Habitats Regulations Assessment of Epping Forest District Council Local Plan

Epping Forest District Council

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Quality information

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Revision History

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1. Introduction

Background to the Project

1.1 AECOM was appointed by Epping Forest District Council to assist the Council in undertaking a Habitat Regulations Assessment of its Local Plan (hereafter referred to as the 'Plan' or 'Local Plan'). The Plan being assessed is the Submission Version of the Local Plan 2017 which sets out the Council's proposed strategy to meet the economic and housing needs in the District up to 2033. The Plan identifies sites for housing (including traveller accommodation) and employment. It also sets out development management policies and infrastructure requirements. The objective of this assessment is to identify any aspects of the Plan that would cause an adverse effect on the integrity of Natura 2000 sites, otherwise known as European sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and, as a matter of Government policy, Ramsar sites), either in isolation or in combination with other plans and projects, and to advise on appropriate policy mechanisms for delivering mitigation where such effects were identified.

1.2 An assessment of housing need across the East Herts and West Essex Housing Market Area (HMA) was undertaken, which was then used as the basis for developing the Local Plan. The HMA covers Epping Forest District Council, Harlow Council, East Herts District Council and Uttlesford District Council. The HMA developed a series of different Options for quanta and distribution of housing in each of the Authority boundaries, focussed on growth within the wider Harlow area.

1.3 The HRA report accompanying the submitted Local Plan was complete based on legal precedent and traffic and air quality modelling results as they stood at the time. Since that time however additional case law has clarified that consideration of mitigation measures must be deferred to the appropriate assessment stage of the HRA process, Natural England confirmed that they considered that an appropriate assessment was necessary and in particular there has been extensively updated traffic and air quality modelling undertaken for Epping Forest SAC, following a methodology agreed with Natural England. As a result it is appropriate to produce this January 2019 HRA report including appropriate assessment. Since the amendments to create this report are extensive (with regard to creating an appropriate assessment and comprehensively updating the air quality work for Epping Forest SAC) this January 2019 HRA entirely replaces the HRA that was submitted with the Local Plan.

Legislation

1.4 The need for Appropriate Assessment is set out within Article 6 of the EC Habitats Directive 1992, and interpreted into British law by the Conservation of Habitats and Species Regulations 2017 (as amended)[1]. The ultimate aim of the 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.

1.5 The Habitats Directive applies the precautionary principle to European sites. 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. Plans and projects with predicted adverse impacts on European sites 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.

1.6 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:

[1] Various amendments to the Regulations were published in late 2018 but these do not change the HRA process for Local Plans or the legal tests which must be met

Box 1: The legislative basis for Appropriate Assessment

Habitats Directive 1992

Article 6 (3) states that:

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

Conservation of Habitats and Species Regulations 2017 (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*".

1.7 Over time the phrase 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the Habitats Directive from screening through to Imperative Reasons of Overriding Public Interest (IROPI). This has arisen in order to distinguish the process from the individual stage described in the law as an 'appropriate assessment'. Throughout this report we use the term Habitat Regulations Assessment for the overall process and restrict the use of Appropriate Assessment to the specific stage of that name.

Scope of the Project

1.8 There is no pre-defined guidance that dictates the physical scope of a HRA of a Plan document. 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 Epping Forest District boundary; and
- Other sites shown to be linked to development within the District boundary through a known 'pathway' (discussed below).

1.9 Briefly defined, pathways are routes by which a change in activity provided within a Local Plan document can lead to an effect upon an internationally designated site. Guidance from the former Department of Communities and Local Government states that the HRA 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). More recently, the Court of Appeal [2] ruled that providing the Council (as competent authority) was duly satisfied that proposed mitigation could be '*achieved in practice'* such that the proposed development would have no adverse effect, then this would suffice. This ruling has since been applied to a planning permission (rather than a Core Strategy document)[3]. In this case the High Court ruled that for 'a multistage process, so long as there is sufficient information at any particular stage to enable the authority to be satisfied that the proposed mitigation can be achieved in practice it is not necessary for all matters concerning mitigation to be fully resolved before a decision maker is able to conclude that a development will satisfy the requirements of the Habitats Regulations'.

1.10 There are three European sites that lie partly within Epping Forest District:

- Epping Forest SAC;

[2] No Adastral New Town Ltd (NANT) v Suffolk Coastal District Council Court of Appeal, 17th February 2015
[3] High Court case of R (Devon Wildlife Trust) v Teignbridge District Council, 28 July 2015

- Lee Valley SPA; and
- Lee Valley Ramsar site.

1.11 Outside the District, the following site also requires consideration because there is potential for impacts stemming from the Local Plan to create significant effects even though the site lies outside the authority boundary:

- Wormley-Hoddesdonpark Woods SAC located 2.2km west of the District.

1.12 The reasons for designation of these sites, together with current trends in habitat quality and pressures on the sites, are set out at Appendix A. All the European sites are shown at Appendix B, Figure B1.

1.13 In order to fully inform the HRA process, a number of recent studies have been consulted to determine likely significant effects that could arise from the Submission Version of the Plan. These include:

- Final Water Resources Management Plan, 2015-2040. Affinity Water. June 2014
- Future development proposed (and, where available, HRAs) for Harlow, East Hertfordshire District, Chelmsford, Brentwood, Havering, Redbridge, Waltham Forest, Enfield and Broxbourne District, and Uttlesford District.
- Recreational activity, tourism and European site recreational catchment data has been used where this exists for individual European sites although this is limited. In such circumstances where data does not exist then this HRA has used appropriate proxy information from other European sites designated for similar features and in similar settings;
- Visitor survey work undertaken for Epping Forest SAC to inform this HRA;
- Traffic and air quality modelling undertaken for Epping Forest SAC to inform this HRA;
- The UK Air Pollution Information System (www.apis.ac.uk); and
- Multi Agency Geographic Information for the Countryside (MAGIC)and its links to SSSI citations and the JNCC website (www.magic.gov.uk)

This Report

1.14 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 contains an initial analysis of likely significant effects. Chapters 5 to 8 then provide appropriate assessment of each impact pathway. Each chapter begins with a consideration of the interest features and ecological condition of the site(s) and of the environmental processes essential to maintain their integrity. An assessment of the Plan in respect of each European site is then carried out mitigation strategies are proposed where necessary[4]. The key findings are summarised in Chapter 9: which provides overall conclusions.

[4] Legal precedent confirms that it is perfectly acceptable to reference mitigation measures at the screening stage of HRA, if that is the stage at which they can be identified.

2. Methodology

Introduction

2.1 The HRA has been carried out in the continuing absence of formal central Government guidance, although general EC guidance on HRA does exist[5]. The former Department of Communities and Local Government (DCLG) released a consultation paper on the Appropriate Assessment of Plans in 2006[6]. As yet, no further formal guidance has emerged. However, Natural England has produced its own internal guidance[7] as has the RSPB[8]. Both of these have been referred to in undertaking this HRA.

2.2 Figure 1 below outlines the stages of HRA according to current draft DCLG guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

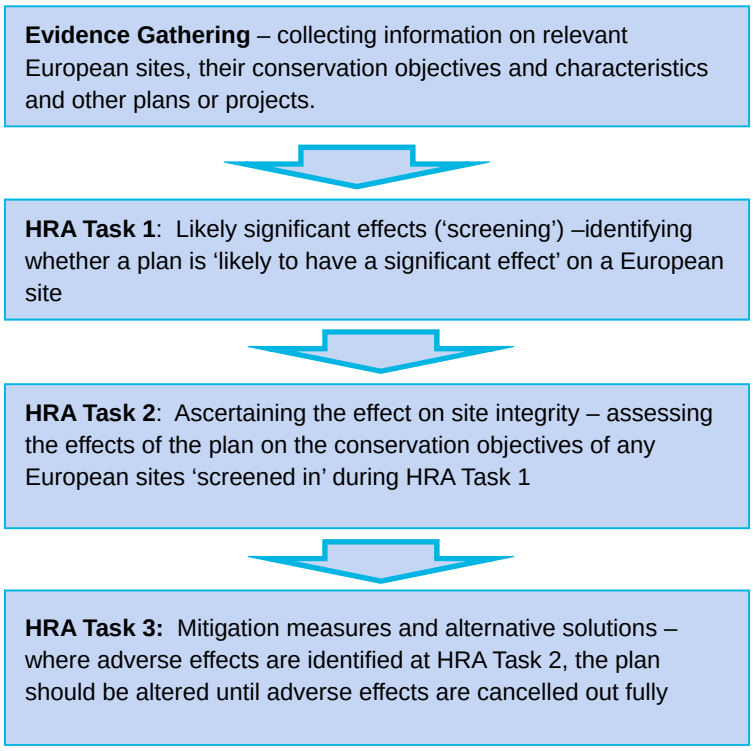


Figure 1: Four Stage Approach to Habitats Regulations Assessment. Source CLG, 2006.

HRA Task 1: Likely Significant Effects (LSE)

2.3 Following evidence gathering, the first stage of any Habitat Regulations Assessment and the purpose of this assessment 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?*"

[5] European Commission (2001): Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and 6(4) of the Habitats Directive.
[6] CLG (2006) Planning for the Protection of European Sites, Consultation Paper
[7] http://www.ukmpas.org/pdf/practical_guidance/HRGN1.pdf
[8] Dodd A.M., Cleary B.E., Dawkins J.S., Byron H.J., Palframan L.J. and Williams G.M. (2007). *The Appropriate Assessment of Spatial Plans in England: a guide to why, when and how to do it.* The RSPB, Sandy.

2.4 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.

2.5 A decision by the European Court of Justice[9] in spring 2018 concluded that measures intended to avoid or reduce the harmful effects of a proposed project or plan on a European site should not be taken into account by competent authorities at the Likely Significant Effects or 'screening' stage of HRA. Since the fullest level of possible technical analysis has already been undertaken for this HRA process, the implications of the ECJ ruling in this case are structural, presentational and terminology-related. They essentially mean that the role of avoidance and mitigation measures is now removed entirely from the initial analysis of policies and allocations and is discussed entirely in a subsequent 'appropriate assessment' stage instead. This new report has been created to reflect that judgment.

HRA Task 2: Appropriate Assessment (AA)

2.6 Where it is determined that a conclusion of 'no likely significant effect' cannot be drawn, the analysis has proceeded to the next stage of HRA known as Appropriate Assessment. Case law has clarified that 'appropriate assessment' is not a technical term. In other words, there are no particular technical analyses, or level of technical analysis, that are classified by law as belonging to appropriate assessment rather than determination of likely significant effects.

2.7 The level of detail in land use plans concerning developments that will be permitted under the plans is rarely sufficient to allow the fullest quantification of potential adverse effects. It is therefore necessary to be cognisant of the fact that HRAs for plans can be tiered, with assessments being undertaken with increasing specificity at lower tiers. This is in line with DCLG guidance and court rulings that the level of detail of the assessment, whilst meeting the relevant requirements of the Habitats Regulations, should be '*appropriate'* to the level of plan or project that it addresses. This 'tiering' of assessment is summarised in Figure 1.

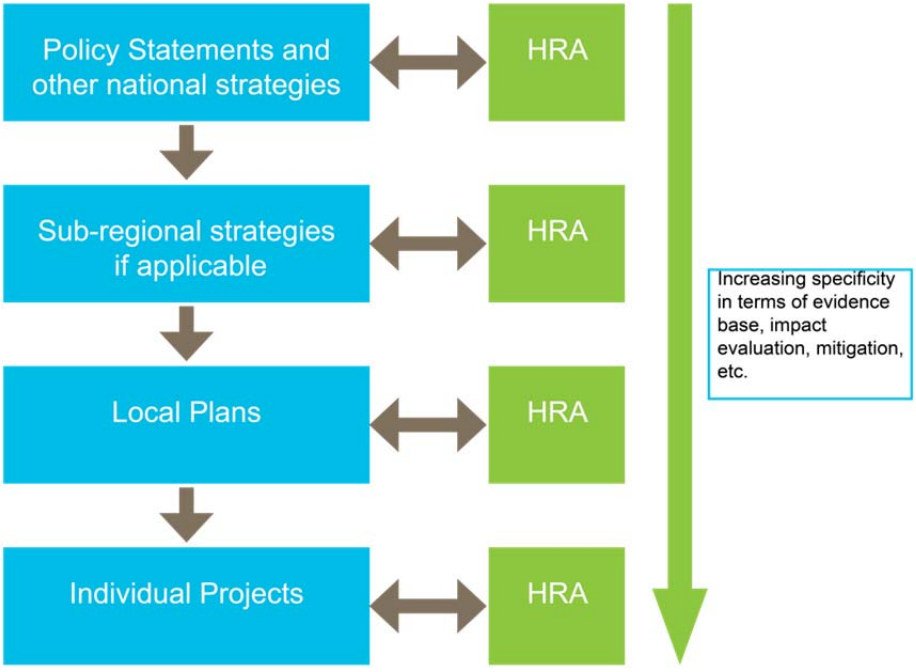


Figure 2: Tiering in HRA of land use plans

2.8 On these occasions the advice of Advocate-General Kokott[10] to the European Court of Justice is worth considering. She commented that: *"It would …hardly be proper to require a greater level of detail in preceding plans* [rather than planning applications] *or the abolition of multi-stage planning and approval procedures so that the assessment of*

[9] People Over Wind and Sweetman v Coillte Teoranta (C-323/17)
[10] Opinion of Advocate-General Kokott, 9th June 2005, Case C-6/04. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland, paragraph 49. http://curia.europa.eu/juris/document/document.jsf?docid=58359&doclang=EN

implications can be concentrated on one point in the procedure. Rather, adverse effects on areas of conservation must be assessed at every relevant stage of the procedure ***to the extent possible on the basis of the precision of the plan. This assessment is to be updated with increasing specificity in subsequent stages of the procedure****"* [emphasis added].

2.9 A more recent 2018 European Court of Justice case[11] confirmed that an appropriate assessment must consider the interest features of European sites even where those features may be found outside the strict boundaries of those sites and must also consider other habitat types or species, which are present on the site, but for which that site has not been listed **if** they are necessary to the conservation of the habitat types and species listed for the protected area. The former matter is traditionally captured in Appropriate Assessment in England (and in this HRA) through consideration of the concept of 'functionally linked land' but that has not been identified in this HRA process as being a relevant issue. The latter is captured where, for example, habitats within a European that are not themselves designated are nonetheless considered in impact assessment because of the functional role in enabling the site to meet its conservation objectives (i.e. the bird interest of the Lee Valley SPA is protected by preserving not only the birds themselves but the vegetation on which they feed, through protection of water quality in the SPA).

Task 3: Avoidance & Mitigation

2.10 Where necessary, measures will be recommended for incorporation into the Plan in order to avoid or mitigate adverse effects on European sites. There is considerable precedent concerning the level of detail that a Local Plan document needs to contain regarding mitigation for recreational impacts on European sites. The implication of this precedent is that it is not necessary for all measures that will be deployed to be fully developed prior to adoption of the Plan, but the Plan must provide an adequate policy framework within which these measures can be delivered.

2.11 In evaluating significance, AECOM has relied on professional judgement as well as the results of previous stakeholder consultation regarding development impacts on the European sites considered within this assessment.

2.12 When discussing 'mitigation' for a Local Plan document, one is concerned primarily with the policy framework to enable the delivery of such mitigation rather than the details of the mitigation measures themselves since the Local Plan document is a high-level policy document.

Principal Other Plans and Projects That May Act 'In Combination'

2.13 In practice in combination assessment is of greatest relevance when the plan would otherwise be screened out because its individual contribution is inconsequential. 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 and commercial/industrial development proposed for other relevant Essex and Hertfordshire authorities over the lifetime of the District Plan, particularly East Herts, Harlow and Uttlesford. These have therefore been taken into consideration.

Table 1: Housing levels to be delivered across Epping Forest District and surrounding authorities, provided for context.

Local Authority	Total housing provided
Uttlesford	These three authorities with Epping Forest District are working together as part of a HMA. Where impacts in combination such as air quality impacts are considered, these assessments will be based in the level of development provided within the HMA.
East Hertfordshire	
Harlow	
Broxbourne	7,718 (2016-2033)[12]
Chelmsford	18,515 (to 2036)[13]

[11] Holohan et al vs. An Bord Pleanála (C-461/17)
[12] https://www.broxbourne.gov.uk/sites/default/files/Documents/Planning/pp_PreSubmission%20Local%20Plan%20-%20Track%20Changes%20version%20V2.pdf [accessed 31/10/2017]

Brentwood	7,240 (to 2033) [14]
Havering	17,550 (2016 - 2031) [15]
Redbridge	16,845 (2015-2030)[16]
Waltham Forest	10,320 (2012 - 2026)[17]
Enfield	13,480 (to 2030)[18]

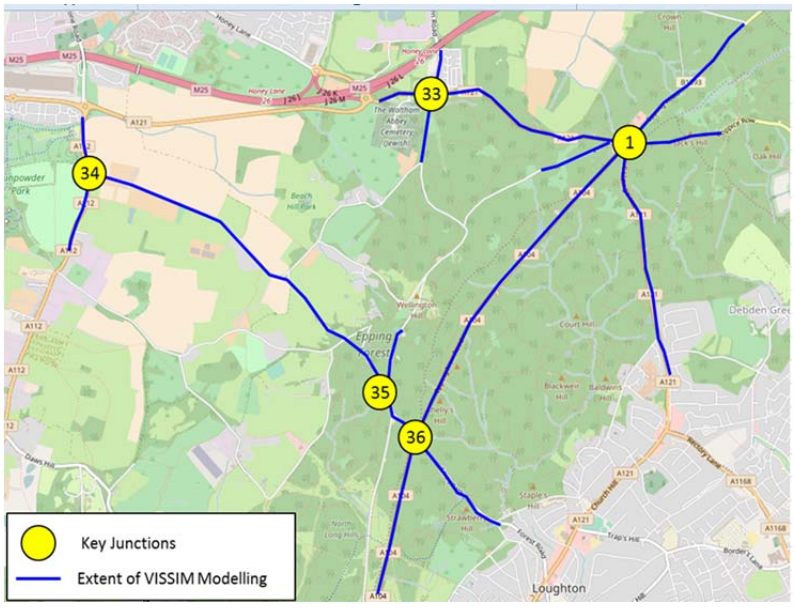
2.14 The Minerals and Waste Development Plans for Hertfordshire, Essex, London and Cambridgeshire are also of some relevance, since these may contribute to increased vehicle movements on the road network within Epping (and thereby contribute to air quality impacts). The, Essex, Hertfordshire and Cambridgeshire Local Transport Plans to 2031 will also be important in terms of encouraging sustainable transport. However, the major contributor to any in combination effect is likely to be that of housing and commercial development within the surrounding districts as set out in Local Plans and these have therefore been the main focus of cumulative 'in combination' effects with regard to this HRA.

2.15 In relation to recreational activity, the following documents have been consulted for their plans and projects that may affect European sites in combination with development in Epping Forest District: Lee Valley Regional Park Authority Site Management Plan and Epping Forest Management Plan and visitor surveys.

Air Quality Impact Assessment

2.16 To support this HRA, traffic modelling and an air quality impact assessment was undertaken in 2018/19 using a modified form of the Design Manual for Roads and Bridges (DMRB) methodology[19], the primary modification being the inclusion of ammonia emissions from traffic which is not part of the standard DMRB methodology. The technical notes explaining the traffic and air quality modelling methodology are contained within Appendices C and D.

2.17 The predicted change in vehicle flows and mean maximum queue length and duration as a result of all expected growth over the plan period (i.e. the development Options identified within the HMA, background traffic growth arising from development in surrounding authorities and delivery of existing planning permissions within the HMA authorities) were modelled on a series of roads within 200m of Epping Forest SAC. The roads were selected as being those most likely to experience the greatest change in flows (and therefore impact) due to housing and employment growth in the East Herts/West Essex Housing Market Area. The modelled network is shown below.



[13] https://www.chelmsford.gov.uk/planning-and-building-control/planning-policy-and-new-local-plan/new-local-plan/developing-the-new-local-plan/?entryid1139=67198 [accessed 31/10/2017]
[14] https://brentwood.jdi-consult.net/localplan/readdoc.php?docid=8&chapter=5&docelemid=d1160#d1160 [accessed 31/10/2017]
[15] http://havering.objective.co.uk/file/4645335 [accessed 31/10/2017]
[16] https://www.redbridge.gov.uk/media/2268/final-web-pdf_redbridge-local-plan_reduced.pdf [accessed 31/10/2017]
[17] https://branding.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf [accessed 31/10/2017]
[18] https://new.enfield.gov.uk/services/planning/planning-policy/local-plan/planning-policy-information-enfield-core-strategy.pdf [accessed 31/10/2017]
[19] Design Manual for Roads and Bridges, Volume 11, Section 3 Part 1 (HA207/07) and subsequent Interim Advice Notes

2.18 The traditional terms used for the various modelled scenarios in traffic and air quality modelling following the DMRB are ‘Baseline’, ‘Do Minimum’ and ‘Do Something’. Traditionally, Baseline is the reference year, typically the year for which traffic counts are available and/or the opening year of the scheme or commencement year of the plan. Do Minimum is the forecast future air quality in the assessment year (typically the opening year of the scheme or completion year of the plan, where traffic generation will be greatest) including expected changes in air quality due to traffic growth from other authorities and other interventions (e.g. improved vehicle emission standards) but excluding the plan or project under particular consideration (i.e. Epping Forest Local Plan in this case). Do Something is identical to Do Minimum but adds in the plan or project under consideration (i.e. Epping Forest Local Plan in this case). Calculation of these three scenarios therefore enables:

- comparison of the Do Something results with Baseline to ascertain the total change in air quality between base year and assessment year and
- comparison of the Do Something results with the Do Minimum results to specifically observe the contribution the given plan or project (Epping Forest Local Plan in this case) makes to that overall change.

2.19 The above scenarios relate specifically to the assessment of air quality effects on the Epping Forest SAC, and were terms used in the December 2017 HRA. However, a letter was received from Natural England, dated 29 March 2018, which provided further advice with respect to a number of matters, including with regard to the methodology that should be pursued in undertaking further assessments of air quality effects. Four principal points emerged:

- firstly, Natural England wished to be able to separate out the effects of a continuation of the existing improving baseline (due for example to improvements in vehicle emission factors) from the negative contribution of additional traffic growth; this is not possible using the two conventionally modelled future scenarios (Do Minimum and Do Something) which merge together the effects of traffic growth and of any improving (or deteriorating) baseline.
- Secondly, Natural England wanted the Baseline to be backdated to 2011 since this was the start year of the Local Plan.
- Thirdly, Natural England wanted traffic generation attributable to growth within the West Essex/East Herts HMA (including permissions granted since 2014) to be separately visible from growth outside the HMA. Again, this is not visible in the conventional two future scenarios, which place all growth other than Epping Forest Local Plan into a single Do Minimum scenario.
- Fourthly, Natural England wished some modelling to be undertaken which showed the expected trend in emissions between 2014 and 2033. Again, this is not possible in conventional modelling which only shows the start and end years.

2.20 In addition, it was requested that the modelling be updated to take account of queueing traffic, rather than assume free-flowing traffic on all links. The further air quality modelling work that has been undertaken has had regard to that advice to the fullest extent possible, including with respect to the scenarios to be used, and the approach to be taken for comparative purposes. In order to provide the fullest breakdown of the cumulative effects of growth in successive plans and projects the following scenarios were therefore calculated in the revised modelling.

2.21 One advantage of the approach below is that each successive scenario is built on (i.e. contains) the baseline traffic and the growth in the preceding scenario. As a result they successively accumulate growth from Scenario C to Scenario F, the latter being the worst-case 'in combination' scenario (unmitigated). This successive accumulation also means that you can see the effect that each incremental addition of growth has on the results by comparing each scenario with the preceding one.

Scenario number	**Scenario**	**Details**
A	Baseline	Traffic data and air quality as of 2014 The base year depends on having traffic count and emissions/background air quality data for the relevant year; there is no count data for 2011 and available emission rates and background concentrations only go back to 2015. However, the difference between an assessment period of 2014-2033 (19 years) and one of 2011-2033 (22 years) is likely to be small and the main result of pushing back the base year would to forecast a greater reduction in emissions/deposition rates between the base year and 2033 (since evidence from APIS shows that NOx concentrations and oxidised nitrogen deposition rates in the Epping Forest area have been reducing since at least 2005)
B	Projected 2033 baseline	The forecast air quality by 2033 in the absence of anything other than 'organic' traffic growth (i.e. a small uplift to allow for changes in car ownership and economic upturn but no further housing/employment). An allowance is then applied for improvements in vehicle technology to those flows. NOx concentrations and nitrogen deposition rates are therefore considerably better (lower) than under any of the other scenarios because this applies the expected improvements in baseline concentrations but with the smallest amount of additional traffic. **Scenario B is a hypothetical scenario created purely for reference and effectively shows the forecast future air quality in the absence of any further development anywhere. It enables the effects of development to be separated from the improving baseline by comparison with Scenarios C to G.**
C	2033 Do Nothing	This scenario builds on scenario B but factors in development in authorities **outside** the HMA to 2033, including LB Redbridge, LB Waltham Forest, LB Hackney, LB Newham, LB Enfield, LB Haringey and Broxbourne and the role of the London Plan. The Do Nothing scenario draws upon a government database tool called the National Trip End Model Presentation Programme (TEMPro). This contains data for each local authority district in England regarding expected changes in population, households, workforce and employment (in addition to data such as car ownership).
D	2033 Do Minimum	This scenario builds on scenario C but also factors in development **within** the HMA due to planning permissions granted between 2014 and 2017. As a result the NOx concentrations are expected to be higher than in scenario C. The effect of the existing permissions in the HMA can be identified by comparing Scenario D with Scenario C; the difference is dominated by permissions in Epping Forest District. **This scenario is what we can expect to happen even with no further planning permissions granted in the East Herts/West Essex HMA.**
E	2033 Do Something 1	This scenario builds on scenario D but also factors in development in Uttlesford, East Herts and Harlow due to housing/employment currently without planning permission (i.e. that portion of growth which is set by the Local Plans).
F	2033 Do Something 2	This scenario builds on scenario E but also factors in traffic growth in Epping Forest District due to housing/employment currently without planning permission (i.e. that portion of growth which is set by the Local Plan). **This is the worst-case 'in combination' scenario taking account of both negative plans/projects (leading to traffic growth) and positive ones (i.e. a scientifically reasonable allowance for an improving baseline and a shift in the vehicle fleet away from those compliant with obsolete Euro standards (e.g. Euro1 and Euro2 and towards those compliant with more recent Euro standards (such as electric vehicles or conventional technology vehicles with better emissions) notably Euro6/VI which became mandatory for the manufacture of HGVs in 2014 and for cars in 2015. The Defra Emission Factor Toolkit is used to represent this shift). The combined effect of these projects/plans can be determined by comparing Scenario F with Scenario A (the baseline). Remember, however, that the role of development in this (or any other) scenario can be separated from the improving baseline if desired by comparing it with the hypothetical 'no development' Scenario B.**
G	2033 Do Something 3	This scenario is identical to scenario F but builds in the traffic flow/speed effects of physical mitigation measures that were under consideration at Wake Arms Roundabout, Honey Lane and Robin Hood Roundabout.. **In practice this would be the 'actual' forecast in combination scenario assuming the mitigation included is achievable.**
H	2033 Do Something 4	Following initial modelling runs in late 2018, it was clear that the potential physical mitigation measures at Wake Arms Roundabout (essentially improving the capacity of the traffic island) would not achieve the hoped for air quality benefits. Feedback from Natural England also indicated that they did not consider that the physical mitigation measures at Wake Arms Roundabout or Robin Hood Roundabout were justified given that they would both involve landtake from habitats for which the Epping Forest Special Area of Conservation was designated and would thus have an adverse effect on SAC integrity on their own account. As a result a further mitigation model run was undertaken to identify whether the improvements at Honey Lane (which would involve a very small amount of landtake from the SAC but not from a habitat for which the SAC is of international importance) would be effective in air quality terms without the improvements to Robin Hood Roundabout or Wake Arms Roundabout. This was Scenario Do Something 4.
I	2033 Do Something 5	There was a professional view that Honey Lane by itself would not achieve significant air quality benefits for the wider network. Therefore, a further Do Something scenario was calculated which kept the traffic and queue data identical to DS2 (i.e. the worst case 'in combination' growth) but *ignored* any physical infrastructure improvements at Honey Lane, Wake Arms Roundabout or Robin Hood Roundabout and instead included an estimate for the air quality benefits of the sustainable transport and non-physical air quality interventions in Epping Forest Local Plan, notably Policy T1, the revised stringent Parking Standards, the requirement for electric vehicle charging within all new developments, public transport improvements and promotion of high speed broadband. There are no specific emission factors available for the kind of non-road infrastructure interventions that are included within the Epping Forest Local Plan. However, since traffic on the modelled road links in this case is dominated by housing and employment in Epping Forest District a reasonable outcome would be for these interventions to result in total NOx concentrations (and thus nitrogen deposition rates) under Scenario DS2 that better reflected the Defra emission factors for 2030 than those for 2023 (which have been used to model unmitigated traffic growth). Essentially the 2030 emission factors are what Defra's analysis indicates should occur by 2030 without any need for local interventions at all. Various factors are taken into account but they are particularly driven by shifts in vehicle fleet composition (i.e. a decreasing number of vehicles compliant with lower Euro standards and an increasing number of those compliant with higher ones like Euro6, including greater uptake of electric vehicles). Given that traffic on the modelled road sections is dominated by people who live or work in Epping District, the interventions set out in Policy T1 and other parts of the Epping Forest Local Plan, and which will be expanded upon in the air quality mitigation strategy, are expected to push emissions (and thus nitrogen deposition rates) on the modelled roads closer to those the Defra Emission Factor Toolkit forecasts for 2030 as opposed to the very cautious 2023 forecasts used in DS2 to represent the 'unmitigated' scenario. They will do this not only by applying the improvement to the additional housing/employment but also by affecting vehicle fleet composition for the existing users that live or work in the district. In practice some of these (e.g. provision of high speed broadband) might result in reductions in flow rather than a change in fleet composition but this is not possible to forecast that vehicle flow has been fixed and emissions improved instead. If Defra are correct regarding their 2030 forecasts then actually the additional initiatives would improve on what has been modelled in Do Something 5.

2.22 Each of scenarios C to J can be compared with scenario A (to establish the change compared to the 2014 baseline) or scenario B (to establish the change compared to the hypothetical future baseline without any development). For example, if roadside NOx concentrations on a given link under scenarios A (baseline), B (projected baseline) and F (all growth 'in combination' but without considering mitigation) are forecast to be 40 μgm^{-3}, 25 μgm^{-3} and 35 μgm^{-3} respectively, then a net reduction in NOx concentrations of 5 μgm^{-3} is forecast even with all growth 'in combination' but that growth is expected to retard the reduction in NOx that would occur with no development at all by 10 μgm^{-3}. Each of scenarios C to G can also be compared with the preceding scenario (e.g. F with E) to establish the specific contribution to NOx emissions of the growth added in that scenario.

2.23 Other manipulations can be performed:

- The role of **all** growth across the HMA (including permissions granted since 2014 **and** planned growth to 2033) can be seen by comparing Scenario F with Scenario C;
- The role of all 4 HMA Local Plans (i.e. delivery of **planned** development in the 4 districts) can be seen by comparing Scenario F with Scenario D – this is important since planned growth can be changed whereas existing permissions cannot; and
- The specific role of EFDC Local Plan (i.e. delivery of development in that specific district that isn't already committed) can be seen by comparing Scenario F with Scenario E – this is important since planned growth in EFDC is likely to have a much greater effect on traffic flows on the modelled links than planned growth in the other HMA authorities.

2.24 In April 2017 a High Court judgment[20] (known as the Ashdown Forest judgment) partially quashed the Lewes District and South Downs National Park Joint Core Strategy. This was on the basis that the HRA supporting the Joint Core Strategy only considered its own contribution to changes in traffic flows (and specifically whether such flows would exceed 1000 Annual Average Daily Traffic) in determining whether there would be a likely significant air quality effect on the Ashdown Forest SPA. The judge ruled that the HRA had thus explicitly failed to undertake any form of assessment 'in combination' with growth in other authorities that would affect the same road links and that this was in contravention of the Conservation of Habitats and Species Regulations 2017 (as amended).

