

Vale of White Horse LPP2

Habitats Regulations Assessment incorporating Appropriate Assessment

Vale of White Horse DC

60520194

June 2018

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1. Introduction

- 1.1.1. AECOM was appointed by Vale of White Horse District Council (VoWH) to assist the Council in undertaking a Habitats Regulations Assessment (HRA) of the emerging Local Plan 2031 Part 2 (LPP2). The objective of the assessment was to identify any aspects of the LPP2 that would have the potential to cause a likely significant effect on Natura 2000 sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs)) and Ramsar sites, either in isolation or in combination with other plans and projects, and to devise appropriate mitigation strategies where such effects were identified. These sites are referred to collectively in this Report as "European Sites".
- 1.1.2. The UK is bound by the terms of the Habitats Directive (92/43/EEC). Under Article 6(3) of the Habitats Directive, an appropriate assessment is required where a plan or project is likely to have a significant effect upon a European Site, either individually or in combination with other projects. The Directive is implemented in the UK by the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations).
- 1.1.3. The Vale of White Horse District Council Local Plan 2031 Part 1 (LPP1) was adopted on 14th December 2016. The LPP1 sets the strategic policies and identifies strategic sites for housing, employment and supporting infrastructure required in the district up to 2031.
- 1.1.4. The LPP2 therefore exists within the context already set by LPP1 and will set:
 - policies and locations for new housing to meet the Vale's proportion of Oxford's housing need, which cannot be met within the City boundaries, as agreed by the Oxford Growth Board
 - policies for the part of Didcot Garden Town that lies within the Vale of White Horse District
 - detailed development management policies to complement the strategic policies set out in the Part 1 plan and replace the remaining saved policies of the Local Plan 2011, where appropriate, and
 - additional development site allocations to address the agreed quantum of Oxford's unmet housing need to be addressed within the Vale and to support the achievement of sustainable development.

1.2. Legislative Context

- 1.2.1. The need for an assessment of impacts on Natura 2000 sites is set out within Article 6 of the Habitats Directive, and transposed into UK law by the Habitats Regulations. The ultimate aim of the Habitats Directive is to "*maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest*" (Article 2(2)). This aim relates to habitats and species, not the European Sites themselves, although the European Sites have a significant role in delivering favourable conservation status.

- 1.2.2. The Habitats Directive applies the precautionary principle to European Sites. Consent should only be granted for plans and projects once the relevant competent authority has ascertained that there will be no adverse effect on the integrity of the European Site(s) in question. Where an appropriate assessment has been carried out and results in a negative assessment, or if uncertainty remains over the significant effect, consent will only be granted if there are no alternative solutions and there are imperative reasons of over-riding public interest (IROPI) for the development and compensatory measures have been secured.
- 1.2.3. In order to ascertain whether or not site integrity will be affected, an assessment should be undertaken of the plan or project in question. The competent authority is entitled to request the applicant to produce such information as the competent authority may reasonably require for the purposes of the assessment, or to enable it to determine whether an appropriate assessment is required.
- 1.2.4. All the European sites mentioned in this document are shown in Figure 1. In order to ascertain whether or not site integrity will be affected, a HRA should be undertaken of the plan or project in question.

Box 1. The legislative basis for Appropriate Assessment

Habitats Directive 1992

Article 6 (3) states that:

“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.”

Conservation of Habitats and Species Regulations 2017

The Regulations state that:

“A competent authority, before deciding to ... give any consent for a plan or project which is likely to have a significant effect on a European site ... shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives... The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site”.

- 1.2.5. Over the years, ‘Habitats Regulations Assessment’ has come into wide currency to describe the overall process set out in the Habitats Regulations from screening through to identification of Imperative Reasons of Overriding Public Interest (IROPI). This has arisen in order to distinguish the overall process from the individual stage of “appropriate assessment”. Throughout this Report we use the term HRA for the overall process and restrict the use of Appropriate Assessment to the specific stage of that name.
- 1.2.6. Since the February 2018 update of the HRA the ‘Sweetman’ European Court of Justice ruling¹ has reversed a decade of UK case law by determining that ‘mitigation’ (i.e. measures that are specifically introduced to avoid or reduce a significant effect that would otherwise arise) should **not** be taken into account

¹ People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

when forming a view on likely significant effects. Mitigation should instead only be taken into account at the ‘appropriate assessment’ stage. Appropriate assessment is not a technical term; it simply means ‘an assessment that is appropriate’ for the plan or project in question. As such, the law purposely does not prescribe what it should consist of or how it should be presented; these are decisions to be made on a case by case basis by the competent authority. Given that the February 2017 HRA did rely upon mitigation in drawing its conclusions as to likely significant effects on Oxford Meadows SAC and Cothill Fen SAC a new report has been prepared which includes a likely significant effects analysis covering all relevant European sites and then an appropriate assessment of effects on Oxford Meadows SAC and Cothill Fen SAC. The mitigation measures are taken into account during the latter. This document also includes new traffic and air quality analysis for both these sites which was requested by Natural England and includes Natural England’s correspondence confirming their agreement with that new data.

1.3. Vale of White Horse District

1.3.1. There is no pre-defined guidance that dictates the physical scope of an HRA of a Local Plan. Therefore, in considering the physical scope of the assessment we were guided primarily by the identified impact pathways rather than by arbitrary ‘zones’. The LPP2 is being developed following the adoption of the LPP1, which was also subject to HRA. Therefore the physical scope of the LPP1 HRA provides a foundation for determining the relevant European sites to include in the HRA of the LPP2. Current guidance suggests that the following European sites be included in the scope of assessment:

- All sites within the VoWH District boundary; and
- Other sites shown to be linked to development within the District boundary through a known ‘pathway’ (discussed below).

1.3.2. Briefly defined, pathways are routes by which a change in activity within the Local Plan area can lead to an effect upon a European site. In terms of the second category of European site listed above, CLG guidance states that the HRA should be ‘proportionate to the geographical scope of the [plan policy]’ and that ‘*an HRA need not be done in any more detail, or using more resources, than is useful for its purpose*’ (CLG, 2006, p.6).

1.3.3. There are two European sites within the VoWH District – Cothill Fen SAC and Hackpen Hill SAC. European sites also lie in adjoining districts and the potential for longer range and indirect effects upon these sites has been considered (Table 1). Figure 1 shows the location of the European sites in relation to the VoWH District.

Table 1 European sites considered at the screening stage of the Habitats Regulations Assessment

Site	Minimum Distance from the Vale of White Horse District
Cothill Fen SAC	Within the district
Hackpen Hill SAC	Within the district

Oxford Meadows SAC	Adjacent to the north east corner of the district; connected by the A34 and A40
Little Wittenham SAC	2.5km east of the district

- 1.3.4. Other European sites were scoped out of the HRA as it was deemed that no actual pathway existed connecting them to development under the LPP2.

2. Methodology

2.1 Introduction

- 2.1.1. The HRA has been carried out in the continuing absence of formal central Government guidance, although general EC guidance on HRA does exist². The former Department of Communities and Local Government (DCLG) released a consultation paper on the Appropriate Assessment of Plans in 2006³. As yet, no further formal guidance has emerged. Both of these have been referred to alongside the guidance outlined in paragraph 1.2.4 in undertaking this HRA.
- 2.1.2. Figure 2 below outlines the stages of HRA according to current draft DCLG guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

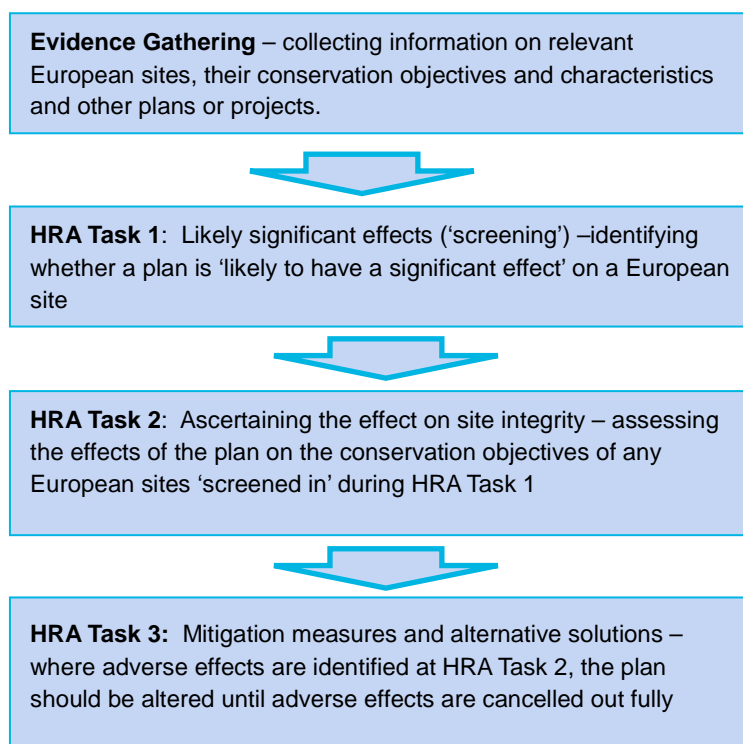


Figure 2 Four Stage Approach to Habitats Regulations Assessment. Source CLG, 2006.

- 2.1.3. This section describes the process involved in HRA. In practice, HRA of projects can be broken down into four discrete stages, each of which effectively culminates in a test. The stages are sequential, and it is only necessary to progress to the following stage if a test is failed. The stages are:

- Stage 1 – Likely Significant Effect Test;

² European Commission (2001): Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and 6(4) of the Habitats Directive.

³ CLG (2006) Planning for the Protection of European Sites, Consultation Paper

- Stage 2 – Appropriate Assessment; and
- Stages 3 and 4 – Assessment of Alternative Solutions and Imperative Reasons of Overriding Public Interest Test.

2.2 Stage 1 – The Likely Significant Effects Test

- 2.2.1. This is essentially a risk assessment, typically utilising existing data, records and specialist knowledge. The process involves identifying the likely impacts of a project upon a European Site, either alone or in combination with other plans and projects, and considering whether the impacts are likely to be significant. The purpose of the test is to decide whether ‘full’ Appropriate Assessment is required. The essential question is:

“Is the Plan, either alone or in combination with other relevant projects and plans, likely to result in a significant effect upon European sites?”

- 2.2.2. If it can be demonstrated that significant effects are unlikely, no further assessment is required.

2.3 Appropriate Assessment and Mitigation

- 2.3.1. With regard to those European sites where it is considered not possible to ‘screen out’ the LPP2 without detailed appraisal, it is necessary to progress to the later ‘Appropriate Assessment’ stage to explore the adverse effects and devise mitigation.
- 2.3.2. The steps involved are detailed in Box 1.

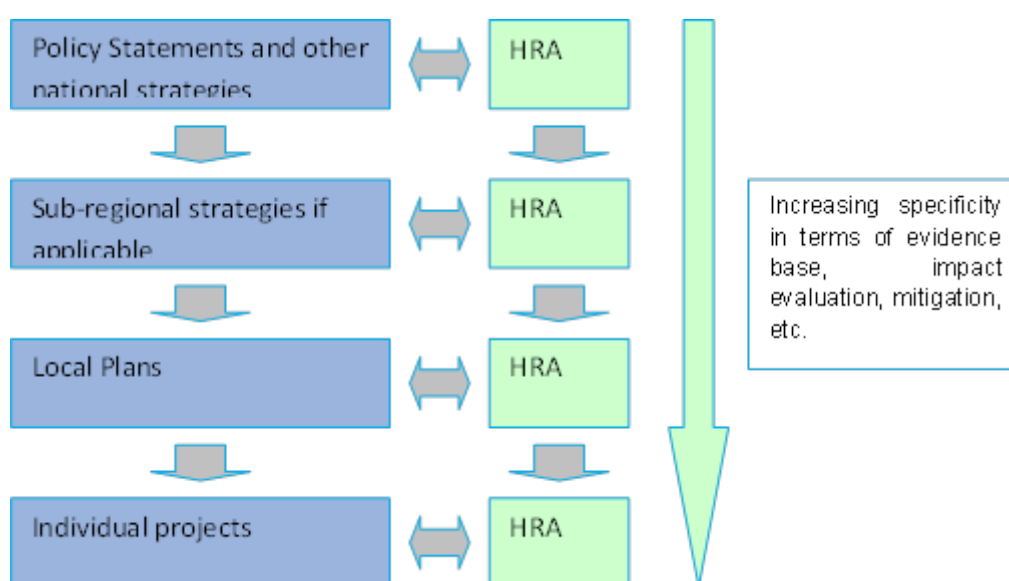
Box 1: The steps involved in Appropriate Assessment

1. Explore the reasons for the European designation of these sites.
2. Explore the environmental conditions required to maintain the integrity of the selected sites and become familiar with the current trends in these environmental processes.
3. Gain a full understanding of the plan and its policies and consider each policy within the context of the environmental processes – would the policy lead to an impact on any identified process?
4. Decide if the identified impact will lead to an adverse effect on integrity.
5. Identify other plans and projects that might affect these sites in combination with the Plan and decide whether there are any adverse effects that might not result from the Plan in isolation but will do so “in combination”.
6. Develop policy mechanisms to enable the delivery of measures to avoid the effect entirely, or if not possible, to mitigate the impact sufficiently that the effect on the European site is rendered effectively inconsequential.

- 2.3.3. In evaluating significance, AECOM have relied on our professional judgement as well as the results of previous stakeholder consultation regarding development

impacts on the European sites considered within this assessment. The level of detail in land use plans concerning developments that will be permitted under the plans will never be sufficient to make a detailed quantification of adverse effects. Therefore, we have again taken a precautionary approach (in the absence of more precise data) assuming as the default position that if an adverse effect cannot be confidently ruled out, avoidance or mitigation measures must be provided. This is in line with the former Department of Communities and Local Government guidance and Court rulings that the level of detail of the assessment, whilst meeting the relevant requirements of the Conservation Regulations, should be 'appropriate' to the level of plan or project that it addresses. This 'tiering' of assessment is summarised in Box 2.

Box 2: Tiering in HRA of Land Use Plans



- 2.3.4. When discussing 'mitigation' for a Local Plan document, one is concerned primarily with the policy framework to enable the delivery of such mitigation rather than the details of the mitigation measures themselves since the Local Plan document is a high-level policy document. It is important to note that there is a clear mitigation hierarchy with regard to Appropriate Assessment – if possible the plan or project should seek to avoid the impact and if that cannot be achieved, the plan-maker or developer should seek to mitigate the impact to such an extent that an adverse effect on integrity of the European site will not result. Only in exceptional circumstances (following demonstration of 'no alternatives' and 'imperative reasons of over-riding public interest') will compensation be acceptable.

2.4 Confirming Other Plans or Projects that may act In Combination

- 2.4.1. It is a requirement of the Regulations that the impacts of any land use plan being assessed are not considered in isolation but in combination with other plans and projects that may also be affecting the European site(s) in question.

- 2.4.2. In considering the potential for regional housing development on European sites considerations include recreational pressure, reduced air quality and pressure on water resources and quality. The actual geographic impact must also be considered within the context of relevant infrastructure (e.g. road transport corridors and water supply catchments).
- 2.4.3. When undertaking this part of the assessment it is essential to bear in mind the principal intention behind the legislation i.e. to ensure that those projects or plans which in themselves have minor impacts are not simply dismissed on that basis, but are evaluated for any cumulative contribution they may make to an overall significant effect. In practice, in combination assessment is therefore of greatest relevance when the plan would otherwise be screened out because its individual contribution is inconsequential.

Table 2. Housing to be Delivered Under Core Strategies or Local Plans of Local Authorities bordering Vale of White Horse

Local Authority	Planning DPD and Timescale	Total housing over the Local Plan Period	Oxfordshire Strategic Housing Market Assessment Recommendations (Net 2011-2031)	Oxford City Unmet Housing Need
South Oxfordshire District	Core Strategy (2018 – 2033) Publication Plan	17,050	17,050 (2011-2033)	3,750
West Oxfordshire District	Submission Local Plan (2011-2031)	15,950	12,700-13,700	2,750
Oxford City*	Core Strategy (2011-2026)	9,132	24,000-32,000	550
Cherwell*	Adopted Local Plan (2011-2031)	22,840	21,800-23,800	4,400
Swindon Borough	Adopted Local Plan (2011-2026)	22,000	NA	NA
Cotswold District	Submission Local Plan (2011-2031)	8,400	NA	NA
Wiltshire (Marlborough Area)	Adopted Local Plan (2006-2026)	920	NA	NA
West Berkshire	Core Strategy (2006-2026)	10,500	NA	NA

* Oxford City's Preferred Options Local Plan (2016-2036) consultation (June 2017) indicates a likely provision of 8,000 new dwellings. One option does allow for 32,000 new dwellings.

Cherwell District Council submitted a Partial Review of their Local Plan (Oxford's Unmet Housing Need) to the Secretary of State in March 2018. This includes the 4,400 additional dwellings in Cherwell District.

3. Pathways of Impact

3.1 Introduction

- 3.1.1. In carrying out a HRA it is important to determine the various ways in which land use plans can impact on European sites by following the pathways along which development can be connected with European sites, in some cases many kilometres distant. Briefly defined, pathways are routes by which a change in activity associated with a development can lead to an effect upon a European site.

3.2 Other Relevant Supporting Spatial Studies

- 3.2.1. In determining pathway-receptor potential for impacts of the Plan on European sites, the following data sources have been interrogated:
- Environment Agency (2012): Kennet and Vale of White Horse Catchment Abstraction Licencing Strategy
 - Environment Agency: Stage 3 and 4 Appropriate Assessments: Review of Consents
 - Thames Water (2014): Final Water Resource Management Plan 2015-2040
 - Thames Water (2015): Five-Year Water Resource Management Plan 2015-2020
 - Oxfordshire Local Transport Plan 2015-2031
 - Locational data available from the Air Pollution Information System (APIS) database

3.3 Recreational Pressure

- 3.3.1. Different types of European sites (e.g. heathland, chalk grassland) are subject to different types of recreational pressures and have different vulnerabilities. Studies across a range of species have shown that the effects from recreation can be complex.
- 3.3.2. There have been several papers published that empirically demonstrate that damage to vegetation in woodlands and other habitats can be caused by vehicles, walkers, horses and cyclists;
- Wilson & Seney (1994)⁴ examined the degree of track erosion caused by hikers, motorcycles, horses and cyclists from 108 plots along tracks in the Gallatin National Forest, Montana. Although the results proved difficult to interpret, It was concluded that horses and hikers disturbed more sediment on wet tracks, and therefore caused more erosion, than motorcycles and bicycles.

