Habitats Regulations Assessment

Submitted to
Woking Borough Council

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Woking Borough Council Site Allocations DPD – Habitats Regulations Assessment

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1 Introduction

1.1 Scope of the project

AECOM was appointed in 2014 by Woking Borough Council to assist the Council in undertaking a Habitats Regulations Assessment (HRA) of the Woking Borough Delivery DPD. Subsequently it was decided to split the HRA process into two documents (matching the splitting of the plan into two documents). These comprised a HRA of the Development Management Policies DPD (prepared in January 2015) and an HRA of the Site Allocations DPD (April 2015). The objective of the assessment in both cases was to identify any aspects of the emerging DPDs that would cause a likely significant effect on Natura 2000 sites, also known as European sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites), in isolation or in combination with other plans and projects. If such effects were identified, the purpose of the report was to identify appropriate mitigation strategies. The Development Management Policies DPD and Site Allocations DPD both support the Core Strategy for Woking. The Core Strategy was subject to HRA that was able to conclude that no significant effects on European protected sites would occur as a result of the policies contained therein. The Core Strategy was adopted in 2012 and covers spatial planning within the Borough from 2010-2027.

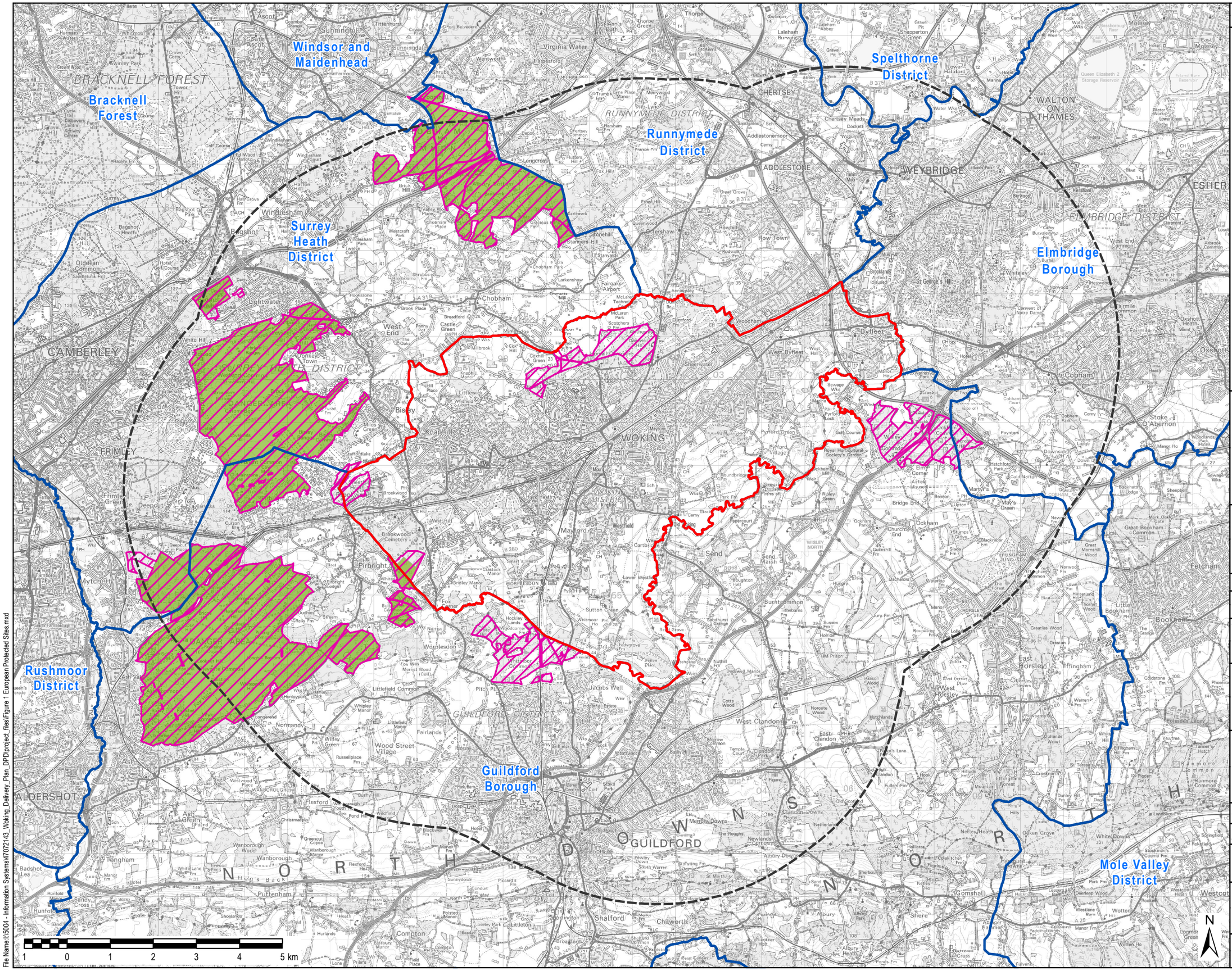
The current HRA document considers the Site Allocations DPD in the light of removal of some site allocations that were subject to HRA screening in April 2015, and the inclusion of new sites.

1.2 Legislation

The need for Appropriate Assessment is set out within Article 6 of the EC Habitats Directive 1992, and interpreted into English and Welsh law by the Conservation of Habitats & Species Regulations 2010. 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*" (Habitats Directive, Article 2(2)). This aim relates to habitats and species, not the European sites themselves, although the sites have a significant role in delivering favourable conservation status. European sites (also called Natura 2000 sites) can be defined as actual or proposed/candidate Special Areas of Conservation (SAC) or Special Protection Areas (SPA). It is also Government policy for sites designated under the Convention on Wetlands of International Importance (Ramsar sites) to be treated as having equivalent status to Natura 2000 sites.

The Habitats Directive applies the precautionary principle to protected areas. Plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of the site(s) in question. This is in contrast to the SEA Directive which does not prescribe how plan or programme proponents should respond to the findings of an environmental assessment; merely that the assessment findings (as documented in the 'environmental report') should be 'taken into account' during preparation of the plan or programme. In the case of the Habitats Directive, plans and projects may still be permitted if there are no alternatives to them and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network.

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, an Appropriate Assessment should be undertaken of the plan or project in question.



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LEGEND

- Woking Borough
- 5km buffer of Woking Borough
- Districts, UAs and Metropolitan Districts

Special Protection Area (SPA) Within 5km

- Thames Basin Heaths

Special Area of Conservation (SAC) Within 5km

- Thursley, Ash, Pirbright and Chobham

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File Name:\\5004 - Information Systems\47072143_Woking_Delivery_Plan_DPD\project_files\Figure 1 European Protected Sites.mxd

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 & Species Regulations 2010 (as amended)

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*".

1.3 Woking Borough

There is no pre-defined guidance that dictates the physical scope of a HRA of a document such as a Site Allocations DPD. Therefore, in considering the physical scope of the assessment we were guided primarily by the identified impact pathways rather than by arbitrary 'zones'. Current guidance suggests that the following European sites be included in the scope of assessment:

- All sites within the Woking Borough boundary; and
- Other sites shown to be linked to development within the Borough boundary through a known 'pathway' (discussed below).

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, Department for Communities and Local Government (CLG) guidance states that the AA should be '*proportionate to the geographical scope of the* [plan policy]' and that '*an AA need not be done in any more detail, or using more resources, than is useful for its purpose*' (CLG, 2006, p.6)[1].

There are two European sites which fall partially within Woking Borough - the Thames Basin Heaths (TBH) SPA and Thursley, Ash, Pirbright and Chobham SAC (which overlaps with the SPA).

During HRA of the Core Strategy it was possible to conclude, in consultation with Natural England, that no likely significant effects would occur on the Thames Basin Heaths SPA or other European sites under consideration. The HRA considered recreational pressure, proximity effects (urbanisation), effects on hydrology/ hydrogeology, invasive species introductions, reductions in air quality and trans-boundary/ cumulative effects in reaching this conclusion.

The HRA Screening exercise did make recommendations for further consideration of certain issues at the time of development of further Development Plan Documents as follows:

- '*It should be noted that whereas the potential…encroachment impacts on SPA, SAC and Ramsar sites in neighbouring Boroughs arising from Woking's Draft Core Strategy are covered by this HRA Screening, there has not been a joint approach by the Boroughs (similar to the Thames Basin Heaths Joint Strategic Partnership Board) in respect of potential cross boundary other urban encroachment impacts on SPA/SAC and Ramsar sites.*

[1] CLG (2006) Planning for the Protection of European Sites, Consultation Paper

- *Where such other urban encroachment impacts are anticipated on SPA, SAC and Ramsar sites close to Borough boundaries, the combined effects of developments from all contiguous Allocations Plans will have to be considered at the more site specific level to ensure that they do not exceed a critical threshold in terms of significant effects on conservation features.*

- *Potential transboundary mechanisms for cumulative other urban encroachment impacts on SPA, SAC and Ramsar sites beyond Woking Borough arising from the anticipated major developments/infrastructure…will require a further joint approach by the Boroughs. This will have to address the potential cumulative other urban encroachment impacts of these major developments/infrastructure projects on SPA/SAC and Ramsar sites close to Borough boundaries.*

- *This requirement is likely to be addressed as the respective Local Development Frameworks of the Boroughs develop, and possibly within the scope of Allocations DPDs, when the locations of proposed development become more site specific*.'

1.4 This report

Chapter 2 of this report explains the process by which the HRA has been carried out. Chapter 3 explores the relevant pathways of impact. Chapter 4 considers the Site Allocations and their potential to lead to adverse effects on the European sites considered within this HRA. Chapter 5 considers the European sites in more detail – designations, condition assessments and potential effects of any site allocations screened in for further consideration from Chapter 4. The key findings are summarised in Chapter 6: Conclusions.

2 Methodology

2.1 Key Principles

This section sets out the basis of the methodology for the HRA. AECOM has adhered to several key principles in developing the methodology – see Table 1.

Table 1. Key principles underpinning the methodology

Principle	Rationale
Use existing information	Make the best use of existing information to inform the assessment. This includes information gathered as part of appraisals of spatial development planning within Woking, and information held by Natural England, the Environment Agency and others.
Consult with Natural England, the Environment Agency and other stakeholders	Ensure consultation with Natural England for the duration of the assessment. We have ensured that we have utilised information held by them and others and taken on board their comments on the assessment process and findings.
Ensure a proportionate assessment	Ensure that the level of detail addressed in the assessment reflects the level of detail in the Plan (i.e. that the assessment is proportionate). With this in mind, the assessment has focused on information and impacts considered appropriate to the local level.
Keep the process as simple as possible	Endeavour to keep the process as simple as possible while ensuring an objective and rigorous assessment in compliance with the Habitats Directive and emerging best practice.
Ensure a clear audit trail	Ensure that the HRA process and findings are clearly documented in order to ensure a clearly discernible audit trail.

2.2 Process

The HRA is being carried out in the continued absence of formal Government guidance. The Department of Communities and Local Government (CLG) released a consultation paper on Appropriate Assessment of Plans in 2006[1]. As yet, no further formal guidance has emerged. However, Natural England and RSPB have produced their own informal internal guidance. Although there is no requirement for an HRA to follow either guidance (or other informal guidance), both have been referred to in producing this HRA.

Figure 2 below outlines the stages of HRA according to current draft CLG 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.