2.25 The air quality modelling undertaken for the West Essex/East Herts HMA authorities avoids the problems that led to the successful Ashdown Forest Judicial Review for three reasons:

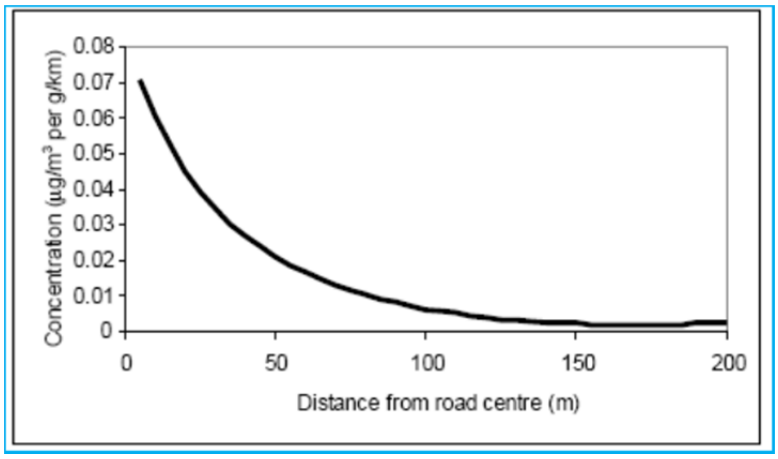
- The modelling was undertaken for a group of four authorities around Epping Forest SAC rather than for a single authority;
- Even when the change in flows due to the HMA growth options was forecast to be below 1,000 AADT air quality modelling was still undertaken; and
- The air quality modelling undertaken for the HRA was in accordance with standard methodology in Volume 11 of the Design Manual for Roads and Bridges, modified in agreement with Natural England. This method inherently involves modelling growth in surrounding authorities outside the HMA (such as Redbridge, Waltham Forest and Broxbourne).

2.26 Natural England confirmed on 21 November 2018 that the updated modelling scenarios have taken on board its advice as detailed in the letter of 29 March 2018 and this approach has been incorporated into the updated HRA that has recently been published.

2.27 As a general rule vehicle exhaust emissions are considered to only have a local effect within a narrow band along the roadside; typically within 200m of the centreline of the road. Beyond 200m emissions should generally have dispersed sufficiently that atmospheric concentrations are essentially background levels. The rate of decline is steeply curved rather than linear. In other words concentrations will decline rapidly as one begins to move away from the roadside, slackening to a more gradual decline over the rest of the distance up to 200m.

[20] http://www.bailii.org/ew/cases/EWHC/Admin/2017/351.html [accessed 26/10/2017]

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



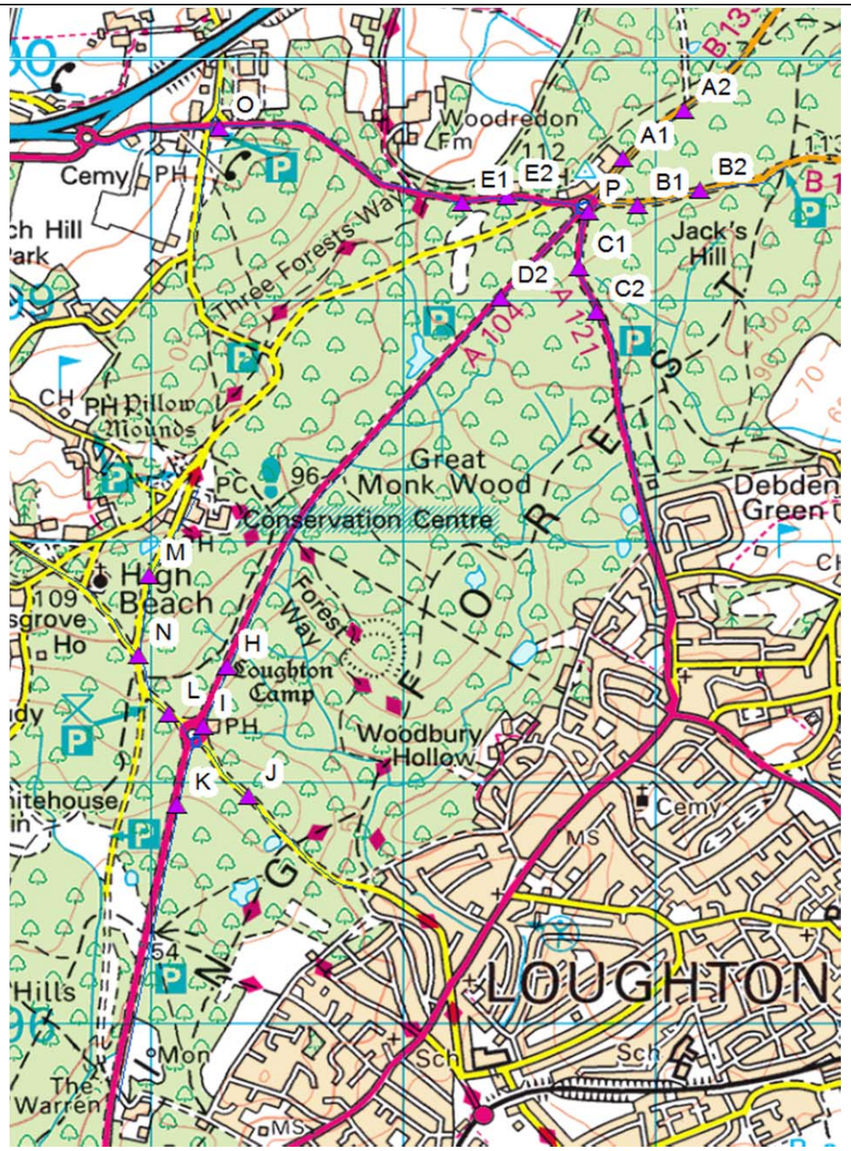
2.28 There are two measures of particular relevance regarding air quality impacts from vehicle exhausts (although a third, ammonia concentrations, is also being modelled for Epping Forest SAC). The first is the concentration of oxides of nitrogen (known as NOx) in the atmosphere. The main importance is as a source of nitrogen, which is then deposited on adjacent habitats (including directly onto the plants themselves) either directly (known as dry deposition) or washed out in rainfall (known as wet deposition). The deposited nitrogen can then have a range of effects, primarily growth stimulation or inhibition[21], but also biochemical and physiological effects such as changes to chlorophyll content. NOx may also have some effects which are un-related to its role in total nitrogen intake (such as the acidity of the gas potentially affecting lipid biosynthesis) but the evidence for these effects is limited and they do not appear to occur until high annual concentrations of NOx are reached. The guideline atmospheric concentration of NOx advocated by Government for the protection of vegetation is 30 micrograms per cubic metre (μgm^{-3}), known as the Critical Level. This is driven by the role of NOx in nitrogen deposition and in particular in growth stimulation and inhibition. If the total NOx concentration in a given area is below the critical level, it is unlikely that nitrogen deposition will be an issue unless there are other sources of nitrogen (e.g. ammonia). If it is above the critical level then local nitrogen deposition from NOx could be an issue and should be investigated.

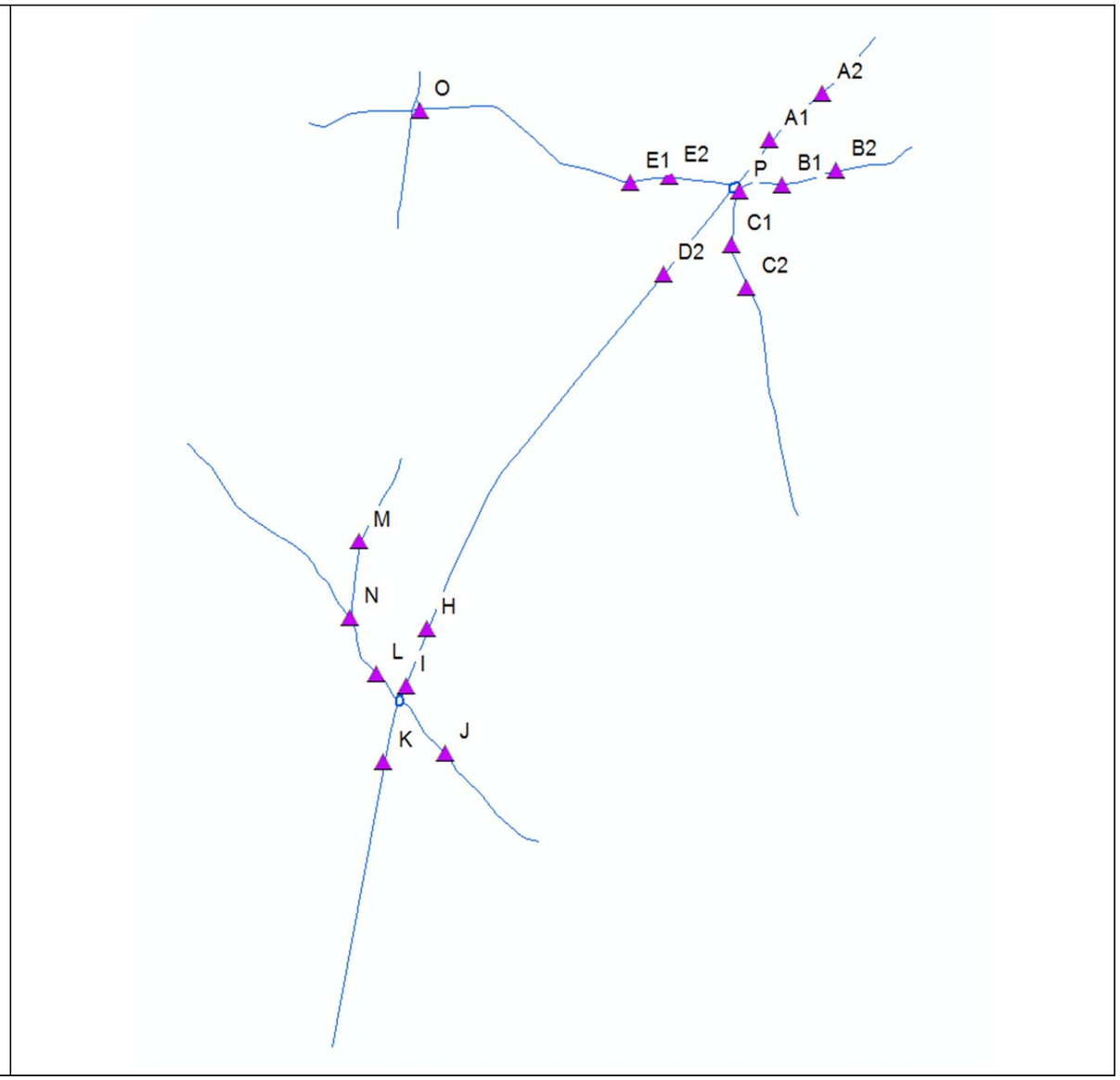
2.29 The second important metric is a direct determination of the rate of the resulting nitrogen deposition. Calculating nitrogen deposition rates rather than relying purely on scrutiny of NOx concentrations has the advantage of being habitat specific (the critical level for NOx is entirely generic; in reality different habitats have varying tolerance to nitrogen) and, for many habitats, of being directly relatable to measurable effects on the ground through scrutiny of published dose-response relationships that do not exist for NOx. Unlike NOx, the nitrogen deposition rate below which current evidence suggests that effects should not arise is different for each habitat. The rate (known as the Critical Load) is provided on the UK Air Pollution Information System website (www.apis.ac.uk) and is expressed as a quantity (kilograms) of nitrogen over a given area (hectare) per year ($kgNha^{-1}yr^{-1}$). More recently, there has also been research compiled[22] which investigates nitrogen dose-response relationships in a range of habitats.

2.30 Using the generated traffic scenarios, and information on average vehicle speeds and percentage heavy duty vehicles (both of which influence the emissions profile), air quality specialists calculated expected NOx concentrations, ammonia concentrations and nitrogen deposition rates for the modelled links. For some road sections (particularly around Wake Arms Roundabout which lies within the Epping Forest SAC) multiple transects were modelled in order to capture the effects of queuing traffic. The modelled links are depicted in Figure 4 overleaf

[21] The addition of nitrogen is a form of fertilization, which can have a negative effect on habitats over time by encouraging more competitive plant species that can force out the less competitive species that are more characteristic of such habitats.
[22] Compiled and analysed in Caporn, S., Field, C., Payne, R., Dise, N., Britton, A., Emmett, B., Jones, L., Phoenix, G., S Power, S., Sheppard, L. & Stevens, C. 2016. Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance. Natural England Commissioned Reports, Number 210.

Figure 4: Modelled air quality transect locations at Epping Forest SAC





2.31 The predictions of nitrogen deposition and annual mean NO_X concentrations are based on the assessment methodology presented in Annex F of the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 1 (HA207/07)[23] for the assessment of impacts on sensitive designated ecosystems due to highways works, modified in agreement with Natural England. Annual mean concentrations of NOx were calculated at 200m transects modelled at 1m, 10m, 20m, 50m, 100m, 150m, and 200m back from all modelled road links. Predictions were made using the latest version of ADMS-Roads using emission rates derived from the Defra Emission Factor Toolkit (version 8.0.1) which utilises traffic data in the form of 24-hour Annual Average Daily Traffic (AADT)[24], detailed vehicle fleet composition and average speed. The end of the Local/District Plan (2033) period was selected for the future scenario as this is the point at which the total emissions due to Plan traffic will be at their greatest. However, Natural England also requested that NOx emissions for a series of interim years between 2014 and 2033 were modelled in order to demonstrate that (as is historically the case) a continued improving trend in NOx emissions is expected between the base year (2014) and the assessment year (2033). This is presented in Appendix E.

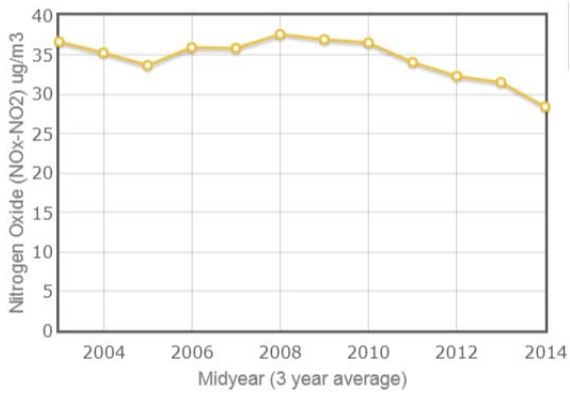
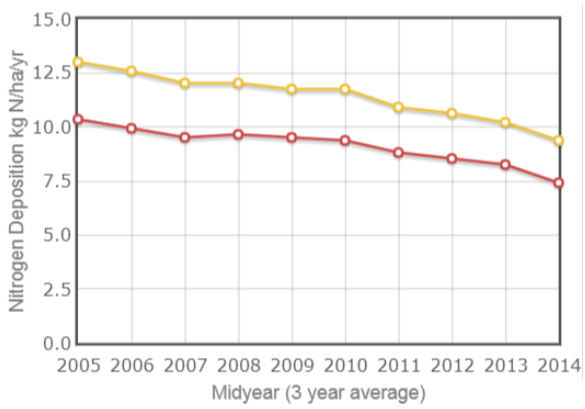
2.32 Background data for the predictions for 2033 were sourced from the Department of Environment, Food and Rural Affairs (Defra) background maps for 2013 projected forward to 2033[25]. Background nitrogen deposition rates and ammonia concentrations were sourced from the Air Pollution Information System (APIS) website[26]. The DMRB does not provide a method for forecasting ammonia emissions from traffic. A method has therefore been devised for this modelling. This method has been used by AECOM in other traffic related air quality impact assessments, in agreement with Natural England.

2.33 The general long-term trend for NOx has been one of improvement (particularly since 1990) despite an increase in vehicles on the roads.[27] Total nitrogen deposition[28] to the UK decreased by 13% between 1988 and 2008, while NOx concentrations decreased by 50% over the same time period.[29] More recent improving trends in background NOx and oxidised nitrogen deposition are shown in the area local to Epping Forest SAC in the graphs in Figure 5 overleaf, which have been taken from APIS (www.apis.ac.uk).

2.34 The graphs in Figure 5 relate to the 1km grid square (for NOx) and 5km grid square (for nitrogen deposition) within which Epping Forest SAC is situated. The data are presented as midyear 3-year averages, and show that average NOx concentrations across the grid square fell from 37 μgm^{-3} in 2003 (2002-2004 average) to 28 μgm^{-3} in 2014 (2013-2015 average). Oxidised nitrogen deposition to forest fell from 13 kgN/ha/yr in 2005 (2004-2006) to 9.4 kgN/ha/yr in 2014 (2013-2015), while deposition to short vegetation fell from 10.4 kgN/ha/yr to 7.4 kgN/ha/yr. This is an average annual rate of improvement of c. 2% for NOx and c. 3-4% for oxidised nitrogen deposition, when expressed as a percentage of the starting concentration. In other words, oxidised nitrogen deposition fell by an annual average of 0.4 kgN/ha/yr over the period in question.

[23] Design Manual for Roads and Bridges, HA207/07, Highways Agency
[24] Derived from Peak Flow data
[25] Air Quality Archive Background Maps. Defra, 2013. Available from: http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html
[26] Air Pollution Information System (APIS) www.apis.ac.uk
[27] Emissions of nitrogen oxides fell by 69% between 1970 and 2015. Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/579200/Emissions_airpollutants_statisticalrelease_2016_final.pdf [accessed 04/07/18]
[28] Nitrogen deposition consists of two components: oxidised nitrogen from combustion, such as vehicle exhausts, and reduced nitrogen from ammonia, primarily from agriculture. Total nitrogen deposition is both oxidised and reduced nitrogen combined.
[29] Rowe EC, Jones L, Stevens CJ, Vieno M, Dore AJ, Hall J, Sutton M, Mills G, Evans CD, Helliwell RC, Britton AJ, Mitchell RJ, Caporn SJ, Dise NB, Field C & Emmett BA (2014) Measures to evaluate benefits to UK semi-natural habitats of reductions in nitrogen deposition. Final report on REBEND project (Defra AQ0823; CEH NEC04307)

Figure 5: Trends in background NOx concentrations and oxidised nitrogen deposition rates at Epping Forest between 2003 and 2014 (source: APIS)

Trend in background NOx concentrations at Epping Forest SAC from 2003 to 2014	**Trend in background oxidised nitrogen deposition[30] at Epping Forest SAC from 2005 to 2015. The yellow line is deposition to forest, the red line is deposition to short vegetation such as heathland**
	

2.35 This improving trend is expected to continue, firstly due to the changing composition of the vehicle fleet as drivers replace vehicles compliant with older emission standards with those compliant with more recent emission standards, and secondly due to further improvements in vehicle emissions technology beyond Euro6. For example, the latest and most stringent (Euro6/VI) emissions standard only became mandatory in 2014 (for Heavy Duty Vehicles) and 2015 (for cars) and its effects will not yet therefore be captured in the trend data on APIS. To account for expected improvements the Design Manual for Roads and Bridges (DMRB) guidance for air quality assessment (document HA207/07)[31] recommends reducing nitrogen deposition rates by 2% each year between the base year and assessment year (‘*The total average deposition rates obtained from the Air Pollution Information System … should be reduced by 2% per year to estimate deposition rates for the assessment years’*).

2.36 However, AECOM has taken a more precautionary approach in our scenarios, allowing for an improvement in background concentrations/deposition rates of 2% per annum for the first part of the plan period (to 2023), but no improvement in background concentrations or deposition thereafter. It can be seen from the graphs presented in Figure 5 that such an allowance would be in line with recent historic improvements within the Epping Forest area and is likely to prove conservative given real world emissions testing has now been introduced.

2.37 No specific allowance is made in the Local Plan modelling undertaken for the UK Government’s recent decision to ban the sale of new petrol and diesel vehicles from 2040 since it would not affect the time period under consideration, or the Government’s new air quality strategy, but those announcements illustrate the general long-term direction of travel for roadside air quality in the UK and underlines that allowing for improvements in both vehicle emissions factors and background rates of deposition over long timescales is both appropriate and realistic.

2.38 In road traffic analyses, ‘baseline’ NOx and nitrogen deposition consists of two elements:

- The ‘background’ – this is the average NOx concentration within the 1km grid square (or nitrogen deposition rate within the 5km grid square) in which the SAC is situated. Improvements in background

[30] Total nitrogen deposition (i.e. oxidised nitrogen from NOx plus reduced nitrogen from ammonia) within the same 5km grid square covering the SAC actually increased by 2-3 kgN/ha/yr over the period 2005-2015. However, APIS shows that this was due to an increase in reduced nitrogen from ammonia, deriving principally from agriculture. According to APIS, UK road traffic is responsible for only 2% of the ammonia and thus a negligible amount of the reduced nitrogen within the grid squares at Epping Forest, but is responsible for 19% of the NOx and 34% of the oxidised nitrogen. In contrast, livestock and fertiliser are responsible for almost 80% of the ammonia and 22% of the reduced nitrogen but none of the NOx or oxidised nitrogen deposited. Therefore, within 200m of the roadside, where the effect of local road traffic will be greatest, trends in oxidised nitrogen can be expected to be more representative of total nitrogen deposition than they are over the 5km grid square as a whole. It is therefore reasonable to postulate an improving trend in total nitrogen deposition within 200m of the roadside due to improving NOx concentrations, continuing the existing trend in oxidised nitrogen deposition seen across the SAC.

[31] http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf

have been captured by applying a 2% per annum improvement between 2014 and 2023 as discussed above; and

- The 'road contribution' – the local effect (i.e. within 200m) of roads on nitrogen deposition is not captured by simply scrutinising the background. Therefore the road contribution is calculated based on applying an emission factor based on fleet composition to the volume of traffic (also taking account of average vehicle speeds, percentage Heavy Duty Vehicles and, in this case, queue length/duration) which is then added to the background to create the baseline. Forecast improvements in the road contribution are achieved by application of the Defra NO_2 emission factors for the future year to the future traffic flows. In this case, to be precautionary, those improvements were frozen at 2023 for all scenarios except DS5. Effectively, the modelling for all scenarios except DS5 therefore assumes that the shift in vehicle fleet composition (from more polluting to less polluting vehicles) that Defra expects to occur over the next five years will actually take fifteen years to achieve. This is considered highly cautious. As explained in detail in the table on page 15, for DS5 the 2030 emission factors were used as a proxy or sensitivity test for the air quality benefits of the sustainable transport and non-physical air quality interventions in Epping Forest Local Plan, notably Policy T1, the revised stringent Parking Standards, the requirement for electric vehicle charging within all new developments, public transport improvements and promotion of high speed broadband.

2.39 The result of these two calculation steps means that the modelling forecasts an improvement in the baseline nitrogen deposition between 2014 and 2033 of between 0.13 kgN/ha/yr and 0.24 kgN/ha/yr depending on link and proximity to the road. This compares to an average per annum improvement in oxidised nitrogen deposition between 2005 and 2014 within the 5km grid square containing Epping Forest SAC of 0.4 kgN/ha/yr, according to APIS. No allowance is made in the modelling for any improvement in ammonia emissions due to uncertainty in the magnitude of emissions from the fraction of the vehicle fleet operating on alternative technologies e.g. hybrid vehicles.

2.40 In preparing the modelling, Natural England commented that a view should be taken on the implications of what is becoming known as the 'Dutch Nitrogen' CJEU ruling[32], with regard to the court's opinion on the extent to which autonomous measures (i.e. improvements in baseline nitrogen deposition that are not attributable to the plan or project in question) can be taken into account in appropriate assessment. The CJEU ultimately ruled that it was legally compliant to take such autonomous measures into account provided the benefits were not uncertain[33]. They defined uncertain as '*because the procedures needed to accomplish them have not yet been carried out or because the level of scientific knowledge does not allow them to be identified or quantified with certainty*'. Note that previous case law on the interpretation of the Habitats Directive has clarified that 'certain' does not mean absolute certainty but 'beyond reasonable scientific doubt'. As explained above, the allowance made for improvements in baseline NOx concentrations and nitrogen deposition rates is notably lower than that which would be justified by recent precedent and is associated with procedures that have already been implemented (i.e. the introduction of vehicles into the fleet which are compliant with increasingly stringent emissions standards up to Euro 6/VI). Therefore, they are scientifically reasonable. It should also be noted that the simple fact that there is forecast to be an improving baseline is not used by itself as a justification for concluding no adverse effect on integrity.

2.41 The modelling has resulted in a great many scenarios being modelled for a large number of links, generating a vast amount of data. The full results dataset is presented in Appendix F. However, to aid interpretation of the 'core' results, the body of this HRA report focusses on analysis of scenarios DS2 (the worst case 'in combination' unmitigated scenario) and Scenario DS5 (the same scenario but taking non-physical infrastructure improvements associated with the Local Plan into account) compared with the future Baseline (the forecast 2033 situation without any housing or employment growth). The data are then used to produce the assessment columns in Figure 6 below.

[32] Coöperatie Mobilisation for the Environment and Vereniging Leefmilieu v College van gedeputeerde staten van Limburg C-293/17 and C-294/17

[33] The context for this ruling is that the improvements in agricultural ammonia emissions and associated reduced nitrogen deposition that the Dutch government were taking into consideration in permitting a range of farm expansion projects, as set out in their Integrated Approach to Nitrogen (PAS), were novel, highly uncertain and in some cases would not be implemented until after than projects in question had been permitted.

Figure 6: Example presentation of air quality summary results for nitrogen deposition for scenarios DS2 and DS5

1	2	3	4	5	6	7	8
DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
-0.62	0.53	-0.09	-3.06	-3.68	-3.59	3	0
-0.46	0.34	-0.12	-2.99	-3.44	-3.33	2	-1
-0.33	0.20	-0.12	-2.90	-3.23	-3.11	1	-1
-0.26	0.14	-0.12	-2.85	-3.11	-2.99	1	-1
-0.22	0.10	-0.12	-2.81	-3.03	-2.91	1	-1
-0.19	0.08	-0.12	-2.78	-2.98	-2.86	1	-1
-0.17	0.06	-0.11	-2.76	-2.93	-2.82	0	-1
-0.16	0.05	-0.11	-2.74	-2.90	-2.79	0	-1
-0.15	0.04	-0.11	-2.72	-2.87	-2.76	0	-1
-0.14	0.03	-0.10	-2.71	-2.85	-2.74	0	-1
-0.13	0.03	-0.10	-2.70	-2.83	-2.73	0	-1
-0.12	0.02	-0.10	-2.69	-2.81	-2.71	0	-1
-0.11	0.02	-0.09	-2.68	-2.79	-2.70	0	-1
-0.11	0.01	-0.09	-2.67	-2.78	-2.69	0	-1
-0.10	0.01	-0.09	-2.66	-2.77	-2.68	0	-1
-0.10	0.01	-0.09	-2.66	-2.76	-2.67	0	-1
-0.09	0.01	-0.09	-2.65	-2.74	-2.66	0	-1
-0.09	0.01	-0.08	-2.65	-2.74	-2.65	0	-1
-0.09	0.01	-0.08	-2.64	-2.73	-2.64	0	-1
-0.09	0.00	-0.08	-2.63	-2.72	-2.64	0	-1
-0.08	0.00	-0.08	-2.63	-2.71	-2.63	0	-1

2.42 Column 1 in Figure 6 shows the benefit of the 2030 emission factors by subtracting DS5 from DS2. This represents the effect of the mitigation. Column 2 presents the difference between DS2 and the 2033 baseline. This therefore represents the unmitigated 'in combination' nitrogen dose due to traffic growth between 2014 and 2033. Column 3 presents the difference between DS5 and the 2033 baseline. This therefore represents the mitigated 'in combination' nitrogen dose due to traffic growth between 2014 and 2033, using 2030 emission factors as a proxy or sensitivity test for the mitigation.

2.43 Putting columns 2 and 3 adjacent and giving them a colour coding enables an easy visual comparison. The colour coding reflects the change magnitude thresholds in DMRB, expressed as a percentage of the critical level or load:

- Green = an 'in combination' dose equivalent to 1% of the minimum part of the critical load range (10 kgN/ha/yr for Epping Forest SAC) or less, which is 'negligible'
- Yellow = an 'in combination' dose equivalent to 1-5% of the critical load, which is 'small'
- Orange = an 'in combination' dose equivalent to 5-10% of the critical load, which is 'medium'; and
- Red = an 'in combination' dose equivalent to 10% of the critical load or above, which is 'large'.

2.44 The colour coding enables one to see at a glance the effect of the DS2 scenario and how the mitigated DS5 scenario differs from the unmitigated DS2 scenario. Columns 4 and 5 then place the dose within the context of the improvements in baseline deposition such that one can observe the net improvement in nitrogen deposition forecast under the unmitigated and mitigated scenarios. Column 6 presents, for reference, the improvement in nitrogen deposition that would be forecast to occur in the absence of growth.

2.45 So in the hypothetical example provided above, the effect of the mitigation would be to take a medium to small retardation of improvement (i.e. delay in the site falling below the critical load) that applies up to 20m from the roadside and turn it into a negligible retardation of improvement. In itself defining the delay in the site falling below the critical load as 'small' or 'large' is difficult to comprehend from an ecological point of view. Therefore, the delay has also been expressed as a number of years. This is achieved by expressing the 'dose' within the context of the annual average improvement in baseline emissions and deposition rates forecast in the model for each receptor transect. The results of this step are shown in column 7 (unmitigated) and column 8 (mitigated). For example, if the annual average baseline improvement is 0.15 kgN/ha/yr and the forecast dose is 0.3 kgN/ha/yr then this represents a two year delay in the site falling below the critical load at that point compared to a situation without that dose.

2.46 For the original 2016 modelling, a series of road links within 200m of Lee Valley SPA/ Ramsar site were also identified for further investigation. However, in their consultation response on the 2016 Regulation 18 draft of the Local Plan HRA Natural England confirmed that they were satisfied that the area of the Lee Valley SPA being analysed (Rye Meads) was not susceptible to atmospheric pollution from road traffic. That site is therefore not discussed further with regard to air quality.

3. Pathways of Impact

Introduction

3.1 In carrying out an HRA it is important to determine the various ways in which land use plans can impact on internationally designated sites by following the pathways along which development can be connected with internationally designated 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 an internationally designated site. Following screening of the Plan, the following impact pathways are considered within this document.

3.2 Impact pathways for consideration are:

- Disturbance from recreational activities including urbanisation
- Atmospheric pollution
- Water abstraction
- Water quality

Disturbance from Recreational Activities Including Urbanisation

3.3 Recreational use of an internationally designated site has potential to:

- Cause damage through mechanical/ abrasive damage and nutrient enrichment;
- Cause disturbance to sensitive species, particularly ground-nesting birds and wintering wildfowl; and
- Prevent appropriate management or exacerbate existing management difficulties.

3.4 Different types of internationally designated sites 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.

Mechanical/abrasive damage and nutrient enrichment

3.5 Most types of land based internationally designated site can be affected by trampling, which in turn causes soil compaction and erosion. Walkers with dogs contribute to pressure on sites through nutrient enrichment via dog fouling and also have potential to cause greater disturbance to fauna as dogs are less likely to keep to marked footpaths and move more erratically. Motorcycle scrambling and off-road vehicle use can cause serious erosion, as well as disturbance to sensitive species.

3.6 There have been several papers published that empirically demonstrate that damage to vegetation in woodlands and other habitats can be caused by vehicles, walkers, horses and cyclists:

- Wilson & Seney (1994)[34] examined the degree of track erosion caused by hikers, motorcycles, horses and cyclists from 108 plots along tracks in the Gallatin National Forest, Montana. Although the results proved difficult to interpret, it was concluded that horses and hikers disturbed more sediment on wet tracks, and therefore caused more erosion, than motorcycles and bicycles.
- Cole et al (1995a, b)[35] conducted experimental off-track trampling in 18 closed forest, dwarf scrub and meadow and grassland communities (each tramped between 0 – 500 times) over five mountain regions in

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

[35] Cole, D.N. 1995a. Experimental trampling of vegetation. I. Relationship between trampling intensity and vegetation response. *Journal of Applied Ecology* 32: 203-214
Cole, D.N. 1995b. Experimental trampling of vegetation. II. Predictors of resistance and resilience. *Journal of Applied Ecology* 32: 215-224

the US. Vegetation cover was assessed two weeks and one year after trampling, and an inverse relationship with trampling intensity was discovered, although this relationship was weaker after one year than two weeks indicating some recovery of the vegetation. Differences in plant morphological characteristics were found to explain more variation in response between different vegetation types than soil and topographic factors. Low-growing, mat-forming grasses regained their cover best after two weeks and were considered most resistant to trampling, while tall forbs (non-woody vascular plants other than grasses, sedges, rushes and ferns) were considered least resistant. Cover of hemicryptophytes and geophytes (plants with buds below the soil surface) was heavily reduced after two weeks, but had recovered well after one year and as such these were considered most resilient to trampling. Chamaephytes (plants with buds above the soil surface) were least resilient to trampling. It was concluded that these would be the least tolerant of a regular cycle of disturbance.

- Cole (1995c)[36] conducted a follow-up study (in 4 vegetation types) in which shoe type (trainers or walking boots) and trampler weight were varied. Although immediate damage was greater with walking boots, there was no significant difference after one year. Heavier tramplers caused a greater reduction in vegetation height than lighter tramplers, but there was no difference in effect on cover.
- Cole & Spildie (1998)[37] experimentally compared the effects of off-track trampling by hiker and horse (at two intensities – 25 and 150 passes) in two woodland vegetation types (one with an erect forb understorey and one with a low shrub understorey). Horse traffic was found to cause the largest reduction in vegetation cover. The forb-dominated vegetation suffered greatest disturbance, but recovered rapidly. Higher trampling intensities caused more disturbance.

3.7 The total volume of dog faeces deposited on sites can be surprisingly large. For example, at Burnham Beeches National Nature Reserve over one year, Barnard[38] estimated the total amounts of urine and faeces from dogs as 30,000 litres and 60 tonnes respectively. The specific impact on Epping Forest SAC has not been quantified from local studies; however, the fact that habitats for which the SAC is designated appear to be subject already to excessive nitrogen deposition, suggests that any additional source of nutrient enrichment (including uncollected dog faeces) will make a cumulative contribution to overall enrichment. Any such contribution must then be considered within the context of other recreational sources of impact on sites.

