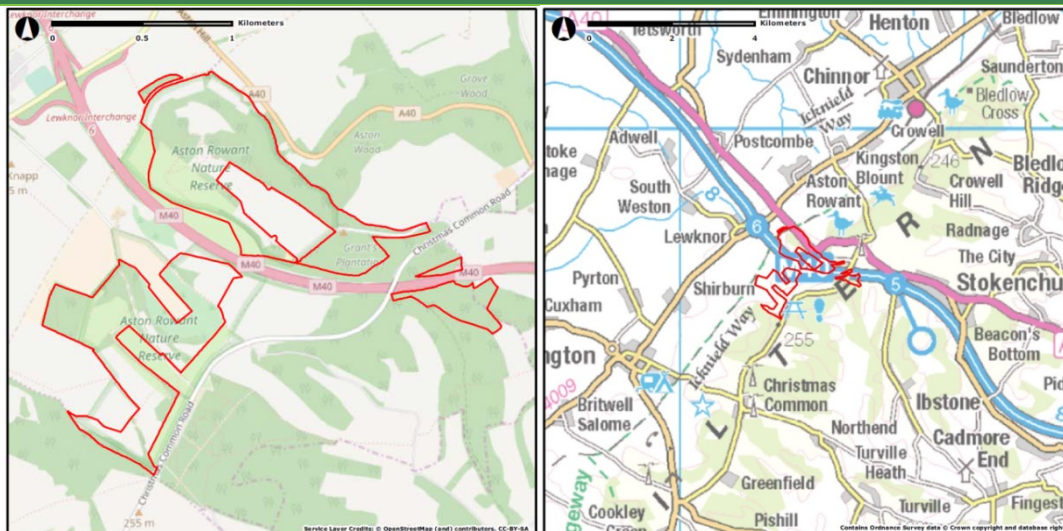
LUC
January 2018

⁹⁴ Letter from Marc Turner to Jon Taylor dated 12th January, 2018

Appendix 1

European sites in and around South Oxfordshire

1. Aston Rowant Special Area of Conservation



Site description

Aston Rowant is classified as SAC because it supports one of the largest remaining populations of juniper in lowland Britain. It is selected as an example of juniper formations on the chalk in the south east of England. At this site juniper is present as part of a mixed scrub community but also occurs as isolated bushes in chalk grassland. In common with most lowland populations of juniper, successful reproduction and survival of new generations of bushes is extremely rare and conservation is currently dependent upon significant levels of management intervention. The low level of reproductive success is the main threat to the feature at this site. Aston Rowant also supports *Asperulo-Fagetum* beech forests although this is not a primary reason for classification as SAC.

Qualifying features

| | |
|--------------|---|
| H5130 | Juniper on heaths or calcareous grassland |
| H9130 | Beech forests on neutral to rich soils |
| Site status* | 100% in favourable condition |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan⁹⁵: pressures, threats and related development

The main pressures and threats to this site include an unsustainable on-site population, changes in species distribution, disease of juniper as well as the impacts of air pollution and the risks of atmospheric nitrogen deposition upon juniper. Additionally, conflicting conservation objectives threaten juniper and deer threaten beech. With regard to the types of development that may be brought forward in the Local Plan, air pollution could impact the site.

Key environmental conditions supporting the site

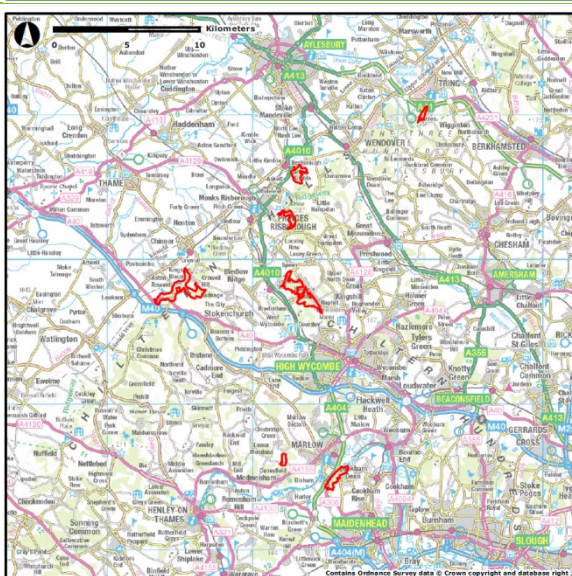
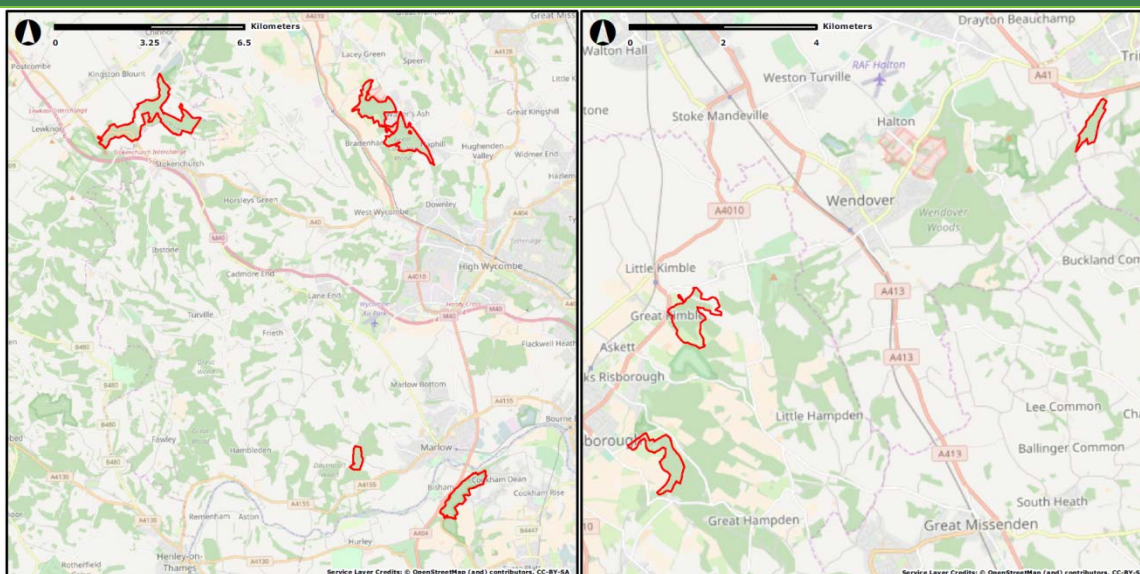
1. Regular management to keep vegetation open and allow seedlings to establish
2. Prevention of rabbit grazing on seedlings
3. Minimal air pollution

*Site status is an assessment by Natural England of the status of the SSSIs within the SAC

⁹⁵ Natural England - Site Improvement Plan: Aston Rowant (SIP007)

<http://publications.naturalengland.org.uk/publication/4960794580090880?category=6149691318206464>

2. Chilterns Beechwoods Special Area of Conservation



Site description

The Chilterns Beechwoods SAC comprises nine separate sites scattered across the Chilterns. There are three features of interest: semi-natural grasslands and scrubland on chalk; *Asperulo-Fagetum* beech woodland (for which this is considered to be one of the best areas in the UK and lies in the centre of the habitat's UK range); and Stag beetle *Lucanus cervus*, for which the area is considered to support a significant presence. The rare coralroot *Cardamine bulbifera* is found in these woods.

Qualifying features

| | |
|--------------|---|
| H6210 | Dry grasslands and scrublands on chalk or limestone |
| H9130 | Beech forests on neutral to rich soils |
| S1083 | Stag beetle |
| Site status* | 100% in favourable condition |

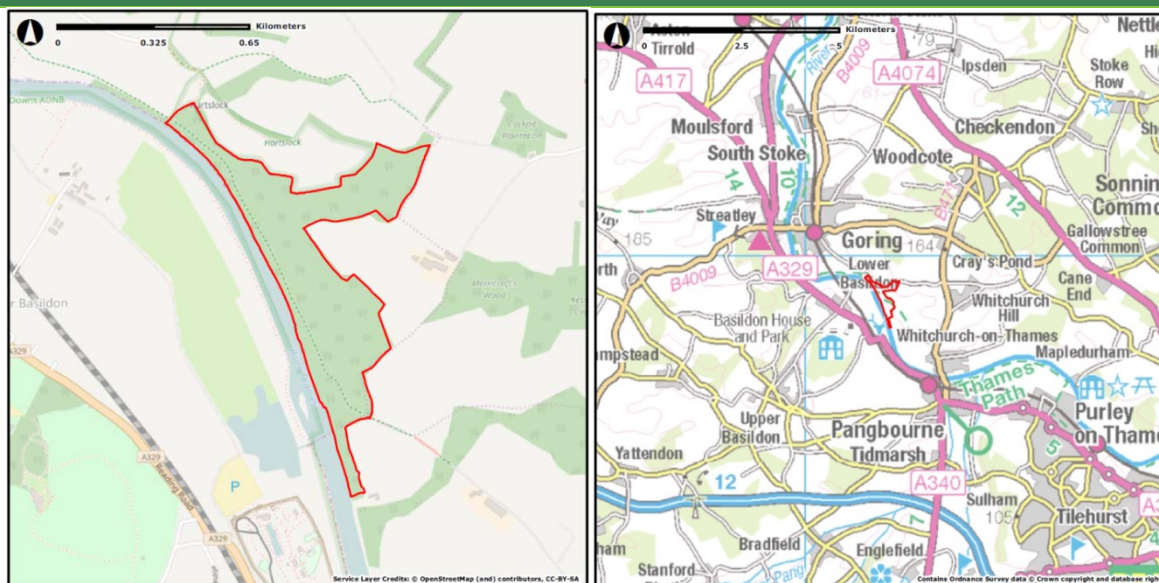
Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

| 2. Chilterns Beechwoods Special Area of Conservation | |
|--|--|
| Site Improvement Plan ⁹⁶ : pressures, threats and related development | |
| <p>The main pressures and threats to this site include the impacts of forestry and woodland management, disease, deer and the invasive species of grey squirrel upon beech. Additionally, the changes in species distribution of stag beetle as well as the impact of public access and disturbance upon stag beetle. Air pollution and the impact of atmospheric nitrogen deposition also threaten the dry grasslands, beech and stag beetle. With regard to the types of development that may be brought forward in the Local Plan, air pollution and visitor disturbance could impact the site.</p> | |
| Key environmental conditions supporting the site | |
| <ol style="list-style-type: none"> 1. Minimal air pollution 2. Managed public access 3. Appropriate management of grasslands 4. Absence of direct fertilisation | |
| <p>*Site status is an assessment by Natural England of the status of the Site of Special Scientific Interest within the SAC</p> | |

⁹⁶ Natural England - Site Improvement Plan: Chilterns Beechwoods (SIP045)
<http://publications.naturalengland.org.uk/publication/6228755680854016?category=6149691318206464>

3. Hartslock Wood Special Area of Conservation



Site description

This site hosts the priority habitat type "orchid rich sites". The steep slopes of this site on the chalk of the Chilterns comprise a mosaic of chalk grassland, chalk scrub and broadleaved woodland. The chalk grassland mostly consists of a mosaic of shorter-turf NVC type CG2 *Festuca ovina*–*Avenula pratensis* grassland and taller CG3 *Bromus erectus* grassland. The site supports one of only three UK populations of monkey orchid *Orchis simia*, a nationally rare Red Data Book species. The bulk of this site lies on a steep slope above the River Thames. Recent storms and landslips have resulted in a diverse age-structure for the yew population. Open patches show a rich flora including local species such as southern wood-rush *Luzula forsteri*, wood barley *Hordelymus europaeus* and narrow-lipped helleborine *Epipactis leptochila*.

Qualifying features

| | |
|--------------|---|
| H6210 | Dry grasslands and scrublands on chalk or limestone |
| H91J0 | Yew dominated woodland |
| Site status* | 100% in favourable condition |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan⁹⁷: pressures, threats and related development

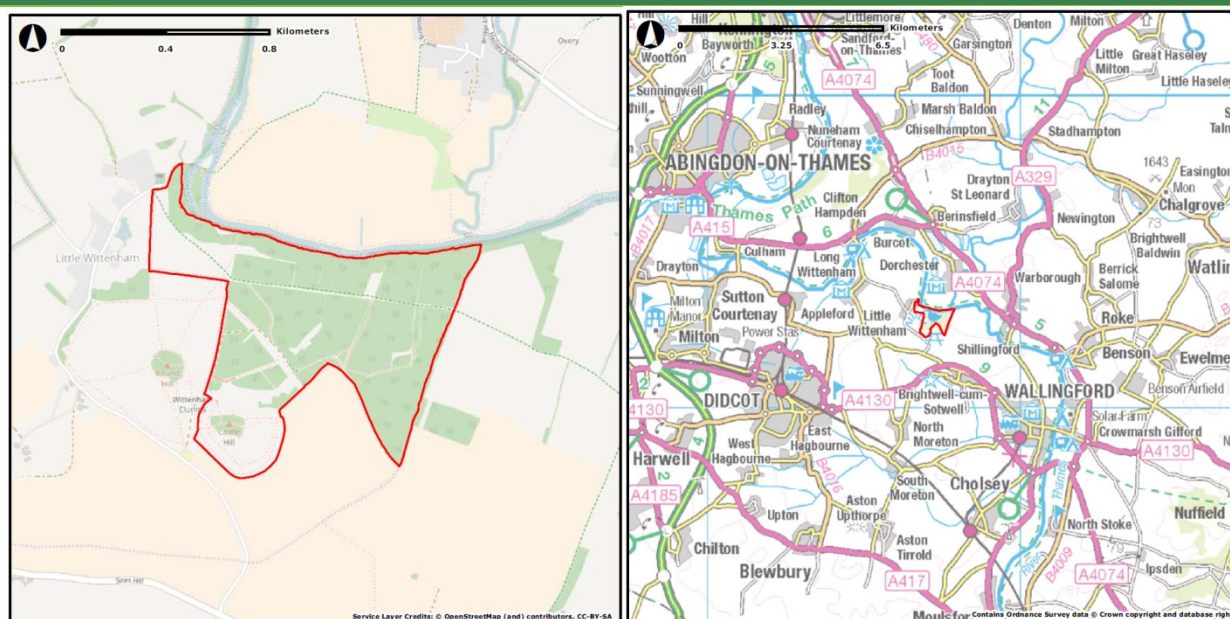
The main threat to this site is air pollution and the risk of atmospheric nitrogen deposition upon the dry grasslands and yew-dominated woodland. With regard to the types of development that may be brought forward in the Local Plan, air pollution could impact the site.

Key environmental conditions supporting the site

1. Appropriate management of grazing
2. Minimal air pollution
3. Absence of direct fertilisation

⁹⁷ Natural England - Site Improvement Plan: Hartslock Wood (SIP100)
<http://publications.naturalengland.org.uk/publication/4874314121740288?category=6149691318206464>

4. Little Wittenham Special Area of Conservation



Site description

One of the best-studied great crested newt sites in the UK, Little Wittenham comprises two main ponds set in a predominantly woodland context (broadleaved and conifer woodland is present). There are also areas of grassland, with sheep grazing and arable bordering the woodland to the south and west. The River Thames is just to the north of the site, and a hill fort to the south. Large numbers of great crested newts *Triturus cristatus* have been recorded in the two main ponds, and research has revealed that they range several hundred metres into the woodland blocks.

Qualifying features

| | |
|--------------|------------------------------|
| S1166 | Great crested newt |
| Site status* | 100% in favourable condition |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan⁹⁸: pressures, threats and related development

The main pressures and threats to this site include the impacts of public access and disturbance, and invasive fish species upon great crested newt. With regard to the types of development that may be brought forward in the Local Plan, visitor disturbance could impact the site.

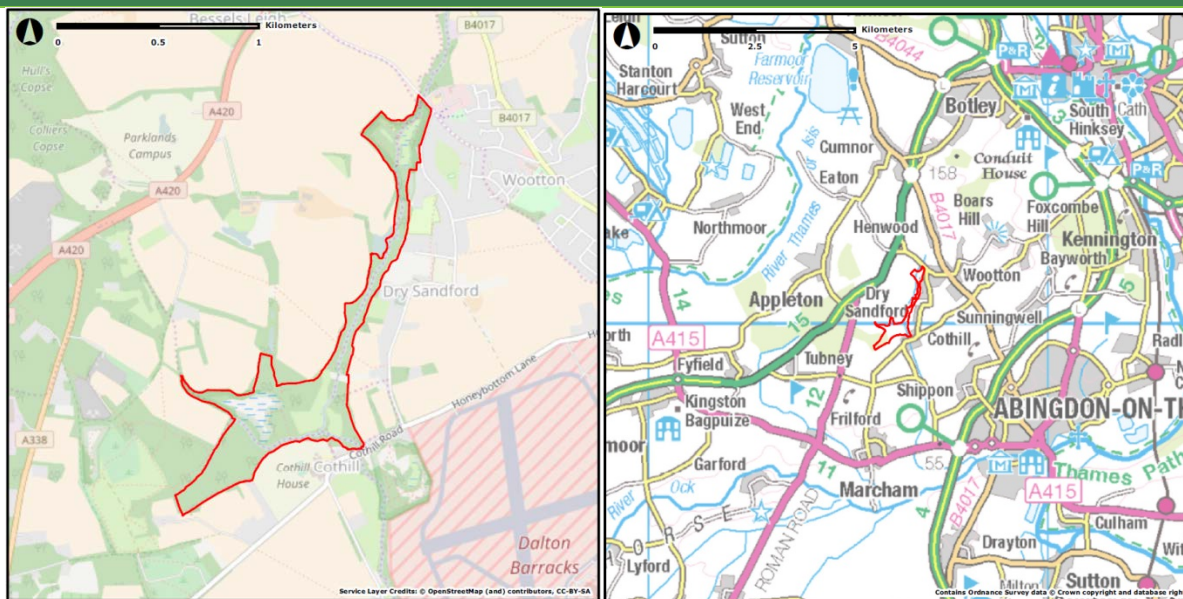
Key environmental conditions supporting the site

1. Suitable foraging and refuge habitat within 500 metres of the pond
2. Relatively unpolluted water of neutral pH
3. Some ponds deep enough to retain water throughout February to August at least one year in three

*Site status is an assessment by Natural England of the status of the SSSI within the SAC

⁹⁸ Natural England - Site Improvement Plan: Little Wittenham (SIP122)
<http://publications.naturalengland.org.uk/publication/6567758347108352?category=6149691318206464>

5. Cothill Fen Special Area of Conservation



Site description

Cothill Fen is an exceptionally important site with an outstanding range of nationally rare habitats which support a large number of rare invertebrates and plants. The habitats consist of calcareous fen, calcareous grassland, woodland and scrub of varying degrees of wetness. The habitat supports over 330 species of vascular plant and over 120 nationally scarce or rare invertebrates, including the nationally rare Southern Damselfly (*Coenagrion mercuriale*).

Qualifying features

| | |
|--------------|--|
| H7230 | Alkaline Fens; Calcium-rich springwater-fed fens |
| H91E0 | Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ; Alder woodland on floodplains |
| Site status* | 65% in favourable condition; 35% in unfavourable recovering condition |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan⁹⁹: pressures, threats and related development

The main pressures and threats to this site include the impacts of water pollution and hydrological changes, as well as air pollution and the impact of atmospheric nitrogen deposition upon the calcium-rich spring water-fed fens.

With regard to the types of development that may be brought forward in the Local Plan, air pollution, and water quality and quantity could impact the site.

Key environmental conditions supporting the site

1. High water table
2. Calcareous base rich water supply

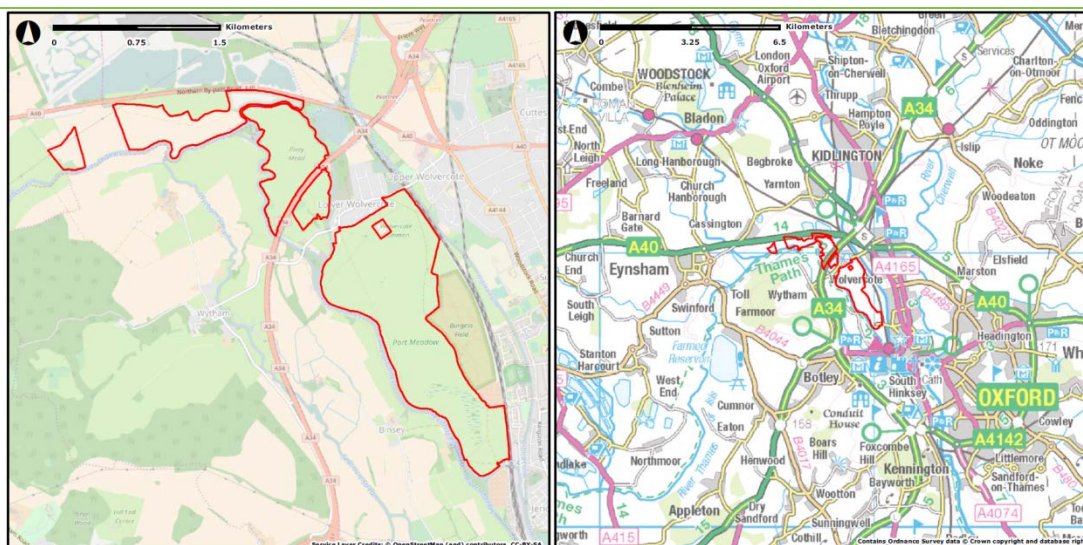
*Site status is an assessment by Natural England of the status of the Site of Special Scientific Interest within the SAC

⁹⁹ Natural England - Site Improvement Plan: Cothill Fen (SIP047)

<http://publications.naturalengland.org.uk/publication/6482436405854208?category=6149691318206464>

5. Cothill Fen Special Area of Conservation

6. Oxford Meadows Special Area of Conservation



Site description

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

| | |
|--------------|--|
| H6510 | Lowland hay meadows |
| S1614 | <i>Apium repens</i> ; Creeping marshwort |
| Site status* | 100% in favourable condition |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰⁰: pressures, threats and related development

The main pressures and threats to this site include the impacts of hydrological changes and the invasive species of *Crassula* upon creeping marshwort. With regard to the types of development that may be brought forward in the Local Plan, water quantity changes could impact the site.

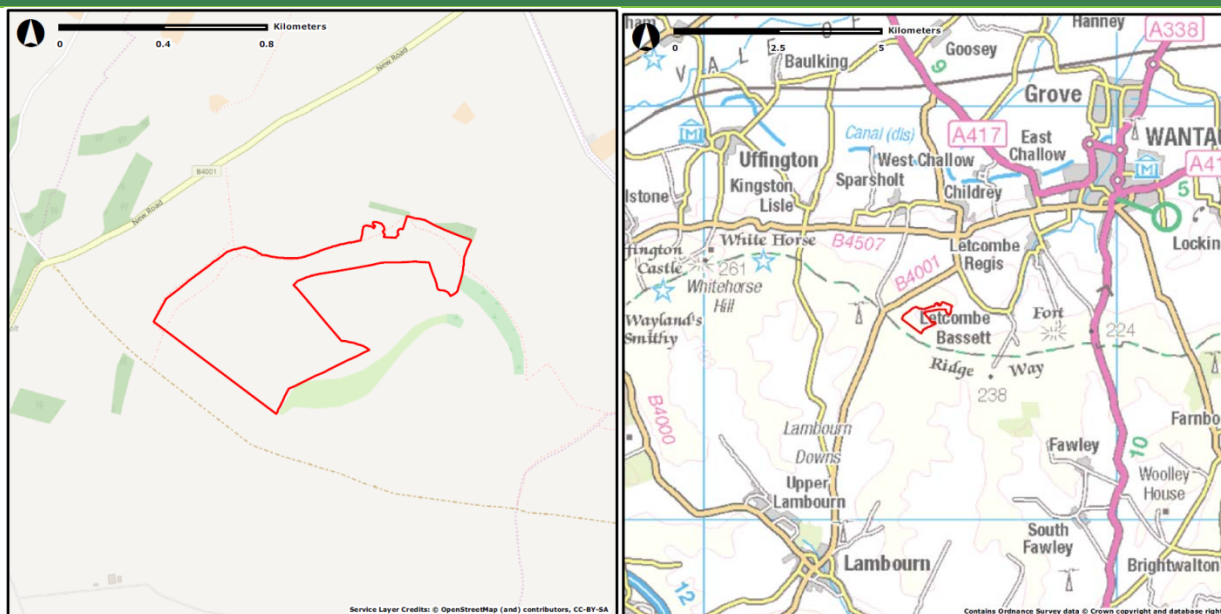
Key environmental conditions supporting the site

1. Maintenance of traditional hay cut
2. Maintenance of appropriate grazing regime
3. Minimal air pollution
4. Absence of direct fertilisation

¹⁰⁰ Natural England - Site Improvement Plan: Oxford Meadows (SIP163)
<http://publications.naturalengland.org.uk/publication/4942743310696448?category=6149691318206464>

| 5. Cothill Fen Special Area of Conservation |
|---|
| <ul style="list-style-type: none"> 5. Balanced hydrological regime 6. Absence of excessive nutrient enrichment of floodwaters |
| *Site status is an assessment by Natural England of the status of the SSSIs within the SAC |

7. Hackpen Hill Special Area of Conservation



Site description

Hackpen Hill SAC is an extensive area of unimproved chalk grassland in the North Wessex Downs, and is considered to be one of the most important areas in the UK for the rare early gentian.

The site has a variety of aspect and gradients, with the grassland dominated by red fescue and upright brome. The herb flora includes a significant population of early gentian, as well as autumn gentian, fragrant orchid, frog orchid, horseshoe vetch, common rock-rose and dwarf thistle.

Qualifying features

| | |
|--------------|--|
| H6210 | Semi-natural dry grasslands and scrubland facies: on calcareous substrates; dry grassland and scrublands on chalk or limestone |
| S1654 | Early gentian |
| Site status* | 100% in favourable condition |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰¹: pressures, threats and related development

There are no pressures and threats identified currently affecting this site.