[1] CLG (2006) Planning for the Protection of European Sites, Consultation Paper

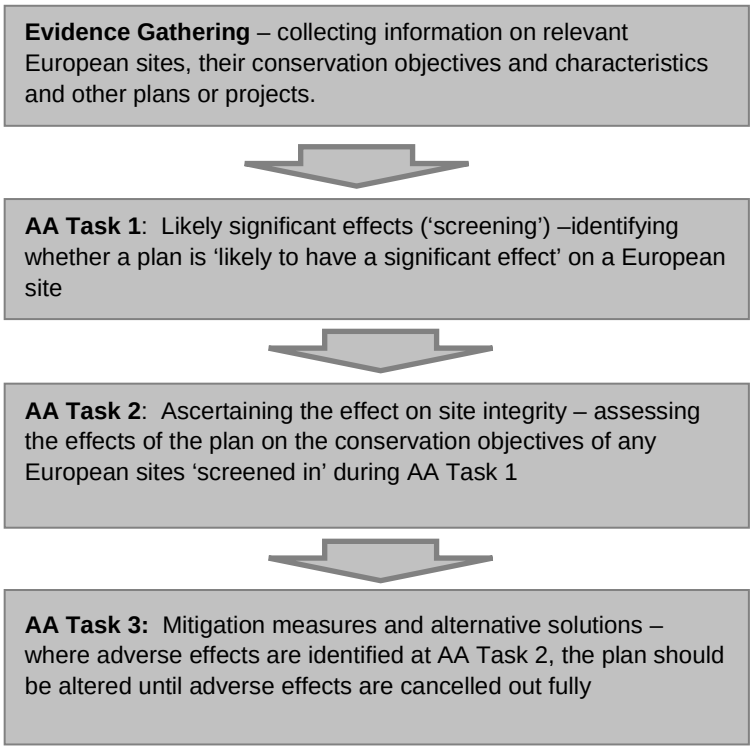

Figure 2. Four-Stage Approach to Habitats Regulations Assessment (Source: CLG, 2006)

2.3 Likely Significant Effects (LSE)

The first stage of any Habitats Regulations Assessment (AA Task 1) is a Likely Significant Effect (LSE) test - essentially a risk assessment to decide whether the full subsequent stage known as 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?"

The objective is to 'screen out' those plans and projects that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects upon European sites, usually because there is no mechanism for an adverse interaction with European sites.

The purpose of the current report is to undertake this exercise with regard to the Site Allocations DPD.

2.4 Confirming other plans and projects that may act 'in combination'

For the purposes of this assessment, we have determined that, due to the nature of the identified impacts, the key other plans and projects relate to the additional housing, transportation and commercial/industrial allocations proposed for other neighbouring authorities over the lifetime of the DPD. Spatial planning policies for Local Authorities surrounding Woking borough are at various stages of production, and Table 2 below indicates the most up to date information on quantum of delivery to be expected during the lifetime of the Woking Core Strategy.

Table 2. Housing levels that were to be delivered in authorities surrounding the Thames Basin Heaths SPA under Local Plans and Core Strategies

Local Authority	Total housing to 2029 unless stated	Source of data
Basingstoke & Deane	15,300	Basingstoke and Deane Revised Local Plan 2011 – 2029 (adopted May 2016)
Bracknell Forest	11,139 (to 2026)	Core Strategy Development Plan (adopted Feb 2008)
Elmbridge	3,375	Elmbridge Core Strategy (adopted Jul 2011)
Guildford	13,860 (to 2033)	Proposed Submission Local Plan (June 2016)
Hart	4,253	Hart Core Strategy (withdrawn Sept 2013)
Mole Valley	3,760 (to 2026)	Core Strategy (adopted 2009)
Runnymede	Up to 10,700 (to 2033)	Local Plan Issues, Options and Preferred Approaches (Jul 2016)
Rushmoor	6,350	Core Strategy (adopted Oct 2011)
Surrey Heath	3,240 (to 2028)	Core Strategy & Development Management Policies 2011- 2028 (adopted Feb 2012)
Windsor & Maidenhead	14,298 (to 2033)	Draft Borough Local Plan Consultation Dec 2016
Wokingham	13,230	Adopted Core Strategy Development Plan Document (adopted Jan 2010)

There are other plans and projects that are often relevant to the 'in combination' assessment, most notably Water Resource Management Plans and the Environment Agency's River Wey Catchment Abstraction Management Strategy (2012) and River Thames Catchment Abstraction Management Strategy (2014). These have all been taken into account in this assessment.

Table 3 summarises documents that we have reviewed to inform our assessment:

Table 3. Documents reviewed in order to inform this assessment

Document		Relevant contents
Woking Borough Council (2012)	Woking Core Strategy 2010-2027	• Provides the context in which the Site Allocations DPD should be considered
Woking Borough Council (2016)	Woking adoptedDevelopment Management Policies DPD	• Provides the context in which the Site Allocations DPD should be considered
Mayer Brown (2012)	HRA Screening of Woking's Draft Core Strategy	• Provides the context in which the Site Allocations DPD HRA should be considered
Environment Agency (2012)	The Wey Catchment Abstraction Licencing Strategy	• Sets out the Environment Agency's position regarding future abstraction within the Wey Catchment

Environment Agency (2014)	The Thames Catchment Abstraction Licencing Strategy	• Sets out the Environment Agency's position regarding future abstraction within the Thames Catchment
Woking Borough Council (2010)	Thames Basin Heaths Avoidance Strategy	• Woking's approach to development in consideration of the Thames Basin Heaths area.
Thames Basin Heaths Joint Strategic Partnership Board (2009)	Thames Basin Heaths SPA Delivery Framework	• Sets out the agreed Framework regarding the Thames Basin Heaths SPA
Natural England (2006)	Thames Basin Heaths Special Protection Area: Mitigation Standards for Residential Development. 26 May 2006.	• Avoidance and mitigation for recreational impacts on heathland SPA.
Environment Agency (various)	Stage 3 and 4 Appropriate Assessments: Review of Consents	• Understanding of existing conditions at European sites
Environment Agency (2006a)	Water Resources in the South East report to latest South East Plan housing provision and distribution received from SEERA. May 2006, for commentary to SEERA	• Water resources.
Affinity Water (June 2014)	Water Resources Management Plan	• Sets out the proposed approach to providing water resources in the future
Environment Agency (2006b)	Creating a Better Place: Planning for Water Quality and Growth in the South East. Version 10.4	• Sewage treatment capacity.
Surrey County Council (2011)	The Surrey Local Transport Plan, 2011 – 2026.	• Transport schemes.
Core Strategies and Local Plans for neighbouring local authorities	Spatial development policies for Guildford, Elmbridge, Rushmoor, and Surrey Heath	• Provides projected levels of housing for authorities surrounding Woking Borough

In preparing this HRA we have utilised data held on the following sources in order to inform on the current ecological status of relevant European sites:

- The UK Air Pollution Information System (www.apis.ac.uk); and
- MAGIC mapping its links to SSSI citations and the JNCC website (www.magic.defra.gov.uk)

3 Pathways of Impact

3.1 Introduction

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 Urbanisation

This impact is closely related to recreational pressure, in that they both result from increased populations within close proximity to sensitive sites. Urbanisation is considered separately as the detail of the impacts is distinct from the trampling, disturbance and dog-fouling that results specifically from recreational activity. The list of urbanisation impacts can be extensive, but core impacts can be singled out:

- Increased fly-tipping - Rubbish tipping is unsightly but the principle adverse ecological effect of tipping is the introduction of invasive alien species with garden waste. Garden waste results in the introduction of invasive aliens precisely because it is the 'troublesome and over-exuberant' garden plants that are typically thrown out[2]. Alien species may also be introduced deliberately or may be bird-sown from local gardens.

- Cat predation - A survey performed in 1997 indicated that nine million British cats brought home 92 million prey items over a five-month period[3]. A large proportion of domestic cats are found in urban situations, and increasing urbanisation is likely to lead to increased cat predation.

The most detailed consideration of the link between relative proximity of development to European sites and damage to interest features has been carried out with regard to the Thames Basin Heaths SPA.

After extensive research, Natural England and its partners produced a 'Delivery Plan' which made recommendations for accommodating development while also protecting the interest features of the European site. This included the recommendation of implementing a series of zones within which varying constraints would be placed upon development. While the zones relating to recreational pressure expanded to 5km (as this was determined from visitor surveys to be the principal recreational catchment for this European site), that concerning other aspects of urbanisation (particularly predation of the chicks of ground-nesting birds by domestic cats, but also including recreational pressure, fly tipping, increased incidence of fires and general urbanisation) was determined at 400m from the SPA boundary. The delivery plan concluded that the adverse effects of any development located within 400m of the SPA boundary could not be mitigated, in part because this was the range within cats could be expected to roam as a matter of routine and there was no realistic way of restricting their movements, and as such, no new housing should be located within this zone.

Woking Borough Council is a participatory organisation within the Thames Basin Heaths SPA Delivery Plan, including the prohibition on net new housing within 400m of the SPA.

3.3 Recreational pressure

Consultation for the HRA of the South East Plan (now revoked, with the exception of Policy NRM6 that seeks to protect the Thames Basin Heaths SPA) revealed that potentially damaging levels of

[2] Gilbert, O. & Bevan, D. 1997. The effect of urbanisation on ancient woodlands. British Wildlife 8: 213-218.
[3] Woods, M. et al. 2003. Predation of wildlife by domestic cats *Felis catus* in Great Britain. Mammal Review 33, 2 174-188

recreational pressure are already faced by many European sites. Recreational use of a site has the potential to:

- Cause disturbance to sensitive species, particularly ground-nesting birds such as woodlark and nightjar, and wintering wildfowl;
- Prevent appropriate management or exacerbate existing management difficulties;
- Cause damage through erosion; and
- Cause eutrophication as a result of dog fouling.

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.

The effects of recreation on heathland sites have been described in a series of English Nature Research Reports[4] [5] [6] [7] [8] [9]. It would appear that recreational pressure can have a significant adverse effect on the Annex 1 bird species for which the SPAs in this area are designated. Disturbance can have an adverse effect in various ways, with increased nest predation by natural predators as a result of adults being flushed from the nest and deterred from returning to it by the presence of people and dogs likely to be a particular problem. A literature review on the effects of human disturbance on bird breeding found that 36 out of 40 studies reported reduced breeding success as a consequence of disturbance[10]. The main reasons given for the reduction in breeding success were nest abandonment and increased predation of eggs or young. Over years, studies of other species have shown that birds nest at lower densities in disturbed areas, particularly when there is weekday as well as weekend pressure[11].

A number of studies have shown that birds are affected more by dogs and people with dogs than by people alone, with birds flushing more readily, more frequently, at greater distances and for longer (Underhill-Day, 2005). In addition, 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 faeces[12].

Underhill-Day (2005) 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%.

However these studies need to be treated with care. For instance, the effect of disturbance is not necessarily correlated with the impact of disturbance, i.e. the most easily disturbed species are not necessarily those that will suffer the greatest impacts. It has been shown that, in some cases, the most easily disturbed birds simply move to other feeding sites, whilst others may remain (possibly

[4] Liley, D. and R.T. Clarke (2002) – Urban development adjacent to heathland sites in Dorset: the effect on the density and settlement patterns of Annex 1 bird species. *English Nature Research Reports*, No. 463.
[5] Murison, G. (2002) – The impact of human disturbance on the breeding success of nightjar *Caprimulgus europaeus* on heathlands in south Dorset, England. *English Nature Research Reports*, No. 483.
[6] Land Use Consultants (2005) – Going, going, gone? The cumulative impact of land development on biodiversity in England. *English Nature Research Reports*, No. 626.
[7] Rose, R.J. and R.T. Clarke (2005) – Urban impacts on Dorset Heathlands: Analysis of the heathland visitor questionnaire survey and heathland fires incidence data sets. *English Nature Research Reports*, No. 624.
[8] Tyldesley, D. and associates (2005) – Urban impacts on Dorset heaths: A review of authoritative planning and related decisions. *English Nature Research Reports*, No. 622.
[9] Underhill-Day, J.C. (2005) – A literature review of urban effects on lowland heaths and their wildlife. English Nature Research Reports, No. 623.
[10] Hockin, D., M. Oundsted, M. Gorman, D. Hill, V. Keller and M.A. Barker (1992) – Examination of the effects of disturbance on birds with reference to its importance in ecological assessments. *Journal of Environmental Management*, **36**, 253-286.
[11] Van der Zande, A.N., J.C. Berkhuizen, H.C. van Letesteijn, W.J. ter Keurs and A.J. Poppelaars (1984) – Impact of outdoor recreation on the density of a number of breeding bird species in woods adjacent to urban residential areas. *Biological Conservation,* **30**, 1-39.
[12] 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.

due to an absence of alternative sites) and thus suffer greater impacts on their population[13]. A recent literature review undertaken for the RSPB[14] also urges caution when extrapolating the results of one disturbance study because responses differ between species and the response of one species may differ according to local environmental conditions. These facts have to be taken into account when attempting to predict the impacts of future recreational pressure on European sites.