Disturbance

3.8 Concern regarding the effects of disturbance on birds stems from the fact that they are expending energy unnecessarily and the time they spend responding to disturbance is time that is not spent feeding[39]. Disturbance therefore risks increasing energetic output while reducing energetic input, which can adversely affect the 'condition' and ultimately the survival of the birds. In addition, displacement of birds from one feeding site to others can increase the pressure on the resources available within the remaining sites, as they have to sustain a greater number of birds[40].

3.9 The potential for disturbance may be less in winter than in summer, in that there are often a smaller number of recreational users. In addition, the consequences of disturbance at a population level may be reduced because birds are not breeding. However, winter activity can still cause disturbance, especially as birds are particularly vulnerable at this time of year due to food shortages, such that disturbance which results in abandonment of suitable feeding areas can have severe consequences. Several empirical studies have, through correlative analysis, demonstrated that out-of-season (October-March) recreational activity can result in quantifiable disturbance:

[36] Cole, D.N. (1995c) Recreational trampling experiments: effects of trampler weight and shoe type. Research Note INT-RN-425. U.S. Forest Service, Intermountain Research Station, Utah
[37] Cole, D.N., Spildie, D.R. (1998) Hiker, horse and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management* 53: 61-71
[38] Barnard, A. (2003) Getting the Facts - Dog Walking and Visitor Number Surveys at Burnham Beeches and their Implications for the Management Process. *Countryside Recreation*, 11, 16 - 19
[39] Riddington, R. *et al*. 1996. The impact of disturbance on the behaviour and energy budgets of Brent geese. *Bird Study* 43:269-279
[40] Gill, J.A., Sutherland, W.J. & Norris, K. 1998. The consequences of human disturbance for estuarine birds. *RSPB Conservation Review* 12: 67-72

- Underhill et al[41] counted waterfowl and all disturbance events on 54 water bodies within the South West London Water bodies Special Protection Area and clearly correlated disturbance with a decrease in bird numbers at weekends in smaller sites and with the movement of birds within larger sites from disturbed to less disturbed areas.
- Evans & Warrington[42] found that on Sundays total water bird numbers (including shoveler and gadwall) were 19% higher on Stocker's Lake LNR in Hertfordshire, and attributed this to displacement of birds resulting from greater recreational activity on surrounding water bodies at weekends relative to week days.
- Tuite et al[43] used a large (379 site), long-term (10-year) dataset (September – March species counts) to correlate seasonal changes in wildfowl abundance with the presence of various recreational activities. They found that on inland water bodies shoveler was one of the most sensitive species to disturbance. The greatest impact on winter wildfowl numbers was associated with sailing/windsurfing and rowing.
- Pease et al[44] investigated the responses of seven species of dabbling ducks to a range of potential causes of disturbance, ranging from pedestrians to vehicle movements. They determined that walking and biking created greater disturbance than vehicles and that gadwall were among the most sensitive of the species studied.
- A three-year study of wetland birds at the Stour and Orwell SPA, Ravenscroft[45] found that walkers, boats and dogs were the most regular source of disturbance. Despite this, the greatest responses came from relatively infrequent events, such as gun shots and aircraft noise Birds seemed to habituate to frequent 'benign' events such as those involving vehicles, sailing and horses, but there was evidence that apparent habituation to more disruptive events related to reduced bird numbers – i.e. birds were avoiding the most frequently disturbed areas. Disturbance was greatest at high tide on the Orwell, but birds on the Stour showed greatest sensitivity.

3.10 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. 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[46] .

3.11 Underhill-Day[47] summarises the results of visitor studies that have collected data on the use of semi-natural habitat by dogs. In surveys where 100 observations or more were reported, the mean percentage of visitors who were accompanied by dogs was 54.0%.

3.12 However the outcomes of many of 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 due to an absence of alternative sites) and thus suffer greater impacts on their population[48] . A literature review undertaken for the RSPB[49] also urges caution when extrapolating the results of one disturbance study because responses differ

[41] Underhill, M.C. *et al.* 1993. Use of Waterbodies in South West London by Waterfowl. An Investigation of the Factors Affecting Distribution, Abundance and Community Structure. Report to Thames Water Utilities Ltd. and English Nature. Wetlands Advisory Service, Slimbridge
[42] Evans, D.M. & Warrington, S. 1997. The effects of recreational disturbance on wintering waterbirds on a mature gravel pit lake near London. International Journal of Environmental Studies 53: 167-182
[43] Tuite, C.H., Hanson, P.R. & Owen, M. 1984. Some ecological factors affecting winter wildfowl distribution on inland waters in England and Wales and the influence of water-based recreation. *Journal of Applied Ecology* 21: 41-62
[44] Pease, M.L., Rose, R.K. & Butler, M.J. 2005. Effects of human disturbances on the behavior of wintering ducks. *Wildlife Society Bulletin* 33 (1): 103-112.
[45] Ravenscroft, N. (2005) Pilot study into disturbance of waders and wildfowl on the Stour-Orwell SPA: analysis of 2004/05 data. Era report 44, Report to Suffolk Coast & Heaths Unit.
[46] 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.
[47] Underhill-Day, J.C. (2005). A literature review of urban effects on lowland heaths and their wildlife. Natural England Research Report 623.
[48] Gill et al. (2001) - Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation,* **97**, 265-268
[49] Woodfield & Langston (2004) - Literature review on the impact on bird population of disturbance due to human access on foot. *RSPB research report* No. 9.

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 internationally designated sites.

3.13 Disturbing activities are on a continuum. The most disturbing activities are likely to be those that involve irregular, infrequent, unpredictable loud noise events, movement or vibration of long duration (such as those often associated with construction activities). Birds are least likely to be disturbed by activities that involve regular, frequent, predictable, quiet patterns of sound or movement or minimal vibration. The further any activity is from the birds, the less likely it is to result in disturbance.

3.14 The factors that influence a species response to a disturbance are numerous, but the three key factors are species sensitivity, proximity of disturbance sources and timing/duration of the potentially disturbing activity.

3.15 It should be emphasised that recreational use is not inevitably a problem. Many internationally designated sites are also nature reserves managed for conservation and public appreciation of nature. The Lee Valley Regional Park that encompasses the SPA and Ramsar sites is such an example. At these sites, access is encouraged and resources are available to ensure that recreational use is managed appropriately.

3.16 The Epping Forest SAC and Lee Valley SPA and Ramsar site lie within the District boundary, whilst Wormley-Hoddesdonpark Woods SAC is located 2.2km from the District boundary. As such they are potentially vulnerable to the effects of recreational pressure and/ or disturbances from construction activities resulting from development within Epping Forest District.

3.17 It is therefore necessary to undertake an initial screening exercise to determine whether the development proposals within the Submission Version Local Plan could lead to a likely significant effects, either alone or 'in combination' with other plans and projects, through recreational pressure, on these internationally designated sites.

Urbanisation

3.18 This impact is closely related to recreational pressure, in that they both result from increased populations within close proximity to sensitive sites. The two impact pathways (recreation and urbanisation) are therefore discussed together in this report. The list of urbanisation impacts can be extensive, but the most significant for the European sites considered in this report (particularly Epping Forest SAC) is risk of increased fly-tipping. The principal adverse ecological effect of tipping is the introduction of invasive non-native species with garden waste. Non-native species can in some situations, lead to negative interactions with habitats or species for which internationally designated sites may be designated. Garden waste results in the introduction of invasive non-native species precisely because it is the 'troublesome and over-exuberant' garden plants that are typically thrown out[50]. Non-native species may also be introduced deliberately or may be bird-sown from local gardens.

3.19 Urbanisation effects are linked with recreational pressure effects and would potentially therefore arise from across the core recreational catchment of the SAC.

Atmospheric Pollution

3.20 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH_3) and sulphur dioxide (SO_2). Ammonia can have a directly toxic effect upon vegetation and research suggests that this may also be true for NOx at very high concentrations. More significantly, greater NOx or ammonia concentrations within the atmosphere will lead to greater rates of nitrogen deposition to vegetation and soils. An increase in the deposition of nitrogen from the atmosphere 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 2: Main sources and effects of air pollutants on habitats and species

Pollutant	Source	Effects on habitats and species
Acid	SO_2, NOx and ammonia all contribute to acid deposition. Although future trends in SO_2	Can affect habitats and species through both wet (acid rain) and dry deposition. Some sites

[50] Gilbert, O. & Bevan, D. 1997. The effect of urbanisation on ancient woodlands. British Wildlife 8: 213-218.

deposition	emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, it is likely that increased NOx emissions may cancel out any gains produced by reduced SO_2 levels.	will be more at risk than others depending on soil type, bed rock geology, weathering rate and buffering capacity.
Ammonia (NH_3)	Ammonia is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but levels have increased considerably with expansion in numbers of agricultural livestock. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_X emissions to produce fine ammonium (NH_4+) - containing aerosol which may be transferred much longer distances (can therefore be a significant trans-boundary issue.)	Adverse effects are as a result of nitrogen deposition leading to eutrophication. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides (NO_x)	Nitrogen oxides are mostly produced in combustion processes. About one quarter of the UK's emissions are from power stations, one-half from motor vehicles, and the rest from other industrial and domestic combustion processes.	Deposition of nitrogen compounds (nitrates (NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3)) can lead to both soil and freshwater acidification. In addition, NO_x can cause eutrophication of soils and water. This alters the species composition of plant communities and can eliminate sensitive species.
Nitrogen (N) deposition	The pollutants that contribute to nitrogen deposition derive mainly from NO_X and NH_3 emissions. These pollutants cause acidification (see also acid deposition) as well as eutrophication.	Species-rich plant communities with relatively high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication, due to its promotion of competitive and invasive species which can respond readily to elevated levels of N. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O_3)	A secondary pollutant generated by photochemical reactions from NO_x and volatile organic compounds (VOCs). These are mainly released by the combustion of fossil fuels. The increase in combustion of fossil fuels in the UK has led to a large increase in background ozone concentration, leading to an increased number of days when levels across the region are above 40ppb. Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O_3 above 40 ppb can be toxic to humans and wildlife, and can affect buildings. Increased ozone concentrations may lead to a reduction in growth of agricultural crops, decreased forest production and altered species composition in semi-natural plant communities.
Sulphur Dioxide (SO_2)	Main sources of SO_2 emissions are electricity generation, industry and domestic fuel combustion. May also arise from shipping and increased atmospheric concentrations in busy ports. Total SO_2 emissions have decreased substantially in the UK since the 1980s.	Wet and dry deposition of SO_2 acidifies soils and freshwater, and alters the species composition of plant and associated animal communities. The significance of impacts depends on levels of deposition and the buffering capacity of soils.

3.21 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 do certain vehicles since NOx reduction technology often involves the trade-off of increased ammonia emissions. NOx emissions are dominated by the output of vehicle exhausts (more than half of all emissions). Within a 'typical' housing development, by far the largest contribution to NOx (92%) will be made by the associated road traffic. Other sources, although relevant, are of minor importance (8%)

in comparison[51]. Emissions of NOx could therefore be reasonably expected to increase as a result of greater vehicle use as an indirect effect of the plan.

Water Abstraction

3.22 The East of England is generally an area of high water stress. It is particularly vulnerable to future climate change. It is already the driest region in the country and the predicted changes could affect the amount and distribution of rainfall, and the demand for water from all sectors. The average natural summer flows of rivers could drastically reduce; the period where groundwater resources are replenished could be shorter; and resources could become much more vulnerable. By 2050, climate change could reduce water resources by 10 -15% on an annual average basis, and reduce summer river flows by 50 -80%. Drought and floods may become more frequent in the future. The reliability of existing reservoirs, groundwater extractions and river intakes will change. The delivery of housing and economic development throughout the region could therefore result in adverse effects on many internationally designated sites in the region including those listed in preceding sections.

3.23 Epping Forest District lies within the Affinity Water supply area, specifically their Central region, WRZ 5. Approximately 60% of the Central region's water supply comes from groundwater sources (chalk and gravel aquifers) and 40% comes from surface water sources and imports from neighbouring water companies (Thames Water, Anglian Water and Cambridge Water). Water is also exported to South East Water and Cambridge Water[52].

Water Quality

3.24 The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:

3.25 At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.

- Eutrophication, the enrichment of plant nutrients in water, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.
- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

3.26 Sewage and some industrial effluent discharges contribute to increased nutrients in the European sites and in particular to phosphate levels in watercourses.

3.27 The Plan provides for development within the following settlements that are served by the following Wastewater Treatment Works (WwTW):

Table 3: Wastewater Treatment Works with Catchments Serving Settlements Identified to Provide New Development in the Local Plan.

WwTW Catchment	Settlements to Provide Residential Development and Approximate Quantum	HRA implications
Rye Meads	Roydon – 62 dwellings, Lower Sheering - 4 dwellings Sites around Harlow - 3,900 dwellings	Discharges into watercourses such as the Tollhouse Stream (ultimately entering the River Lee)
Deephams	Waltham Abbey – 858 dwellings	Discharges into the Salmon Brook, a tributary of the River

[51] 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
[52] Affinity Water (2014) Final Water Resource management Plan, 2015-2040.

	Nazeing – 122 dwellings Buckhurst Hill – 87 new dwellings	Lee, but is not connected to the Lee Valley SPA/Ramsar site
Theydon Bois	Theydon Bois – 57 dwellings	Discharges into the River Roding which discharges into the River Thames near Barking, 16.2 km from the discharge point (in a straight line)
Fiddlers Hamlet	Epping – 1305 dwellings (it is not known how much new development will be located within this catchment)	Discharges into Brookhouse Brook, and then the River Roding which discharges into the River Thames near Barking, 18.9 km from the discharge point (in a straight line)
Thornwood	Epping – 1305 dwellings (it is not known how much new development will be located within this catchment) North Weald Bassett – 1050 dwellings Coopersale – 6 dwellings Thornwood – 172 dwellings	Discharges into a ditch, then to Cripsey Brook, and then the River Roding which discharges into the River Thames near Barking, 23.5 km from the discharge point (in a straight line)
Stanford Rivers	Ongar - 590 dwellings High Ongar – 10 dwellings	Discharges into the River Roding which discharges into the River Thames near Barking, 20.5 km from the discharge point (in a straight line)
Moreton	Fyfield - 14 dwellings	Discharges into a drain and then the River Roding which discharges into the River Thames near Barking, 26.3 km from the discharge point (in a straight line)
Abbess Roding	Sheering - ~ 74 dwellings	Discharges into a drain and then the River Roding which discharges into the River Thames near Barking, 30.7 km from the discharge point (in a straight line)
Beckton	Loughton – 1021 dwellings Chigwell - 376 dwellings Stapleford Abbotts – 47 dwellings	Discharges into the River Thames close to the site near Barking

3.28 Of the WwTWs serving Epping Forest District, Rye Meads WwTW is the only one that is to receive an increase in housing numbers has potential to link to an internationally designated site (identified in orange in Table 3).This will be discussed later in this document.

4. Likely Significant Effects

Likely Significant Effects of Plan Policies

4.1 Table 4 presents an initial assessment of likely significant effects for plan policies, from the point of view of HRA. Where policies have been coloured green in the 'Likely Significant Effects' column, this indicates that the policy does not contain potential impact pathways linking to European designated sites and has been screened out from further consideration. Where policies have been coloured orange in the 'Likely Significant Effects' column, this indicates that the policy provides for potential impact pathways linking to European designated sites and has been screened in for appropriate assessment in this report. Where policies contain both negative and positive implications for European sites, the negative implications have resulted in the policy being taken forward to appropriate assessment.

Table 4: Screening Assessment of Submission Local Plan Policies

Policy number/ name	Policy detail	Likely Significant Effects
Chapter 2: Strategic Policies		
Policy SP 1 Presumption in favour of sustainable development	A. The Council will take a positive approach to the consideration of development proposals, reflecting the presumption in favour of sustainable development contained in the National Planning Policy Framework. The Council will work proactively with applicants to find solutions for development proposals that help to improve the economic, social and environmental conditions in the District. B. Proposals which accord with the development plan will be approved. Proposals that do not accord with the development plan will be refused, unless material considerations indicate otherwise. When taking decisions, the Council will apply the presumption in favour of sustainable development within national planning policy.	No Likely Significant Effects. By definition sustainable development will not result in likely significant effects upon internationally designated sites. There are no impact pathways present.
Policy SP 2: Spatial Development Strategy 2011-2033	A. Within the period 2011-2033 the Local Plan will provide for a minimum of 11,400 new homes allocated in accordance with the following sequential approach: (i) The creation of Garden Town Communities around Harlow recognizing its strategic economic role and needs, (ii) A sequential flood risk assessment – proposing land in Flood Zone 2 and 3 only where need cannot be met in Flood Zone 1; (iii) Sites located on previously developed land within settlements; (iv) Sites located on open space within settlements where such selection would maintain adequate open space provision within the settlement; (v) Previously developed land within the Green Belt; (vi) Greenfield/Green Belt land on the edge of settlements: - Of least value to the Green Belt if the land meets other suitable criteria for development. - Of greater value to the Green Belt if the land meets other suitable criteria for development. - Of most value to the Green Belt if the land meets other suitable criteria for development. (vi) Agricultural land: - Of Grade 4-5 if the land meets other suitable criteria for development. - Of Grade 1-3 if the land meets other suitable criteria for development. (vii) Enable small scale sites in smaller rural communities to come forward where there is a clear local need which supports the social and economic well-being of that community.	**Likely Significant Effects** This policy identifies a quantum of new homes (set as a minimum), pitches and yards for Travellers and Travelling Showpeople, and employment land to be provided during the Plan period, including for the Garden Town Communities around Harlow. This policy does contain the positive provision of the requirement for development proposals to demonstrate they accord with infrastructure requirements. Dependent on the location of the types of development provided within this policy. **Potential impact pathways are present:** • **Recreational Pressure and urbanisation** • **Atmospheric Pollution** • **Water Abstraction** • **Water Quality.**

Policy number/ name	Policy detail	Likely Significant Effects

B. The new homes will be distributed as follows:

Settlement	Allocated Housing
Sites around Harlow	~3900
Epping	~1305
Loughton	~1,021
Waltham Abbey	~858
Ongar	~590
Buckhurst Hill	~87
North Weald Bassett	~1050
Chigwell	~376
Theydon Bois	~57
Roydon	~62
Nazeing	~122
Thornwood	~172
Coopersale, Fyfield, High Ongar, Sheering, Lower Sheering, Stapleford Abbots	~175
Rural East	~41

C. The new homes will be delivered by:

(i) permitting development proposals within the defined settlement boundaries where they comply with all other relevant policies of the Local Plan;

(ii) the development of Garden Town Communities around Harlow and at other settlements as allocated through this Local Plan (as identified in Policy SP 5 and Chapter 5);

(iii) Permitting rural exception sites in accordance with Policy H 3 and all other relevant policies of the Local Plan;

(iv) the delivery of sites identified in made Neighbourhood Plans;

(v) making the best use of land by ensuring that development densities are appropriate to the location and size of the site in accordance with Policy SP 3; and

(vi) resisting developments which would result in a net loss of homes, unless it can be

Policy number/ name	Policy detail	Likely Significant Effects
	demonstrated that the benefits of doing so will materially outweigh the harm. D. An additional 38 pitches and 1 yard will be provided through the allocation of sites in the Local Plan to accommodate the needs of Travellers as identified in Policy SP 5 and Chapter 5. This provision will be delivered through the following sequential approach: (i) the regularisation of existing sites with temporary permissions or other unauthorised sites where appropriate; (ii) making the best use of existing traveller sites through intensification and extension, and the review of personal permissions where appropriate; (iii) new sites in locations outside the Green Belt which are appropriately located in terms of access to healthcare, education and other services (iv) new Traveller sites in Green Belt areas which are appropriately located in terms of access to healthcare, education and other services; (v) the provision of land as part of the development of the Garden Town Communities around Harlow and other allocated sites in this Local Plan; and (vi) permitting additional Traveller sites in accordance with Policy H 4. E. Within the period 2011-2033 the Local Plan will provide for employment needs by: (i) retaining and enhancing existing employment sites and premises where appropriate; (ii) allocating 23 hectares of new employment land at appropriate locations across the District as set out in Policy E 1 to provide a flexible supply of future sites to cater for needs, and to meet the economic needs of the wider sub-region, and complement Harlow Enterprise Zone; and (iii) promoting new small-scale employment opportunities within mix-use developments, including at the Garden Town Communities. F. In addition, the Council will: (i) promote and support town centre development and regeneration; (ii) encourage town centres to complement other larger sub-regional and regional comparison retail destinations outside of the District; (iii) support growth in the food production and glasshouse industry; (iv) support growth in the tourism industry and visitor economy; (v) seek to provide suitable training and skills development for local residents, to provide them with the skills needed to access future employment opportunities both within and outside the District; (vi) seek to increase workforce participation and encouraging older workers to continue to work; and (vii) attract new businesses, encourage start-ups, and help growing businesses. G. Development proposals will be required to demonstrate that they accord with infrastructure requirements established through the Infrastructure Delivery Plan and all other policies of the Plan.	

Policy number/ name	Policy detail	Likely Significant Effects
Policy SP 3 Place Shaping	Strategic Masterplans and development proposals must reflect and demonstrate that the following place shaping principles have been adhered to with respect to the scale of development proposed: (i) strong vision, leadership and community engagement; (ii) provide for the long term stewardship of assets; (iii) provide mixed tenure of homes and a range of housing types and sizes; (iv) ensure a robust range of employment opportunities with a variety of jobs within easy commuting distance of homes; (v) provide high quality and imaginatively designed homes with gardens or access to usable and accessible amenity space, combining the very best of urban and rural living to promote healthy and active lifestyles and vibrant communities; (vi) ensure generous, well connected and biodiverse rich green space provision; (vii) extend, enhance and reinforce strategic green infrastructure and public open space; (viii)ensure that development enhances the natural environment; (ix) deliver strong local cultural, recreational, social (including health and educational where required) and shopping facilities to support day-to-day needs in walkable neighbourhoods; (x) ensure positive integration and connection with adjacent rural and urban communities thereby contributing to the revitalisation of existing neighbourhoods; (xi) maintain and enhance the important features, character and assets of existing settlements; (xii) conserve and positively enhance key landscapes, habitats and biodiversity; (xiii) provide for sustainable movement and access to local and strategic destinations (including rail, bus and pedestrians/cycling); and (xiv) to positively respond to sustainable water management. B. To ensure the best and most efficient use of land as a guide the Council will normally expect: (i) a greater density of development at places with good public transport accessibility; (ii) densities above 50 dwellings per hectare in towns and large village centres, and along main transport routes and/or close to transport nodes; (iii) in the areas outside town and large village centres, new residential development should achieve densities of between 30 and 50 dwellings per hectare, and should enhance the distinctive character and identity of the area; (iv) lower density developments may be appropriate in other areas of the District. Some parts of the urban areas and some villages are particularly sensitive to the impact of intensification and redevelopment because of the prevailing character of the area and the sensitive nature of the surrounding countryside or built form.	No Likely Significant Effects This is a development management policy. It does not identify any location, quantum or type of development. A positive policy that provides for green infrastructure which has potential to divert recreational pressure away from internationally designated sites, encourages sustainable transport which has potential to improve air quality, and to positively respond to sustainable water management which has potential to reduce water abstraction and improve water quality. There are no impact pathways present.
Policy SP 4 Development	A. The following three Garden Town Communities are planned in the Harlow and Gilston	**Likely Significant Effects**

Policy number/ name	Policy detail	Likely Significant Effects
& Delivery of Garden Communities in the Harlow and Gilston Garden Town	Garden Town within Epping Forest District: (i) Latton Priory; (ii) Water Lane Area; and (iii) East of Harlow B. Development within the Garden Town Communities will be holistically and comprehensively planned with a distinct identity that responds directly to its context and is of sufficient scale to incorporate a range of homes, employment, education and community facilities, green space and other uses to enable residents to meet the majority of their day-to-day needs. Delivery of each new Garden Town Community will be phased and underpinned by a comprehensive package of infrastructure as set out within the Infrastructure Delivery Plan. C. The design, development and phased delivery of each Garden Town Community must accord with the following principles: (i) The public sector will work pro-actively and collaboratively with the private sector to design, and bring forward the Garden Town Communities to: (a) secure a high-quality of place-making; (b) ensure the timely delivery of both the on-site and off-site infrastructure required to address the impact of these new communities; and (c) provide and fund a mechanism for future stewardship, management, maintenance and renewal of community infrastructure and assets; (ii) Community and stakeholder empowerment will be embedded in the design and delivery of each Garden Town Community from the outset and include a long-term community engagement strategy. (iii) Inclusion of opportunities for community led housing development; (iv) Agreeing appropriate and sustainable long term governance and stewardship arrangements for community assets including green space, the public realm areas and community and other relevant facilities prior to the submission of outline planning applications. Such arrangements will be funded by the development and include community representation to ensure residents have a stake in long term development, stewardship and management of their community; (v) A Strategic Masterplan will be developed for each of the Garden Town Communities setting out the key development design and delivery principles and guide development proposals. Planning applications and any other consenting mechanisms for the Garden Town Communities will be required to be in general conformity with the Strategic Masterplans which have been formally endorsed by Epping Forest District Council and where appropriate Harlow District Council; (vi) Be consistent with and adhere to the relevant Design Code(s) which has been formally endorsed by Epping Forest District Council and where appropriate Harlow District Council; (vii) Strategic Masterplans and detailed design proposals must be reviewed and informed by the Quality Review Panel; (viii) Promotion and execution of the highest quality of planning, design and management of the built and public realm so that the Garden Town Communities are characterised as	Whilst this policy provides the positive provision of sustainable transport corridors (which by definition would not result in a likely significant effect), provision of infrastructure and sustainable and long-term governance of green space assets prior to outline planning, and encourages alternative transport methods (walking cycling and public transport), that have potential to reduce atmospheric pollution contributions), this policy also provides for a quantum and broad locations of residential development. **Potential impact pathways are present:** • **Recreational Pressure** • **Atmospheric Pollution** • **Water Abstraction** • **Water Quality.**

Policy number/ name	Policy detail	Likely Significant Effects
	distinctive places that capitalise on local assets and establish environments that promote health, happiness and well-being. Proposals should adhere to the Harlow and Gilston Garden Town Spatial Vision and Design Charter, and have regard to the original guiding principles established by Sir Frederick Gibberd's masterplan for Harlow, including the Green Wedge network; (ix) Ensure that on-site and off-site infrastructure is provided in a timely manner, subject to viability considerations, ahead of or in tandem with the development it supports to mitigate any impacts of the new Garden Communities, meet the needs of residents and establish sustainable travel patterns; (x) Provide for balanced and inclusive communities through a mix of homes of different sizes, tenures and types. Provision should be made for self and custom-built homes and the needs of an aging population; (xi) Provide and promote appropriate opportunities for small-scale employment generating uses; (xii) Ensure the provision of integrated and sustainable transport systems for the Harlow and Gilston area that put walking, cycling and public transit networks and connections at the heart of growth in the area, to create a step change in modal shift through providing for and encouraging more sustainable travel patterns; (xiii) Contribute to the delivery of the Sustainable Transport Corridors and the establishment of an integrated, accessible and safe transport system which maximises the use of the sustainable transport modes of walking, cycling and the use of public and community transport in order to improve air quality and reduce emissions and promote healthy lifestyles. Garden Town Communities must ensure the provision of high quality, safe and direct walking and cycling routes and linkages to and from Harlow within a permeable site layout with priority over vehicular traffic; (xiv) Create sociable, vibrant, healthy and walkable neighbourhoods with equality of access for all to local employment opportunities, a range of community services and facilities including health, education, retail, culture, community meeting spaces, multi-functional open space, the Green Wedge Network, sports and leisure facilities and to high quality digital infrastructure; (xv) Develop specific Garden Town Community parking approaches and standards recognising that car-ownership will need to be accommodated without impacting on the 'quality of place, and sustainable transport objectives' whilst making the best use of land; (xvi) Create distinctive environments which relate to the surrounding area, the natural and historic landscapes and systems, provide a multi-functional green-grid which creates significant networks of new green infrastructure and which provides a high degree of connectivity to existing corridors and networks and enhance biodiversity; (xvii) Integrate a sustainable approach to design and construction that secures net gains in local biodiversity and the highest standards of energy efficiency and innovation in technology; and (xviii) Ensure that appropriate measures are put in place to equalise and apportion the cost	

<table>
<tr><th>Policy number/ name</th><th>Policy detail</th><th>Likely Significant Effects</th></tr>
<tr><td></td><td>of shared infrastructure and associated land contributions.</td><td></td></tr>
<tr><td>Policy SP 5 Garden Town Strategic Allocations</td><td>Allocates:
<table>
<tr><td>Allocation Reference</td><td>Location</td><td>Development to be delivered</td></tr>
<tr><td>SP 5.1</td><td>Latton Priory</td><td>Approximately 1,050 homes and 1ha of employment land; 0.5ha for up to 5 traveller pitches</td></tr>
<tr><td>SP 5.2</td><td>Water Lane Area</td><td>Approximately 2,100 homes; 0.5ha for up to 5 traveller pitches</td></tr>
<tr><td>SP 5.3</td><td>East of Harlow</td><td>Approximately 750 homes and potential relocation of Princess Alexandra Hospital; 0.5ha for up to 5 traveller pitches</td></tr>
</table>
B As well as the delivery of new homes sites SP5.1 – SP5.3 will also be expected to make provision for appropriate small-scale employment, retail and community uses in accordance with other policies within the Plan. The Garden Town Communities must be planned and delivered as high quality, integrated, sustainable and distinctive developments supported by necessary infrastructure, services and facilities.
C. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Development identified in this policy will be expected to make a contribution proportionate to its scale and impact for the delivery of improvments to Junction 7 and other strategic requirements..
D. Development proposals in relation to sites SP 5.1-5.3 will be required to be in general conformity with a Strategic Masterplan endorsed by the Council.
E Development proposals for the Garden Town Communities (and where applicable Strategic Masterplans) must reflect and demonstrate that the Place Shaping and Garden Town principles set out in policies SP 3 and SP 4 have been adhered to.
<u>Latton Priory</u>: Land allocated at Latton Priory (SP 5.1) will be brought forward on a phased basis for a comprehensive high quality development to include:</td><td>Likely Significant Effects
The closest of these sites is 5.5km from Epping Forest SAC (SP 5.1), 6.3km from Wormley-Hoddesdonpark Woods SAC (SP 5.2), and 2.9 km from Lee Valley SPA and Ramsar site (SP 5.2).
Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7.
Potential impact pathways present include:
• Recreational Pressure
• Atmospheric Pollution
• Water Abstraction
• Water Quality.
Locations are illustrated on Figures 3A to 4B.</td></tr>
</table>

Policy number/ name	Policy detail	Likely Significant Effects
	(i) At least 1,050 homes up to 2033; (ii) 1ha of employment land at Dorrington farm; (iii) 0.5ha for up to 5 traveller pitches; (iv) strategic 'green infrastructure' comprising natural / semi natural open space, walking and cycling routes, flood mitigation and wildlife space and a new Green Belt defensible boundary to the South of the site; (v) Land within the Green Belt and Masterplan area must be retained for public open space and for appropriate uses in the Green Belt; (vi) A sympathetic design which responds to the adjacent ancient woodland and the Scheduled Monument; (vii) a local centre (viii) A two-form entry primary school; (ix) At least 10ha of land to accommodate a secondary school in addition to any necessary contributions (x) Early years facilities; (xi) The provision of appropriate community and health facilities; (xii) highway and transport improvements including to the north-south sustainable transport corridor, works to Southern Way and Second Avenue corridor, and upgrades to Junction 7 of the M11; (xiii) Satisfactory water supply and waste water network infrastructure for occupants; and (xiv) bus services and direct pedestrian and cycle links between housing and the facilities that serve them. G Water Lane Area: Land allocated in the Water Lane Area (SP 5.2) will be brought forward on a phased basis for a comprehensive high quality development to include: (i) at least 2,100 homes up to 2033; (ii) 0.5 hectares for up to 5 traveller pitches; (iii) strategic 'green infrastructure' comprising natural / semi natural open space, walking and cycling routes, flood mitigation and wildlife space and a Green Belt defensible boundaries as indicated on the map; (iv) a local centre; (v) A two-form entry primary school; (vi) Contributions towards new secondary school provision within the Garden Town; (vii) Early years facilities; (viii) The provision of appropriate community and health facilities; (ix) Highway and transport improvements including works to Water Lane / A1169 roundabout; A1025/Abercrombie Way signals and traffic calming along the	

Policy number/ name	Policy detail	Likely Significant Effects
	A1169 Southern Way Corridor; (x) Satisfactory water supply and waste water network infrastructure for occupants; and (xi) Bus services and direct pedestrian and cycle links between housing and the facilities that serve them. H East of Harlow: Land allocated in the East of Harlow (SP5.3) will be brought forward on a phased basis for a comprehensive high quality development to include: (i) At least 750 homes up to 2033; (ii) O.5 hectares for up to 5 traveller pitches; (iii) Strategic 'green infrastructure' comprising natural / semi natural open space, walking and cycling routes, flood mitigation and wildlife space and any compensatory BAP habitat to retain existing provision; (iv) No built development will be permitted on land within Flood Zone 2 and 3 as indicated on the Environment Agency maps; (v) A local centre; (vi) The provision of appropriate community and health facilities including approximately 14 hectares of land for a health and well-being hospital campus (vii) A two-form entry primary school; (viii) At least 10ha of land to accommodate a new secondary school in addition to any necessary contributions; (ix) Early years facilities; (x) The provision of appropriate community and health facilities; (xi) Highway and transport improvements including linkages into off-road cycle and walking networks; (xii) The delivery of works to widen the B183 Gilden Way, a left turn slip road from M11 Junction 7a link road approach to the East Harlow northern access road ahead of development commencing; (xiii) Satisfactory water supply and waste water network infrastructure for occupants; (xiv) Bus services and direct pedestrian and cycle links between housing and the facilities that serve them; (xv) The proposed National Cycle Route 1;and (xvi) Measures to ensure the protection of the functional flood plain and restriction of surface water run-off from the site into Pincey Brook to no more than existing rates.	
Policy SP 6 Green Belt and District Open Land	Green Belt The general extent of the Green Belt is set out in Map 2.5. The detailed boundaries and inset settlements are defined in Chapter 5 and shown on the policies map. The openness	No Likely Significant Effects. This is a development management policy that provides for the protection of the green Belt and District Open Land.