Key environmental conditions supporting the site

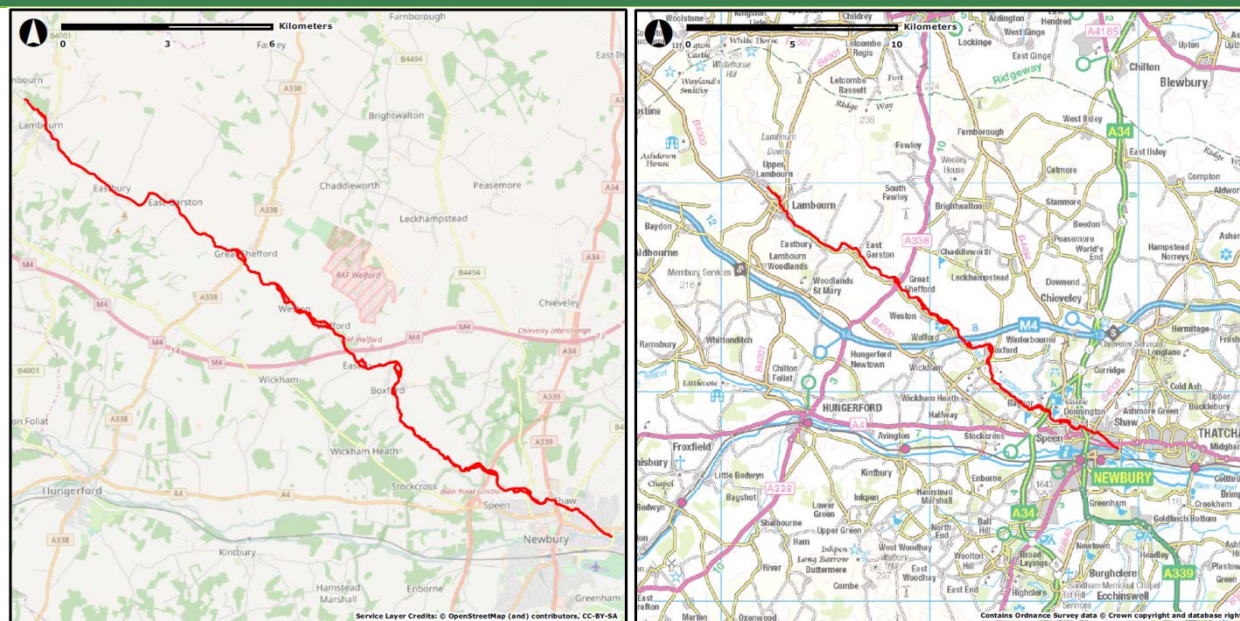
- Maintenance of appropriate grazing regime
- Controlling rabbit numbers on the site

*Site status is an assessment by Natural England of the status of the Site of Special Scientific Interest within the SAC

¹⁰¹ Natural England - Site Improvement Plan: Hackpen Hill (SIP096)

<http://publications.naturalengland.org.uk/publication/5938642669273088?category=6149691318206464>

8. River Lambourn Special Area of Conservation



Site description

The River Lambourn is an example of a classic chalk stream with a seasonally dry winterbourne section. It is relatively unmodified and has near-natural flow characteristics. The river supports a characteristic range of aquatic plant communities of the *Ranunculus fluitantis* and *Callitriche-Batrachion* types. As well as being classified as SAC for its river type, the Lambourn is also of importance in supporting self-sustaining populations of Bullhead. An additional qualifying feature present is Brook lamprey.

Qualifying features

| | |
|--------------|---|
| H3260 | Rivers with floating vegetation often dominated by water-crowfoot |
| S1096 | Brook Lamprey |
| S1163 | Bullhead |
| Site status* | 100% unfavourable condition, no change |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰²: pressures, threats and related development

The main pressures and threats to this site include the impacts of siltation, the invasive species of crayfish, inland flood defence works and inappropriate cutting and mowing upon the following features; rivers with floating vegetation often dominated by water-crowfoot, Brook lamprey, and Bullhead.

With regard to the types of development that may be brought forward in the Local Plan, water quality and quantity could impact the site.

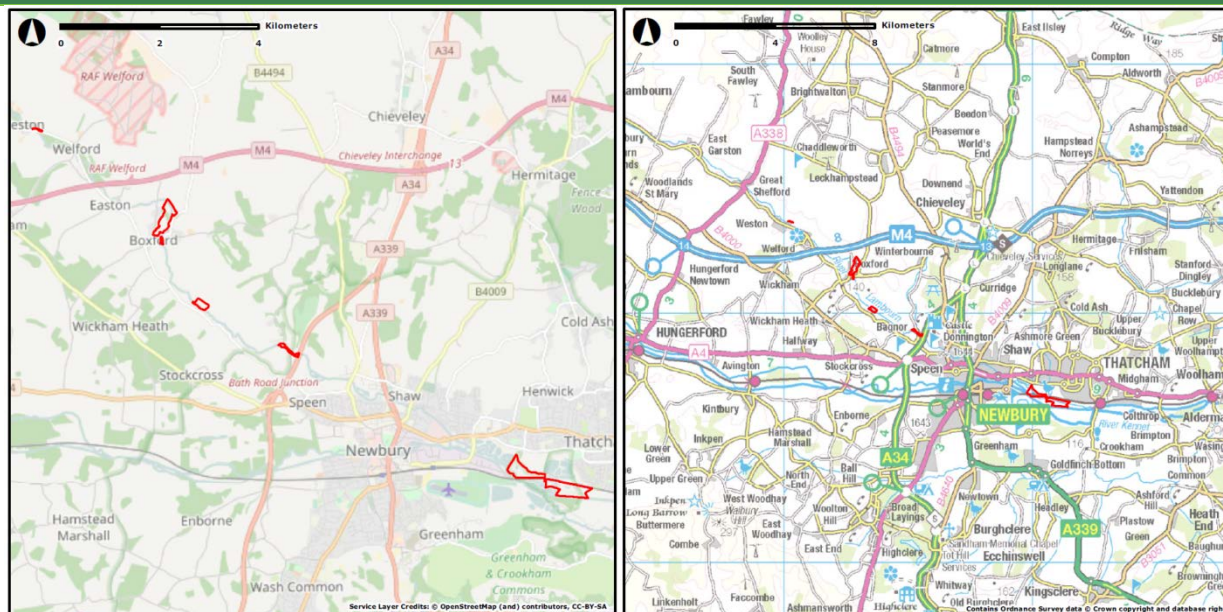
Key environmental conditions supporting the site

1. Water quality
2. Water quantity

¹⁰² Natural England - Site Improvement Plan: River Lambourn and Kennet-Lambourn Floodplain (SIP112)
<http://publications.naturalengland.org.uk/publication/4738329056641024?category=6149691318206464>

| 8. River Lambourn Special Area of Conservation |
|--|
| 3. Habitat quality |
| *Site status is an assessment by Natural England of the status of the Site of Special Scientific Interest within the SAC |

9. Kennet and Lambourn Floodplain Special Area of Conservation



Site description

The Kennet and Lambourn Floodplain SAC consists of a cluster of sites in the Kennet and Lambourn river valleys. These areas represent locations where the terrestrial snail *Vertigo moulinsiana* is particularly abundant.

Qualifying features

| | |
|--------------|---|
| S1016 | Desmoulin's whorl snail |
| Site status* | 69% in favourable condition; 15% in unfavourable condition, recovering; 1% in unfavourable condition, no change; 16% in unfavourable condition, declining |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰³: pressures, threats and related development

The main pressures and threats to this site include the impacts hydrological changes caused by the decline of *Vertigo moulinsiana*, water pollution caused by molluscicides, changing land management and inappropriate water levels, upon Desmoulin's whorl snail. Also, the impacts of water pollution and hydrological changes upon these features as well as Desmoulin's whorl snail.

With regard to the types of development that may be brought forward in the Local Plan, water quality and quantity could impact the site.

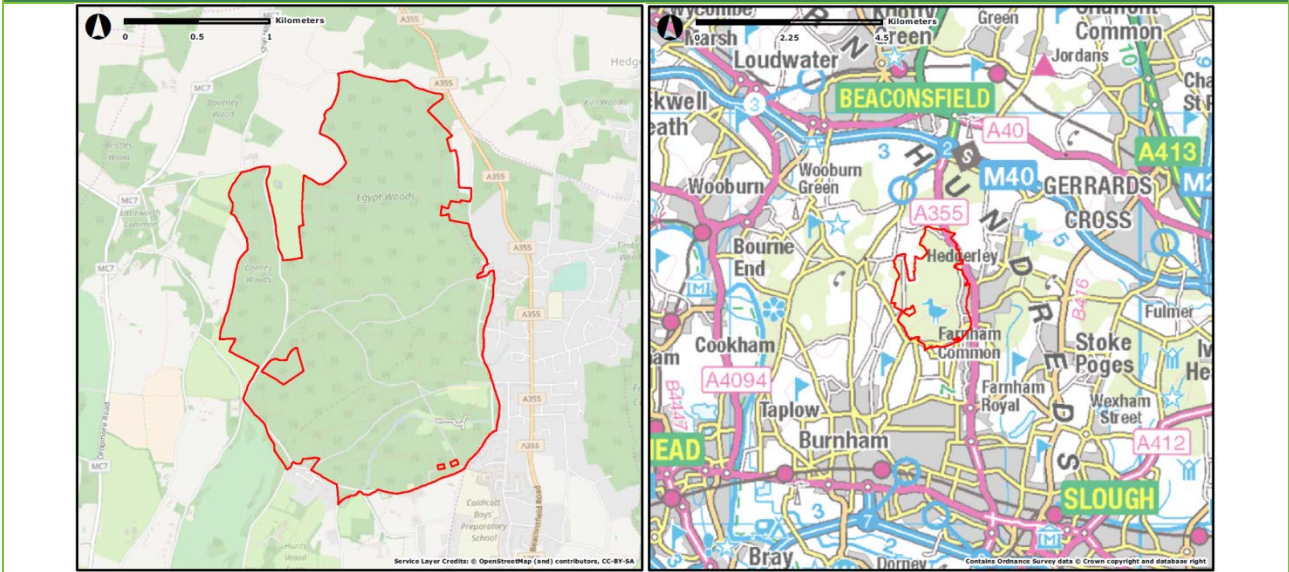
Key environmental conditions supporting the site

1. Open, unshaded areas
2. Adequate supply of high quality water

*Site status is an assessment by Natural England of the status of the SSSIs within the SAC

¹⁰³ Natural England - Site Improvement Plan: River Lambourn and Kennet-Lambourn Floodplain (SIP112)
<http://publications.naturalengland.org.uk/publication/4738329056641024?category=6149691318206464>

10. Burnham Beeches Special Area of Conservation



Site description

Burnham Beeches is an example of Atlantic acidophilous beech forests in central southern England. It is an extensive area of former beech wood-pasture with many old pollards and associated beech *Fagus sylvatica* and oak *Quercus spp.* high forest. Surveys have shown that it is one of the richest sites for saproxylic invertebrates in the UK. It also retains nationally important epiphytic communities, including the moss *Zygodon forsteri*.

| Qualifying features |
|---------------------|
|---------------------|

| | |
|--------------|--|
| H9120 | Beech forests on acid soils |
| Site status* | 63% in favourable condition; 37% in unfavourable condition, recovering |

Special Area of Conservation objectives

| | |
|---|---|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | <p>Subject to natural change, maintain or restore:</p> <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰⁴: pressures, threats and related development

The main pressures and threats to this site include the impacts of air pollution and the risk of atmospheric nitrogen deposition, public access and disturbance, habitat fragmentation, deer, species decline and invasive species upon Beech. With regard to the types of development that may be brought forward in the Local Plan, air pollution, visitor disturbance and direct habitat loss could impact the site.

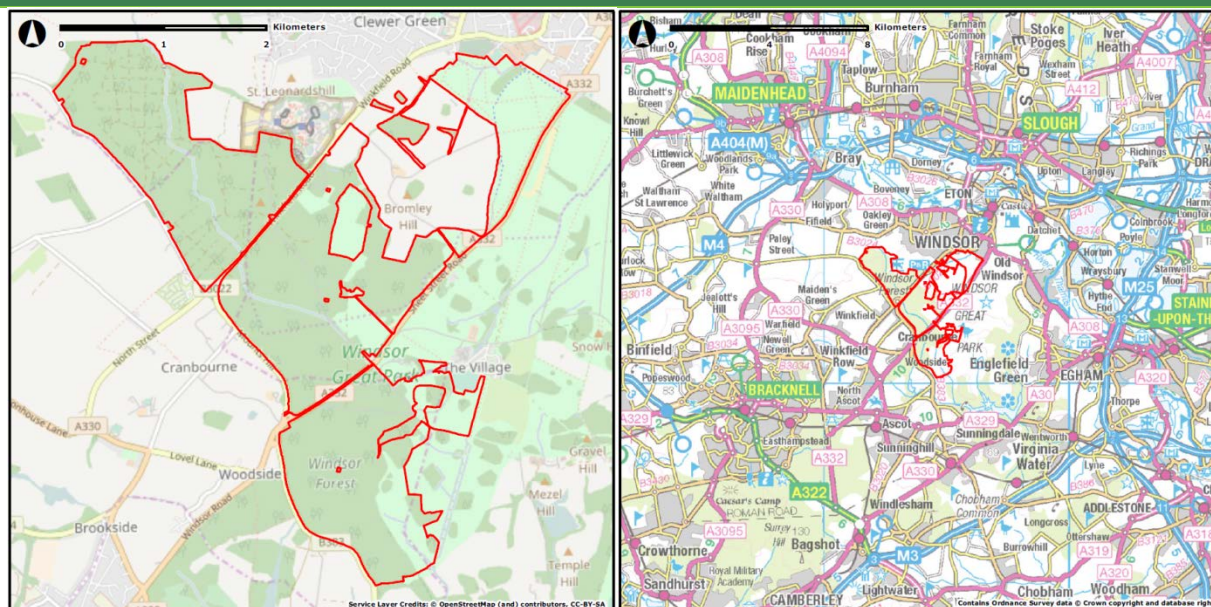
Key environmental conditions supporting the site

1. Air quality related to neighbouring extraction site
2. Water supply
3. Growth of secondary woodland

*Site status is an assessment by Natural England of the status of the SSSI within the SAC

¹⁰⁴ Natural England - Site Improvement Plan: Burnham Beeches (SIP032)
<http://publications.naturalengland.org.uk/publication/5689860228644864?category=6149691318206464>

11. Windsor Forest and Great Park Special Area of Conservation



Site description

Windsor represents old acidophilous oak woods (H9190) in the south-eastern part of its UK range. It has the largest number of veteran oaks *Quercus* spp. in Britain (and possibly in Europe), a consequence of its long continuity of management. Windsor Forest is listed as the most important site in the UK for fauna associated with decaying timber on ancient trees (oak spp, beech, and other species of tree). It is of importance for its range and diversity of saproxylic invertebrates, including many rare species (e.g. the beetle *Lacon querceus*). The SAC is thought to support the largest of the known populations in the UK of European important Violet click beetle *Limoniscus violaceus*. It is also recognised as having rich fungal assemblages. Atlantic acidophilous beech forest habitat (H9120) is present at the site and supports many of the important invertebrate and fungi assemblage.

Qualifying features

| | |
|--------------|--|
| H9120 | Beech forests on acid soils |
| H9190 | Dry oak-dominated woodland |
| S1079 | Violet click beetle |
| Site status* | 55% in favourable condition; 45% in unfavourable condition, recovering |

Special Area of Conservation objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰⁵: pressures, threats and related development

The main pressures and threats to this site include the impacts of forestry and woodland management upon dry oak-dominated woodland, as well as beech and violet click beetle. In addition, the impact of disease upon dry oak-dominated woodland, the impact of air pollution and the impact of atmospheric nitrogen deposition upon beech and dry oak-dominated woodland, and the impact of invasive pest and plant species upon dry oak-dominated woodland and violet click beetle.

With regard to the types of development that may be brought forward in the Local Plan, air pollution could impact the site.

¹⁰⁵ Natural England - Site Improvement Plan: Windsor Forest and Great Park (SIP263)
<http://publications.naturalengland.org.uk/publication/6221375450644480?category=6149691318206464>

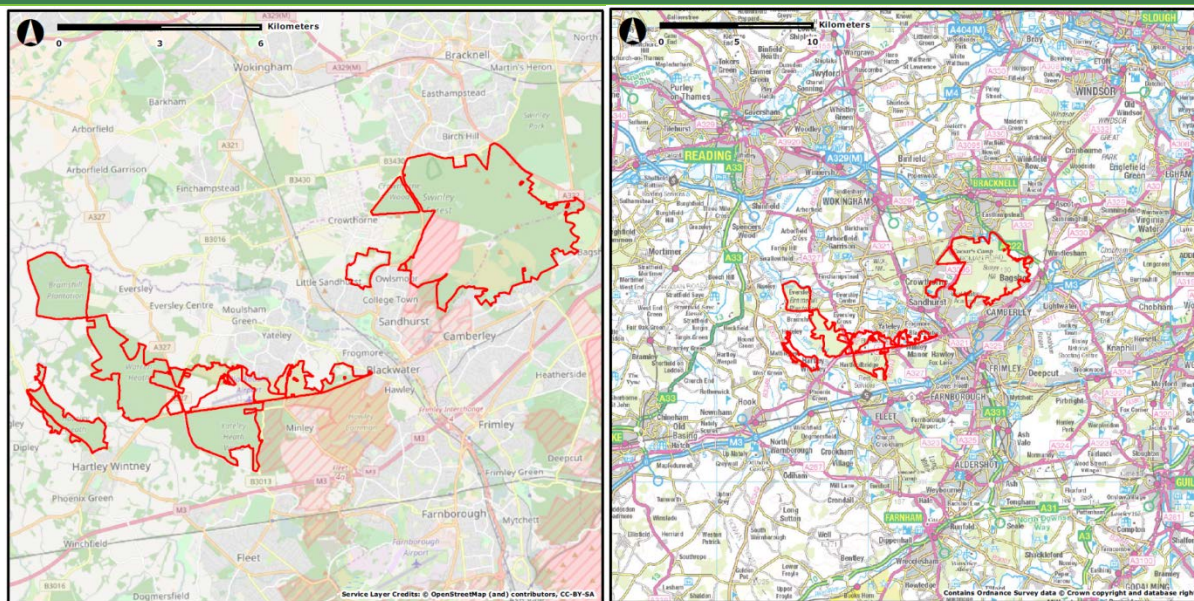
11. Windsor Forest and Great Park Special Area of Conservation

Key environmental conditions supporting the site

1. Continuous supply of old and decaying trees
2. Water quality
3. Maintenance of a high and stable water table
4. Maintenance of an appropriate grazing regime
5. Threat of non-native / invasive species
6. Scrub encroachment
7. Good air quality

*Site status is an assessment by Natural England of the status of the Site of Special Scientific Interest within the SAC

12. Thames Basin Heath Special Protection Area



Site description

Thames Basin Heaths SPA forms part of an extensive complex of lowland heathlands in southern England that support important breeding bird populations. It is located across the counties of Surrey, Hampshire and Berkshire and within the Thames Basin Heaths National Character Area (NCA) which stretches westwards from Weybridge in Surrey to the countryside around Newbury in Berkshire. The SPA consists of areas of agriculturally-unimproved heathland, scrub and woodland which were once almost continuous but are now fragmented by roads, urban development and farmland. It supports important breeding populations of a number of birds which are strongly associated with heathland habitat, especially the ground nesting birds Nightjar and Woodlark, and also the Dartford Warbler which often nests close to the ground amongst dense heather and gorse. The geology of the area consists of sand and gravel sediments which give rise to sandy or peaty acidic soils. These support dry heath vegetation in well-draining areas and wet heath vegetation in low-lying shallow slopes and bogs.

Qualifying features

| | |
|--------------|---|
| A224 | European nightjar (breeding) |
| A246 | Woodlark (breeding) |
| A302 | Dartford warbler (breeding) |
| Site status* | 58% in unfavourable condition, recovering; 41% in favourable condition, 1% in unfavourable condition, declining; <1% in unfavourable condition; no change |

Special Protection Area objectives

| | |
|---|--|
| 1 | Avoid the deterioration of the qualifying natural habitats and significant disturbance to them, ensuring the integrity of the site is maintained and makes a full contribution to achieving Favourable Conservation Status for the qualifying features on this site. |
| 2 | Subject to natural change, maintain or restore: <ul style="list-style-type: none"> the extent and distribution of natural habitats, and habitats of protected species; the structure and function of habitats, and habitats of protected species the supporting processes on which protected species and their habits rely; the population of protected species; and the distribution of protected species within the site. |

Site Improvement Plan¹⁰⁶: pressures, threats and related development

The main pressures and threats to this site include the impacts of public access and disturbance, as well as unknowns regarding feature location, extent and condition, upon European nightjar, Woodlark, and Dartford Warbler. In addition, impacts of forestry and woodland management and inappropriate scrub control upon European nightjar, Woodlark, Dartford Warbler, wet heathland with cross-leaved heath and European dry heaths. Impacts of undergrazing, military operations, habitat fragmentation, wildfire and arson, as well as air pollution and the impact of atmospheric nitrogen deposition, upon European nightjar, Woodlark, Dartford Warbler, wet heathland with cross-

¹⁰⁶ Natural England - Site Improvement Plan: Thames Basin (SIP237)

<http://publications.naturalengland.org.uk/publication/6249258780983296?category=6149691318206464>

12. Thames Basin Heath Special Protection Area

leaved heath, European dry heaths and depressions on peat substrates. Also, impacts of invasive species on wet heathland with cross-leaved heath and European dry heaths. Additionally, impacts of hydrological changes on wet heathland with cross-leaved heath and depressions on peat substrates.

With regard to the types of development that may be brought forward in the Local Plan, air pollution, visitor disturbance, direct habitat loss and water quantity changes could impact the site.

Key environmental conditions supporting the site

1. Water quality
2. Maintenance of a high and stable water table
3. Maintenance of an appropriate grazing regime
4. Good air quality (nitrogen impact)

*Site status is an assessment by Natural England of the status of the Site of Special Scientific Interest within the SAC

Appendix 2

Plans, Policies and Programmes with the Potential for In-Combination Effects

Local Plans and Strategies

Oxfordshire County Council Local Transport Plan 2015-2031 ('Connecting Oxfordshire')

Status

Adopted in September 2015 and then updated in 2016

Proposed development

Provides transport infrastructure to serve the estimated increase of 85,000 new jobs and 100,000 new homes in the county by 2031, while also reducing emissions to air and protecting and enhancing the environment. The proposals include:

- Enhanced road capacity at: the A34 and Oxford to Cambridge expressway; the A40; Oxford City ring road; the A420 corridor; local routes in Science Vale, Bicester, Banbury, Witney & Carterton; and cross-boundary links
- Measures to reduce car use e.g. prioritising sustainable modes of transport, better integrated public transport
- Managing freight: promoting freight by rail and working to improve strategic roads
- Managing the demand for parking
- Improving accessibility and safety
- Requiring developments to mitigate adverse effects on transport, make provision for sustainable transport, and agree local routing where appropriate to protect environmentally sensitive locations from traffic.

HRA

The 2015 HRA of the Local Transport Plan concluded that there would be no likely significant effects from the plan's proposals, subject to design and mitigation. The work did identify the potential need for project-level HRA of future projects, in relation to Oxford Meadows SAC, Cothill Fen SAC, and Little Wittenham SAC; however, air pollution effects at these sites were screened out on the basis of distance from roads, and the proposals will not increase recreation pressure at Little Wittenham SAC.

Therefore, there are no likely in-combination effects of the Oxfordshire County Council Local Transport Plan 2015-2031 with the South Oxfordshire Local Plan.

Oxfordshire County Council Minerals and Waste Local Plan: Core Strategy Proposed Submission Document 2015

Status

The current plan was adopted in July 1996 and covering the period to 2006. This will be replaced by a new Minerals and Waste Local Plan (Core Strategy and Site Allocations), which is currently in preparation.

The new Core Strategy is currently undergoing consultation on its proposed modifications (February 2017). The site allocations DPD is not yet available.

Proposals

The plan sets out policies to meet the county's requirements for minerals supply and waste disposal, including.

The plan also identifies strategic areas for development but specific sites will be identified through the Site Allocations DPD.

Policy M4 states that locations for minerals working will need to avoid locations likely to have an adverse effect on sites of international nature conservation insurance, and:

In the case of locations within the Eynsham / Cassington / Yarnton part of the Thames, Lower Windrush and Lower Evenlode Valleys area, it must be demonstrated that there will be no change in water levels in the Oxford Meadows Special Area of Conservation and the proposal must not involve the working of land to the north or north east of the River Evenlode; in the case of locations within the Corallian Ridge area, it must be demonstrated that there will be no change in water levels in the Cothill Fen Special Area of Conservation.

HRA

The 2014 HRA Screening Report concluded the Core Strategy would not have likely significant effects on European sites either alone or in-combination with other plans. An earlier version of the HRA (2011) had identified the possibility of hydrological effects from minerals extraction on Oxford Meadows SAC and Cothill Fen SAC, but additional studies concluded that minerals extraction could take place, if additional safeguards were put in place, without a likely effect on the SACs.

It is assumed that the Site Allocations DPD will be in line with the Core Strategy and therefore that the HRA conclusions will be similar, however that work has not yet been undertaken by Oxfordshire County Council.

There are no likely in-combination effects of the Oxfordshire Minerals and Waste Local Plan Core Strategy with the South Oxfordshire Local Plan.

Oxford City Council Core Strategy 2026 and the Sites and Housing Plan 2011-2026

Status

Core Strategy adopted in March 2011.

Sites and Housing Plan adopted in February 2013.

Replaced many policies within the Local Plan 2001-2016, including those relating to employment land and housing provision.

Core Strategy and Sites and Housing Plan will be replaced by the Local Plan 2016-2036 once adopted.

Housing Provision

Provision of 8,000 additional dwellings over the plan period from 2006-2026.

The Sites and Housing Plan lists the housing site allocations, and indicates approximately half of the 2,258 allocated dwellings will be at the Cowley/Blackbird Leys site.

Employment Land Provision

Provision of employment land for 11,000-14,000 jobs over the plan period via the granting of planning permission for developments that seek to achieve 'managed economic growth', whereby proposals show they maintain, strengthen, modernise or diversify Oxford's economy.

The Sites and Housing Plan highlights that some key employment sites are to be protected, unless viable alternatives are found.

HRA

The April 2011 HRA for the adopted Core Strategy concluded that there would be no significant effects on European sites. An Appropriate Assessment was carried out to assess the effects of recreation pressure, air pollution and changes to water quantity and quality on Oxford Meadows SAC; this concluded no adverse effects on integrity. Potential in-combination effects with SODC Local Plan, in relation to recreational pressure at Little Wittenham SAC were ruled out on the basis of the HRA of SODC's draft growth options.

The February 2012 HRA for the draft Sites and Housing Plan determined that, providing all of the mitigation measures recommended were carried out, the Sites and Housing Plan was not likely to have any adverse impact on European sites, either alone, or in combination with other plans or projects.

Therefore, there are no likely in-combination effects of the Oxford City Council Core Strategy 2026 and the Sites and Housing Plan 2011-2026 with the South Oxfordshire Local Plan.

Vale of White Horse Local Plan 2031 Part 1: Strategic Sites and Policies and Draft Local Plan 2013 Part 2: Detailed Policies and Additional Sites

Status

Part 1 Adopted in December 2016.

Part 2 in draft and open to consultation.

This replaces the majority of the Local Plan 2011. The remaining 'saved' policies from the Local Plan 2011 will be replaced by the Local Plan 2031 Part 2 once adopted. This will set out strategic policies and locations for

strategic housing for the agreed quantum of Oxford's unmet housing need to be addressed within the Vale of White Horse District.

Housing Provision

The Local Plan Part 1 makes provision of at least 20,560 homes over the plan period between 2011 and 2031.

12,495 of these are to be delivered through strategic allocations, the majority of which are to be provided within the South East Vale Sub-Area, predominantly at Grove Airfield and Valley Park where each site has been allocated 2,550 dwellings, and at Crab Hill where 1,500 dwellings have been allocated.

The Draft Local Plan Part 2 makes provision for at least 22,760 homes over the plan period between 2011 and 2031. The additional 2,200 homes (in comparison to that provided for in Part 1) are to address a proportion of the unmet housing need for Oxford City.

12,495 of these are to be delivered through Part 1 strategic allocations and 3,850 of these are to be delivered through Part 2 strategic allocations.