It should be emphasised that recreational use is not inevitably a problem. Many European sites are also National Nature Reserves (e.g. Thursley Common) or nature reserves managed by wildlife trusts and the RSPB. At these sites, access is encouraged and resources are available to ensure that recreational use is managed appropriately.

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 Plans (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 Woking, opportunities for this are limited since, according to Natural England, the majority of Thames Basin Heath component SSSI units are in favourable or favourable 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.

3.4 Atmospheric pollution

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.

Table 4. 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 nitrogen emissions may cancel out any gains produced by reduced suplhur 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.

[13] Gill et al. (2001) - Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation,* **97**, 265-268

[14] Woodfield & Langston (2004) - Literature review on the impact on bird population of disturbance due to human access on foot. *RSPB research report* No. 9.

Pollutant	Source	Effects on habitats and species
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.	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.

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 Plans. NO_x emissions, however, are dominated by the output of vehicle exhausts. 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 comparison[15]. 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.

According to the World Health Organisation, the critical NO_x concentration (critical threshold) for the protection of vegetation is 30 μgm^{-3}; the threshold for sulphur dioxide is 20 μgm^{-3}. In addition, ecological studies have determined 'critical loads'[16] of atmospheric nitrogen deposition (that is, NO_x combined with ammonia NH_3) for key habitats within European sites.

Local air pollution

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'[17].

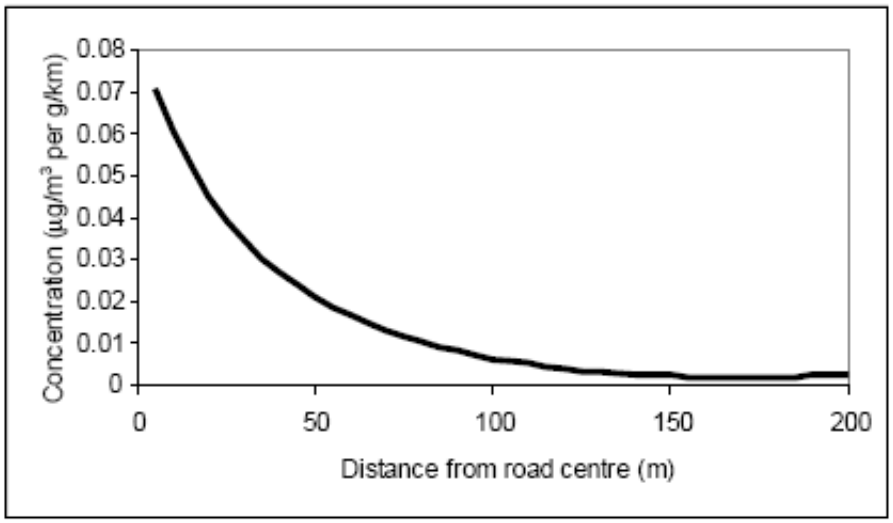

Figure 3. Traffic contribution to concentrations of pollutants at different distances from a road (Source: DfT)

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 Site Allocations DPD. Although the HRA of the Core Strategy was able to screen out effects of reduced air quality, the Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC do lie within 200m of numerous roads that may be regularly used by vehicle journeys arising from within Woking borough as a result of the increased population (M25, A320, A322, A324, A245 and A3046 within Woking). In scoping this HRA with Natural England, it was therefore concluded that air quality should be included within the scope of this assessment. The location of these roads in relation to the SAC and SPA is shown in Figure 1.

Diffuse air pollution

In addition to the contribution to local air quality issues, development can also contribute cumulatively to an overall deterioration in background air quality across an entire region. In July 2006, when this issue was raised by Runnymede Borough Council in the South East, Natural England advised that their Local Development Framework 'can only be concerned with locally emitted and short range locally acting pollutants' as this is the only scale which falls within a local

[15] 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

[16] The critical load is the rate of deposition beyond which research indicates thatadverse effects can reasonably be expected to occur

[17] www.webtag.org.uk/archive/feb04/pdf/feb04-333.pdf

authority remit. It is understood that this guidance was not intended to set a precedent, but it inevitably does so since (as far as we are aware) it is the only formal guidance that has been issued to a Local Authority from any Natural England office on this issue.

In the light of this and our own knowledge and experience, it is considered reasonable to conclude that diffuse pan-authority air quality impacts are the responsibility of higher tier strategies or national government, both since they relate to the overall quantum of development within a region (over which individual districts have little control), and since this issue is best addressed at the highest pan-authority level. Diffuse air quality issues will not therefore be considered further within this HRA.

3.5 Water abstraction

The South East is generally an area of high water stress[18].

Development within Woking Borough over the plan period will increase water demand.

According to the Wey Catchment Abstraction Management Strategy Woking Borough lies within the following Water Resource Management Units:

- Hoe Stream; and
- Weybridge

The assessment for water availability within these Wey catchment units is that there is water available for licensing, however, this is overridden by the wider Thames Catchment Abstraction Management Strategy to become no water available for licensing.

Woking borough lies within Affinity Water's Wey Water Resource Zone. According to the Water Resource Management Plan (2014) this water resource zone is calculated to be in deficit within the plan period. However Affinity Water have also identified the need to employ measures to ensure sustainable supply. The determination of surplus or deficit does take account of environmental limits and the implication is that there should be no requirement for damaging levels of abstraction from any of the aquifers connected to these European sites.

Therefore this pathway of impact is not considered further in this report.

3.6 Water quality

Development within Woking Borough over the plan period will increase wastewater production. Wastewater from the District is treated by Thames Water and does not discharge into European sites.

Moreover, research carried out by the Environment Agency has indicated that future sewage treatment capacity at sewage treatment works serving Woking would be adequate to deal with projected growth, at least to 2026[19] and will therefore not have an adverse effect upon receiving waters.

Therefore this pathway of impact is not considered further in this report.

[18] Environment Agency and Natural Resources Wales (2013). Water Stressed Area – Final Classification.
[19] Environment Agency. May 2006. Creating a Better Place: Planning for Water Quality and Growth in the South East.

4 HRA Screening of Woking Site Allocations

The following tables present a summary of each site allocation that has been put forward for consideration. Table 5 shows the proximity of proposed residential or mixed use sites to the Thames Basin Heaths SPA to illustrate the potential for recreational disturbance. Major roads that run within 200m of the SPA are indicated to illustrate the most likely route by which transport related air quality effects should be considered. Table 6 indicates the proximity of potential SANG allocations to the SPA and the level of housing the SANGS are considered to be able to serve according to the Site Allocations DPD.

Table 5. HRA Screening of Woking Draft Local Plan Site Allocations for Thames Basin Heaths SPA

Site Allocation Reference	Details of Development	Distance to SPA	Major roads passing within 200m of SPA that are most likely to experience increases in traffic
GB1	Green Belt Site – 37 dwellings	1.1km	A324
GB2	Green Belt Site – 10 traveller pitches in total with GB3	1.1km	A324
GB3	Green Belt Site – up to 12 traveller's pitches	1.3km	A320
GB4	Green Belt Site - 188 dwellings; and a school	2km	A320
GB7		1.3km	A320
GB5	Green Belt Site - 592 dwellings	1.6km	M25
GB6	Green Belt Site - Protected for employment	2km	M25
GB7-14	Open Space and SANG sites	NA	NA
GB15	Infrastructure site	0.3km	A324
GB16	Non-residential (transport)	Directly adjacent to SPA	A245/A320
SG1	Safeguarded site (2027-2040) – at least 1,200 new dwellings	0.3km	A245/A320
SG2	Safeguarded site (2027-2040)	2.1km	A320
UA1	Mixed residential, up to 12 dwellings	1.6km	M25
UA6	100 dwellings and employment	1.6km	A320
UA10	85 dwellings and employment	1-2km	A320
UA11	Up to 33 dwellings	1-2km	A320
UA14	55+ dwellings, employment and retail	1-2km	A320
UA16	125+ dwellings ,employment and retail	1.7km	A320
UA17	Mixed use development – offices, warehouse, energy station	1.6km	A320
UA2	50 dwellings and employment	1.2km	A320
UA5	46 dwellings and employment	1.3km	A320
UA8	200+ dwellings, employment and retail	2km	A320
UA9	392 dwellings, employment and retail	2km	A320
UA7	149+ dwellings, employment and retail	1.5km	A320
UA18	67+ dwellings and employment	1.4km	A320
UA4	14+dwellings and employment	1.9km	A320
UA12	55+ dwellings and employment	1-2km	A320

Site Allocation Reference	Details of Development	Distance to SPA	Major roads passing within 200m of SPA that are most likely to experience increases in traffic
UA20	Employment	1.4km	A320
UA21	Employment	1.4km	A320
UA15	Employment	1.6km	A320
UA13	Employment	1.1km	A320
UA24	11+dwellings	1-2km	A320
UA25	20 bed hospice	1.0km	A320
UA22	12+ dwellings and employment	1-2km	A320
UA26	67+ dwellings	1.2km	A320
UA27	16+ dwellings	1.2km	A320
UA28	55 dwellings	3km	A320
UA29	12 dwellings	2.9km	A320
UA30	10+ dwellings	3.9km	None
UA31	10 dwellings and retail	3.5km	None
UA33	104+ dwellings and employment	1.2km	A320
UA37	77 dwellings and employment	1.1km	A320
UA38	21+ dwellings	1.3km	A320
UA36	10+ dwellings	1.3km	A320
UA32	250+ dwellings and retail	700m	A320
UA34	Employment	800m	A320
UA35	Employment	900m	A320
UA40	250+dwellings	1.3km	A324
UA39	88+ dwellings	1.6km	A320
UA44	91+ dwellings and retail	1.8km	A320
UA45	40+ dwellings and employment	1.8km	A320
UA47	48+ dwellings and employment	1.8km	A320
UA41	422+ dwellings	1.8km	A320
UA42	135+ dwellings, employment and retail	1.9km	A320
UA48	11+ dwellings	1.8km	A324
UA19	Employment	1.3km	A320
UA23	Non-residential (transport)	1.6km	A320
UA46	10+ dwellings and employment	1.8km	A320
UA50	12 dwellings and retail	3km	M25
UA52	28+ dwellings	3km	M25
UA49	Employment	3.0km	M25
UA3	14+ dwellings and employment	1.2km	A320
UA43	Employment	2.0km	A320
UA51	91+ dwellings, employment and retail	2.6km	A245
UA53	40 dwellings and leisure	2.9km	A320

All residential development proposed lies within 400m-5km of the Thames Basin Heaths SPA and will therefore require SANG provision and SAMM contributions. The need for this has already been identified at a strategic level.

Table 6. HRA Screening of Woking Draft Local Plan Site Allocations for SANG Delivery in Relation to Thames Basin Heaths SPA

Site Allocation Reference	Details of Development	Distance to SPA	Number of dwellings that can be supported and catchment area
GB7	SANG – 8.06ha	0.2km	418 dwellings within 2km
GB9	SANG – 17.4ha	1.8km	901 dwellings within 4km
GB10	SANG – 9.9ha	3.1km	674 dwellings within 2km
GB11	SANG – 9.52ha	3.1km	493 dwellings within 2km

5 Thursley, Ash Pirbright and Chobham SAC and Thames Basin Heaths SPA

5.1 Introduction

Thursley, Ash, Pirbright and Chobham SAC and the Thames Basin Heaths Special Protection Area consist of a number of fragments of lowland heathland. The predominant habitats are dry and wet heath but the designations also include areas of deciduous woodland, gorse scrub, acid grassland and mire, as well as associated conifer plantations. Around 75% of the SPA has open public access being either common land or designated as open country under the Countryside and Rights of Way Act 2000.