Policy number/ name	Policy detail	Likely Significant Effects
	of the Green Belt will be protected from inappropriate development in accordance with national planning policy and Policy DM 4. <u>District Open Land</u> The same level of protection will be applied to areas of District Open Land as is applied to Green Belt. The key characteristics of District Open Land are their openness, permanence, local significance, wildlife value and/or public accessibility. It is not necessary for each of these characteristics to be present to be designated or retained as such.	There are no impact pathways present.
Policy SP 7 The Natural Environment, Landscape Character and Green and Blue Infrastructure	A. 'The Council will protect the natural environment, enhance its quality and extend access to it; this contributes to the health and wellbeing of its people and economic viability of the District. In considering proposals for development the Council aims to create a comprehensive network of green and blue corridors and places, appropriate to the specific rural or urban setting. In so doing, it seeks to connect and enrich biodiversity through habitat improvement and protection at all scales, including priority habitats and extend access to and maximise the recreation opportunities of, our countryside and urban open spaces.' B. The countryside: (i) the Council will conserve and enhance the character and appearance of the countryside. Landscape character assessments will be used to assist in judgements on the suitability of new development; (ii) the Council will act itself, and in relation to development proposals, to develop a multifunctional countryside, which is productive, rich in biodiversity at all scales, with a well-connected green and blue infrastructure network that is accessible for quiet enjoyment, recreation and exercise. C. Towns and smaller settlements: (i) the Council will protect the green and blue infrastructure assets of the towns and smaller settlements and improve the quality of existing green space in towns and smaller settlements; (ii) the Council will ensure that new developmentis designed to protect existing green and blue infrastructure, enhance networks, secure better provision where deficiencies have been identified and deliver new green and blue infrastructure to link to local or wider green and blue infrastructure networks; and (iii) the Council will seek the provision of new quality green space appropriate to the scale of the development. D. Green and Blue Infrastructure The District's green and blue infrastructure network will be extended, maintained and enhanced through the remaining policies in this Plan including: (i) the location of development (Policy SP 2 and Chapter 5)	No Likely Significant Effects. This is a positive policy as it provides for the retention and extension of green infrastructure which has potential to divert recreational pressure away from internationally designated sites. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	(ii) protecting habitat and improving biodiversity (Policy DM 1) (iii) sustainable urban drainage systems (Policy DM 16) (iv) supporting sustainable transport choices (Policy T 1) (v) open space, sport and recreation provision (Policy DM 6) E -The Council will therefore expect all development proposals, where appropriate, to contribute towards the delivery of new green and blue infrastructure which develops and enhances a network of multi-functional green and blue assets throughout the District. This will be proportionate to the scale of the proposed development and the rural or urban context. The Council will support development which contributes to the District's existing green and blue infrastructure and where possible, enhances and protects networks. It will secure additional provision where deficiencies have been identified through the Infrastructure Delivery Plan and other appropriate evidence base documents. Where on site provision is not feasible then the use of CIL/S106 agreements will be sought to contribute.	
Chapter 3: Housing, Economic and Transport Policies		
Policy H 1 Housing mix and accommodation types	A. Development will be permitted where the mix of new homes: (i) includes a range of house types and sizes to address local need including for 'down-sizing'; (ii) is appropriate to the size, location and characteristics of the site and its surroundings; (iii) takes into account the existing housing stock in the settlement or neighbourhood in order to avoid any over-concentration of a single type or size of homes, or specialist accommodation, where this would undermine the achievement of mixed and balanced communities; and (iv) allows for community-led approaches such as cohousing and co-operatives where appropriate; (v) provides for all new homes to be accessible and adaptable as defined by the Building Regulations in effect at the time of the application. B. Planning applications will be required to be supported by evidence, proportionate to the nature and scale of development proposed, to justify the mix of new homes to be provided. Such evidence will also need to reflect latest housing needs evidence published by the Council. C. Proposals for housing, requiring specialist accommodation, self-build/custom build housing, sites upon which caravans can be stationed, or locations for mooring houseboats, will be supported where: (i) they meet a proven identified need; (ii) the location is appropriate in terms of access to facilities, services and public transport and; (iii) It can be demonstrated that the development is designed and managed to provide the most appropriate types and levels of support to the proposed occupier and adequately caters for the needs of support staff.	No Likely Significant Effects. This is a policy relating to the mix and type of housing to be provided. This policy does not identify any location or quantum of development. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	D. The Council will require all New Housing Development to include affordable housing in accordance with Policy H 2 (Affordable Housing). E. Where there is evidence of an identified unmet need in the local area and the location is appropriate in terms of access to existing or proposed facilities, services and public transport, larger scale new residential developments should incorporate specially designed housing/specialist accommodation for people with support needs (including for older people and housing with care). F. The loss of bungalows and specialist accommodation will be resisted. G. The Council will support the development of self-build homes on appropriately sized, serviced sites in the first instance or on appropriately sized sites that are capable of being serviced. The provision of such will be encouraged as part of larger development schemes.	
Policy H 2 Affordable housing	A. On development sites which provide for 11 or more homes, or residential floorspace of more than 1,000 sq m (combined gross internal area), the Council will require 40% of those homes to be for affordable housing provided on site. The mix of affordable homes will be required to reflect the latest available housing need. All new homes will be required to meet accessible and adaptable homes standards as defined by the Building Regulations applicable at the time of the application. B. The management of the affordable housing provided will be undertaken by a Registered Provider which is a Preferred Partner of the Council unless otherwise agreed by the Council. Any relevant scheme will need to demonstrate that the design, siting and phasing of affordable homes provides for its proper integration and timely provision as part of the wider development. C. The mix of units in respect of size will be determined on a site by site basis dependent on the overall needs for the local area and on the specific characteristics of the individual site. However, the Council will generally expect the mix of the affordable homes to reflect the mix of the market housing, in terms of the ratios of types, sizes and the overall number of habitable rooms. D. Proposals that do not accord with the requirements of paragraph A (above) must be accompanied by a financial and viability appraisal (with supporting evidence), which is transparent and complies with relevant national or local guidance applicable at the time. E. Where, it has been demonstrated to the Council's satisfaction that the provision of affordable housing in accordance with the above levels and tenure mix would render the scheme unviable, the Council will determine the approach to be taken to achieving viability, where appropriate, having regard to the following available options: (i) reviewing the tenure mix; (ii) reviewing the extent of other site specific planning obligations; and (iii) reviewing the proportion of affordable housing. F. In exceptional circumstances, where the Council agrees that it would be inappropriate for the required affordable housing to be provided on-site as part of the development, the Council will accept a financial contribution to fund the provision of affordable housing on	No Likely Significant Effects. This is a policy relating to the provision of affordable housing. This policy does not identify any location or quantum of development. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	another site in the District, provided that the Council is satisfied that: (i) The financial contribution is at least equivalent to the increased development value if affordable housing was not provided on-site, subject to such a contribution being viable; and (ii) A financial and viability appraisal has been provided (with supporting evidence) in accordance with paragraph D (above) which is transparent and complies with relevant national and local guidance applicable at the time, properly assessing the level of financial contribution to be provided. G. Where a viability and financial appraisal has been submitted in accordance with paragraph D (above) the Council will undertake an independent review of that appraisal for which the applicant will bear the cost.	
Policy H 3 Rural exceptions	A. Planning permission may be granted for small-scale affordable housing schemes which are related to smaller settlements, where planning permission for housing development will not normally be granted, where the Council is satisfied that: (i) there is a demonstrable social or economic need for affordable housing for local residents which cannot be met in any other way and which can reasonably be expected to persist in the long term. Planning applications will be expected to be supported by a local housing needs assessment; (ii) the development is well-related to the existing settlement and there is no significant detrimental impact to the character of the nearby settlement and the surrounding countryside, or would cause significant harm to Green Belt objectives. Proposals involving extensions into the open countryside or the creation of ribbons or isolated pockets of development are unlikely to be considered acceptable and should be avoided. There should be no significant material grounds for objection including on highways, infrastructure, environmental or amenity matters; and (iii) suitable arrangements have been secured to ensure that all of the affordable homes built are available only for initial and subsequent qualifying occupiers whose total income is insufficient to enable them to afford to rent or buy a dwelling of a sufficient size on the open market in the specified parish. B. The management of the affordable housing provided will be undertaken by a Registered Provider which is a Preferred Partner of the Council unless otherwise agreed by the Council. C. For the purpose of this Policy 'local resident' is defined as: (i) Persons who have been permanently resident in the specified parish for at least two years; or (ii) Persons who are no longer resident in the specified parish but who have been resident there for at least three years during the last iii) Persons who are in permanent employment in the specified parish and have been for a minimum of two years and are working at least an average of 24 hours per week; or (iv) Persons who have close relatives (i.e. parents, grandparents, children, brother or sister)	No Likely Significant Effects. It is noted that this policy provides for new housing beyond that previously identified, however this is small scale housing in exceptional circumstances. This policy does not provide for any location or quantum (other than small scale) for development. As such there are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	living in the specified parish who have lived there for at least five years. D. Should there be insufficient applicants from the specified parish when the homes become available for occupation, then applicants from neighbouring parishes who comply with the eligibility criteria set out above will be considered. E. The Council will consider the provision of a small proportion of market housing within the proposal site if it can be demonstrated through a financial and viability appraisal (with supporting evidence), which is transparent and complies with relevant national or local guidance applicable at the time, that such housing is financially necessary to ensure the delivery of the affordable homes. F. Where a viability appraisal has been submitted in accordance with paragraph D (above) the Council will undertake an independent review of that appraisal for which the applicant will bear the cost.	
Policy H 4 Traveller site development	A. The Council will meet the identified need for Travellers through the provision of plots and/or pitches as part of allocations as set out in Policies SP 2, SP 4 and Chapter 5. B. If applications for Traveller site development are received for sites other than those allocated in this Plan they will be determined taking into account the following considerations: (i) The impact on local amenity and the natural and historic environment; (ii) The relationship to local services with capacity, including education establishments, health and welfare services, shops and community facilities; (iii) Access to the highway, public transport services and sustainable transport options; (iv) The provision of on-site facilities for parking, storage, play and residential amenity and appropriate essential services; (v) Whether the site is located outside areas of high flooding risk; (vi) The compatibility of the proposed use with surrounding land uses including potential disturbance from vehicular movements, and on-site business activities; (vii) The impact on the physical and visual character of the area; (viii)The potential for successful integration between travelling and settled communities; and (ix) Any impact on the Green Belt. C. In accordance with Policy SP 4, proposals for new sites under part B of this policy should not exceed five pitches or 0.5 hectares, unless a specific justification is provided for a greater number of pitches up to a maximum of 10 pitches. D. Planning permission will not be granted for the replacement of lawful Traveller sites by permanent dwellings or other uses unless it can be clearly demonstrated to the satisfaction of the local planning authority that there is no genuine need or likely future need for Traveller sites in the locality and other planning policy requirements are met.	No Likely Significant Effects. Whilst this policy relates to provision of new Traveller sites, it does not itself identify any quantum or location (this is provide in policies SP 2 and SP 3). In addition, it ensures that no adverse impact upon the natural environment will occur. As such there are No Likely Significant Effects.
Policy E 1 Employment sites	A. Existing Employment Sites (i) The Council will seek to retain and enhance existing employment sites and premises.	**Likely Significant Effects** The closest new employment site is located 1km from Epping

<table>
<tr><th>Policy number/ name</th><th>Policy detail</th><th>Likely Significant Effects</th></tr>
<tr><td></td><td>Proposals for the redevelopment, renewal, intensification, or extension of existing employment sites and premises for their existing use will be encouraged.
(ii) The change of use of existing employment sites or premises (whether designated or undesignated) to other uses will not normally be permitted unless the applicant can demonstrate through evidence, including marketing of the site, that there is no longer a reasonable prospect of the site being used for the existing employment use.
(iii) Proposals which will result in loss of employment space will be expected to provide mitigation measures in the form of contributions to local employment training and small business growth programmes supported by the Council.
B. New Employment Sites
(i) The Council will meet the identified need for employment sites through new allocations as set out in Policies SP 2, SP 5 and Chapter 5.
C. The Council will support and encourage the development of flexible local employment space to meet the employment and economic needs of the District.

<table><tr><th>Allocation reference</th><th>Site Name</th><th>Allocated use</th><th>Indicative Development Area</th></tr><tr><td>LOU.E2</td><td>Langston Road Industrial Estate</td><td>B2</td><td>1 ha</td></tr><tr><td>NWB.E4</td><td>North Weald Airfield</td><td>B1/B2/B8</td><td>10 ha</td></tr><tr><td>RUR.E19</td><td>Dorrington Farm</td><td>B1a/B1b</td><td>1 ha</td></tr><tr><td>WAL.E6</td><td>Galley Hill Road Industrial Estate</td><td>B2/B8</td><td>1 ha</td></tr><tr><td>WAL.E8</td><td>Land North of A121</td><td>B1c/B2/B8</td><td>10 ha</td></tr><tr><td>Total</td><td></td><td></td><td>23ha</td></tr></table>(note – figures have been rounded)</td><td>Forest SAC (SR-1034-Z: WAL.E9), 6.3km from Wormley-Hoddesdonpark Woods SAC (SP 5.2), and 1 km from Lee Valley SPA and Ramsar site (SR-0375-N: WAL.E7).
Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7.
Potential impact pathways present include:
• Atmospheric Pollution
• Water Abstraction
• Water Quality.
Locations are illustrated on Figures 3A to 4B.</td></tr>
<tr><td>Policy E 2 Centre Hierarchy/Retail Policy</td><td>A. The following Town and District Centre hierarchy applies in the District:
(i) Town Centre:
• Epping
• Loughton High Road
(ii) Small District Centre:</td><td>No Likely Significant Effects.
This is a policy relates to Centre Hierarchy and Retail.
This policy does not identify any type or location of development.
There are no impact pathways present.</td></tr>
</table>

Policy number/ name	Policy detail	Likely Significant Effects
	• Waltham Abbey • Loughton Broadway • Ongar • Buckhurst Hill B. Proposals within defined Town and Small District Centres for retail, leisure, entertainment, offices, arts and culture, tourism and other main town centre uses, as defined by national planning guidance, will be supported where they will maintain and enhance the vitality and viability of the centres. C. Within defined Primary Retail Frontage ground floor units will be maintained in A1 Class Uses in accordance with Policies P 1 to P 5. Proposals that would not result in a reduction in the specified percentage of A1 Class Uses will be permitted for other main town centre uses where this would support the function, vitality or viability of the Town or District Centre and maintain an active daytime frontage. D. Within defined Secondary Retail Frontage ground floor units will be maintained in A1 Class Uses in accordance with Policies P 1 to P 5, but a wider range of main town centre uses may be supported where they would maintain the diversity, viability and vitality of the Town or District Centre. Proposals for non-A1 Class Uses within Secondary Retail Frontages must encourage active shop fronts, attract a high footfall consistent with other main town centre uses and positively contribute to the function of the Town or District Centre. E. The scale and type of any development proposals should be proportionate to the position of the relevant centre in the hierarchy. F. In Town and Small District Centres, the Council may permit residential development in appropriate locations and within Primary or Secondary Retail Frontages where it is above the ground floor and would not lead to a loss of main town centre uses, floorspace or frontage. G. The Council will not permit the change of use to any non- retail use of corner shops, shops in small local parades or village shops, unless it can be demonstrated that: (i) there is no demand for a retail use; or (ii) the service provided is to be continued in another location in the village or locality; or (iii) the new use would meet an identified need for community facilities or services. H. Out of Centre development (i) All proposals for main town centre uses outside of defined Town and Small District Centres, including edge of centre/out of centre development, will be subject to sequential testing as required by national planning guidance and will only be permitted where: • There is demonstrable need for the development; • The proposal satisfies the sequential approach to site selection; • The proposal would not put at risk or harm proposals to safeguard the vitality and viability of any nearby town centre; • The proposal would not cause material harm to the vitality and viability of any nearby town centre; and	

Policy number/ name	Policy detail	Likely Significant Effects
	• The development would be readily accessible, or will be made so, by a range of transport options, including public transport, cycle and foot I. Relevant applications for main town centre use outside of defined Town and Small District Centres will be required to undertake and provide an impact assessment in accordance with national planning guidance.	
Policy E 3 Food production and glasshouses	A. New or replacement glasshouses, any ancillary packhouse development, any ancillary low carbon energy generation facilities and Combined Heat and Power (CHP) facilities will be permitted subject to the following criteria: (i) The scheme does not have a significant visual impact upon the character of the landscape particularly with regard to long-distance views; (ii) the planning application includes full details of landscaping, including trees and other vegetation which will be retained or removed; (iii) the land is capable of being developed without major changes to existing contouring; (iv) vehicular access from the site to the road network is adequate and uses roads capable of accommodating the vehicle movements likely to be generated by the development without detriment to highway safety, the rural character of the roads, and residential amenity; (v) adequate surface water and foul drainage capacity exists or can be provided as part of the development. The Council may require inclusion of suitable and adequately maintained sustainable drainage systems to control the quality or attenuate the rate of surface water run-off; (vi) adequate quality and quantity of provision of water is available or can be provided on-site, for all domestic and non-domestic purposes; B. Within existing horticultural nurseries sites, residential accommodation for nursery workers will only be permitted where it can be demonstrated, to the Council's satisfaction, that: (i) There is clear and robust evidence which shows that the lack of on-site accommodation is rendering existing use unviable. This include the possibility for converting/extending existing onsite structure to provide for such accommodation; (ii) There is no other alternative suitable accommodation within a reasonable distance including purchasing/renting of existing residential property for use as a House in Multiple Occupation or hostel; (iii) The quality, size and nature of the proposed structure is commensurate with the needs of the enterprise concerned; (iv) Any permission for such accommodation will be strictly tied by either a planning condition and/or other forms of legal agreements e.g. an occupancy agreement to ensure that the accommodation will only be occupied by horticultural workers employed by the relevant enterprise; (v) any relevant structure will be removed or demolished once the need for such accommodation ceased to continue and the site reinstate to agricultural use; and	No Likely Significant Effects. This is a policy relating to food production and glasshouses. This policy does not identify and location or quantum of development. It does provide the requirement for adequate water resources. It should be noted that food production uses lots of water. At this stage it is not possible to assess the impacts of any new food production and glasshouse development. Any increase in water abstraction for commercial reasons would be required to gain an abstraction license from the Environment Agency for the specific development. The quantum of new residential development provided by this policy is likely to be small. As no location is identified, there are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	(vi) Where applicable, any permission will lead to the removal of long established, but inappropriate caravan accommodation within the site, where applicable.	
Policy E 4 The visitor economy	A. Opportunities for the sustainable development of the visitor economy will be supported where they are of a scale, type and appearance appropriate to the locality and provide local economic benefits, through the following measures: (i) support for the development of high quality visitor accommodation, in particular accommodation linked to outdoor sport and activity hubs in the Lee Valley Regional Park, and visitor accommodation of an appropriate scale and type that makes use of existing buildings and strengthens existing rural leisure businesses; (ii) support for the upgrading of existing visitor attractions, visitor centres and development of appropriate new ones; (iii) the retention and improvement of existing visitor accommodation and venues unless there is proof that there is no market interest in acquisition and investment to allow continued profitable operation; (iv) encouraging sustainable tourism in rural areas. This will include better linkages between the towns and rural surroundings; and opportunities for the enjoyment of the Lee Valley Regional Park and Epping Forest while recognising the importance of heritage of the area, as assets that form the basis of the tourist industry here; (v) support a year-round visitor economy while ensuring the facility remains for visitor use; (vi) supporting the improvement of sustainable transport opportunities for visitors and encourage the use of sustainable transport modes to reduce the impact of visitors on the highway network; and (vii) encouraging local food/produce and appropriate tourism development that supports rural business and farm diversification.	No Likely Significant Effects. This policy has potential to increase visitor numbers to internationally designated sites and to lead to impact pathways such as increased water abstraction and atmospheric pollution, and reduction in water quality. However, by definition sustainable development, sustainable tourism and sustainable transport would not result in likely significant effects upon internationally designated sites. Further, this policy does not identify any location, type or scale of development. There are no impact pathways present.
Policy T 1 Sustainable Transport Choices	A. The Council will work in partnership with relevant stakeholders to promote a safe, efficient and convenient transport system which will: (i) build on the District's strategic location, through improvements to strategic road and rail connections and other public transport networks to the wider area; (ii) promote transport choice, through improvements to public transport services and supporting infrastructure, and providing coherent and direct cycling and walking networks to provide a genuine alternative to the car and facilitate a modal shift; (iii) provide opportunities to improve access to the two town and four district centres and rail stations by all modes of transport and ensure good integration between transport modes; (iv) manage congestion, seek to reduce journey time and maintain consistency in journey times; (v) promote and improve safety, security and healthy lifestyles; and (vi) improve the efficiency of the local highway network. B. Development should minimise the need to travel, promote opportunities for sustainable transport modes, improve accessibility to services and support the transition to a low carbon	No Likely Significant Effects By definition sustainable transport would not result in likely significant effects upon internationally designated sites. Further, this policy does not identify any location, type or scale of development, or any scale or location of any transport schemes. It contains positive text to encourage modal shift away towards cycling, walking and use of public transport and electric cars which all have potential to reduce atmospheric pollution. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	future. C. Development proposals will be permitted where they: (i) integrate into existing transport networks; (ii) provide safe, suitable and convenient access for all potential users; (iii) provide on-site layouts that are compatible for all potential users with appropriate parking and servicing provision; and (iv) do not result in unacceptable increases in traffic generation or compromise highway safety. D. Development proposals that generate significant amounts of movement, must be supported by a Transport Statement or Transport Assessment and will normally be required to provide a Travel Plan. Development proposals which generate a significant number of heavy goods vehicle movements will be required to demonstrate by way of a Routing Management Plan that no severe impacts are caused to the efficient and safe operation of the road network and no material harm caused to the living conditions of residents. E. Development will, where appropriate, ensure that transport infrastructure will be of a high quality, sustainable in design, construction and layout, and offer maximum flexibility in the choice of travel modes, including walking and cycling, and with accessibility for all potential users. F. Development will be permitted where it: (i) does not result in cumulative severe impact on the operation and safety of, or accessibility to, the local or strategic highway networks; (ii) mitigates impacts on the local or strategic highway networks and London Underground station infrastructure within the District, arising from the development itself or the cumulative effects of development, through the provision of, or contributions towards, necessary transport improvements, including those secured by legal agreement, subject to viability considerations; (iii) protects and, where appropriate, enhances access to public rights of way; (iv) provides appropriate parking provision, in terms of amount, design and layout and cycle storage arrangements, in accordance with adopted Parking Standards and which mitigates any impact on on-street parking provision within the locality. Reduced car parking, including car free, development in sustainable locations will be supported; and (v) ensures that, where appropriate, development proposals provide a co-ordinated and comprehensive scheme that does not prejudice the future provision of transport infrastructure on and through adjoining sites. G. In order to accommodate the use of low emission vehicles to support improvements in air quality within the District the provision of electric vehicle charging points will be required within all new developments which make provision for car parking for vehicles.	
Policy T 2 Safeguarding of routes and facilities	A. Land required for proposed transport schemes as identified in Plans and Programmes including Essex County Council's Highways and Transport Investment Programmes, the Highways England Route Investment Strategies, Network Rail Investment Strategies and Transport for London Investment Strategies will be protected from other developments	No Likely Significant Effects. This is a policy relating to safeguarding land for future schemes.

Policy number/ name	Policy detail	Likely Significant Effects
	which would prevent their proper implementation. B. Local filling stations and car repairs facilities will be protected from redevelopment for alternative uses unless it can be demonstrated through evidence, that the current use on site is no longer viable or necessary, and that the site has been effectively marketed at a rate which is comparable to local market value of its existing use.	There are no impact pathways present.
Chapter 4: Development Management Policies		
Policy DM 1 Habitat Protection and Improving Biodiversity	A. All development should seek to deliver net biodiversity gain in addition to protecting existing habitat and species. Development proposals should seek to integrate biodiversity through their design and layout, including, where appropriate, through the provision of connections between physical and functional networks. B. Development proposals must protect and enhance natural habitats, areas and corridors for biodiversity and should not negatively impact upon areas of international or national designation. The creation of new corridors for biodiversity will be supported in appropriate locations. The provision of buffers to protect sensitive habitats including those of wetlands and ponds will be required where necessary. C. Development proposals which are likely to have a negative impact on a locally designated site (Local Wildlife Site and Local Nature Reserve) will only be permitted where the benefits of the proposed development clearly outweigh the value of the ecological feature adversely affected and there are no appropriate alternatives. D. In exceptional circumstances where the negative impacts of development on natural habitat and biodiversity are unavoidable, the negative impacts must be proportionately addressed in accordance with the hierarchy of: (i) mitigation; (ii) compensation in the form of habitat; and finally (iii) offsetting within the locality. E. The details of any necessary enhancing, mitigating or compensatory measures should accompany the planning application as appropriate. When appropriate, conditions will be put in place to require that monitoring is undertaken (by a suitably qualified ecological professional), and to make sure that any mitigation, compensation and offsetting is effective. F. The loss, deterioration or fragmentation of irreplaceable habitats, such as veteran trees and ancient woodland, will not be permitted by the Council, unless the need for, and benefits of, the development in that location can be demonstrated to clearly outweigh the loss. G. Where there are grounds to believe that a Protected Species, Priority Species, Priority Habitat or other valuable habitat may be affected by proposed development, applicants must provide a full survey and site assessment to establish the extent of potential impact. This evidence should inform appropriately designed plans and mitigation measures. H. Ecological impacts of a proposed development will be quantified by using the Biodiversity Impact Assessment Calculator (BIAC) where	No Likely Significant Effects. This is a development management policy relating to the protection of habitats and improving biodiversity. It includes text that explicitly identifies the need to '*not negatively impact upon areas of international or national designation*.' There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	appropriate. Development proposals must demonstrate a net gain in ecological units. I. Ecological information must be supplied in accordance with BS 42020 2013 for all relevant planning applications.	
Policy DM 2 Epping Forest SAC and the Lee Valley SPA	A. The Council will expect all relevant development proposals to assist in the conservation and enhancement of the biodiversity, character, appearance and landscape setting of the Epping Forest Special Area of Conservation (SAC) and the Lee Valley Special Protection Area (SPA). B. New residential development likely to have a significant effect, either alone or in combination with other development in these areas, will be required to demonstrate that adequate measures are put in place to avoid or mitigate any potential adverse effects. C. All outline or detailed planning applications for new homes within the settlements of Loughton, Epping, Waltham Abbey, North Weald Bassett, Theydon Bois, Coopersale, Thornwood, Buckhurst Hill, Chigwell and Chigwell Row will be required to make a financial contribution to access management and monitoring of visitors to the Epping Forest SAC, in accordance with Visitor Survey Information which demonstrates this is needed. D. To mitigate against potential or identified adverse effects of additional development in the District, in particular from strategic developments, on the Epping Forest SAC, and Lee Valley SPA the Council will ensure the provision of a meaningful proportion of Natural Green Space or access to Natural Green Space. This could involve: (i) providing new green spaces; or (ii) improving access to green space; or (iii) improving the naturalness of existing green spaces; or (iv) improving connectivity between green spaces where this would not contribute to a material increase in recreational pressure on designated sites. E. Planning applications on sites within 400m of the Epping Forest SAC will be required to submit a site level Habitats Regulations Assessment setting out how any urbanisation effects (including from fly tipping, the introduction of non-native plant species and incidental arson) will be mitigated against.	No Likely Significant Effects This is a positive policy. The pre-amble to this policy (paragraphs 4.15 and 4.18) includes reference to the need for projects or plans to undertake HRA as required. The policy itself provides for the explicit protection of Epping Forest SAC and the Lee Valley SPA and Ramsar site. There are no impact pathways present.
Policy DM 3 Landscape Character, Ancient Landscapes and Geodiversity	A. Development proposals will be permitted where applicants are able to demonstrate that the proposal will not, directly, indirectly or cumulatively, cause significant harm to landscape character, the nature and physical appearance of ancient landscapes, or geological sites of importance. Proposals should: (i) be sensitive to their setting in the landscape, and its local distinctiveness and characteristics; (ii) use techniques to minimise impact on, or enhance the appearance of, the landscape by: • taking into account existing landscape features from the outset; • careful landscaping of the site; • ensuring the sensitive use of design, layout, materials and external finishes; and • having regard to protecting, and where possible, enhancing long views to distant	No Likely Significant Effects. This is a development management policy relating to landscape character and ancient landscapes. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	landmarks and landscapes of interest	
DM 4 Green Belt	A. The purposes of the Green Belt are to: Check the unrestricted sprawl of large built up areas; Prevent neighbouring towns from merging into one another; Safeguard the countryside from encroachment; Preserve the setting and special character of historic towns; and Assist urban regeneration by encouraging the recycling of derelict and other urban land. B. Within the Green Belt planning permission will not be granted for inappropriate development, except in very special circumstances, in accordance with national policy. C. The construction of new buildings is inappropriate development in the Green Belt. Exceptions to this are: (i) Buildings for the purposes of agriculture and forestry; (ii) Provision of appropriate facilities for outdoor sport, outdoor recreation and for cemeteries, as long as any development preserves the openness of the Green Belt and does not conflict with the purposes of including land within it; (iii) The extension or alteration of a building provided that it does not result in disproportionate additions over and above the size of the original building; (iv) The replacement of a building, provided the building is of the same use and not materially larger than the one it replaces; (v) Limited infilling in smaller settlements and limited affordable housing in accordance with Policy H 3; and (vi) Limited infilling or the partial or complete redevelopment of previously developed land, which would not have a greater impact on the openness of the Green Belt and the purpose of including land within it than the existing development. D. Certain other forms of development may also be appropriate in the Green Belt provided they preserve the openness of the Green Belt and do not conflict with the purposes of including land in the Green Belt. These are: (i) Mineral extraction; (ii) Engineering operations; (iii) Local transport infrastructure that can demonstrate a requirement for a Green Belt location; (iv) The re-use of buildings provided that the buildings are of a permanent and substantial construction; and (v) Development brought forward under a Community Right to Build Order.	No Likely Significant Effects. This is a development management policy relating to development in the Green Belt. There are no impact pathways present.
Policy DM 5 Green and Blue Infrastructure	A. Development proposals must demonstrate that they have been designed to: (i) retain and where possible enhance existing green infrastructure, including trees, hedgerows, woods and meadows, green lanes, wetlands, ponds and watercourses; (ii) use native species where appropriate and take account of the need for biosecurity	**Likely Significant Effects** In general this is a positive policy with regards to biodiversity, however point A.iv. provides for enhanced connectivity and integration to existing Green Infrastructure. This could include access to the European designated sites, thus increasing