Employment Land Provision

The Local Plan Part 1 makes provision for 218 hectares of strategic employment land which is anticipated to deliver approximately 23,000 jobs over the plan period between 2011 and 2031. 93 hectares of this land will be at the Harwell Campus Enterprise Zone.

HRA

The February 2015 HRA of the draft Local Plan 2031 Part 1 concluded that no strategic housing sites would lead to likely significant effects, either alone or in combination. The July 2016 addendum to the HRA concluded that modifications made to the Local Plan since the previous HRA was undertaken did not impact the findings of the previous HRA.

The March 2017 HRA for the draft Local Plan 2031 Part 2 concluded that, given the incorporation of the recommendations within the HRA and subject to development of strategic air quality studies relating to Oxford Meadows SAC, the plan will not lead to likely significant effects on European sites either alone, or in combination with other plans and projects.

Therefore, there are no likely in-combination effects of the Vale of White Horse Local Plan 2031 Part 1: Strategic Sites and Policies and Draft Local Plan 2013 Part 2: Detailed Policies and Additional Sites with the South Oxfordshire Local Plan.

Cherwell District Council Local Plan 2011-2031

Status

Part 1 was adopted in July 2015 (and Policy Bicester 13 was re-adopted in December 2016). This sets out the strategic planning policy framework and strategic site allocations for the district to 2031.

Part 1 is now also in the process of a partial review which focuses specifically on how to accommodate additional housing and associated supporting infrastructure within Cherwell in order to help meet Oxford's unmet housing need.

Part 2 is also in the process of being prepared and contains non-strategic site allocations and development management policies.

Until Part 2 is adopted, there are saved policies within the adopted Local Plan 1996, adopted in November 1996, which are still in use. However, the plan period extended until 2001, therefore the policies are expired.

Housing Provision

Part 1 provides for 22,840 additional dwellings over the plan period from 2011-2031.

Part 2 is informed by the Oxfordshire Growth Board which has agreed the appointment of Cherwell to make provision for an additional 4,400 homes over the plan period from 2011-2031 to help meet Oxford's unmet housing needs.

Employment Land Provision

Part 1 provides for 200 hectares of employment sites providing approximately 20,500 jobs, and provides for the retention of existing employment sites.

HRA

The October 2014 HRA for the Submission Cherwell Local Plan incorporating proposed modifications (October 2014) (Local Plan Part 1) determined that it would not lead to likely significant effects, either alone or in combination, on the qualifying features of any European sites.

The June 2017 HRA of the Local Plan Part 1 Partial Review: Options and Additional sites determined that the plan may lead to likely significant effects on the qualifying features of Oxford Meadows SAC and that an HRA Screening will therefore need to be undertaken for the Proposed Submission Partial Review Plan, which will contain details of strategic site allocations to meet Oxford's unmet need.

Subsequently, the June 2017 HRA of the Part 1 Partial Review: Oxford's unmet housing needs Proposed Submission Plan determined that the plan will not lead to likely significant effects, either alone or in combination, on the qualifying features of Oxford Meadows SAC.

Therefore, there are no likely in-combination effects of the Cherwell District Council Local Plan 2011-2031 with the South Oxfordshire Local Plan.

Vale of Aylesbury Draft Local Plan 2016 and the Aylesbury Vale District Local Plan 2004

Status

Local Plan 2016 is in draft, still in preparation.

Local Plan 2004 was adopted in January 2004 and in 2007 a selection of these policies were saved. However, the plan period extended until 2011, therefore the policies are expired. The Local Plan 2016 will replace this once adopted.

Housing Provision

The Draft Local Plan 2016 makes provision for 33,300 homes, however this is subject to a decision on unmet needs.

Strategic growth to be focussed on Aylesbury, and development at Buckingham, Winslow, Wendover and Haddenham supported by growth at other larger, medium and smaller villages. The strategy also allocates growth at a new settlement and on sites adjacent to Milton Keynes.

Employment Land Provision

The draft Local Plan 2016 makes provision for 22 hectares of employment land.

Strategic growth to be focussed on Aylesbury, and development at Buckingham, Winslow, Wendover and Haddenham supported by growth at other larger, medium and smaller villages. The strategy also allocates growth at a new settlement and on sites adjacent to Milton Keynes.

HRA

The April 2017 HRA of the Vale of Aylesbury Local Plan concluded that the plan is not likely to have significant effects on European sites, either alone or in-combination.

Therefore, there are no likely in-combination effects of the Vale of Aylesbury Local Plan 2016 with the South Oxfordshire Local Plan.

Wycombe Draft Local Plan 2031, Core Strategy 2008, Local Plan 2004 and Princes Risborough Draft Town Plan 2016

Status

The Local Plan 2031 is in draft, still in preparation. This will review the Core Strategy 2008 and replace the Local Plan 2004.

The Core Strategy was adopted in 2008 and covers the plan period from 2006-2026.

The Local Plan 2004 was adopted in January 2004 and in 2007 a selection of these policies was saved. However, the plan period extended until 2011, therefore the policies are expired. The Local Plan 2031 will replace this once adopted.

Princes Risborough is one of the district's larger settlements, that lies close to the boundary with South Oxfordshire. The draft Town Plan (an Area Action Plan) was consulted on in March 2016 and will form part of the emerging Local Plan.

Housing Provision

Local Plan 2031 makes provision for 10,000 homes over the plan period from 2013-2033 as well as approximately 5,000 homes to help meet the unmet element of the district's housing needs. The majority of homes are to be provided at the urban area of High Wycombe.

Core Strategy makes provision for a total of 7,240 houses over the plan period from 2006-2026 and notes that the Site Allocations DPD will identify and allocate sufficient land for this.

The Princes Risborough draft Town Plan makes provision for a town extension of 2000-2,500 homes, employment development and infrastructure improvements.

Employment Land Provision

Local Plan 2031 makes provision employment land via safeguarding existing employment areas, supporting High Wycombe as a location for high quality offices, facilitating rural enterprise and diversification, and allocating additional employment sites on the edge of High Wycombe, at Stokenchurch, limited development on former reserve sites and at Princes Risborough.

Core Strategy makes provision of employment land primarily through the regeneration and intensification of existing business areas, as well as through new sites for business.

HRA

The September 2017 HRA Screening Report of the Local Plan concluded that the Local Plan is unlikely to have significant effects, either individually or in combination with other plans or projects, on the integrity of European sites.

Additionally, the February 2016 HRA Screening Report of the Princes Risborough Town Plan concluded that the Town Plan is also unlikely to have significant effects, either individually or in-combination with other plans or projects, upon the integrity of European Sites.

Therefore, there are no likely in-combination effects of the Wycombe Local Plan 2031 or the Princes Risborough Town Plan 2016 with the South Oxfordshire Local Plan.

Wokingham Borough Core Strategy 2010 and Managing Development Delivery Local Plan 2014

Status

Core strategy adopted in 2010.

Managing Development Delivery Local Plan adopted in 2014.

Both or parts of both will be superseded by the Local Plan Update due to be adopted in 2019.

Housing Provision

Core Strategy makes provision for at least 13,232 over the plan period from 2006-2026, including those at allocated sites.

The Managing Development Delivery Local Plan highlights that the Core Strategy requires the provision of at least 13,230 dwellings over the plan period from 2006-2026 and identifies allocated sites.

Employment Land Provision

Core Strategy makes provision for employment development at 9 Core Employment Areas. Some limited additional employment development may also be identified in the Managing Development Delivery plan, within Strategic Development Locations and at retail centres.

The Managing Development Delivery Local Plan highlights that Core Employment Areas are defined in the Core Strategy and identifies allocated sites.

HRA

The Core Strategy advises that an Appropriate Assessment was undertaken and identified the potential significant impacts upon Thursley, Ash, Pirbright & Chobham SPA and Windsor Forest & Great Park SAC, but concluded that likely significant effects could be avoided.

Therefore, there are no likely in-combination effects of the Wokingham Borough Core Strategy 2010 and Managing Development Delivery Local Plan 2014 with the South Oxfordshire Local Plan.

Reading Borough Local Development Framework: Core Strategy (2008), draft Local Plan Issues and Options (2016) and Sites and Detailed Policies Document (2012)

Status

Core Strategy adopted in January 2008 and alteration adopted in January 2015.

Sites and Detailed Policies Document adopted in October 2012 and alteration adopted in January 2015.

The Reading Borough Local Development Framework (the Core Strategy, Reading Central Area Action Plan and Sites and Detailed Policies Document) will be replaced by the New Local Plan which is in draft. The Issues and Options document has undergone consultation in March 2016.

Housing Provision

Core Strategy makes provision for a total of 10,930 dwellings over the plan period from 2006-2026.

Reading Central Area Action Plan makes provision for housing allocations at opportunity sites within the Reading Central Area of the Borough.

The Sites and Detailed Policies Document makes provision for housing site allocations.

Employment Land Provision

Core Strategy seeks additional employment provision, particularly offices, in the centre and along the A33 corridor, whilst at the same time allows for the release of areas no longer required for employment use, including some parts of the central area.

Sites and Detailed Policies Document makes provision for employment site allocations.

HRA

The May 2017 Sustainability Appraisal of the Draft Local Plan incorporates the HRA and concludes that all of the policy options are unlikely to have significant effects on European sites.

Therefore, there are no likely in-combination effects of the Reading Borough new Local Plan with the South Oxfordshire Local Plan.

West Berkshire Council Core Strategy (2006-2026)

Status

Core Strategy adopted in July 2012.

Housing Provision

Core Strategy makes provision for at least 10,500 additional dwellings over the plan period from 2006-2026.

Delivery includes housing in settlement boundaries and within broad locations and strategic sites, including those at and south of Newbury.

Employment Land Provision

Core Strategy makes provision for managing the growth of employment floorspace including through Protected Employment Areas.

Protected Employment Areas are located predominantly within Newbury, Thatcham and along the M4 and A4 corridors.

HRA

The 2016 HRA concluded that the Core Strategy, either alone or in combination with other plans and projects, will not affect the integrity of any of the European sites within the district or within 5km of the district boundary.

Therefore, there are no likely in-combination effects of the West Berkshire Council Core Strategy with the South Oxfordshire Local Plan.

Neighbourhood Plans

Benson Neighbourhood Plan: Pre-Submission Plan 2017

Status

The Benson Neighbourhood Plan has been submitted to South Oxfordshire District Council for examination by an independent examiner.

Housing Provision

Provision of 571 houses over the plan period of 2016-2032; this exceeds the allocation in the South Oxfordshire Local Plan. The majority of housing sites are located to the north of the village, with one located to the southwest of the village.

Employment Land Provision

Provision of retail, financial and professional, café and restaurant, and business developments via change of use from residential and commercial use in the village centre.

HRA

The HRA screening report for the Benson Neighbourhood Plan was carried out concurrently with the Local Plan HRA (this assessment). While it identified the potential for in-combination effects of air pollution with the Local Plan on the Aston Rowant SAC, it concluded that the in-combination effects would not lead to any adverse effects, on the SAC on the basis of the Appropriate Assessment of the Local Plan (as set out in Section 5 above).

Potential in-combination effects of the Benson Neighbourhood Plan on the Aston Rowant SAC with the South Oxfordshire Local Plan should be considered.

Watlington Draft Neighbourhood Development Plan: Our Community, Our Plan 2017

Status

The Watlington Neighbourhood Development Plan has been submitted to South Oxfordshire District Council for examination by an independent examiner.

Housing Provision

Provision of 260 houses over the plan period from 2017-2033; this meets the allocation in the South Oxfordshire Local Plan. Housing sites are located to the northwest of the town.

Employment Land Provision

Provision of new small-scale workshops and accommodation for small and medium sized businesses, including start-ups, appropriate to the location within Watlington. One allocation is identified as a site for employment development to the west of the town.

HRA

The HRA screening report for the Watlington Neighbourhood Plan was carried out concurrently with the Local Plan HRA (this assessment). While it identified the potential for in-combination effects of air pollution with the Local Plan on the Aston Rowant SAC, it concluded that the in-combination effects would not lead to any adverse effects, on the SAC on the basis of the Appropriate Assessment of the Local Plan (as set out in Section 5 above).

Potential in-combination effects of the Watlington Neighbourhood Plan on the Aston Rowant SAC with the South Oxfordshire Local Plan should be considered.

Appendix 3
Screening Matrix for the Publication Local Plan

The screening matrix below shows which types of impacts on European sites could potentially result from each of the policies and sites allocated in the Local Plan. Where a site is not expected to have a particular type of impact, the relevant cell is shaded **green**. Where a site could potentially have a certain type of impact, this is shown in **orange**. The final column sets out the screening conclusions, taking into account mitigation provided by other policies in the Local Plan (or other plans and strategies) as explained in **Chapters 3 and 4**, and shown in the fifth column.

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|---|--|---|--|--|
| Policies | | | | | |
| STRAT1: The Overall Strategy | None – this policy describes the overall strategy for development within the district but will not itself result in new development; the principles set out in this strategic policy are covered by other more specific development policies. | n/a | n/a | n/a | No |
| STRAT2: The Need for New Development in South Oxfordshire (at least 17,050 homes and 35.9 hectares of employment development) | Residential development Employment development Increase in vehicle traffic Increase in recreation pressure | Air pollution Disturbance from recreation | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC Recreation: Little Wittenham SAC | Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts. Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan. Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. | Uncertain: air pollution and recreation The screening of this policy considers the overall number of new homes in the district. The effect of those homes in specific locations is assessed in relation to specific allocations, below. STRAT2 and STRAT3 between them provide for at least 20,800 homes and a total supply of up to 22,411 homes. 12,740 homes have already been completed or committed; therefore this policy will result in at least 5,921 new homes (assuming the STRAT3 provides the full 3,750). The provision of new homes in the district is likely to relate to an increase in population and therefore result in an increase in traffic flows on roads throughout the district. Where those roads pass within 200m of sensitive |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|---|--|--|--|
| | | | | <p>Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | <p>European sites, the increase in traffic could have air pollution impacts. This policy could have an air pollution effect in combination with other policies (e.g. STRAT3) or plans. This is considered further in the Appropriate Assessment.</p> <p>Development within c.7km of Little Wittenham SAC has the potential to increase visitor numbers at the site and cause disturbance from recreation. While not all of the new homes accounted for in STRAT2 will be within 7km, that area does encompass a number of large settlements (e.g. Didcot & Wallingford), larger villages (e.g. Crowmarsh Gifford and Cholsey), and strategic allocations (e.g. Culham & Chalgrove Airfield). Policies ENV5 and CF5 will provide some mitigation for recreational pressure impacts, but Appropriate Assessment is required to consider the impacts further.</p> |
| STRAT3: The unmet housing requirements from Oxford City (c.3,750 homes) | <p>Residential development</p> <p>Increase in vehicle traffic</p> <p>Increase in recreational pressure</p> | <p>Air pollution</p> <p>Disturbance from recreation</p> | <p>Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC</p> <p>Recreation: Little Wittenham SAC</p> | <p>Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts.</p> <p>Policies EP1 and DES8 require that new development complies</p> | <p>Uncertain: air pollution and recreation</p> <p>The screening of this policy considers the overall number of new homes in the district. The effect of those homes in specific locations is assessed in relation to specific allocations, below.</p> <p>This policy will result in up to 3,750 new homes in the district (see explanation under STRAT2).</p> <p>The provision of new homes in the district is likely to relate to an increase in population and therefore result in an increase in</p> |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|-------------------------------|--|--|---------------------------------------|--|--|
| | | | | <p>with the council's Air Quality Action Plan.</p> <p>Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | <p>traffic flows on roads throughout the district. Where those roads pass within 200m of sensitive European sites, the increase in traffic could have air pollution impacts. This policy could have an air pollution effect in combination with other policies (e.g. STRAT3) or plans. This is considered further in the Appropriate Assessment.</p> <p>Development within c.7km of Little Wittenham SAC has the potential to increase visitor numbers at the site and cause disturbance from recreation. While not all of the new homes accounted for in STRAT2 will be within 7km, that area does encompass a number of large settlements (e.g. Didcot & Wallingford), larger villages (e.g. Crowmarsh Gifford and Cholsey), and strategic allocations (e.g. Culham & Chalgrove Airfield). Policies ENV5 and CF5 will provide some mitigation for recreational pressure impacts, but Appropriate Assessment is required to consider the impacts further.</p> |
| STRAT4: Didcot Garden Town | None – this policy sets out the design principles for the garden town but will not itself result in new development | n/a | n/a | n/a | No |
| STRAT5: Strategic Development | None – this policy sets out the principles for development within strategic areas but will not itself result in new development. The strategic | n/a | n/a | n/a | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|---|---|---------------------------------------|--|---|
| | allocations are assessed individually, below. | | | | |
| STRAT6: Culham Science Centre (7.3 ha additional employment land) | Employment development | None (The in-combination air pollution impact of employment land has been assessed in relation to EMP1.) | n/a | n/a | No |
| STRAT7: Land adjacent to Culham Science Centre (3,500 homes, 3 Gypsy and Traveller pitches, 2,000 sq.m food retail, 1,700 sq.m non-food retail.) | Residential development Retail development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3, Gypsy & Traveller pitches in relation to H14, retail in relation to TC1, and employment land in relation to EMP1.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | Uncertain: recreation Culham Science Centre lies c.4km from Little Wittenham SAC. The increase in population at this location could therefore contribute an increase in visitors to the SAC. |
| STRAT8: Land at Berinsfield (1,700 homes, 5ha employment land, 1,300 food retail, and 1,200 sq.m non-food retail) | Residential development Employment development Retail development Increase in vehicle traffic | Disturbance from recreation (The in-combination air pollution impact of homes has | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and | Uncertain: recreation Berinsfield lies c.3km from Little Wittenham SAC. The increase in population at this location could |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|---|---|---------------------------------------|---|--|
| | Increase in recreational pressure | been assessed in relation to STRAT2 and STRAT3, retail in relation to TC1, and employment land in relation to EMP1.) | | accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | therefore contribute an increase in visitors to the SAC. |
| STRAT8i: Berinsfield Local Green Space | None - this allocates land as the centre of Berinsfield as Local Green Space and will not result in new development. | n/a | n/a | n/a | No |
| STRAT9: Land at Chalgrove Airfield (3,000 homes, 5ha employment land, 3 Gypsy & Traveller pitches, 2,000 sq.m food retail and 1,700 sq.m non-food retail) | Residential development Employment development Retail development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3, Gypsy & Traveller pitches in relation to H14, retail in relation to TC1, and employment land in relation to EMP1.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. | Uncertain: recreation Chalgrove Airfield lies c.7km from Little Wittenham SAC. The increase in population at this location could therefore potentially contribute an increase in visitors to the SAC. |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|--|---------------------------------------|--|---|
| | | | | Policy ENV2 provides protection to European sites from all potential impacts. | |
| STRAT10: Land at Wheatley Campus, Oxford Brookes University (300 homes, 700 sq.m food retail and 500 sq.m non-food retail) | Residential development Retail development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3, and retail in relation to TC1.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | Unlikely: recreation Wheatley Campus lies greater than 13km away from Little Wittenham SAC and is therefore not likely to contribute a significant increase in visitors to the site. |
| STRAT11: Green Belt | None – this policy describes the protection or alteration of Green Belt in relation to development, but will not itself result in new development. | n/a | n/a | n/a | No |
| HEN1: The Strategy for Henley-on-Thames | None – this policy describes the principles for development in Henley-on-Thames but will not itself result in new development | n/a | n/a | n/a | No |
| TH1: The Strategy for Thame | None – this policy describes the principles for | n/a | n/a | n/a | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|---|---|---------------------------------------|--|---|
| | development in Thame but will not itself result in new development | | | | |
| WAL1: The Strategy for Wallingford | None – this policy describes the principles for development in Wallingford but will not itself result in new development | n/a | n/a | n/a | No |
| H1: Delivering new homes | None – this policy describes the circumstances in which new housing will be permitted outside of allocated sites, but will not itself result in new development | n/a | n/a | n/a | No |
| H2: New Housing in Didcot (at least 6,500 homes, including the following sites and indicative dwelling numbers- Already committed: - Ladygrove East (642) - Didcot NE (2,030) - Great Western Park (2,587) - Orchard Centre Phase II (300) - Gateway (300) - Hadden Hill (74) - Didcott A (270) | Residential development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | Uncertain: recreation Only the 300 homes at Vauxhall Barracks have not yet been committed. This site lies c.5.5km from Little Wittenham SAC. The increase in population at this location could therefore potentially contribute an increase in visitors to the SAC, however the number of additional visitors would be low. This policy is unlikely to have a significant recreational pressure effect alone; however it could have an effect in combination with other policies or plans. |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|---------------------------------------|---|--|
| <p>H3: Housing in the towns of Henley-on-Thames, Thame and Wallingford</p> <p>(at least 1,155 additional homes, including the following locations and indicative dwelling numbers:</p> <ul style="list-style-type: none"> -Henley-on-Thames (350) -Thame (510) -Wallingford (295) <p>Land for a further 555 dwellings (with planning permission) is also safeguarded at Wallingford</p> | <p>Residential development</p> <p>Increase in vehicle traffic</p> <p>Increase in recreational pressure</p> | <p>Disturbance from recreation</p> <p>(The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3.)</p> | <p>Little Wittenham SAC</p> | <p>Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | <p>Uncertain: recreation (Wallingford only)</p> <p>The strategic sites at Wallingford lie c.5km from Little Wittenham SAC. The increase in population at this location could therefore potentially contribute an increase in visitors to the SAC.</p> <p>Unlikely: recreation (Thame & Henley-on-Thames)</p> <p>Thame lies c.18km and Henley-on-Thames c.20km away from Little Wittenham SAC. Development at these locations is unlikely to significantly increase visitor numbers at Little Wittenham SAC.</p> |
| <p>H4: Housing in the Larger Villages</p> <p>(A minimum of 1,041 additional homes including the following locations and indicative dwelling numbers):-</p> <ul style="list-style-type: none"> - Cholsey (175) - Crowmarsh Gifford (110) - Goring (140) - Nettlebed (46) - Sonning Common (150) - Watlington (260) - Woodcote (160) | <p>Residential development</p> <p>Increase in vehicle traffic</p> <p>Increase in recreational pressure</p> | <p>Disturbance from recreation</p> <p>(The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3.)</p> | <p>Little Wittenham SAC</p> | <p>Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers.</p> | <p>Uncertain: recreation (Cholsey and Crowmarsh Gifford)</p> <p>Cholsey and Crowmarsh Gifford lie <7km from Little Wittenham SAC and could therefore potentially contribute an increase in visitors to the SAC. However, the number of proposed homes at each of these sites is small and unlikely to contribute significant recreational pressure from each site alone. These sites do have the potential for recreational effects in combination with other policies (e.g. H3).</p> <p>Unlikely: recreation (Goring, Sonning Common, Watlington and Woodcote)</p> |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|---|---|---------------------------------------|--|---|
| | | | | Policy ENV2 provides protection to European sites from all potential impacts. | The other larger villages are situated >7km from Little Wittenham SAC. Development at these locations is unlikely to significantly increase visitor numbers at Little Wittenham SAC. |
| H5: Land to the west of Priests Close, Nettlebed (11 homes); H6: Joyce Grove, Nettlebed (20 homes); and H7: Land to the South and West of Nettlebed Service Station; (15 homes) | Residential development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | Unlikely: recreation Nettlebed lies greater than 13km away from Little Wittenham SAC and these allocations are for a small number of homes. They are therefore not likely to contribute a significant increase in visitors to the site. |
| H8: Housing in Smaller Villages (500 homes) | Residential development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little | Uncertain: recreation The location of proposed housing in smaller villages is not specified in the Local Plan; however if 500 homes were developed close to Little Wittenham SAC, these could contribute to an increase in visitors to the site, either alone or in combination with other policies. |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|---------------------------------------|--|--|
| | | | | Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | |
| H9: Affordable Housing; H10: Exception Sites; H11: Housing Mix; H12: Self-Build and Custom Housing; and H13: Specialist Housing for Older People. | None – these policies set out the requirements for specific types of housing but will not themselves result in new development | n/a | n/a | n/a | No |
| H14: Provision for Gypsies, Travellers and Travelling Showpeople (Including the following allocations- Gypsy & Traveller pitches: - Didcot (4) - Culham (3) - Chalgrove (3); and H15: Safeguarding Gypsies, Traveller and Traelling Showpeople Sites | Residential development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European | Unlikely: recreation and physical loss/damage to habitat The allocated plots and pitches permitted by policy H14 are at sites for residential development assessed under policies STRAT7-9 and H2. The small number of additional residents at these sites provided for by policy H14 will not contribute significant recreation effects on European sites. Policies H14 and H15 do allow for some development outside of these allocations, as extensions to existing sites, or where there has been a need to close an existing site. However, the identified need for 10 pitches is met by the allocated sites and the existing |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|---|---------------------------------------|--|--|
| | | | | sites from all potential impacts. | sites are small (16 pitches at Sandford-on-Thames and Wheatley, and 5 pitches at Benson). Any additional development is likely to be very small scale and unlikely to result in significant effects on European sites. |
| H16: Infill Development | Residential development Increase in vehicle traffic Increase in recreational pressure | Disturbance from recreation (The in-combination air pollution impact of homes has been assessed in relation to STRAT2 and STRAT3.) | Little Wittenham SAC | Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers. Policy ENV2 provides protection to European sites from all potential impacts. | Unlikely: recreation The scale of development that would result from this policy will be small and will not contribute to significant recreation or air pollution effects on European sites. |
| H17: Sub-division and Conversion to Multiple Occupation; H18: Replacement Dwellings; H19: Re-use of Rural Buildings; H20: Rural Workers' Dwellings; and H21: Extensions to dwellings | None – these policies set out principles for development to existing dwellings and will not result in new development. | n/a | n/a | n/a | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|--|---|---|---|
| | | | | | |
| H22: Loss of Existing Residential Accommodation in Town Centres | None – this policy restricts the loss of existing residential development and will not result in new development | n/a | n/a | n/a | No |
| <p>EMP1: The amount and distribution of new B-class employment land</p> <p>At least 35.9 hectares, to include the following-</p> <p>Already committed:</p> <ul style="list-style-type: none"> - Didcot (9.42ha) - Wallingford (2.25ha) - Culham (5.3ha) <p>Not yet committed:</p> <ul style="list-style-type: none"> - Henley-on-Thames (1ha) - Thame (1.6ha) - Wallingford (3.1ha) - Crowmarsh Gifford (0.28ha) - Culham (7.3ha) - Chalgrove (7.25ha) - Berinsfield (5ha)) | <p>Employment development</p> <p>Increase in vehicle traffic</p> | Air pollution | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC | <p>Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts.</p> <p>Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | <p>Uncertain: air pollution</p> <p>This policy makes provision for at least 37.2 ha of employment space, of which 16.97 ha is already committed; however at least 20.23 ha has been allowed for under this policy, at specific sites.</p> <p>The sites in combination and the overall quantum of employment development have the potential to increase traffic on roads close to sensitive sites. This policy could therefore have an air pollution impact in combination with other policies (e.g. STRAT2) or plans.</p> |
| EMP2: Range, Size and Mix of Employment Premises | None – this policy sets principles for the type of employment space but will not result in new development | n/a | n/a | n/a | No |
| EMP3: Retention of Employment Land | None – this policy describes the circumstances in which change of use of existing employment land will be permitted. It will not result in new development | n/a | n/a | n/a | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|---|--|--|--|
| EMP4: Employment Land in Didcot; EMP5: New Employment Land in Henley-on-Thames; EMP6: New Employment Land in Thame; EMP7: New Employment Land in Wallingford; EMP8: New Employment Land at Crowmarsh Gifford; and EMP9: New Employment Land at Chalgrove | Employment development | None (The in-combination air pollution impact of employment land has been assessed in relation to EMP1.) | n/a | n/a | No |
| EMP10: Community Employment Plans | None – this policy sets requirements for developments to produce Community Employment Plans (CEPs) and will not result in new development. | n/a | n/a | n/a | No |
| EMP11: Development in the Countryside and Rural Areas | Employment development Increase in vehicle traffic | None (The in-combination air pollution impact of employment land has been assessed in relation to EMP1.) | n/a | n/a | No |
| EMP12: Tourism | Tourism development Increase in vehicle traffic Increase in recreational pressure | Air pollution Disturbance from recreation | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC | Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore | Uncertain: air pollution The scale of development that will come forward as a result of this development is likely to be small in scale. However this policy could contribute additional traffic to roads and therefore have an air pollution impact on sensitive sites, in combination with other policies (e.g. EMP1) or plans. |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|----------------------------------|--|---|---|---|--|
| | | | Recreation: Little Wittenham SAC | <p>provide mitigation for air pollution impacts.</p> <p>Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan.</p> <p>Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | <p>Unlikely: recreation and physical damage / loss of habitat</p> <p>Although this policy may result in an increase in tourist visitors to the district, it is likely to also provide a wider choice of attractions. Overall, this policy is unlikely to significantly increase visitor numbers at Little Wittenham SAC.</p> |
| EMP13: Caravan and Camping Sites | <p>Tourism development</p> <p>Increase in vehicle traffic</p> <p>Increase in recreational pressure</p> | <p>Air pollution</p> <p>Disturbance from recreation</p> | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC | <p>Policy EMP13 itself includes some mitigation as development will only be permitted where it will have no adverse ecological effects on the site or its surroundings.</p> <p>Policies TRANS1, TRANS2, TRANS4,</p> | <p>Unlikely: air pollution, recreation and physical damage / loss of habitat</p> <p>The scale of development that will come forward as a result of this development is likely to be small in scale. The temporary increases in population that the policy will result in are unlikely to generate</p> |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|--|---|---|--|
| | | | Recreation: Little Wittenham SAC | <p>TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts.</p> <p>Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan.</p> <p>Policies ENV5 and CF5 require new developments to contribute towards the provision of new green infrastructure and accessible open space. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation recreation impacts associated with increases visitor numbers.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | significant increases in traffic, or visitors to Little Wittenham SAC. |
| EMP14: Retention of Visitor Accommodation | Tourism development Increase in vehicle traffic | Air pollution | Air pollution: Aston Rowant SAC, Burnham | Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 | Unlikely: air pollution and recreation |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|--|---|--|--|
| | Increase in recreational pressure | Disturbance from recreation | Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC Recreation: Little Wittenham SAC | seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan. Policy ENV2 provides protection to European sites from all potential impacts. | The scale of development that will come forward as a result of this development is likely to be small in scale. The temporary increases in population that the policy will result in are unlikely to generate significant increases in traffic, or visitors to Little Wittenham SAC. |
| INF1: Infrastructure Provision | None – this policy requires new development to be served by appropriate infrastructure and services, but will not itself increase traffic or visitor numbers . | n/a | n/a | n/a | No |
| TRANS1: Supporting Strategic Transport Investment | Transport development Changes to vehicle traffic | Air pollution | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC | Policy TRANS1 states that the council will work to ensure that the impacts of new development on the strategic and local road network are adequately mitigated. This may provide some mitigation for air pollution impacts related to other policies in the plan. Policies EP1 and DES8 require that new development complies | Uncertain: air pollution The highways improvements identified by SODC that would be implemented via this policy will change the flow of traffic on the road network and could therefore have a significant effect on air pollution close to European sites in combination with other policies. Some of the strategic transport development that this policy relates to is covered by the Oxfordshire Local Transport |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|---------------------------------------|---|---|
| | | | | with the council's Air Quality Action Plan. Policy ENV2 provides protection to European sites from all potential impacts. | Plan ¹⁰⁷ , which is subject to its own HRA. The Local Transport Plan may have significant effects in combination with policies within this Local Plan. This has been considered in the Appropriate Assessment and in Appendix 2. |
| TRANS2: Promoting Sustainable Transport and Accessibility | None – this policy encourages sustainable transport and will not result in development that would increase vehicle traffic or visitor numbers | n/a | n/a | Policy TRANS2 makes provision for sustainable transport, intended to reduce journeys by car. It requires new development to be designed to encourage walking and cycling within and to/from the development. This will provide some mitigation for air pollution impacts related to other policies in the plan. | No |
| TRANS3: Safeguarding of Land for Strategic Transport Schemes | None – this policy safeguards land for some of the development that would come forward under STRAT1, but will not itself result in new development | n/a | n/a | n/a | No |
| TRANS4: Transport Assessments, Transport Statements and Travel Plans | None – this policy sets out the requirements for transport assessment and will not result in new development | n/a | n/a | Policy TRANS4 requires all new development that will have 'transport implications' alone or in combination with other developments to undertake a transport assessment and travel | No |