⁴ Wilson, J.P. & J.P. Seney. 1994. Erosional impact of hikers, horses, motorcycles and off road bicycles on mountain trails in Montana. Mountain Research and Development 14:77-88

- Cole et al (1995a, b)⁵ conducted experimental off-track trampling in 18 closed forest, dwarf scrub and meadow & grassland communities (each trampled between 0 – 500 times) over five mountain regions in the US. Vegetation cover was assessed two weeks and one year after trampling, and an inverse relationship with trampling intensity was discovered, although this relationship was weaker after one year than two weeks indicating some recovery of the vegetation. Differences in plant morphological characteristics were found to explain more variation in response between different vegetation types than soil and topographic factors. Low-growing, mat-forming grasses regained their cover best after two weeks and were considered most resistant to trampling, while tall forbs (non-woody vascular plants other than grasses, sedges, rushes and ferns) were considered least resistant. Cover of hemicryptophytes and geophytes (plants with buds below the soil surface) was heavily reduced after two weeks, but had recovered well after one year and as such these were considered most resilient to trampling. Chamaephytes (plants with buds above the soil surface) were least resilient to trampling. It was concluded that these would be the least tolerant of a regular cycle of disturbance.
 - Cole (1995c)⁶ conducted a follow-up study (in 4 vegetation types) in which shoe type (trainers or walking boots) and trampler weight were varied. Although immediate damage was greater with walking boots, there was no significant difference after one year.
 - Cole & Spildie (1998)⁷ experimentally compared the effects of off-track trampling by hiker and horse (at two intensities – 25 and 150 passes) in two woodland vegetation types (one with an erect forb understorey and one with a low shrub understorey). Horse traffic was found to cause the largest reduction in vegetation cover. The forb-dominated vegetation suffered greatest disturbance, but recovered rapidly. Higher trampling intensities caused more disturbance.
- 3.3.3. Dogs, rather than people, tend to be the cause of many management difficulties, notably by worrying grazing animals, and can cause eutrophication near paths. Nutrient-poor habitats such as heathland are particularly sensitive to the fertilising effect of inputs of phosphates, nitrogen and potassium from dog faeces⁸.
- 3.3.4. Underhill-Day (2005)⁹ summarises the results of visitor studies that have collected data on the use of semi-natural habitat by dogs. In surveys where 100 observations or more were reported, the mean percentage of visitors who were accompanied by dogs was 54.0%.
- 3.3.5. A survey undertaken during October 2011 by Oxford City Council to inform the Oxford Sites and Housing DPD identified that over 80% of visitors to the Oxford Meadows SAC live within 5km of the site. The majority of respondents (82%)

⁵ Cole, D.N. 1995a. Experimental trampling of vegetation. I. Relationship between trampling intensity and vegetation response. *Journal of Applied Ecology* 32: 203-214

Cole, D.N. 1995b. Experimental trampling of vegetation. II. Predictors of resistance and resilience. *Journal of Applied Ecology* 32: 215-224

⁶ Cole, D.N. 1995c. Recreational trampling experiments: effects of trampler weight and shoe type. Research Note INT-RN-425. U.S. Forest Service, Intermountain Research Station, Utah.

⁷ Cole, D.N., Spildie, D.R. 1998. Hiker, horse and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management* 53: 61-71

⁸ Shaw, P.J.A., K. Lankey and S.A. Hollingham (1995) – Impacts of trampling and dog fouling on vegetation and soil conditions on Headley Heath. *The London Naturalist*, 74, 77-82.

⁹ Underhill-Day, J.C. 2005. A literature review of urban effects on lowland heaths and their wildlife. English Nature Research Reports No. 623.

indicated that they were residents of Oxford with only 4% being resident in other parts of Oxfordshire. Those settlements within Vale of White Horse from which visitors originated were Kennington, Botley, North Hinksey and Wytham. However, considerably less than 4% of visitors to the SAC derived from these settlements. The Vale of White Horse LPP2 does not include any site allocation options or areas of search that lie within 5km of Oxford Meadows SAC.

3.3.6. It should be emphasised that many European sites are National Nature Reserves (e.g. Cothill Fen) or nature reserves managed by wildlife trusts or nature conservation charities, at which access is encouraged and resources are available to ensure that recreational use is managed appropriately. However, recreational pressure at Cothill Fen could still have a likely significant effect on the integrity of the SAC, dependent on scale and location of options for new development.

3.3.7. Where increased recreational use is predicted to cause adverse impacts on a site, avoidance and mitigation should be considered. Avoidance of recreational impacts at European sites involves location of new development away from such sites; Local Development Frameworks (and other strategic plans) provide the mechanism for this. Where avoidance is not possible, mitigation will usually involve a mix of access management, habitat management and provision of alternative recreational space:

- *Access management* – restricting access to some or all of a European site - is not usually within the remit of the Council and restriction of access may contravene a range of Government policies on access to open space, and Government objectives for increasing exercise, improving health etc. However, active management of access is possible, for example as practised on nature reserves.
- *Habitat management* is not within the direct remit of the Council. However the Council can help to set a framework for improved habitat management by promoting cross-authority collaboration and S106 funding of habitat management. In the case of Vale of White Horse, opportunities for this are limited since, according to Natural England, the Cothill Fen component SSSI units are in favourable or unfavourable recovering conditions.
- *Provision of alternative recreational space* can help to attract recreational users away from sensitive European sites, and reduce additional pressure on them. Some species for which European sites have been designated are particularly sensitive to dogs, and many dog walkers may be happy to be diverted to other, less sensitive, sites. However the location and type of alternative space must be attractive for users to be effective. The timely delivery of this suitable habitat in advance of occupation of dwellings is also required.

3.4 Atmospheric pollution

3.4.1. Current levels of understanding of air quality effects on semi-natural habitats are not adequate to allow a rigorous assessment of the likelihood of significant effects on the integrity of key European sites.

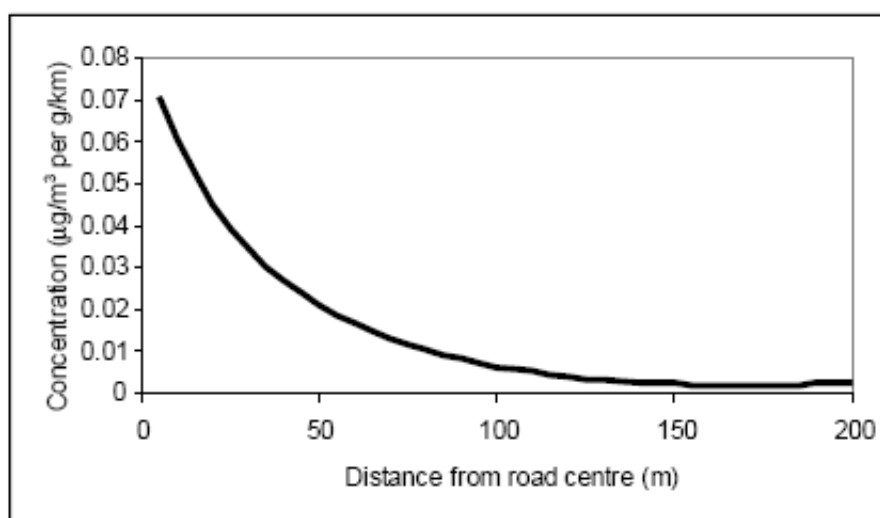
Table 3. Main sources and effects of air pollutants on habitats and species

Pollutant	Source	Effects on habitats and species
Acid deposition	SO ₂ , NO _x and ammonia all contribute to acid deposition. Although future trends in S emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, it is likely that increased N emissions may cancel out any gains produced by reduced S levels.	Can affect habitats and species through both wet (acid rain) and dry deposition. Some sites will be more at risk than others depending on soil type, bed rock geology, weathering rate and buffering capacity.
Ammonia (NH ₃)	Ammonia is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but levels have increased considerably with expansion in numbers of agricultural livestock. Ammonia reacts with acid pollutants such as the products of SO ₂ and NO _x emissions to produce fine ammonium (NH ₄ ⁺)-containing aerosol which may be transferred much longer distances (can therefore be a significant trans-boundary issue.)	Adverse effects are as a result of nitrogen deposition leading to eutrophication. As emissions mostly occur at ground level in the rural environment and NH ₃ is rapidly deposited, some of the most acute problems of NH ₃ deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides NO _x	Nitrogen oxides are mostly produced in combustion processes. About one quarter of the UK's emissions are from power stations, one-half from motor vehicles, and the rest from other industrial and domestic combustion processes.	Deposition of nitrogen compounds (nitrates (NO ₃), nitrogen dioxide (NO ₂) and nitric acid (HNO ₃)) can lead to both soil and freshwater acidification. In addition, NO _x can cause eutrophication of soils and water. This alters the species composition of plant communities and can eliminate sensitive species.
Nitrogen (N) deposition	The pollutants that contribute to nitrogen deposition derive mainly from NO _x and NH ₃ emissions. These pollutants cause acidification (see also acid deposition) as well as eutrophication.	Species-rich plant communities with relatively high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication, due to its promotion of competitive and invasive species which can respond readily to elevated levels of N. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O ₃)	A secondary pollutant generated by photochemical reactions from NO _x and volatile organic compounds (VOCs). These are mainly released by the combustion of fossil fuels. The increase in combustion of fossil fuels in the UK has led to a large increase in background ozone concentration, leading to an increased number of days when levels across the region are above 40ppb. Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O ₃ above 40 ppb can be toxic to humans and wildlife, and can affect buildings. Increased ozone concentrations may lead to a reduction in growth of agricultural crops, decreased forest production and altered species composition in semi-natural plant communities.
Sulphur Dioxide SO ₂	Main sources of SO ₂ emissions are electricity generation, industry and domestic fuel combustion. May also arise from shipping and increased atmospheric concentrations in busy ports. Total SO ₂ emissions have decreased substantially in the UK since the 1980s.	Wet and dry deposition of SO ₂ acidifies soils and freshwater, and alters the species composition of plant and associated animal communities. The significance of impacts depends on levels of deposition and the buffering capacity of soils.

- 3.4.2. The main pollutants of concern for European sites are oxides of nitrogen (NO_x), ammonia (NH_3) and sulphur dioxide (SO_2). NO_x can have a directly toxic effect upon vegetation. In addition, greater NO_x or ammonia concentrations within the atmosphere will lead to greater rates of nitrogen deposition to soils. An increase in the deposition of nitrogen from the atmosphere to soils is generally regarded to lead to an increase in soil fertility, which can have a serious deleterious effect on the quality of semi-natural, nitrogen-limited terrestrial habitats.
- 3.4.3. Sulphur dioxide emissions are overwhelmingly influenced by the output of power stations and industrial processes that require the combustion of coal and oil. Ammonia emissions are dominated by agriculture, with some chemical processes also making notable contributions. As such, it is unlikely that material increases in SO_2 or NH_3 emissions will be associated with Local Development Frameworks. NO_x emissions, however, are dominated by the output of vehicle exhausts (more than half of all emissions). Within a 'typical' housing development, by far the largest contribution to NO_x (92%) will be made by the associated road traffic. Other sources, although relevant, are of minor importance (8%) in comparison¹⁰. Emissions of NO_x could therefore be reasonably expected to increase as a result of greater vehicle use as an indirect effect of the LDF.
- 3.4.4. According to the World Health Organisation, the critical NO_x concentration (critical threshold) for the protection of vegetation is $30 \mu\text{g m}^{-3}$; the threshold for sulphur dioxide is $20 \mu\text{g m}^{-3}$. In addition, ecological studies have determined 'critical loads'¹¹ of atmospheric nitrogen deposition (that is, NO_x combined with ammonia NH_3) for key habitats within European sites.

Local Air Pollution

- 3.4.5. According to the Department of Transport's Transport Analysis Guidance, "*Beyond 200m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant*"¹².



¹⁰ Proportions calculated based upon data presented in Dore CJ et al. 2005. UK Emissions of Air Pollutants 1970 – 2003. UK National Atmospheric Emissions Inventory. <http://www.airquality.co.uk/archive/index.php>

¹¹ The critical load is the rate of deposition beyond which research indicates that adverse effects can reasonably be expected to occur

¹² www.webtag.org.uk/archive/feb04/pdf/feb04-333.pdf

Figure 3. Traffic contribution to concentrations of pollutants at different distances from road (Source: DfT)

3.4.6. This is therefore the distance that has been used throughout this HRA in order to determine whether European sites are likely to be significantly affected by development under the Local Plan Part 2. Given that sites detailed in Table 4 lie within 200m of roads that may be regularly used by vehicle journeys arising from VoWH as a result of the increased population, it was concluded that air quality should be included within the scope of this assessment. The location of these roads in relation to the European sites is shown in Figure 1.

Table 4. Critical nitrogen loads, actual rates of nitrogen deposition and NOx concentrations¹³ for the four European sites considered within this assessment (APIS data correct as of 30/08/17) Note that data presented in this table are based on centroids of the European site; deposition rates and concentrations in different parts of each European site may vary

Site	Grid reference ¹⁴	Key features	Minimum ¹⁵ critical loads (Kg N/ha/yr)	Actual mean nitrogen deposition ¹⁶	Actual mean NOx concentration (µgm ⁻³)	Actual mean SO ₂ concentration (µgm ⁻³)
Cothill Fen SAC	SU463999	Fen, marsh and swamp	15	17.2	14.5	0.3
Hackpen Hill SAC	SU352847	Calcareous grassland	15	19.3	9.9	0.2
Little Wittenham SAC	SU572929	Great-crested newts	10	18.8	15.3	0.3
Oxford Meadows SAC	SP484099	Neutral grassland	20	15.2	24.9	0.4

3.5 Water abstraction

3.5.1. The South East is generally an area of high water stress.

3.5.2. The majority of the Vale of White Horse district is supplied via the 'Kennet and Vale of the White Horse' catchment¹⁷, with a combination of surface and groundwater supply, with most from groundwater and for public water supply, the remainder for farming, domestic, recreation, industry and the environment. The southern boundary of the Vale of White Horse CAMS area is dominated by a Chalk and Upper Greensand outcrop. A groundwater divide follows the topography of the catchment, with groundwater in the scarp slope flowing into the Vale of White Horse catchment, and the remainder flowing into the Kennet catchment. This groundwater flow feeds the headwaters of the surface watercourses within the CAMS area. In the rest of the catchment, clays underlie the area so the rivers are typically flashy in nature (respond quickly to rainfall events).

¹³ As NO₂

¹⁴ For sites outside Vale of White Horse District, grid references relate to the closest points to the District.

¹⁵ APIS provides a critical load range – on a precautionary basis, this assessment uses the lowest figure in that range

¹⁶ To a resolution of 5 km

¹⁷ Environment Agency. 2012. The Kennet and Vale of White Horse Catchment Abstraction Licencing Strategy

- 3.5.3. The catchment areas underlying the VoWH are regarded as having water available for abstraction. All new consumptive surface water and groundwater licences (only those that are in direct hydraulic continuity with a nearby river) will be subject to a dual hands off flow (HOF) system (a local HOF and a Q50 HOF set at Kingston on the River Thames) to protect flows in the Lower Thames. Abstraction in the Vale draws upon water resources from the wider River Thames catchment, and the Lower Thames is classified as 'over-abstracted.' Any consumptive abstraction from the tributaries will reduce flows in the Thames, causing the Lower Thames to become further 'over abstracted.' Flows in the Lower Thames need to be maintained for the environment, navigation, recreation and to protect existing licences, including abstractions for public water supply. The Vale of White Horse CAMS rivers are all tributaries of the River Thames.
- 3.5.4. According to the final Thames Water Resources Management Plan (2014), the Vale of White Horse is covered by Thames Water's Swindon, North and South Oxfordshire (SWOX) Water Resources Zone (WRZ). This WRZ is calculated to suffer an increasing deficit under peak demand, rising to -33 MI/d by 2039/40. Whilst Thames Water Utilities Ltd intends to increase its metering programmes into the zone in order to conserve resources, it already has low levels of leakage.

3.6 Water quality

- 3.6.1. Increased amounts of housing or business development can lead to reduced water quality of rivers and estuarine environments. Sewage and industrial effluent discharges can contribute to increased nutrients on European sites leading to unfavourable conditions. In addition, diffuse pollution, partly from urban run-off has been identified during an Environment Agency Review of Consents process, as being a major factor in causing unfavourable condition of European sites.
- 3.6.2. Overall, water quality in England is improving, but there is still a considerable disparity between the various regions.
- 3.6.3. The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:
- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.
 - Eutrophication, the enrichment of plant nutrients in water, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.
- 3.6.4. Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

- 3.6.5. The watercourses in the Vale of White Horse catchment have been monitored by the Environment Agency¹⁸ (and river quality data is consequently available): the area is assessed as mostly having poor or moderate biological quality with objectives to be either moderate or good by 2027.
- 3.6.6. A consequence of increased development within the Vale will be increased volume of waste water and sewage. For treatment works close to capacity, further development may increase the risk of effluent escape into aquatic environments. In many urban areas, sewage treatment and surface water drainage systems are combined, and therefore a predicted increase in flood and storm events could increase pollution risk.
- 3.6.7. Waste water within the district is dealt with by Thames Water Utilities Ltd.
- 3.6.8. In addition to water quality from treated effluent discharge, surface water quality can also be affected through runoff on hard standing or tarmac which can affect European sites if it occurs within the catchment of that European site.

¹⁸ http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Likely Significant Effects of Local Plan 2031 Part 2 Policies

4.1 Introduction

- 4.1.1. The following table (Table 5) highlights the proposed Local Plan policies including revisions. Where there is a conclusion of no likely significant effect on European sites, the final column is shaded green. Where this conclusion cannot be made, the shading is orange to indicate that appropriate assessment (i.e. more detailed discussion) is required. The appropriate assessment is presented in later chapters.
- 4.1.2. All remaining policies were assessed to not require screening for likely significant effects on European sites within the Vale of White Horse District.