Policy number/ name	Policy detail	Likely Significant Effects
	including control of non-native invasive species, and ensure all planting stock is supplied free of pests or disease, and uses non-invasive species;; (iii) incorporate appropriate provision of new green assets or space; (iv) enhance connectivity and integration by providing pedestrian / cycle access to existing and proposed Green Infrastructure networks and established routes, including footpaths, cycleways and bridleways/Public Rights of Way; and (v) enhance the public realm through the provision and/or retention of trees and/or designated and undesignated open spaces within built up areas. B. Development proposals must be accompanied by sufficient evidence to demonstrate that: (i) the retention and protection of trees (including veteran trees), landscape features or habitats will be successfully implemented in accordance with relevant guidance and best practice; (ii) the provision of new trees, new landscape and water features or habitat creation/improvement will be implemented in accordance with relevant guidance and best practice; and (iii) as a whole the proposals for Green and Blue Infrastructure are appropriate and adequate, taking into account the nature and scale of the development, its setting, context and intended use. C. In the Garden Communities a full concept plan of proposed green and blue infrastructure that incorporates existing features on the site and its links to the wider landscape and townscape will be required for submission with the application. Further requirements may be outlined within Strategic Masterplans in accordance with policies SP 3 and DM 9.	unsustainable recreational pressure that impacts upon the integrity of the European designated site. Whilst this policy does not identify any locations for improved and enhanced links, **care should be taken to ensure that these increased links do not <u>increase</u> recreational pressure upon the designated sites.**
Policy DM 6 Designated and undesignated open spaces	A. Where appropriate development proposals will be required to provide open space, or links to open space in accordance with the guidance contained within the Infrastructure Delivery Plan and Open Space Strategy. Nationally adopted space standards will be used as a starting point for provision. B. Development on open spaces) will only be permitted if it does not result in a net loss of usable public open space or reasonable access to alternative open space within a settlement. Existing open space should not be built upon unless: i) an assessment has been undertaken showing the land to be surplus to requirements; or ii) where development would not have a detrimental impact upon the accessibility to open space; or iii) the loss would be replaced by equivalent or better provision in terms of quantity or quality in a suitable location; or iv) the development is for alternative sports and recreational provision, the needs for which clearly outweigh the loss. C. In circumstances where partial loss of the space is considered justified, the predominantly open nature of the remainder of the site should be maintained and enhanced together with the visual amenity and its function as appropriate for active play and recreation.	**Likely Significant Effects** This is a positive policy as it provides for open spaces that can detract recreational pressure away from internationally designated sites and ensures that there is no net loss of open space. However it also provides for increased links to open spaces (which could include European designated sites), which could increase recreational pressure within the European designated sites. Whilst this policy does not identify any locations of the links, **care should be taken to ensure that these increased links do not <u>increase</u> recreational pressure upon the designated sites.**

Policy number/ name	Policy detail	Likely Significant Effects
Policy DM 7 Heritage Assets	Historic Environment A. The historic environment will be conserved and enhanced in a manner appropriate to its significance. Development proposals should seek to conserve and enhance the character, appearance and function of heritage assets and their settings, and respect the significance of the historic environment. B. Heritage assets are an irreplaceable resource and works which would cause harm to the significance of a heritage asset (whether designated or non-designated) or its setting, will not be permitted without a clear justification to show that the public benefits of the proposal considerably outweigh any harm to the significance or special interest of the heritage asset in question. Local Heritage Assets C. Development proposals that affect local heritage assets detailed on the Local List will be expected to demonstrate how they retain the significance, appearance, character and setting of the local heritage asset. D. There is a general presumption in favour of retaining local listed heritage assets and where this is not possible, recording of the heritage asset should be undertaken and submitted alongside development proposals.	No Likely Significant Effects. A development management policy relating to heritage assets including Registered Parks and Gardens. These spaces can act to divert recreational pressure away from internationally designated sites. There are no impact pathways present.
Policy DM 8 Heritage at Risk	A. The Council will expect property owners/ partners to work proactively with the authority in bringing forward proposals for the conservation and enhancement of Heritage Assets at Risk or under threat within the District to secure their future and seek a viable use consistent with their heritage value and significance.	No Likely Significant Effects A development management policy relating to Heritage at Risk. There are no impact pathways present.
Policy DM 9 High quality design	A. All new development must achieve a high specification of design and contribute to the distinctive character and amenity of the local area. The Council will require all development proposals to be design-led and: (i) relate positively to their context; (ii) make a positive contribution to a place; (iii) where appropriate, incorporate sustainable design and construction principles that consider adaptation and mitigation approaches to address climate change; (iv) are planned, where appropriate, to minimise vulnerability to climate change impacts and which will not exacerbate vulnerability in other areas; and (v) incorporate design measures to reduce social exclusion, the risk of crime, and the fear of crime. Strategic Sites B. The Council will require Strategic Masterplans to be prepared and developed for the Garden Town Communities set out in SP 5 and other relevant allocated sites as set out in Chapter 5. Strategic Masterplans will be produced by the applicant, in partnership with the Council, and the local community, and be capable of being adopted by the Council as Supplementary Planning Documents. Design Codes will be required to be produced and agreed with the Council to support the implementation of the Strategic Masterplans. All	No Likely Significant Effects. This is a development management policy relating to design. It is a positive policy as it includes text relating to sustainable design, which by definition would not have an impact upon designated sites. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	relevant applications will be required to conform with the agreed Strategic Masterplans and Design Codes C. The Council will require the use of the established Quality Review Panel for larger or contentious sites at appropriate stages, to be agreed with the Council, to inform detailed design proposals for major developments. Design Standards D. Development proposals must relate positively to their locality, having regard to: (i) building heights; (ii) the form, scale and massing prevailing around the site; (iii) the framework of routes and spaces connecting locally and more widely; (iv) the rhythm of any neighbouring or local regular plot and building widths and, where appropriate, following existing building lines; (v) the need to provide active frontages to the public realm; and (vi) distinctive local architectural styles, detailing and materials. Landscaping E. Development proposals must demonstrate how the landscaping and planting has been integrated into the development as a whole. The Council will expect development proposals to respond to: (i) levels, slopes and fall in the ground; (ii) trees on and close to the site; (iii) natural boundary features; (iv) the biodiversity of the site and its surroundings; and (v) the need to maximise the use of permeable surfaces. Public Realm F. Where appropriate development proposals must contribute positively to the public realm and to public spaces to which it is physically or functionally connected. Connectivity and Permeability G. Where appropriate, development proposals must maximise connectivity within, and through, the development and to the surrounding areas including the provision of high quality and safe pedestrian and cycle routes. Privacy and Amenity H. Development proposals must take account of the privacy and amenity of the development's users and neighbours. The Council will expect proposals to: (i) provide adequate sunlight, daylight and open aspects to all parts of the development and adjacent buildings and land (including any private amenity) space; (ii) avoid overlooking and loss of privacy detrimental to the living conditions of neighbouring residents and the residents of the proposed development; (iii) not result in an over-bearing or overly enclosed form of development which materially impacts on either the outlook of occupiers of neighbouring properties or the residents of the proposed development; and	

Policy number/ name	Policy detail	Likely Significant Effects
	(iv) address issues of vibration, noise, fumes, odour, light pollution, air quality and microclimatic conditions likely to arise from any use or activities as a result of the development or from neighbouring uses or activities. I. All development proposals must demonstrate that they are in general conformity with the design principles set out in other relevant Local Development Documents, Design Guides, Neighbourhood Plans or Village Design Statements (VDSs) adopted or endorsed by the Council.	
Policy DM 10 Housing design and quality	A. All new housing development is required to meet or exceed the minimum internal space standards set out in National Prescribed Space Standards and open space standards. B. Ground floor family housing must provide access to private garden/amenity space, and family housing on upper floors should have access to a balcony and/or terrace, subject to acceptable amenity, privacy and design considerations, or to shared communal amenity space and children's play space. C. Where appropriate development proposals should seek to include enhanced provision of green infrastructure, including the quantity and quality of landscaped areas, tree provision and the provision of additional open space as required by Policy DM 5 and DM 6. D. Mixed tenure residential development proposals must be designed to be 'tenure blind' to ensure homes across tenures are indistinguishable from one another in terms of quality of design, space standards and building materials. Residential Extensions E. Extensions or alterations to residential buildings will be required to respect and/or complement the form, setting, period, detailing of the original buildings. Matching or complementary materials should be used.	No Likely Significant Effects. This is a positive policy as it encourages the inclusion of amenity/ garden space, green infrastructure and open space. These have potential to divert recreational pressure away from internationally designated sites. There are no impact pathways present.
Policy DM 11 Waste recycling facilities on new development	A. All development which generates waste will be required to make on site provision for general waste, the separation of recyclable materials and organic material for composting. The on-site provision must: (i) ensure adequate dedicated internal and external storage space to manage the volume of waste arising from the site; (ii) provide accessible and safe access to on site storage facilities, both for occupiers and collection operatives including vehicles; and (iii) be located and screened to avoid nuisance and adverse impact on visual and other amenity to occupiers and neighbouring uses; and for mixed use development, suitably separate household and commercial waste. B. Proposals for new flatted residential development will be required to make provision for: (i) Adequate temporary storage space within each flat, allowing for separate storage of recyclable materials; and (ii) Adequate communal storage for waste, including separate storage for recyclables pending its collection	No Likely Significant Effects. This is a development management policy relating to waste recycling storage facilities on new development sites. This is a positive policy as it is likely to reduce any occurrences of fly tipping within an internationally designated site as a result of new development. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
Policy DM 12 Subterranean, basement development and lightwells	A. Subterranean developments, basements, or extensions to existing basements, will only be permitted where it can be demonstrated that the proposal: (i) will not adversely affect the structural stability of the host building, neighbouring buildings and other infrastructure, including the adjoining highway, having regard to local geological conditions; (ii) does not increase flood risk to the property and adjacent properties from any source; (iii) avoids harm to the appearance or setting of the property or the established character of the surrounding area; (iv) will not adversely impact the amenity of adjoining properties by reason of noise or increased levels of internal or external activity; and (v) will not adversely impact the local natural and historic environment; B. The siting, location, scale and design of basements must have minimal impact on, and be subordinate to, the host building and property. Basement development should: (i) not comprise of more than one storey; and (ii) not exceed 50% of each area of garden within the curtilage of the property; C. And during the construction phase: (i) will not cause harm to pedestrian, cycle, vehicular and road safety, adversely affect bus or other transport operations, significantly increase traffic congestion, nor place unreasonable inconvenience on the day to day life of those living, working or visiting nearby; (ii) will minimise construction impacts such as noise, vibration and dust for the duration of the works; and (iii) ensure compliance with the Construction Management Statement submitted (see Policy DM 21) D. The Council will not permit subterranean developments or basements which include habitable rooms or other sensitive uses in areas prone to flooding and where there is no satisfactory means of escape from flooding. E. In determining applications for light wells, the Council will protect: (i) the architectural character of the building; and (ii) the character and appearance of the surrounding area. F. In determining proposals for basements and other underground development the Council will require an assessment of the scheme's impact on drainage, flooding, groundwater conditions and structural stability in the form of a Basement Impact Assessment and where appropriate a Basement Construction Management Statement. G. Within the Green Belt basement developments may be considered acceptable provided they do not have a greater impact on the openness of the Green Belt, either themselves or cumulatively with other developments.	No Likely Significant Effects. This is a development management policy relating to subterranean, basement development and lightwells. This policy ensures that new development should have regard to local geological conditions, thus ensuring that new development will not impact upon subterranean hydrological systems. There are no impact pathways present.
Policy DM 13		No Likely Significant Effects.

Policy number/ name	Policy detail	Likely Significant Effects
Advertisements	A. Where advertisement consent is required, such consent will be permitted if the proposal respects the interests of public safety and amenity, and meets the following criteria: (i) the design, materials and location of the advertisement respects the scale and character of the building on which it is displayed and the surrounding area; (ii) the proposals would not result in a cluttered street scene, excessive signage, or proliferation of signs advertising a single site or enterprise; (iii) any illumination will be considered in relation to impact on visual amenity, potential light pollution, road safety and functional need; (iv) Internally illuminated signs will not be permitted where harm is caused to heritage assets including listed buildings and conservation areas; and (v) illuminated signs will not be permitted in residential areas.	This is a development management policy relating to advertisements. There are no impact pathways present.
Policy DM 14 Shopfronts and on street dining	Shopfronts A. The Council requires shopfronts, including their signs, security shutters and canopies, to be designed to a high standard and contribute to a safe and attractive environment. In particular: (i) The Council will seek the retention of traditional shopfronts contributing to the visual, architectural or historic quality of the local townscape; (ii) Replacement shopfronts should relate to the host building and conserve original materials and features as far as possible; (iii) The alteration or replacement of an existing shopfront or the development of a new shopfront must allow for easy access by all members of the community; and (iv) Security shutters must be open mesh and, wherever possible, be located internally. On Street Dining B. Proposals for on-street/forecourt dining must demonstrate the suitability of the proposed location having regard to the proximity of residential development and should: (i) be integral and functionally related to the business; and (ii) provide sufficient space to not obstruct the pavement space and not create a permanent enclosure.	No Likely Significant Effects. This is a development management policy relating to shopfronts and on street dining. There are no impact pathways present.
Policy DM 15 Managing and reducing flood risk	A. The Council will require all development proposals to demonstrate that they avoid and reduce the risk of all forms of flooding to future occupants and do not increase the risk of flooding elsewhere; B. The Local Plan allocations are directed towards Flood Zone 1 or to areas with the lowest probability of flooding. Any proposals for new development (except water compatible uses) within Flood Zone 2 and 3a will be required to provide sufficient evidence for the Council to assess whether the requirements of the Sequential Test and Exception Test, have been satisfied. C. Proposals within flood zones 2 and 3a must be informed by a site specific Flood Risk Assessment (FRA) taking account of all potential sources of flooding and climate change	No Likely Significant Effects This is a positive development management policy relating to management and reduction of flood risk. It provides for the requirement for new development to manage and reduce surface run-off and waste water discharges. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	allowances and should: (i) demonstrate the application of a sequential approach for the development of individual sites to ensure that the highest vulnerability of land uses are located in areas of the site that are at lowest risk of flooding; (ii) preserve overland flood and flow routes and ensure there is no net loss of flood storage; (iii) ensure that there is no adverse effect on the operational functions of any existing flood defence infrastructure; (iv) provide adequate flood storage and compensation on site; (v) where appropriate, set out the mitigation measures that will be incorporated on site to manage residual flood risk including finished floor levels to accord with Environment Agency's Standing Advice; and (vi) naturalise water courses where opportunities arise, in line with Policy DM 17 (Watercourses and Flood Defences). D. All proposals for new development will be required to: (i) manage and reduce surface water run-off, in line with Policy DM 16 (Sustainable Drainage Systems); (ii) manage water and waste water discharges, in line with Policy DM 18 (On-site Management of Waste Water and Water Supply); (iii) ensure safe access and egress for future users of the development and an appropriate emergency evacuation plan where appropriate; and (iv) include measures to assist existing communities at risk of flooding where feasible. E. All proposals for development within a Critical Drainage Area (CDA) or an EFDC Flood Risk Assessment Zone (FRAZ) will be required to provide a site specific flood risk assessment consisting of: an assessment of the risks involved, focussing predominantly on surface water and ordinary watercourses; details of any mitigation measures on site where required (e.g. increased thresholds); and a drainage strategy incorporating the use of SuDS (Policy DM 16) to mitigate any impacts of site. F. With the exception of water compatible uses and essential infrastructure, subject to passing the Exception Test, development in areas designated in Epping Forest District's Strategic Flood Risk Assessment or as determined by specific Flood Risk Assessment as being within Flood Zone 3b will not be permitted. G. Proposals for developments within identified Critical Drainage Areas could, based on the outcome of the site specific flood risk assessment, be subject to a Section 106 contribution or CIL funding for the delivery of appropriate flood alleviation schemes.	
Policy DM 16 Sustainable Drainage Systems	A. All proposals for new development must seek to manage surface water as close to its source as possible in line with the following drainage hierarchy: (i) store rainwater for later use; (ii) use infiltration techniques, such as porous surfaces in non-clay areas. Porous surfaces are suitable in areas of clay but must be adequately tanked with an outfall. Epping Forest	No Likely Significant Effects. By definition, sustainable drainage systems would not result in likely significant effects upon internationally designated sites. This is a positive policy as it aims to improve water quality and reduce runoff. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	District is predominantly clay so any infiltration proposals must be subject to and pass the relevant percolation tests; (iii) attenuate rainwater in ponds or open water features for controlled release; (iv) attenuate rainwater by storing in tanks or sealed water features for controlled release. B. Other methods must also reflect the stringent drainage hierarchy contained within the current CIRIA1 SuDS Manual (2015), which provides further detailed guidance over and above Building Regulations: (i) controlled discharge of rainwater direct to a watercourse/ surface water body; (ii) controlled discharge rainwater to a surface water sewer/drain; (iii) controlled discharge rainwater to the combined sewer. C. The Council will encourage the use of green, brown and blue roofs. D. The Council will require Sustainable Drainage Systems (SuDS) to be sensitively incorporated into new development by way of site layout and design, having regard to the following requirements: (i) all major development proposals will be required to reduce surface water flows to the 1 in 1 greenfield run-off rate and provide storage for all events up to and including the 1 in 100 year critical storm event including an allowance for climate change, and include at least one source control SuDS measure resulting in a net improvement in water quantity and quality discharging to a sewer; (ii) all brownfield development proposals should aim to achieve the 1 in 1 greenfield run-off rate and, at a minimum, achieve a 50 per cent reduction in existing site run-off rates for all events, including an allowance for climate change, SuDS measures resulting in a net improvement in water quantity and quality discharging to a sewer; (iii) all 'minor' and 'other' development proposals should aim to achieve the 1 in 1 greenfield run off rate where possible, including an allowance for climate change, or a rate as otherwise agreed with the Council; and (iv) for all development where the greenfield run off rate cannot be achieved justification must be provided to demonstrate that the run-off rate has been reduced as much as possible. E. Where Sustainable Drainage Systems are implemented they will be expected to: (i) meet the requirements set out in national standards, and meet the Council's standards if they exceed national guidance; (ii) incorporate measures identified in Surface Water Management Plans; (iii) be designed to maximise biodiversity and local amenity benefits and where appropriate, ensure that SuDS techniques provide for clean and safe water at the surface; (iv) improve water quality; and (v) full details of the means of achieving future management and maintenance of the SuDS scheme to ensure that it will function effectively over the lifespan of the development will be required, including responsibilities and funding. F. The Council will give consideration to adopting SuDS. Contributions in the form of	

Policy number/ name	Policy detail	Likely Significant Effects
	commuted sums or CIL will be sought for maintenance if adopted by the Council. G. Where SuDS cannot be implemented due to site constraints (such as land contamination robust justification must be provided along with proposed alternative approaches to surface water management. H. Where particular sites and the wider catchment have identified existing flood issues, the implementation of good practice on Natural Flood Management must be explored.	
Policy DM 17 Protecting and enhancing watercourses and flood defenses	A. New development must be set back at a distance of at least 8 metres from a main river and an ordinary watercourse3, or at an appropriate width as agreed by the Council and/or the Environment Agency, in order to provide a naturalised and undeveloped buffer zone, free of built development, other than for site access and other essential infrastructure connections. Buffer zones should be designed for the benefit of biodiversity and should be undisturbed by lighting. Planning applications must include a long term scheme to protect and enhance the conservation value of the watercourse and ensure access for flood defence maintenance, in line with the requirements of the Water Framework Directive and the Thames River Basin Management Plan. B. All major development will be required to and minor development will be expected to (i) investigate and secure the implementation of environmental enhancements to open4 sections of the river or watercourse if appropriate; and (ii) investigate and secure the implementation of measures to restore culverted sections of the river or watercourse, if appropriate. C. Where de-culverting or other river enhancements are shown to be unfeasible, the Council will seek a financial contribution to restore another section of the same watercourse. D. Proposals must not adversely affect the natural functioning of main rivers and ordinary watercourses, including through culverting. E. Where appropriate the Council will require planning applications to include a condition survey of existing watercourse infrastructure to demonstrate that it will adequately function for the lifetime of the development, if necessary, the proposal must make provision for repairs or improvements. F. Development on or adjacent to a watercourse must not result in the deterioration of the water quality of that watercourse. Development must not impact on the stability of the banks of a watercourse or river.	No Likely Significant Effects. This is a positive policy that ensures that development does not lead to deterioration to the quality or stability of a watercourse and refers to the WFD and TRBMP. There are no impact pathways present.
Policy DM 18 On site management of waste water and water supply	A. The Council will expect planning applications to set out how they will ensure that there is adequate surface water, foul drainage and treatment capacity to serve their development and demonstrate that it does not impact on the adequacy of existing development in this regard. All proposals for new development will be required to: (i) ensure the separation of surface and foul water systems; and (ii) implement sustainable drainage systems, in line with Policy DM 16.	No Likely Significant Effects. This is a positive development management policy as it ensures that the public sewerage network has sufficient capacity to serve existing and new development, and that provision of new infrastructure is in place prior to occupation, thus preventing a reduction in water quality.

Policy number/ name	Policy detail	Likely Significant Effects
	B. Where the local public sewer network does not have adequate capacity to serve the existing and proposed development proposals will be required to demonstrate that it provides for suitable alternative arrangements for storing, treating and discharging foul water. Should there be capacity issues resulting from development that can be addressed through upgrades of the sewerage network, developers will are required to demonstrate how these will be delivered in advance of the occupation of development. C. The Council will expect new development to connect to mains foul drainage, and will restrict the use of non-mains drainage for foul water disposal, particularly in Groundwater Source Protection Zones, in line with Environment Agency guidance. The location of and likely impact on the private water supplies within the District must also be taken into account. Where non-mains drainage is proposed for the disposal of foul water, a foul drainage assessment will be required to ensure the most sustainable drainage option will be implemented. D. All proposals for new development will be required to: (i) ensure that there is adequate water supply infrastructure capacity both on and off site to serve the development with wholesome water of sufficient quantity, flow rate and pressure, without adversely impacting on existing users; and (ii) make provision for the installation and management of measures for the efficient use of mains water and where possible with direct connection to the mains public water supply. Please also refer to Policy DM 19.	There are no impact pathways present.
Policy DM 19 Sustainable water use	A. Development will need to demonstrate that: (i) Water saving measures and equipment is incorporated in all new development (ii) New homes (including replacement dwellings) meet a water efficiency standard of 110 litres or less per person per day; and (iii) New non-residential development of 1000sqm gross floor area or more aims to achieve at least a 30% improvement over baseline building consumption B. The above applies unless it can be clearly demonstrated that it would not be feasible on technical or viability grounds. C. Where new national standards exceed those set out above, the national standards will take precedence.	No Likely Significant Effects. This is a positive development management policy that provides for enhanced water use efficiency, thus reducing the need for water abstraction. There are no impact pathways present.
Policy DM 20 Low carbon and renewable energy	A. The incorporation of low carbon and renewable energy measures in new and existing development will be encouraged with regard to both standalone installations and micro renewables integrated into development. B. Low carbon and renewable energy technologies will be permitted provided that: (i) they do not have any adverse impact on the integrity of any European sites, wildlife sites, protected species or habitats or the openness of the Green Belt; (ii) a positive assessment is provided demonstrating how any impacts on the environment and heritage assets, including cumulative landscape, noise, visual, air quality and emissions, and traffic generation impacts can be avoided or mitigated through careful consideration of location, scale and design; and	No Likely Significant Effects. This is a development management policy relating to low carbon and renewable energy. No type, location or extent of development is identified. In addition, this policy provides explicit protection for European sites. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	(iii) the benefits of the proposal are clear with regard to the amount of heat or electricity generated and consequential reduction in greenhouse gases, and the local individual or community benefit. C. The use of combined heat and power (CHP), and/or combined cooling, heat and power (CCHP) and district heating will be encouraged in new developments. D. Strategic Masterplans will be required to demonstrate how the potential to incorporate infrastructure for district heating can be provided, and will be expected to connect to any existing suitable systems (including systems that will be in place at the time of construction), unless it is demonstrated that this would render development unviable or that alternative technologies are available that provide the same or similar benefits and opportunities. E. Where a district heating scheme is proposed the Council will expect the scheme to demonstrate that the proposed heating and cooling systems (CHP/CCHP) have been selected considering the heat hierarchy in line with the following order of preference: (i) connection with existing CHP/CCHP distribution networks; (ii) site wide CHP/CCHP fed by renewables; (iii) communal CHP/CCHP fuelled by renewable energy sources; and (iv) gas fired CHP/CCHP.	
Policy DM 21 Local environmental impacts, pollution and land contamination	A. The Council will require that the residual local environmental impacts of all development proposals after mitigation do not lead to unacceptable impacts on the health, safety, wellbeing and amenity of existing and new users or occupiers of the development site, or the surrounding land. These potential impacts can include, but are not limited to, air and water (surface and groundwater) pollution, dust, noise, vibration, light pollution, odours, and fumes as well as land contamination. B. The Council will: (i) resist development that leads to unacceptable local environmental impacts, including, but not limited to, air pollution, noise and vibration, light pollution, odours, dust and land and water contamination; (ii) require that activities likely to generate pollution are located away from sensitive uses and receptors where possible, practical and economically feasible; (iii) require development proposals to mitigate and reduce to a minimum any adverse local environmental impacts and activities that may have wider cumulative effects; (iv) where there are unacceptable risks of contamination or land instability, require these to be properly and fully addressed through remediation. If remediation measures are not suitable then planning permission will be refused; and (v) where necessary, apply planning conditions to reduce local environmental impacts on adjacent land uses to acceptable levels. Land Contamination C. The Council will expect the remediation of contaminated land through development. Potential contamination risks will need to be properly considered and adequately mitigated before development proceeds. To deliver this the Council will require development	No Likely Significant Effects. This is a positive development management policy relating to environmental impact, pollution and land contamination. It is a positive policy as it provides for preventing detrimental impacts as a result of environmental conditions resulting from new development such as air quality, and provides for the reuse and recycling of building materials and the use of local products, thus reducing atmospheric pollutants further, and the use of water resources during the manufacturing process. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	proposals on contaminated land: (i) to be informed by a desk top study and preliminary risk assessment, including an assessment of the site's history, potential contamination sources, pathways and receptors; (ii) where necessary to undertake a site investigation and detailed risk assessment in line with current best practice guidance, including where appropriate physical investigations, chemical testing and assessments of ground gas risks and risks to groundwater; (iii) where necessary to provide a remediation strategy that sets out how any identified risks from the assessments above are going to be addressed. If remediation measures are not suitable then planning permission will be refused; (iv) where necessary to provide a long term maintenance and monitoring regime for the mitigation of any ongoing risk and identify the person/s responsible for the regime; (v) where necessary to provide a validation report once remediation has taken place, including evidence that demonstrates that risks from contamination have been controlled effectively; and (vi) to ensure that all above assessments and investigations are carried out by a competent person. Construction and Demolition D. The Council will seek to manage and limit environmental disturbances during construction and demolition as well as during excavations and construction of subterranean developments. To deliver this the Council requires the submission of Construction Management Statements for the following types of developments: (i) all major developments; (ii) any basement developments; (iii) developments of sites in confined locations or near sensitive receptors; and (iv) if substantial demolition/excavation works are proposed. E. In addition the Council supports the use of sustainable design and construction techniques, including where appropriate the local or on-site sourcing of building materials enabling reuse and recycling on site.	
DM 22 Air Quality	A. The Council will seek to ensure that the District is protected from the impacts of air pollution. Potential air pollution risks will need to be properly considered and adequate mitigation included in the design of new development to ensure neither future, nor existing residents, workers, visitors, or environmental receptors including the Epping Forest SAC are adversely impacted as a result of the development. B. Mitigation measures required will be determined by the scale of development, its location, the potential to cause air pollution, and the presence of sensitive receptors in the locality. C. Larger proposals or those that have potential to produce air pollution, will be required to undertake an air quality assessment that identifies the potential impact of the development, together with, where appropriate, contributions towards air quality monitoring. Assessments shall identify mitigation that will address any deterioration in air quality as a result of the	No Likely Significant Effects. This is a positive development management policy that ensures that changes in air quality as a result of new development will not adversely impact upon Epping Forest SAC alone or in combination.

Policy number/ name	Policy detail	Likely Significant Effects
	development, having taken into account other permitted developments, and these measures shall be incorporated into the development proposals. This will include an assessment of emissions (including from traffic generation) and calculation of the cost of the development to the environment. All assessments for air quality shall be undertaken by competent persons.	
Chapter 5: Places		
Policy P 1 Epping	A. Proposals for development on allocated sites should accord with the site specific requirements in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) EPP.R1 Land South of Epping, West – approximately 450 homes ii) EPP.R2 Land South of Epping, East – approximately 500 homes iii) EPP.R3 Epping London Underground Car Park – approximately 89 homes iv) EPP.R4 Land at St Johns Road – approximately 34 homes v) EPP.R5 Epping Sports Centre – approximately 43 homes vi) EPP.R6 Cottis Lane Car park – approximately 47 homes vii) EPP.R7 Bakers Lane Car Park – approximately 31 homes viii) EPP.R8 Land and part of Civic Offices – approximately 44 homes ix) EPP.R9 Land at Bower Vale – approximately 50 homes x) EPP.R10 Land to rear of High Street – approximately 6 homes xi) EPP.R11 Epping Library – approximately 11 homes Employment Sites C. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) EPP.E1 Land at Eppingdene ii) EPP.E2 Land at Coopersale Hall iii) EPP.E3 Falconry Court iv) EPP.E4 Bower Hill Industrial Estate Infrastructure Requirements D. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development proposals in Epping will be expected to contribute proportionately towards the following infrastructure items: (i) New primary school; (ii) Appropriate provision of health facilities;	**Likely Significant Effects** This policy provides for residential and employment site allocations between 400m and 1.8km from Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational Pressure and urbanisation** • **Atmospheric Pollution** • **Water Abstraction** • **Water Quality.** However, this policy also provides positive provision for financial contributions towards access management and monitoring of visitors to Epping Forest SAC and the phasing of development in line with provision of water treatment facilities. It acknowledges that these site allocations have potential to affect Epping Forest SAC from increased atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	(iii) Highways and junction upgrades; (iv) Upgrades to Lindsey Street sub-station; (v) Necessary upgrades to existing waste water infrastructure; and (vi) Appropriate provision of green infrastructure and open space throughout the settlement. E. Development proposals must contribute proportionately towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these requirements have changed. Town Centre Uses F. In accordance with Policy E 2, in Epping Town Centre, at least 70% of the ground floor Primary Retail Frontage and at least 20% of the ground floor Secondary Retail Frontage will be maintained in A1 use. Air Pollution G. The development of the allocated sites within Epping have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure H. Due to their proximity to Epping Forest, development of the allocated sites within Epping will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. Flood Risk I. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1. South Epping Masterplan Area J. Development proposals in relation to sites EPP.R1 and EPP.R2 must comply with a Strategic Masterplan for the South Epping Area which has been formally endorsed by the Council. K. In addition to the requirements set out above, the Strategic Masterplan should make provision for: (i) a minimum of 950 homes; (ii) a new neighbourhood centre to include community facilities, employment and retail use; (iii) a new primary school and early years childcare provision (which could be accommodated through the relocation of Ivy Chimneys Primary School); (iv) appropriate provision of health facilities, exploring the potential for a new health hub to include an integrated GP surgery, pharmacy and any other necessary health services; (v) new road access and internal road layout to support a bus corridor; (vi) a new vehicular, pedestrian and cycling bridge over the railway line;	

Policy number/ name	Policy detail	Likely Significant Effects
	(vii) car clubs/car sharing or pooling arrangements, visitor parking and blue badge holders; (viii) minimising the impact upon the setting of the Grade II listed Gardners Farm and Grade II listed Farm Buildings; (ix) minimising the impact upon the BAP Habitat within the site and nearby Local Wildlife Site; (x) incorporation of an appropriate buffer to protect the amenity of future residents with regards to noise and air quality from the M25 and an appropriate buffer from the High Voltage Transmission Cables and land impacted by the BPA Oil Pipeline constraints; (xi) careful design to avoid or reduce impacts on the Ancient Woodland which may include providing a buffer zone of semi-natural habitat between built development and the Ancient Woodland; (xii) the continued protection of those trees benefitting from a Tree Preservation Order; (xiii) the strengthening and/or creation of new Green Belt boundaries to the east and west of the site; (xiv) the integration, retention and improvements to the existing watercourse and public rights of way, including the retention of the existing pedestrian footbridge over the M25, and enhanced linkages to Epping station; (xv) adequate levels of high quality public open space , including the replacement of Brook Road Informal Recreation Ground; and (xvi) contribute towards air quality monitoring within the Epping Forest. L. The Masterplan and subsequent applications should be considered and informed by the Quality Review Panel.	
Policy P 2 Loughton	A Proposals for development on allocated sites should accord with the site specific requirements in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) LOU.R1 Loughton London Underground car park – Approximately 165 homes ii) LOU.R2 Debden London Underground car park – Approximately 192 homes iii) LOU.R3 Land at Vere Road – Approximately 9 homes iv) LOU.R4 Borders Lane playing fields – Approximately 217 homes v) LOU.R5 Land at Jessel Green – Approximately 154 homes vi) LOU.R6 Royal Oak public house – Approximately 10 homes vii) LOU.R7 Loughton Library – Approximately 20 homes viii) LOU.R8 Land west of High Road – Approximately 29 homes ix) LOU.R9 Land at former Epping Forest College site – Approximately 111 homes	**Likely Significant Effects.** This policy provides for residential and employment site allocations between less than 300m and 2.1km from Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** However, this policy also provides positive provision for financial contributions towards access management and monitoring of visitors to Epping Forest SAC and the phasing of