The component SSSIs of the SPA, Horsell Common SSSI, and Ash to Brookwood Heaths SSSI lie within or partly within Woking Borough, whilst Whitmoor Common SSSI, Colony Bog and Bagshot Heaths SSSI and Ockham and Wisley Commons SSSI lie adjacent to it. Ash to Brookwood Heaths SSSI and Colony Bog and Bagshot Heaths SSSI also form part of the SAC designation.

The location of the Thames Basin Heaths SPA means that levels of development in surrounding authorities has led to potential for recreational pressure and disturbance. English Nature (now Natural England) published a Draft Delivery Plan for the Thames Basin Heaths SPA in May 2006, partly in response to the European Court of Justice ruling of October 2005. This is updated by the 'Thames Basin Heaths Special Protection Delivery Framework' published by the Thames Basin Heaths Joint Strategic Partnership Board in January 2009 These documents aim to allow a strategic approach to accommodating development by providing a method through which local authorities can meet the requirements of the Habitats Regulations through avoidance and mitigation measures.

In addition Woking Borough Council has produced a Thames Basin Heaths Avoidance Strategy (2009-2014), which has identified that between 400m and 5km of the SPA boundary, development will only be possible if it can demonstrate adequate avoidance or mitigation of significant adverse effects through recreational pressure.

5.2 Features of European interest[20]

Thursley, Ash, Pirbright and Chobham qualifies as a SAC for its habitats. The site contains the Habitats Directive Annex I habitats of:

- Wet heathland with cross-leaved heath
- Dry heaths: This site contains a series of large fragments of once-continuous heathland
- Depressions on peat substrates

Thames Basin Heaths SPA qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:

- Nightjar *Caprimulgus europaeus*: 7.8% of the breeding population in Great Britain (count mean, 1998-1999);
- Woodlark *Lullula arborea*: 9.9% of the breeding population in Great Britain (count as at 1997);

[20] 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.

- Dartford warbler *Sylvia undata*: 27.8% of the breeding population in Great Britain (count as at 1999).

These species nest on or near the ground and as a result are susceptible to predation and disturbance.

5.3 Conservation objectives

The Conservation Objectives for the European interests on the SAC are, subject to natural changes:

- to maintain*, in favourable condition, the wet heathland with cross-leaved heath, dry heaths and depressions on peat substrates.

The Conservation Objectives for the European interests on the SPA are, subject to natural changes:

- to maintain*, in favourable condition, the habitats for the populations of Annex 1 bird species+ of European importance, with particular reference to: lowland heathland and rotationally managed plantation.

* maintenance implies restoration if the feature is not currently in favourable condition.
+ Nightjar, woodlark and Dartford warbler.

The Site Improvement Plan for the Thames Basin Heaths SPA[21] indicates the following threats that, at the least, are identified as requiring investigation:

- Public access/ disturbance.
- Undergrazing.
- Forestry and woodland management.
- Hydrological changes.
- Inappropriate scrub control.
- Invasive species.
- Wildfiere/ arson.
- Air pollution.
- Feature location/ extent/ condition unknown.
- Military.
- Habitat fragmentation.

5.4 Key environmental conditions

The key environmental conditions that support the features of European interest have been defined as:

- Appropriate management.
- Management of disturbance during breeding season (March to July).
- Minimal air pollution.
- Absence or control of urbanisation effects, such as fires and introduction of invasive non-native species.
- Maintenance of appropriate water levels.
- Maintenance of water quality.

[21] http://publications.naturalengland.org.uk/publication/6249258780983296

5.5 Potential effects of the plan

Two potential impacts of the Site Allocations DPD upon the SAC and SPA have been identified:

- Recreational disturbance.
- Air pollution.

Recreational disturbance

Previous HRA exercises carried out on behalf of Woking's Core Strategy development and for local authorities surrounding Woking have determined that ground-nesting birds are vulnerable to disturbance, particularly from walkers and dogs. Disturbance can have an adverse effect in various ways, with increased nest predation by natural predators as a result of adults being flushed from the nest and deterred from returning to it by the presence of people and dogs likely to be a particular problem. Several studies have demonstrated that site-specific information is required to understand the relationship between recreational use of a site and any disturbance effects.

An estimated 5 million visitors use the Thames Basin Heaths per annum and of those people interviewed 13% had arrived on foot from less than 1.5km away and 83% had driven from within 5km[22]. The survey was conducted at a number of access points to the SPA and reported a positive correlation between the number of visitors recorded and both the proximity of the access point to a residential area and the amount of parking available.

The population of the 11 authorities around the Thames Basin Heaths SPA is forecast to increase from 1.19 million in 2003 (1.21 million in 2006) to 1.3 million in 2026 (2003 sub-national population projections). This 10% increase in population is notwithstanding the forecasted reduction in average household size or any changes in population growth trends subsequent to the 2003 statistics. The projected 10% growth in population (assuming similar usage of recreational facilities) could lead to at least comparable increase in visits to the Thames Basin Heaths[23]. Such an increased use could have a cumulative impact upon the SPA.

Effects of the plan could occur due to housing development leading to increased recreational pressure. However, this would effectively be mitigated by implementation of the strategically agreed Thames Basin Heaths Delivery Framework in Woking with the provision of 8ha/1000 population of Suitable Accessible Natural Greenspace (SANG) and contributions to the Strategic Access Management and Monitoring (SAMM) programme.

Given the proximity of the majority of Woking Borough to the Thames Basin Heaths SPA, all development would occur within 5km of the SPA, and therefore all development within Woking will require SANG.

The Thames Basin Heaths SPA Avoidance Strategy (2009-2014) developed by Woking Borough in accordance with the Thames Basin Heaths Delivery Framework has identified that between 400m and 5km of the SPA boundary, development will only be possible if it can demonstrate adequate avoidance or mitigation of significant adverse effects due to recreational pressure.

In the aforementioned Avoidance Strategy, a three-part strategy is set out to avoid or mitigate adverse effects:

- The provision of SANGS to attract people away from the SPA and hence reduce pressure on it;
- Access management measures on, and monitoring of, the SPA to reduce the impact of people who visit the SPA (SAMM); and
- Habitat management of the SPA, which will improve the habitat for the ground nesting birds.

[22] Liley, D. et al. 2005. Visitor access patterns on the Thames Basin Heaths. *English Nature Research Report,* English Nature, Peterborough

[23] Submission of Wokingham Borough Council (7265) to the Thames Basin Heaths Technical Sessions for the Examination in Public of The South East Plan

New development can provide SANGS (or make a contribution toward their provision) in addition to making a financial contribution to SAMM, and in so doing contribute toward meeting the requirements of the Habitats Directive.

This approach is reflected in the adopted Woking BC Core Strategy, which has a specific policy regarding the Thames Basin Heaths (policy CS8). This includes that:

"*New residential development beyond 400m threshold but within 5 kilometres of the SPA boundary (in a straight line) will be required to make an appropriate contribution towards the provision of Suitable Alternative Natural Greenspace (SANG) and the Strategic Access Management and Monitoring (SAMM). Details of how the contribution will apply are set out in the Council's Thames Basin Heaths Special Protection Area Avoidance Strategy 2010 – 2015*.

An applicant may wish to provide SANG as part of development. Where that is the case, all relevant standards including standards recommended by Natural England should be met and a contribution will have to be made towards SAMM.

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."

The Thames Basin Heaths Special Protection Area Delivery Framework identifies that new development between 400m and 5km from the SPA will need to develop or contribute to SANGS capacity.

Natural England's guidance is as follows:

- No development will be possible within 400m of the SPA.
- SANGS of 12ha or less can supply a development within a catchment area of 400m-2km;
- SANGS of 12-20ha are sufficient to supply a 4km radius;
- SANGS of 20+ha can supply 5km.

All of the proposed development within Woking lies within 400m-5km of the Thames Basin Heaths Special Protection Area, as indicated in Table 5, and therefore all new development requires provision of sufficient SANG. Woking have identified sufficient SANG across the Borough to cover the quantum of development committed to in the Core Strategy. The Green Belt review has provided further options for development locations (though not an extra quantum of development) as set out within site allocations indicated in Table 5.

Woking Borough Council has confirmed in its Site Allocations document that sufficient SANG exists at a rate of 8ha/1000 population to mitigate for the delivery of 4,964 new dwellings over the lifetime of the Core Strategy (2010-2027). Natural England stated in early discussion over this HRA that before the plan is submitted to the Secretary of State it will be necessary for each housing site to be explicitly allocated to a particular SANG, or for it to be able to confirm that it can provide a bespoke SANG. At this stage that apportionment exercise remains to be undertaken by the Council. This HRA report will be updated to reflect the apportionment of SANG to allocated sites.

It is therefore possible at this stage to confirm that there will be no LSE overall as a result of Woking meeting their housing requirements but it is not yet possible to confirm which individual development sites are allocated to which SANG and therefore which are demonstrably deliverable. The availability of SANG is recognised by the Council as a fundamental constraint and they have confirmed that any site which cannot be apportioned to a particular SANG, or provide a bespoke SANG, will not be allocated.

Thursley, Ash, Pirbright and Chobham SAC is also vulnerable to recreational pressure through pathways such as trampling of vegetation and erosion. However, the measures taken to protect the Thames Basin Heaths SPA from recreational pressure will also apply to the SAC, since the designations overlap in the small part of Woking Borough in which the SAC occurs.

Once individual allocated sites have been linked to particular SANG, this will protect both the SPA and SAC from excessive recreational pressure and it could then be concluded that there would be no LSE as a result of the plan via this pathway.

Non-Recreational Disturbance

Proposed allocation GB16 lies adjacent to the SPA. The project is to upgrade the existing road junction, and there is therefore potential for disturbance and reduced air quality on the adjacent SPA as a result of the construction process. It is recommended that a project specific HRA should be undertaken for this development. In order to avoid likely significant effects of the Thames Basin Heaths SPA it is recommended that the project should consider avoidance of nesting season for the birds for which the SPA is designated (February to September).

Air Quality

Modelling of transport movements and associated air quality undertaken in support of the Woking Core Strategy concluded that no significant effects would occur on European protected sites. The HRA undertaken for the Woking Core Strategy in 2012 identified that the Thames Basin Heaths SPA was sensitive to air quality within 200m of the A245, A320 and A322 within the Borough. The HRA concluded that no likely significant effects would arise on the Thames Basin Heaths SPA through reduced air quality as a result of development proposed within Woking.

The air quality modelling was undertaken for a quantum of housing that has not changed since the Core Strategy was adopted. Nonetheless, following discussion with Natural England over the scope of the current HRA, it was concluded that in order to present a robust approach to determination of the effect of spatial development within the Borough on air quality at European sites housing scenarios should be re-appraised for major roads passing within 200m of the European sites that could be subject to increased traffic as a result of such development.

The following eight road locations were identified as requiring assessment, based on proximity to European sites:

- M25, junction 10-11
- A322 from Limecroft Road south to A324
- A322 at Bisley
- A322 between Heath House Road north to B380
- A3046 Philpot Lane to Kettlewell Hill
- A320 Whitmoor Lane to Burdenshott Road
- A320 between Six Crossroads roundabout and McLaren roundabout
- A324 between Brunswick Road and Connaught Crescent

Traffic movements generated on these roads by proposed development were modelled for three housing scenarios (each of which were subject to transport modelling for Woking Borough's Green Belt Boundary Review):

- Core Strategy housing;
- Core Strategy housing plus potential for 500 new dwellings on green belt land at Mayford; and
- Core Strategy housing plus potential for 592 new dwellings on green belt land at West Byfleet.

The latter two scenarios are intended to represent the opportunities for green belt land release identified between 2015 and 2027 by proposal sites GB3, GB5 and GB6.

Although a potentially substantial allocation of residential development (1,200+ new dwellings) could be delivered at Martyrs Lane, Horsell (site SG1), at present this is purely safeguarded against alternative uses and thus sterilisation of the site. The allocation would not come forward for development until 2027-2040 and will only be realised at the time of a future review of the Core Strategy and/or Site Allocations DPD. At this stage specific key requirements to enable development to be acceptable would be set out. This would be the appropriate point at which to undertake a HRA screening update that would include the potential effect of delivery of this site in updating road traffic scenarios and air quality modelling.