Table 5. HRA Screening of Local Plan Policies

Policy reference	Policy	Likely Significant Effects?
Core Policy 4a – Meeting Our Housing Needs	The strategy for meeting the housing target for the Vale of White Horse is set out within Core Policy 4: Meeting our Housing Needs (Local Plan 2031: Part 1) and includes details of the strategic allocations necessary to meet this target, along with a policy framework for development.	The quantum and location of housing development to be delivered under the LPP2 is set out within these policies.
Core Policy 8a – Additional Site Allocations for Abingdon-on-Thames and Oxford Fringe Sub-Area	This policy sets out how the Council will address housing needs arising from elsewhere in the Housing Market Area, expressly the quantum of unmet housing need for Oxford City to be addressed within the Vale of White Horse of 2,200 homes, as agreed by the Oxford Growth Board in September 2016.	Housing development can lead to likely significant effects on European sites through impact pathways including recreational pressure, water resource demands, water quality effects and reduced air quality.
Core Policy 15a – Additional Site Allocations for South East Vale Sub-Area	The housing target for the Vale of White Horse is for at least 22,760 homes to be delivered in the plan period between 2011 and 2031. 12,495 dwellings will be delivered through strategic allocations. 3,420 dwellings will be delivered through additional allocations. The agreed quantum of unmet housing need for Oxford City to be addressed within the Vale of White Horse of 2,200 dwellings will be provided for through either strategic or additional sites provided for within the Abingdon-on-Thames and Oxford Fringe Sub-Area. The additional site allocations also complement those set out within the Part 1 plan to assist with delivering the Spatial Strategy and supporting infrastructure delivery.	Regardless of the location and scale of new housing development all new development within VoWH is considered to lead to potential for reduced air quality effects on Oxford Meadows SAC, an issue that is being considered strategically across Oxfordshire, and which was appraised during the HRA of the LPP1. The issue is discussed in further detail in Chapter 8 of this HRA report.
	Additional dwellings (for example, windfalls) will be delivered through Neighbourhood	

Policy reference	Policy	Likely Significant Effects?																																										
	<p>Development Plans or through the Development Management Process. The contribution of all sources of housing supply are shown by the following table which supersedes the table set out in Core Policy 4:</p> <table><tr><th colspan="2">Category</th><th>Number of Dwellings</th></tr><tr><td colspan="2">Housing requirement for the full plan period (Apr 2011 to Mar 2031)</td><td>22,760</td></tr><tr><td colspan="2">Housing Completions (Apr 2011 to Mar 2016)</td><td>4,672</td></tr><tr><td rowspan="4">Housing Supply (Apr 2016 to Mar 2031)</td><td>Known Commitments</td><td>3,061</td></tr><tr><td>Local Plan 2031 Part 1 allocations</td><td>12,495</td></tr><tr><td>Local Plan 2031 Part 2 allocations</td><td>3,420</td></tr><tr><td>Windfalls</td><td>1,100</td></tr></table> <p>Additional Allocations</p> <p>In addition to the strategic site allocations set out in Core Policy 4, development will be supported at the additional site allocations through a masterplanning process involving the community, local planning authority, developer and other stakeholders, where development meets the requirements set out within the Development Site Templates shown by Appendix A and are in accordance with the Development Plan taken as a whole. The following tables show how the level of housing required through additional sites will be distributed:</p> <p>Abingdon-on-Thames and Oxford Fringe Sub-Area</p> <table><tr><th>Settlement / Parish</th><th>Settlement Type</th><th>Site Name</th><th>Number of Dwellings</th></tr><tr><td>East Hanney</td><td rowspan="5">Larger Village</td><td>North West East Hanney</td><td>80</td></tr><tr><td>East Hanney</td><td>East of East Hanney</td><td>50</td></tr><tr><td>Kingston Bagpuize with Southmoor (Parish of Fyfield and Tubney)</td><td>East Kingston Bagpuize with Southmoor</td><td>600</td></tr><tr><td></td><td></td><td></td></tr><tr><td>Marcham</td><td>South East Marcham</td><td>90</td></tr><tr><td>Shippon</td><td>Smaller Village</td><td>Dalton Barracks</td><td>1,200^{b, c}</td></tr></table>	Category		Number of Dwellings	Housing requirement for the full plan period (Apr 2011 to Mar 2031)		22,760	Housing Completions (Apr 2011 to Mar 2016)		4,672	Housing Supply (Apr 2016 to Mar 2031)	Known Commitments	3,061	Local Plan 2031 Part 1 allocations	12,495	Local Plan 2031 Part 2 allocations	3,420	Windfalls	1,100	Settlement / Parish	Settlement Type	Site Name	Number of Dwellings	East Hanney	Larger Village	North West East Hanney	80	East Hanney	East of East Hanney	50	Kingston Bagpuize with Southmoor (Parish of Fyfield and Tubney)	East Kingston Bagpuize with Southmoor	600				Marcham	South East Marcham	90	Shippon	Smaller Village	Dalton Barracks	1,200 ^{b, c}	<p>Of the housing sites which are listed above the following are screened in for appropriate assessment in Chapters 5-8 as an increase in housing development has potential to lead to other effects on European sites, in particular, recreational pressure on Cothill Fen SAC;</p> <ol style="list-style-type: none">1. Dalton Barracks (Shippon) – lies 1km from Cothill Fen SAC and is screened in for further assessment of potential for likely significant effects to arise through recreational pressure.2. South East of Marcham lies within 2km of Cothill Fen SAC and is screened in for further assessment of potential likely significant effects to arise through recreational pressure. <p>According to data relating to the known hydrological pathways supplying Cothill Fen SAC, both Dalton Barracks and South East Marcham lie outside the hydrological catchment of the SAC.</p>
Category		Number of Dwellings																																										
Housing requirement for the full plan period (Apr 2011 to Mar 2031)		22,760																																										
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	<table><tr><td>Total</td><td>2,020</td></tr></table>		Total	2,020																			
	Total	2,020																					
	South East Vale Sub-Area																						
	<table><tr><th>Settlement / Parish</th><th>Settlement Type</th><th>Site Name</th><th>Number of Dwellings</th></tr><tr><td>Grove</td><td>Local Service Centre</td><td>North West Grove</td><td>400^a</td></tr><tr><td>Harwell Campus</td><td>Larger Village^e</td><td>Harwell Campus</td><td>1,000</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td colspan="3">Total</td><td>1,400</td></tr></table>		Settlement / Parish	Settlement Type		Site Name	Number of Dwellings	Grove	Local Service Centre	North West Grove	400 ^a	Harwell Campus	Larger Village ^e	Harwell Campus	1,000					Total			1,400
	Settlement / Parish	Settlement Type	Site Name	Number of Dwellings																			
	Grove	Local Service Centre	North West Grove	400 ^a																			
	Harwell Campus	Larger Village ^e	Harwell Campus	1,000																			
	Total			1,400																			
	^a																						
^b The allocation at Dalton Barracks has the capacity to deliver considerably more housing, subject to appropriate infrastructure improvements. Housing which is in addition to the 1,200 homes is expected to be delivered after 2031.																							
^c The allocation at North West Grove has the capacity to deliver considerably more housing, subject to appropriate infrastructure improvements. Housing which is in addition to the 400 homes is expected to be delivered after 2031.																							
^d Harwell Campus has services and facilities equivalent to a Larger Village.																							
Core Policy 8b – Dalton Barracks Comprehensive Development Framework	<p>All new development at Dalton Barracks will be guided by a comprehensive development framework.</p> <p>The new housing allocated at Dalton Barracks will be provided to an exemplar standard and following ‘Garden Village’ principles to ensure the potential for highly sustainable and accessible development is fully realised. The new settlement will form a mixed-use community incorporating on-site services and facilities, including new schools, a local centre, providing local opportunities for employment and ensuring excellent public transport, cycle way and footpath connections to Oxford and Abingdon-on-Thames. This development will come forward in accordance with Core Policies 8a and 8b and the Development Template set out in Appendix A.</p> <p>The site is removed from the Oxford Green Belt in accordance with Core Policy 13a. The site area, however, contains a large area of land that will remain within the Oxford Green Belt and any development on this area will be limited to Green Belt-compatible development. This area will include a substantial Country Park, located on the western side of the site that should be planned for as part of the comprehensive development framework.</p> <p>Proposals for development at Dalton Barracks must demonstrate how they contribute</p>																						
<p>Dalton Barracks lies in close proximity (1km) to Cothill Fen SAC.</p> <p>The SAC is vulnerable to effects of recreational pressure that could arise from new development at this location alone, and also when considered in combination with development elsewhere within the Vale.</p> <p>However, the policy does state that:</p> <ul style="list-style-type: none">• The Council will continue to work with...Natural England and other relevant stakeholders to prepare a comprehensive development framework for the site;• the development is in accordance with and makes the necessary contributions to a comprehensive																							

Policy reference	Policy	Likely Significant Effects?
	<p>towards a comprehensive approach to development.</p> <p>The Council will continue to work with the Defence Infrastructure Organisation, Oxfordshire County Council, Natural England and other relevant stakeholders to prepare a comprehensive development framework for the site. Additional guidance will be provided by a comprehensive development framework that will be published as a Supplementary Planning Document and will ensure proposals are considered in the context of a comprehensive approach to the whole site, including:</p> <ul style="list-style-type: none"> i. the development is in accordance with and meets the requirements of a travel plan for the whole site to make the necessary contributions in order to implement sustainable transport initiatives, including minimising car usage and increasing the use of public transport, walking and cycling ii. the development is in accordance with and makes the necessary contributions to a comprehensive landscape plan for the whole site, including the provision of a Country Park of at least 80 hectares iii. in considering proposals for new development and redevelopment it should be demonstrated that there would be no adverse impact on Cothill Fen SAC and protection for the SSSI located to the west of the site, and iv. proposals for buildings and structures (including their extensions) will not unacceptably harm the character and appearance of the surrounding area, taking into account their location, scale, bulk and height. 	<p>landscape plan for the whole site, including the provision of a Country Park of at least 80 hectares; and</p> <ul style="list-style-type: none"> • in considering proposals for new development and redevelopment it should be demonstrated that there would be no adverse impact on Cothill Fen SAC and protection for the SSSI located to the west of the site. <p>The policy clearly indicates that any development at this location will need to be subject to project-level HRA.</p>
Core Policy 16b – Didcot Garden Town	Proposals for development within the Didcot Garden Town Masterplan Area, as defined on the Adopted Policies Map will be expected to demonstrate how they positively contribute to the achievement of the Didcot Garden Town Masterplan Principles	<p>At present, details on the Didcot Garden Town proposals remain to be developed and this policy merely sets out Principles associated with any future development.</p> <p>This location, coupled with other development within the Vale and in the wider area has the potential to lead to increased pressure on Oxford Meadows SAC through reduced air quality resulting from increased traffic utilizing the A34.</p> <p>However, it is noted that further details will be included in a future DPD and SPD relating specifically to this</p>

Policy reference	Policy	Likely Significant Effects?
		development, and at this point it will be appropriate to consider the implications of this in combination with other plans and projects.
Development Policy 16 – Transport Assessments and Travel Plans	<p>Proposals for major development will need to be supported by a Transport Assessment or Statement and Travel Plan in accordance with Oxfordshire County Council guidance, including their Walking and Cycling Design Guide, and the latest National Planning Practice Guidance. The scope of the assessment should be agreed with the County Council as the highway authority, in association with the district council, as the planning authority. Highways England should also be consulted as appropriate, in accordance with Highways England guidance.</p> <p>The Transport Assessment and Travel Plan will need to demonstrate consistency with Core Policy 37: Design and Local Distinctiveness in addition to the sustainable transport priorities identified in Local Plan Part 1 and other relevant Local Plan policies.</p>	<p>This plan promotes sustainable transport and therefore will not lead to a likely significant effect on European sites.</p> <p>There is the potential for the policy to assist in leading to a reduction in air quality on European sites by promoting increased sustainable transport within the district</p>
Development Policy 30 – Protection of Public Rights of Way, National Trails and Open Access Areas	<p>Development on and/or over public rights of way will be permitted where the development can be designed to accommodate satisfactorily the existing route or where the right of way is incorporated into the development site as an attractive, safe and continuous route. Alternative routes will need to be made equally or more attractive, safe and convenient to rights of way users.</p> <p>The Council will actively seek opportunities to improve the accessibility and the addition of new connections and status upgrades to the existing rights of way network, including National Trails. Proposals of this nature will be supported where they would not lead to increased pressure on sensitive sites, such as those of important ecological value.</p> <p>Development will not be permitted where proposals remove, narrow or materially impair the approved line of the Thames Path or Ridgeway National Trails, key connecting routes and/or public access to them.</p>	<p>This policy reflects the council's position on maintaining and protecting public rights of way and seeing to improve access to existing rights of way and National Trails.</p> <p>Increasing access to existing public rights of way and creating new connectors to existing public rights of way may lead to localized increases in recreational activity, which has the potential to increase recreational pressure on European sites such as Cothill Fen SAC.</p> <p>However, the policy does state that proposals of this nature will be supported where they would not lead to increased pressure on sensitive sites, such as those of important ecological value.</p>
Development Policy 32 – Open Space	<p>a. Proposals for major* residential developments will be required to provide or contribute towards safe, attractive and convenient open space in accordance with the open space standards as set out in Appendix F including:</p>	This plan promotes the inclusion of public open green space and outdoor leisure facilities with new housing developments.

Policy reference	Policy	Likely Significant Effects?
	<ul style="list-style-type: none"> • children's Play and youth Provision • public Open Space • allotments. <p>b. Development of open space will only be permitted provided that:</p> <ul style="list-style-type: none"> • when assessed against the Open Spaces Report, it is clearly shown that the Open Space is surplus to requirements; or • the loss resulting from the proposed development would be replaced by equivalent or better provision in terms of scale, quantity and quality in a suitable and accessible location; or • the development is for alternative sports and recreational provision, the needs for which clearly outweigh the loss; or <p>the proposed development is ancillary to the main use of the site and strengthens its public open space function.</p>	<p>With the provision of public open green space and outdoor leisure facilities there is potential to reduce recreational pressure on European sites within and outside the district and therefore have a positive impact on the favourable conservation status of European sites.</p>
Development Policy 33 – Leisure and Sports Facilities	<p>a. New housing developments will be required to provide or contribute towards indoor and outdoor leisure and sports facilities in accordance with the local standards as set out in Appendix F.</p> <p>On sites of major development* financial contributions towards providing or improving off-site provision will be required.</p> <p>b. Development of existing leisure and sports facilities will not be permitted unless it can be demonstrated that:</p> <ul style="list-style-type: none"> i. when assessed against the Leisure Facilities Study, Local Leisure Facilities Study and / or Playing Pitch Study, it is clearly shown that the leisure and / sport facility is surplus to requirements; or ii. the loss resulting from the proposed development would be replaced by equivalent or better provision in terms of scale, quantity and quality in a suitable and accessible location; or 	<p>This plan promotes the creation of leisure facilities. This is unlikely to have a significant effect on European sites in terms of recreational pressure. With the provision of leisure facilities there is the potential to reduce recreational pressure on European sites within the district and therefore have a positive impact on the favourable status of European sites.</p>

Policy reference	Policy	Likely Significant Effects?
	<p>iii. the development is for alternative sports and recreational provision, the needs for which clearly outweigh the loss; or</p> <p>iv. the proposed development is ancillary to the main use of the site and strengthens its function. * As defined by Development Management Procedure Order 2010.</p>	
Development Policy 34 - New Countryside Recreation Facilities	<p>Development proposals for small scale countryside recreational facilities will be supported, provided that:</p> <ul style="list-style-type: none"> i. it does not harm the North Wessex Downs Area of Outstanding Natural Beauty and/or its setting ii. it is consistent with Core Policy 13: Green Belt iii. it does not adversely impact on heritage assets iv. it is located within good access to public transport and will not impact on the existing Public Rights of Way Network v. it respects the settlement character, locality and intrinsic beauty vi. it does not harm the ecology of the area. 	<p>This plan promotes the creation of commercial leisure facilities and countryside recreational facilities. This is unlikely to have a significant effect on European sites in terms of recreational pressure. With the provision of commercial and countryside leisure facilities there is the potential to reduce recreational pressure on European sites within the district and therefore have a positive impact on the favourable status of European sites.</p> <p>In theory new development within catchment areas of water sensitive European sites could give rise to changes in surface and groundwater flows and increased pollution through run off but the policy does include the provision that they will not be permitted unless they do not have a detrimental effect upon the landscape or ecology of the area. Therefore new countryside recreational facilities are unlikely to have a significant effect on European sites.</p>

- 4.1.3. In summary, it has been concluded that three policies (Core Policy 4a, Core Policy 8a and Core Policy 15a) cannot be dismissed as being unlikely to lead to significant effects on Cothill Fen SAC or Oxford Meadows SAC, without further analysis (appropriate assessment). This is because three policies govern the delivery of housing and employment growth within Vale of White Horse generally and/or within the vicinity of the two designated sites. The appropriate assessment is presented in Chapters 7 and 8 of this report.

5. Likely Significant Effects: Hackpen Hill SAC

5.1 Introduction

- 1.1.1. This unimproved chalk grassland site lies on the Middle Chalk and has all aspects and a wide range of slope-gradients represented. It has well-drained, silty soils of the Wantage 1 Series, with the thinner soils of the upper slopes containing a high proportion of large chalk nodules.
- 1.1.2. Hackpen Hill has slopes with a wide variety of aspect and gradient. Most of the grassland is dominated by red fescue *Festuca rubra*, but this is replaced by upright brome *Bromus erectus* on some middle and lower slopes. The herb flora includes horseshoe vetch *Hippocrepis comosa*, common rockrose *Helianthemum nummularium*, dwarf thistle *Cirsium acaule*, autumn gentian *Gentianella amarella*, fragrant orchid *Gymnadenia conopsea* and frog orchid *Coeloglossum viride*. An enclosed, ungrazed strip on Hackpen Down contains hawthorns and elder scrub, interspersed with upright brome grassland and herbs including sainfoin *Onobrychis viciifolia* and basil thyme *Acinos arvensis*.
- 1.1.3. Hackpen Hill SAC lies around 4km to the south-west of Wantage, within the Vale of White Horse district.

5.2 Features of European Interest

- 1.2.1. The site is designated as a SAC for its:
 - Dry grasslands and scrublands on chalk or limestone
 - Early gentian

5.3 Condition Assessment

- 1.3.1. The Conservation Objectives for the European interests on the SSSI are, subject to natural changes:
 - to maintain¹⁹, in favourable condition, the habitats of European importance.
- 1.3.2. During the most recent Condition Assessment process (May 2008), the site was in favourable condition.
- 1.3.3. From examination of the UK Air Pollution System (www.apis.ac.uk) it can be seen (Table 4) that the SAC is currently suffering from poor air quality. Hackpen Hill SAC currently exceeds the minimum critical load for nitrogen deposition.
- 1.3.4. The Site Improvement Plan for Hackpen Hill²⁰ indicates that no current issues affecting the Natura 2000 feature(s) have been identified.

¹⁹ maintenance implies restoration if the feature is not currently in favourable condition

²⁰ <http://publications.naturalengland.org.uk/publication/5938642669273088>

5.4 Key Environmental Conditions

- 1.4.1. This site is a well-drained hill and therefore water resource and water quality issues are not relevant as key environmental conditions. The key environmental conditions that support the features of European interest are:
- Appropriate management: grazing.
 - Minimal air pollution.
 - Absence of direct fertilisation.

5.5 Potential Effects of the Plan

- 1.5.1. Two potential effects of the LPP2 upon the SAC have been identified:
- Recreational pressure
 - Air quality

Recreational Pressure

- 1.5.2. The HRA of the Local Plan 2031 Part 1 was able to conclude no likely significant effect on Hackpen Hill SAC through recreational pressure.
- 1.5.3. The site is managed by cattle grazing. The site contains features that would be susceptible to increased recreational impact through direct fertilisation (dog fouling) and possibly via trampling. However, excessive rabbit grazing is currently more of a risk than trampling. Small-scale scattered erosion (as might arise from limited off-track movement) is not a negative impact since it creates niches for colonisation by early gentian, horseshoe vetch etc.
- 1.5.4. In the absence of specific data regarding the recreational catchment of Hackpen Hill SAC or the recreational behaviour of local residents regarding this type of site, we have taken as a proxy the figure of 4-5km which has been identified as the core recreational catchment for a wide range of other European sites.
- 1.5.5. Using this distance, Wantage is the only large settlement that lies within relatively close proximity to the SAC. However, although the settlement lies just within 5km of the SAC as the crow flies (as does the development North West of Grove), it is a considerably longer distance by road. Moreover, the closest area where people can park to access the site is on the Ridgeway at Sparsholt Firs, but this is over 600m from the SAC and requires traversing the ridgeway and a muddy footpath. This again naturally limits the accessibility of the site. There is only informal off road parking here which would accommodate approximately 30 cars. Hackpen Hill SAC is a site that is visited for its own intrinsic features by people (including holidaymakers) undertaking substantial walks cross-country, rather than being used as a convenient piece of local greenspace for dog walking etc. by large numbers of residents from nearby towns.
- 1.5.6. In practice therefore, it is very likely that the majority of regular local resident visitors derive from the small settlements very close to the SAC. In addition, the number of available parking spaces inherently limits the number of vehicle-based visitors who can use the site; given the distances involved, visitors deriving from Wantage are bound to arrive at site by car. Given this, the delivery of dwellings at a distance greater than 5km from the SAC would be likely to have a very limited effect on actual regular visitor activity within the SAC.