Policy number/ name	Policy detail	Likely Significant Effects
	x) LOU.R10 Land at Station Road – Approximately 12 homes xi) LOU.R11 Land west of Roding Road – Approximately 9 homes xii) LOU.R12 Land at 63 Wellfields – Approximately 10 homes xiii) LOU.R13 Land at 70 Wellfields – Approximately 6 homes xiv) LOU.R14 Land at Alderton Hill – Approximately 33 homes xv) LOU.R15 Land at Traps Hill – Approximately 6 homes xvi) LOU.R16 St Thomas More RC Church – Approximately 18 homes xvii) LOU.R17 Land to the rear of High Road – Approximately 12 homes xviii) LOU.R18 Land at High Beech Road – Approximately 8 homes Employment Sites C. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) LOU.E1 – Oakwood Hill Industrial Estate ii) LOU.E3 – Buckingham Court D.In accordance with Policy SP 2 and Policy E 1 the following site is designated for employment uses with a further allocated expansion for B Use Class employment uses: i) LOU.E2 – Langston Road Industrial Estate Infrastructure Requirements E. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically , development in Loughton will be expected to contribute proportionately towards the following infrastructure items: (i) Expansion of Secondary Schools in the local area; (ii) Appropriate provision of health facilities; (iii) Highways and junction upgrades; (iv) Potential upgrades to existing water infrastructure; and (v) Improvements to open space throughout the settlement. F. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Town Centre Uses G. In accordance with Policy E 2, in Loughton High Road Town Centre, at least 70% of the ground floor Primary Retail Frontage and at least 35% of the ground floor Secondary Retail Frontage will be maintained in A1 use. Small District Centre Uses H. In accordance with Policy E 2, in Loughton Broadway District Centre, at least 60% of the	development in line with provision of water treatment facilities. It acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	ground floor Primary Retail Frontage will be maintained in A1 use. Air Pollution I. The development of the allocated sites within Loughton have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure J. Due to their proximity to Epping Forest development of the allocated sites within Loughton will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. Flood Risk K. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1. Jessel Green Masterplan L. Development proposals in relation to site LOU.R5 must comply with a Strategic Masterplan that has been formally endorsed by the Council. M. In addition to the requirements set out above, the Jessel Green Masterplan must make provision for: (i) a minimum of 154 homes; (ii) approximately half the site as enhanced public open space; (iii) car clubs/car sharing or pooling arrangements, visitor parking and blue badge holders; (iv) improved vehicular access into the site, and, new and improved pedestrian and cycle linkages with the surrounding area and nearby London Underground stations; (v) be consistent and adhere to the approach to design set out in Policy SP 3; (vi) a new Local Centre; (vii) the varying levels throughout the site, taking the landscape into account; (viii) mitigating surface water flooding issues at the south of the site; and (ix) careful design to avoid or reduce impacts on the Ancient Woodland which may include providing a buffer zone of semi-natural habitat between built development and the Ancient Woodland. N. The Masterplan and subsequent applications should be considered and informed by the Quality Review Panel.	
Policy P 3 Waltham Abbey	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential Sites	**Likely Significant Effects** This policy provides for residential, traveller and employment site allocations between less than 1.9km and 3.2km from

Policy number/ name	Policy detail	Likely Significant Effects
	B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) WAL.R1 Land west of Galley Hill Road – Approximately 295 homes ii) WAL.R2* Lea Valley Nursery, Crooked Mile – Approximately 315 homes iii) WAL.R3 Land adjoining Parklands – Approximately 130 homes iv) WAL.R4 Fire Station, Sewardstone Road – Approximately 16 homes v) WAL.R5 Waltham Abbey Community Centre, Saxon Way – Approximately 67 homes and re-provision of a community centre vi) WAL.R6 Waltham Abbey Swimming Pool, Roundhills – Approximately 27 homes vii) WAL.R7 Pine Tree Nursery, Avey Lane – Approximately 8 homes Employment Sites C. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) WAL.E1 – Howard Business Park ii) WAL.E2 – Land at Breeches Farm iii) WAL.E3 – Land at Woodgreen Road iv) WAL.E4 – Cartersfield Road/Brooker Road Industrial Estate v) WAL.E5 – Meridian Business Park and Distribution Centre vi) WAL.E7 – Providence Nursery, Avey Lane D. In accordance with Policy SP 2 and Policy E 1 the following sites are allocated for B Use Class employment uses: i) WAL.E6 – Galley Hill Road Industrial Estate ii) WAL.E8 – Land north of A414 Traveller Sites E. In accordance with Policy SP 2 the following site in allocated for traveller accommodation: i) WAL.T1* Lea Valley Nursery, Crooked Mile – up to 5 pitches Infrastructure Requirements F. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development in Waltham Abbey will be expected to contribute proportionately towards the following infrastructure items: (i) Expansion of two primary schools within Waltham Abbey Forecast Planning Group; (ii) Appropriate provision of health facilities; (iii) Highways and junction upgrades; (iv) Potential upgrades to existing water infrastructure; and	Epping Forest SAC and between 1.1km and 2.6km from Lee Valley SPA and Ramsar site. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** This policy provides for pedestrian links to the Lee Valley Regional Park. **Whilst this policy does not identify any locations of the pedestrian links, care should be taken to ensure that these increased links do not increase recreational pressure upon the designated sites.** It is noted that, this policy provides positive provision for financial contributions towards access management and monitoring of visitors to Epping Forest SAC and the phasing of development in line with provision of water treatment facilities. It acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2: Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	(v) Improvements and provision of open space throughout the settlement. G. The Council will seek the potential relocation and expansion of a secondary school in the local area in order to meet future needs arising from development. H. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Small District Centre Uses I. In accordance with Policy E 2, in Waltham Abbey Small District Centre, at least 45% of the ground floor Primary Retail Frontage and at least 25% of the ground floor Secondary Retail Frontage will be maintained in A1 use. Air Pollution J. The development of the allocated sites within Waltham Abbey have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure K. Due to their proximity to Epping Forest, development of the allocated sites within Waltham Abbey will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. Flood Risk L. In accordance with Policy DM 15, development on residential or traveller allocations must be located wholly within Flood Zone 1. Waltham Abbey North Masterplan M. Development proposals in relation to sites WAL.R1, WAL.R2, WAL.R3, WAL.T1 and WAL.E7 must comply with a Strategic Masterplan that has been formally endorsed by the Council. N. In addition to the requirements set out above the Strategic Masterplan should make provision for: (i) a minimum of 610 homes; (ii) effective integration with the Town Centre, supporting regeneration; (iii) up to 5 pitches for Traveller Accommodation; (iv) a new local centre and community facility; (v) Expansion of a Secondary School in the local area; (vi) new road links between Crooked Mile and Galley Hill and an internal road layout to support a bus corridor; (vii) the potential need to upgrade/widen the existing Galley Hill Road and Crooked Mile, in order to ensure a safe access point and sufficient capacity for the development they serve;	

Policy number/ name	Policy detail	Likely Significant Effects
	(viii) car clubs/car sharing or pooling arrangements, visitor parking and blue badge holders; (ix) the strengthening and/or creation of new Green Belt boundaries to the north and east of the site; (x) the integration, retention and improvements to the existing watercourses and public rights of way; (xi) new pedestrian and cycle links through the site to the Lee Valley Regional Park, the existing allotments to the north, and towards Waltham Abbey District Centre; (xii) adequate levels of public open space; and (xiii) ensure that vulnerability to Surface Water flooding as well as the potential consequences for surrounding sites is suitably mitigated through appropriate surface water drainage. O. The Masterplan and subsequent applications should be considered and informed by the Quality Review Panel. P. In accordance with Part F the Masterplan should explore and support the possible relocation and expansion of the King Harold Secondary School to an appropriate site within this Masterplan Area.	
Policy P 4 Ongar	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) ONG.R1 Land west of Ongar – Approximately 99 homes ii) ONG.R2 Land at Bowes Field – Approximately 135 homes iii) ONG.R3 Land southwest of Fyfield Road– Approximately 27 homes iv) ONG.R4 Land north of Chelmsford Road – Approximately 163 homes v) ONG.R5 Land at Greensted Road – Approximately 107 homes vi) ONG.R6 Land between Stamford Rivers Road and Brentwood Road – Approximately 33 homes vii) ONG.R7 Land south of Hunters Chase and west of Brentwood Road – Approximately 17 homes viii) ONG.R8 The Stag Pub – Approximately 9 homes C. Proposals for residential development will be expected to accord with the place shaping principles identified in Policy SP 3 and site specific guidance set out in Appendix 6. Employment Sites	**Likely Significant Effects** This policy provides for residential and employment site allocations more than 9km from Epping Forest SAC and more than 10km from Lee Valley SPA and Ramsar site. **Potential linking impact pathways include:** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** It is noted that, this policy provides positive provision for green infrastructure and the phasing of development in line with provision of water treatment facilities. It also requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	D. There are no new employment site allocations in Ongar. In accordance with Policy E 1 the following existing site is designated for employment uses: i) ONG.E1 – Essex Technology and Innovation Centre Infrastructure Requirements E. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development in Ongar will be expected to contribute proportionately towards the following infrastructure items: (i) Expansion of one of the Primary Schools; (ii) Highways and junction upgrades; (iii) Potential upgrades to existing waste water infrastructure; and (iv) The delivery/improvement of open space throughout the settlement. F. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Small District Centre Uses G. In accordance with Policy E 2, in Ongar District Centre, at least 50% of the ground floor Primary Retail Frontage and at least 45% of the ground floor Secondary Retail Frontage will be maintained in A1 use. Air Pollution H. The development of the allocated sites within Ongar has the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Flood Risk I. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1. West Ongar Concept Framework J. In order to ensure that a comprehensive and cohesive approach is taken to the planning and delivery of certain sites and associated infrastructure, development proposals in relation to sites ONG.R1 and ONG.R2 will be required to be in accordance with a Concept Framework Plan, as defined in Policy SP 3. K. The Concept Framework Plans relate to a number of site allocations. These should be undertaken jointly between all applicants of the site allocations subject to the Concept Framework Plan. Details of the specific requirements of the Concept Framework Plans can be found within the site specific guidance set out in Appendix 6. L. These will be produced by the applicants of the site allocations and shall be endorsed by	

Policy number/ name	Policy detail	Likely Significant Effects
	the Council prior to the submission of any planning applications. The Concept Framework Plan and the development proposals for each site located within it should be considered and informed by the Quality Review Panel.	
Policy P 5 Buckhurst Hill	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) BUCK.R1 Land at Powell Road – Approximately 31 homes ii) BUCK.R2 Queens Road car park – Approximately 41 homes iii) BUCK.R3 Stores at Lower Queens Road – Approximately 15 homes and retail floorspace. Infrastructure Requirements C. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically , development in Buckhurst Hill will be expected to contribute proportionately towards the following infrastructure items: (i) Highways and junction upgrades; (ii) The improvement and provision of open space throughout the settlement. D. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Small District Centre Uses E. In accordance with Policy E 2, in Buckhurst Hill District Centre, at least 65% of the ground floor Primary Retail Frontage and at least 40% of the ground floor Secondary Retail Frontage will be maintained in A1 use. Air Pollution F. The development of the allocated sites within Buckhurst Hill have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure G. Due to their proximity to Epping Forest, development of the allocated sites within Buckhurst Hill will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2.	**Likely Significant Effects.** This policy provides for three residential site allocations all less than 400m from Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality** It is noted that, this policy provides positive provision for financial contributions to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. It also requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality) and the phasing of development in line with provision of water treatment facilities. Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	Flood Risk H. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1.	
P 6 North Weald Bassett	A. Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential sites B. In accordance with Policy SP 2 the following sites are: i) NWB.R1 Land at Bluemans – Approximately 223 homes ii) NWB.R2 Land at Tylers Farm – Approximately 21 homes iii) NWB.R3 Land south of Vicarage Lane – Approximately 728 homes iv) NWB.R4 Land at Chase Farm – Approximately 27 homes v) NWB.R5 Land at The Acorns, Chase Farm – Approximately 51 homes Employment Sites C. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) NWB.E1 – New House Farm, Vicarage Lane ii) NWB.E2 – Tylers Green Industrial Estate iii) NWB.E3 – Weald Hall Farm and Commercial Centre D. In accordance with Policy SP 2 and Policy E 1 the following site is designated for employment uses with a further allocated expansion for B Use Class employment uses: i) NWB.E4 – North Weald Airfield Traveller Sites E. In accordance with Policy SP 2 the following sites are allocated for Traveller Accommodation: i) NWB.T1 Land west of Tylers Green – up to 5 pitches Infrastructure Requirements F. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development in North Weald Bassett will be expected to contribute proportionately towards the following infrastructure items: (i) A new primary school; (ii) Appropriate provision of health facilities;	**Likely Significant Effects** This policy provides for residential, traveler and employment site allocations within 6.2km of Epping Forest SAC (specifically site NWB R3) but more than 10km from Lee Valley SPA and Ramsar site. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** It is noted that, this policy provides positive provision for green infrastructure and contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2 and the phasing of development in line with provision of water treatment facilities. It also requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	(iii) Highways and junction upgrades; (iv) Local upgrades to the existing waste water network and drainage infrastructure; (v) Potential upgrades to existing water, gas and telecommunications infrastructure; and (vi) The improvement and provision of open space throughout the settlement. G. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution H. The development of the allocated sites within North Weald Bassett have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure I. Due to their proximity to Epping Forest development of the allocated sites within North Weald Bassett will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. Flood Risk J. In accordance with Policy DM 15, development on residential or traveler allocations must be located wholly within Flood Zone 1. North Weald Bassett Masterplan Area K. Development proposals in relation to sites NWB.R1, NMB.R2, NWB.R3, NWB.R4 and NWB.R5, NWB.T1 must comply with a Strategic Masterplan for the North Weald Bassett Area which has been formally endorsed by the Council. L. In addition to the requirements set out above, the Strategic Masterplan must make provision for: (i) a minimum of 1,050 homes and 5 Traveller pitches; (ii) local centre including, retail, community, and appropriate provision of health facilities; (iii) addressing surface water flooding; (iv) new primary school; (v) adequate levels of public open space to be provided on the site; (vi) careful design that mitigates any potential impact upon the Grade II Listed Buildings at Bluemans Farm/Tyler's Farmhouse; (vii) new and improved Public Rights of Way and cycle linkages with the surrounding area; (viii) careful design and layout to ensure that where sensitive land uses are proposed near the intermediate High Pressure Gas Pipeline they accord with the requirements set out in	

Policy number/ name	Policy detail	Likely Significant Effects
	the HSE's Land Use Planning Methodology; (ix) the need to upgrade/widen the existing Vicarage Lane West access in order to ensure a safe access point which has sufficient capacity for the development it serves; and (x) the continued protection of those trees benefitting from a Tree Preservation Order, and other identified veteran trees. M. The Masterplan and subsequent applications should be considered and informed by the Quality Review Panel. North Weald Airfield Masterplan N. Development proposals at North Weald Airfield must comply with a Masterplan for the North Weald Airfield. O. In addition to the requirements set out in parts A-K, the Strategic Masterplan must make provision for: (i) a Leisure Centre and other community uses to the east of the main runway; (ii) retention and expansion of aviation uses to the west of the main runway; (iii) provision for c.10ha of additional Employment of B1, B2, B8 uses to the east; and (iv) a new access from Epping Road to service the west of the site. P. The Masterplan and subsequent applications should be considered and informed by the Quality Review Panel.	
Policy P 7 Chigwell	A. Proposals for development on allocated sites should accord with with the site specific requirements set out in Appendix 6. Residential sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) CHIG.R1 Land adjacent to The Paddock – Approximately 12 homes ii) CHIG.R2 Woodview – Approximately 23 homes iii) CHIG.R3 Land at Manor Road – Approximately 11 homes iv) CHIG.R4 Land between Froghall Lane and railway line – Approximately specialist 105 homes v) CHIG.R5 Land at Chigwell Nurseries – Approximately 65 homes vi) CHIG.R6 The Limes Estate – Approximately 100 homes vii) CHIG.R7 Land at Chigwell Convent – Approximately 28 homes viii) CHIG.R8 Land at Fencepiece Road – Approximately 6 homes ix) CHIG.R9 Land at Grange Court – Approximately 8 homes x) CHIG.R10 The Maypole – Approximately 11 homes xi) CHIG.R11 Land at Hainault Road – Approximately 7 homes	**Likely Significant Effects** This policy provides for residential site allocations between 1.7km and 6.2km from Epping Forest SAC. Specifically, sites Chig.R3/R5/R7/R8/R9/R11 and a small part of R6 are all within 6.2 km. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** This policy also provides positive provision for financial contributions towards access management and monitoring of visitors to Epping Forest SAC and the phasing of development in line with provision of water treatment facilities It acknowledges that these site allocations have potential to

Policy number/ name	Policy detail	Likely Significant Effects
	Infrastructure Requirements C. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Development in Chigwell will be expected to contribute proportionately towards the following infrastructure items: (i) Secondary School expansion; (ii) Highways and junction upgrades; (iii) Potential upgrades to existing waste water infrastructure; and (iv) Improvement of open space throughout the settlement. D. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution E. The development of the allocated sites within Chigwell have the potential to produce air pollution that could impact air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Flood Risk F. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1.	affect Epping Forest SAC from increase atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.
Policy P 8 Theydon Bois	A. Proposals for development on allocated sites should accord with and the site specific requirements set out in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) THYB.R1 Land at Forest Drive – Approximately 39 homes ii) THYB.R2 Theydon Bois London Underground Station car park – Approximately 12 homes	**Likely Significant Effects**. This policy provides for residential site allocations between 260m and 0.7km from Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction**

Policy number/ name	Policy detail	Likely Significant Effects
	iii) THYB.R3 Land at Coppice Row – Approximately 6 homes Infrastructure Requirements C. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically , development in Theydon Bois will be expected to contribute proportionately towards the following infrastructure items: (i) Highways and junction upgrades; (ii) Local upgrades to the existing waste water network and drainage infrastructure; and (iii) The improvement of open space throughout the settlement. D. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution E. The development of the allocated sites within Theydon Bois has the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure F. Due to their proximity to Epping Forest, development of the above allocated sites within Theydon Bois will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. Flood Risk G. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1.	• **Water Quality.** This policy provides positive provision for financial contributions to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. It also requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality) It also requires the phasing of development in line with provision of water treatment facilities and open space. Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.
Policy P 9 Roydon	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) ROYD.R1 The Old Coal Yard – Approximately 7 homes ii) ROYD.R2 Land at Kingsmead School – Approximately 21 homes iii) ROYD.R3 Land at Epping Road – Approximately 14 homes iv) ROYD.R4 Land at Parklands Nursery – Approximately 20 homes	**Likely Significant Effects** This policy provides for residential site allocations between 1.2km and 1.7km from the Lee Valley SPA and Ramsar site. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.**

Policy number/ name	Policy detail	Likely Significant Effects
	Infrastructure Requirements C. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development in Roydon will be expected to contribute proportionately towards the following infrastructure items: (i) Highways and junction upgrades; (ii) Local utilities upgrades; and (iii) The improvement of open space throughout the settlement. D. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Flood Risk E. In accordance with Policy DM 15, development on residential or traveller allocations must be located wholly within Flood Zone 1.	This policy acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. It also requires the phasing of development in line with provision of water treatment facilities and open space. Full screening of the Site Allocations can be found in Table 5, Table 6 and Table 7. Locations are illustrated on Figures 3A to 4B.
Policy P 10 Nazeing	A. Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) NAZE.R1 Land at Perry Hill – Approximately 33 homes ii) NAZE.R2 The Fencing Centre, Pecks Hill – Approximately 29 homes iii) NAZE.R3 Land to the rear of Pound Close – Approximately 39 homes iv) NAZE.R4 Land at St Leonards Farm – Approximately 21 homes Employment Sites C. There are no new employment site allocations in Nazeing. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) NAZE.E1 – The Old Waterworks ii) NAZE.E2 – Land west of Sedge Green iii) NAZE.E3 – Bridge Works and Glassworks, Nazeing New Road iv) NAZE.E4 – Hillgrove Business Park v) NAZE.E5 – Birchwood Industrial Estate vi) NAZE.E6 – Millbrook Business Park vii) NAZE.E7 – Land at Winston Farm	**Likely Significant Effects.** This policy provides for residential traveller and employment site allocations between 2.2km and 2.8km from the Lee Valley SPA and Ramsar site and between 3.9km and 4.7km from Wormley Hoddesdonpark Woods SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** This policy acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality) It also requires the phasing of development in line with provision of water treatment facilities and open space.

Policy number/ name	Policy detail	Likely Significant Effects
	Infrastructure Requirements D. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically , development in Nazeing will be expected to contribute proportionately towards the following infrastructure items: (i) Primary School expansion; (ii) Highways and junction upgrades; (iii) Local utilities upgrades; and (iv) The improvement of open space throughout the settlement. E. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution F. The development of the allocated sites within Nazeing have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Flood Risk G. In accordance with Policy DM 15, development on residential allocations must be located wholly within Flood Zone 1. South Nazeing Concept Framework H. In order to ensure that a comprehensive and cohesive approach is taken to the planning and delivery of certain sites and associated infrastructure, development proposals in relation to sites NAZE.R1, NAZE.R3 and NAZE.R4 will be required to be in accordance with a Concept Framework, as defined in Policy SP 3. I. Some Concept Framework Plans will relate to multiple allocation sites, whereby these should be undertaken jointly between all applicants of the site allocations subject to the Concept Framework Plan Details of the specific requirements of each Concept Framework Plan can be found within the site specific guidance set out in Appendix 6. J. These will be produced by the applicants of the site allocations and shall be endorsed by the Council prior to the submission of any planning applications. The Concept Framework Plan and the development proposals for each site located within it should be considered and informed by the Quality Review Panel.	Full screening of the Site Allocations can be found in Table 6, Table 7 and Table 8. Locations are illustrated on Figures 3A to 4B.
Policy P 11 Thornwood	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6.	**Likely Significant Effects** This policy provides for site allocations within 6.2km from

Policy number/ name	Policy detail	Likely Significant Effects
	B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) THOR.R1 Land at Tudor House – Approximately 124 homes ii) THOR.R2 Land east of High Road – Approximately 48 homes Employment Sites C. There are no new employment site allocations in Thornwood. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) THOR.E1 – Camfaud Concrete Pumps ii) THOR.E2 – Land at Esgors Farm iii) THOR.E3 – Woodside Industrial Estate iv) THOR.E4 – Weald Hall Lane Industrial area Infrastructure Requirements D. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically , development in Thornwood will be expected to contribute proportionately towards the following infrastructure items: (i) Highways and junction upgrades; (ii) Local utilities upgrades; (iii) The improvement of open space throughout the settlement; and (iv) Community uses. E. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution F. The development of the allocated sites within Thornwood have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Recreational Pressure G. Due to their proximity to Epping Forest development of the above allocated sites within Thornwood will be required to make a contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2.	Epping Forest SAC, although more than 9km from Lee Valley SPA and Ramsar site. All the Thornwood sites are within 6.2km of Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** This policy acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). It also requires for infrastructure (including open space) to be delivered in line with rate and scale of need. Full screening of the Site Allocations can be found in Table 6, Table 7 and Table 8. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	Flood Risk H. In accordance with Policy DM 15, development on residential or traveller allocations must be located wholly within Flood Zone 1.	
Policy P 12 Coopersale, Fyfield, High Ongar, Lower Sheering, Moreton, Sheering and Stapleford Abbotts	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential Sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) COOP.R1 Land at Parklands - Approximately 6 homes (Coopersale); ii) FYF.R1 Land at Gypsy Mead - Approximately 14 homes (Fyfield); iii) HONG.R1 Land at Mill Lane - Approximately 10 homes (High Ongar); iv) LSHR.R1 Land at Lower Sheering - Approximately 14 homes (Lower Sheering); v) SHR.R1 Land at Daubneys Farm- Approximately 10 homes, SHR.R2 Land to the East of the M11 Approximately 62 homes and SHR.R3 Land north of Primley Lane - Approximately 12 homes (Sheering); and vi) STAP.R1 Land at Oakfield Road - Approximately 33 homes; STAP.R2 Land to rear of Mountford and Bishops Brow, Oak Hill Road - Approximately 8 homes; STAP.R3 Land at The Drive - Approximately 6 homes (Stapleford Abbots). Travelling showpeople sites C. In accordance with Policy SP 3 the following site is allocated for travelling showpeople accommodation: i) MORE.T1 (Lakeview, Moreton) – 1 yard Employment sites D. There are no new employment site allocations in Coopersale, Fyfield, High Ongar, Lower Sheering, Moreton, Sheering or Stapleford Abbotts. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) High Ongar – HONG.E1 Nash Hall Industrial Estate ii) Lower Sheering – LSHR.E1 Land at The Maltings iii) Stapleford Abbotts – STAP.E1 Land at High Willows Infrastructure Requirements E. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically , development in these settlements will be expected to contribute proportionately towards the following infrastructure items:	**Likely Significant Effects** This policy provides for site allocations within 3.3km from Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** This policy acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). It also requires for infrastructure (including open space) to be delivered in line with rate and scale of need and for residential development in Coopersale to contribution to the access management and monitoring of visitors to the Forest in accordance with Policy DM 2. Full screening of the Site Allocations can be found in Table 6, Table 7 and Table 8. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	(i) Highways and junction upgrades; (ii) Local utilities upgrades; and (iii) The improvement of open space throughout the settlements. F. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution G. The development of the allocated sites have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Flood Risk H. In accordance with Policy DM 15, development on residential or traveller allocations must be located wholly within Flood Zone 1.	
Policy P 13 Rural sites in the east of the District	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Residential sites B. In accordance with Policy SP 2 the following sites are allocated for residential development: i) RUR.R1 Avenue Home, Latton Common – Approximately 11 homes ii) RUR.R2 Norton Heath Riding Centre – Approximately 30 homes Employment sites C. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) RUR.E1 – Brickfield House, Thornwood ii) RUR.E2 – Land at Kingstons Farm, Matching iii) RUR.E3 – Matching Airfield South iv) RUR.E4 – Land at London Road, Stanford Rivers v) RUR.E6 – Land at Housham Hall Farm, Matching vi) RUR.E7 – Land at Searles Farm, Foster Street vii) RUR.E8 – Fosters Croft, Foster Street viii) RUR.E9 – Horseshoe Farm, London Road	**Likely Significant Effects** This policy provides for residential, traveler and employment site allocations located more than 8km from the Lee Valley SPA and Ramsar site. **Potential linking impact pathways include:** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** This policy acknowledges that these site allocations have potential to affect Epping Forest SAC from increase atmospheric pollution. It requires larger developments to provide an air quality assessment of the individual site and requires contributions towards air quality monitoring, including for the SAC. Additionally, this policy cross refers to Policy DM 2 (Epping Forest SAC and Lee Valley SPA) and Policy DM 22 (Air Quality). It also requires for infrastructure (including open space and utilities upgrades) to be delivered in line with rate and scale of

Policy number/ name	Policy detail	Likely Significant Effects
	ix) RUR.E10 – Land at Little Hyde Hall Farm, Sheering x) RUR.E11 – Land at Quickbury Farm, Sheering xi) RUR.E12 – New House Farm, Little Laver Road xii) RUR.E14 – Matching Airfield North xiii) RUR.E15 – Land at Rolls Farm Barns, Hastingwood Road xiv) RUR.E18 – Land at Dunmow Road, Fyfield xv) RUR.E19 – Land at Dorrington Farm (see Policy SP 5 and allocation SP 4.1) xvi) RUR.E20 – Land at Stewarts Farm xvii) RUR.E21 – Land at Paslow Hall Farm, King Street, High Ongar xviii) RUR.E22 – Hastingwood Business Centre, Hastingwood xix) RUR.E23 – Hobbs Cross Business Centre, Theydon Garnon xx) RUR.E24 – Land at Holts Farm, Threshers Bush D. In accordance with Policy SP 2 and Policy E 1 the following site is designated for employment uses with a further allocated expansion for B Use Class employment uses: • RUR.E19 – Dorrington Farm, Rye Hill Road (see Poicy SP 5 and allocation SP 4.1) Traveller sites E. In accordance with Policy SP 3 the following site is allocated for Traveller Accommodation: i) RUR.T4 Land at Valley View, Curtis Mill Lane – up to 1 pitch Infrastructure Requirements F. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development on these allocations will be expected to contribute proportionately towards the following infrastructure items: (i) Highways and junction upgrades; and (ii) Local utilities upgrades; G. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or discussions with providers determine that these items are no longer required. Air Pollution H. The development of the allocated sites within the rural east of the District have the potential to produce air pollution that could impact upon air quality in the District, including Epping Forest. In accordance with Policy DM 2 and Policy DM 22, all proposals on sites which require a Transport Assessment/Transport Statement will be required to undertake an	need. Full screening of the Site Allocations can be found in Table 6, Table 7 and Table 8. Locations are illustrated on Figures 3A to 4B.

Policy number/ name	Policy detail	Likely Significant Effects
	air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring. Flood Risk I. In accordance with Policy DM 15, development on residential or traveller allocations must be located wholly within Flood Zone 1.	
Policy P 14 Rural sites in the west of the District	A Proposals for development on allocated sites should accord with the site specific requirements set out in Appendix 6. Employment sites B. There are no new employment site allocations in the rural locations in the west of the District. In accordance with Policy E 1 the following existing sites are designated for employment uses: i) RUR.E5 – Land at Hayleys Manor, Epping Upland ii) RUR.E13 – Warlies Park House, Horseshoe Hill Traveller sites C. In accordance with Policy SP 3 the following sites are allocated for Traveller Accommodation: i) RUR.T1 Land at Sons Nursery, Hamlet Hill – up to 2 pitches ii) RUR.T2 Land at Ashview, Hamlet Hill – up to 1 pitch iii) RUR.T3 Land at James Mead, Waltham Road – up to 4 pitches iv) RUR.T5 Land at Stoneshot View – up to 5 pitches Infrastructure Requirements D. Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan. Specifically, development on these allocations will be expected to contribute proportionately towards the following infrastructure items: (i) Highways and junction upgrades; (ii) Local utilities upgrades; E. The Council will only permit planning applications that contribute towards the delivery of those infrastructure items set out above and in the Infrastructure Delivery Plan, unless subsequent iterations of the Infrastructure Delivery Plan or items are no longer required. Flood Risk F. In accordance with Policy DM 15, development on residential or traveller allocations must be located wholly within Flood Zone 1.	**Likely Significant Effects** This policy provides for site allocations of which RUR.T3 lies within 6.2km of Epping Forest SAC. **Potential linking impact pathways include:** • **Recreational pressure and urbanisation** • **Atmospheric pollution** • **Water Abstraction** • **Water Quality.** As this policy provides only for the allocation of existing employment sites and 12 Traveller pitches the quantum of development falls below the level required to submit an Air Quality Assessment although it has 'in combination' potential to affect Epping Forest SAC via increased atmospheric pollution and (with regard to traveller pitches) recreational pressure. Full screening of the Site Allocations can be found in Table 6, Table 7 and Table 8. Locations are illustrated on Figures 3A to 4B.
Policy P 15 Rural sites in	A Employment sites	No Likely Significant Effects

Policy number/ name	Policy detail	Likely Significant Effects
the south of the District	In accordance with Policy E 1 the following existing sites are designated for employment uses: i) RUR.E16 – Taylors Farm, Gravel Lane ii) RUR.E17 – Brookside Garage, Gravel Lane Infrastructure Requirements B Infrastructure requirements must be delivered at a rate and scale to meet the needs that arise from the proposed development, in accordance with the Infrastructure Delivery Plan.	This policy provides for the allocation of two existing employment sites. As such there no impact pathways present. Full screening of the Site Allocations can be found in Table 6, Table 7 and Table 8. Locations are illustrated on Figures 3A to 4B.
Chapter 6: Infrastructure and Delivery.		
Policy D 1 Delivery of Infrastructure	A. New development must be served and supported by appropriate on and off-site infrastructure and services as identified through the Infrastructure Delivery Plan. Proposals must demonstrate that there is sufficient appropriate infrastructure capacity to support the development or that such capacity will be delivered by the proposed development. Applications must be able to demonstrate that such capacity will prove to be sufficient and sustainable over time both in physical and financial terms. B. Where a proposed development requires additional infrastructure capacity to support the growth, measures must be agreed with the Council and the appropriate infrastructure provider. Such measures may include (not exclusively): (i) financial contributions towards new or expanded facilities and the maintenance thereof; (ii) on-site construction of new provision; (iii) off-site capacity improvement works; and/or (iv) the provision of land. For the purposes of this policy, a wide definition of infrastructure and infrastructure providers will be applied. C. Exceptions to this policy will only be considered if: (i) it can be demonstrated that the benefit of the development proceeding without full mitigation outweighs the harm; (ii) a financial and viability appraisal (with supporting evidence), which is transparent and complies with any relevant national or local guidance applicable at the time, demonstrates that full mitigation is not viable to allow the development to proceed; (iii) it can be demonstrated that a full and thorough investigation has been undertaken to find innovative solutions to make the necessary provision and all possible steps have been taken to minimise the residual level of unmitigated impacts; and (iv) Obligations are entered into by the developer that provide for appropriate additional mitigation in the event that viability improves prior to completion of the development. D. Infrastructure and services required as a consequence of development and provision for their maintenance, where appropriate, will be sought from developers and secured through planning obligations prior to the issue of planning permission. E. In negotiating planning obligations, the Council will take into account economic viability. Where relevant, development proposals should be supported by a financial and viability	Likely Significant Effects. This is a development management policy relating to the delivery of infrastructure. This is a positive policy as it required development to demonstrated sufficient appropriate infrastructure capacity to support the development or that such capacity will be delivered by the proposed development. It also includes for appropriate phasing of infrastructure and services. There are no impact pathways present.