¹⁰⁷ <https://www.oxfordshire.gov.uk/cms/content/ltp4-policy-and-overall-strategy>
South Oxfordshire Local Plan

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|---------------------------------------|---|--|
| | | | | plan, aimed at reducing transport impacts and improving access to sustainable transport. This will provide some mitigation for air pollution impacts related to other policies in the plan. | |
| TRANS5: Consideration of Development Proposals | None – this policy requires all development to make provision for access but will not result in new development | n/a | n/a | Policy TRANS5 requires all new development to be accessible by sustainable transport modes and be served by a road network that can accommodate traffic without damage to the environment. This will provide some mitigation for air pollution impacts related to other policies in the plan. | No |
| TRANS6: Rail | None – this policy encourages sustainable transport and will not result in development that would increase vehicle traffic or visitor numbers | n/a | n/a | n/a | No |
| TRANS7: Development Generating new Lorry Movements | None – this policy sets out principles for development that would result in significant increases in lorry movements but will not itself result in new development | n/a | n/a | Policy TRANS7 only permits significant increases in lorry movements where it would not result in adverse environmental effects. This will provide some mitigation for air pollution impacts | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect related to other policies in the plan. | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|---------------------------------------|---|--|
| | | | | | |
| INF2: Electronic Communications | None – this policy requires new development to be served by communications infrastructure, but will not itself increase traffic or visitor numbers | n/a | n/a | n/a | No |
| INF3: Telecommunications Technology | None – this policy will result in infrastructure development but will not increase traffic or visitor numbers | None | n/a | Policy INF3 will not permit development where it would have an unacceptable effect on an area of ecological interest | No |
| INF4: Water Resources | None – this policy requires developments to put in place adequate water supply and treatment but will not itself result in new development | n/a | n/a | n/a | No |
| ENV1: Landscape and Countryside | None – this policy sets out principles to protect landscape and countryside from inappropriate development, and will not result in new development | n/a | n/a | Policy ENV1 includes a statement that development will be permitted where it protects or enhances landscape features that contribute to biodiversity. | No |
| ENV2: Biodiversity - Designated Sites, Priority Habitats and Species | None – this policy sets out principles to protect biodiversity from inappropriate development, and will not result in new development | n/a | n/a | Policy ENV2 states that the highest level of protection will be given to sites of international nature conservation importance. Any development likely to result in a significant effect will need to satisfy the requirements of the | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|--|---------------------------------------|---|--|
| | | | | Conservation of Habitat and Species Regulations 2010. In addition, development that would affect SSSIs (which all European sites coincide with) will only be permitted in exceptional circumstances. This policy will provide some mitigation for all potential impacts on European sites associated with other policies in the plan. | |
| ENV3: Biodiversity – Non designated sites, habitats and species | None – this policy protects non-designated sites, habitats and species and will not result in new development | n/a | n/a | Policy ENV3 strengthens the general protection for biodiversity in the local plan and requires developments to provide a net gain in biodiversity. | No |
| ENV4: Watercourses | None – this policy protects watercourses and will not result in new development | n/a | n/a | n/a | No |
| ENV5: Green Infrastructure in new developments | None – this policy requires developments to contribute to the provision of new green infrastructure but will not increase traffic or visitor numbers | n/a | n/a | Policy ENV5 requires new developments to contribute towards the provision of new green infrastructure. Where this provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation for impacts from other policies that have the | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|---|--|---------------------------------------|--|--|
| | | | | potential to increase visitor numbers. | |
| ENV6: Historic Environment; ENV7: Listed Buildings; ENV8: Conservation Areas; ENV9: Archaeology and Scheduled Monuments; and ENV10: Historic Battlefields, Registered Parks and Gardens and Historic Landscapes | None – these policies provides protection for heritage assets and will not result in new development | n/a | n/a | n/a | No |
| ENV11: Pollution - Impact from Existing and/or Previous Land Uses on Development (Potential Receptors of Pollution) | None – this policy protects the occupants of new development from pollution and will not result in new development | n/a | n/a | n/a | No |
| ENV12: Pollution - Impact of Development on Human Health, the Natural Environment and/or Local Amenity (Potential Sources of Pollution) | None – this policy protects the environment, human health and amenity from pollution and will not result in new development | n/a | n/a | Policy ENV12 requires that development will not have a significant adverse impact on the environment, including air pollution and other types of pollution, although this is unlikely to mitigation air pollution impacts associated with increases in traffic | No |
| EP1: Air Quality | None – this policy protects air quality and will not result in new development | n/a | n/a | Policy EP1 requires new development to comply with the council's Air Quality Action Plan, national air quality guidance and local transport plans. Where developments have a negative effect on air quality, mitigation | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|--|--|---------------------------------------|--|--|
| | | | | should be provided. This policy will provide some mitigation for air pollution impacts associated with other policies in the plan. | |
| EP2: Hazardous substances | None – this policy limits development associated with hazardous waste and will not result in new development | n/a | n/a | n/a | No |
| EP3: Waste Collection and Recycling | None - this policy outlines requirements for waste and recycling facilitates at new developments, but will not result in new development. | n/a | n/a | n/a | No |
| EP4: Flood Risk | None - this policy directs development away from areas likely to flood and sets principles for the design of new development to minimise flood risk, but will not result in new development. | n/a | n/a | n/a | No |
| EP5: Minerals Safeguarding Areas | None – this policy directs non-mineral development away from safeguarded minerals areas, but will not itself result in new development | n/a | n/a | n/a | No |
| DES1: Delivering High Quality Development; DES2: Enhancing Local Character; DES3: Design and Access Statements; DES4: Masterplans for allocated sites and major development; | None – these policies set principles for the design of new development and the design process, but will not themselves result in new development | n/a | n/a | n/a | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|--|--|---|
| DES5: Outdoor Amenity Space; DES6: Residential Amenity DES7: Public Art | | | | | |
| DES8: Efficient use of resources | None – this policy relates to the design of development and will not result in new development | n/a | n/a | Policy DES8 includes requirements new developments to be consistent with the council's Air Quality Action Plan. This policy will therefore provide some mitigation for air pollution impacts associated with other policies in the plan. | No |
| DES9: Promoting sustainable design | None – this policy relates to the design of development and will not result in new development | n/a | n/a | n/a | No |
| DES10: Renewable Energy | None – this policy enables energy infrastructure development but will not increase traffic or visitor numbers | n/a | n/a | n/a | No |
| TC1: Retail in towns and villages | None – this policy sets out the principles for locating retail development within settlements, but will not itself result in new development | n/a | n/a | n/a | No |
| TC2: Amount and location of new retail floorspace (11,100 sq.m food store and 24,700 sq.m non-food store) | Retail development Changes to vehicle traffic | Air pollution | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC | Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. | Uncertain: air pollution The increase in retail development within the district may alter the travel patterns of the population it serves. If the development results in an increase in traffic on roads close to sensitive European sites, it could have an air pollution impact on those sites in combination with |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|---|---|--|---|--|---|
| | | | | <p>These will therefore provide mitigation for air pollution impacts.</p> <p>Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan.</p> <p>Policy ENV2 provides protection to European sites from all potential impacts.</p> | other policies (e.g. STRAT2) or plans. |
| TC3: Retail frontages and Town Centre Boundaries | None – this requires neighbourhood plans to designate primary shopping frontages and town centre boundaries and will not itself result in new development | n/a | n/a | n/a | No |
| CF1: Safeguarding Community Facilities | None – this policy safeguards existing facilities and will not result in new development | n/a | n/a | n/a | No |
| CF2: Provision of Community Facilities and Services | <p>Community and social infrastructure development</p> <p>Increase in vehicle traffic</p> | Air pollution | <p>Air pollution:</p> <p>Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC</p> | <p>Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts.</p> <p>Policies EP1 and DES8 require that new development complies</p> | <p>Unlikely: air pollution</p> <p>The scale of development that would result from this policy is likely to be small and will not contribute to significant air pollution effects on European sites.</p> |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|--|--|--|
| | | | | with the council's Air Quality Action Plan. Policy ENV2 provides protection to European sites from all potential impacts. | |
| CF3: New Open Space, Sport and Recreation Facilities | Community and social infrastructure development Increase in vehicle traffic | Air pollution | Air pollution: Aston Rowant SAC, Burnham Beeches SAC, Chilterns Beechwoods SAC, and Windsor Forest & Great Park SAC | Policies TRANS1, TRANS2, TRANS4, TRANS5 and TRANS7 seek to reduce the impacts development on the road network and encourage trips by sustainable modes of travel rather than car. These will therefore provide mitigation for air pollution impacts. Policies EP1 and DES8 require that new development complies with the council's Air Quality Action Plan. Policy ENV2 provides protection to European sites from all potential impacts. | Unlikely: air pollution The scale of development that would result from this policy is likely to be small and will not contribute to significant air pollution effects on European sites. |
| CF4: Existing Open Space, Sport and Recreation Facilities | None – this policy safeguards existing facilities and will not result in new development | n/a | n/a | n/a | No |
| CF5: Open Space, and Sport and Recreation in new residential development | None – this policy enables green infrastructure to serve new development but will not itself increase traffic or visitor numbers | n/a | n/a | Policy CF5 requires new residential development to provide or contribute towards accessible open space, in line with SODC open space standards. Where this | No |

| | Likely activities (operation) to result as a consequence of the proposal | Likely effects if proposal implemented | European site(s) potentially affected | Potential mitigation measures – if implemented would avoid likely significant effect | Could the proposal have likely significant effects on European sites (taking mitigation into account)? |
|--|--|--|---------------------------------------|---|--|
| | | | | provides suitable, accessible and natural spaces close to Little Wittenham SAC, this policy will provide some mitigation for impacts from other policies that have the potential to increase visitor numbers. | |

Appendix 4

Consultation Responses

Summary of comments relevant to the HRA and the response provided within the HRA report

| Date of comment and document consulted on | Comment | HRA response |
|--|--|---|
| 13 February 2015 HRA of the South Oxfordshire Local Plan 2031 (housing distribution and growth scenarios), January 2015 | <p>Environment Agency:</p> <p><i>Only a few of the sites identified in the HRA are truly water dependant habitats:</i></p> <ul style="list-style-type: none"> • Cothill Fen • River Lambourn • Kennet and Lambourn Floodplain • Little Wittenham <p><i>Water supply/availability is already covered by an existing regulatory regime. However, we have reviewed all licences to ensure that that do not have a significant impact on Habitat Directives sites. Without further detail on any increased water demand, it's impossible for us to specifically confirm that new developments will or will not impact upon the environment.</i></p> <p><i>Of the sites above only the River Lambourn and Kennet and Lambourn would likely be impacted by abstraction. Cothill Fen has a very small, localised catchment and is fed by water moving locally through the sand. Little Wittenham has ponds that are fed by rainwater and potentially spring sources. Other ponds on site are supported by the Thames. No likely abstraction points will impact on these.</i></p> <p><i>Water supply for Kennet and Lambourn Floodplain and River Lambourn is from the chalk of the Kennet catchment. Under CAMS this aquifer has no available resource - so no new source of water will come from this catchment.</i></p> <p><i>All the woodland sites identified are perched on top of the Chilterns with significant unsaturated zones beneath them meaning abstraction can't impact them and discharges can't get to them.</i></p> | <p>This information has been acknowledged in the assumptions used to screen potential water quality and quantity impacts (paragraphs 3.24-3.33 of this report).</p> |
| 17 February 2015 HRA of the South Oxfordshire Local | <p>Natural England:</p> | <p>No action required. This HRA has built upon the assumptions and findings of the earlier HRA work.</p> |

| Date of comment and document consulted on | Comment | HRA response |
|--|--|--|
| Plan 2031 (housing distribution and growth scenarios), January 2015 | <i>The draft HRA as submitted for the South Oxfordshire District Local Plan 2031 is satisfactory.</i> | |
| 17 May 2017 HRA of the Second Preferred Options Local Plan 2031 | <p>Natural England:</p> <p><i>We have reviewed the HRA which accompanies the Local Plan Part 2 and we note in section 3.13 of the HRA that impacts on Oxford Meadows from air pollution have been screened out of the assessment. We do not agree with this assumption and advise that air pollution impacts on the Oxford Meadows SAC are screened into the HRA. The assessment should consider both whether increased air pollution resulting from proposals in the South Oxfordshire Local Plan would lead to a likely significant effect alone (through contributing to an increase in traffic within 200m of the SAC of 1000 AADT or over), or if other plans or projects would act in-combination and together they would lead to an increase of more than 1000 AADT within 200m of a SAC.</i></p> | <p>Natural England's concerns about nitrogen deposition at Oxford Meadows SAC are on the basis that the Annex 1 habitat type 'Lowland hay meadows' present at Oxford Meadows SAC has been identified as being potentially sensitive to nitrogen deposition. However, Annex 1 habitat type Lowland hay meadows (6510) comprises a relatively broad habitat type, including both floodplain and fully terrestrial grassland sub-communities¹⁰⁸. Therefore, while the overall Annex 1 habitat might potentially be sensitive to aerial nitrogen deposition, it is important to consider the sensitivities of the different sub-communities, particularly those understood to be present at Oxford Meadows SAC.</p> <p>Oxford Meadows SAC lies entirely within the floodplain of the River Thames (predominately Flood Zone 3), and as such it is subject to regular inundation during flooding events. Floodplain grassland communities such as these have very different nutrient cycles from terrestrial communities, as flooding events can cause both the flushing of nutrients from the soil surface as flood water pass over them, and the accumulation of nutrients as sediments in the floodwater precipitate and accumulate on the soil surface during more prolonged flooding events. These sediment particles are vectors for the transfer of nutrients, particularly from chemical fertilisers washed out of agricultural fields and into the river. These sediments therefore have a strong influence of soil nutrient levels in floodplain ecosystems.</p> <p>Terrestrial ecosystems are not subject to such inputs; therefore aerial nitrogen deposition (e.g. from vehicle emissions) has a relatively much stronger influence than in floodplain ecosystems, particularly as aerial nitrogen deposition is allowed to gradually accumulate in the soils over time. This is reflected in the majority of Site Improvement Plans for floodplain SACs, which tend to identify diffuse water pollution rather than aerial deposition as a threat to</p> |

¹⁰⁸ European Commission (2013) Interpretation Manual of European Union Habitats

| Date of comment and document consulted on | Comment | HRA response |
|--|--|---|
| | | <p>site integrity, even where critical loads for nitrogen have already been exceeded.</p> <p>Nutrient enrichment is also generally dependant on the levels of three key nutrients; nitrogen (N), phosphorous (P) and potassium (K). Terrestrial habitats tend to be nitrogen limited i.e. nitrogen levels have the strongest influence on plant productivity, therefore any accumulations of nitrogen over time can trigger the eutrophication of sensitive habitats. Aquatic ecosystems on the other hand tend to be phosphorous limited, and in these systems background levels of nitrogen have a relatively limited influence upon plant growth and the risk of eutrophication compared with the influence of phosphorus levels.</p> <p>Floodplain meadows are also naturally relatively rich in nutrients as a result of the regular inundation of sediment laden floodwater. In floodplain ecosystems, the grassland communities present tend to have a competitive advantage over other more vigorous plant species which would otherwise normally dominate in such a nutrient-rich environment, due to their ability to survive the high moisture content of the soils and anaerobic conditions created by regular inundation. These communities therefore tend to be primarily defined by their hydrological regime rather than nutrient levels, and as such they are less sensitive to background nutrient levels than terrestrial grasslands, provided appropriate hydrological conditions are maintained. At Oxford Meadows SAC it is understood that the hydrological regime is controlled artificially via a number of ditches and channels, and the Site Improvement Plan has identified actions to ensure that appropriate hydrological conditions will be maintained.</p> <p>Oxford Meadows is therefore not considered to be particularly sensitive to aerial nitrogen deposition from increases in vehicle emissions.</p> <p>In addition, the contribution of the Local Plan to traffic flows on the A34 and A40 is expected to be negligible (see Table 3.2 and paragraphs 3.45 & 3.46)</p> |
| 17 May 2017 HRA of the Second Preferred | Berks, Bucks & Oxon Wildlife Trust: <i>The Habitats Regulation Assessment (HRA) considers potential impacts of the South Oxfordshire Local Plan on Special Areas for Conservation (SAC) including</i> | LUC has discussed this with Natural England (Rebecca Micklem, Lead Advisor) and has been advised that Natural England generally has no concerns about using 7km as an approximate screening distance / general threshold. However, where there are specific |

| Date of comment and document consulted on | Comment | HRA response |
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| Options Local Plan 2031 | <p><i>Aston Rowant SAC, Chilterns Beechwoods SAC, Cothill Fen SAC; Hartslock Wood SAC, Little Wittenham SAC and Oxford Meadows SAC.</i></p> <p><i>This assessment is based on the application of a 7km buffer to the site identified as the "Zone of Influence" by the Thames Basin Heaths SPA Delivery Framework. We are not convinced that this 7km buffer is appropriate for this situation and recommend that recreational effects are also screened in with regard to Aston Rowant and Cothill Fen SACs. This is on the basis of increased recreational pressure arising from allocations at Didcot, Culham, Chalgrove, Watlington, Thame and Chinnor as well as major allocations in the neighbouring districts of Aylesbury Vale and Vale of White Horse.</i></p> <p><i>In our experience the Chilterns are a favoured destination for informal recreation from people living some distance away. This seems to be also supported by the findings of the South Oxfordshire Open Space User Survey (2005) and the Little Wittenham SAC visitor surveys as outlined in para 3.16 of the HRA.</i></p> <p><i>We believe that Aston Rowant acts as a particular attraction to visitors because a large part of the SAC is also designated as a National Nature Reserve (NNR). Similarly Cothill Fen SAC contains a number of SSSI, which are managed by BBOWT as nature reserves and which act as an attraction for visitors. We consider it therefore reasonable to assume that residents in South Oxfordshire will travel to nature conservation sites outside the district even if these are more than 7km away. On the basis that potential significant in-combination effects on the SACs cannot be fully ruled out we request that recreational effects on Aston Rowant SAC and Cothill Fen SAC are also assessed.</i></p> | <p>evidence or concerns, sites outside this distance should be considered.</p> <p>Since the HRA was prepared, we have received details of the visitor survey data for Little Wittenham. This states that the majority of visits are from people within 20 minutes' drive of the site, or c.8km (7km to the South Oxfordshire border, plus Abingdon). Development in Abingdon has therefore been considered (paragraphs 4.17 & 4.18). This does not alter the HRA screening conclusions.</p> <p>Further discussions with Natural England's SSSI officers for Cothill Fen (Alison Muldal) and Aston Rowant (Graham Steven), has provided reassurance that those sites are not particularly sensitive to increases in recreation pressure, for the following reasons:</p> <p>Cothill Fen SAC: The site is not generally promoted for public access and is unlikely to attract visitors from a long distance. Development very close to the site could generate visitors (e.g. dog walkers from within c.1km away), but as the site is very wet, visitors naturally follow the boardwalk paths. The site is mainly considered to be sensitive to changes in groundwater or hydrology, not recreation; and</p> <p>Aston Rowant SAC: The site's qualifying features are considered to be fairly resilient to recreation pressure, with changes to habitat management more likely to be an issue. Access to the site can be effectively managed as there are two relatively small car parks and only two main footpaths; there are no plans to increase parking capacity or change the access management policy.</p> <p>LUC has contacted BBOWT to invite them to provide further comment on the approach taken in this HRA but, at the time of writing, no response has been received.</p> |
| 17 May 2017 HRA of the Second Preferred Options Local Plan 2031 | <p>Member of the public:</p> <p><i>An assessment is also noted that 'Upgrades to waste-water treatment' have been deemed necessary, mentioning groundwater (Habitat Assessment, Table 3.1). It is perhaps understandable that such planning does not say when and what, but there have also been previous plans for pumping infrastructure for waste from Huntercombe, Nuffield. Directly adjacent land is part of Nettlebed Parish. This may also be developable, but the status of waste treatment may need clarification.</i></p> | <p>Upgrades to waste water treatment in the district are being planned for as part of South Oxfordshire's Water Cycle Study work.</p> |

| Date of comment and document consulted on | Comment | HRA response |
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| 15 May 2017 HRA of the Second Preferred Options Local Plan 2031 | <p>Member of the public:</p> <p><i>The Habitats Regulations Assessment Report identifies the following concerns in relation to the proposed developments: Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site. Reduce the diversity of the site Result in disturbance that could affect the population, density or balance between key species 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) Result in the loss of key features. Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem Reduce the extent of key habitats or the population of key species. The report goes on to say that planning permission will be granted if proposals can demonstrate that they will, protect, conserve and where possible, enhance the Districts green infrastructure.</i></p> <p><i>There are hedgehogs, bats, barn owls, woodpeckers, bees, deer, monk jacks, frogs, house martins, bee orchids and snow drops within and adjacent to the proposed development site. My objection is based as identified in the Habitats Regulations Assessment Report; the area of outstanding natural beauty, at Harwell Science Park, will be destroyed by constructing 1000 houses. Habitats and protected species will be destroyed. There are protected species which are seen flourishing on a daily basis. Such species include Nesting Red Kites and Barn Owls which are seen regularly (These are protected species). Woodpeckers and Mistle Thrush will all lose their habitats should this development be approved.</i></p> | Harwell Science Park is in Vale of White Horse, not South Oxfordshire. |
| 25 April 2017 HRA of the Second Preferred Options Local Plan 2031 | <p>Member of the public:</p> <p><i>Table 3.1 in HRA refers to Waste Water Treatment with the additional waste water going into the River Thame. The fields adjacent to the River Thame on the opposite side of London road from the commercial area are flood meadows.</i></p> | This does not alter the conclusions of the HRA. |
| 15 May 2017 HRA of the Second Preferred Options Local Plan 2031 | <p>Member of the public:</p> <p><i>Additional subject: HRA Comment on the Second Preferred Options document:</i></p> <p><i>I am delighted to see that the following proposed development sites are not to go forward in the plan at this stage: Harrington (Jn 7 M40) because of the potential dreadful negative impact on Spartum fen SSSI. This development would be on the rainwater catchment of this fen (this is as yet uncalculated) and restrict infiltration plus cause groundwater pollution of the spring water. The catchment should not be built on. Also there may be a call for drinking water abstraction which would deprive the fen of water flow.</i></p> | <p>The summary of site features in Appendix 1 has been reviewed and updated based on the latest Site Improvement Plans.</p> <p>As stated above, further consideration has been given to potential air pollution impacts at Oxford Meadows SAC. The site's qualifying features are not considered to be particularly sensitive to airborne nitrogen and the contribution of the Local Plan to increases in traffic is expected to be negligible.</p> |