Other Plans and Projects

- 1.5.7. Although there will be population increases in neighbouring districts (currently committed or projected as 22,840 new dwellings in Cherwell, 9,132 in Oxford, 17,050 in South Oxfordshire, up to 10,500 in West Oxfordshire, 22,000 in Swindon, 8,400 in the Cotswold District and 920 in the Marlborough Area of Wiltshire) these all lie well outside the probable core recreational catchment of the SAC²¹. West Berkshire, where 10,500 new dwellings are allocated under their Core Strategy, does lie within 5km of the SAC, however, no major settlements occur within this distance.

Air Pollution

- 1.5.8. The HRA of the Local Plan 2031 Part 1 was able to conclude no likely significant effect on Hackpen Hill SAC through reduced air quality.
- 1.5.9. The site is sensitive to air pollution, and modelling results suggest that the SAC is currently experiencing deposition rates exceeding the 'critical load' of this habitat for nitrogen deposition.
- 1.5.10. The closest road to the SAC is the B4001, but this lies 300m from the site at its closest, which is outside the distance from which vehicle exhaust emissions may be contributing to local nitrogen deposition. Coupled with the minor nature of this road and the fact that the SAC is physically situated above the road which will further limit the dispersal of pollution, it is highly unlikely that any increases in traffic flows resulting from development proposed in this Local Plan Part 2 document would have a significant effect upon the qualifying interest of the SAC as a consequence of air pollution. As previously stated in 6.5.5 the closest housing site is North West of Grove.
- 1.5.11. No avoidance or mitigation measures are therefore required with regards to air quality impacts of the Local Plan Part 2 Submission document on Hackpen Hill SAC. No 'in combination' assessment is required since local air quality from road traffic has been ruled out as an impact pathway.

Conclusion

- 1.5.12. Issues of recreational pressure and air quality have been considered in relation to impacts of the Local Plan 2031 Part 2 document on the Hackpen Hill SAC. It is possible to conclude that likely significant effects will not arise on the Hackpen Hill SAC as a result of development within the Vale of White Horse District under the Local Plan Part 2 and no mitigation is needed to draw this conclusion.

²¹ Figures subject to change based on emerging Local Plans/ Core Strategies, and emerging Oxfordshire SHMA.

6. Likely Significant Effects: Little Wittenham SAC

6.1 Introduction

- 2.1.1. This site supports one of the largest known breeding populations of great crested newt *Triturus cristatus* in the UK. The site also supports an outstanding breeding assemblage of amphibians, which include smooth newt, common frogs and common toads, and of dragonflies and damselflies.
- 2.1.2. The calcareous flushes in the woodland have extensive deposits of tufa and support a specialized invertebrate fauna which includes a number of rare species. These include the soldier flies *Oxycera analis* and *O. pardalina*.
- 2.1.3. The woodland ponds and streams support a wide diversity of dragonflies and damselflies. A total of 16 species are known to breed on the site including the brown hawkler *Aeshna grandis*, migrant hawkler *A. mixta*, emperor dragonfly *Anax imperator* and ruddy darter *Sympetrum sanguineum*.
- 2.1.4. Additional aquatic habitat is provided by a backwater of the River Thames which provides suitable conditions for the white-legged damselfly *Platycnemis pennipes*, club-tailed dragonfly *Gomphus vulgatissimus* and red-eyed damselfly *Erythromma najas*. The associated riverine woodland supports the Loddon lily *Leucojum aestivum*.
- 2.1.5. The nationally scarce plant greater dodder *Cuscuta europaea* is regularly seen growing parasitically on nettle *Urtica dioica* alongside the River Thames.
- 2.1.6. The site is approximately 6km south-east of Abingdon-on-Thames, less than 4km from Didcot, and less than 3km from the district boundary.

6.2 Features of European Interest

- 2.2.1. The site is designated as a SAC for its:
 - Great crested newt populations.

6.3 Condition Assessment

- 2.3.1. The Conservation Objectives for the European interests on the SSSI are, subject to natural changes:
 - to maintain²², in favourable condition, the species of European importance.
- 2.3.2. During the most recent Condition Assessment process (October 2010), the entire site was in favourable condition.
- 2.3.3. From examination of the UK Air Pollution System (www.apis.ac.uk) it can be seen (Table 4) that the SAC is currently suffering from poor air quality. Little Wittenham SAC currently exceeds the minimum critical load for nitrogen deposition.
- 2.3.4. The Site Improvement Plan for Little Wittenham²³ indicates the following threats that, at the least, are identified as requiring investigation:

²² maintenance implies restoration if the feature is not currently in favourable condition

- Invasive species; and
- Public access and disturbance.

6.4 Key Environmental Conditions

2.4.1. The key conditions that support the features of European interest are:

- Suitable foraging and refuge habitat within 500m of the pond.
- Relatively unpolluted water of roughly neutral pH.
- Some ponds deep enough to retain water throughout February to August at least one year in every three.
- In a wider context, great crested newts require good connectivity of landscape features (ponds, hedges etc) as they often live as metapopulations in a number of ponds.

6.5 Potential Effects of the Plan

2.5.1. Recreational pressure has been discounted as an impact pathway as the site is several kilometres from any developments proposed under the VoWH LPP2. Great crested newts are not particularly sensitive to recreational pressure. Natural England considered that 100% of the site was in favourable condition in 2010. The Earth Trust manages public access to limit access to the SAC and directs visitors instead to the Wittenham Clumps and other land within its ownership. Water resource impacts have been discounted because there is not abstraction for the Public Water Supply in Vale of White Horse from the Little Wittenham pools. Air quality has been discounted because no significant roads lie within 200m of the SAC. Little Wittenham SAC is sensitive to water quality, as it relies on unpolluted water. As it lies adjacent to the River Thames, any pollution events upstream could affect the integrity of the site if flooding is possible. The upstream Thames forms the eastern boundary of the Vale of White Horse, and flows past Abingdon-on-Thames and Oxford. However, the LPP2 does not propose any site allocations or areas of search whereby surface water pollution into the Thames flowing past the SAC is a realistic risk.

6.6 Conclusion

- 2.6.1. It is possible to conclude that likely significant effects on the Little Wittenham SAC as a result of development within the Vale of White Horse District under the LPP2 documents will not occur and no mitigation is needed to draw this conclusion.
- 2.6.2. The next two chapters of this report present a detailed consideration (appropriate assessment) of impacts on Cothill Fen SAC and Oxford Meadows SAC.

²³ <http://publications.naturalengland.org.uk/publication/6567758347108352>

7. Appropriate Assessment: Cothill Fen SAC

7.1 Introduction

- 7.1.1. Cothill Fen supports outstanding examples of nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats. It is one of a number of nationally important sites where the vegetation of the area over the past ten millennia can be interpreted from peat samples. Cothill Fen exhibits succession from open water to fen, scrub and carr, together with an adjacent area of ancient woodland. Plant distribution varies in conjunction with differences in water table, canopy cover, peat depth, soils and historical factors such as peat cutting and attempts at drainage. Over 330 vascular plants have been recorded, including species which are uncommon in southern England, together with many uncommon invertebrates. The site is located approximately 2km to the north west of Shippon on the edge of Abingdon-on-Thames.

7.2 Features of European Interest²⁴

- 7.2.1. The site is designated as a SAC for its:
- Calcium-rich, spring-water-fed fens; and
 - Alder woodland on floodplains

7.3 Conservation objectives

- 7.3.1. The Conservation Objectives for the European interests on the SSSI are, subject to natural changes:
- To maintain²⁵, in favourable condition, the habitats of European importance.
- 7.3.2. During the most recent Conditions Assessment process (May, 2009), 65% of the site was in favourable condition with the remainder recovering from unfavourable status. This latter specifically related to the Parsonage Moor component which was previously unfavourable due to lack of management and low water levels.
- 7.3.3. From examination of the UK Air Pollution System (www.apis.ac.uk) it can be seen (Table 6) that the SAC is currently suffering from poor air quality. Cothill Fen SAC currently exceeds the minimum critical load for nitrogen deposition.
- 7.3.4. The Site Improvement Plan for Cothill Fen²⁶ indicates the following threats that, at the least, are identified as requiring investigation:
- Hydrological changes;
 - Water pollution; and
 - Air pollution.

²⁴ Features of European Interest are the features for which a European site is selected. They include habitats listed on Annex 1 of the Habitats Directive, species listed on Annex II of the EC Habitats Directive and populations of bird species for which a site is designated under the EC Birds Directive.

²⁵ Maintenance implies restoration if the feature is not currently in favourable condition.

²⁶ <http://publications.naturalengland.org.uk/publication/6482436405854208?category=4981459005734912>

7.4 Key environmental conditions

- 7.4.1. The key environmental conditions that support the features of European interest are:
- High water table;
 - Good water quality;
 - Appropriate grazing regime; and
 - Calcareous, base-rich water supply.

7.5 Potential effects of the plan

- 7.5.1. Three potential effects of the Local Plan 2031 Part 2 document upon the SAC have been identified;
- Air Quality
 - Recreational Pressure
 - Hydrology

Hydrology

- 7.5.2. Consultation with Natural England has raised queries regarding potential for effects of the LPP2 on the SAC through hydrological pressures. These are discussed below.
- 7.5.3. Cothill Fen SAC is one of the few European sites for which a digital hydrological catchment is known²⁷ (see Figure 4 below).

²⁷ This was sourced in 2014 from Natural England's Nature on the Map portal, which no longer exists. Consultation with Natural England has determined that this catchment area is considered to remain valid.

Piotr Behnke (31/08/17) – "I've now been able to catch up with my colleague who is responsible for the SSSI at Cothill Fen SAC and have been informed of a report from 2016 entitled "Eco-hydrological assessment of the risks to the long-term integrity of Cothill Fen SAC, Oxon". This includes a diagram which shows an extent for the hydrological catchment however this appears to effectively be based upon the 1978 work carried out by Peter Morris and we aren't aware of any more up to date catchment work at this time (unless the SFRA is currently doing this). Unfortunately we don't have a GIS file for this catchment.

I've attached a link which should download the report in question from our records management system - Eco-hydrological assessment of the risks to the long-term integrity of Cothill Fen SAC, Oxon. The hydrological catchment diagram in question can be found on page 22 of the report.

Having looked at both of the catchments the original one which was used as part of the LPP1 covers a slightly larger area (mainly to the north and east) so in being precautionary we would prefer that this were used with regard to assessing the potential impacts of LPP2 allocations."

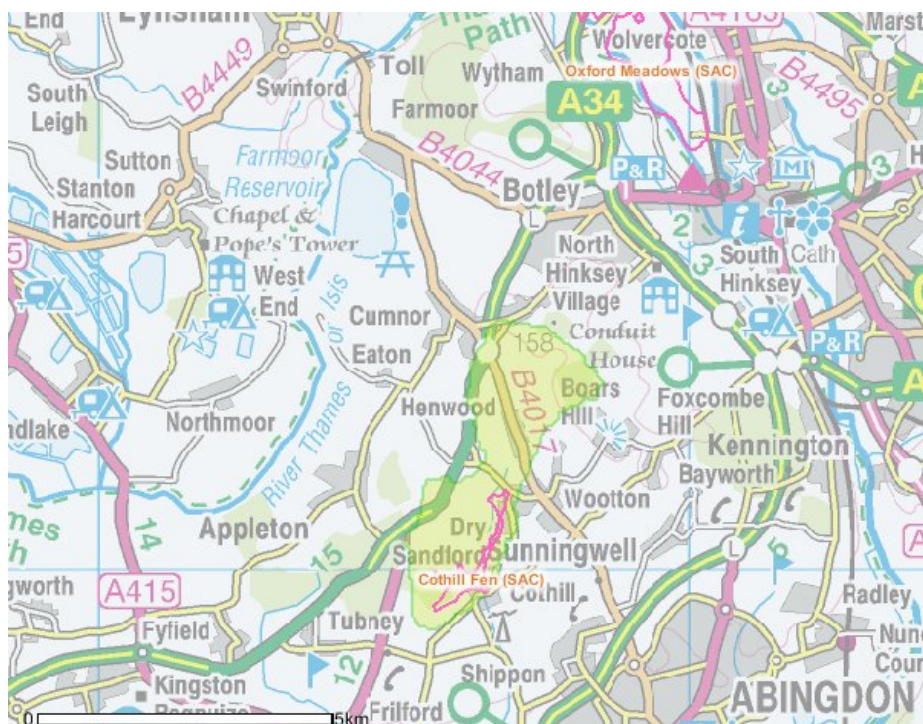


Figure 4 Approximate hydrological catchment for Cothill Fen SAC

- 7.5.4. A detailed examination of impacts on the hydrology of Cothill Fen from surrounding development would require a level of detail regarding the detailed design and construction for each development that is not available prior to planning applications being developed. Development proposals within the zone highlighted in Figure 4 should therefore undertake project-level HRA that will need to demonstrate that no interference with groundwater flows to the SAC would be created by the footprint of the development and that no localised run-off or pollution sources would occur that would lead to reduction of water quality in the SAC. In any event, the LPP2 does not make any site allocations within this zone.
- 7.5.5. The site allocation closest to the SAC and the known hydrological catchment is Dalton Barracks. Studies undertaken specifically to inform planning for development on Dalton Barracks have demonstrated that it is very unlikely that surface or shallow sub-surface flows from the development footprint would occur into the catchment of the SAC and nearby SSSIs within the same catchment²⁸. Surface water flows from the proposed development were modelled and it was found that *“the majority of surface flow would drain towards the Wildmoor Brook in an easterly to southerly direction.”* No flows were found to occur in the direction of the SAC. It was also determined that it is very unlikely for groundwater from the development site to interact with the Cothill Fen designated areas. The report states that *“it can still be determined that it is very unlikely for groundwater from the development site to interact with the Dry Sandford Pit or Cothill Fen designated areas. This is due to the fact that these designated areas at a higher elevation than the majority of the development site and due to the lateral distance between these designated areas and the development area.”*
- 7.5.6. No other plans and projects have been identified other than LPP2 which would deliver development within the hydrological catchment of the SAC. Therefore, it

²⁸ Dalton Barracks SSSI Hydrological Assessment (January 2017) . Carter Jonas.

can be concluded that no adverse effects on the integrity of Cothill Fen SAC would arise from LPP2 through hydrological pathways.

Air Quality

- 7.5.7. The site allocation at Dalton Barracks (proposed to accommodate 1,200 dwellings to 2031, with the potential for more thereafter), coupled with the allocation at South East of Marcham (90) is likely to lead to increased vehicular movements in the local area. However, the main routes for vehicular traffic will not be the country lanes around Cothill Fen but the major roads (e.g. A34) to the east that provide commuter links.
- 7.5.8. There is an expectation that significant increases in vehicular movements within 200m of Cothill Fen SAC are unlikely, and it is therefore considered unlikely that any air quality impact on Cothill Fen will arise. This is supported by flow data (see Appendix A) provided by Atkins traffic modellers at the request of Natural England. These data confirm that:
- Total flows (as Annual Average Daily Traffic) on the roads within 200m of Cothill Fen SAC are fairly low. Even allowing for all expected traffic growth to 2031 no road within 200m of the SAC has two-way flows exceeding 8,000 AADT and most are in the region 3,000 AADT to 6,000 AADT;
 - The contribution of growth in LPP2 to two-way flows on the network within 200m of the SAC is very small, being less than 200 AADT on all roads and, for many links, less than 100 AADT.
- 7.5.9. Moreover, neither of the two habitats for which the SAC is designated is highly sensitive to nitrogen deposition (which is the main potential effect of traffic exhaust emissions on vegetation). The Air Pollution Information System indicates that alluvial forests are not sensitive and that alkaline fens are only sensitive to atmospheric nitrogen at deposition rates above 15-30 kgN/ha/yr. The current average deposition rate at the SAC only slightly exceeds the lower numeral (being 15.58 kgN/ha/yr) and improvements in vehicle emission factors over the plan period due to the further deployment of the Euro 6/VI emissions standard are likely to result in a continued reduction in traffic NOx emissions (and thus oxidised nitrogen deposition rates) notwithstanding growth in the actual volume of traffic. This is already visible from existing APIS trends for the 5km grid square within which the SAC is situated which show that oxidised nitrogen deposition rates²⁹ dropped from 7 kgN/ha/yr in 2005 to 4 kgN/ha/yr in 2015.
- 7.5.10. As a result, air quality impacts on Cothill Fen SAC from traffic generally and LPP2 in particular, will not result in adverse effects on integrity either alone or in combination with other plans and projects.

Other Plans and Projects

- 7.5.11. Housing and employment growth in surrounding local authorities (Cherwell, Oxford, West Oxfordshire, South Oxfordshire and further afield) has already been considered in the AADT figures reported above. There are proposals for Park & Ride (P&R) schemes at Cumnor and Lodge Hill. Whilst Core Policy 12a of the LPP2 seeks to safeguard land for such purposes (i.e. preventing it from being subject to conflicting development use), the P&R schemes themselves are not committed to in the LPP2, or in LPP1. Lodge Hill is on the western side of the A34, approximately 3.5km from Cothill Fen, and would be likely to serve as a major public transport link between Dalton Barracks and employment sites to

²⁹ Oxidised nitrogen derives from combustion sources and is therefore the main form of nitrogen affected by traffic. This is in contrast to reduced nitrogen, which is associated with ammonia emissions and is heavily influenced by agriculture.

the east of Oxford. Cumnor is closer to the SAC, lying 2.2km north of the SAC and accessible via Wootton which lies adjacent to the SAC. For any future plans for the P&R, it would be advisable to undertake transport modelling studies of the effect on Cothill Fen SAC. It would be expected that the county council's Local Transport Plan, which is subject to its own HRA, would include this assessment. The same considerations would apply to safeguarding of land for a bypass south of Marcham, as outlined in Core Policy 12a. Ultimately, the project-specific HRA for Dalton Barracks (where transport and air quality modelling is recommended), would need to take schemes such as relevant P&Rs and road schemes into consideration.