Department for Transport Guidance as expressed in the Design Manual for Roads and Bridges (DMRB)[24] states that the first process in determining air quality impacts from road schemes is to determine whether the road in question is an 'affected road' which is defined as, among other criteria, if it will experience an increase in flows of more than 1,000 Annual Average Daily Traffic (AADT) as a result of the planned development. Transport modelling undertaken for this HRA confirmed that the 1,000 AADT threshold would be exceeded as a result of the plan, on all roads and for all scenarios.

Air quality calculations were therefore undertaken. The results of the air quality calculations are provided in Appendix 1. Assessment of air quality changes due to development in Woking under each new housing scenario ('do something' scenarios) was compared to the change that would occur due to background changes in traffic flow in response to background levels of population growth minus Core Strategy allocations ('do minimum' scenario), at various distances from the relevant roads, up to 200m. The modelling takes into account background improvements in NOx concentrations that are expected by 2025 due to improving emissions technology and other measures being nationally deployed to tackle background air quality.

Environment Agency guidance, to which Natural England also subscribe, advises that '*Where the concentration within the emission footprint [i.e. the contribution of the project/plan in question] in any part of the European site(s) is less than 1% of the relevant long-term benchmark (EAL, Critical Level or Critical Load), the emission is not likely to have a significant effect alone or in combination irrespective of the background levels*'. However, this does not mean that an increase in deposition rate equivalent to more than 1% of the critical level/load will lead to an adverse effect, but rather that further consideration is required.

The Site-Relevant Critical Load function on the UK Air Pollution Information System identifies that the appropriate minimum rate of nitrogen deposition to utilise as the 'critical load' for the SPA is 10 kg/N/ha/yr. The critical level for NOx concentrations is nationally set at 30 μgm^{-3} and is not habitat specific.

Air quality modelling of the roads and scenarios identified that in no cases was nitrogen deposition found to exceed 1% of the critical load, but that 1% of the critical load for NOx is exceeded at the following locations for all scenarios tested:

- A3046, immediately adjacent to the road, but declining to below 1% by 50m from the roadside;
- A322 (Bisley) at 20m from roadside, but declining to below 1% by 70m from the roadside; and
- A320 (Six Crossroads to McLaren roundabouts) immediately adjacent to the road, but declining to below 1% by 50m from the roadside.

In other words, NOx concentrations would only deteriorate to a level greater than 1% of the critical level at relatively close distances to the carriageway. These are the locations which are least likely to be used by SPA birds. Moreover, none of these scenarios would result in exceedence of the $30ugm^{-3}$ critical level for NOx. Therefore, although housing development in Woking would result in a contribution to air quality changes that is greater than trivial, the total NOx concentrations would remain below the potential threshold above which adverse effects may occur.

[24] Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1: Air Quality

Nonetheless, as discussed in the following section and in line with the approach being taken by other Thames Basin Heaths authorities, recommendations are made for Woking to participate in a collaborative monitoring and response partnership relating to traffic related air quality at Thames Basin Heaths SPA.

In Combination Effects

The HRA of the Woking Core Strategy identified several developments outside of Woking that could act 'in combination' with Woking's policies to lead to likely significant effects on European sites. The HRA primarily considered the effect on European sites beyond Woking Borough, but we would consider that it is also important to account for 'in combination' effects from development in surrounding Local Authorities on European sites that also lie within Woking Borough.

It was noted that the Borough members of the Thames Basin Heaths Joint Strategic Partnership Board have Avoidance Strategies to protect the SPA from excess recreational pressure, and this remains the case. All partners have identified SANGS or the requirement for SANGS at levels in alignment with those required by the Avoidance Strategies, and therefore with this in place it is possible to conclude no likely significant effects from Woking's Site Allocations DPD in combination with other plans and projects through recreational pressure.

Hydrological effects have been considered, but given the fact that the heathland SAC and SPA are relatively insensitive to water flows and levels; that the relevant water companies for Woking identify that sufficient measures are in place in order to supply the Borough; and that the EA CAMS for the region will protect against damaging levels of abstraction, then 'in combination' effects due to reduced water availability on the SAC and SPA are screened out.

The major mechanism by which 'in combination' effects could arise from the Woking's DPDs is through reduced air quality as a result of traffic increases on major roads that run through surrounding local authorities and within 200m of European protected sites.

Transport and air quality modelling has been undertaken for surrounding authorities as part of their spatial planning. Of greatest relevance to developments in combination with those in Woking are Guildford and Surrey Heath since major roads within Woking then pass within 200m of the Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC within these other two local authorities.

Transport and air quality modelling has been undertaken on behalf of Guildford Borough as part of their Local Strategies and Sites planning and has been able to conclude that traffic along the A320 and A324 as a result of their Proposed Submission DPD would not lead to likely significant effects on European sites. The modelling scenario for the A322 indicated that significant reductions in air quality (NOx) on the Thames Basin Heaths SPA would occur only within 50m of the roadside. Modelling for the M25 indicated that the proposed development would result in greater than 1% of the Critical Level for NOx at Thames Basin Heaths SPA being exceeded up to 200m from the roadside.

The HRA of the Surrey Heath Core Strategy (2011)[25] was able to conclude that "*an effective policy framework exists to enable the delivery of sustainable transport measures to mitigate the effects of development within the DPD (when considered 'in combination' with the other Thames Basin Heaths authorities rather than in itself) to an adverse air quality effect associated with increased traffic on the M3, A3095 and A322 as they traverse the Thames Basin Heaths SPA and Thursley, Ash, Pirbright & Chobham SAC*."

For spatial planning in Guildford and Surrey Heath, the effective policy framework considered sufficient to mitigate the effects of development on air quality on the SPA and SAC has included collaborative working with other local authorities to monitor air quality and the success of measures to improve air quality.

The areas of the Thames Basin Heaths SPA where modelling has demonstrated that road traffic increases as a result of development in Woking will lead to an increase in NOx of over 1% of the critical load for sensitive habitats are areas unlikely to be used by birds for which the SPA is

[25] URS Scott Wilson (2011). Surrey Heath Core Strategy and Development Management Policies Habitat Regulations Assessment of the Proposed Submission DPD incorporating amendments made post-suspension

designated. This is due to the fact that these species generally show avoidance of busy roads, with the associated noise and disturbance issues that arise. On these ground therefore an in combination effect on the SPA is unlikely to arise.

There may be an in combination effect on the SAC, which 1% of the critical load is exceeded in close proximity to the A322 at Bisley, but the area involved is extremely small, and any effects are likely to be subtle as the area closest to the roadside is the area most likely to be already affected by other road influences e.g. salt runoff, drainage and the original road construction works, and the effect of atmospheric nitrogen deposition can be dwarfed by the effect of these influences or habitat management).

Although when taken as a single unit, the Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC may be subject to in combination effects due to traffic generation on numerous roads in neighbouring boroughs, these effects appear to be occurring very close to the roads in question, leading to a conclusion that widespread in combination effects are likely, but not significant, and should be best addressed through collaborative approaches by all authorities surrounding the Thames Basin Heaths.

Nonetheless, it is considered that the local authority should deploy the same measures that the other Thames Basin Heaths have committed to in their Local Plans.

5.6 Recommendations

Air Quality

In consultation on Local Plans and Core Strategies for surrounding local authorities, Natural England has referred to the following mitigation measures that could be included in Local Plan Strategies:

- 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.

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 dwarfed by changes in management regime. Moreover, it is rarely possible to separate the effects of atmospheric nitrogen deposition and other causes and 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.

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.

This is in line with the precautionary principle as set out in EC Guidance[26] 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

[26] European Commission (2000): Communication from the Commission on the use of the Precautionary Principle.

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'.

The Council therefore should commit to working with other local authorities, land managers, and strategic highway authorities to develop a framework by which air quality measures can be linked to monitoring of the air quality in the European site before and for a number of years after introduction of the measures, such that further measures[27] can be devised if the air quality does not improve. In making these assessments the critical load for the relevant habitat should be used as the target for assessment. In its adopted Core Strategy, the Council does commit to '*proactively work in partnership to deliver projects of cross-boundary significance such as the strategic monitoring and mitigation of Thames Basin Heaths Special Protection Areas...*'

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 Core Strategy period.

The Development Management Plan contains measures that should aim to maintain good air quality associated with new development. Policy DM6 states that appropriate schemes of mitigation must be provided for new developments that, individually or cumulatively, would have potential to result in reductions in air quality. The Council will require impact assessments on the Thames Basin Heaths SPA to consider air quality reductions, followed if necessary by appropriate avoidance or mitigation for any new developments. These should include measures to encourage modal shift and behaviour to reduce the need for vehicle journeys, including integration of new development with local facilities and opportunities.

Proposed allocation GB16 lies adjacent to the SPA. The project is to upgrade the existing road junction, and there is therefore potential for disturbance and reduced air quality on the adjacent SPA as a result of the construction process. It is recommended that a project specific HRA should be undertaken for this development and that this is included as a requirement for this allocation within the Site Allocations DPD. In order to avoid likely significant effects of the Thames Basin Heaths SPA it is recommended that the project should incorporate standard industry measures to avoid air pollution (and also water pollution) through a Construction Environment Management Plan (CEMP) or similar.

6 Conclusions

At this stage, the Woking Site Allocations DPD has not been fully screened out as having no likelihood of leading to significant adverse effects on European sites, for the following reason:

Recreational Pressure on Thames Basin Heaths SPA

It is still necessary to confirm that each site allocation proposed will have sufficient SANG to serve the increased population that will occupy the development. Whilst it is not anticipated that this would be likely to lead to concerns over deliverability of new housing, as Woking has sufficient overall SANG capacity to cope with the quantum of housing proposed, nonetheless, the exercise should be completed prior to final conclusion of no likely significant effects on European sites.

The Woking Site Allocations DPD has been screened out as having no likelihood of leading to significant adverse effects on European sites through effects on:

Air Quality

In its adopted Core Strategy, the Council does commit to '*proactively work in partnership to deliver projects of cross-boundary significance such as the strategic monitoring and mitigation of Thames Basin Heaths Special Protection Areas...*'Contribution toward a monitoring framework by which air quality measures can be linked to the air quality in the European site before and for a number of years after introduction of measures to improve air quality across the Borough is an important aspect of such collaboration, such that further measures[28] can be devised if the air quality does not improve. In making these assessments the critical load for the relevant habitat should be used as the target for assessment.

Recommendation for Allocation GB16

Proposed allocation GB16 lies adjacent to the SPA. The project would involve upgrade of the existing road junction, and therefore there is potential for disturbance and reduced air quality on the adjacent SPA as a result of the construction process. It is recommended that a project specific HRA should be undertaken for this development should it be approved, and that this is included as a requirement for this allocation within the Site Allocations DPD.