| Date of comment and document consulted on | Comment | HRA response |
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| | <p><i>Wick Farm and Lower Elsfield because of the potential negative impact of these developments on Sydlings Copse SSSI fen. Both an increase in public recreational pressure and negative impacts on the water quality of the fen would be expected with development so close to the site. The water catchment of the springs is not known, but this critical area needs protection from ANY development.</i></p> <p><i>Should these sites return as proposals in a few year's time, I will strongly oppose their inclusion as viable/sustainable development sites for the above reasons.</i></p> <p><i>Comments on the HRA document:</i></p> <p><i>Page 44 Aston Rowant SAC</i> <i>As a voluntary expert species recorder for Natural England at Aston Rowant NNR/SAC I am very surprised to see that the following qualifying feature of the site is omitted from the table:</i> <i>'H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates; dry grasslands and scrublands on chalk and limestone'</i> This should surely be included? After all, it is a qualifying feature of both Hackpen Down SAC and Hartslock SAC which have the same habitat, so why is it not included for the similar and very important chalk grassland at Aston Rowant? This needs to go in because the impact of increased traffic on the M40 from proposed developments needs to be assessed in terms of the critical load for N deposition on such dry calcareous grassland flora (See APIS – Air Pollution Information Service)</p> <p><i>Page 50 Oxford Meadows SAC</i> <i>Again as a voluntary species recorder on these meadows for Natural England and Oxford City Council, I am very surprised to see that the site description is wrong. They are NOT 'unimproved chalk grassland...uncommon in the Berkshire Downs' ! The Qualifying Features are right, some of the meadows are certainly H6510 Lowland Haymeadows – and specifically they are the rare floodplain community known as MG4 Meadow Foxtail – Great Burnet in the NVC. However the Port Meadow section is not haymeadow and is best described as grazing marsh. This is the only portion where the rare Creeping Marshwort Apium repens is to be found as it requires both winter flooding and moderately heavy grazing. I am voluntary 'Flora Guardian' for Creeping Marshwort Apium repens within the Ashmolean Natural History Society of Oxon (ANHSO) in association with Natural England and Oxford City Council.</i></p> <p><i>The Site Improvement plan, pressures, threats and related development section also has an important omission. The MG4 Lowland Haymeadows are sensitive to the impacts of air pollution and risks of atmospheric nitrogen deposition and the HRA should say this. The air pollution from the A40 and the A34 already negatively impacts Oxey Mead and Pixey Mead within the SAC. Indeed the N</i></p> | |

| Date of comment and document consulted on | Comment | HRA response |
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| | <p><i>deposition on Pixey Mead is already over the critical load limits for this habitat (See APIS) for some 60m of the meadow to either side of the A34 road. This is important when assessing the predicted traffic increase on this road as a result of some of the planned future development. [Widening the A34 should not be an option, no land-take from these meadows should occur because their loss will be irreplaceable, plus a wider road will mean more traffic and even more air pollution impact.]</i></p> <p><i>If the HRA does not contain accurate information, how can the impacts of proposed developments in the plan be properly assessed in the future?</i></p> | |
| <p>17 May 2017</p> <p>HRA of the Second Preferred Options Local Plan 2031</p> | <p>Member of the public:</p> <p><i>The objection and comment I wish to make is to the statement "that only 'A' roads are likely to have a significant increase in traffic" If the very large development at Chalgrove, Berinsfield, Benson and Watlington go ahead the 'B' roads will have very significant increases in traffic and 'Edge' streets and bypasses will only increase this further. Air pollution is already a problem in Watlington and Henley on Thames and further pollution will have a detrimental effect on the local SACs. I understand there are regulations against building more than 50 houses within 5 - 7 km of a European Site (SAC) and proposed development at Chinnor and Berinsfield will undoubtedly do this.</i></p> | <p>The HRA refers to 'significance' in terms of traffic increase with reference to DMRB guidance, ie increases of 1,000 AADT or more, rather than in terms of percentage increase in traffic.</p> <p>B roads that the named site allocations are located on are as follows: B4015 (Berinsfield), B480 (Chalgrove and Watlington), and B4009 (Benson). None of these B-roads passes a European site (SAC/SPA) before connecting to the A-road network. The B-roads therefore do not need to be considered in the HRA.</p> <p>Where an increase in traffic of 1,000 AADT or more indicates that an air quality assessment is required, an HRA would take into account the baseline and predicted future air quality at the European site, rather than at the source of additional traffic (e.g. Watlington).</p> <p>There are no regulations against building more than 50 houses within 5-7km of an SAC.</p> |
| <p>17 May 2017</p> <p>HRA of the Second Preferred Options Local Plan 2031</p> | <p>Chalgrove Airfield Action Group:</p> <p><i>A Habitats Regulation Assessment March 2017 has been undertaken of the Local Plan, as discussed in STRAT1 above, air pollution impacts have been assessed as uncertain in relation to potential increases in traffic. Further information will be required from SODC's transport study to determine whether the Local Plan proposals will result in a degree of change in those locations that could have a significant effect.</i></p> <p><i>In STRAT1, the HRA states:</i></p> <p><i>At this stage, with the information available, air pollution impacts have been assessed as uncertain in relation to potential increases in traffic on the following roads within 200 metres of sensitive European sites:</i></p> <p><i>M40: Aston Rowant SAC;</i></p> | <p>The version of the HRA Report issued for consultation was written in March; this does not mean that habitat/species surveys were undertaken in March (or at all). The HRA is based on existing data and there is no requirement to survey sites to complete the work.</p> <p>The HRA report covers the entire local plan area and is therefore relevant to Chalgrove.</p> |

| Date of comment and document consulted on | Comment | HRA response |
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| | <p>A355: Burnham Beeches SAC; A404 & A4010: Chilterns Beechwoods SAC; and A332 & A329: Windsor Forest & Great Park SAC.</p> <p><i>None of these are relevant to Chalgrove or the B480. Instead of referring to the March HRA, carry out specific HRA reviews in the area that will be affected. And please, not in March, when many species are still hibernating.</i></p> | |
| November 2017 Local Plan 2011-2033 - Final publication version | <p>Natural England:</p> <p>The HRA reports that it has not been possible to conclude the Appropriate Assessment of air pollution impacts arising from the Local Plan in combination with other plans or projects. NE have met with SODC and the other Oxfordshire Districts to consider the approach to in-combination assessment of air quality impacts on SACs within 200m of roads. NE's advice to SODC has been that air quality modelling needs to be undertaken at Aston Rowant SAC in order to inform the Appropriate Assessment, and specifically to understand whether the in-combination effect of development on air quality would have an adverse effect on the integrity of the SAC, and any mitigation measures that may be required as a result. This is needed in order to ensure the Plan is compliant with the requirements of the Conservation of Habitats and Species Regulations 2017.</p> | An air quality model for the M40 at Aston Rowant SAC has been carried out, as requested by NE. The results of this model are provided as Appendix 5 to the HRA, and are considered in the Appropriate Assessment at Section 5. |
| November 2017 Local Plan 2011-2033 - Final publication version | <p>Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust:</p> <p>STRAT9: Land at Chalgrove Airfield</p> <p>This allocation is located some distance from any designated site and as such we are not concerned about direct impacts on designated sites. We are however concerned about potential indirect impacts further afield such as Aston Rowant SAC and the Chilterns caused by increased air pollution and recreational pressure (see comments on HRA below). We consider the adequate provision of sustainable transport alternatives and sufficient amount of Green Infrastructure and open space essential in mitigating any such effects.</p> <p>In the absence of any baseline ecological information the nature conservation interest of the site cannot be fully assessed. In our experience former military sites often develop considerable nature conservation interest due to the lack of disturbance and this should be assessed at the earliest opportunity. Nature conservation interest could potentially comprise botanical interests (edges of the site), invertebrates, amphibians, reptiles and birds.</p> | <p>The air quality and recreational pressure effects of Policy STRAT9 upon Aston Rowant SAC have been assessed as part of the HRA.</p> <p>With regards to recreational pressure, the likely significant effects upon Aston Rowant SAC were screened out on the basis of distance and conversations with Natural England officers about the management and condition of the site who felt that recreation was not a risk to the favourable conservation status of the qualifying features.</p> <p>With regards to air quality, an air quality model was carried out to fully assess the potential effects of increasing traffic on the M40 as a result of the plan (Appendix 5). This issue was subject to an Appropriate Assessment which concluded that the air quality effects of the plan would not have an adverse effect on the integrity of the site; Natural England concurs with the conclusion of the Appropriate Assessment.</p> |
| November 2017 Local Plan 2011-2033 - Final | <p>Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust:</p> <p>The Habitats Regulation Assessment (HRA) considers potential impacts of the South Oxfordshire Local Plan on Special Areas for Conservation (SAC) including</p> | BBOWT's experience as site managers for Aston Rowant SAC and Cothill Fen SAC is welcomed and valued, and indeed this issue has been further investigated in consultation with Natural England officers as a result of the concerns raised during the previous |

| Date of comment and document consulted on | Comment | HRA response |
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| publication version | <p>Aston Rowant SAC, Chilterns Beechwoods SAC, Cothill Fen SAC; Hartslock Wood SAC, Little Wittenham SAC and Oxford Meadows SAC.</p> <p>During the previous consultation BBOWT raised concerns about the HRA's conclusion that the Local Plan would not cause significant recreational impacts on Aston Rowant SAC and Cothill Fen SAC. We note and welcome that LUC have revisited this issue and have also sought Natural England's (NE) view on this. This has confirmed LUC's initial assessment and we accept the arguments being put forward.</p> <p>However, it is our experience as managers of several designated sites in the three counties that recreational pressures from developments are difficult to quantify and are often underestimated. Considering the amount of development coming forward not only in South Oxfordshire but also in the neighbouring districts some of our concerns about recreational impacts on designated sites (including Aston Rowant SAC and Cothill Fen SAC) still remain.</p> <p>Having said this, we are guided by NE's judgement on this (recreational impacts) as well as on effects on hydrology, air quality and in combination effects for these European sites.</p> <p>However, we would ask that appropriate monitoring is carried out for all the above mentioned SACs with regard to recreational pressure and air quality pressure to help build an evidence base that can be used when assessing the potential impacts of developments in the future.</p> | <p>consultation. While it is acknowledge that recreational pressure at these sites may be generally increasing, the qualifying of the SACs are not considered to be particularly sensitive to recreation and are not at risk.</p> <p>While the recommendation for monitoring at the site is noted, this is not required to support the conclusions of the HRA. Monitoring of effects at the SACs would provide a useful future evidence base, however the burden of doing so need not fall solely upon the Council.</p> |
| November 2017 Local Plan 2011-2033 - Final publication version | <p>N/A:</p> <p>STRAT7 is in my opinion unsound for the following reasons:</p> <p>Unsound consideration given to the natural environment.</p> <p>The Habitats Regulations assessment makes reference to European sites, but not local SSSIs. The STRAT7 site is close to the Culham Brake SSSI, which is listed as such for having the rare summer snowflake plant. There needs to be a complete and thorough study of the impact that such a huge development would have on the Culham Brake SSSI. As such the Habitats Regulations Assessment is unsound, particularly as Natural England states that the following are offences.</p> <p>"Carrying out or authorising operations likely to damage an SSSI without meeting the requirements to notify us.</p> <p>Failing to minimise any damage to an SSSI and if there is any damage, failing to restore it to its former state so far as is reasonably practical and possible."</p> | <p>Regulation 102 of the Habitats Regulations require the LPA to carry out an Appropriate Assessment of likely significant effects upon 'European sites', as defined by Regulation 8. That definition does not include SSSIs (other than those which are also designated as SAC/SPA). It would therefore be inappropriate and legally flawed for the HRA to include an assessment of likely significant effects upon all SSSIs.</p> <p>SSSIs are afforded strong policy and legislative protection in the planning system through NPPF118, Circular 06/2005 and Section 28 of the Wildlife and Countryside Act. It would therefore be most appropriate for any potential effects upon Culham Brake SSSI to be considered within that policy / legislative framework.</p> |

| Date of comment and document consulted on | Comment | HRA response |
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| | To my knowledge SODC have not carried out any assessments relating to how much the enormous STRAT7 would be affected by either due to the increase in population near the site, or changes in drainage (to which the summer snowflake is particularly susceptible – information taken from Natural England Website). Failure to have specifically done so do this would also make the plan illegal. | |
| November 2017 Local Plan 2011-2033 - Final publication version | <p>N/A:</p> <p>There is no assessment of the combined impact on air pollution of developments close to the B4009 from Lewknor to Benson. There is no traffic data for the B4009 and no mention of obtaining any.</p> <p>It is likely that increased traffic and associated air pollution will negatively affect Aston Rowant SAC and Chiltern Beechwoods SAC. The effects of nitrogen deposits from vehicle exhausts damage plants and degrade soil and water quality.</p> <p>Some towns and villages along this route are in designated Air Quality Management areas. Poor air quality is the largest environmental risk to public health in the UK (Health Improvement Board 2016/17).</p> | <p>It is accepted best practice to only consider the effects of increasing traffic and on A roads and motorways on air quality receptors, therefore the effects of increased traffic on the B4009 was not included in the traffic model.</p> <p>The effects of increased traffic on Chiltern Beechwoods were screened out in the basis of distance, while the effects on Aston Rowant SAC were subject to a deposition model and considered as part of an Appropriate Assessment.</p> |
| November 2017 Local Plan 2011-2033 - Final publication version | <p>University of Reading:</p> <p>Policy ENV2 (Biodiversity - Designated Sites, Priority Habitats and Species)</p> <p>Our first comment on Policy ENV2 is that it limits its definition of 'sites of international nature conservation importance' to Special Areas of Conservation (SACs). Whilst it is acknowledged that this may be because no other internationally important nature conservation sites are located within the District boundary, the Council in our view should not entirely preclude the possibility that large-scale development within the District could exert effects over a 'Zone of Influence' (ZoI) that encompasses other types of internationally important sites elsewhere. This can only be established once the full details of proposed development have been subject to assessment under the Habitats Regulations.</p> <p>We suggest therefore that the list of sites included within brackets in paragraph 1 of Policy ENV2 is extended to include Special Protection Areas (SPAs) and Ramsar Sites (the latter of which are provided the same protection as SPAs and SACs as a matter of National Planning Policy under Section 11 of the NPPF).</p> <p>The Conservation of Habitats and Species Regulations 2010, referred to in paragraph 1 of Policy ENV2, have been subject to amendments (in 2012). We suggest that, for clarity, the words '(as amended)' are added.</p> | <p>This amendment is not considered necessary for the purposes of this HRA, as no likely significant effects were identified on any SPA or Ramsar sites.</p> <p>It is therefore at the Council's discretion whether to incorporate the suggested amendment for reasons of clarity.</p> |

Appendix 5

Air Quality Modelling



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South Oxfordshire Local Plan

Aston Rowant SAC - Air Quality Model
Prepared by LUC in association with Air Quality Assessments Ltd.
December 2017

Project Title: Aston Rowant SAC Air Quality Model

Client: South Oxfordshire District Council

| Version | Date | Version Details | Prepared by | Checked by | Approved by Principal |
|---------|----------|------------------------------------|-------------|------------|-----------------------|
| 1.0 | 11/12/17 | Draft from Air Quality Assessments | Bob Thomas | Jon Taylor | Jon Taylor |
| 1.1 | 13/12/17 | Final for issue | Bob Thomas | Jon Taylor | Jon Taylor |
| | | | | | |
| | | | | | |



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South Oxfordshire Local Plan

Aston Rowant SAC - Air Quality Model

Prepared by LUC in association with Air Quality Assessments Ltd.

December 2017

Planning & EIA
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1 Introduction

Background

- 1.1 LUC and Air Quality Assessments Ltd (AQA) have been commissioned by South Oxfordshire District Council (SODC) to assess the air quality effects of the Submission Draft of the South Oxfordshire Local Plan (the Local Plan) on the Aston Rowant Special Area of Conservation (SAC). The effect of the Local Plan has been considered in isolation and in-combination with other plans and projects. The Local Plan will lead to an increase in road traffic on the M40, which runs through the Aston Rowant SAC within South Oxfordshire (see **Figure 1**), which might potentially increase emissions within the SAC.

Scope of Assessment

- 1.2 This report describes the existing air quality conditions at the Aston Rowant SAC in proximity to the M40, and assesses the likely impact that traffic generated by the Local Plan will have on air quality. The main air pollutants of concern related to road traffic are nitrogen oxides (NO_x), nutrient nitrogen deposition and acid nitrogen deposition.
- 1.3 The assessment has been prepared taking into account all relevant local and national guidance and regulations.
- 1.4 The references and a glossary of common air quality terminology used in this assessment are shown in **Section 9** and **Section 10** respectively.

2 Air Quality Legislation and Policy

European Legislation

EU Ambient Air Quality Directive

- 2.1 The European Union's Directive on ambient air quality and cleaner air for Europe (European Parliament, Council of the European Union, 2008) sets out legally binding critical levels for the protection of vegetation. The critical level for NO_x is an annual mean concentration of 30 µg/m³ not to be exceeded after 19th July 2001. The Air Quality Standards Regulations 2010 (The Stationary Office, 2010a) implement the EU Directive critical levels in English legislation. Achievement of the critical levels is a national obligation rather than a local one. The critical levels only apply at sites more than 20 km 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 a day.

EU Habitats Directive

- 2.2 European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive") requires member states to introduce a range of measures for the protection habitats and species. The Conservation of Habitats and Species Regulations (The Conservation of Habitats and Species Regulations 2010 (No. 490), 2010b) transposes the Directive into law in England and Wales. The Regulations require the Secretary of State to provide the European Commission with a list of sites which are important for the habitats or species listed in the Directive. The Commission then designates worthy sites as Special Areas of Conservation (SACs). The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs); with these classified under the Council Directive 79/409/EEC on the Conservation of Wild Birds (Directive 2009/147/EC of the European Parliament and of the Council, 2009). These sites form a network termed "Natura 2000".
- 2.3 The Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna.
- 2.4 In addition to SACs and SPAs, some internationally important UK sites are designated under the Ramsar Convention. Originally intended to protect waterfowl habitat, the Convention has broadened its scope to cover all aspects of wetland conservation.
- 2.5 The Habitats Directive (as implemented by the Regulations) requires the competent authority, which in this case will be the planning authority, to firstly evaluate whether plans are likely to give rise to a significant effect on European sites. Where this is the case, it has to carry out an 'appropriate assessment' in order to determine whether the plans will adversely affect the integrity of the site.

National Legislation

The Air Quality Strategy

- 2.6 Part IV of The Environment Act 1995 required the UK Government to prepare an Air Quality Strategy. The Air Quality Strategy (Defra, 2007), provides an overview and outline of ambient air quality policy in the UK and the devolved administrations. The strategy sets out air quality standards and objectives intended to protect human health and the environment.

- 2.7 Standards are the concentrations of pollutants in the atmosphere, below which there is a minimum risk of health effects or ecosystem damage; they are set with regard to scientific and medical evidence. Objectives are the policy targets set by the Government, taking account of economic efficiency, practicability, technical feasibility and timescale, where the standards are expected to be achieved by a certain date.
- 2.8 The national objective for NO_x is an annual mean of 30 µg/m³, and is the same as the EU critical level; however, the compliance date by which the objective must be achieved, and maintained thereafter, is 31st December 2000.
- 2.9 The national objective only strictly applies away from urban areas and heavily trafficked roads (see **Paragraph 2.1**); however, Natural England has adopted a precautionary approach, and applies the objective across all European sites.

Planning Policy

National Policies

- 2.10 The National Planning Policy Framework (NPPF) (DCLG, 2012) sets out planning policy for England and acts as guidance for local planning authorities in drawing up plans and as a material consideration in determining applications. It places a general presumption in favour of sustainable development, stressing that the planning system should perform an environmental role to minimise pollution.
- 2.11 The NPPF states that:
"The planning system should contribute to conserving and enhancing the environment and reducing pollution by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."
- 2.12 The NPPF goes on to say that:
"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account."
- 2.13 With specific reference to air quality, the NPPF states that:
"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."
- 2.14 The NPPF is supported by Planning Practice Guidance (PPG) (DCLG, 2014). The PPG states that:
"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit".
- 2.15 The PPG goes on to state that:
"Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)."
- 2.16 The PPG makes clear that:

“Air quality can also affect biodiversity and may therefore impact on our international obligation under the Habitats Directive”.

3 Methodology

Existing Conditions

- 3.1 Information on existing air quality within the study area has been collated from the following sources:
- Background pollutant concentration maps published by Defra (Defra, 2017b). These cover the whole country on a 1 x 1 km grid; and
 - Background nitrogen deposition fluxes published by the Air Pollution Information System (APIS, 2017).

Road Traffic Impacts

Sensitive Locations

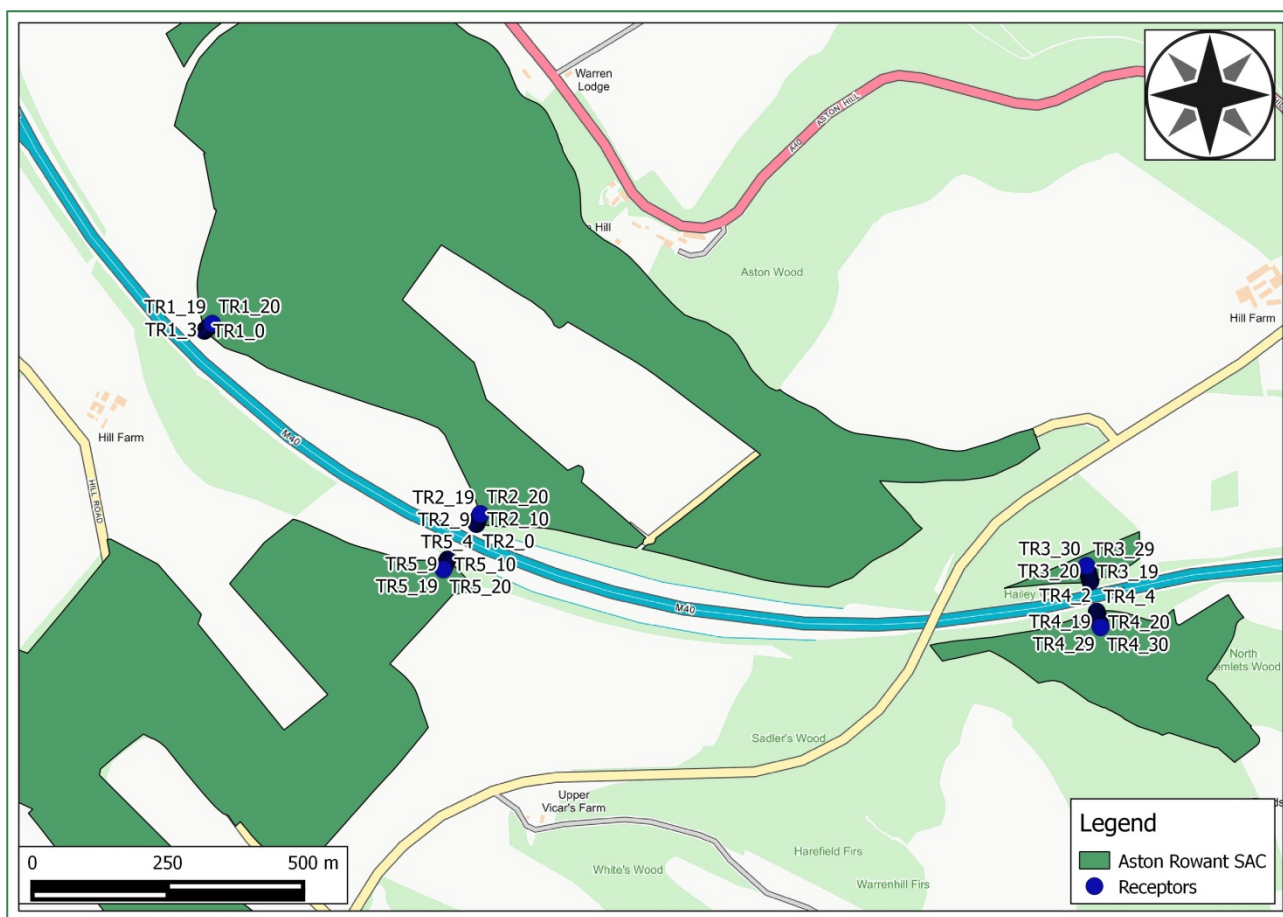
- 3.2 Concentrations have been modelled along five transects on either side of the M40. The transect locations are shown in **Figure 1**. Concentrations have been predicted every 1 m along the transects, from the SAC boundary closest to the road, up to 30 m from the boundary. The grid references for the transect receptor points are shown in **Appendix A1**.

Assessment Scenarios

- 3.3 Concentrations of NO_x have been predicted for the following scenarios, with the air quality effects of the Local Plan assessed in isolation and cumulatively in-combination with other plans and projects:
- Model verification year (2016);
 - 2031 without the Local Plan;
 - 2031 with the Local Plan; and
 - 2031 with the Local Plan + in-combination plans and projects.
- 3.4 In addition to predictions using emissions data published by Defra, a sensitivity analysis has been undertaken that assumes higher NO_x emissions from diesel vehicles. The sensitivity analysis provides a worst case assessment of future impacts (see section on uncertainty below).

Modelling Methodology

- 3.5 Concentrations have been predicted using the ADMS Roads (v4.1.1.0) dispersion model. The model requires the input of a range of data, details of which are provided in **Appendix A1**, along with details of the model verification calculations.



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- 3.6 There are many factors that contribute to uncertainty when predicting pollutant concentrations. The emission factors utilised in the air quality model are dependent on traffic data, which have inherent uncertainties associated with them. There are also uncertainties associated with the model itself, which simplifies real world conditions into a series of algorithms. The model verification process, as described in **Appendix A1**, minimises the uncertainties; however, future year predictions use projected traffic data, emissions data, and background concentrations. The most recent emission factors and background data have been used in this assessment; however, there are still uncertainties associated with this data.
- 3.7 Analysis has shown a disparity between historical monitoring data and the projected background concentrations published by Defra (Carslaw, et al., 2011). Overall, there is little evidence of the consistent downward trend in NO₂ and NO_x concentrations suggested by the emission inventory estimates.
- 3.8 This disparity is believed to be due to the actual on-road performance of diesel vehicles when compared with emissions calculations based on the Euro standards and published in the Emissions Factor Toolkit (EFT) used for modelling. Therefore, forecast reductions in the road traffic component of background concentrations are also likely to be over optimistic in the near-term. There is no evidence that the contribution to background concentrations from non-traffic sources should not behave as forecast.
- 3.9 Recent evidence indicates that future emissions from petrol vehicles are likely to reduce as expected, but that emissions from Euro 6, Euro IV, Euro V and Euro VI diesel vehicles should be uplifted to provide a worst-case assessment.