Recreational Pressure and Urbanisation

- 7.5.12. The LPP1 allocates 20,560 new dwellings to be delivered over the lifetime of the Local Plan (to 2031), with 12,495 to be delivered through strategic allocations and a further 1,000 to be determined, potentially through the LPP2. The LPP2 allocates seven sites to deliver the remaining needs for the district and also to meet the agreed 2,200 dwellings apportionment of un-met housing need for Oxford City.
- 7.5.13. In undertaking the HRA of the LPP1, strategic housing locations were assessed for potential likely significant effects on Cothill Fen SAC, with a conclusion that none, either alone or 'in combination' was likely to lead to significant adverse effects.
- 7.5.14. At present, up to 1,290 houses to be delivered via the LPP2 could lie within 2km of Cothill Fen SAC.
- 7.5.15. Cothill Fen comprises terrain that on the whole is of an inaccessible nature away from designated paths. A site visit indicated that at Parsonage Moor the habitat is extremely wet off-path, whilst footpaths through other parts of the SAC are lined by dense growth of reedbeds. The SAC is part designated for its 'alder woodland on floodplains' and theoretically in places visitors and dogs could stray from the designated paths into this habitat.
- 7.5.16. However, access overall is limited by a minimal number of off-road parking spaces (approximately 10-15 at Cothill, close to Parsonage Moor and only 3-4 at Lashford Lane), though parking on residential streets and other public areas is possible. The majority of access is however likely to be through walking or cycling. Where footpaths exist at Parsonage Moor and Lashford Lane, off-path access is restricted in places by fencing, whilst Parsonage Moor has signs and gates/stiles restricting access for dog walkers. Parsonage Moor also lacks a circular walk, with only a small section of board walk over marshy ground which again limits the number of people likely to enter the Fen.
- 7.5.17. Part of the SAC is a National Nature Reserve so access is managed. Natural England and the Oxford Conservation Volunteers undertake footpath management/improvement specifically to ensure that people are discouraged from travelling 'off-track'.
- 7.5.18. Moreover, under-grazing and a lack of trampling appear to have historically been more of a problem at this site than excessive trampling. Recreational pressure is not recognised as a threat to the site under its Site Improvement Plan.
- 7.5.19. In addition to the National Nature Reserve, parts of the SAC are also Berkshire, Buckinghamshire & Oxfordshire Wildlife Trust (BBOWT) reserves (Parsonage Moor and Lashford Lane).
- 7.5.20. Nonetheless, BBOWT have identified that dog walking, dogs off leads, dog fouling and scaring of livestock do contribute to management difficulties on

nature reserves including those at Cothill Fen. They have expressed an opinion regarding the site allocation at Dalton Barracks that *“signage and fencing have limited effects on deterring people and... [we] are unconvinced that increased visitor numbers will be able to be fully mitigated through management.”* Therefore, mitigation for recreational pressure on the SAC from development at Dalton Barracks will depend on the *“quantum of development, the masterplanning, the creation of green infrastructure links, and the design of the space.”* BBOWT have expressed a willingness to assist in the masterplanning process, and it is recommended that partnership working should take place in order to provide confidence that the delivery of the allocation is able to avoid likely significant effects on Cothill Fen SAC through increased recreational pressure.

- 7.5.21. New development at Dalton Barracks (Core Policies 4a, 8a and 8b) and South East of Marcham (Core Policies 4a and 8a) should be required to provide details, in line with LPP1 CP45 (Green Infrastructure), of how the project will deliver accessible natural greenspace, or where this is not possible, how it will contribute to *“the delivery of new Green Infrastructure and/or the improvement of existing assets”*. Such greenspace will provide added confidence that residents of the development can be recreationally self-sufficient without needing to place an undue burden on the few parts of Cothill Fen SAC that are potentially vulnerable to a significant increase in recreation. Given the proximity of the Dalton Barracks site to the SAC it will also be a useful precaution that any green infrastructure delivery or contribution fulfils the criterion of *“at least one accessible 20 hectare site within two kilometres of home”* and that this be in addition to Cothill Fen SAC.
- 7.5.22. Core Policy 8b does provide details of project-specific measures that will aid in mitigating any potential effects of development at Dalton barracks on the SAC. These include:
- The Council will continue to work with...Natural England and other relevant stakeholders to prepare a comprehensive development framework for the site;
 - The development is in accordance with and makes the necessary contributions to a comprehensive landscape plan for the whole site, including the provision of a Country Park of at least 80 hectares; and
 - In considering proposals for new development and redevelopment it should be demonstrated that there would be no adverse impact on Cothill Fen SAC and protection for the SSSI located to the west of the site.
- 7.5.23. The most stringent standards applied by Natural England (relating to housing in the vicinity of the Thames Basin Heaths SPA) to the provision of Strategic Alternative Natural Greenspace (SANG)³⁰ are:
- “Where mitigation is provided in the form of SANG, the following standards and arrangements will apply:*
- A minimum of 8 hectares of SANG land (after discounting to account for current access and capacity) should be provided per 1,000 new occupants.”*
- 7.5.24. Over the Plan period, the Dalton Barracks site allocation would be expected to provide 1,200 new dwellings, which based on an average household size of 2.3 persons³¹ would be expected to attract 2,760 new residents. This would then lead to an expectation of a need for SANG of at least 22ha. Natural England

³⁰ file:///C:/Users/37105gd/Downloads/Thames_Basin_Heaths_Special_Protection_Area_Strategy_2009_-_2016.pdf

³¹ <https://www.ons.gov.uk/.../populationandhouseholdestimatesfortheunitedkingdom/20...>

guidance would suggest that SANG of such size would be valid for deflecting recreational pressure from development up to 5km away. It is therefore likely that, coupled with effective site management, the provision of a country park of at least 80ha will be able to incorporate sufficient areas of SANG to deflect users of Dalton Barracks from Cothill Fen SAC. In so saying, it should be made clear that the SANG area and location is not the only consideration, the SANG must also be of a nature that is likely to attract visitors to utilise it rather than the nearby SAC. In this case, it must therefore create a feeling for users of being in rural, undisturbed countryside, and be suitable for walking and dog walking.

Other Plans and Projects

- 7.5.25. Although there will be population increases in neighbouring districts (currently committed or projected as 22,840 new dwellings in Cherwell, 9,132 in Oxford, 17,050 in South Oxfordshire, 10,500 in West Oxfordshire, 22,000 in Swindon, 8,400 in the Cotswold District, 10,500 in West Berkshire, and 920 in the Marlborough Area of Wiltshire) these all lie well outside the probable core recreational catchment of the SAC³². The VoWH LPP1 has allocated a strategic housing delivery target of 12,495 new dwellings. 1,000 new dwellings north and north-west of Abingdon-on-Thames were included in this apportionment, and these also lie within 2km of Cothill Fen SAC. However these developments would lie east of the A34, and the LPP1 has been subject to HRA where it was concluded that the allocations were unlikely to contribute to significant numbers of visitors to the SAC, being of sufficient distance away that alternative and more easily accessible SANG would be more likely to be utilised.
- 7.5.26. In consultation on the Local Plan 2031 Part 1, Natural England requested in their consultation response of 17/06/10 on the previous versions of the Core Strategy that they would like to see that adequate green infrastructure is provided with all of the new development sites in line with Accessible Natural Greenspace Standards (ANGSt) to ensure that this is readily accessible for residents close to their homes.
- 7.5.27. Policy 35 within the LPP1 (Green Infrastructure) does state that “*proposals for new development must provide adequate Green Infrastructure in line with Accessible Natural Greenspace Standards (ANGSt). Applications must be accompanied by a statement demonstrating that they have taken into account the relationship of the proposed development to existing Green Infrastructure and how this will be retained and enhanced...*”
- 7.5.28. The Council has produced a Green Infrastructure Audit which includes an assessment against relevant ANGst standards. The audit identifies a deficit which will be addressed through a forthcoming county-wide GI Strategy. The supporting text to LPP1 Core Policy 45 does indicate that the Council is working with partners (including statutory agencies) in order to produce a Green Infrastructure Strategy. The Council are currently working in partnership with South Oxfordshire to facilitate the production of a joint GI strategy alongside publication of the VoWH LPP2.
- 7.5.29. In the context of this GI strategy it will be important for development proposals at Dalton Barracks and at South East of Marcham to deliver greenspace planning that integrates with strategic greenspace provision, including that for development north of Abingdon-on-Thames. It will need to be demonstrated that sufficient provision and location of greenspace can be delivered to effectively deflect recreational pressure away from Cothill Fen SAC. The greenspace provision should take into account Natural England guidance on the size and proximity of SANG in relation to new development and European sites.

³² Figures subject to change based on emerging Local Plans/ Core Strategies, and emerging Oxfordshire SHMA.

Conclusion

- 7.5.30. In conclusion, while the risk is considered significantly lower than for other sites that do not have inherent limitations on accessibility, it is possible that additional housing at locations in close proximity to Cothill Fen SAC could, prior to mitigation, lead to adverse effects on the integrity of the SAC through recreational pressure. However, development at Dalton Barracks and South East of Marcham would be deliverable provided that proposals are able to demonstrate through project-level HRA that this pathway of impact can be avoided or mitigated. It is considered that the policy framework set by LPP2 (and the broader context of LPP1) is sufficient to enable these measures (including a Country Park of at least 80ha in area) to be required and brought forward. Therefore, it is considered that the plan will not result in adverse effects on the integrity of the SAC.

8. Appropriate Assessment: Oxford Meadows SAC

8.1 Introduction

- 8.1.1. Port Meadow is a classic site for studying the effects of grazing on plant communities. The site consists of a series of neutral grasslands situated in the Thames floodplain. Despite the generally low species-diversity of Port Meadow compared with adjoining hay fields a total of 178 flowering plants have been recorded. These include the Red Data Book species creeping marshwort *Apium repens*, for which Port Meadow is now one of only two sites in Britain.
- 8.1.2. Wolvercote Meadows, bordering the River Thames consists of unimproved and semi-improved neutral grassland that continues to be managed traditionally for hay and pasture and support a rich flora. Pixey and Yarnton Meads are unimproved floodplain meadows on alluvium over calcareous gravel on the first terrace bordering the River Thames and are internationally renowned. They are amongst the best remaining examples of neutral grassland in lowland England. Cassington Meadows are a cluster of neutral hay meadows and fen, which are surviving remnants of semi-natural vegetation in an area now characterised by intensive arable farming and gravel extraction. Oxford Meadows SAC is adjacent to the north-eastern boundary of Vale of White Horse district.

8.2 Features of European Interest

- 8.2.1. The site is designated as a SAC for its:
- Lowland hay meadows
 - Creeping marshwort

8.3 Condition Assessment

- 8.3.1. The Conservation Objectives for the European interests on the SSSI are, subject to natural changes:
- to maintain³³, in favourable condition, the habitats and species, of European importance.
- 8.3.2. During the most recent Condition Assessment process, all of the site was in favourable condition.
- 8.3.3. From examination of the UK Air Pollution System (www.apis.ac.uk) it can be seen (Table 4) that the SAC is not currently suffering from poor air quality.
- 8.3.4. The Site Improvement Plan for Oxford Meadows³⁴ indicates the following threats that, at the least, are identified as requiring investigation:
- Hydrological changes; and
 - Invasive species.
- 8.3.5. The Site Improvement Plan does not specifically identify recreational pressure or air quality as a significant current or expected future threat; although that

³³ maintenance implies restoration if the feature is not currently in favourable condition

³⁴ <http://publications.naturalengland.org.uk/publication/4942743310696448>

does not mean that no risk is presented via either pathway. However, they are clearly not the main focus of concern.

8.4 Key Environmental Conditions

8.4.1. The key conditions that support the features of European interest are:

- Maintenance of traditional hay cut.
- Maintenance of light aftermath grazing.
- Minimal air pollution.
- Absence of direct fertilisation.
- Balanced hydrological regime –alteration to adjacent rivers may alter flooding regime and reduce botanical diversity.
- Absence of excessive nutrient enrichment of floodwaters

8.5 Potential Effects of the Plan

8.5.1. Three potential effects of the LPP2 document upon the SAC have been identified. In this case, the assessment of recreational pressure and air quality is inherently ‘in combination’ as (unlike Cothill Fen) plans and projects outside Vale of White Horse will be significant sources of both impacts.

Recreational Pressure

8.5.2. The site contains features that would be susceptible to increased recreational impact through direct fertilisation (dog fouling) and possibly via trampling. According to the HRA of the Cherwell Core Strategy ‘*Oxford Meadows SAC is a popular place for walking, particularly for residents of and visitors to Oxford*’³⁵. A visitor survey undertaken during October 2011 by Oxford City Council to inform the Oxford Sites and Housing DPD identified that over 80% of visitors to the SAC live within 5km of the site. The majority of respondents (82%) indicated that they were residents of Oxford with only 4% being resident in other parts of Oxfordshire. Those settlements within Vale of White Horse from which visitors originated were Kennington, Botley, North Hinksey and Wytham. However, considerably less than 4% of visitors to the SAC derived from these settlements.

8.5.3. The distance between even the closest housing proposed in the Vale of White Horse Local Plan 2031 Part 2 and the Oxford Meadows SAC is in excess of 5km and thus outside the core catchment from within which 80% of visitors derive. As such, it is considered that visitors from the housing locations outlined in the LPP2 are unlikely to significantly contribute to recreational pressure at the site.

Other Plans and Projects

8.5.4. It is clear from this survey that visitor pressure on the SAC stems almost entirely from Oxford, with other settlements making a negligible contribution even ‘in combination’. This is particularly the case since the LPP2 allocations in Vale of White Horse lie outside the 5km core catchment of the SAC. Oxford City has an adopted Core Strategy which plans to deliver over 9,000 dwellings between 2011 and 2026 while Oxford City’s Preferred Options Local Plan consultation (June 2017) indicated a likely provision of 8,000 new dwellings between 2016 and 2036.

8.5.5. LPP1 Core Policy 45 (Green Infrastructure) does state that “*proposals for new development must provide adequate Green Infrastructure in line with Accessible*

³⁵ [http://www.cherwell.gov.uk/media/pdf/o/5/Habitats_Regulations_Assessment_\(Stage_1\)_of_Options_for_Growth_-_Consultation_on_Directions_of_Grow.pdf](http://www.cherwell.gov.uk/media/pdf/o/5/Habitats_Regulations_Assessment_(Stage_1)_of_Options_for_Growth_-_Consultation_on_Directions_of_Grow.pdf)

Natural Greenspace Standards (ANGSt). Applications must be accompanied by a statement demonstrating that they have taken into account the relationship of the proposed development to existing Green Infrastructure and how this will be retained and enhanced...

- 8.5.6. The Council has produced a Green Infrastructure Audit which includes an assessment against relevant ANGst standards. The audit identifies a deficit which will be addressed through a GI Strategy produced by VoWH and South Oxfordshire, and which will be published alongside the VoWH LPP2.
- 8.5.7. It is therefore concluded that no adverse effect on integrity will result from Vale of White Horse LPP2 on Oxford Meadows SAC through the pathway of recreational pressure either alone or as part of an 'in combination' effect.

Air Quality

- 8.5.8. The increase in development proposed within the VoWH LPP1 and LPP2 is likely to result in increased car use on roads that pass within 200m of the SAC (namely the A34 and A40), notably as a consequence of housing and business development. It is reasonable to assume that the increased population (both residential and business) will lead to increased vehicle movements. When coupled with the new homes identified for the local authorities surrounding the Vale of White Horse (such as Cherwell District), there is an even greater likelihood of an increase in traffic movements along the A34 and A40 which run adjacent to the Oxford Meadows SAC.
- 8.5.9. Air quality effects as a result of new development on Oxford Meadows SAC is an issue that is now being considered as a wider, strategic, cross-boundary issue in an initiative being led by the Oxfordshire Planning Policy Group. Preliminary findings appear to indicate that it will be necessary for new individual developments leading to greater than 500 AADT on the A34 or A40 to demonstrate that they will not lead to likely significant effects on Oxford Meadows SAC.
- 8.5.10. Air quality due to traffic emissions was considered 'in combination' for LPP1 HRA. That HRA stated that *"In various air quality assessments undertaken for this Local Plan, before it was determined to assess the issue strategically across all Oxfordshire local authorities, an extreme figure of 26,949 dwellings in Vale of White Horse was used to calculate an extreme worst case air quality situation."* This figure of 26,949 dwellings exceeds commitments within LPP1 and LPP2 combined. Even in this circumstance the change in nitrogen deposition within 200m of the roadside due to Local Plan-related traffic was considered effectively inconsequential. These calculations assumed improvements in background nitrogen deposition rates and vehicle emissions in the future baseline, and the Oxfordshire Planning Policy Group has also done this. Moreover, because seasonally-flooded hay meadows (such as those for which the SAC is designated) are naturally rich in nitrogen the atmospheric nitrogen critical load (the deposition rate above which effects might arise) is quite high being 20-30 kgN/ha/yr. The average nitrogen deposition rate at the SAC is currently well below this range being 16.59 kgN/ha/yr. Moreover, improvements in vehicle emission factors are expected over the plan period due to the further deployment of the Euro 6/VI emissions standard. As with Cothill Fen SAC, these are likely to result in a reduction in traffic NOx emissions (and thus oxidised nitrogen deposition rates) notwithstanding growth in the actual volume of traffic. This is already visible from existing APIS trends for the 5km grid square within which the SAC is situated which show that oxidised nitrogen deposition rates dropped from 8 kgN/ha/yr in 2005 to 4 kgN/ha/yr in 2015.
- 8.5.11. Collaborative working to investigate air quality strategically has already commenced under the auspices of the Oxfordshire Planning Policy Group.

- 8.5.12. The LPP1 Core Policy 34 (A34 Strategy) indicates that the Council will “*continue to work with the Highways Agency, Oxfordshire County Council and other partners to develop an air quality monitoring framework associated with the A34 within the Vale of White Horse District to monitor any impact on the Oxford Meadows SAC.*” In making these assessments the critical load for the relevant habitat should be used as the target for assessment.
- 8.5.13. Until recently, the first important step in determine effects of increased road traffic on SACs was to determine whether the Local Plan growth is likely to result in a change in flows of more than 1000 AADT on this stretch of road compared to the future baseline without the Local Plan, as the DMRB method specifically scopes out impacts if the change in flows is less than 1000 AADT. However, a recent High Court judgement in respect of effects of transport generated air quality changes on Ashdown Forest SAC³⁶ means that the 1000 AADT figure is no longer likely to be sufficiently precautionary in case of challenge.
- 8.5.14. Dialogue with Natural England has led to the shared view that once the Oxfordshire local authorities are in a position to determine the overall levels and locations of growth that would result from Local Plans, then it would be sensible to undertake a combined transport and air quality modelling assessment based on latest technical guidance and baseline information available at that point. Cherwell Council are currently at the Proposed Submission stage of a Partial Review of their Local Plan Part 1 that will potentially add 4,400 new dwellings to their existing commitment. South Oxfordshire Council are currently at the Publication stage of their Local Plan. West Oxfordshire has submitted their Local Plan.
- 8.5.15. As a precaution in the absence of the outcomes of the detailed strategic study it was considered appropriate during the HRA of the LPP1 to identify measures that would address an air quality issue if one was identified ‘in combination’ with other projects and plans (particularly the aforementioned Local Plans of surrounding authorities). To do this, the approach to addressing air quality in the Thames Basin Heaths area, as set out in the Local Authority Core Strategies/Local Plans and their HRAs (and which was agreed with Natural England) were drawn upon.
- 8.5.16. In consultation on the Thames Basin Heaths Core Strategies/Local Plans Natural England referred to the West London Air Quality Best Practice Guide for Air Quality and Transport, as a source of appropriate mitigation measures that could be included in Core Strategies:
- 8.5.17. That report identifies four broad types of mitigation measure:
- Behavioural measures and modal shift - reducing the amount of traffic overall;
 - Traffic management - modifying traffic behaviour to control where emissions are generated;
 - Emissions reduction at source - reducing the emissions level per vehicle; and
 - Roadside barriers - reducing the impact on the public of emissions.
- 8.5.18. Measures introduced into the Local Plan 2031 Part 1 covered the first two of these categories (emissions reductions per vehicle and roadside barriers being outside the remit of local planning policy). The Local Plan 2031 Part 1 already contains a range of transport measures designed to reduce congestion (which causes reductions in air quality) and increase use of more sustainable forms of transport such as buses and bicycles:

³⁶ <http://www.bailii.org/ew/cases/EWHC/Admin/2017/351.html>

- CP7 (Providing Supporting Infrastructure and Services) commits to partnership working with adjoining authorities and relevant stakeholders, in order to ensure sufficient and timely provision of infrastructure to support development. Such measures may include infrastructure to improve traffic flows and traffic management.
- CP46 (Conservation and Improvement of Biodiversity) commits to a general protection of nature conservation, including European sites.
- In particular, CP33 (Promoting Sustainable Transport and Accessibility) aims to:
 - support a modal shift toward public transport, cycling and walking
 - improve air quality through improvements to the transport network
 - require transport assessments and travel plans for relevant developments
 - promote electronic communications.
- CP35 (Promoting Public Transport, Cycling and Walking) reinforces the approaches outlined in CP33.
- At a project-specific level, CP43 (Natural Resources) commits to new development proposals “*causing no deterioration and, where possible, achieving improvements in air quality.*”

8.5.19. The LPP2 supports the above policies by including a Development Policy 15 (Transport Assessments and Travel Plans) that will ensure new development takes into account the measures listed in the LPP1.