Appendix 1 - Air Quality Modelling

Scenario B – Core Strategy

Table 1: NO_X Annual Mean Background Pollutant Concentrations

Site	Ecological Site	Ecological Designation	Nearest Link Road to Eco Site	1 km x 1 km OS Grid Square	NOx Background Concentrations (µg/m^3)Year	
					2014	2026
1	Ockham and Wisley Commons/Thames Heath Basin	SSSI, SPA	M25	507520, 159429	23.8	15.8
2	Basingstoke Canal	SSSI	A322 Bagshot Road	495859, 157208	17.5	13.3
3	Horsell Common/Thames Heath Basin	SSSI, SPA	A3046 Chobham Road	499506, 160444	18.8	14.1
4	Colony Bog and Bagshot Heath/Thames Heath Basin	SSSI, SPA, SAC	A322 Guildford Road	494890, 159561	18.2	13.7
5	Whitmoor Common/Thames Heath Basin	SSSI, SPA, SAC	A320 Guildford Road	499488, 153719	18.2	13.4
6	Ash to Brookwood Heaths/Thames Heath Basin	SSSI, SPA, SAC	A322 Bagshot Road	496180, 155956	17.4	12.8
7	Colony Bog and Bagshot Heath/Thames Heath Basin	SSSI, SPA	A324 Connaught Road	494361, 157024	18.2	13.7
8	Hornsell Common/Thames Heath Basin	SSSI, SPA	A320 Chertsey Road	501502, 160745	20.4	15.4

Note: Site 2 Basingstoke Canal, has been excluded from this assessment

NOx Concentrations

Table 2: NO_x Concentrations at Site 1

Distance from link road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
South_0m	95.30	45.60	45.78	+0.18	-49.53
South_50m	38.92	21.96	22.01	+0.05	-16.92
South_100m	32.65	19.38	19.41	+0.03	-13.24
South_150m	29.99	18.29	18.31	+0.02	-11.67
South_200m	28.56	17.71	17.72	+0.02	-10.83
North_0m	65.70	32.90	33.07	+0.16	-32.63
North_50m	37.05	21.16	21.21	+0.05	-15.84
North_100m	31.66	18.97	19.00	+0.03	-12.66
North_150m	29.43	18.06	18.08	+0.02	-11.35
North_200m	28.18	17.56	17.57	+0.02	-10.61

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 3: NO_x Concentrations at Site 3

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
South_0m	41.98	22.43	23.57	+1.14	-18.41
South_50m	21.48	15.02	15.14	+0.13	-6.34
South_100m	20.24	14.57	14.64	+0.06	-5.60
South_150m	19.77	14.41	14.45	+0.04	-5.32
South_200m	19.53	14.32	14.35	+0.03	-5.18
North_0m	42.05	22.38	23.52	+1.14	-18.53
North_50m	21.54	15.03	15.15	+0.13	-6.38
North_100m	20.26	14.58	14.64	+0.06	-5.62
North_150m	19.80	14.41	14.46	+0.04	-5.34
North_200m	19.56	14.33	14.36	+0.03	-5.20

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 4: NO_x Concentrations at Site 4

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
20	31.29	19.78	20.42	+0.64	-10.87
70	21.88	15.35	15.53	+0.18	-6.36
120	20.11	14.53	14.62	+0.09	-5.49
170	19.38	14.19	14.24	+0.06	-5.13

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 5: NO_x Concentrations at Site 5

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
West_0m	34.32	20.25	21.01	+0.76	-13.31
West_50m	20.52	14.32	14.42	+0.11	-6.09
West_100m	19.42	13.85	13.91	+0.05	-5.51
West_150m	19.01	13.68	13.72	+0.04	-5.29
West_200m	18.80	13.59	13.62	+0.03	-5.18
East_0m	42.59	23.78	24.94	+1.16	-17.65
East_50m	21.08	14.55	14.68	+0.13	-6.39
East_100m	19.69	13.97	14.04	+0.07	-5.65
East_150m	19.19	13.76	13.81	+0.04	-5.39
East_200m	18.94	13.65	13.69	+0.03	-5.25

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 6: NO_x Concentrations at Site 6

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
125	18.17	13.01	13.04	+0.04	-5.13
175	17.95	12.94	12.97	+0.03	-4.99

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 7: NO_x Concentrations at Site 7

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
150	18.78	13.87	13.90	+0.03	-4.88
200	18.64	13.82	13.84	+0.02	-4.80

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 8: NO_x Concentrations at Site 8

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
0	45.53	20.78	20.74	-0.03	-24.78
50	23.72	16.11	16.10	-0.01	-7.62
100	22.12	15.78	15.78	-<0.01	-6.35
150	21.53	15.66	15.66	-<0.01	-5.87
200	21.22	15.59	15.59	-<0.01	-5.63

This is distance from edge of named road. Other major roads included within calculation if within 200m

Nitrogen Deposition

Table 9: Nitrogen Deposition Rates at Site 1

Distance From Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
South_0m	2014 Base	3.14	13.69	16.83
	2026 DM	1.38	10.74	12.12
	2026 DS	1.39	10.74	12.13
	DS-DM	-	-	+0.01
	DS-Base	-	-	-4.70
South_50m	2014 Base	0.78	13.69	14.47
	2026 DM	0.29	10.74	11.03
	2026 DS	0.30	10.74	11.04
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.43
South_100m	2014 Base	0.47	13.69	14.16
	2026 DM	0.17	10.74	10.91
	2026 DS	0.17	10.74	10.91
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.25
South_150m	2014 Base	0.33	13.69	14.02
	2026 DM	0.11	10.74	10.85
	2026 DS	0.11	10.74	10.85
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.17
South_200m	2014 Base	0.26	13.69	13.95
	2026 DM	0.08	10.74	10.82
	2026 DS	0.08	10.74	10.82
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.13
North_0m	2014 Base	1.99	13.69	15.67
	2026 DM	0.82	10.74	11.56
	2026 DS	0.82	10.74	11.56
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-4.11
North_50m	2014 Base	0.69	13.69	14.37
	2026 DM	0.25	10.74	10.99
	2026 DS	0.26	10.74	11.00
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.38
North_100m	2014 Base	0.42	13.69	14.11
	2026 DM	0.14	10.74	10.89
	2026 DS	0.15	10.74	10.89
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.22
North_150m	2014 Base	0.31	13.69	13.99
	2026 DM	0.10	10.74	10.84
	2026 DS	0.10	10.74	10.84
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.15
North_200m	2014 Base	0.24	13.69	13.93
	2026 DM	0.07	10.74	10.81
	2026 DS	0.07	10.74	10.81
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.12
Critical Load				**10-20**

This is distance from named edge of named road. Other major included within calculation if within 200m

Table 10: Nitrogen Deposition Rates at Site 3

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
South_0m	2014 Base	1.28	13.43	14.71
	2026 DM	0.48	10.54	11.02
	2026 DS	0.54	10.54	11.08
	DS-DM	-	-	+0.06
	DS-Base	-	-	-3.64
South_50m	2014 Base	0.27	13.43	13.70
	2026 DM	0.11	10.54	10.65
	2026 DS	0.12	10.54	10.66
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.04
South_100m	2014 Base	0.21	13.43	13.64
	2026 DM	0.09	10.54	10.63
	2026 DS	0.09	10.54	10.63
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.00
South_150m	2014 Base	0.18	13.43	13.61
	2026 DM	0.08	10.54	10.62
	2026 DS	0.09	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.99
South_200m	2014 Base	0.17	13.43	13.60
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
North_0m	2014 Base	1.29	13.43	14.72
	2026 DM	0.48	10.54	11.02
	2026 DS	0.54	10.54	11.08
	DS-DM	-	-	+0.05
	DS-Base	-	-	-3.64
North_50m	2014 Base	0.27	13.43	13.70
	2026 DM	0.11	10.54	10.65
	2026 DS	0.12	10.54	10.66
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.04
North_100m	2014 Base	0.21	13.43	13.64
	2026 DM	0.09	10.54	10.63
	2026 DS	0.10	10.54	10.63
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.00
North_150m	2014 Base	0.18	13.43	13.61
	2026 DM	0.08	10.54	10.62
	2026 DS	0.09	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.99
North_200m	2014 Base	0.17	13.43	13.60
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 11: Nitrogen Deposition Rates at Site 4

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
20m	2014 Base	0.84	13.17	14.01
	2026 DM	0.41	10.34	10.74
	2026 DS	0.44	10.34	10.77
	DS-DM	-	-	+0.03
	DS-Base	-	-	-3.24
70m	2014 Base	0.37	13.17	13.54
	2026 DM	0.18	10.34	10.52
	2026 DS	0.19	10.34	10.53
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.01
120m	2014 Base	0.27	13.17	13.44
	2026 DM	0.14	10.34	10.48
	2026 DS	0.15	10.34	10.48
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.96
170m	2014 Base	0.24	13.17	13.41
	2026 DM	0.12	10.34	10.46
	2026 DS	0.13	10.34	10.46
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.94
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 12: Nitrogen Deposition Rates at Site 5

Distance From Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
West_0m	2014 Base	0.89	14.08	14.97
	2026 DM	0.37	11.05	11.41
	2026 DS	0.41	11.05	11.45
	DS-DM	-	-	+0.04
	DS-Base	-	-	-3.52
West _50m	2014 Base	0.20	14.08	14.27
	2026 DM	0.07	11.05	11.11
	2026 DS	0.08	11.05	11.12
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.15
West _100m	2014 Base	0.14	14.08	14.21
	2026 DM	0.05	11.05	11.09
	2026 DS	0.05	11.05	11.09
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.12
West _150m	2014 Base	0.12	14.08	14.19
	2026 DM	0.04	11.05	11.08
	2026 DS	0.04	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
West _200m	2014 Base	0.10	14.08	14.18
	2026 DM	0.03	11.05	11.08
	2026 DS	0.03	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.10

Distance From Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
East _0m	2014 Base	1.29	14.08	15.37
	2026 DM	0.54	11.05	11.59
	2026 DS	0.60	11.05	11.64
	DS-DM	-	-	+0.06
	DS-Base	-	-	-3.72
East _50m	2014 Base	0.22	14.08	14.30
	2026 DM	0.08	11.05	11.13
	2026 DS	0.09	11.05	11.13
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.17
East _100m	2014 Base	0.15	14.08	14.23
	2026 DM	0.05	11.05	11.10
	2026 DS	0.06	11.05	11.10
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.13
East _150m	2014 Base	0.13	14.08	14.20
	2026 DM	0.04	11.05	11.09
	2026 DS	0.04	11.05	11.09
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
East _200m	2014 Base	0.11	14.08	14.20
	2026 DM	0.04	11.05	11.08
	2026 DS	0.04	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.10
Critical Load				**10-20**

This is distance from edge of named road. Other major included within calculation if within 200m

Table 13: Nitrogen Deposition Rates at Site 6

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
125m	2014 Base	0.18	13.04	13.22
	2026 DM	0.09	10.23	10.33
	2026 DS	0.09	10.23	10.33
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.89
175m	2014 Base	0.17	13.04	13.21
	2026 DM	0.09	10.23	10.32
	2026 DS	0.09	10.23	10.32
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.89
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 14: Nitrogen Deposition Rates at Site 7

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
150m	2014 Base	0.16	13.17	13.33
	2026 DM	0.07	10.34	10.41
	2026 DS	0.08	10.34	10.41
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.91
200m	2014 Base	0.15	13.17	13.32
	2026 DM	0.07	10.34	10.41
	2026 DS	0.07	10.34	10.41
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.91
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 15: Nitrogen Deposition Rates at Site 8

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
0m	2014 Base	1.35	13.17	14.52
	2026 DM	0.31	10.34	10.65
	2026 DS	0.31	10.34	10.65
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.88
50m	2014 Base	0.29	13.17	13.46
	2026 DM	0.08	10.34	10.42
	2026 DS	0.08	10.34	10.42
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.04
100m	2014 Base	0.20	13.17	13.38
	2026 DM	0.06	10.34	10.40
	2026 DS	0.06	10.34	10.40
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
150m	2014 Base	0.17	13.17	13.34
	2026 DM	0.06	10.34	10.39
	2026 DS	0.06	10.34	10.39
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.95
200m	2014 Base	0.16	13.17	13.33
	2026 DM	0.05	10.34	10.39
	2026 DS	0.05	10.34	10.39
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.94
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Scenario D – Core Strategy plus Green Belt Release at Mayford

Table 1: NO_X Annual Mean Background Pollutant Concentrations

Site	Ecological Site	Ecological Designation	Nearest Link Road to Eco Site	1 km x 1 km OS Grid Square	NOx Background Concentrations (µg/m^3)Year	
					2014	2026
1	Ockham and Wisley Commons/Thames Heath Basin	SSSI, SPA	M25	507520, 159429	23.8	15.8
2	Basingstoke Canal	SSSI	A322 Bagshot Road	495859, 157208	17.5	13.3
3	Horsell Common/Thames Heath Basin	SSSI, SPA	A3046 Chobham Road	499506, 160444	18.8	14.1
4	Colony Bog and Bagshot Heath/Thames Heath Basin	SSSI, SPA, SAC	A322 Guildford Road	494890, 159561	18.2	13.7
5	Whitmoor Common/Thames Heath Basin	SSSI, SPA, SAC	A320 Guildford Road	499488, 153719	18.2	13.4
6	Ash to Brookwood Heaths/Thames Heath Basin	SSSI, SPA, SAC	A322 Bagshot Road	496180, 155956	17.4	12.8
7	Colony Bog and Bagshot Heath/Thames Heath Basin	SSSI, SPA	A324 Connaught Road	494361, 157024	18.2	13.7
8	Hornsell Common/Thames Heath Basin	SSSI, SPA	A320 Chertsey Road	501502, 160745	20.4	15.4