- 3.10 Transport for London (TfL) has published a report that compares the on-road emissions performance of vehicles with the emissions factors in COPERT 4 (as used in the EFT until November 2017) (TfL, 2015). The report shows that on-road emissions from Euro 6 petrol vehicles are consistently less than those in COPERT 4, using a London drive cycle. In addition, diesel emissions from Euro 6 cars show a significant improvement on those at Euro 5; however, these emissions are higher than the emissions in COPERT 4. Euro VI emissions from buses and heavy duty vehicles (HDVs) have also been found to be significantly reduced from Euro V.
- 3.11 An analysis of recent reports that compare the on-road NO_x emissions performance of diesel vehicles with vehicle type-approval standards has been published by Air Quality Consultants Ltd (AQC) (AQC, 2016a). The report concludes that Euro 6 vehicles perform significantly better than earlier vehicles; with a reduction in NO_x emissions of 50-70% when compared with Euro 5 vehicles. However, Euro 6 vehicles have been found to emit significantly more NO_x than the Euro 6 standard. For HDVs there is good evidence that Euro VI NO_x emissions are consistently better than those of Euro V and earlier standards.
- 3.12 The COPERT emissions factors used in the EFT have been updated to reflect recent evidence on the real-world emission performance; however, the AQC report compares on-road NO_x emissions with the COPERT 4 emissions factors and concludes that:
- there is no evidence that COPERT emissions factors are incorrect for Euro 5 or earlier diesel cars;
 - there is a small under-prediction in the COPERT emissions factors when compared with Euro 6ab diesel cars;
 - COPERT emissions factors for Euro IV and Euro V under-predict emissions; and
 - It is likely that COPERT emissions factors for Euro VI under-predict emissions.
- 3.13 The AQC report recommends that future year modelling should be based on the unadjusted EFT emissions factors, and that a sensitivity analysis that uplifts emissions from Euro 6, Euro IV, Euro V and Euro VI diesel vehicles should be undertaken. AQC have produced the Calculator Using Realistic Emissions for Diesels (CURED) tool (V2A) that applies the relevant adjustments to diesel emission factors from the EFT for use by consultants when undertaking sensitivity analysis of future air quality impacts (AQC, 2016b). The current CURED tool (V2A) is based on emissions from EFT v7. The EFT has now been updated to v8 incorporating COPERT 5 emissions; however, following a comparison of CURED V2A and COPERT 5, AQC consider that CURED V2A continues to provide a relevant basis for a sensitivity test on future-year NO_x emissions (AQC, 2017).
- 3.14 The road traffic components of NO_x and NO₂ in the Defra background maps have also been adjusted to produce background concentrations for the sensitivity test following a methodology recommended by AQC (AQC, 2016c).

Assessment Criteria and Significance

Assessment Criteria

- 3.15 Critical loads for nitrogen deposition onto sensitive ecosystems have been specified by the United Nations Economic Commission for Europe (UNECE). They are defined as a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. The critical load relates to the quantity of pollutant deposited from air to ground, whereas the critical level is the gaseous concentration of a pollutant in the air. It must be emphasised that exceedence of the critical load does not provide a quantitative estimate of damage to an ecosystem, but only the *potential* for damage to occur. The critical loads for the ecosystems under consideration in this assessment, as defined in the Air Pollution Information System (APIS, 2017), are provided in **Table 1**.
- 3.16 The critical loads from the habitats most sensitive to nutrient or acid nitrogen deposition have been used, along with the NO_x objective for the protection of vegetation and ecosystems, to determine the assessment criteria, as shown in **Table 2**.

Table 1: Critical Loads

| Site | Feature of Interest | Critical Load | | | |
|------------------|--|-----------------------|-----|--------------------|--------|
| | | Nutrient N (kg/ha/yr) | | Acid N (keq/ha/yr) | |
| | | min | max | min | max |
| Aston Rowant SAC | Juniperus communis formations on heaths or calcareous grasslands (H5130) | 10 | 25 | 1.369 | 5.120 |
| | Asperulo-Fagetum beech forests (H9130) | 10 | 20 | 1.953 | 11.920 |

Table 2: Assessment Criteria

| Site | Annual Mean NO _x (µg/m ³) | Nutrient N (kg/ha/yr) | Acid N (keq/ha/yr) |
|------------------|--|-----------------------|--------------------|
| Aston Rowant SAC | 30 | 10 | 1.369 |

- 3.17 There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. Online guidance published by Defra and the Environment Agency (EA) has been used in the first instance to screen out impacts that will have an insignificant effect (Defra & EA, 2016). The guidance explains that regardless of the baseline environmental conditions, a process can be considered as insignificant if:
- The long-term (annual mean) process contribution is less than 1% of the long-term environmental standard.
- 3.18 It should be recognised that this criterion determines when an impact can be screened out as not significant. It does not imply that there will be damage to a habitat above this threshold, or that impacts will necessarily be significant above this criterion, merely that there is a potential for significant impacts to occur that should be considered using a detailed assessment methodology, such as a detailed dispersion modelling study (as has been carried out for this assessment in any event) in association with a qualified ecologist to consider the likelihood of an adverse effect on the integrity of the habitat. A position statement published by the Institute of Air Quality Management (IAQM)¹ suggest that only impacts clearly above 1% should be treated as potentially significant, rather than impacts that are about 1%, or slightly higher (IAQM, 2016).
- 3.19 For the purposes of this assessment, where concentrations and/or deposition rates are predicted to increase by 1% or less of the assessment criteria, the potential for significant impacts can be discounted, and no further assessment is necessary. If the initial screening shows the potential for significant impacts, i.e. concentrations and/or deposition rates are predicted to increase by more than 1% of the assessment criteria, the total concentrations and deposition rates (road contribution + background) will be compared with the critical level/loads. The overall effect of the air quality impacts should be judged as either significant or not significant following evaluation by a qualified ecologist with full consideration of the habitat's circumstances.

¹ The IAQM is the professional body for air quality practitioners.

4 Baseline Conditions

Background Concentrations and Fluxes

National Background Pollution Maps

- 4.1 Estimated background concentrations in the study area, derived from the national maps published by Defra, are shown in **Table 3**. The background concentrations are well below the critical level.

Table 3: Estimated Annual Mean Background Concentrations in 2016 and 2031 ($\mu\text{g}/\text{m}^3$)^a

| Year | NO _x | NO ₂ |
|-----------------------|-----------------|-----------------|
| 2016 | 16.8-20.3 | 12.5-14.9 |
| 2030 | 8.6-9.9 | 6.7-7.6 |
| 2030 – CURED | 11.2-13.5 | 8.6-10.2 |
| Critical Level | 30 | - |

^a The range of concentrations from across the study area are shown. Predicted background concentrations from the background maps are only available up to 2030; therefore, 2031 concentrations have been assumed to be the same as in 2030.

Nutrient Nitrogen and Acid Nitrogen Deposition

- 4.2 Background nitrogen deposition fluxes have been calculated using data from the APIS website, and are shown in **Table 4**. 2015 and 2022 background deposition fluxes have been estimated from the 2013-15 average data provided by APIS using the methodology in DMRB, Volume 11, Section 3, Part 1 HA207/07 (Highways Agency, 2007). Background deposition fluxes are above the critical loads in 2016 and 2031.

Table 4: Estimated Annual Mean Background Nitrogen Deposition in 2016 and 2031 ($\mu\text{g}/\text{m}^3$)

| Year | Nutrient Nitrogen (kg/ha/yr) | Acid Nitrogen (keq/ha/yr) |
|----------------------|------------------------------|---------------------------|
| 2016 | 29.30 | 2.093 |
| 2031 | 20.14 | 1.439 |
| Critical Load | 10 | 1.369 |

Predicted Baseline Concentrations

- 4.3 Baseline concentrations and deposition fluxes at receptors located along the five transects are set out in **Table 5**.

Table 5: Predicted Baseline Concentrations and Deposition Fluxes in 2016 and 2031^a

| Receptor | NO _x ($\mu\text{g}/\text{m}^3$) | | | Nutrient Nitrogen (kg/ha/yr) | | | Acid Nitrogen (keq/ha/yr) | | |
|----------|--|------|--------------|------------------------------|------|--------------|---------------------------|-------|--------------|
| | 2016 | 2031 | 2031 – CURED | 2016 | 2031 | 2031 – CURED | 2016 | 2031 | 2031 – CURED |
| TR1_0 | 54.7 | 20.9 | 37.8 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR1_1 | 53.8 | 20.6 | 37.2 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR1_2 | 53.0 | 20.4 | 36.6 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR1_3 | 52.2 | 20.1 | 36.0 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR1_4 | 51.5 | 19.9 | 35.5 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.441 |

| Receptor | NOx (µg/m³) | | | Nutrient Nitrogen (kg/ha/yr) | | | Acid Nitrogen (keq/ha/yr) | | |
|----------|-------------|------|--------------|------------------------------|------|--------------|---------------------------|-------|--------------|
| | 2016 | 2031 | 2031 – CURED | 2016 | 2031 | 2031 – CURED | 2016 | 2031 | 2031 – CURED |
| TR1_5 | 50.8 | 19.7 | 35.1 | 29.4 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_6 | 50.1 | 19.4 | 34.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_7 | 49.5 | 19.2 | 34.1 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_8 | 48.8 | 19.0 | 33.7 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_9 | 48.2 | 18.8 | 33.2 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_10 | 47.6 | 18.6 | 32.8 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_11 | 47.1 | 18.4 | 32.4 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_12 | 46.5 | 18.3 | 32.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_13 | 46.0 | 18.1 | 31.7 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_14 | 45.5 | 17.9 | 31.3 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_15 | 45.0 | 17.8 | 31.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_16 | 44.5 | 17.6 | 30.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_17 | 44.0 | 17.5 | 30.3 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_18 | 43.6 | 17.3 | 30.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_19 | 43.2 | 17.2 | 29.7 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR1_20 | 42.8 | 17.0 | 29.4 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR2_0 | 65.0 | 24.3 | 45.0 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.442 |
| TR2_1 | 63.7 | 23.8 | 44.1 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.442 |
| TR2_2 | 62.4 | 23.4 | 43.2 | 29.4 | 20.2 | 20.2 | 2.098 | 1.440 | 1.442 |
| TR2_3 | 61.2 | 23.0 | 42.3 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_4 | 60.1 | 22.6 | 41.5 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_5 | 59.0 | 22.3 | 40.8 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_6 | 57.9 | 22.0 | 40.0 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_7 | 57.0 | 21.6 | 39.4 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_8 | 56.0 | 21.3 | 38.7 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_9 | 55.1 | 21.0 | 38.1 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_10 | 54.3 | 20.8 | 37.5 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_11 | 53.5 | 20.5 | 36.9 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_12 | 52.7 | 20.3 | 36.4 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR2_13 | 52.0 | 20.0 | 35.9 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.441 |
| TR2_14 | 51.3 | 19.8 | 35.4 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.441 |
| TR2_15 | 50.6 | 19.6 | 34.9 | 29.4 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR2_16 | 50.0 | 19.4 | 34.4 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR2_17 | 49.3 | 19.2 | 34.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR2_18 | 48.7 | 19.0 | 33.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR2_19 | 48.2 | 18.8 | 33.2 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR2_20 | 47.6 | 18.6 | 32.8 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_0 | 78.7 | 28.9 | 54.4 | 29.4 | 20.2 | 20.2 | 2.099 | 1.441 | 1.443 |
| TR3_1 | 76.4 | 28.2 | 52.8 | 29.4 | 20.2 | 20.2 | 2.099 | 1.441 | 1.443 |
| TR3_2 | 74.3 | 27.5 | 51.3 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.443 |
| TR3_3 | 72.4 | 26.9 | 50.0 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.443 |
| TR3_4 | 70.6 | 26.3 | 48.8 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.443 |
| TR3_5 | 69.0 | 25.8 | 47.6 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.442 |
| TR3_6 | 67.4 | 25.3 | 46.5 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.442 |
| TR3_7 | 66.0 | 24.8 | 45.5 | 29.4 | 20.2 | 20.2 | 2.098 | 1.440 | 1.442 |
| TR3_8 | 64.6 | 24.3 | 44.6 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_9 | 63.3 | 23.9 | 43.7 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_10 | 62.2 | 23.5 | 42.9 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_11 | 61.0 | 23.2 | 42.1 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_12 | 60.0 | 22.8 | 41.3 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_13 | 59.0 | 22.5 | 40.6 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_14 | 58.0 | 22.2 | 39.9 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_15 | 57.1 | 21.9 | 39.3 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_16 | 56.2 | 21.6 | 38.7 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR3_17 | 55.4 | 21.3 | 38.1 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.441 |
| TR3_18 | 54.6 | 21.1 | 37.6 | 29.4 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_19 | 53.9 | 20.9 | 37.1 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_20 | 53.1 | 20.6 | 36.5 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_21 | 52.5 | 20.4 | 36.1 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_22 | 51.8 | 20.2 | 35.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_23 | 51.2 | 20.0 | 35.2 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_24 | 50.6 | 19.8 | 34.7 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_25 | 50.0 | 19.6 | 34.3 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |

| Receptor | NOx (µg/m³) | | | Nutrient Nitrogen (kg/ha/yr) | | | Acid Nitrogen (keq/ha/yr) | | |
|---------------------|-------------|------|--------------|------------------------------|-------------|--------------|---------------------------|--------------|--------------|
| | 2016 | 2031 | 2031 – CURED | 2016 | 2031 | 2031 – CURED | 2016 | 2031 | 2031 – CURED |
| TR3_26 | 49.4 | 19.4 | 33.9 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_27 | 48.9 | 19.2 | 33.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_28 | 48.4 | 19.1 | 33.2 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_29 | 47.9 | 18.9 | 32.8 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR3_30 | 47.4 | 18.7 | 32.5 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_0 | 73.1 | 27.4 | 51.1 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.443 |
| TR4_1 | 71.1 | 26.7 | 49.6 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.443 |
| TR4_2 | 69.2 | 26.1 | 48.3 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.443 |
| TR4_3 | 67.4 | 25.5 | 47.0 | 29.4 | 20.2 | 20.2 | 2.098 | 1.441 | 1.442 |
| TR4_4 | 65.8 | 24.9 | 45.8 | 29.4 | 20.2 | 20.2 | 2.098 | 1.440 | 1.442 |
| TR4_5 | 64.2 | 24.4 | 44.7 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_6 | 62.9 | 23.9 | 43.7 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_7 | 61.5 | 23.5 | 42.7 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_8 | 60.2 | 23.1 | 41.9 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_9 | 59.1 | 22.7 | 41.0 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_10 | 58.0 | 22.3 | 40.3 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_11 | 56.9 | 22.0 | 39.5 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_12 | 56.0 | 21.7 | 38.8 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.442 |
| TR4_13 | 55.1 | 21.4 | 38.2 | 29.4 | 20.2 | 20.2 | 2.097 | 1.440 | 1.441 |
| TR4_14 | 54.2 | 21.1 | 37.5 | 29.4 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_15 | 53.4 | 20.8 | 37.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_16 | 52.6 | 20.5 | 36.4 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_17 | 51.9 | 20.3 | 35.9 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_18 | 51.1 | 20.1 | 35.3 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_19 | 50.5 | 19.8 | 34.9 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_20 | 49.8 | 19.6 | 34.4 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_21 | 49.2 | 19.4 | 34.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_22 | 48.6 | 19.2 | 33.5 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_23 | 48.0 | 19.0 | 33.1 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_24 | 47.5 | 18.8 | 32.7 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_25 | 47.0 | 18.7 | 32.4 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_26 | 46.4 | 18.5 | 32.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_27 | 46.0 | 18.3 | 31.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_28 | 45.5 | 18.2 | 31.3 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_29 | 45.0 | 18.0 | 31.0 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR4_30 | 44.6 | 17.9 | 30.7 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_0 | 45.5 | 18.0 | 31.6 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_1 | 44.9 | 17.8 | 31.1 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_2 | 44.3 | 17.6 | 30.7 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_3 | 43.7 | 17.4 | 30.3 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_4 | 43.2 | 17.3 | 29.9 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_5 | 42.7 | 17.1 | 29.5 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_6 | 42.2 | 16.9 | 29.1 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_7 | 41.7 | 16.8 | 28.8 | 29.3 | 20.2 | 20.2 | 2.096 | 1.440 | 1.441 |
| TR5_8 | 41.2 | 16.6 | 28.5 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_9 | 40.7 | 16.5 | 28.1 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_10 | 40.3 | 16.3 | 27.8 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_11 | 39.9 | 16.2 | 27.5 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_12 | 39.5 | 16.0 | 27.2 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_13 | 39.1 | 15.9 | 26.9 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_14 | 38.7 | 15.8 | 26.7 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.441 |
| TR5_15 | 38.3 | 15.7 | 26.4 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.440 |
| TR5_16 | 38.0 | 15.5 | 26.2 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.440 |
| TR5_17 | 37.6 | 15.4 | 25.9 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.440 |
| TR5_18 | 37.3 | 15.3 | 25.7 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.440 |
| TR5_19 | 37.0 | 15.2 | 25.5 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.440 |
| TR5_20 | 36.7 | 15.1 | 25.3 | 29.3 | 20.2 | 20.2 | 2.095 | 1.440 | 1.440 |
| Assessment Criteria | 30 | | | 10 | | | 1.369 | | |

a Exceedences of the assessment criteria are shown in bold.

4.4 Annual mean NO_x concentrations are predicted to be above the assessment criterion of 30 µg/m³ up to 30m from the SAC boundary in 2016. By 2031 annual mean NO_x concentrations are

predicted to be below the assessment criterion at all receptors assuming road traffic emissions decrease in line with the EFT, but using CURED, exceedences of the assessment criterion are predicted at up to 30m from the SAC boundary.

- 4.5 Nutrient nitrogen deposition in 2016 is predicted to be above the assessment criterion at all the transect receptors. Nutrient nitrogen deposition fluxes are predicted to decrease by 2031; however the assessment criterion is still exceeded at all the transect receptors assuming EFT and CURED emissions.
- 4.6 Acid nitrogen deposition in 2016 is also predicted to be above the assessment criterion at all the transect receptors. Acid nitrogen deposition fluxes are predicted to decrease by 2031; however the assessment criterion is still exceeded at all the transect receptors assuming EFT and CURED emissions.

5 Impact Assessment

Emerging Local Plan

Screening

- 5.1 The predicted contributions to annual mean NO_x concentrations due to the Local Plan at the closest receptors to the M40 on each transect are set out in **Table 6**. The results show that the screening criterion for NO_x is not exceeded at any of the receptors closest to the M40; therefore, the impacts of the Local Plan on annual mean NO_x concentrations at the SAC would not be significant.

Table 6: Predicted Contribution of NO_x due to the Local Plan in 2031

| Receptor | Predicted Road Contribution of Annual Mean NO _x (µg/m ³) | | % of Screening Criterion ^a | |
|---------------------|---|-------|---------------------------------------|-------|
| | EFT | CURED | EFT | CURED |
| TR1_0 | 0.1 | 0.1 | 0 | 0 |
| TR2_0 | 0.1 | 0.1 | 0 | 0 |
| TR3_0 | 0.1 | 0.2 | 0 | 1 |
| TR4_0 | 0.1 | 0.2 | 0 | 1 |
| TR5_0 | 0.0 | 0.1 | 0 | 0 |
| Screening Criterion | - | | 1 | |

- 5.2 The predicted contributions to nutrient and acid nitrogen deposition fluxes due to the Emerging Local Plan at the closest receptors to the M40 on each transect are set out in **Table 7**. The predicted contributions are below the screening criteria for both nutrient and acid nitrogen deposition; therefore, the impacts of the Local Plan on nutrient and acid nitrogen deposition would not be significant.

Table 7: Predicted Road Contribution to Nutrient and Acid Nitrogen Deposition due to the Local Plan in 2031

| Receptor | Predicted Road Contribution of Nutrient N (kg/ha/yr) | | % of Nutrient N Screening Criterion ^a | | Predicted Road Contribution of Acid N (keq/ha/yr) | | % of Acid N Screening Criterion ^a | |
|--------------------|--|-------|--|-------|---|-------|--|-------|
| | EFT | CURED | EFT | CURED | EFT | CURED | EFT | CURED |
| TR1_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR2_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR3_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR4_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR5_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| Screening Criteria | - | | 1 | | - | | 1 | |

Cumulative Effects of Planned Growth (Local Plan & In-Combination Plans and Projects)

Screening

- 5.3 The in-combination effects planned growth on annual mean NO_x concentrations are set out in **Table 8**. Assuming EFT emissions, there are no exceedences of the annual mean screening criterion, and the impacts would not be significant. Assuming CURED emissions, the annual mean screening criterion is exceeded at Transect 1 up to 8m from the SAC boundary, at Transect 2 up to 18m from the SAC boundary, at Transect 3 up to 22m from the SAC boundary, and at Transect 4 up to 20m from the SAC boundary.

Table 8: Predicted Contribution of NO_x due to the in-combination effects of planned growth in 2031

| Receptor | Predicted Road Contribution of Annual Mean NO _x (µg/m ³) | | % of Screening Criterion ^a | |
|----------|---|-------|---------------------------------------|-------|
| | EFT | CURED | EFT | CURED |
| TR1_0 | 0.2 | 0.5 | 1 | 2 |
| TR1_1 | 0.2 | 0.5 | 1 | 2 |
| TR1_2 | 0.2 | 0.5 | 1 | 2 |
| TR1_3 | 0.2 | 0.5 | 1 | 2 |
| TR1_4 | 0.2 | 0.5 | 1 | 2 |
| TR1_5 | 0.2 | 0.5 | 1 | 2 |
| TR1_6 | 0.2 | 0.5 | 1 | 2 |
| TR1_7 | 0.2 | 0.5 | 1 | 2 |
| TR1_8 | 0.2 | 0.5 | 1 | 2 |
| TR1_9 | 0.2 | 0.4 | 1 | 1 |
| TR1_10 | 0.2 | 0.4 | 1 | 1 |
| TR1_11 | 0.2 | 0.4 | 1 | 1 |
| TR1_12 | 0.2 | 0.4 | 1 | 1 |
| TR1_13 | 0.2 | 0.4 | 1 | 1 |
| TR1_14 | 0.2 | 0.4 | 1 | 1 |
| TR1_15 | 0.2 | 0.4 | 1 | 1 |
| TR1_16 | 0.2 | 0.4 | 1 | 1 |
| TR1_17 | 0.2 | 0.4 | 1 | 1 |
| TR1_18 | 0.2 | 0.4 | 1 | 1 |
| TR1_19 | 0.2 | 0.4 | 1 | 1 |
| TR1_20 | 0.2 | 0.4 | 1 | 1 |
| TR2_0 | 0.3 | 0.7 | 1 | 2 |
| TR2_1 | 0.3 | 0.7 | 1 | 2 |
| TR2_2 | 0.3 | 0.6 | 1 | 2 |
| TR2_3 | 0.3 | 0.6 | 1 | 2 |
| TR2_4 | 0.3 | 0.6 | 1 | 2 |
| TR2_5 | 0.3 | 0.6 | 1 | 2 |
| TR2_6 | 0.3 | 0.6 | 1 | 2 |
| TR2_7 | 0.3 | 0.6 | 1 | 2 |
| TR2_8 | 0.3 | 0.6 | 1 | 2 |
| TR2_9 | 0.3 | 0.5 | 1 | 2 |
| TR2_10 | 0.2 | 0.5 | 1 | 2 |
| TR2_11 | 0.2 | 0.5 | 1 | 2 |
| TR2_12 | 0.2 | 0.5 | 1 | 2 |
| TR2_13 | 0.2 | 0.5 | 1 | 2 |
| TR2_14 | 0.2 | 0.5 | 1 | 2 |
| TR2_15 | 0.2 | 0.5 | 1 | 2 |
| TR2_16 | 0.2 | 0.5 | 1 | 2 |
| TR2_17 | 0.2 | 0.5 | 1 | 2 |
| TR2_18 | 0.2 | 0.5 | 1 | 2 |
| TR2_19 | 0.2 | 0.4 | 1 | 1 |
| TR2_20 | 0.2 | 0.4 | 1 | 1 |
| TR3_0 | 0.4 | 0.8 | 1 | 3 |
| TR3_1 | 0.4 | 0.8 | 1 | 3 |
| TR3_2 | 0.3 | 0.8 | 1 | 3 |
| TR3_3 | 0.3 | 0.7 | 1 | 2 |
| TR3_4 | 0.3 | 0.7 | 1 | 2 |

| Receptor | Predicted Road Contribution of Annual Mean NOx ($\mu\text{g}/\text{m}^3$) | | % of Screening Criterion ^a | |
|----------|---|-------|---------------------------------------|-------|
| | EFT | CURED | EFT | CURED |
| TR3_5 | 0.3 | 0.7 | 1 | 2 |
| TR3_6 | 0.3 | 0.7 | 1 | 2 |
| TR3_7 | 0.3 | 0.6 | 1 | 2 |
| TR3_8 | 0.3 | 0.6 | 1 | 2 |
| TR3_9 | 0.3 | 0.6 | 1 | 2 |
| TR3_10 | 0.3 | 0.6 | 1 | 2 |
| TR3_11 | 0.3 | 0.6 | 1 | 2 |
| TR3_12 | 0.3 | 0.6 | 1 | 2 |
| TR3_13 | 0.3 | 0.5 | 1 | 2 |
| TR3_14 | 0.2 | 0.5 | 1 | 2 |
| TR3_15 | 0.2 | 0.5 | 1 | 2 |
| TR3_16 | 0.2 | 0.5 | 1 | 2 |
| TR3_17 | 0.2 | 0.5 | 1 | 2 |
| TR3_18 | 0.2 | 0.5 | 1 | 2 |
| TR3_19 | 0.2 | 0.5 | 1 | 2 |
| TR3_20 | 0.2 | 0.5 | 1 | 2 |
| TR3_21 | 0.2 | 0.5 | 1 | 2 |
| TR3_22 | 0.2 | 0.5 | 1 | 2 |
| TR3_23 | 0.2 | 0.4 | 1 | 1 |
| TR3_24 | 0.2 | 0.4 | 1 | 1 |
| TR3_25 | 0.2 | 0.4 | 1 | 1 |
| TR3_26 | 0.2 | 0.4 | 1 | 1 |
| TR3_27 | 0.2 | 0.4 | 1 | 1 |
| TR3_28 | 0.2 | 0.4 | 1 | 1 |
| TR3_29 | 0.2 | 0.4 | 1 | 1 |
| TR3_30 | 0.2 | 0.4 | 1 | 1 |
| TR4_0 | 0.4 | 0.8 | 1 | 3 |
| TR4_1 | 0.4 | 0.8 | 1 | 3 |
| TR4_2 | 0.4 | 0.8 | 1 | 3 |
| TR4_3 | 0.3 | 0.7 | 1 | 2 |
| TR4_4 | 0.3 | 0.7 | 1 | 2 |
| TR4_5 | 0.3 | 0.7 | 1 | 2 |
| TR4_6 | 0.3 | 0.7 | 1 | 2 |
| TR4_7 | 0.3 | 0.6 | 1 | 2 |
| TR4_8 | 0.3 | 0.6 | 1 | 2 |
| TR4_9 | 0.3 | 0.6 | 1 | 2 |
| TR4_10 | 0.3 | 0.6 | 1 | 2 |
| TR4_11 | 0.3 | 0.6 | 1 | 2 |
| TR4_12 | 0.3 | 0.6 | 1 | 2 |
| TR4_13 | 0.3 | 0.5 | 1 | 2 |
| TR4_14 | 0.2 | 0.5 | 1 | 2 |
| TR4_15 | 0.2 | 0.5 | 1 | 2 |
| TR4_16 | 0.2 | 0.5 | 1 | 2 |
| TR4_17 | 0.2 | 0.5 | 1 | 2 |
| TR4_18 | 0.2 | 0.5 | 1 | 2 |
| TR4_19 | 0.2 | 0.5 | 1 | 2 |
| TR4_20 | 0.2 | 0.5 | 1 | 2 |
| TR4_21 | 0.2 | 0.4 | 1 | 1 |
| TR4_22 | 0.2 | 0.4 | 1 | 1 |
| TR4_23 | 0.2 | 0.4 | 1 | 1 |
| TR4_24 | 0.2 | 0.4 | 1 | 1 |
| TR4_25 | 0.2 | 0.4 | 1 | 1 |
| TR4_26 | 0.2 | 0.4 | 1 | 1 |
| TR4_27 | 0.2 | 0.4 | 1 | 1 |
| TR4_28 | 0.2 | 0.4 | 1 | 1 |
| TR4_29 | 0.2 | 0.4 | 1 | 1 |
| TR4_30 | 0.2 | 0.4 | 1 | 1 |
| TR5_0 | 0.2 | 0.4 | 1 | 1 |
| TR5_1 | 0.2 | 0.4 | 1 | 1 |
| TR5_2 | 0.2 | 0.4 | 1 | 1 |
| TR5_3 | 0.2 | 0.4 | 1 | 1 |
| TR5_4 | 0.2 | 0.4 | 1 | 1 |
| TR5_5 | 0.2 | 0.4 | 1 | 1 |
| TR5_6 | 0.2 | 0.4 | 1 | 1 |

| Receptor | Predicted Road Contribution of Annual Mean NO _x (µg/m ³) | | % of Screening Criterion ^a | |
|----------------------------|---|-------|---------------------------------------|-------|
| | EFT | CURED | EFT | CURED |
| TR5_7 | 0.2 | 0.4 | 1 | 1 |
| TR5_8 | 0.2 | 0.4 | 1 | 1 |
| TR5_9 | 0.2 | 0.4 | 1 | 1 |
| TR5_10 | 0.2 | 0.4 | 1 | 1 |
| TR5_11 | 0.2 | 0.4 | 1 | 1 |
| TR5_12 | 0.2 | 0.3 | 1 | 1 |
| TR5_13 | 0.2 | 0.3 | 1 | 1 |
| TR5_14 | 0.2 | 0.3 | 1 | 1 |
| TR5_15 | 0.2 | 0.3 | 1 | 1 |
| TR5_16 | 0.1 | 0.3 | 0 | 1 |
| TR5_17 | 0.1 | 0.3 | 0 | 1 |
| TR5_18 | 0.1 | 0.3 | 0 | 1 |
| TR5_19 | 0.1 | 0.3 | 0 | 1 |
| TR5_20 | 0.1 | 0.3 | 0 | 1 |
| Screening Criterion | - | | 1 | |

^a Exceedences of 1% of the assessment criterion are shown in bold.