Policy number/ name	Policy detail	Likely Significant Effects
	appraisal (with supporting evidence), which is transparent and complies with relevant national or local guidance applicable at the time. Where a financial and viability appraisal has been submitted the Council will undertake an independent review of that appraisal for which the applicant will bear the cost. F. Where viability constraints can be demonstrated by evidence, the Council may consider prioritising contributions in line with the IDP Schedule and phasing developer contributions appropriately. G. Development proposals within the Garden Town Communities (as identified by Policy SP 2) will be expected to contribute collectively, equitably and proportionally towards delivering the identified infrastructure requirements related to each of the sites.	
Policy D 2 Essential Facilities and Services	A. Development proposals will be permitted only where they provide or improve the essential facilities and services required to serve the scale of the proposed development. B. Development proposals which would be detrimental to or result in the loss of essential facilities and services that meet community needs and support well-being will only be permitted where it can be clearly demonstrated that: (i) The service or facility is no longer needed; or (ii) It is demonstrated that it is no longer practical, desirable or viable to retain them; or (iii) The proposals will provide sufficient community benefit to outweigh the loss of the existing facility or service C. Proposals for new facilities will be supported where they meet an identified local need. The Council will work with local communities and support proposals to retain, improve or re-use essential facilities and services, including those set out in Neighbourhood Plans or Development Orders, including Community Right to Build Orders, along with appropriate supporting development which may make such provision economically viable. All Use Class C2 developments and Use Class C3 residential development in excess of 50 units will be required to prepare a Health Impact Assessment that will measure the wider impact upon healthy living and the demands that are placed upon the capacity of health services and facilities arising from the development.	No Likely Significant Effects. This is a development management policy relating to essential facilities and services. There are no impact pathways present.
Policy D 3 Utilities	A. Planning permission will be granted for proposals only where there is sufficient capacity within the utilities infrastructure to meet the needs of the development. Applicants will be expected to consult with utilities providers to ensure this is the case, and may be required to undertake The Council will expect developers and utilities providers to work together to ensure the appropriate provision of required utilities. B. Where there is a capacity problem and no improvements are programmed by the utilities provider, the Council will require the developer to fund appropriate improvements which must be completed prior to occupation of the development, or the relevant phase of development. C. Large developments may need to be phased to ensure there is sufficient capacity, and that any required upgrades can take place prior to occupation.	No Likely Significant Effects. This is a positive development management policy relating to provision of utilities. It ensures that any required upgrades are in place prior to occupation/ phasing. There are no impact pathways present.
Policy D 4 Community,		No Likely Significant Effects.

Policy number/ name	Policy detail	Likely Significant Effects
Leisure and Cultural Facilities	A. Development proposals will be permitted where they: (i) Retain and maintain existing facilities that are valued by the community; or (ii) Improve the quality and capacity of facilities valued by the community. B. Proposed developments should contribute to the provision of new or improved community, leisure and cultural facilities in a way that is proportionate to the scale of the proposed development and in accordance with the standards in the Infrastructure Delivery Plan and Essex County Council's Developers Guide. C. Strategic and larger developments will be expected to make on site provision for community, leisure and cultural facilities where feasible. For smaller developments a financial contribution will be sought where required. D. Financial contributions will be sought for the on-going maintenance of community facilities, where appropriate. E. The provision of new facilities will be appropriately phased to meet the needs of the community they are provided for. F. Where opportunities exist, the Council will support the co-location of community, leisure and culture facilities and other local services. G. Proposals that would result in the loss of valued facilities currently or last used for the provision of community, leisure and cultural activities will only be permitted if it is demonstrated that: (iii) The facility is no longer needed for any of the functions that it can perform; or (iv) It is demonstrated that it is no longer practical, desirable or viable to retain them; or (v) Any proposed replacement or improved facilities will be equivalent or better in terms of quality, quantity and accessibility and there will be no overall reduction in the level of facilities in the area in which the existing development is located; or (vi) The proposal will clearly provide sufficient community benefit to outweigh the loss of the existing facility, meeting evidence of a local need. H. Other than proposals which involve the comprehensive relocation of facilities, any development proposals that would result in the loss of community, leisure and cultural facilities must be accompanied by an assessment which demonstrates that the facility or land is surplus to requirements and that it has been unsuccessfully marketed for a minimum of 2 years. The assessment must also evaluate the quantity and quality of existing facilities in the locality and assess the need and value to the community. The views of the local community on any loss must be sought as part of this assessment. I. The Council will work positively with national governing bodies and communities, including local voluntary organisations, and support proposals to develop, retain, improve or re-use community, leisure or cultural facilities, including those set out in Neighbourhood Plan or Development Orders including Community Right to Build Orders, along with the appropriate supporting development which may make such provision economically viable.	This is a development management policy relating to community, leisure and cultural facilities. Loss of leisure facilities has potential to lead to an increase in recreational pressure upon a designated site, as such provides policy to prevent this loss, except in some circumstances as outlined. There are no impact pathways present.
Policy D 5 Communications	A. The Council will promote enhanced digital connectivity throughout the District by supporting high speed broadband and telecommunication infrastructure. In particular applicants submitting planning applications for major development proposals should	No Likely Significant Effects. This is a development management policy relating to

Policy number/ name	Policy detail	Likely Significant Effects
Infrastructure	demonstrate how high speed broadband infrastructure will be accommodated within the development. B. Applications for telecommunications development (including for prior approval under Part 16 of the General Permitted Development Order, or any other such future Order) will be considered in accordance with national policy guidance. The visual impacts of telecommunications proposals should be minimised, particularly on rooftops/roof slopes.	communications infrastructure. It does not identify any location, or type of development. This is a positive policy: the provision of high speed internet and telecommunications has potential to reduce the need to travel, thus reducing atmospheric pollution. There are no impact pathways present.
Policy D 6 Neighbourhood Planning	A. The Council will support the preparation and production of Neighbourhood Plans. Neighbourhood Plans should: (i) Show how they are contributing towards the strategic objectives of the Local Plan and that they are in general conformity with its strategic approach and policies; and (ii) Clearly set out how they will promote sustainable development at the same level or above that which would be delivered through the Local Plan, and Neighbourhood Plan policies are supported by evidence on local need for new homes, jobs and facilities, for their Plan area.	No Likely Significant Effects. This is a development management policy relating to Neighbourhood Planning and ensures conformity with Local Plan documents. There are no impact pathways present.
Policy D 7 Monitoring and Enforcement	A. The Council will monitor the implementation of the Local Plan policies and infrastructure provision and report the results on an annual basis. It will deal with the enforcement of planning controls in accordance with the Council's Local Enforcement Plan.	No Likely Significant Effects. This is a development management policy providing for annual monitoring of implementation of Plan policies and infrastructure. There are no impact pathways present.

4.2 Table 4 identifies that District Plan policies provide potential linking impact pathways to European designated sites. Impact pathways include:

- Recreational pressure and urbanisation
- Atmospheric pollution
- Water Abstraction
- Water Quality.

4.3 These impact pathways are discussed further in relation to Epping Forest SAC, Lee Valley SPA and Ramsar site and Worley-Hoddesdonpark Woods SAC in Chapters 5 to 8.

Likely Significant Effects of Site Allocations

4.4 Table 5 5 presents an assessment of likely significant effects of Residential Site Allocations within the Local Plan from the point of view of HRA; Table 6 does the same for Travellers Site Allocations and Table 7 for Employment Site Allocations. **Note that this table only discriminates between site allocations on the basis of recreational pressure and urbanisation catchments because it is considered that all development in Epping Forest District will result in a likely significant effect through the air quality pathway.**

4.5 In Table 5, Table 6 and Table 7 where Site Allocations have been coloured green in the 'Likely Significant Effects' column, this indicates that the Allocations do not contain potential impact pathways linking to European designated sites and have been screened out from further consideration. Where Site Allocations have been coloured orange in the 'Likely Significant Effects' column, this indicates that the Allocations have potential impact pathways linking to European designated sites and have been screened in for appropriate assessment in this report. Table 7 includes existing employment sites designated for employment uses. However, Plan policy does not identify any type or quantum of development at these locations; as such, they are not assessed further.

4.6 For Residential and Traveller Site Allocations, impacts relating to recreational pressure in combination have been screened out for Allocations located more than 6.2 km from Epping Forest SAC, 7 km from Worley-Hoddesdonpark Woods SAC and 6 km from Lee Valley SPA and Ramsar site. The reasoning for these distances is discussed in Chapter 5.

Table 5: Screening Assessment of Residential Site Allocations

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
EPF/0055/17 (LOU.R17)	Loughton	Loughton	~12	157m from Epping Forest SAC; more than 6km from Lee Valley SPA/ Ramsar site; more than 10 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
EPF/0329/17 (CHIG.R1)	Chigwell	Chigwell	~12	Just over 4km from Epping Forest SAC; more than 10km from Lee Valley SPA/ Ramsar site; more than 17 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
EPF/0719/17 (LOU.R18)	Loughton	Loughton	~8	348m from Epping Forest SAC; more than 6km from Lee Valley SPA/ Ramsar site; more than 13 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
EPF/0781/17 (STAP.R3)	Stapleford Abbotts	Stapleford Abbotts	~6	More than 8km from Epping Forest SAC; more than 14km from Lee Valley SPA/ Ramsar site; more than 20 km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
EPF/2473/16 (CHIG.R2)	Chigwell	Chigwell	~23	Just over 4km from Epping Forest SAC; more than 10km from Lee Valley SPA/ Ramsar site; more than 18 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
EPF/2881/16 (WAL.R7)	Waltham Abbey	Waltham Abbey	~8	1.9km from Epping Forest SAC; 2.6km from Lee Valley SPA/ Ramsar site; more than 8 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure upon Epping Forest SAC; and in-combination recreational pressure impact pathway for Lee Valley SPA and Ramsar site are considered in Chapter 5
EPF/3034/16 (RUR.R2)	High Ongar	Rural sites (east)	~30	More than 15km from Epping Forest SAC; more than 22km from Lee Valley SPA/ Ramsar site; more than 25 km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
EPF/3281/16 (CHIG.R3)	Chigwell	Chigwell	~11	2.8km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 17 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
EPP.R1 (West)	Epping	Epping	~450	400m from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 12 km from Wormley-Hoddesdonpark Woods SAC.	**HRA implications** Due to its close proximity to Epping Forest SAC, in-combination effect of recreational pressure and urbanisation require consideration. Due to the large number of dwellings to be provided this site should consider bespoke greenspace provision
EPP.R2 (East)	Epping	Epping	~500	970m from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 13 km from Wormley-Hoddesdonpark Woods SAC.	**HRA implications** Due to its close proximity to Epping Forest SAC, in-combination effects of recreational pressure and urbanisation require consideration. Due to the large number of dwellings to be provided this site

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
					should consider bespoke greenspace provision
Latton Priory (SP5.1)	North Weald Bassett	Harlow	~1,050	5.8km from Epping Forest SAC; more than 6km from Lee Valley SPA/ Ramsar site; more than 9 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC.
Water Lane Area (SP5.2)	Roydon	Harlow	~2,100	5.8km from Epping Forest SAC; 2.9km from Lee Valley SPA/ Ramsar site; 6.3 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC. In-combination effect of recreational pressure upon Lee Valley SPA/ Ramsar site is considered in Chapter 5, along with in-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC.

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
East of Harlow (SP5.3)	Sheering	Harlow	~750	More than 11km from Epping Forest SAC; more than 9km from Lee Valley SPA/ Ramsar site; more than 13 km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0011 (NAZE.R1)	Nazeing	Nazeing	~33	6.3km from Epping Forest SAC; 2.8km from Lee Valley SPA/ Ramsar site; 4.3km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure upon Lee Valley SPA/ Ramsar site is considered in Chapter 5, along with in-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC.
SR-0032 (LSHR.R1)	Sheering	Lower Sheering	~14	More than 14km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0033 (SHR.R1)	Sheering	Sheering	~10	More than 14km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0036 (NWB.R1)	North Weald Bassett	North Weald Bassett	~223	6.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present. However, due to the large size of this site, it may have potential to provide bespoke greenspace.
SR-0067i-N (ONG.R1)	Chipping Ongar	Ongar	~99	More than 10km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0070 (THYB.R1)	Theydon Bois	Theydon Bois	~39	0.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
SR-0072 (NWB.R2)	North Weald Bassett	North Weald Bassett	~21	6.9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0073 (SHR.R2)	Sheering	Sheering	~62	More than 13km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0089A (WAL.R1)	Waltham Abbey	Waltham Abbey	~295	2.7km from Epping Forest SAC; 1.4km from Lee Valley SPA/ Ramsar site; more than 7km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC and the Lee Valley SPA/ Ramsar site are considered in Chapter 5.
SR-0099 (WAL.R2)	Waltham Abbey	Waltham Abbey	~315	2.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; within 1.1km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC and the Lee Valley SPA and Ramsar site are considered in Chapter 5. Due to the large size of this site, it may have potential to provide bespoke publically accessible green space.
SR-0102 (ONG.R2)	Chipping Ongar	Ongar	~135	More than 10km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0104 (WAL.R3)	Waltham Abbey	Waltham Abbey	~130	2.5km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; within 1.5km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC and the Lee Valley SPA and Ramsar site.
SR-0120	Chipping	Ongar	~27	More than 10km from Epping Forest SAC; more	No Likely Significant Effects.

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
(ONG R3)	Ongar			than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	Due to the distances involved, there are no impact pathways present.
SR-0149 (THOR.R1)	North Weald Bassett	Thornwood	~124	4.4km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 9.5km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects.** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0150 (NAZE.R2)	Nazeing	Nazeing	~29	More than 7km from Epping Forest SAC; 3.9km from Wormley-Hoddesdonpark Woods SAC; 2.6km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and the Lee Valley SPA and Ramsar site are considered in Chapter 5.
SR-0158A (NWB.R3)	North Weald Bassett	North Weald Bassett	~728	5.9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC Due to the large size of this site, it may have potential to provide ANG.
SR-0169 (ROYD.R1)	Roydon	Roydon	~7	More than 9km from Epping Forest SAC; 5.4km from Wormley-Hoddesdonpark Woods SAC; 1.7km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and the Lee Valley SPA and Ramsar site are considered in Chapter 5.
SR-0176 (BUCK.R1)	Buckhurst Hill	Buckhurst Hill	~31	Within 400m of Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 6km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0181 (HONG.R1)	High Ongar	High Ongar	~10	More than 11km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
				Ramsar site.	
SR-0184 (ONG.R4)	Chipping Ongar	Ongar	~163	More than 11km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0185 (ONG.R5)	Chipping Ongar	Ongar	~107	More than 10km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0186 (ONG.R6)	Chipping Ongar	Ongar	~33	More than 10km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0197-N (ROYD.R2)	Roydon	Roydon	~21	More than 9km from Epping Forest SAC; 1.6km from Lee Valley SPA/ Ramsar site; 5.2 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and for Lee Valley SPA and Ramsar site are considered in Chapter 5.
SR-0219 (WAL.R4)	Waltham Abbey	Waltham Abbey	~16	2.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; within 1.4km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination impacts relating to recreational pressure and urbanization upon Epping Forest SAC and the Lee Valley SPA and Ramsar site are considered in Chapter 5.
SR-0225 (BUCK.R2)	Buckhurst Hill	Buckhurst Hill	~41	Less than 100m from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 6km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0226-N (LOU.R1)	Loughton	Loughton	~165	0.6km from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 13 km from Wormley-Hoddesdonpark Woods	**Likely Significant Effects** In-combination effect of recreational pressure and

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
				SAC.	urbanisation upon Epping Forest SAC
SR-0227 (LOU.R2)	Loughton	Loughton	~192	2.1km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0228i-N (THYB.R2)	Theydon Bois	Theydon Bois	~12	0.6km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 13 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0229 (EPP.R3)	Epping	Epping	~89	1.2km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 7km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0242-N (STAP.R1)	Stapleford Abbotts	Stapleford Abbotts	~33	More than 8km from Epping Forest SAC; more than 15km from Lee Valley SPA/ Ramsar site; more than 21km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0281-N (EPP.R4)	Epping	Epping	~34	1.3km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0289 (LOU.R3)	Loughton	Loughton	~9	1.9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0300c (NAZE.R3)	Nazeing	Nazeing	~39	6.3km from Epping Forest SAC; 2.2km from Lee Valley SPA/ Ramsar site; more than 4.7 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination impacts relating to recreational pressure upon Lee Valley SPA/ Ramsar site and Wormley-Hoddesdonpark Woods SAC are considered in Chapter 5.

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
SR-0311 (SHR.R3)	Sheering	Sheering	~12	More than 14km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0317-N (CHIG.R4)	Chigwell	Chigwell	~105	3.1km from Epping Forest SAC; more than 9km from Lee Valley SPA/ Ramsar site; more than 17km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0318 (CHIG.R5)	Chigwell	Chigwell	~65	2.6km from Epping Forest SAC; more than 9km from Lee Valley SPA/ Ramsar site; more than 16km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0347 (EPP.R5)	Epping	Epping	~43	1.2km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 7km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0348 (EPP.R6)	Epping	Epping	~47	1.6km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 8km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0349 (EPP.R7)	Epping	Epping	~31	1.6km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 8km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0356 (LOU.R4)	Loughton	Loughton	~217	1.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0361 (LOU.R5)	Loughton	Loughton	~154	1.2km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar	**Likely Significant Effects** In-combination effect of recreational pressure and

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
				site.	urbanisation upon Epping Forest SAC
SR-0390-N (ONG.R.7)	Chipping Ongar	Ongar	~17	More than 9km from Epping Forest SAC; more than 17km from Lee Valley SPA/ Ramsar site; more than 20 km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0410 (THOR.R2)	North Weald Bassett	Thornwood	~48	Just over 4km from Epping Forest SAC; more than 9km from Lee Valley SPA/ Ramsar site; more than 12 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0455 (NWB.R4)	North Weald Bassett	North Weald Bassett	~27	6.3km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0473 (NAZE.R4)	Nazeing	Nazeing	~21	More than 6.2km from Epping Forest SAC; 4.4km from Wormley-Hoddesdonpark Woods SAC; 2.2-3km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effect** In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and the Lee Valley SPA and Ramsar site are discussed in Chapter 5.
SR-0478B (CHIG.R6)	Chigwell	Chigwell	~100	1.8km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0527 (LOU.R6)	Loughton	Loughton	~10	Within 400m of Epping Forest SAC (less than 100m); more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0541 (WAL.R5)	Waltham Abbey	Waltham Abbey	~67	2.9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; 1.1km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC and the Lee Valley

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
					SPA and Ramsar site.
SR-0556 (EPP.R8)	Epping	Epping	~44	1.8km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 7km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0557 (CHIG.R7)	Chigwell	Chigwell	~28	2.9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC From review of freely available aerial mapping, this site comprises existing open amenity green space. The presence of this space acts to divert some recreational activity away from the SAC. Loss of this space could act to increase recreational pressure upon the SAC, further compounded by additional new dwellings. It is therefore assumed that development of this site would need to ensure no net loss of open space in line with Policy DM6. It is recognized that residents of the site (and others in the Chigwell area) have an ability to access either Hainault Forest Country Park or the Roding Valley (including the Nature Reserve which permits dog walking) which are in closer proximity to, or provide easier access than, Epping Forest.
SR-0565-N (LOU.R7)	Loughton	Loughton	~20	300m from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 12 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0587 (EPP.R9)	Epping	Epping	~50	1.3km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 7km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
SR-0588 (CHIG.R8)	Chigwell	Chigwell	~6	1.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0813 (BUCK.R3)	Buckhurst Hill	Buckhurst Hill	~15	Within 400m of Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 6km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0834 (LOU.R8)	Loughton	Loughton	~29	Within 400m of Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0835 (LOU.R9)	Loughton	Loughton	~111	1.5km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0842 (ONG.R8)	Chipping Ongar	Ongar	~9	More than 10km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0873 (STAP.R2)	Stapleford Abbotts	Stapleford Abbotts	~8	More than 9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0878 (LOU.R10)	Loughton	Loughton	~12	0.7km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0890	Roydon	Roydon	~14	More than 8km from Epping Forest SAC; 5.3km from Wormley-Hoddesdonpark Woods SAC;	**Likely Significant Effects**

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
(ROYD.R3)				1.7km from Lee Valley SPA/ Ramsar site.	In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and the Lee Valley SPA and Ramsar site are discussed in Chapter 5.
SR-0895 (CHIG.R9)	Chigwell	Chigwell	~8	2.9km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0898 (CHIG.R10)	Chigwell	Chigwell	~11	2.4km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0903 (WAL.R6)	Waltham Abbey	Waltham Abbey	~27	2.3km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; within 1.9km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC and the Lee Valley SPA and Ramsar site are discussed in Chapter 5.
SR-0916 (CHIG.R11)	Chigwell	Chigwell Row	~7	2.8km from Epping Forest SAC; more than 11km from Lee Valley SPA/ Ramsar site; more than 18 km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0935 (FYF.R1)	Fyfield	Fyfield	~14	More than 12km from Epping Forest SAC; more than 17km from Lee Valley SPA/ Ramsar site; more than 20km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0937 (RUR.R1)	North Weald Bassett	Rural sites (east)	~11	More than 7km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 11km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-0974 (LOU.R11)	Loughton	Loughton	~9	0.9km from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
					urbanisation upon Epping Forest SAC
SR-0976 (ROYD.R4)	Roydon	Roydon	~20	More than 9km from Epping Forest SAC; 1.2km from Lee Valley SPA/ Ramsar site; more than 4.8km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination impacts relating to recreational pressure upon Lee Valley SPA/ Ramsar and Wormley-Hoddesdonpark Woods SAC are discussed in Chapter 5.
SR-0984 (LOU.R12)	Loughton	Loughton	~10	0.8km from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0986 (LOU.R13)	Loughton	Loughton	~6	0.9km from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0987 (COOP.R1)	Epping	Coopersale	~6	3.3km from Epping Forest SAC; more than 10km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-0991 (NWB.R5)	North Weald Bassett	North Weald Bassett	~51	6.3km from Epping Forest SAC; more than 11km from Lee Valley SPA/ Ramsar site; more than 14km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
SR-1020 (THYB.R3)	Theydon Bois	Theydon Bois	~6	260m from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 14km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-1021 (EPP.R10)	Epping	Epping	~6	1.7km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC

Site Ref	Parish	Settlement	Number of dwellings	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
SR-1026 (LOU.R14)	Loughton	Loughton	~33	0.9km from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-1027 (LOU.R15)	Loughton	Loughton	~6	0.7km from Epping Forest SAC; more than 7km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-1032 (LOU.R16)	Loughton	Loughton	~18	0.9km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 14km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC
SR-1035 (EPP.R11)	Epping	Epping	~11	1.4km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 11km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC

Table 6: Screening Assessment of Traveller Site Allocations

Site Ref	Parish	Settlement	Number of Pitches	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
T-E_11 (RUR.T2)	Roydon	Rural sites (west)	1	7.3km from Epping Forest SAC; 4.7km from Lee Valley SPA/ Ramsar site; 5.3km from Wormley-Hoddesdonpark Woods SAC.	**HRA implications** In-combination recreational pressure impact pathway for the Lee Valley SPA/ Ramsar and Wormley-Hoddesdonpark Woods SAC.
T-E_12 (RUR.T4)	Stapleford Abbotts	Rural Sites (east)	1	More than 10km from Epping Forest SAC; more than 7 km from Lee Valley SPA/ Ramsar site; more than 20 km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
T-I_02 (RUR.T3)	Roydon	Rural sites (west)	4	4.9km from Epping Forest SAC; 3.4km from Lee Valley SPA/ Ramsar site; 6.0km from Wormley-Hoddesdonpark Woods SAC.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC.In-combination recreational pressure impact pathway for the Lee Valley SPA/ Ramsar and Wormley-Hoddesdonpark Woods SAC.
GRT_N_07 (WAL.T1)	Waltham Abbey	Waltham Abbey	5	3.2km from Epping Forest SAC; 6.9km from Wormley-Hoddesdonpark Woods SAC; within 1.1km of Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination effect of recreational pressure and urbanisation upon Epping Forest SAC and the Lee Valley SPA and Ramsar site.
GRT_N_06 (NWB.T1)	North Weald Bassett	North Weald Bassett	5	6.8km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
GRT_I-09 (MORE.T1)	Moreton, Bobbingworth and the Lavers	Moreton	1 yard	More than 10km from Epping Forest SAC; more than 7km from Wormley-Hoddesdonpark Woods SAC; more than 10km from Lee Valley SPA/ Ramsar site.	No Likely Significant Effects. Due to the distances involved, there are no impact pathways present.
GRT-1_08 (RUR.T1)	Roydon	Rural sites (west)	2	More than 7km from Epping Forest SAC; 5.2km from Wormley-Hoddesdonpark Woods SAC; within 4.7km from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and the Lee Valley

Site Ref	Parish	Settlement	Number of Pitches	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
					SPA and Ramsar site.
EPF/1105/17 (RUR.T5)	Nazeing	Rural Sites (west)	5	More than 7km from Epping Forest SAC; 2.9km from Wormley-Hoddesdonpark Woods SAC; 2.5 from Lee Valley SPA/ Ramsar site.	**Likely Significant Effects** In-combination recreational pressure impact pathway for Wormley-Hoddesdonpark Woods SAC and the Lee Valley SPA and Ramsar site.

4.7 The screening undertaken in Table 5 of Residential and Table 6 of Traveller Site Allocations identify sites that are located within 6.2 km of Epping Forest SAC, 7 km of Worley-Hoddesdonpark Woods SAC and 6 km of Lee Valley SPA and Ramsar site. These are discussed in Chapter 5.

Table 7: Screening Assessment of Employment Site Allocations

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
EMP-0002b (LOU.E2)	Loughton	Loughton	1ha of B2 (General industrial) uses.	1.9km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 14km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water abstraction
SR-0006-N (RUR.E19)	North Weald Bassett	Harlow	1ha of B2 (General industrial)/ B8 (Storage or distribution) uses.	More than 5km from Epping Forest SAC; more than 6km from Lee Valley SPA/ Ramsar site; more than 9km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water abstraction
SR-0375-N (WAL. E7)	Waltham Abbey	Waltham Abbey	5,120 m^2 of B2 (General industrial)/ B8 (Storage or distribution) uses.	2.4km from Epping Forest SAC; 1.0km from Lee Valley SPA/ Ramsar site; more than 7km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water abstraction
SR-0940 (NWB.E4)	North Weald Bassett	North Weald Bassett	10ha of B1 (Business) / B2 (General industrial)/ B8 (Storage or	More than 4km from Epping Forest SAC; more than 11km from Lee Valley SPA/ Ramsar site; more than 13km from	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
			distribution) uses.	Wormley-Hoddesdonpark Woods SAC.	abstraction
SR-1034-Z (WAL.E9)	Waltham Abbey	Waltham Abbey	40,000 m^2 of B1c (Business) / B2 (General industrial)/ B8 (Storage or distribution) uses.	1km from Epping Forest SAC; more than 2km from Lee Valley SPA/ Ramsar site; more than 7km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water abstraction
EMP-0021 (WAL.E6)	Waltham Abbey	Waltham Abbey	1ha of B2 (General industrial)/ B8 (Storage or distribution) uses.	2.6km from Epping Forest SAC; 1.4km from Lee Valley SPA/ Ramsar site; more than 7km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water abstraction
SR-0945 (WAL.E8)	Waltham Abbey	Waltham Abbey	10ha of B1c (Business) / B2 (General industrial)/ B8 (Storage or distribution) uses.	1.8km from Epping Forest SAC; 2.7km from Lee Valley SPA/ Ramsar site; more than 8km from Wormley-Hoddesdonpark Woods SAC.	No Likely Significant Effects No impacts beyond in-combination effects: atmospheric pollution, water quality, and water abstraction
E-095 (EPP.E1)	Epping	Epping	Existing site designated for employment uses	N/A	N/A
ELR-0091 (EPP.E2)	Epping	Epping	Existing site designated for employment uses	N/A	N/A
EMP-0011 (EPP.E3)	Epping	Epping	Existing site designated for employment uses	N/A	N/A
EMP0013 (EPP.E4)	Epping	Epping	Existing site designated for employment uses	N/A	N/A

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
EMP-0002a (LOU.E1)	Loughton	Loughton	Existing site designated for employment uses	N/A	N/A
EMP-0003 LOU.E3	Loughton	Loughton	Existing site designated for employment uses	N/A	N/A
E-066 (WAL.E1)	Waltham Abbey	Waltham Abbey	Existing site designated for employment uses	N/A	N/A
E-113 (WAL.E2)	Waltham Abbey	Waltham Abbey	Existing site designated for employment uses	N/A	N/A
ELR-0088 (WAL.E4)	Waltham Abbey	Waltham Abbey	Existing site designated for employment uses	N/A	N/A
EMP-0005 (WAL.E5)	Waltham Abbey	Waltham Abbey	Existing site designated for employment uses	N/A	N/A
E-058 (ONG.E1)	Ongar	Ongar	Existing site designated for employment uses	N/A	N/A
ELR-0097 (NWB.E1)	North Weald Bassett	North Weald Bassett	Existing site designated for employment uses	N/A	N/A
EMP-0019 (NWB.E2)	North Weald Bassett	North Weald Bassett	Existing site designated for employment uses	N/A	N/A
SR-0415 (NWB.E3)	North Weald Bassett	North Weald Bassett	Existing site designated for employment uses	N/A	N/A
E-112	Nazeing	Lower Nazeing	Existing site	N/A	N/A

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
(NAZE.E1)			designated for employment uses		
ELR-0099 (NAZE.E2)	Nazeing	Lower Nazeing	Existing site designated for employment uses	N/A	N/A
EMP-0007 (NAZE.E3)	Nazeing	Lower Nazeing	Existing site designated for employment uses	N/A	N/A
EMP-0009 (NAZE.E4)	Nazeing	Lower Nazeing	Existing site designated for employment uses	N/A	N/A
SR-0151 (NAZE.E5)	Nazeing	Nazeing	Existing site designated for employment uses	N/A	N/A
SR-0863-N (NAZE.E6)	Nazeing	Nazeing	Existing site designated for employment uses	N/A	N/A
SR-0965 (NAZE.E7)	Nazeing	Nazeing	Existing site designated for employment uses	N/A	N/A
E-092 (THOR.E1)	North Weald Bassett	Thornwood	Existing site designated for employment uses	N/A	N/A
ELR-0092 (THOR.E2)	North Weald Bassett	Thornwood	Existing site designated for employment uses	N/A	N/A
ELR 0093 (THOR.E3)	North Weald Bassett	Thornwood	Existing site designated for employment uses	N/A	N/A
EMP 0014 (THOR.E4)	North Weald Bassett	Thornwood	Existing site designated for employment uses	N/A	N/A
SR-0394	High Ongar	High Ongar	Existing site	N/A	N/A

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
(HONG. E1)			designated for employment uses		
SR-0017 (LSHR.E1)	Sheering	Lower Sheering	Existing site designated for employment uses	N/A	N/A
ELR-0074 (STAP.E1)	Stapleford Abbotts	Stapleford Abbotts	Existing site designated for employment uses	N/A	N/A
E-049 (RUR.E1)	North Weald Bassett	Thornwood	Existing site designated for employment uses	N/A	N/A
E068 (RUR.E2)	Matching	Matching	Existing site designated for employment uses	N/A	N/A
E-070 (RUR.E3)	Abbess Beauchamp and Berners Roding	Abbess Roding	Existing site designated for employment uses	N/A	N/A
E-078 (RUR.E4)	Stanford Rivers	Stanford Rivers	Existing site designated for employment uses	N/A	N/A
E-097 (RUR.E6)	Matching	Matching	Existing site designated for employment uses	N/A	N/A
E-101 (RUR.E7)	North Weald Bassett	Harlow	Existing site designated for employment uses	N/A	N/A
E-104 (RUR.E8)	North Weald Bassett	Harlow	Existing site designated for employment uses	N/A	N/A
E-105 (RUR.E9)	North Weald Bassett	Harlow	Existing site designated for employment uses	N/A	N/A

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
E-106 (RUR.E10)	Sheering	Lower Sheering	Existing site designated for employment uses	N/A	N/A
E-107 (RUR.E11)	Sheering	Lower Sheering	Existing site designated for employment uses	N/A	N/A
E-109 (RUR.E12)	Moreton, Bobbingworth and the Lavers	Moreton	Existing site designated for employment uses	N/A	N/A
E-119 (RUR.E14)	Abbess Beauchamp and Berners Roding	Abbess Roding	Existing site designated for employment uses	N/A	N/A
ELR-0095 (RUR.E15)	Moreton, Bobbingworth and the Lavers	Magdalen Laver	Existing site designated for employment uses	N/A	N/A
EMP-0020 (RUR.E18)	Fyfield	Fyfield	Existing site designated for employment uses	N/A	N/A
SR-0211 (RUR.E20)	Stanford Rivers	Stanford Rivers	Existing site designated for employment uses	N/A	N/A
ELR-0094 (RUR.E22)	North Weald Bassett	Hastingwood	Existing site designated for employment uses	N/A	N/A
E-065 (RUR.E23)	Theydon Garnon	Theydon Garnon	Existing site designated for employment uses	N/A	N/A
E-098 (RUR.E24)	Moreton, Bobbingworth and the Lavers	Threshers Bush	Existing site designated for employment uses	N/A	N/A

Site Ref	Parish	Settlement	Area (m^2) and Type of Employment	Distance from Internationally Designated Sites	Pathways of Impact Requiring Investigation
E-096 (RUR.E5)	Epping Upland	Epping Upland	Existing site designated for employment uses	N/A	N/A
E-115 (RUR.E13)	Waltham Abbey	Waltham Abbey	Existing site designated for employment uses	N/A	N/A
ELR-0104A (RUR.E16)	Chigwell	Chigwell	Existing site designated for employment uses	N/A	N/A
ELR-0104B (RUR.E17)	Chigwell	Chigwell	Existing site designated for employment uses	N/A	N/A

4.8 Screening of the Employment Site Allocations undertaken in Table 7 does not identify any potential impact pathways linking to European designated sites beyond in combination affects relating to changes in air quality as a result of increase traffic movement resulting from development provided by the Plan.