Note: Site 2 Basingstoke Canal has been excluded from this assessment

NOx Concentrations

Table 2: NO_x Concentrations at Site 1

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
South_0m	95.30	45.60	45.82	+0.22	-49.48
South_50m	38.92	21.96	22.01	+0.05	-16.91
South_100m	32.65	19.38	19.41	+0.03	-13.24
South_150m	29.99	18.29	18.31	+0.02	-11.67
South_200m	28.56	17.71	17.72	+0.02	-10.83
North_0m	65.70	32.90	33.04	+0.14	-32.66
North_50m	37.05	21.16	21.20	+0.04	-15.84
North_100m	31.66	18.97	19.00	+0.03	-12.67
North_150m	29.43	18.06	18.08	+0.02	-11.35
North_200m	28.18	17.56	17.57	+0.01	-10.61

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 3: NO_x Concentrations at Site 3

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
South_0m	41.98	22.43	23.47	+1.04	-18.51
South_50m	21.48	15.02	15.13	+0.12	-6.35
South_100m	20.24	14.57	14.63	+0.06	-5.60
South_150m	19.77	14.41	14.44	+0.04	-5.32
South_200m	19.53	14.32	14.35	+0.03	-5.18
North_0m	42.05	22.38	23.42	+1.04	-18.64
North_50m	21.54	15.03	15.14	+0.12	-6.39
North_100m	20.26	14.58	14.64	+0.06	-5.63
North_150m	19.80	14.41	14.45	+0.04	-5.35
North_200m	19.56	14.33	14.36	+0.03	-5.20

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 4: NO_x Concentrations at Site 4

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
20	31.29	19.78	20.63	+0.85	-10.66
70	21.88	15.35	15.59	+0.24	-6.30
120	20.11	14.53	14.65	+0.12	-5.46
170	19.38	14.19	14.26	+0.07	-5.12

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 5: NO_x Concentrations at Site 5

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
West_0m	34.32	20.25	20.60	+0.34	-13.73
West_50m	20.52	14.32	14.37	+0.05	-6.15
West_100	19.42	13.85	13.88	+0.03	-5.54
West_150m	19.01	13.68	13.70	+0.02	-5.31
West_200m	18.80	13.59	13.61	+0.01	-5.19
East_0m	42.59	23.78	24.30	+0.52	-18.29
East_50m	21.08	14.55	14.61	+0.06	-6.46
East_100m	19.69	13.97	14.00	+0.03	-5.69
East_150m	19.19	13.76	13.78	+0.02	-5.41
East_200m	18.94	13.65	13.67	+0.02	-5.27

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 6: NO_x Concentrations at Site 6

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
125	18.17	13.01	13.06	+0.05	-5.12
175	17.95	12.94	12.98	+0.04	-4.98

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 7: NO_x Concentrations at Site 7

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
150	18.78	13.87	13.91	+0.03	-4.88
200	18.64	13.82	13.84	+0.03	-4.80

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 8: NO_x Concentrations at Site 8

Distance from road link (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
5	45.53	20.78	21.07	+0.29	-24.46
50	23.72	16.11	16.14	+0.04	-7.58
100	22.12	15.78	15.80	+0.02	-6.33
150	21.53	15.66	15.67	+0.01	-5.86
200	21.22	15.59	15.60	+0.01	-5.62

This is distance from edge of named road. Other major roads included within calculation if within 200m

Nitrogen Deposition

Table 9: Nitrogen Deposition Rates at Site 1

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
South_0m	2014 Base	3.14	13.69	16.83
	2026 DM	1.38	10.74	12.12
	2026 DS	1.39	10.74	12.13
	DS-DM	-	-	+0.01
	DS-Base	-	-	-4.70
South_50m	2014 Base	0.78	13.69	14.47
	2026 DM	0.29	10.74	11.03
	2026 DS	0.30	10.74	11.04
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.43
South_100m	2014 Base	0.47	13.69	14.16
	2026 DM	0.17	10.74	10.91
	2026 DS	0.17	10.74	10.91
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.25
South_150m	2014 Base	0.33	13.69	14.02
	2026 DM	0.11	10.74	10.85
	2026 DS	0.11	10.74	10.85
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.17
South_200m	2014 Base	0.26	13.69	13.95
	2026 DM	0.08	10.74	10.82
	2026 DS	0.08	10.74	10.82
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.13
North_0m	2014 Base	1.99	13.69	15.67
	2026 DM	0.82	10.74	11.56
	2026 DS	0.82	10.74	11.56
	DS-DM	-	-	+0.01
	DS-Base	-	-	-4.11
North_50m	2014 Base	0.69	13.69	14.37
	2026 DM	0.25	10.74	10.99
	2026 DS	0.26	10.74	11.00
	DS-DM	-	-	+<0.01
	DS-Base	**-**	**-**	**-3.38**
North_100m	2014 Base	0.42	13.69	14.11
	2026 DM	0.14	10.74	10.89
	2026 DS	0.15	10.74	10.89

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
North_100m	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.22
North_150m	2014 Base	0.31	13.69	13.99
	2026 DM	0.10	10.74	10.84
	2026 DS	0.10	10.74	10.84
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.15
North_200m	2014 Base	0.24	13.69	13.93
	2026 DM	0.07	10.74	10.81
	2026 DS	0.07	10.74	10.81
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.12
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 10: Nitrogen Deposition Rates at Site 3

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
South_0m	2014 Base	1.28	13.43	14.71
	2026 DM	0.48	10.54	11.02
	2026 DS	0.53	10.54	11.07
	DS-DM	-	-	+0.05
	DS-Base	-	-	-3.64
South_50m	2014 Base	0.27	13.43	13.70
	2026 DM	0.11	10.54	10.65
	2026 DS	0.12	10.54	10.66
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.04
South_100m	2014 Base	0.21	13.43	13.64
	2026 DM	0.09	10.54	10.63
	2026 DS	0.09	10.54	10.63
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.00
South_150m	2014 Base	0.18	13.43	13.61
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.99
South_200m	2014 Base	0.17	13.43	13.60
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
North_0m	2014 Base	1.29	13.43	14.72
	2026 DM	0.48	10.54	11.02
	2026 DS	0.53	10.54	11.07
	DS-DM	-	-	+0.05
	DS-Base	-	-	-3.65
North_50m	2014 Base	0.27	13.43	13.70
	2026 DM	0.11	10.54	10.65
	2026 DS	0.12	10.54	10.66
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.05

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
North_100m	2014 Base	0.21	13.43	13.64
	2026 DM	0.09	10.54	10.63
	2026 DS	0.09	10.54	10.63
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.01
North_150m	2014 Base	0.18	13.43	13.61
	2026 DM	0.08	10.54	10.62
	2026 DS	0.09	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.99
North_200m	2014 Base	0.17	13.43	13.60
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 11: Nitrogen Deposition Rates at Site 4

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
20m	2014 Base	0.84	13.17	14.01
	2026 DM	0.41	10.34	10.74
	2026 DS	0.45	10.34	10.78
	DS-DM	-	-	+0.04
	DS-Base	-	-	-3.23
70m	2014 Base	0.37	13.17	13.54
	2026 DM	0.18	10.34	10.52
	2026 DS	0.20	10.34	10.53
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.01
120m	2014 Base	0.27	13.17	13.44
	2026 DM	0.14	10.34	10.48
	2026 DS	0.15	10.34	10.48
	DS-DM	-	-	+0.01
	DS-Base	-	-	-2.96
170m	2014 Base	0.24	13.17	13.41
	2026 DM	0.12	10.34	10.46
	2026 DS	0.13	10.34	10.46
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.94
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 12: Nitrogen Deposition Rates at Site 5

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
West_0m	2014 Base	0.89	14.08	14.97
	2026 DM	0.37	11.05	11.41
	2026 DS	0.39	11.05	11.43
	DS-DM	-	-	+0.02
	DS-Base	-	-	-3.54
West _50m	2014 Base	0.20	14.08	14.27
	2026 DM	0.07	11.05	11.11
	2026 DS	0.07	11.05	11.12
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.15
West _100m	2014 Base	0.14	14.08	14.21
	2026 DM	0.05	11.05	11.09
	2026 DS	0.05	11.05	11.09
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.12
West _150m	2014 Base	0.12	14.08	14.19
	2026 DM	0.04	11.05	11.08
	2026 DS	0.04	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
West _200m	2014 Base	0.10	14.08	14.18
	2026 DM	0.03	11.05	11.08
	2026 DS	0.03	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.10
East _0m	2014 Base	1.29	14.08	15.37
	2026 DM	0.54	11.05	11.59
	2026 DS	0.57	11.05	11.61
	DS-DM	-	-	+0.03
	DS-Base	-	-	-3.75
East _50m	2014 Base	0.22	14.08	14.30
	2026 DM	0.08	11.05	11.13
	2026 DS	0.08	11.05	11.13
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.17
East _100m	2014 Base	0.15	14.08	14.23
	2026 DM	0.05	11.05	11.10
	2026 DS	0.05	11.05	11.10
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.13
East _150m	2014 Base	0.13	14.08	14.20
	2026 DM	0.04	11.05	11.09
	2026 DS	0.04	11.05	11.09
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
East _200m	2014 Base	0.11	14.08	14.19
	2026 DM	0.04	11.05	11.08
	2026 DS	0.04	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 13: Nitrogen Deposition Rates at Site 6

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
125m	2014 Base	0.18	13.04	13.22
	2026 DM	0.09	10.23	10.33
	2026 DS	0.09	10.23	10.33
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.89
175m	2014 Base	0.17	13.04	13.21
	2026 DM	0.09	10.23	10.32
	2026 DS	0.09	10.23	10.32
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.89
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 14: Nitrogen Deposition Rates at Site 7

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
150m	2014 Base	0.16	13.17	13.33
	2026 DM	0.07	10.34	10.41
	2026 DS	0.08	10.34	10.41
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.91
200m	2014 Base	0.15	13.17	13.32
	2026 DM	0.07	10.34	10.41
	2026 DS	0.07	10.34	10.41
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.91
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 15: Nitrogen Deposition Rates at Site 8

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
0m	2014 Base	1.35	13.17	14.52
	2026 DM	0.31	10.34	10.65
	2026 DS	0.33	10.34	10.66
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.86
50m	2014 Base	0.29	13.17	13.46
	2026 DM	0.08	10.34	10.42
	2026 DS	0.08	10.34	10.42
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.04
100m	2014 Base	0.20	13.17	13.38
	2026 DM	0.06	10.34	10.40
	2026 DS	0.06	10.34	10.40
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98

Distance from road link (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
150m	2014 Base	0.17	13.17	13.34
	2026 DM	0.06	10.34	10.39
	2026 DS	0.06	10.34	10.39
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.95
200m	2014 Base	0.16	13.17	13.33
	2026 DM	0.05	10.34	10.39
	2026 DS	0.05	10.34	10.39
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.94
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Scenario F – Core Strategy plus Green Belt Release at West Byfleet

Table 1: NO_X Annual Mean Background Pollutant Concentrations

Site	Ecological Site	Ecological Designation	Nearest Link Road to Eco Site	1 km x 1 km OS Grid Square	NOx Background Concentrations (µg/m^3)Year	
					2014	2026
1	Ockham and Wisley Commons/Thames Heath Basin	SSSI, SPA	M25	507520, 159429	23.8	15.8
2	Basingstoke Canal	SSSI	A322 Bagshot Road	495859, 157208	17.5	13.3
3	Horsell Common/Thames Heath Basin	SSSI, SPA	A3046 Chobham Road	499506, 160444	18.8	14.1
4	Colony Bog and Bagshot Heath/Thames Heath Basin	SSSI, SPA, SAC	A322 Guildford Road	494890, 159561	18.2	13.7
5	Whitmoor Common/Thames Heath Basin	SSSI, SPA, SAC	A320 Guildford Road	499488, 153719	18.2	13.4
6	Ash to Brookwood Heaths/Thames Heath Basin	SSSI, SPA, SAC	A322 Bagshot Road	496180, 155956	17.4	12.8
7	Colony Bog and Bagshot Heath/Thames Heath Basin	SSSI, SPA	A324 Connaught Road	494361, 157024	18.2	13.7
8	Hornsell Common/Thames Heath Basin	SSSI, SPA	A320 Chertsey Road	501502, 160745	20.4	15.4