- 5.4 The predicted contributions to nutrient and acid nitrogen deposition fluxes due to the in-combination effects of planned growth at the closest receptors to the M40 on each transect are set out in **Table 9**. The predicted contributions are below the screening criteria for both nutrient and acid nitrogen deposition; therefore the in-combination effects of planned growth on nutrient and acid nitrogen deposition would not be significant.

Table 9: Predicted Road Contribution to Nutrient and Acid Nitrogen Deposition due to the in-combination effects of planned growth in 2031

| Receptor | Predicted Road Contribution of Nutrient N (kg/ha/yr) | | % of Nutrient N Screening Criterion ^a | | Predicted Road Contribution of Acid N (keq/ha/yr) | | % of Acid N Screening Criterion ^a | |
|---------------------------|--|-------|--|-------|---|-------|--|-------|
| | EFT | CURED | EFT | CURED | EFT | CURED | EFT | CURED |
| TR1_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR2_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR3_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR4_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| TR5_0 | 0.00 | 0.00 | 0 | 0 | 0.00 | 0.00 | 0 | 0 |
| Screening Criteria | - | | 1 | | - | | 1 | |

^a Exceedences of 1% of the critical load are shown in bold.

Impact Assessment

- 5.5 Predicted total NO_x concentrations in 2031 at receptors where the screening criterion has been exceeded assuming CURED emissions, and the in-combination effects of planned growth, are set out in **Table 10**. The assessment criterion of 30 µg/m³ is predicted to be exceeded for the baseline scenario and for the in-combination scenario, with predicted annual mean NO_x concentrations ranging from 33.6 µg/m³ to 55.2 µg/m³. The maximum in-combination increase in annual mean NO_x concentrations is 0.8 µg/m³, which is an increase of 3% as a percentage of the assessment criterion of 30 µg/m³.
- 5.6 It should be noted that the predicted impacts represent a worst-case scenario with regard to the emissions used. In reality, the introduction of progressively cleaner vehicles into the UK fleet is likely to result in a significant reduction in NO_x emissions from diesel vehicles between 2016 and 2031. The introduction of Real Driving Emissions (RDE) tests for vehicle type-approval for Euro 6 vehicles and in-use testing for Euro VI vehicles using Portable Emissions Measurement Systems

(PEMS) should ensure that real world emissions closely match those required by the Euro 6/VI standards. By 2031, most vehicles in the UK fleet will be Euro6/VI and the use of uplifted NOx emissions from some diesel vehicles provides an extremely conservative assessment of emissions in 2031.

Table 10: Predicted 2031 Nitrogen Oxides Impacts of the in-combination effects of planned growth in 2031 Assuming CURED Emissions

| Receptor | Predicted Total NOx (µg/m³) | | Impact | |
|----------|-----------------------------|---|------------------|--|
| | Baseline | With Emerging Local Plan and Additional Transport Schemes | Increase (µg/m³) | Increase as Percentage of Assessment Criterion (%) |
| TR1_0 | 37.8 | 38.3 | 0.5 | 2 |
| TR1_1 | 37.2 | 37.7 | 0.5 | 2 |
| TR1_2 | 36.6 | 37.1 | 0.5 | 2 |
| TR1_3 | 36.0 | 36.5 | 0.5 | 2 |
| TR1_4 | 35.5 | 36.0 | 0.5 | 2 |
| TR1_5 | 35.1 | 35.5 | 0.5 | 2 |
| TR1_6 | 34.6 | 35.1 | 0.5 | 2 |
| TR1_7 | 34.1 | 34.6 | 0.5 | 2 |
| TR1_8 | 33.7 | 34.1 | 0.5 | 2 |
| TR2_0 | 45.0 | 45.7 | 0.7 | 2 |
| TR2_1 | 44.1 | 44.7 | 0.7 | 2 |
| TR2_2 | 43.2 | 43.8 | 0.6 | 2 |
| TR2_3 | 42.3 | 43.0 | 0.6 | 2 |
| TR2_4 | 41.5 | 42.1 | 0.6 | 2 |
| TR2_5 | 40.8 | 41.4 | 0.6 | 2 |
| TR2_6 | 40.0 | 40.6 | 0.6 | 2 |
| TR2_7 | 39.4 | 39.9 | 0.6 | 2 |
| TR2_8 | 38.7 | 39.3 | 0.6 | 2 |
| TR2_9 | 38.1 | 38.6 | 0.5 | 2 |
| TR2_10 | 37.5 | 38.0 | 0.5 | 2 |
| TR2_11 | 36.9 | 37.5 | 0.5 | 2 |
| TR2_12 | 36.4 | 36.9 | 0.5 | 2 |
| TR2_13 | 35.9 | 36.4 | 0.5 | 2 |
| TR2_14 | 35.4 | 35.9 | 0.5 | 2 |
| TR2_15 | 34.9 | 35.4 | 0.5 | 2 |
| TR2_16 | 34.4 | 34.9 | 0.5 | 2 |
| TR2_17 | 34.0 | 34.5 | 0.5 | 2 |
| TR2_18 | 33.6 | 34.0 | 0.5 | 2 |
| TR3_0 | 54.4 | 55.2 | 0.8 | 3 |
| TR3_1 | 52.8 | 53.6 | 0.8 | 3 |
| TR3_2 | 51.3 | 52.1 | 0.8 | 3 |
| TR3_3 | 50.0 | 50.7 | 0.7 | 2 |
| TR3_4 | 48.8 | 49.5 | 0.7 | 2 |
| TR3_5 | 47.6 | 48.3 | 0.7 | 2 |
| TR3_6 | 46.5 | 47.2 | 0.7 | 2 |
| TR3_7 | 45.5 | 46.2 | 0.6 | 2 |
| TR3_8 | 44.6 | 45.2 | 0.6 | 2 |
| TR3_9 | 43.7 | 44.3 | 0.6 | 2 |
| TR3_10 | 42.9 | 43.5 | 0.6 | 2 |
| TR3_11 | 42.1 | 42.6 | 0.6 | 2 |
| TR3_12 | 41.3 | 41.9 | 0.6 | 2 |
| TR3_13 | 40.6 | 41.2 | 0.5 | 2 |
| TR3_14 | 39.9 | 40.5 | 0.5 | 2 |
| TR3_15 | 39.3 | 39.8 | 0.5 | 2 |
| TR3_16 | 38.7 | 39.2 | 0.5 | 2 |
| TR3_17 | 38.1 | 38.6 | 0.5 | 2 |
| TR3_18 | 37.6 | 38.1 | 0.5 | 2 |
| TR3_19 | 37.1 | 37.5 | 0.5 | 2 |
| TR3_20 | 36.5 | 37.0 | 0.5 | 2 |
| TR3_21 | 36.1 | 36.5 | 0.5 | 2 |
| TR3_22 | 35.6 | 36.1 | 0.5 | 2 |
| TR4_0 | 51.1 | 51.9 | 0.8 | 3 |
| TR4_1 | 49.6 | 50.4 | 0.8 | 3 |
| TR4_2 | 48.3 | 49.0 | 0.8 | 3 |

| Receptor | Predicted Total NO _x (µg/m ³) | | Impact | |
|-----------------------------|--|---|-------------------------------|--|
| | Baseline | With Emerging Local Plan and Additional Transport Schemes | Increase (µg/m ³) | Increase as Percentage of Assessment Criterion (%) |
| TR4_3 | 47.0 | 47.7 | 0.7 | 2 |
| TR4_4 | 45.8 | 46.5 | 0.7 | 2 |
| TR4_5 | 44.7 | 45.4 | 0.7 | 2 |
| TR4_6 | 43.7 | 44.4 | 0.7 | 2 |
| TR4_7 | 42.7 | 43.4 | 0.6 | 2 |
| TR4_8 | 41.9 | 42.5 | 0.6 | 2 |
| TR4_9 | 41.0 | 41.6 | 0.6 | 2 |
| TR4_10 | 40.3 | 40.8 | 0.6 | 2 |
| TR4_11 | 39.5 | 40.1 | 0.6 | 2 |
| TR4_12 | 38.8 | 39.4 | 0.6 | 2 |
| TR4_13 | 38.2 | 38.7 | 0.5 | 2 |
| TR4_14 | 37.5 | 38.1 | 0.5 | 2 |
| TR4_15 | 37.0 | 37.5 | 0.5 | 2 |
| TR4_16 | 36.4 | 36.9 | 0.5 | 2 |
| TR4_17 | 35.9 | 36.4 | 0.5 | 2 |
| TR4_18 | 35.3 | 35.8 | 0.5 | 2 |
| TR4_19 | 34.9 | 35.3 | 0.5 | 2 |
| TR4_20 | 34.4 | 34.9 | 0.5 | 2 |
| Assessment Criterion | 30 | | - | |

a Exceedences of the assessment criterion are shown in bold.

Significance of Effects

- 5.7 The effects of the Local Plan in alone have been shown to not be significant.
- 5.8 In-combination with other plans and projects, the effects are negligible assuming EFT emissions; however, a sensitivity test that assumes uplifted NO_x emissions from certain diesel vehicles results in a risk of potentially significant effects on annual mean NO_x concentrations up to 22m within the SAC. It is considered that the use of CURED emissions provides a conservative upper estimate of the impacts. It is likely that the real in combination impact will lie somewhere between the EFT and CURED scenarios, and that the maximum increase in annual mean NO_x concentrations as a percentage of the assessment criterion will be between 0-3%.

6 Mitigation

- 6.1 Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation. It is not considered appropriate to propose further mitigation measures for this scheme. The South Oxfordshire District Council's Air Quality Action Plan will also be helping to deliver improved air quality.

7 Residual Impacts

7.1 The residual impacts will be the same as those identified in **Section 5**.

8 Conclusions

- 8.1 The Local Plan alone is likely to have a negligible effect on the Aston Rowant SAC.
- 8.2 The in-combination effects of growth are likely to be negligible assuming EFT emissions. Assuming CURED emissions, there is the potential for significant effects on annual mean NO_x concentrations up to 22m from the SAC boundary; however, given the conservative assumptions used for the sensitivity test, it is considered that the use of CURED emissions would be overly pessimistic, and it is likely that the effects would, in reality, be negligible.
- 8.3 The effects of the predicted contribution of planned growth to annual mean NO_x concentrations at the SAC should nonetheless be considered by an ecologist in the context of a Habitats Regulations Assessment.

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10 Glossary

| | |
|-------------------------|---|
| AADT | Annual Average Daily Traffic |
| ADMS-Roads | Atmospheric Dispersion Modelling System |
| CURED | Calculator Using Realistic Emissions for Diesels |
| DCLG | Department for Communities and Local Government |
| Defra | Department for Environment, Food and Rural Affairs |
| DfT | Department for Transport |
| EFT | Emissions Factor Toolkit |
| EPUK | Environmental Protection UK |
| Exceedence | A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure |
| HDV | Heavy Duty Vehicles (> 3.5 tonnes) |
| HGV | Heavy Goods Vehicle |
| IAQM | Institute of Air Quality Management |
| LAQM | Local Air Quality Management |
| µg/m³ | Microgrammes per cubic metre |
| NO | Nitric oxide |
| NO₂ | Nitrogen dioxide |
| NO_x | Nitrogen oxides (taken to be NO ₂ + NO) |
| NPPF | National Planning Policy Framework |
| Objectives | A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides |
| Standards | A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal |

11 Appendices

Modelling Methodology

Model Inputs

Receptors

Table A1: Location of Transect Receptors

| Receptor | Location | x | y | z |
|----------|------------|----------|----------|---|
| TR1_0 | Transect 1 | 472410.7 | 196965.7 | 0 |
| TR1_1 | Transect 1 | 472411.5 | 196966.4 | 0 |
| TR1_2 | Transect 1 | 472412.2 | 196967.1 | 0 |
| TR1_3 | Transect 1 | 472413 | 196967.8 | 0 |
| TR1_4 | Transect 1 | 472413.7 | 196968.4 | 0 |
| TR1_5 | Transect 1 | 472414.4 | 196969.1 | 0 |
| TR1_6 | Transect 1 | 472415.2 | 196969.7 | 0 |
| TR1_7 | Transect 1 | 472415.9 | 196970.4 | 0 |
| TR1_8 | Transect 1 | 472416.6 | 196971.1 | 0 |
| TR1_9 | Transect 1 | 472417.3 | 196971.7 | 0 |
| TR1_10 | Transect 1 | 472418.1 | 196972.4 | 0 |
| TR1_11 | Transect 1 | 472418.8 | 196973.1 | 0 |
| TR1_12 | Transect 1 | 472419.6 | 196973.8 | 0 |
| TR1_13 | Transect 1 | 472420.3 | 196974.4 | 0 |
| TR1_14 | Transect 1 | 472421 | 196975.1 | 0 |
| TR1_15 | Transect 1 | 472421.8 | 196975.8 | 0 |
| TR1_16 | Transect 1 | 472422.5 | 196976.5 | 0 |
| TR1_17 | Transect 1 | 472423.3 | 196977.1 | 0 |
| TR1_18 | Transect 1 | 472424 | 196977.8 | 0 |
| TR1_19 | Transect 1 | 472424.8 | 196978.5 | 0 |
| TR1_20 | Transect 1 | 472425.5 | 196979.2 | 0 |
| TR2_0 | Transect 2 | 472913.6 | 196609 | 0 |
| TR2_1 | Transect 2 | 472913.9 | 196609.9 | 0 |
| TR2_2 | Transect 2 | 472914.3 | 196610.8 | 0 |
| TR2_3 | Transect 2 | 472914.7 | 196611.8 | 0 |
| TR2_4 | Transect 2 | 472915 | 196612.7 | 0 |
| TR2_5 | Transect 2 | 472915.4 | 196613.6 | 0 |
| TR2_6 | Transect 2 | 472915.8 | 196614.6 | 0 |
| TR2_7 | Transect 2 | 472916.1 | 196615.5 | 0 |
| TR2_8 | Transect 2 | 472916.5 | 196616.4 | 0 |
| TR2_9 | Transect 2 | 472916.9 | 196617.4 | 0 |

| | | | | |
|--------|------------|----------|----------|---|
| TR2_10 | Transect 2 | 472917.3 | 196618.3 | 0 |
| TR2_11 | Transect 2 | 472917.6 | 196619.3 | 0 |
| TR2_12 | Transect 2 | 472918 | 196620.2 | 0 |
| TR2_13 | Transect 2 | 472918.3 | 196621.1 | 0 |
| TR2_14 | Transect 2 | 472918.7 | 196622.1 | 0 |
| TR2_15 | Transect 2 | 472919.1 | 196623 | 0 |
| TR2_16 | Transect 2 | 472919.4 | 196623.9 | 0 |
| TR2_17 | Transect 2 | 472919.8 | 196624.9 | 0 |
| TR2_18 | Transect 2 | 472920.2 | 196625.8 | 0 |
| TR2_19 | Transect 2 | 472920.6 | 196626.7 | 0 |
| TR2_20 | Transect 2 | 472920.9 | 196627.7 | 0 |
| TR3_0 | Transect 2 | 474047.9 | 196502.6 | 0 |
| TR3_1 | Transect 3 | 474047.7 | 196503.6 | 0 |
| TR3_2 | Transect 3 | 474047.4 | 196504.6 | 0 |
| TR3_3 | Transect 3 | 474047.2 | 196505.6 | 0 |
| TR3_4 | Transect 3 | 474047 | 196506.5 | 0 |
| TR3_5 | Transect 3 | 474046.7 | 196507.5 | 0 |
| TR3_6 | Transect 3 | 474046.5 | 196508.5 | 0 |
| TR3_7 | Transect 3 | 474046.3 | 196509.5 | 0 |
| TR3_8 | Transect 3 | 474046 | 196510.4 | 0 |
| TR3_9 | Transect 3 | 474045.8 | 196511.4 | 0 |
| TR3_10 | Transect 3 | 474045.5 | 196512.4 | 0 |
| TR3_11 | Transect 3 | 474045.3 | 196513.4 | 0 |
| TR3_12 | Transect 3 | 474045.1 | 196514.3 | 0 |
| TR3_13 | Transect 3 | 474044.8 | 196515.3 | 0 |
| TR3_14 | Transect 3 | 474044.6 | 196516.3 | 0 |
| TR3_15 | Transect 3 | 474044.4 | 196517.3 | 0 |
| TR3_16 | Transect 3 | 474044.1 | 196518.2 | 0 |
| TR3_17 | Transect 3 | 474043.9 | 196519.2 | 0 |
| TR3_18 | Transect 3 | 474043.7 | 196520.2 | 0 |
| TR3_19 | Transect 3 | 474043.4 | 196521.2 | 0 |
| TR3_20 | Transect 3 | 474043.2 | 196522.2 | 0 |
| TR3_21 | Transect 3 | 474042.9 | 196523.1 | 0 |
| TR3_22 | Transect 3 | 474042.7 | 196524.1 | 0 |
| TR3_23 | Transect 3 | 474042.4 | 196525.1 | 0 |
| TR3_24 | Transect 3 | 474042.2 | 196526.1 | 0 |
| TR3_25 | Transect 3 | 474042.0 | 196527.1 | 0 |
| TR3_26 | Transect 3 | 474041.7 | 196528.0 | 0 |
| TR3_27 | Transect 3 | 474041.5 | 196529.0 | 0 |
| TR3_28 | Transect 3 | 474041.3 | 196530.0 | 0 |
| TR3_29 | Transect 3 | 474041.0 | 196531.0 | 0 |
| TR3_30 | Transect 3 | 474040.8 | 196532.0 | 0 |
| TR4_0 | Transect 4 | 474059.7 | 196447.5 | 0 |

| | | | | |
|--------|------------|----------|----------|---|
| TR4_1 | Transect 4 | 474059.9 | 196446.6 | 0 |
| TR4_2 | Transect 4 | 474060.1 | 196445.6 | 0 |
| TR4_3 | Transect 4 | 474060.4 | 196444.6 | 0 |
| TR4_4 | Transect 4 | 474060.6 | 196443.6 | 0 |
| TR4_5 | Transect 4 | 474060.9 | 196442.6 | 0 |
| TR4_6 | Transect 4 | 474061.1 | 196441.6 | 0 |
| TR4_7 | Transect 4 | 474061.3 | 196440.6 | 0 |
| TR4_8 | Transect 4 | 474061.6 | 196439.6 | 0 |
| TR4_9 | Transect 4 | 474061.8 | 196438.6 | 0 |
| TR4_10 | Transect 4 | 474062.1 | 196437.7 | 0 |
| TR4_11 | Transect 4 | 474062.3 | 196436.7 | 0 |
| TR4_12 | Transect 4 | 474062.6 | 196435.7 | 0 |
| TR4_13 | Transect 4 | 474062.8 | 196434.7 | 0 |
| TR4_14 | Transect 4 | 474063 | 196433.8 | 0 |
| TR4_15 | Transect 4 | 474063.3 | 196432.8 | 0 |
| TR4_16 | Transect 4 | 474063.5 | 196431.8 | 0 |
| TR4_17 | Transect 4 | 474063.8 | 196430.8 | 0 |
| TR4_18 | Transect 4 | 474064 | 196429.8 | 0 |
| TR4_19 | Transect 4 | 474064.2 | 196428.9 | 0 |
| TR4_20 | Transect 4 | 474064.5 | 196427.9 | 0 |
| TR4_21 | Transect 4 | 474064.7 | 196427.0 | 0 |
| TR4_22 | Transect 4 | 474064.9 | 196426.0 | 0 |
| TR4_23 | Transect 4 | 474065.2 | 196425.0 | 0 |
| TR4_24 | Transect 4 | 474065.4 | 196424.0 | 0 |
| TR4_25 | Transect 4 | 474065.6 | 196423.1 | 0 |
| TR4_26 | Transect 4 | 474065.9 | 196422.0 | 0 |
| TR4_27 | Transect 4 | 474066.1 | 196421.1 | 0 |
| TR4_28 | Transect 4 | 474066.3 | 196420.1 | 0 |
| TR4_29 | Transect 4 | 474066.6 | 196419.2 | 0 |
| TR4_30 | Transect 4 | 474066.8 | 196418.2 | 0 |
| TR5_0 | Transect 5 | 472860.2 | 196543.7 | 0 |
| TR5_1 | Transect 5 | 472859.8 | 196542.8 | 0 |
| TR5_2 | Transect 5 | 472859.4 | 196541.8 | 0 |
| TR5_3 | Transect 5 | 472859 | 196540.9 | 0 |
| TR5_4 | Transect 5 | 472858.6 | 196540 | 0 |
| TR5_5 | Transect 5 | 472858.2 | 196539.1 | 0 |
| TR5_6 | Transect 5 | 472857.8 | 196538.1 | 0 |
| TR5_7 | Transect 5 | 472857.4 | 196537.2 | 0 |
| TR5_8 | Transect 5 | 472857.1 | 196536.3 | 0 |
| TR5_9 | Transect 5 | 472856.7 | 196535.4 | 0 |
| TR5_10 | Transect 5 | 472856.3 | 196534.4 | 0 |
| TR5_11 | Transect 5 | 472855.9 | 196533.5 | 0 |
| TR5_12 | Transect 5 | 472855.5 | 196532.5 | 0 |

| | | | | |
|--------|------------|----------|----------|---|
| TR5_13 | Transect 5 | 472855.1 | 196531.6 | 0 |
| TR5_14 | Transect 5 | 472854.7 | 196530.7 | 0 |
| TR5_15 | Transect 5 | 472854.3 | 196529.8 | 0 |
| TR5_16 | Transect 5 | 472853.9 | 196528.8 | 0 |
| TR5_17 | Transect 5 | 472853.6 | 196527.9 | 0 |
| TR5_18 | Transect 5 | 472853.2 | 196526.9 | 0 |
| TR5_19 | Transect 5 | 472852.8 | 196526.1 | 0 |
| TR5_20 | Transect 5 | 472852.4 | 196525.1 | 0 |

Traffic Data

- A1.1. The AADT flows for the M40 adjacent to the Aston Rowant SAC have been provided by Atkins. The vehicle fleet composition data have been determined using data from the interactive web-based map provided by the Department for Transport (DfT) (DfT, 2017a). The vehicle fleet composition is assumed to remain the same for the 2031 scenarios as it is in 2016. Traffic speeds have been estimated based on the motorway speed limit (70 mph). The traffic data are shown in **Table A2**. The modelled road network is shown in **Figure 2**.
- A1.2. It has been assumed that the M40 is at grade with the surrounding area, including the Aston Rowant SAC. Some parts of the M40 are within a cutting as the road passes through the SAC. Modelling the road at grade would likely result in a conservative assessment of concentrations at parts of the SAC where it lies above a cutting as the distance between the emissions source and the receptor is decreased, also, entrainment and recirculation of emissions within the cutting would result in a reduced impact outside the cutting.
- A1.3. The transects have been located at points where the SAC is closest to the M40, which is also where the M40 is almost level with the SAC. Much of the SAC is located at a higher level than the road, and the impacts at these locations would be smaller; however, transects 3 and 4 are located where the M40 is level with SAC.
- A1.4. Diurnal flow profiles for the traffic have been derived from the national diurnal profiles published by the DfT (DfT, 2017b).