8.5.20. For those sustainable transport measures which are available at the strategic planning level, it is not possible to predict in advance the precise quantum of improvement that can be delivered by a given mitigation measure due to both the novel nature of the mitigation tools available and the limitations of the science. Vegetative changes that theory identifies as being likely to result from changes (either negative or positive) in atmospheric nitrogen deposition can fail to appear in practice since they are relatively subtle and can be totally offset by management regime. Moreover, it is rarely possible to separate the effects of atmospheric nitrogen deposition and other causes, or to separate the effects of atmospheric nitrogen deposition arising from vehicle exhausts from those arising from other sources (e.g. agriculture). For example, a policy to ‘require developers to produce travel plans indicating that they have maximised opportunities for sustainable transport’ may prove effective in practice, but cannot be predictively linked to a specific scale of improvement of air quality.

8.5.21. It is therefore important that where air quality problems are identified there is also a mechanism established to monitor the effectiveness of the measures adopted (using the critical load/level as a monitoring target against which the success or failure of mitigation measures can be evaluated) and amend them as required. If a qualitative effect attributable to air quality was confirmed, then this would trigger the introduction of further mitigation measures proven to be effective in such situations. These could include management initiatives to improve the vegetative quality of other parts of the SAC further from the roadside or to counter any additional growth of vegetation close to the roadside, roadside barriers, reallocation of road space (high occupancy vehicle lanes), re-routing of heavy goods and older vehicles, traffic management and calming measures, or measures to change vehicle speeds on the A34 and/or A40 which would also affect emissions. Exactly which measures would be most appropriate

would need to be determined at the time (if required at all) and therefore the Local Plan should not commit to specific initiatives at this stage.

- 8.5.22. This is in line with the precautionary principle as set out in EC Guidance³⁷ on its use:

'If a preliminary scientific evaluation shows that there are reasonable grounds for concern that a particular activity might lead to damaging effects on the environment, or on human, animal or plant health, which would be inconsistent with the protection normally afforded to these within the European Community, the Precautionary Principle is triggered.

Decision-makers then have to determine what action to take. They should take account of the potential consequences of taking no action, the uncertainties inherent in the scientific evaluation, and they should consult interested parties on the possible ways of managing the risk. Measures should be proportionate to the level of risk, and to the desired level of protection. They should be provisional in nature pending the availability of more reliable scientific data.

Action is then undertaken to obtain further information enabling a more objective assessment of the risk. The measures taken to manage the risk should be maintained so long as the scientific information remains inconclusive and the risk unacceptable'.

- 8.5.23. While not mitigation in itself, monitoring is an essential factor when dealing with an issue such as air quality which has a high degree of uncertainty, since it will enable the effectiveness of air quality improvement measures to be evaluated and amended over the Local Plan period.

- 8.5.24. Notwithstanding the recommendations emerging from the Oxfordshire Planning Policy Group that relate to delivery of individual projects contributing to increased traffic flows on the A34 and A40, it is therefore considered that the mitigation and monitoring approaches accepted at the time of adoption of the LPP1 remain sufficient to ensure confidence that delivery of the VoWH LPP2 will not lead to likely significant effects on Oxford Meadows SAC, given both the relatively low sensitivity of that SAC to nitrogen deposition from traffic and the forecast improving trend.

Other Plans and Projects

- 8.5.25. There will be population increases in neighbouring districts (currently committed or projected to be up to 22,840 new dwellings in Cherwell, 9,132 in Oxford, 17,050 in South Oxfordshire, up to 10,500 in West Oxfordshire, 22,000 in Swindon, 8,400 in the Cotswold District, 10,500 in West Berkshire, and 920 in the Marlborough Area of Wiltshire)³⁸. Development of new housing in adjacent local authorities combined with development under VoWH LPP1 and LPP2 is likely to lead to increased road transport on the A34 and A40 that pass through, or within 200m of, Oxford Meadows SAC. The Oxfordshire Planning Policy Group strategic study into effects of new development on air quality at Oxford Meadows SAC will lead to strategic approaches toward mitigation for any effects on the SAC. Until such point as the conclusions are taken forward to apply to strategic development across Oxfordshire and beyond it is considered that the modelling of air quality effects on the SAC from strategic planning within VoWH, and associated mitigation approaches remain a robust approach to ensuring no likely significant adverse effects on the SAC.
- 8.5.26. Nonetheless, Natural England requested further analysis of the implications of Vale of White Horse LPP2 growth specifically 'in combination' with growth in Cherwell Local Plan, in order to mathematically support the conclusion of no

³⁷ European Commission (2000): Communication from the Commission on the use of the Precautionary Principle.

³⁸ Figures subject to change based on emerging Local Plans/ Core Strategies, and emerging Oxfordshire SHMA.

adverse effect 'in combination'. That modelling was not available when the LPP2 and its HRA were first submitted to the Secretary of State but is now available and is provided in Appendix B of this report. Natural England's response is provided in Appendix C. In summary, the analysis supports the preceding discussion in this Chapter and endorses the conclusion of no adverse effect on integrity 'in combination'. Natural England have confirmed that they concur with this conclusion.

- 8.5.27. Core Policy 16b sets out Principles associated with any future development at Didcot Garden Town. This location, in combination with other development within the Vale and in the wider area has the potential to contribute to increased pressure on Oxford Meadows SAC through reduced air quality resulting from increased traffic utilizing the A34. However, it is noted that further details will be included in a future DPD and SPD relating specifically to this development, and at this point it will be appropriate to consider the HRA implications of this in combination with other plans and projects.

Water Quality

- 8.5.28. The LPP1 sets a need for 20,560 new dwellings to be delivered over the lifetime of the Local Plan (to 2031), with 12,495 to be delivered through strategic allocations and a further 1,000 to be determined, potentially through the LPP2. At present the draft LPP2 document includes options to deliver the remaining needs for the district and also to meet the agreed apportionment of un-met housing need for Oxford City, which is 2,200 dwellings.
- 8.5.29. Waste water treatment facilities and sewage treatment works will need to be able to cope with increased capacity as a result of new development. In terms of the protection of the SAC it is important to avoid pollution of the River Thames. The Environment Agency (2006), based on proposed housing allocations at the time, did not highlight requirements for any new infrastructure to meet forecast demands for increases in housing development of 11,560 new dwellings under the South East Plan within the Vale of White Horse District, although phosphorous levels in discharge from the Abingdon-on-Thames STW needed to be reduced.
- 8.5.30. The capacity of existing STWs to accommodate increased growth within VoWH under LPP1 was assessed as part of a Water Cycle Study³⁹. This identified that in respect to WwTW capacity:
- This has been assessed at each of the WwTWs planned to receive additional flows. Drayton, Faringdon, Kingston Bagpuize, Oxford and Shrivenham WwTWs are particularly constrained as upgrades would be required by 2021 to enable them to accommodate expected growth without failing their consents.
 - Virtually all of the larger site allocations would require upgrading of existing or new sewerage systems to be provided, therefore phasing within developments and within settlements may need to be considered carefully.
- 8.5.31. Inevitably development proposed under the LPP2 will add to the requirements for WwTW capacity to be met. The Council have commissioned an updated Water Cycle Study as part of the process of delivering the LPP2. A draft report has been prepared from this study and it is possible to conclude that Oxford Meadows SAC is upstream of any WwTWs with constrained headroom, whilst the two WwTW that do discharge upstream of the SAC (Faringdon - 11.5km upstream and Shrivenham - 0.9km upstream) were assessed to have

³⁹ Vale of White Horse District Council – Water Cycle Study Phase 1 Study (November 2014). JBA Consulting.

headroom. Therefore WwTW capacity will not lead to likely significant effects on the SAC through reduction in water quality.

- 8.5.32. In their consultation response of 17/06/10 Natural England commented that a balanced hydrological regime is a key condition for this SAC. Therefore Natural England required a measure within Local Plan 2031 Part 1 policy that would ensure the protection of water quality in existing watercourses (particularly the River Thames). The following policies were included and should ensure that this is achieved with developments under the LPP1 and LPP2 taken into account:

- CP5 (Providing Supporting Infrastructure and Services) states that “*all new development will be required to provide, in a timely manner, the on-site and, where appropriate, off-site infrastructure requirements necessary for the development to be sustainably accommodated.*” The policy also commits to partnership working with adjoining authorities and stakeholders such as the Environment Agency to ensure appropriate and timely infrastructure provision.
- CP32 (Flood Risk) includes a commitment to incorporate sustainable drainage systems or techniques to limit surface run-off from development.
- CP33 (Promoting Sustainable Transport and Accessibility) commits to new development proposals “*causing no deterioration and, where possible, achieving improvements in water quality.*”

Other Plans and Projects

- 8.5.33. The recommendations of the VoWH WCS incorporated into policy within the LPP1 (particularly CP43: Natural Resources) will ensure that development within VoWH will not contribute to adverse effects on the Oxford Meadows SAC through reduction in water quality.

Conclusions

- 8.5.34. Issues of recreational pressure and water quality have been considered in relation to impacts of the LPP2 on the Oxford Meadows SAC. It is possible to conclude that likely significant effects on the Oxford Meadows SAC as a result of development under the Vale of White Horse LPP2 will not occur as a result of pathways of impact from recreational pressure, either alone, or in combination with other plans and projects. Effects of water quality on Oxford Meadows SAC are considered unlikely to occur, given the policy commitments in the Local Plan 2031 Part 1, informed by a Water Cycle Study, to provision of adequate infrastructure to accompany new development. This conclusion has been reaffirmed through the outcomes of an updated Water Cycle Study currently commissioned.
- 8.5.35. It is considered likely that housing across Oxfordshire will result in an increase in nitrogen deposition and NOx concentration within a small part of the Oxford Meadows SAC as it lies adjacent to the A34 and A40. The Oxfordshire authorities are undertaking strategic studies to investigate transport scenarios and air quality effects within the SAC adjacent to the A34 and A40, which will in turn inform specific mitigation interventions. In addition, further modelling and liaison with Natural England has been undertaken specifically regarding the potential for adverse effects from growth in LPP2 and Cherwell Local Plan ‘in combination’. This modelling supports the conclusion of the HRA of LPP1 and the original HRA of LPP2 that no adverse effects are expected.
- 8.5.36. As a precaution, until that study is completed, it has been assumed in this analysis that an air quality effect may exist and appropriate plan-level measures to address the issue (as accepted for other local authorities) have been

identified and are reflected in the Local Plan 2031 Part 1 which would enable a conclusion of no adverse effect to be reached (as has been the case in the Thames Basin Heaths area) for the allocations and policies contained within the Local Plan Part 2.

- 8.5.37. It is therefore considered that the modelling undertaken for this report and the mitigation and monitoring approaches accepted at the time of adoption of the LPP1 remain sufficient to ensure confidence that delivery of the VoWH LPP2 will not lead to likely significant effects on Oxford Meadows SAC, given both the relatively low sensitivity of that SAC to nitrogen deposition from traffic and the forecast improving trend.

9. Conclusion

- 9.1.1. The LPP1 Submission version allocates 20,560 new dwellings to be delivered over the lifetime of the Local Plan (to 2031), with 12,495 to be delivered through strategic allocations and a further 1,000 to be determined, potentially through the LPP2. The LPP2 allocates sites to deliver the remaining needs for the district and also to meet the agreed apportionment of un-met housing need for Oxford City, which is 2,200 dwellings.
- 9.1.2. It is not considered that any of the DM policies contained within the LPP2 would lead to likely significant effects on European sites.
- 9.1.3. The following site allocations contained within Core Policies 4a, 8a and 8b were screened in for further consideration for potential to lead to adverse effects on European sites. These were subject to appropriate assessment to determine adverse effects on integrity either alone or in combination with other plans and projects.
- 9.1.4. New development at Dalton Barracks or South East of Marcham should be required to provide details, in line with LPP1 CP45 (Green Infrastructure), of how the project will deliver accessible natural greenspace, or where this is not possible, how it will contribute to *“the delivery of new Green Infrastructure and/or the improvement of existing assets”*. Such greenspace will provide added confidence that residents of the development can be recreationally self-sufficient without needing to place an undue burden on the few parts of Cothill Fen SAC that are potentially vulnerable to a significant increase in recreation. Given the proximity of the Dalton Barracks site to the SAC it will also be a useful precaution that any green infrastructure delivery or contribution fulfils the criterion of *“at least one accessible 20 hectare site within two kilometres of home”* and that this be in addition to Cothill Fen SAC. Core Policy 8b does provide details of project-specific measures that will aid in mitigating any potential effects of development at Dalton barracks on the SAC, including outline provision for a Country Park of at least 80 hectares. BBOWT have expressed a willingness to assist in the masterplanning process, and it is recommended that partnership working should take place in order to provide confidence that the delivery of the allocation is able to avoid likely significant effects on Cothill Fen SAC through increased recreational pressure. It is considered that the policy framework set by LPP2 (and the broader context of LPP1) is sufficient to enable these measures (including a Country Park of at least 80ha in area) to be required and brought forward. Therefore, it is considered that the plan will not result in adverse effects on the integrity of the SAC.
- 9.1.5. Studies undertaken specifically to inform planning for development on Dalton Barracks have demonstrated that it is very unlikely that surface or shallow sub-surface flows from the development footprint would occur into the catchment of the SAC and nearby SSSIs within the same catchment⁴⁰. Surface water flows from the proposed development were modelled and it was found that *“the majority of surface flow would drain towards the Wildmoor Brook in an easterly to southerly direction.”* No flows were found to occur in the direction of the SAC. It was also determined that it is very unlikely for groundwater from the development site to interact with the Cothill Fen designated areas. The report states that *“it can still be determined that it is very unlikely for groundwater from*

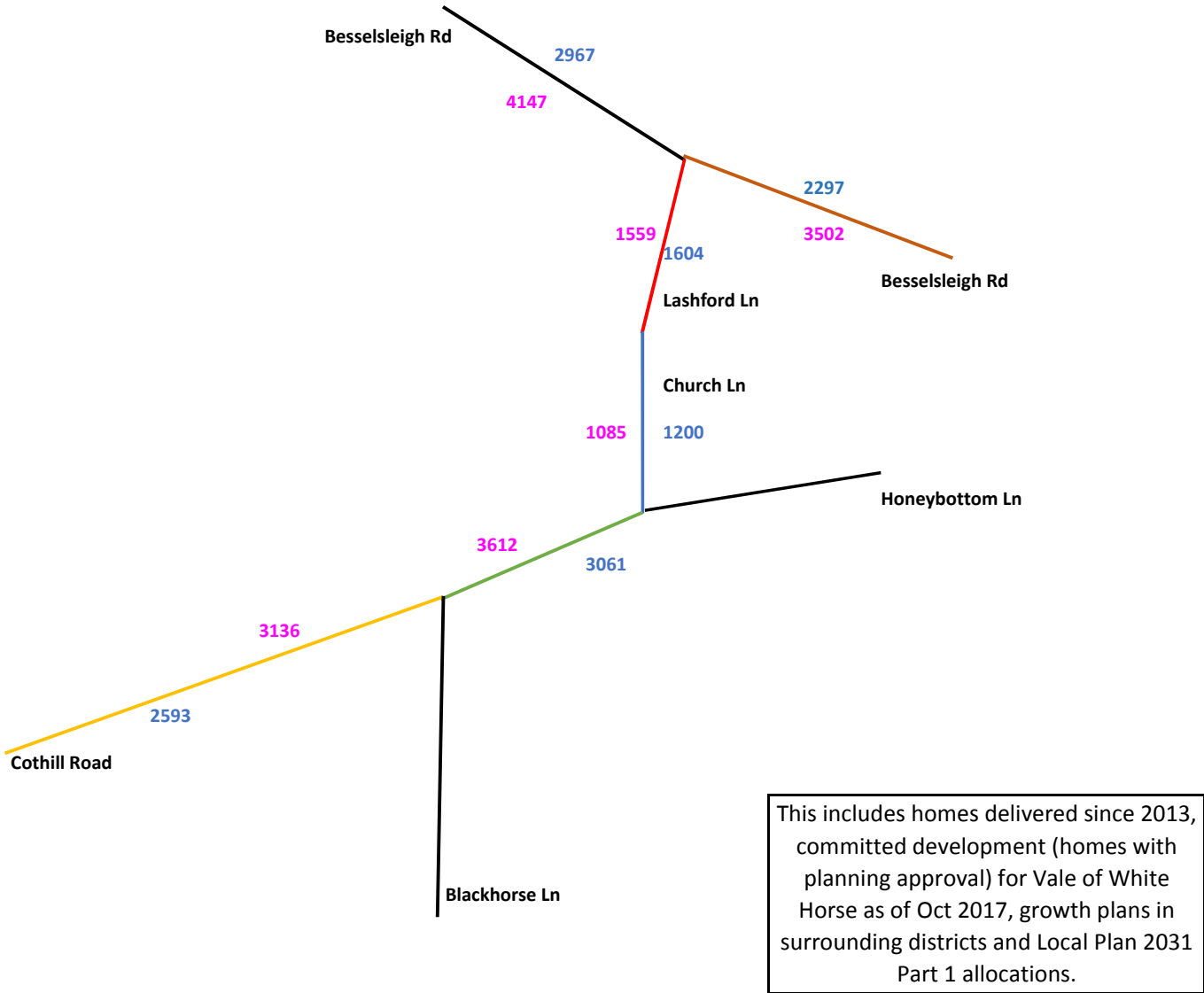
⁴⁰ Dalton Barracks SSSI Hydrological Assessment (January 2017) . Carter Jonas.

the development site to interact with the Dry Sandford Pit or Cothill Fen designated areas. This is due to the fact that these designated areas at a higher elevation than the majority of the development site and due to the lateral distance between these designated areas and the development area.”