Note: Site 2 Basingstoke Canal, has been excluded from this assessment

NOx Concentrations

Table 2: NO_x Concentrations at Site 1

Distance from link road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
South_0m	95.30	45.60	45.78	+0.18	-49.53
South_50m	38.92	21.96	22.01	+0.05	-16.92
South_100m	32.65	19.38	19.41	+0.03	-13.24
South_150m	29.99	18.29	18.31	+0.02	-11.67
South_200m	28.56	17.71	17.72	+0.02	-10.83
North_0m	65.70	32.90	33.07	+0.16	-32.63
North_50m	37.05	21.16	21.21	+0.05	-15.84
North_100m	31.66	18.97	19.00	+0.03	-12.66
North_150m	29.43	18.06	18.08	+0.02	-11.35
North_200m	28.18	17.56	17.57	+0.02	-10.61

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 3: NO_x Concentrations at Site 3

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
South_0m	41.98	22.43	23.57	+1.14	-18.41
South_50m	21.48	15.02	15.14	+0.13	-6.34
South_100m	20.24	14.57	14.64	+0.06	-5.60
South_150m	19.77	14.41	14.45	+0.04	-5.32
South_200m	19.53	14.32	14.35	+0.03	-5.18
North_0m	42.05	22.38	23.52	+1.14	-18.53
North_50m	21.54	15.03	15.15	+0.13	-6.38
North_100m	20.26	14.58	14.64	+0.06	-5.62
North_150m	19.80	14.41	14.46	+0.04	-5.34
North_200m	19.56	14.33	14.36	+0.03	-5.20

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 4: NO_x Concentrations at Site 4

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
20	31.29	19.78	20.42	+0.64	-10.87
70	21.88	15.35	15.53	+0.18	-6.36
120	20.11	14.53	14.62	+0.09	-5.49
170	19.38	14.19	14.24	+0.06	-5.13

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 5: NO_x Concentrations at Site 5

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
West_0m	34.32	20.25	21.01	+0.76	-13.31
West_50m	20.52	14.32	14.42	+0.11	-6.09
West_100m	19.42	13.85	13.91	+0.05	-5.51
West_150m	19.01	13.68	13.72	+0.04	-5.29
West_200m	18.80	13.59	13.62	+0.03	-5.18
East_0m	42.59	23.78	24.94	+1.16	-17.65
East_50m	21.08	14.55	14.68	+0.13	-6.39
East_100m	19.69	13.97	14.04	+0.07	-5.65
East_150m	19.19	13.76	13.81	+0.04	-5.39
East_200m	18.94	13.65	13.69	+0.03	-5.25

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 6: NO_x Concentrations at Site 6

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
125	18.17	13.01	13.04	+0.04	-5.13
175	17.95	12.94	12.97	+0.03	-4.99

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 7: NO_x Concentrations at Site 7

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
150	18.78	13.87	13.90	+0.03	-4.88
200	18.64	13.82	13.84	+0.02	-4.80

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 8: NO_x Concentrations at Site 8

Distance from Link Road (m)	Annual Mean NO_x ($\mu g/m^3$)			Change ($\mu g/m^3$)	
	2014 Base	2026 Do-Min	2026 Do-Some	Do-Some – Do-Min	Do-Some – Base
0	45.53	20.78	20.74	-0.03	-24.78
50	23.72	16.11	16.10	-0.01	-7.62
100	22.12	15.78	15.78	-<0.01	-6.35
150	21.53	15.66	15.66	-<0.01	-5.87
200	21.22	15.59	15.59	-<0.01	-5.63

This is distance from edge of named road. Other major roads included within calculation if within 200m

Nitrogen Deposition

Table 9: Nitrogen Deposition Rates at Site 1

Distance From Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
South_0m	2014 Base	3.14	13.69	16.83
	2026 DM	1.38	10.74	12.12
	2026 DS	1.39	10.74	12.13
	DS-DM	-	-	+0.01
	DS-Base	-	-	-4.70
South_50m	2014 Base	0.78	13.69	14.47
	2026 DM	0.29	10.74	11.03
	2026 DS	0.30	10.74	11.04
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.43
South_100m	2014 Base	0.47	13.69	14.16
	2026 DM	0.17	10.74	10.91
	2026 DS	0.17	10.74	10.91
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.25
South_150m	2014 Base	0.33	13.69	14.02
	2026 DM	0.11	10.74	10.85
	2026 DS	0.11	10.74	10.85
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.17
South_200m	2014 Base	0.26	13.69	13.95
	2026 DM	0.08	10.74	10.82
	2026 DS	0.08	10.74	10.82
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.13
North_0m	2014 Base	1.99	13.69	15.67
	2026 DM	0.82	10.74	11.56
	2026 DS	0.82	10.74	11.56
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-4.11
North_50m	2014 Base	0.69	13.69	14.37
	2026 DM	0.25	10.74	10.99
	2026 DS	0.26	10.74	11.00
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.38

Distance From Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
North_100m	2014 Base	0.42	13.69	14.11
	2026 DM	0.14	10.74	10.89
	2026 DS	0.15	10.74	10.89
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.22
North_150m	2014 Base	0.31	13.69	13.99
	2026 DM	0.10	10.74	10.84
	2026 DS	0.10	10.74	10.84
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.15
North_200m	2014 Base	0.24	13.69	13.93
	2026 DM	0.07	10.74	10.81
	2026 DS	0.07	10.74	10.81
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.12
Critical Load				**10-20**

This is distance from named edge of named road. Other major included within calculation if within 200m

Table 10: Nitrogen Deposition Rates at Site 3

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
South_0m	2014 Base	1.28	13.43	14.71
	2026 DM	0.48	10.54	11.02
	2026 DS	0.54	10.54	11.08
	DS-DM	-	-	+0.06
	DS-Base	-	-	-3.64
South_50m	2014 Base	0.27	13.43	13.70
	2026 DM	0.11	10.54	10.65
	2026 DS	0.12	10.54	10.66
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.04
South_100m	2014 Base	0.21	13.43	13.64
	2026 DM	0.09	10.54	10.63
	2026 DS	0.09	10.54	10.63
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.00
South_150m	2014 Base	0.18	13.43	13.61
	2026 DM	0.08	10.54	10.62
	2026 DS	0.09	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.99
South_200m	2014 Base	0.17	13.43	13.60
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
North_0m	2014 Base	1.29	13.43	14.72
	2026 DM	0.48	10.54	11.02
	2026 DS	0.54	10.54	11.08
	DS-DM	-	-	+0.05
	DS-Base	-	-	-3.64

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
North_50m	2014 Base	0.27	13.43	13.70
	2026 DM	0.11	10.54	10.65
	2026 DS	0.12	10.54	10.66
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.04
North_100m	2014 Base	0.21	13.43	13.64
	2026 DM	0.09	10.54	10.63
	2026 DS	0.10	10.54	10.63
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.00
North_150m	2014 Base	0.18	13.43	13.61
	2026 DM	0.08	10.54	10.62
	2026 DS	0.09	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.99
North_200m	2014 Base	0.17	13.43	13.60
	2026 DM	0.08	10.54	10.62
	2026 DS	0.08	10.54	10.62
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 11: Nitrogen Deposition Rates at Site 4

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
20m	2014 Base	0.84	13.17	14.01
	2026 DM	0.41	10.34	10.74
	2026 DS	0.44	10.34	10.77
	DS-DM	-	-	+0.03
	DS-Base	-	-	-3.24
70m	2014 Base	0.37	13.17	13.54
	2026 DM	0.18	10.34	10.52
	2026 DS	0.19	10.34	10.53
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.01
120m	2014 Base	0.27	13.17	13.44
	2026 DM	0.14	10.34	10.48
	2026 DS	0.15	10.34	10.48
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.96
170m	2014 Base	0.24	13.17	13.41
	2026 DM	0.12	10.34	10.46
	2026 DS	0.13	10.34	10.46
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.94
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 12: Nitrogen Deposition Rates at Site 5

Distance From Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
West_0m	2014 Base	0.89	14.08	14.97
	2026 DM	0.37	11.05	11.41
	2026 DS	0.41	11.05	11.45
	DS-DM	-	-	+0.04
	DS-Base	-	-	-3.52
West _50m	2014 Base	0.20	14.08	14.27
	2026 DM	0.07	11.05	11.11
	2026 DS	0.08	11.05	11.12
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.15
West _100m	2014 Base	0.14	14.08	14.21
	2026 DM	0.05	11.05	11.09
	2026 DS	0.05	11.05	11.09
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.12
West _150m	2014 Base	0.12	14.08	14.19
	2026 DM	0.04	11.05	11.08
	2026 DS	0.04	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
West _200m	2014 Base	0.10	14.08	14.18
	2026 DM	0.03	11.05	11.08
	2026 DS	0.03	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.10
East _0m	2014 Base	1.29	14.08	15.37
	2026 DM	0.54	11.05	11.59
	2026 DS	0.60	11.05	11.64
	DS-DM	-	-	+0.06
	DS-Base	-	-	-3.72
East _50m	2014 Base	0.22	14.08	14.30
	2026 DM	0.08	11.05	11.13
	2026 DS	0.09	11.05	11.13
	DS-DM	-	-	+0.01
	DS-Base	-	-	-3.17
East _100m	2014 Base	0.15	14.08	14.23
	2026 DM	0.05	11.05	11.10
	2026 DS	0.06	11.05	11.10
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.13
East _150m	2014 Base	0.13	14.08	14.20
	2026 DM	0.04	11.05	11.09
	2026 DS	0.04	11.05	11.09
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.11
East _200m	2014 Base	0.11	14.08	14.20
	2026 DM	0.04	11.05	11.08
	2026 DS	0.04	11.05	11.08
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.10
Critical Load				**10-20**

This is distance from edge of named road. Other major included within calculation if within 200m

Table 13: Nitrogen Deposition Rates at Site 6

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
125m	2014 Base	0.18	13.04	13.22
	2026 DM	0.09	10.23	10.33
	2026 DS	0.09	10.23	10.33
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.89
175m	2014 Base	0.17	13.04	13.21
	2026 DM	0.09	10.23	10.32
	2026 DS	0.09	10.23	10.32
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.89
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 14: Nitrogen Deposition Rates at Site 7

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
150m	2014 Base	0.16	13.17	13.33
	2026 DM	0.07	10.34	10.41
	2026 DS	0.08	10.34	10.41
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.91
200m	2014 Base	0.15	13.17	13.32
	2026 DM	0.07	10.34	10.41
	2026 DS	0.07	10.34	10.41
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.91
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

Table 15: Nitrogen Deposition Rates at Site 8

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
0m	2014 Base	1.35	13.17	14.52
	2026 DM	0.31	10.34	10.65
	2026 DS	0.31	10.34	10.65
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.88
50m	2014 Base	0.29	13.17	13.46
	2026 DM	0.08	10.34	10.42
	2026 DS	0.08	10.34	10.42
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-3.04
100m	2014 Base	0.20	13.17	13.38
	2026 DM	0.06	10.34	10.40
	2026 DS	0.06	10.34	10.40
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.98

Distance from Link Road (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
150m	2014 Base	0.17	13.17	13.34
	2026 DM	0.06	10.34	10.39
	2026 DS	0.06	10.34	10.39
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.95
200m	2014 Base	0.16	13.17	13.33
	2026 DM	0.05	10.34	10.39
	2026 DS	0.05	10.34	10.39
	DS-DM	-	-	+<0.01
	DS-Base	-	-	-2.94
Critical Load				**10-20**

This is distance from edge of named road. Other major roads included within calculation if within 200m

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