Table A2: Summary of Traffic Data used in the Assessment ^a

| Road Link | AADT | | | | Fleet Composition (%) | | | | | |
|----------------|--------|--|--|--|-----------------------|-------|-----------|-----------|-----------|------|
| | 2016 | 2031 | | | Car | LGV | Rigid HGV | Artic HGV | Bus Coach | MC |
| | | No LP, no additional transport schemes | With LP, no additional transport schemes | With LP, with additional transport schemes | | | | | | |
| M40 northbound | 48,896 | 54,529 | 54,877 | 55,909 | 77.77 | 11.41 | 4.42 | 5.41 | 0.56 | 0.42 |
| M40 southbound | 49,675 | 52,831 | 52,980 | 53,716 | 78.61 | 11.08 | 4.01 | 5.19 | 0.62 | 0.49 |

^a LGV = light goods vehicle (<3.5 tonnes), HGV = heavy goods vehicle (>3.5 tonnes), MC = motorcycle

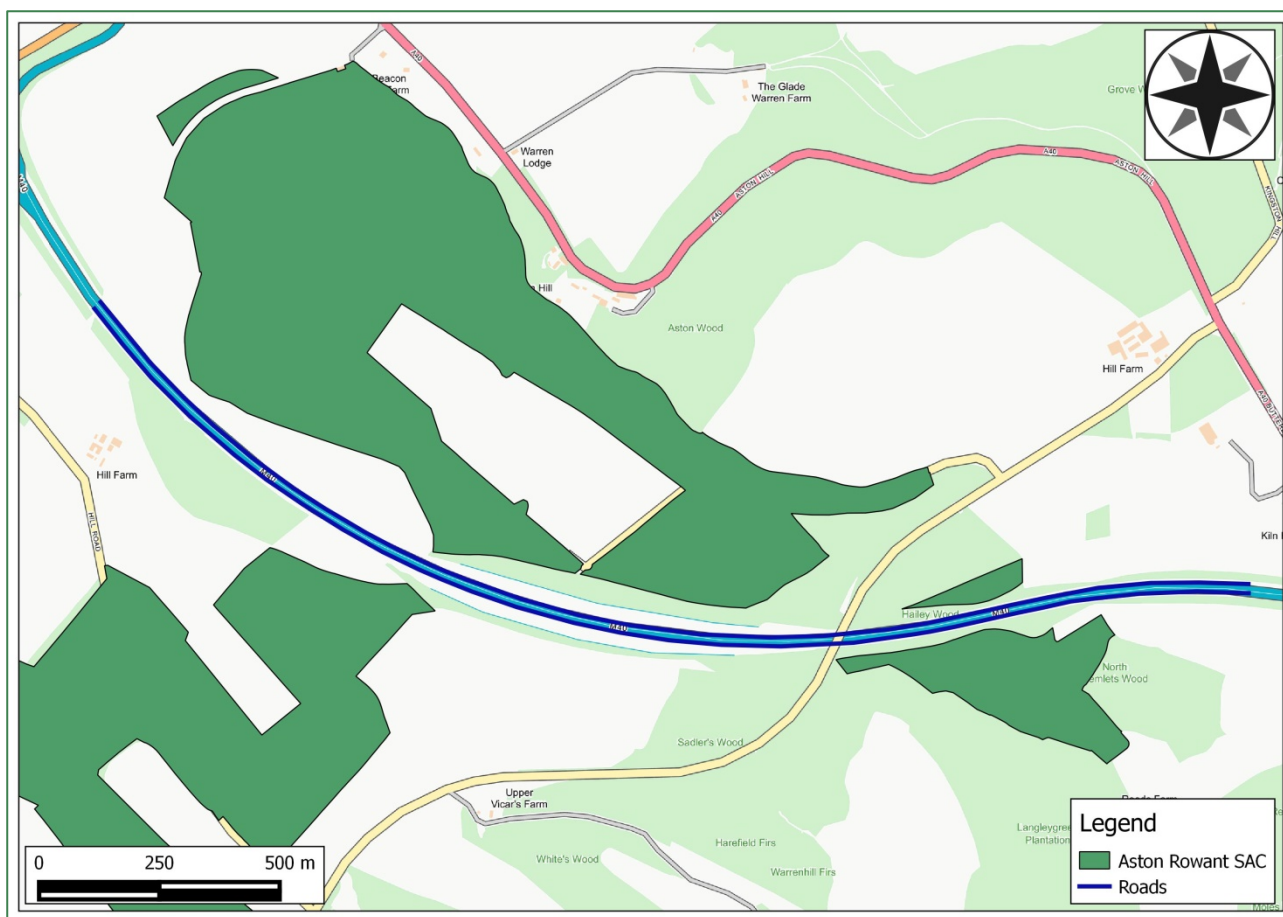


Figure 2: Modelled Roads

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Emissions

- A1.5. Emissions have been calculated using the most recent version of the Emissions Factor Toolkit (EFT) v8.0 (Defra, 2017a). The traffic data were entered into the EFT in order to calculate a combined emission rate for each of the road links in the modelled network. Emissions data are only available up to 2030; therefore, it has been assumed that emissions in 2031 will be the same as those in 2030.
- A1.6. The road traffic emissions for the sensitivity analysis have been calculated using the Calculator Using Realistic Emissions for Diesels (CURED) tool (V2A) (AQC, 2016b).

Meteorological Data

- A1.7. The model has been run using the full year of meteorological data that corresponds with the most recent set of monitoring data used for model verification (2016). The meteorological data has been taken from the monitoring station located at RAF Benson, approximately 10 km to the southwest of the SAC, which is considered suitable for the area. The data was provided by ADM Ltd, and a wind rose of the data is shown in **Figure 3**.

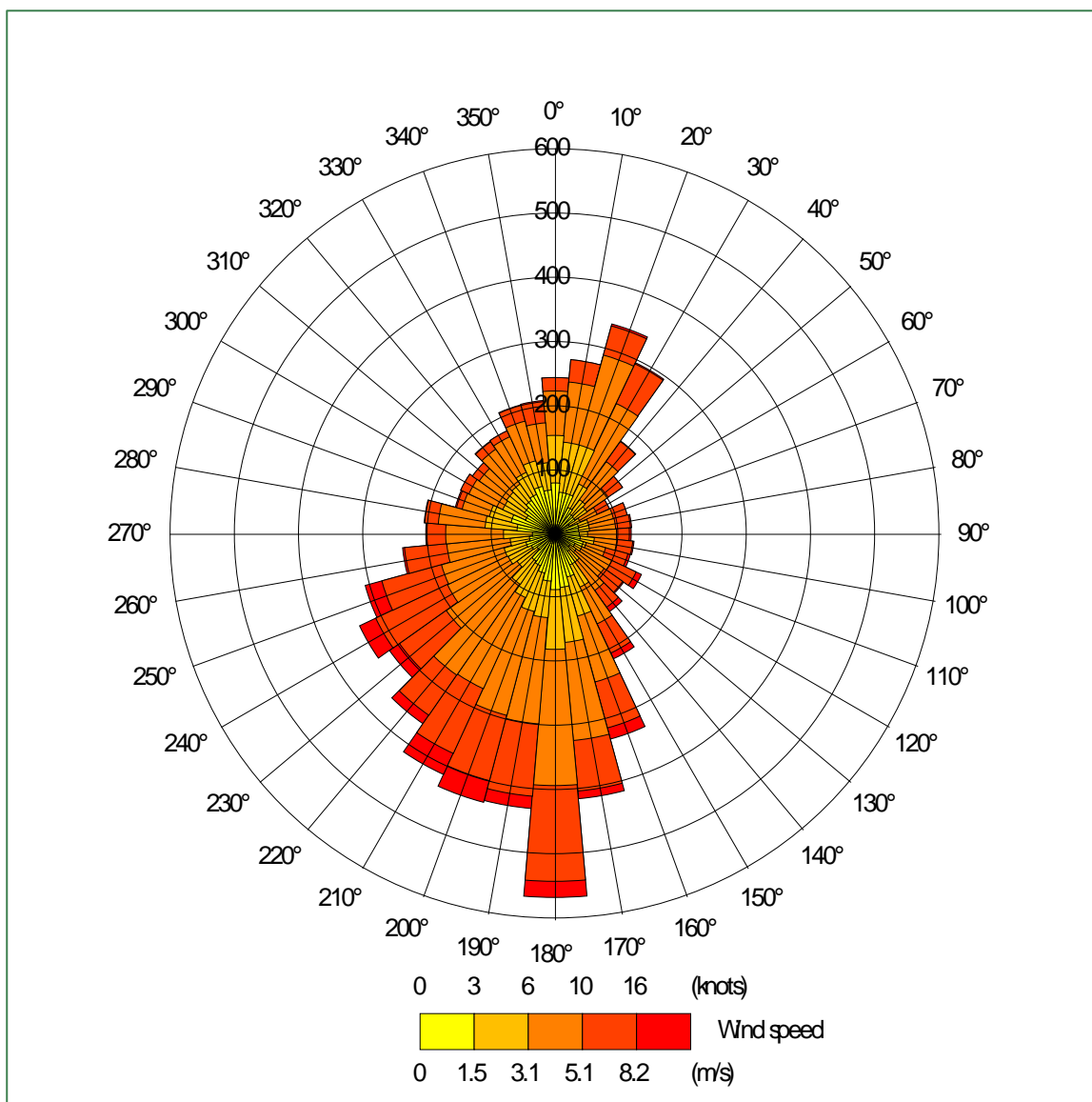


Figure 3: Wind Rose RAF Benson 2016

Background Concentrations

- A1.8. Background NO_x and NO₂ concentrations have been derived from those published by Defra (Defra, 2017b). These cover the whole country on a 1 km by 1 km grid and are published for each year from 2015 to 2030. The current maps have been verified against measurements undertaken during 2015. As the background maps are only available up to 2030, it has been assumed that background concentrations in 2031 will be the same as those in 2030. The background concentrations for the sensitivity analysis have been adjusted using the CURED methodology (AQC, 2016c).
- A1.9. Background nitrogen and acid deposition data have been taken from the APIS database (APIS, 2017). Future year background deposition fluxes have been estimated using the DMRB methodology, which assumes a 2% per year reduction in deposition levels (Highways Agency, 2007).

Verification

A1.10. The verification process seeks to minimise uncertainties associated with the air quality model by comparing the model output with locally measured concentrations. The model has been verified against data from two diffusion tube monitoring sites located close to the M40, approximately 4km northwest of the study area. The verification methodology is described below.

Background Concentrations

A1.11. Background concentrations at each of the monitoring sites in the verification year (2016) have been derived from those published by Defra (Defra, 2017b) and are shown in **Table A3**.

Table A3: Annual Mean NO_x and NO₂ Background Concentrations at the Monitoring Sites (µg/m³)

| Monitoring Site ID | Monitoring Site Location | Grid Square | 2016 | |
|--------------------|--------------------------|---------------|-----------------|-----------------|
| | | | NO _x | NO ₂ |
| S57 | M40, 9 Adwell Cottages | 470500,200500 | 16.8 | 12.5 |
| S61 | M40, 10 Adwell Cottages | 470500,200500 | 16.8 | 12.5 |

Traffic Data

A1.12. The AADT flows and the vehicle fleet composition data have been determined using data from the interactive web-based map provided by the Department for Transport (DfT) (DfT, 2017a). Traffic speeds have been estimated based on the speed limits, the road layout and the proximity to a junction. The traffic data used for verification are shown in **Table A4**.

Table A4: Summary of Traffic Data used for Verification (2016) ^a

| Road Link | AADT | Fleet Composition (%) | | | | | |
|----------------|--------|-----------------------|------|-----------|-----------|-----------|-----|
| | | Car | LGV | Rigid HGV | Artic HGV | Bus Coach | MC |
| A40 2-way | 5,531 | 81.3 | 13.7 | 2.2 | 0.4 | 0.3 | 2.1 |
| M40 northbound | 57,339 | 78.5 | 11.4 | 4.0 | 4.9 | 0.6 | 0.5 |
| M40 southbound | 49,953 | 79.6 | 10.5 | 4.0 | 4.7 | 0.7 | 0.5 |

^a LGV = light goods vehicle (<3.5 tonnes), HGV = heavy goods vehicle (>3.5 tonnes), MC = motorcycle

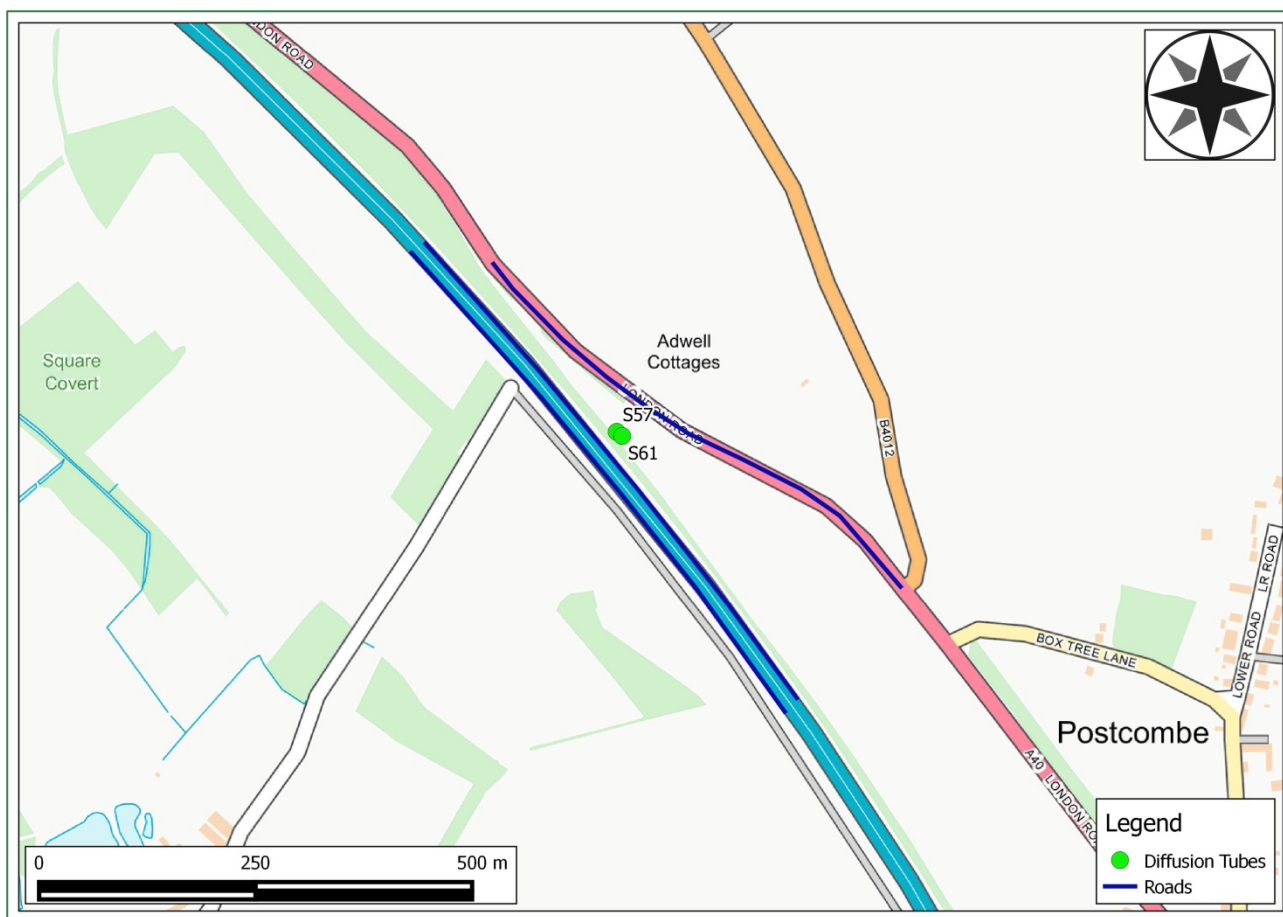


Figure 4: Modelled Roads and Monitoring Sites used for Verification

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NO₂

- A1.13. Most NO₂ is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the 2016 annual mean NO_x concentrations at two diffusion tube monitoring sites located close to the M40, as shown in **Figure 4**.
- A1.14. The model output of road-NO_x has been compared with the 'measured' road-NO_x, calculated from the measured annual mean NO₂ concentrations and the background concentrations using the NO_x from NO₂ calculator v6.1 published by Defra (Defra, 2017a).
- A1.15. The slope of the best-fit line between the 'measured' road-NO_x contribution and the model derived road-NO_x contribution, forced through zero, has been used to determine a primary adjustment factor (**Figure 5**). This factor has then been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations. The NO_x to NO₂ calculator has then been used to determine total NO₂ concentrations from the adjusted modelled road-NO_x concentrations and the background NO₂ concentrations. Finally, a secondary adjustment factor has been calculated as the slope of the best-fit line between the measured NO₂ concentrations and the primary adjusted total NO₂ concentrations, forced through zero (**Figure 6**).
- A1.16. The following primary and secondary adjustment factors have been applied to all modelled nitrogen dioxide data:
- Primary adjustment factor : 1.3158
 - Secondary adjustment factor: 0.9998

- A1.17. The results imply that the model has under-predicted the road-NOx contribution. This is a common experience with this and most other models. The final NO₂ adjustment is minor.
- A1.18. **Figure 7** compares secondary adjusted total NO₂ at each of the monitoring sites, to measured NO₂, and shows a 1:1 relationship.

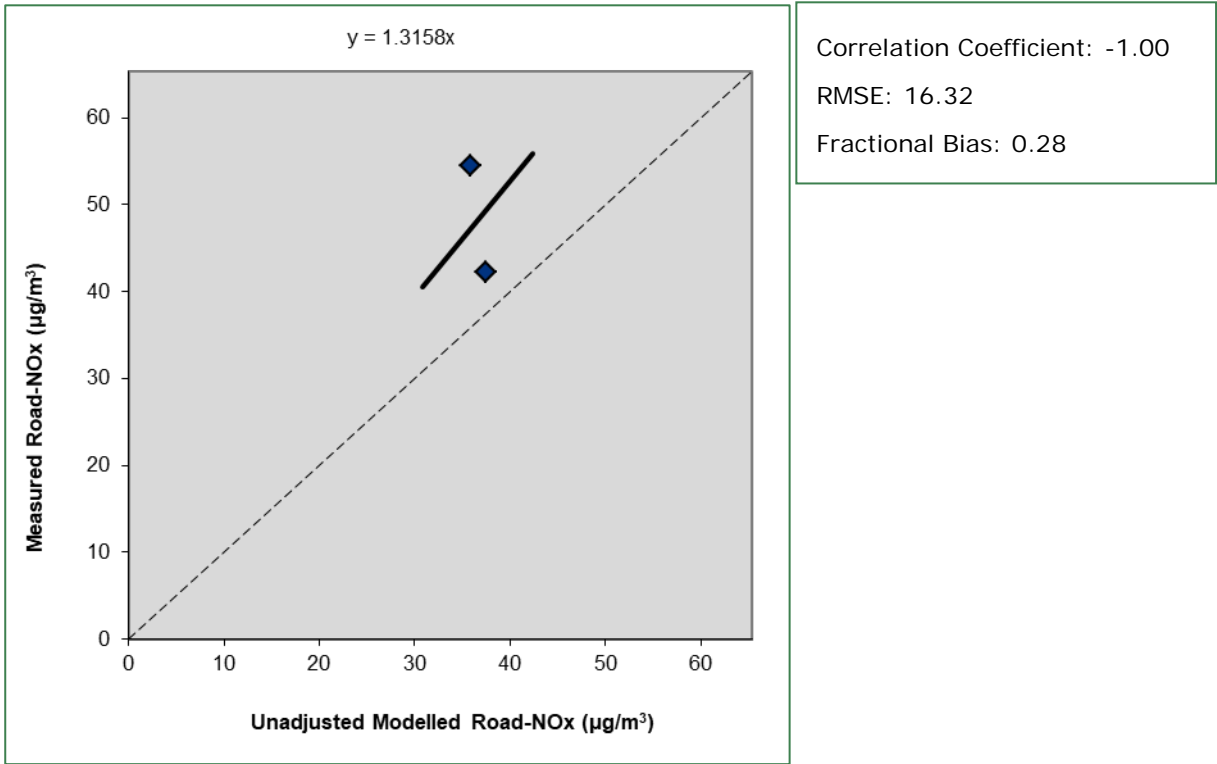


Figure 5: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations.

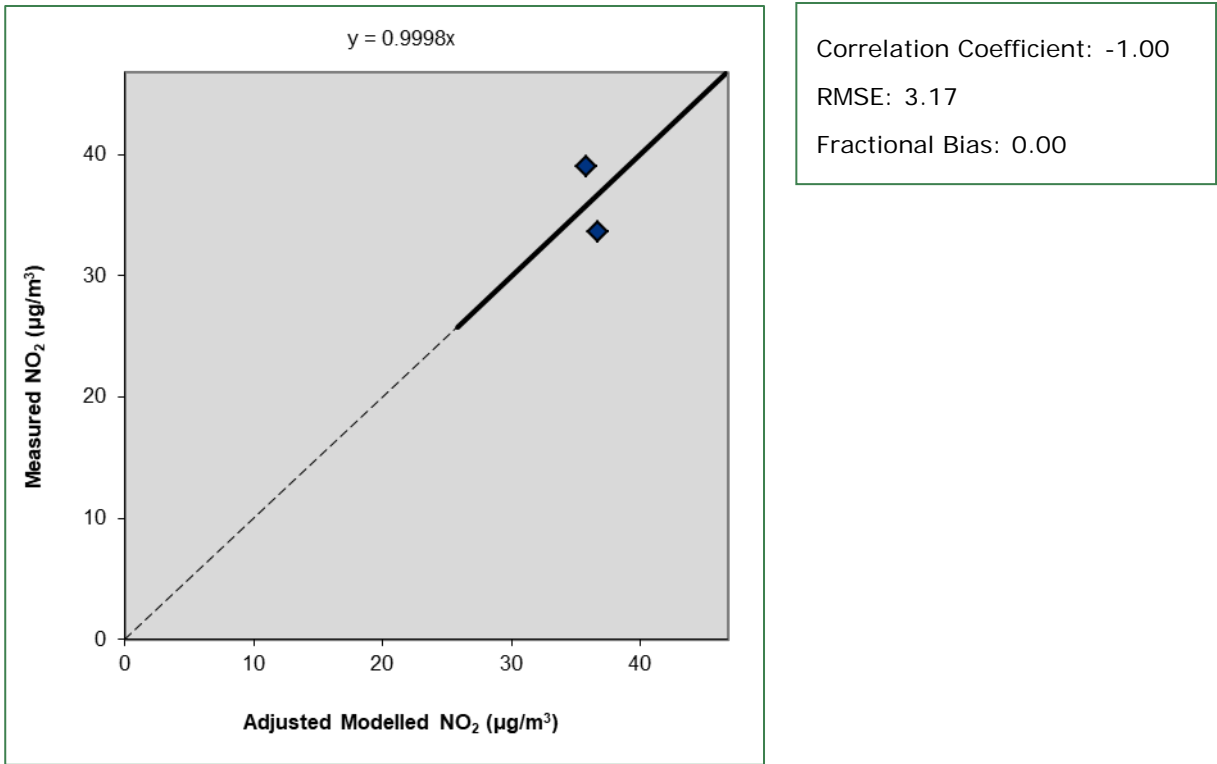


Figure 6: Comparison of Measured Total NO₂ to Primary Adjusted Modelled Total NO₂ Concentrations.

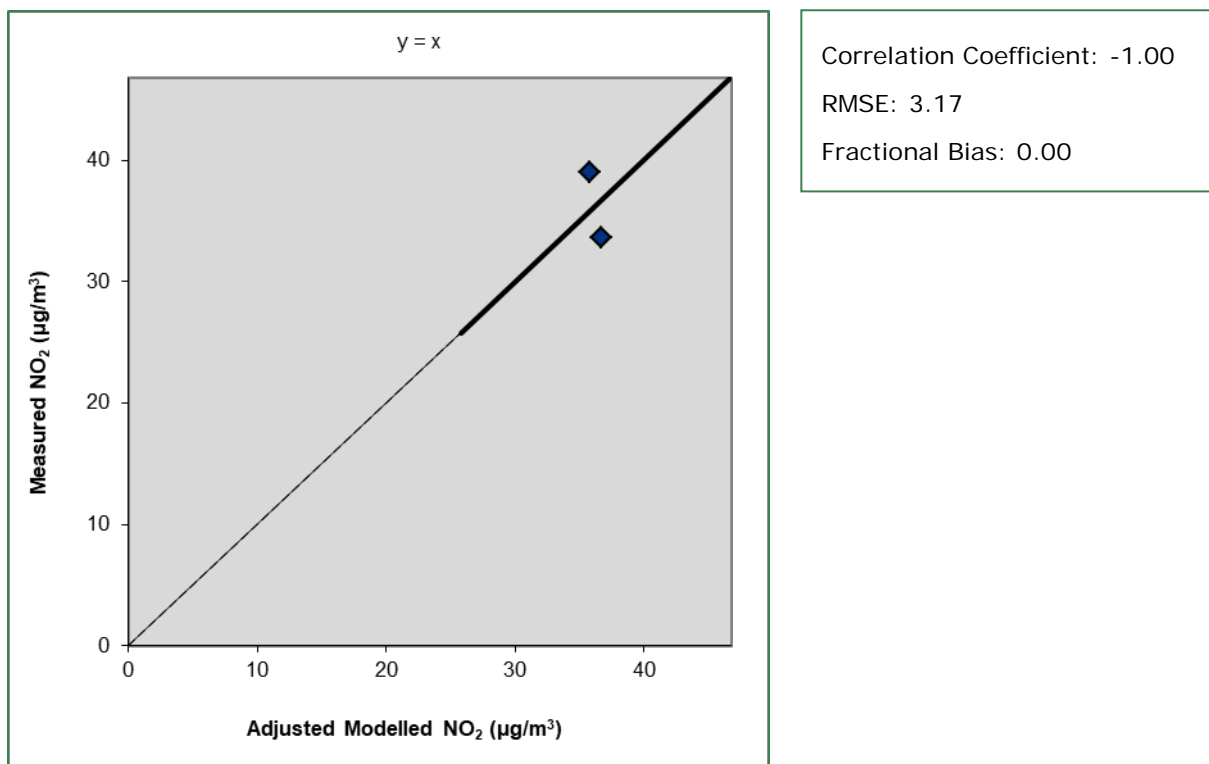


Figure 7: Comparison of Measured Total NO₂ to Final Adjusted Modelled Total NO₂ Concentrations.

Model Post-processing

NO₂

- A1.19. The NO_x to NO₂ calculator v6.1 published by Defra (Defra, 2017a) has been used to convert the modelled, verified road-NO_x output for each receptor to road-NO₂.

Deposition Fluxes

- A1.20. Deposition has been calculated from the predicted ambient NO₂ concentration using the deposition velocity for forests of 0.003 m/s published by the Environment Agency (Environment Agency, 2011).
- A1.21. The deposition velocity multiplied by the predicted concentration (µg/m³) gives the deposition flux (µg/m²/s). A factor of 96 was then used to calculate the nutrient nitrogen deposition due to NO₂ in units of kg/ha/yr (Environment Agency, 2011).
- A1.22. The acid nitrogen deposition has been calculated from the nutrient nitrogen deposition using a factor of 0.071428 (Environment Agency, 2011).
- A1.23. Wet deposition has not been assessed as it is not considered to be significant within the distances covered by the study area (Environment Agency, 2011).

Professional Experience

Bob Thomas, BSc (Hons) PgDip MSc MEnvSc MIAQM CSci

Bob Thomas is a Director at AQA, with over ten years' experience in the field of air quality management and assessment. He has carried out air quality assessments for a wide range of developments, including residential, commercial, industrial, minerals and waste developments. He has been responsible for air quality projects that include ambient air quality monitoring of nitrogen dioxide, dust and PM₁₀, the assessment of nuisance odours and dust, and the preparation of Review and Assessment reports for local authorities. He has extensive dispersion modelling experience for road traffic, energy centre and industrial sources, and has completed many stand-alone reports and chapters for inclusion within an Environmental Statement. Bob has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers, architects and process operators, and has provided expert witness services at public inquiry. He is a Chartered Scientist, a Member of the Institute of Air Quality Management and a Member of the Institution of Environmental Sciences.

A full CV for Bob Thomas is available at <http://aqassessments.co.uk/about>