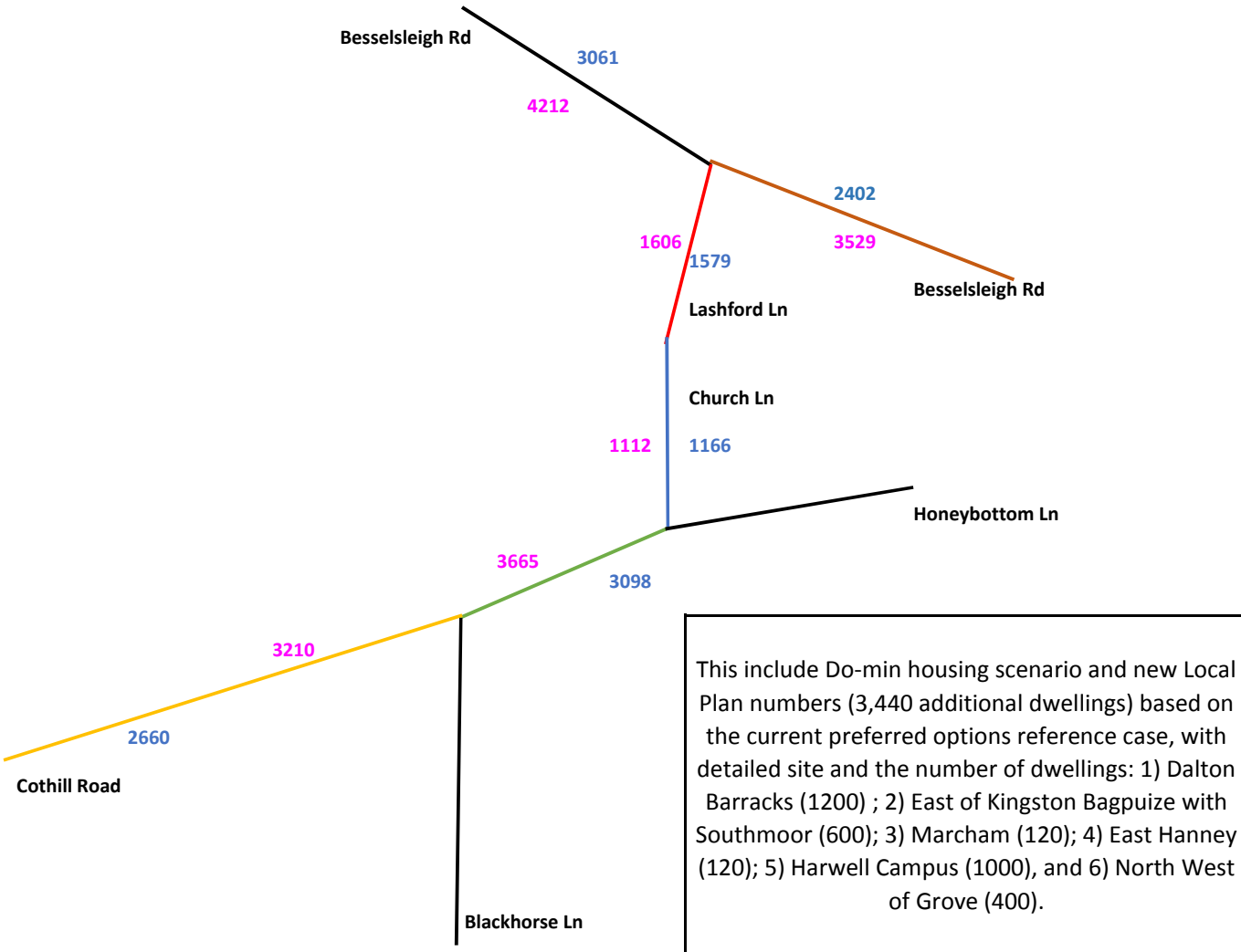
- 9.1.6. There is an expectation that significant increases in vehicular movements within 200m of Cothill Fen SAC are unlikely, and it is therefore considered unlikely that any air quality impact on Cothill Fen will arise.
- 9.1.7. It is considered likely that housing across Oxfordshire will result in an increase in nitrogen deposition and NO_x concentration within a small part of the Oxford Meadows SAC as it lies adjacent to the A34 and A40. The Oxfordshire authorities are undertaking strategic studies to investigate transport scenarios and air quality effects within the SAC adjacent to the A34 and A40, which will in turn inform specific mitigation interventions. As a precaution, until that study is completed, it has been assumed in this analysis that an air quality effect may exist and appropriate plan-level measures to address the issue (as accepted for other local authorities) have been identified and are reflected in the Local Plan Part 1 which would enable a conclusion of no adverse effect to be reached (as has been the case in the Thames Basin Heaths area) for the allocations and policies contained within the Local Plan Part 2. It is therefore considered that the modelling undertaken for this report and the mitigation and monitoring approaches accepted at the time of adoption of the LPP1 remain sufficient to ensure confidence that delivery of the VoWH LPP2 will not lead to likely significant effects on Oxford Meadows SAC, given both the relatively low sensitivity of that SAC to nitrogen deposition from traffic and the forecast improving trend.
- 9.1.8. Core Policy 16b sets out Principles associated with any future development at Didcot Garden Town. This location, in combination with other development within the Vale and in the wider area has the potential to contribute to increased pressure on Oxford Meadows SAC through reduced air quality resulting from increased traffic utilizing the A34. However, it is noted that further details will be included in a future DPD and SPD relating specifically to this development, and at this point it will be appropriate to consider the HRA implications of this in combination with other plans and projects.
- 9.1.9. Effects of water quality on Oxford Meadows SAC are considered unlikely to occur, given the policy commitments in the Local Plan Part 1, informed by a Water Cycle Study, to provision of adequate infrastructure to accompany new development. This conclusion has been reaffirmed through the outcomes of an updated Water Cycle Study currently commissioned.
- 9.1.10. It is concluded that, given the incorporation of the above recommendations and subject to development of strategic air quality studies relating to Oxford Meadows SAC, the LPP2 will not lead to an adverse effect on the integrity of European sites either alone, or in combination with other plans and projects.

Appendix A Forecast Traffic Flow Data for Roads Within 200m of Cothill Fen SAC

Average Annual Daily Traffic flows in the vicinity (200m) of Cothill Fen SAC--2031 Do-Min



Average Annual Daily Traffic flows in the vicinity (200m) of Cothill Fen SAC--2031 Option 2



Appendix B Memo from Atkins to Natural England regarding air quality effects at Oxford Meadows SAC from growth in Cherwell and Vale of White Horse in combination

Memo

To:	Sharon Whiting		
From:	Jennie Godwin	Email:	
Phone:		Date:	09 May 2018
Ref:	Cherwell HRA - Natural England Consultation	cc:	David Peckford, Ronan Leydon, Sarah Horrocks, James Riley
Subject:	Examination of predicted change in traffic in Cherwell and Vale of White Horse with proposed Local Plan Development		

Introduction

As expressed in Marc Turner's email to you (dated 23/02/2018) and Rebecca Micklem's response (dated 15/03/2018) to your further correspondence, Natural England is concerned about the potential for additional development identified in Cherwell's Local Plan Part 1 Partial Review (LPP1 PR), in-combination with that identified in Vale of White Horse's (VoWH) LPP2, to result in an adverse effect on the integrity of the Oxford Meadows Special Area of Conservation (SAC) (specifically, Wolvercote Meadows). This note presents additional evidence to assist Natural England in reaching a conclusion.

Background

Cherwell and VoWH have each submitted assessments of expected changes in air quality (including NOx concentrations and nitrogen deposition) at Oxford Meadows SAC as a result of proposed local plan development within their Habitats Regulations Assessments (HRA) over the past six or so years. The most recent submission by Cherwell was published in June 2017¹, which included an assessment of expected changes in air quality near the A40 and A34 through the Oxford Meadows SAC, due to the implementation of additional housing identified in the Cherwell LPP1 PR. This assessment used the results of atmospheric dispersion modelling² to conclude that there would be no likely significant effects on the SAC as the critical load for nitrogen deposition (N dep) was not exceeded and the change in N dep with the additional development was less than 1% of the critical load.

The most recent air quality assessment that VoWH has published was prepared in support of their LPP1 in 2015³. This work concluded that, as a result of all the possible development in VoWH, (a worst case development scenario) in 2015, there would be no likely significant effect on Oxford Meadows SAC. The modelling work was based on the simple DMRB screening tool and processing tools available at the time of the assessment.

In their most recent HRA for LPP2⁴, VoWH indicated that further air quality assessment work would be done through the Oxfordshire Growth Board and concluded that because the LPP1 assessment showed inconsequential changes with the highest possible growth scenario, the limited additional development with LPP2 was unlikely to change these findings.

Approach

As described in the introduction, Natural England is concerned about the potential for additional development identified in Cherwell's LPP1 Partial Review, in-combination with that identified in VoWH LPP2, to result in an adverse effect on the integrity of the Oxford SAC. It is not appropriate to combine the output from the VoWH air quality assessment (2015) with the most recent air quality assessment for Cherwell's LPP1 PR (June 2017) as the assessments were based on different modelling methodologies and different tools, including emission rates. It is, however, reasonable to use the outputs from the dispersion modelling undertaken for Cherwell's LPP1 PR to examine the forecast change in NOx concentration associated with a certain change

¹ Partial Review of the Cherwell Local Plan 2011-2031 (Part 1): Oxford's Unmet Housing /needs, Propose Submission Plan – Habitat Regulations Assessment – Screening Report, Cherwell District Council, June 2017

² ADMS Roads v4.0, EFT v 7.0, Defra NOx to NO2 calculator v5.1, and Defra's 2013 based background maps. These tools were superseded in November 2017 with an update to the background maps (2015 base year) which are now available for new assessments. There is no expectation that the modelling presented in the HRA needs to be updated.

³ Vale of White Horse LPP1 Submissions Document, Habitats Regulations Assessment, February 2015

⁴ Vale of White Horse LPP2, Habitats Regulations Assessment, October 2017

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in traffic flow, and from that determine how much additional traffic (i.e. in combination with VoWH LPP2 development) would need to be added to the A40 and the A34 through Oxford Meadows SAC to result in a change in N dep of more than 1% of the critical load. This will provide Natural England with insight as to the likelihood that a traffic change near to the SAC associated with VoWH LPP2 could cause a change in air quality that could have an adverse effect on integrity of the SAC.

The traffic conditions assessed within the Cherwell LPP1 PR HRA (June 2017) have therefore been considered and from this, the volume of development traffic that would be required to change the outcome of the assessment has been determined. This traffic volume has then been compared to the volumes associated with VoWH LPP2.

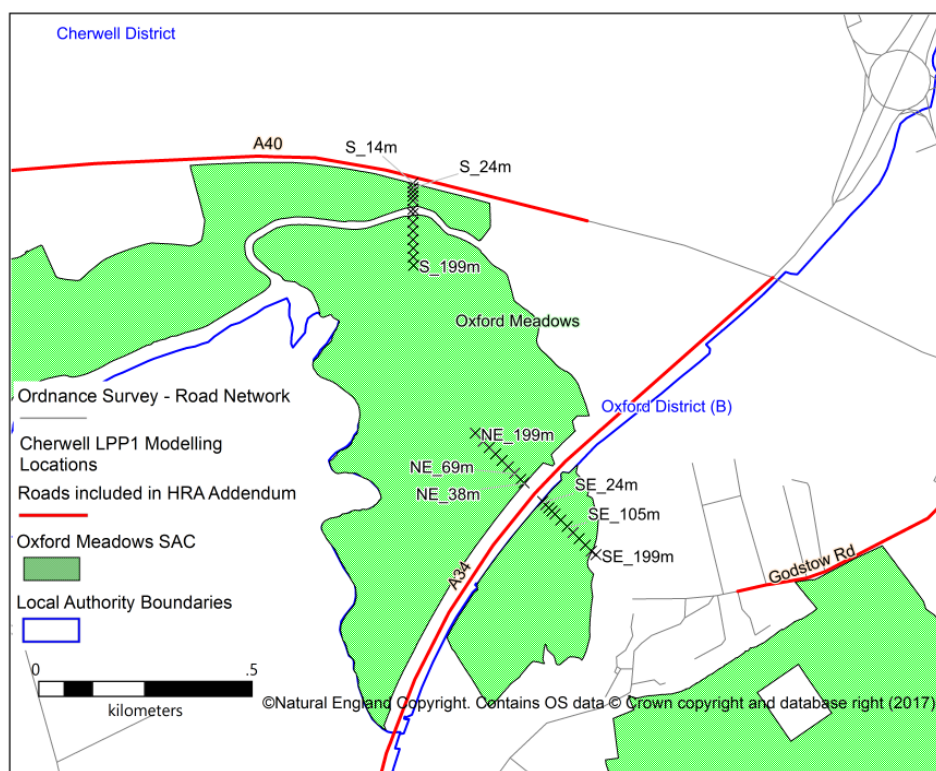
The Cherwell LPP1 PR HRA examined the change in air quality as a result of the traffic change between:

- All local authorities' planned and permitted developments (Table 1 below), which includes Cherwell's Local Plan development and VoWH LPP1 development as well as the traffic for the committed development for Oxford, South and West Oxfordshire authorities, available in February 2017; and
- Cherwell's Scenario 4, which is all the Local Plan development plus 4,400 additional dwellings for Oxford's Additional Unmet Need and additional Cherwell policies to mitigate the additional traffic generated, including the Cycle Super Highway.

Tables 1 and 2 show the proposed housing and employment figures for these two scenarios, which were used to generate traffic flow estimates on the A40 and A34 with the Oxfordshire Strategic Traffic Model in Spring 2017. This analysis produced the traffic estimates shown in Tables 3 and 4, which were used to determine the change in air quality as a result of the LPP1 PR in Cherwell. In addition, the table compares the latest traffic estimates with data published in previous HRA assessments.

The tables show that, since work was done to prepare the Reference Scenario (first used in the Cherwell HRA in 2012) future traffic flow estimates have gone down rather than up. This is believed to be due to a combination of lower national growth forecast factors and less favourable UK economic conditions. Therefore, the latest forecast traffic flows on the A40 and A34 with Cherwell and VoWH approved local plans in place are lower than the 2030 Reference Scenario used in the assessment of the Cherwell HRA 2012 assessment in 2012.

Figure 1 Map of air quality dispersion modelling locations examined in Cherwell's LPP1 HRA.



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Findings

Oxides of nitrogen

The changes in NO_x concentrations within the Oxford Meadows SAC have been examined along three transects. The total NO_x concentrations for the Do Minimum (DM) scenario and the change with LPP1 PR Do Something (DS) at distances up to 200 metres from the A40 and the A34 centrelines, as published in the Cherwell LPP1 PR HRA, are summarised in Table 5. These data have been explored to determine the following:

- How much additional traffic would result in a change of 1% in NO_x concentration within the SAC;
- How much additional traffic would result in a change exceeding the NO_x critical level within the SAC;
- How much of the SAC would be included in areas subject to a >1% change in NO_x concentration and/or exceedance of the NO_x critical level with all traffic scenarios.

Table 5 shows that for the area of Oxford Meadows SAC within 200 m of the A40, the critical level for NO_x of 30 µg/m³ is exceeded in the Base scenario, however there is no exceedance in either the DM and DS scenarios with Cherwell LPP1 PR development (2031).

A change in NO_x concentration equivalent to 1% of the critical level would occur with an increase in traffic flow greater than 677 AADT, however, the SAC area affected by a change of this magnitude would be limited to that between the road boundary and a line 24m from the A40 road centreline, as shown in Figure 2. The (unknown) additional traffic associated with VoWH additional 3,420 housing units would need to exceed 7,000 AADT on the A40 for the NO_x critical level to be exceeded. As the additional traffic resulting from 4,400 additional housing units detailed in Cherwell's LPP1 PR is shown in Table 4 to be 1,129 AADT on the A40 and 1,008 AADT on the A34, this is considered to be an unlikely scenario.

The results for the A34 transects, presented in Table 5, indicate that NO_x concentrations at the Oxford Meadows SAC boundary closest to the A34 exceed the critical level in the Base, DM and DS scenarios. The AADT changes with Cherwell LPP1 PR development result in an increase in NO_x of up to 1% of the critical level at the SAC boundary.

To examine the impact that additional traffic from VoWH additional 3,420 housing units might have on the air quality conditions modelled with Cherwell's LPP1 PR development, a hypothetical increase of 10,000 AADT was determined using the relationship established between Cherwell DM and DS scenario and factoring up to +10,000 AADT. The results are shown in Table 6. The area of the SAC affected by a) changes in NO_x equivalent to more than 1% of the critical level and b) NO_x concentrations above the critical level, are also examined in Table 6.

For the A40, the change of more than 1% applies for the first 10 m into the SAC, up to 24 m from the A40 road centre line, as shown in Figure 3. This is equivalent to 0.3% of the total SAC area. The NO_x critical level is not exceeded anywhere within this part of the SAC.

For a hypothetical increase in AADT of 10,000 on the A40 with VoWH LPP2, there would be a change in NO_x of more than 1% of the critical level up to 200 m from the road edge, as shown in Figure 3 including 6.6% of the SAC area. However, the area subject to an exceedance of the critical level would only extend up to 24 m from the road centre line as shown in Figure 2. This hypothetical change in critical level affects 0.3% of the SAC area as a whole. It also underlines the premise that a change of 1% of the critical load should not necessarily be interpreted to indicate a 'likely significant effect'.

On the A34, the change in NO_x with Cherwell LPP1 PR vs Do Minimum does not exceed 1% of the critical level. The critical level is, however, exceeded up to 69 m to the north west and 105 m to the south east of the A34 in both future scenarios, i.e. with or without LPP1 PR, affecting a combined total of 1.4% of the SAC as shown in Figure 2; beyond this distance NO_x concentrations reduce below 30 µg/m³.

For a hypothetical increase in AADT of 10,000 with VoWH LPP2, again the distance within the SAC affected by a change of more than 1% of the critical level extends up to 200 m of the road edge affecting 8.6% of the SAC in total, as shown in Figure 3. There is no change in the area exceeding the critical level where it is exceeded up to 69 m north west and 105m to the south east of the A34 as a result of this hypothetical additional development traffic, as shown in Figure 2. Further support for the premise that there is no 'likely

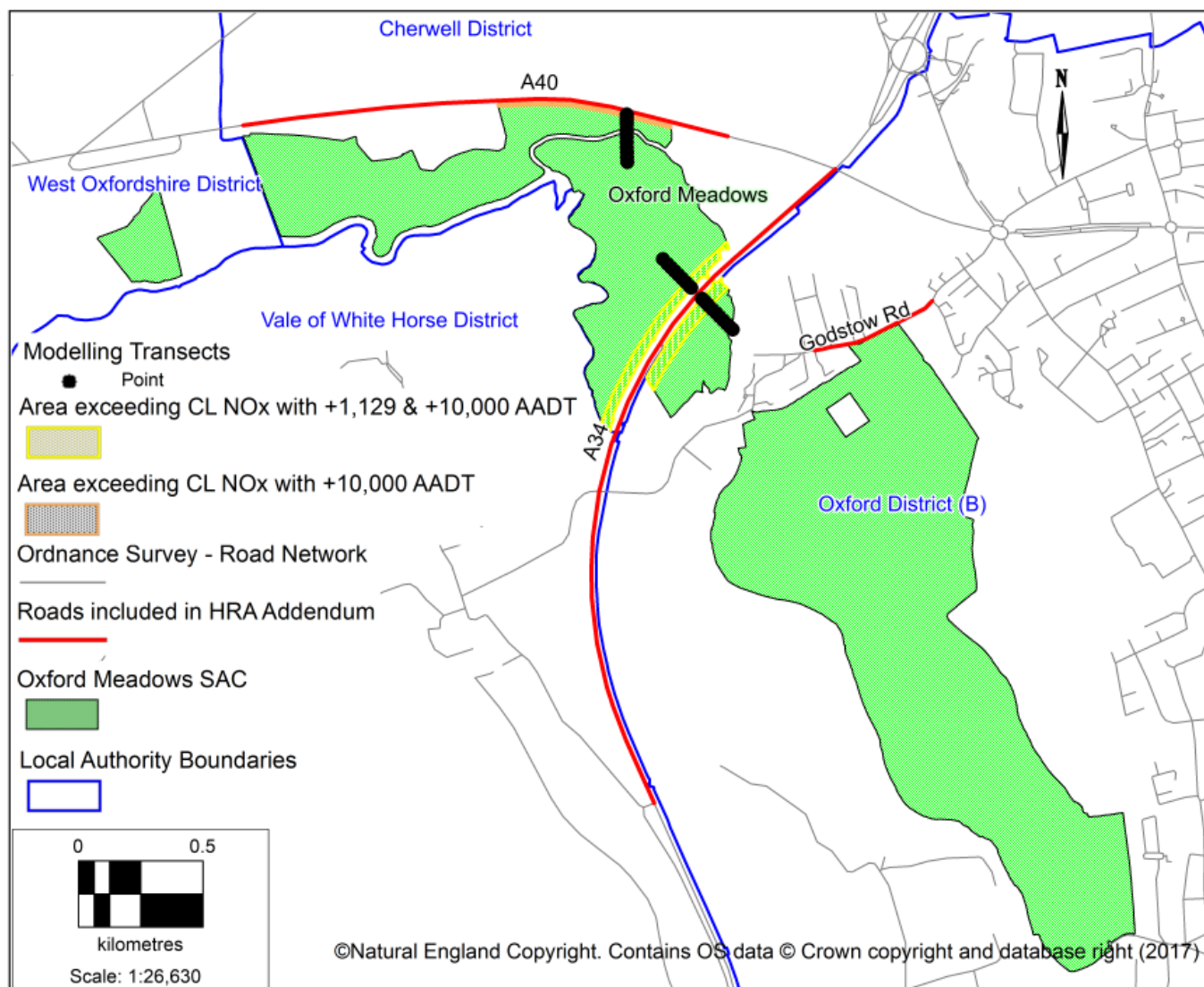
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significant effect' on air quality conditions in the SAC from the potential additional traffic attracted by VoWH LPP2 development.

At annual average concentrations below approximately $100 \mu\text{g}/\text{m}^3$, NOx is essentially a source of deposited nitrogen rather than a toxic compound and for this assessment, concentrations for the Base, DM and DS scenarios are all below that level (and only slightly above the critical level).⁵

On the above basis, the changes in traffic in Cherwell and Vale of White Horse with proposed Local Plan development are unlikely to result in increases in NOx concentrations of 1% or more of the critical level, however, where they do, the resulting changes in total NOx concentrations are unlikely to have an adverse effect on the integrity of the Oxford Meadows due to the limited extent of the affected area relative to the total SAC.

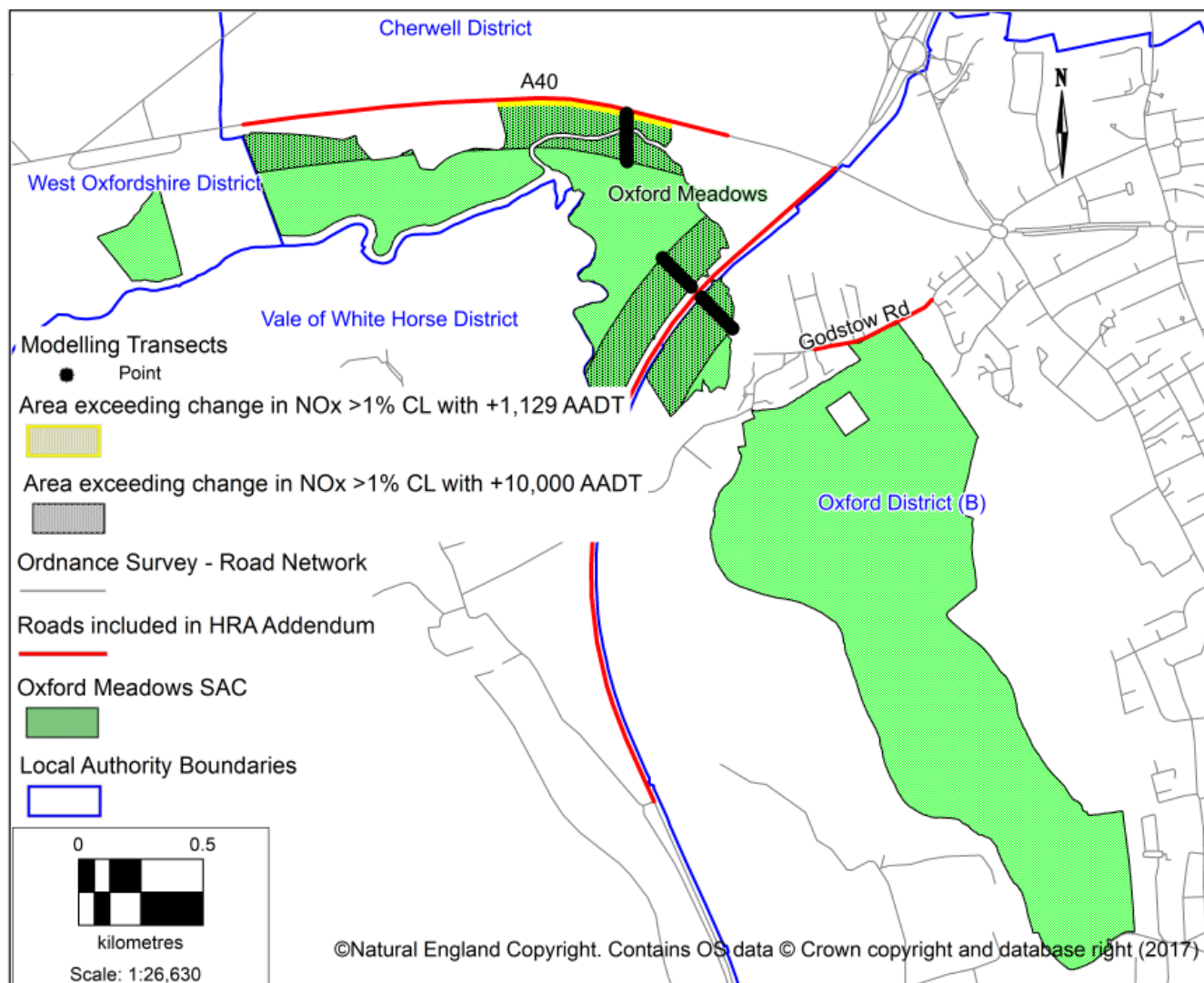
Figure 2 Area of the Oxford Meadows SAC exceeding the NOx critical level (CL) for Vegetation of $30 \mu\text{g}/\text{m}^3$



⁵ 'WHO Regional Office for Europe, Copenhagen, Denmark, 2000. Air Quality Guidelines – Second Edition. Chapter 11, Figure 2, indicates that exposure to annual average concentrations below $100 \mu\text{g}/\text{m}^3$ are unlikely to cause direct biochemical or physiological effects based on the available studies'

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Figure 3 Area of the Oxford Meadows SAC with change in NO_x concentration greater than 0.3 µg/m³



Nitrogen deposition

The total N dep rate for the Do Minimum scenario, and the change in N dep at the closest point between the Oxford Meadows SAC and the A40 and the A34, published in the Cherwell LPP1 PR HRA, are presented in Table 7. This calculation used the modelled change in N dep to determine how much traffic flows would need to increase by to result in a 1% increase in N dep rate. If the contribution of N dep were to increase by 1%, this does not necessarily indicate a 'likely significant effect', however such a level of change would suggest further examination or assessment is required.

The additional traffic resulting from 4,400 additional housing units, detailed in Cherwell's LPP1 PR is shown in Table 4 to be 1,129 AADT on the A40 and 1,008 AADT on the A34. The additional traffic associated with VoWH additional 3,420 housing units therefore would need to exceed 9,000 AADT on the A40 and 10,000 AADT on the A34 to result in an increase in N dep rate of 1%, which might require further assessment to identify any potential adverse effect on site integrity.

On the above basis, therefore, the changes in traffic in Cherwell and Vale of White Horse with proposed Local Plan development are unlikely to result in increases in N deposition of 1% or more.

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Table 1. Do Minimum Scenario including all of VoWH and Cherwell Local Plan Development without Additional Housing

Developments 2031	Oxford	Cherwell	Vale	South	West	TOTAL
Houses	6,695	21,132	21,739	10,791	5,088	65,445
Jobs	30,267	41,434	26,379	4,135	12,182	114,398

Table 2. Cherwell Scenario 4 – Do Minimum + 4400 additional dwellings and traffic mitigation policies

Developments 2031	Oxford	Cherwell	Vale	South	West	TOTAL
Houses	6,695	25,122	21,739	10,791	5,498	69,845
Jobs	29,967	41,434	26,379	4,135	12,182	114,098

Table 3. Traffic data input for air quality assessment presented in HRA by Cherwell and VoWH

Link Name	2013 Base			2030 Reference Scenario used in VoWH and 2012 Cherwell HRA assessment			2031 Cherwell LPP1 DM* = (with Cherwell LP & VoWH LPP1)			2031 Cherwell LPP1 DS^ = 'Transport Improvement Package 2 and Super Cycle Route'			Additional VoWH LPP2 development		
	AADT	%HGV	Speed (kph)	AADT	%HGV	Speed (kph)	AADT	%HGV	Speed (kph)	AADT	%HGV	Speed (kph)	AADT	%HGV	Speed (kph)
A40 (W of A34)	20,022	2.7	55.8	25,033	6.3	54	21,819	4.3	45.5	22,948	4.2	43.4	TBC		
A34 (S of A40)	83,196	2.5	67.8	102,593	12.7	68	96,296	2.4	64.2	97,304	2.4	64	TBC		

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Table 4. Changes in traffic assessed for HRA and used in this memo

Link name	Cherwell LP & VoWH LPP1 (DM) minus Ref Scenario from 2012 assessment	Cherwell LPP1 with improvements (DS) minus Ref Scenario	Cherwell LPP1 with improvements (DS) minus Cherwell LP & VoWH LPP1 (DM)	VoWH LPP2 minus Cherwell LP & VoWH LPP1 (DM)	Increase in AADT giving a 1% increase in N dep [#]
A40 (W of A34) Change in AADT	-3,214	-2,085	+1,129	TBC	+9,000
A34 (SE of A40) Change in AADT	-6,297	-5,289	+1,008	TBC	+10,000
Comment	Change in traffic with already approved plans in place compared to the Reference Scenario i.e. the Reference Scenario overestimated future flows	Change in traffic with Cherwell's LPP1 in place (with already approved plans) compared with Reference Scenario i.e. the Reference Scenario overestimated future flows	Change in traffic with Cherwell's LPP1 in place compared to existing approved plans and found not to have a likely significant effect on Oxford Meadows SAC	TBC - the change in traffic that additional housing as a result of VoWH's LPP2 will have, compared with existing approved plans	Change in traffic that would need to happen to result in a 1% increase in N dep. Smaller changes in traffic would likely be judged as insignificant.

[#] The calculation used to determine the change in N dep as a result of changes in traffic data is set out in Table 5 below

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Table 5. Relationship between change in traffic and NOx concentration at Oxford Meadows SAC*, based on detailed dispersion modelling results

Link name	Base Total NOx at SAC boundary, (µg/m ³)	DM Total NOx at SAC boundary, (µg/m ³)	DS Total NOx at SAC boundary, (µg/m ³)	Change in NOx at SAC boundary, DS-DM (µg/m ³)	Cherwell LPP1 traffic change, DS-DM (AADT)	1% of NOx critical level (CL)	AADT Factor	Change in AADT giving NOx > 1% CL at SAC boundary	Change in NOx giving >30 µg/m ³ at SAC boundary	Change in AADT giving >30 µg/m ³ at SAC boundary
	(1)	(2)	(3)	(4) = (3)-(2)	(5)	(6) = 30*0.01	(7) = (6)/(4)	(8) = (7)*(5)	(9) = 30-(2)	(10) = (5)*(9)/(4)
A40-14m S transect	49.7	26.9	27.4	0.5	+1,129	0.3	0.6	+677	+3.1	7,000
A34-38m NW transect	63.0	31.9	32.0	0.1	+1,008	0.3	3.0	+3,024	n/a	CL exceeded in DM
A34-24m SE transect	87.8	48.3	48.6	0.3	+1,008	0.3	1.0	+1,008	n/a	CL exceeded in DM

* Where SAC boundary is quoted in the table, this is the point on the SAC boundary closest to the road in question. See Figure 1

- DM Total NOx concentration and change in NOx concentration are reported in the air quality assessment, Appendix C, Partial Review of the Cherwell Local Plan 2011-2031 (Part 1): Oxford's Unmet Housing /needs, Propose Submission Plan – Habitat Regulations Assessment – Screening Report, Cherwell District Council, June 2017
- This calculation assumes a linear relationship between increasing traffic and increasing NOx concentration. This is valid for a single location where the change is from a substantial amount of traffic to a slightly larger flow with no change to road layout, speed or vehicle composition. It would not be the case for all assessments.

Memo

Table 6. Calculation of area of SAC affected by change in NOx concentration at Oxford Meadows SAC

Link name	Future development scenario*	Associated traffic change (AADT)	Change in NOx at SAC boundary ($\mu\text{g}/\text{m}^3$)	Change in NOx as % of CL	Distance from road within SAC with change in NOx > 1% CL (m)	Total SAC area with change > 1% CL (DS) ^	Distance from road within SAC with NOx CL exceedance	% of total SAC area with NOx CL exceedance (DS)^	Change in % area affected DS vs DM^
A40-14m S transect	Cherwell LPP1 DS	+1,129	0.5	1.7	14-24	0.7 ha (0.3% of SAC)	n/a	n/a	n/a
	VoWH LPP2 [#]	+10,000	4.4	15	14-199	17.5 ha (6.6% of SAC)	14 to 24	0.7 ha	+0.3%
A34-38m NW transect	Cherwell LPP1 DS	+1,008	0.1	0.3	n/a	0	38-69	1.3 ha (0.5% of SAC)	0
	VoWH LPP2 [#]	+10,000	1.0	3.3	38-199	14.4 ha (5.4% of SAC)	38-69	1.3 ha	0
A34-24m SE transect	Cherwell LPP1 DS	+1,008	0.3	1.0	n/a	0	24-105	2.5 ha (0.9% of SAC)	0
	VoWH LPP2 [#]	+10,000	3.0	10	24-199	8.6 ha (3.2% of SAC)	24-105	2.5 ha	0

* Where SAC boundary is quoted in the table, this is the point on the SAC boundary closest to the road in question. See Figure 1

[#] Estimates for VoWH LPP2 are hypothetical as traffic data is not yet available. These estimates are provided to give an indication of scale of change in NO_x only.

[^] Estimates of area affected are based on measurements in square kilometre as compared to the area of Oxford Meadows SAC which, in accordance with the Improvement Programme for England's Natura 2000 Sites (IPENS) Site Improvement Plan is 265.89 ha

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Table 7. Relationship between change in traffic and N dep at Oxford Meadows SAC, based on detailed dispersion modelling results

Link name	Cherwell LPP1 with improvements (DS) minus Cherwell LP & VoWH LPP1 (DM), (AADT)	Total N dep at SAC boundary closest to road (DM)	Change in N dep at SAC boundary closest to road due to change in AADT	Change in N dep resulting in a 1% increase compared with DM at closest point	Factor = Change with 1% / Actual Change	Factor * Cherwell change in AADT = Change in AADT giving a 1% increase in N dep
A40-14m S transect	+1,129	18.6	0.024	0.186	8	+9,000
A34-38m NW transect	+1,008	13.7	0.008	0.137	17	+17,000
A34-24m SE transect	+1,008	14.5	0.014	0.145	10	+10,000

- DM Total N dep and change in N dep are reported in the air quality assessment, Appendix C, Partial Review of the Cherwell Local Plan 2011-2031 (Part 1): Oxford's Unmet Housing /needs, Propose Submission Plan – Habitat Regulations Assessment – Screening Report, Cherwell District Council, June 2017
- This calculation assumes that there is a linear relationship between increasing traffic and increasing N dep. This is valid for a single location where the change is from a substantial amount of traffic to a slightly larger flow with no change to road layout, speed or vehicle composition. It would not be the case for all assessments.

Appendix C Natural England response to Atkins memo

Riley, James D (Basingstoke)

From: Micklem, Rebecca (NE)
Sent: 25 May 2018 10:45
To: Sharon Whiting; Turner, Marc (NE)
Cc: 'Godwin, Jennie A'; ; Riley, James D
(Basingstoke); David Peckford; 'Leydon, Ronan';
Subject: RE: Air Quality data for Oxford Meadows

Dear Sharon,

Thank you for providing the in-combination assessment of NOx levels for Vale of White Horse and Cherwell District Council Local Plan work. Having reviewed the data, I can confirm that we are satisfied with the conclusion that the changes in NOx levels arising from Vale and Cherwell Local Plans will not have an adverse effect on the integrity of Oxford Meadows SAC. We advise that the Local Plan Appropriate Assessments are updated accordingly and will be happy to consider an additional Statement of Common Ground to cover this issue.

Whilst we are satisfied that this issue has been sufficiently addressed for these Local Plans, there was general agreement at our joint meeting on 2nd November that a strategic solution to air pollution issues at Oxford Meadows would be a useful future direction for all districts and we look forward to working together on this going forward.

Kind regards,

Rebecca Micklem

Lead Adviser

Sustainable Development
Thames Team

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We are here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

In an effort to reduce Natural England's carbon footprint, I will, wherever possible, avoid travelling to meetings and attend via audio, video or web conferencing.

Natural England is accredited to the Cabinet Office Customer Service Excellence Standard

From: Sharon Whiting
Sent: 10 May 2018 15:13