Air Quality Modelling Results: Likely Significant Effects

4.9 Epping Forest SAC is known to be adversely affected by relatively poor local air quality alongside the roads that traverse the SAC and this has been demonstrated to have negatively affected the epiphytic lichen communities of the woodland. The nature of the road network around the modelled part of Epping Forest SAC is such that journeys between a number of key settlements around the Forest by car, van or bus effectively necessitate traversing the SAC. Moreover, queues are known to build around most arms of Wake Arms Roundabout, primarily during the AM and PM peak, which increases emissions compared to the same volume and composition of free-flowing traffic.

4.10 The full results of the air quality modelling are contained within Appendix F. Published internal Natural England guidance on air quality assessment for HRA[53] indicates that the first step once it is has been confirmed that a site is air quality sensitive is to determine whether the change in pollutant concentrations (in this case NOx and ammonia) due to growth 'in combination' exceeds 1% of the critical level. If it does not exceed 1% of the critical level then it can be concluded that no likely significant effect will arise since the total change in pollutant concentrations is imperceptible. The plans showing the Transects set out below are set out at page 18 of this document.

Transect	**NOx (µgm^{-3})** *Dose (i.e. change between 2033 Baseline and 2033 Do Something 2 (DS2) at the closest point to the road, expressed as a percentage of the critical level (30 µgm^{-3})*	**Ammonia (µgm^{-3})** *Dose (i.e. change between 2033 Baseline and 2033 Do Something 2 (DS2) at the closest point to the road, expressed as a percentage of the lower critical level for lichens (1 µgm^{-3})*
Wake Arms Roundabout		
A1	12.5 (42%)	0.12 (12%)
A2	3.0 (10%)	0.05 (5%)
B1	15.4 (51%)	0.12 (12%)
B2	1.1 (4%)	0.02 (2%)
C1	22.5 (75%)	0.21 (21%)
C2	10.9 (36%)	0.10 (10%)
D1	13.0 (43%)	0.12 (12%)
D2	13.6 (45%)	0.13 (13%)
E1	1.2 (4%)	0.02 (2%)
E2	2.1 (7%)	0.03 (3%)
P (transect taken directly from the traffic island itself)	8.9 (30%)	0.15 (15%)
Robin Hood Roundabout		
H	9.1 (30%)	0.09 (9%)
I	13.9 (46%)	0.14 (14%)
J	1.4 (5%)	0.02 (2%)
K	14.6 (49%)	0.14 (14%)
L	10.0 (33%)	0.09 (9%)
M	4.5 (15%)	0.04 (4%)

[53] NE Internal Guidance – Approach to Advising Competent Authorities on Road Traffic Emissions and HRAs V1.4 Final - June 2018

Transect	**NOx (µgm^{-3})** *Dose (i.e. change between 2033 Baseline and 2033 Do Something 2 (DS2) at the closest point to the road, expressed as a percentage of the critical level (30 µgm^{-3})*	**Ammonia (µgm^{-3})** *Dose (i.e. change between 2033 Baseline and 2033 Do Something 2 (DS2) at the closest point to the road, expressed as a percentage of the lower critical level for lichens (1 µgm^{-3})*
N	20.5 (68%)	0.18 (18%)
Honey Lane		
O	5.6 (19%)	0.06 (6%)

4.11 On receptors J, L and M the critical level for NOx will not be breached at the roadside under any scenario (i.e. NOx concentrations will be below 30 µgm^{-3} in 2033 even with the forecast traffic growth). For all other transects, it can be seen that the critical level will be exceeded (which is already the case for most receptors), and the growth 'in combination' will result in total roadside NOx dose on all other transects exceeding 1% of the critical level for each pollutant. Moreover, for receptor N the NOx emissions due to growth in combination will cause the critical level for NOx to be exceeded at the roadside when this would not otherwise be the case in 2033. However, in all cases NOx concentrations would be lower in 2033 than in 2014 or 2017 even when all growth 'in combination' is taken into account. There is no receptor at which a net deterioration in NOx concentrations is forecast.

4.12 At no receptor will growth 'in combination' cause an ammonia critical level to be exceeded although in all instances the dose due to growth in combination exceeds 1% of the critical level for lichens at the roadside. Even with no housing or employment growth ammonia concentrations in 2033 would exceed the critical level for lichens as they do so already (being c. 1.1-1.2 µgm^{-3} in 2033 even at 200m from the roadside when the influence of the road will be slight). This is due to background ammonia concentrations for the grid squares in which the SAC is situated, which are dominated by non-road sources (particularly agriculture)[54]. Although growth would cause roadside ammonia concentrations to rise by 0.02 to 0.2 µgm^{-3} on most transects, it would not cause a breach of the critical level for either lichens or that for general vegetation. The effect of additional traffic on ammonia concentrations is mainly felt within 5m of the roadside.

4.13 Since the 1% of the critical level threshold is exceed for both NOx and ammonia at the majority of receptors due to growth 'in combination', appropriate assessment is required.

Which authorities play the greatest part in the 'in combination' effect?

4.14 The relative responsibility for the additional NOx, ammonia and nitrogen deposition can be ascertained by comparing the difference between the 2033 Baseline and the various 2033 growth scenarios described in the methodology (DN, DM, DS1 and DS2). It can be seen that for all receptors the difference between the 2033 baseline and the Do Nothing (DN) scenario is negligible (i.e. the concentrations are almost identical with the difference being well below 1% of the critical level) for both ammonia and NOx. This shows that housing and employment growth outside the four HMA authorities (Epping Forest District, Uttlesford, Harlow and East Herts) makes a negligible contribution to changes in either pollutant. The big increases in concentrations occur between scenarios DN and DM (when planning permissions granted since 2014, particularly in Epping Forest District, are added into the modelling) and/or between scenarios DS1 and DS2 (when planned future growth in Epping Forest District is added into the modelling). This shows that growth in Epping Forest District between 2014 and 2033 is the primary source of additional ammonia and NOx emissions on the modelled road sections and all other plans and projects make a negligible contribution to the in combination effect. This is most probably because the average daily traffic flow on all the modelled sections of road is dominated by people who either live or work in Epping Forest District, particularly the settlements that surround the SAC, including Epping itself.

[54] According to ammonia source attribution for the SAC on APIS, traffic is responsible for only 2% of the background ammonia within the 1km grid squares that cover Epping Forest. In contrast 77% is attributed to livestock and fertiliser.

5. Appropriate Assessment: Recreational Pressure and Urbanisation

5.1 The following policies and site allocations were deemed to pose a risk of likely significant effects upon the Lee Valley SPA and Ramsar site, Wormley-Hoddesdonpark Woods SAC and Epping Forest SAC internationally designated sites as a result of increased recreational pressure including urbanisation affects. These are therefore discussed further in this Chapter:

Policies

- Policy SP 2: Spatial Development Strategy 2011-2033;
- Policy SP 4 Development & Delivery of Garden Communities in the Harlow and Gilston Garden Town; and
- Policy SP 5 Garden Town Communities.

Site Allocations

5.2 In general, residential site allocations will not result in an impact alone upon internationally designated sites. The sites identified below are site allocations that will potentially result in loss of existing amenity space that may currently help divert recreational pressure away from internationally designated sites. Thus, any loss of these publically accessible green spaces could result in an increase in recreational pressure upon internationally designated sites. Distances from internationally designated sites and the quantum of development to be delivered are identified in Table 5.

- SR-0478B (CHIG.R6)
- SR-0361 (LOU.R5)

5.3 The following policies within the Plan provide a positive contribution that could result in a reduction in recreational pressure and urbanisation:

- Paragraph 4.12 of the pre-amble to Policy DM 2 (Epping Forest SAC and the Lee Valley SPA) provides a positive contribution requiring '*Habitats Regulation Assessments of development proposals likely to affect these sites are undertaken',* thus ensuring that no likely significant effects occur as a result of the Plan. It provides for HRA of projects or plans that are '*likely to give rise to significant impact on the integrity of the sites'*.
- Policy DM 2 (Epping Forest SAC and the Lee Valley SPA) is a positive policy as it expects all relevant development to '*assist in the conservation and enhancement of the biodiversity*' of Epping Forest SAC and Lee Valley SPA and also requires '*All outline or detailed planning applications for new homes within the settlements of Loughton, Epping, Waltham Abbey, North Weald Bassett, Theydon Bois and Chigwell will be required to make a financial contribution to access management and monitoring of visitors to the Epping Forest SAC*' and that '*the Council will ensure the provision of a meaningful proportion of Natural Green Space or access to Natural Green Space'*
- Policy DM 5 (Green and Blue Infrastructure) is a positive policy that provides for green and blue infrastructure for recreational use which can potential divert recreational pressure away from the designated sites.
- Policy DM 6 (Designated and Undesignated Open Spaces) is a positive policy as it provides for open spaces that can detract recreational pressure away from internationally designated sites and requires no net loss of open space.
- Policy DM 7 (Heritage Assets) is a development management policy relating to heritage assets including Registered Parks and Gardens. These spaces can act to divert recreational pressure away from internationally designated sites and this policy requires no net loss.
- Policy DM 10 (Housing Design and Quality) is a positive policy as it encourages the inclusion of amenity/ garden space, green infrastructure and open space. These have potential to divert recreational pressure away from internationally designated sites.

- Policy SP 7 (The Natural Environment, Landscape Character and Green and Blue Infrastructure) is a positive policy that provides for the retention and extension of green infrastructure which has potential to divert recreational pressure away from internationally designated sites. This policy includes the requirement for CIL/S106 agreements where appropriate green infrastructure cannot be provided on site.
- Furthermore, Policy DM 11 (Waste Recycling Facilities on New Development) is a development management policy relating to waste recycling storage facilities on new development sites. This is a positive policy as it is likely to reduce any occurrences of fly tipping within an internationally designated site as a result of new development.

5.4 Within the context of these policies, recreational pressure on each European site is discussed below.

Lee Valley SPA/Ramsar site

5.5 The following SSSI's are components of the SPA/ Ramsar site:

- Turnford & Cheshunt Pits SSSI straddles the boundary between Epping Forest District and Broxbourne and lies 300m from the settlement of Waltham Abbey. Most of the site is owned by the Lee Valley Regional Park Authority and is managed as a Country Park (River Lee Country Park).
- Rye Meads SSSI is located approximately 70 metres north of Epping Forest District and 2.6km from the nearest significant village within that district (Lower Nazeing, with a population c. 4,500). The site is a Nature Reserve and is owned by Thames Water and the RSPB who manage the site with Herts and Middlesex Wildlife Trust.
- Amwell Quarry SSSI is located 2.5km north west of the District boundary. The site is a National Nature Reserve. It is owned and managed by Herts and Middlesex Wildlife Trust.

5.6 The Local Plan allocates a total of 3,178 dwellings between 1.1km and 2.9km from the SPA/Ramsar site on 16 development sites at Waltham Abbey, Roydon (near Harlow) and Nazeing. It does not allocate any dwellings closer to the SPA/Ramsar site than 1.1km and 2,203 of the dwellings (69% of the total) are located over 2.5km from the SPA. The majority of these (66% of the total) are the sites that comprise the SP 5.2 Water Lane Area (2,100 dwellings) located 2.9km from the Rye Meads part of the SPA/Ramsar site at its closest. Moreover, visiting Rye Meads from the Roydon area is more convoluted than suggested by a simple measure of 'as the crow flies' due to the intervening railway line and River Stort and the existence of a toll on Rye Road[55]. As such, the toll-free route requires one to drive north onto the A414, west along the A414 and then south into Hoddesdon to reach the reserve.

5.7 There are several reasons why this analysis considers that recreational pressure effects on this site from development in Epping Forest District are unlikely to result in adverse effects on integrity even 'in combination':

- Amwell Quarry SSSI (Amwell Nature Reserve) and Rye Meads SSSI (Rye Meads Nature Reserve) are both laid out in considerable detail with a network of hides (ten at Rye Meads, three at Amwell) and clearly marked footpaths/boardwalks with screening vegetation that are specifically laid out and designed to route people away from the sensitive areas and minimise disturbance while at the same time accommodating high numbers of visitors. Additionally, no dogs are allowed (except registered assistance dogs) and the wet and marshy/open water nature of the habitats on site inherently limits off-track recreational activity, rendering it difficult to accomplish and unappealing. For these reasons it is considered that the vulnerability of Amwell Nature Reserve and Rye Meads Nature Reserve to the potential adverse effects of recreational activity that can affect other less well-managed sites is very low. In Turnford and Cheshunt Pits SSSI, recreational activity is similarly regulated through zoning of water bodies. The majority of the site is already managed in accordance with agreed management plans in which nature conservation is a high or sole priority.

[55] Although the toll is modest (currently £0.5) it is nonetheless likely to discourage casual visitors from using that route.

- Two of the three faunal species for which the SPA and Ramsar site are designated – gadwall and shoveler – are not inherently highly sensitive to disturbance and are readily able to adapt (habituate) to the presence of shore-based human recreational activities without being flushed (as opposed to water-based activities which are potentially highly disturbing).
- Turnford & Cheshunt Pits is located within the Lee Valley Country Park, which is part of the Lee Valley Regional Park. In their response to the Regulation 18 Draft Epping Forest Local Plan the Lee Valley Regional Park Authority did not raise any concerns regarding future recreational pressure on the SPA from growth in Epping Forest District.
- The closest allocated housing sites in Epping Forest Local Plan (SR-0099 (WAL.R2) providing 316 dwellings and SR-0541 (WAL.R5) providing 67 dwellings) are more than 1km from the closest part of the SPA/Ramsar site (Turnford & Cheshunt Pits SSSI) and considerably further than that from other parts. Various investigations into the habits of recreational visitors to nationally and internationally important wildlife sites have found that the majority of dog walkers and casual walkers are generally disinclined to walk very far to visit sites for recreation. For example, in one of the most thorough studies visitor surveys were conducted at the Thames Basin Heaths Special Protection Area. The study found that the average distance between the visitor's home postcode and Thames Basin Heaths SPA when arriving by foot was 0.8 km, with 75% of foot-based visitors living within a 0.9 km straight line distance from the visitor survey point. Other surveys show a similar broad pattern, since there is a natural limit as to how far most people are prepared to walk to visit a particular countryside site, even when it is large and appealing. The Thames Basin Heaths is also extensively visited by people travelling by car, who typically live 5km from the SPA. However, that site has an abundance of parking whereas parking in the vicinity of Rye Meads, Turnford & Cheshunt Pits and Amwell Quarry will naturally restrict the number of car-based visitors at any time and, unlike Epping Forest SAC, informal roadside verge parking is very limited.

5.8 Nonetheless, Epping Forest District Council recognises that case-by-case decisions need to be made for individual planning applications. To facilitate this, Policy DM 2 (Epping Forest SAC and Lee Valley SPA) includes the following protective text: '*New residential development likely to have a significant effect, either alone or in combination with other development in these areas, will be required to demonstrate that adequate measures are put in place to avoid or mitigate any potential adverse effects*' and this will apply explicitly to Lee Valley SPA/Ramsar site.

5.9 With these precautions in place it is concluded that there will be no recreational likely significant effect on Lee Valley SPA/Ramsar site.

Wormley-Hoddesdonpark Woods SAC

5.10 The site is a large, attractive area of ancient woodland with extensive public access and close to large urban centres. The majority of the woods in the complex are in sympathetic ownership, with no direct threat (Wormley-Hoddesdonpark Wood, for example, is managed by The Woodland Trust). No visitor survey data that identifies the recreational catchment could be sourced for Wormley-Hoddesdonpark Woods. However, data does exist for other large woodland European sites, such as Ashdown Forest[56] and Epping Forest SAC. These indicate that core visitor catchments (i.e. the zone within which the majority (c. 75%) of regular, frequent visitors are concentrated) tend to lie between c. 5km (Epping Forest) and 6-7km (Ashdown Forest) from the site. If the more precautionary figure of 7km is used for Wormley Hoddesdonpark Woods in the absence of bespoke visitor data for this site, the zone would include some small villages in the north-west of Epping Forest District (such as Nazeing, Lower Nazeing and Bumbles Green), but none of the larger settlements.

[56] Clarke RT, Sharp J & Liley D. 2010. Ashdown Forest Visitor Survey Data Analysis (Natural England Commissioned Reports, Number 048) and subsequent analyses
UE Associates and University of Brighton. 2009. Visitor Access Patterns on the Ashdown Forest: Recreational Use and Nature Conservation

5.11 Natural England's Site Improvement Plan (SIP)[57] indicates that the site is heavily used by the public for recreational purposes. However, it also indicates that recreational activity is generally well-managed. Sensitive management of access points and routes by the site's main owners has been largely successful in mitigating the potential adverse effects of this high level of use. As such, general recreational pressure is not indicated in the Site Improvement Plan as a current or future obstacle to achieving or maintaining favourable conservation status and preserving the integrity of the SAC.

5.12 Recreation is actively promoted on this site and most recreation is concentrated on well-established paths. Most of the complex is covered by a High Forest Zone Plan (Hertfordshire County Council 1996) which sets out a framework for woodland management across the whole area. It aims to restore a varied age structure and natural stand types through sustainable forestry.

5.13 The Local Plan does not propose to allocate any new residential sites at all within 2.9km of the SAC. The closest residential site is EPF-1105-17 (RUR.T5) providing a single travellers pitch. The next closest residential development site is SR-0150 (NAZE.R2) located 3.9km from the SAC and providing for 32 dwellings in Lower Nazeing. The Local Plan proposes to allocate a total of nine housing sites (2,317 dwellings) and five traveller sites within 7km of the SAC as identified below:

- SP 5.2 Water Lane Area - Approximately 2,100 homes
- SR-0011 (NAZE.R1) in Lower Nazeing– Approximately 63 dwellings
- SR-0150 (NAZE.R2) in Lower Nazeing – Approximately 32 dwellings
- SR-0169 (ROYD.R1) in Roydon – Approximately 7 dwellings
- SR-0197-N (ROYD.R2) in Roydon – Approximately 21 dwellings
- SR-0300c (NAZE.R3) in Lower Nazeing – Approximately 39 dwellings
- SR-0473 (NAZE.R4) in Lower Nazeing – Approximately 21 dwellings
- SR-0890 (ROYD.R3) in Roydon – Approximately 14 dwellings
- SR-0976 (ROYD.R4) in Roydon – Approximately 20 dwellings
- T-E_11 (RUR.T2) in Hamlet Hill, Roydon – Approximately 1 pitch
- T_I_02 (RUR.T3) in Roydon Hamlet, Roydon – Approximately 4 pitches
- GRT_N_07 (WAL.T1) in Waltham Abbey – Up to 5 pitches
- GRT-1_08 (RUR.T1) in Roydon – Up to 2 pitches
- EPF/1105/17 (RUR.T5) Lower Nazeing, Nazeing – Up to 1 pitch

5.14 Based on the issues identified in the Site Improvement Plan and the fact that concerns about recreational pressure on this site have not been flagged by Natural England during the preparation of the Local Plan and its HRA, which commenced in 2012, there is no basis to conclude that such an increase would result in a likely significant effect on the SAC.

In Combination

5.15 The Local Plan includes both new allocations (i.e. sites that do not currently have planning permission) and sites that have already received planning permission but which have not yet been implemented. The housing requirement for Epping Forest District over the Local Plan period 2011-2033 (including commitments and completed development) is 11,400 new homes.

[57] http://publications.naturalengland.org.uk/file/6541134543192064 [accessed 12/08/16]

5.16 Some parts of East Herts District also lie within the likely recreational catchment of the SAC (assumed as a worst case 7km), but the HRA of the East Herts District Plan identifies that the District Plan does not propose to allocate any new housing sites at all within 3km of the SAC and the nearest large housing site is 5km distant, to the east of Ware. It concludes that these will not be significant even in combination. Additionally, Wormley-Hoddesdonpark Woods SAC is located within the borough of Broxbourne. The screening assessment of Broxbourne's draft Local Plan[58] (undertaken in December 2016) enabled this impact pathway to be screened out alone and in combination with other projects and plans. Based on these conclusions and the quantum and location of new housing within Epping Forest District it is considered that it would not result in a likely significant effect in combination.

Epping Forest SAC

5.17 Epping Forest SAC receives a great many visits per year (estimated at over 4 million) and discussions with the City of London Corporation have identified long-standing concerns about increasing recreational use of the Forest resulting in damage to its interest features. A programme of detailed formal visitor surveys has been undertaken and has identified that 75% of visitors to Epping Forest SAC arise from within approximately 6km (6.2km) of the site. This is relevant because the 75th percentile is often used to define the core recreational catchment of a European site. However, within that 6.2km zone visitors are not evenly spread; the vast majority of Essex-resident visitors live within 3km of the SAC with few living further afield. For example, only 3 visitor postcodes recorded in the visitor survey were between 3km and 6.2km of the SAC in Epping Forest District; almost all visitors resident in Epping Forest District (irrespective of visit frequency or activity) lived within 3km of the SAC. The 6.2km distance appears to be influenced particularly by residents to the south of the SAC in north London who are dispersed over a wider area. Nonetheless, Epping Forest District Council is using 6.2km as a definition of the core catchment of Epping Forest SAC for purposes of determining mitigation.

5.18 Residential site allocations and traveller sites located wholly or in part within 6.2km of Epping Forest SAC are provided in Table 9.

Table 8: Site Allocations Providing Residential Development and/or traveller sites within 6.2km of Epping Forest SAC

LOU.R17	LOU.R5
CHIG.R1	THOR.R2
LOU.R18	CHIG.R6
DHIG.R2	LOU.R6
WAL.R7	WAL.R5
CHIG.R3	EPP.R8
EPP.R1 (West)	CHIG.R7
EPP.R2 (East)	LOU.R7
SP5.1 (Latton Priory)	EPP.R9

[58] https://www.broxbourne.gov.uk/sites/default/files/Documents/Planning/pp_LC-218_Broxbourne_HRA_Screening_8_051216JE-compressed.pdf [accessed 06/11/2016]

SP5.2 (Water Lane Area)	CHIG.R8
THYB.R1	BUCK.R3
WAL.R1	LOU.R8
WAL.R2	LOU.R9
WAL.R3	LOU.R10
NWB.R3 (North Weald Bassett)	CHIG.R9
BUCK.R1	CHIG.R10
WAL.R4	WAL.R6
BUCK.R2	CHIG.R11
LOU.R1	LOU.R11
LOU.R2	LOU.R12
THYB.R2	LOU.R13
EPP.R3	COOP.R1
EPP.R4	THYB.R3
LOU.R3	EPP.R10
CHIG.R4	LOU.R14
CHIG.R5	LOU.R15
EPP.R5	LOU.R16
EPP.R6	EPP.R11
EPP.R7	RUR.T3
LOU.R4	WAL.T1

5.19 There are sixty sites listed in Table 9: 58 housing sites and 2 gypsy & traveller sites. Of these, 49 sites are located within 3km of the SAC, the zone within which almost all current EFDC-resident visitors recorded in the survey were located. Ten of these sites (EPP.R1 (West), LOU.R17, LOU.R18, LOU.R6, LOU.R7, LOU.R8, BUCK.R1, BUCK.R2, BUCK.R3, THYB.R3) are located very close to the SAC (within 400m). Since Epping Forest SAC is already known to be under pressure from high levels of recreation, additional recreational activity resulting from new residential development within 3km of the SAC in Epping Forest District would result in an adverse effect 'in combination' with growth in adjacent authorities (notably the London Boroughs of Waltham Forest and Redbridge, which are also core centres of SAC visitor origin) without mitigation. This would arise through recreational pressure itself and through the interlinked impact pathway of urbanisation (e.g. littering and fly tipping).

5.20 The remaining eleven sites are located between 3km and 6.2km from the SAC. These are CHIG.R1, CHIG.R2, CHIG.R4, SP5.1 (Latton Priory), SP5.2 (Water Lane Area), THOR.R1, NWB.R3 (North Weald Bassett), THOR.R2, RUR.T3, WAL.T1 and COOP.R1. Of these, three large sites (SP5.1, SP5.2 and NWB.R3) will be responsible for

delivering a total of 3,878 dwellings between them, or 69% of the 4,196 dwellings to be delivered in the 3km to 6.2km zone. The visitor survey indicates that few current visitors to the SAC derive from the 3km to 6.2km zone. However, the delivery of three large sites totalling almost 4,000 dwellings *could* result in changes to the patterns of activity and potentially result in a greater proportion of visitors to the SAC deriving from the 3km to 6.2km zone. For this reason a 6.2km zone of influence is being used to define the core recreational and urbanisation catchment of the SAC.

5.21 Epping Forest District Council has already committed to work with partners to produce a strategic mitigation strategy for Epping Forest SAC[59]. Since that commitment was made governance arrangements have been put in place and this commitment has been reflected in Local Plan policy. The first step in development of this strategy, through undertaking an updated visitor survey of the SAC has been completed and EFDC's Cabinet approved an interim mitigation strategy on 18th October 2018 as a material consideration in the determination of planning applications. The interim strategy will be replaced by the long-term mitigation strategy during the course of 2019 (as the full mitigation strategy is to be informed by further visitor survey which is due to be undertaken in early Summer 2019). In reviewing the interim mitigation strategy Natural England commented in a letter to the Council dated 1st October 2018 that '*This interim proposal provides a solid base on which to further develop the final Mitigation Strategy…*'

5.22 The analysis provided above concerning the relative distribution of visitor origins within Epping Forest District and the associated distribution of new housing development indicates that a two-tier approach to the 6.2km core catchment would be appropriate:

- To adopt a 3km inner zone where all net new dwellings make a financial contribution to access management in the SAC, this is currently £352 per dwelling and is based upon the cost of delivering the interventions in the Interim Mitigation Strategy. Residential care home schemes will be assessed on a case by case basis to determine whether they need to make the above contribution, dependent upon the nature and level of care being provided and the likely level of independence of occupiers. The tariff (and interventions) will be reviewed as the long-term Mitigation Strategy is developed; and
- Require the four large sites situated within 3km and 6.2km of the SAC (SP5.1 Latton Priory, SP5.2 Water Lane Area, EPP.R1/EPP.R2 South of Epping and NWB.R3 North Weald Bassett) deliver (or contribute to delivering) large areas of nearby accessible natural greenspace with a view to making these development sites as recreationally self-sufficient as possible. This is on the basis that they could change current patterns of visitor origin for the SAC and by capturing them the vast majority of new housing in this outer zone would be addressed.

5.23 The pre-amble to Policy DM2 sets out the Council's stance in some detail: '… *Policy DM 2 provides the mechanisms for managing future recreational pressures on the Forest in particular. The Council's approach is to facilitate the development of a green infrastructure network. Through improved links to other green spaces, and to the quality of those green spaces and links, the human pressure on these assets is intended to be more widely spread, with the aim of being less harmful to biodiversity.*

5.24 *In pursuit of protecting the vulnerable habitat of Epping Forest the Council seeks to provide alternative spaces and corridors that can relieve the recreational pressure on the Forest. It recognises that additional development in the District is likely to give rise to further visitor pressure on the Forest that needs to be mitigated. This can be achieved by increasing public access to land that is not in the Forest, and altering the character of existing open spaces and the links between open spaces. These linkages are intended to improve access for walkers, dog walkers, cyclists and horse riders, as well as provide space, including additional space for wildlife and plant species.*

[59] The MoU states that '*It is intended this Joint Strategy will be in agreed and published prior to the determination of any of the planning applications on sites around Harlow that are part of The Spatial Option detailed in the "Distribution of OAN across West Essex and East Hertfordshire" MoU. If the Joint Strategy is not in place when planning applications are submitted, applicants will be required to submit the necessary information to ascertain whether any adverse impacts will be caused in Epping Forest, and if necessary any mitigation measures that may be necessary*'.

5.25 *However, it is recognised that some housing sites will not be of a sufficient scale to make provision for a meaningful proportion of natural green space. Where those sites are within the 'sphere of influence' of the Forest (as determined by an up-to-date Visitor Survey, the most recent of which was undertaken in October/November 2017) the Council will seek contributions to support the development and implementation of an access management strategy by the City of London Corporation'*.

5.26 Policy DM 2 part C states that '…*New residential development likely to have a significant effect, either alone or in combination with other development in these areas, will be required to demonstrate that adequate measures are put in place to avoid or mitigate any potential adverse effects'*. For many developments this could be simply a contribution of the appropriate tariff but it is considered that some individual planning applications *may* be able to deliver their own bespoke mitigation. To facilitate this potential, all allocations above a certain size (such as for more than 400 dwellings[60]) in the core catchment of the SAC, and particularly the settlements of Loughton, Epping, Waltham Abbey, Theydon Bois and Chigwell, should consider any potential to deliver their own on-site accessible natural greenspace. This is facilitated by Policy DM 2 which states that '*To mitigate against potential or identified adverse effects of additional development in the District, in particular from strategic developments, on the Epping Forest SAC, the Council will ensure the provision of a meaningful proportion of Natural Green Space or access to Natural Green Space.*' If the visitor survey identifies a larger core catchment then, depending on its size, this same principle could also be applied to the Garden Communities around Harlow set out in Policy SP 4 and Policy SP 5. In any event, all of those Garden Communities are of a sufficient size that it would be appropriate for them to provide extensive areas of accessible natural greenspace in order to maximise their recreational self-sufficiency[61].

5.27 Note that the provision of bespoke greenspace for a given strategic development is not intended to replace the delivery of access management and related interventions within Epping Forest SAC itself, to which the Council has already committed.

5.28 It should be noted that Policy DM2 does not defer consideration of the implications of allocated sites to the planning application stage as the implications of all allocated sites are discussed in this Local Plan HRA. Rather DM2 does the following:

- Makes it clear (clause B) that developments for which European site issues exist must avoid adverse effects on integrity. This is a legal requirement anyway and also ensures that developers are aware they will need to contribute;
- Identifies (in C) those settlements where developments will need to contribute to the strategic mitigation solution for recreation being organised and delivered on their behalf by the Council.
- Notes (in D) that the Council '*will ensure the provision of a meaningful proportion of natural greenspace'*. For the four aforementioned large developments this will be primarily handed down to planning applications which is in line with Advocate-General Kokott's advice regarding the approach to tiering of appropriate assessment and mitigation in multi-stage planning; However, it also indicates that the Council will consider strategic options to which developers might contribute.

5.29 It is considered that the Epping Forest SAC Memorandum of Understanding, the Interim Mitigation Strategy and commitment to a long-term Mitigation Strategy and Policies DM 2: Epping Forest SAC and Lee Valley SPA, SP 7: The Natural Environment, Landscape Character and Green and Blue Infrastructure, Policy DM 5; Green and Blue Infrastructure, Policy DM 6: Designated and Undesignated Open Spaces, Policy DM 7: Heritage Assets, and Policy DM 10: Housing Design and Quality will provide an appropriate framework to ensure that Epping Forest SAC is

[60] Examples of site allocations within 4km of Epping Forest SAC that are to provide 400 dwellings or more are: EPP.R2 (East); 500 dwellings; and EPP.R1 (West): 450 dwellings.

[61] It is known from experience elsewhere that such mitigating greenspace, to be most effective, generally needs to be a minimum of 10ha in size not to feel unduly cramped and allow for a circular walk of at least 2.5km which, based on experience elsewhere, is likely to be ample for most people to obtain sufficient enjoyment. A given developer would not necessarily need to provide the entirety of this space themselves (for example they could provide an area of additional land that adequately enhances an existing area of greenspace), or they could facilitate delivery of a large area of greenspace elsewhere within the recreational catchment, since this could still result in a net absorption of additional visitors to the SAC.

protected from the adverse effects of new development and thus ensure no likely significant effect on the SAC would materialise in practice, either alone or in combination with other plans and projects.

Loss of Existing Green Space

5.30 It should be noted that the following site allocations (also located within 3km of Epping Forest SAC) could result in the loss of areas of existing green infrastructure that are used for recreational activities. The presence of these green areas is likely to divert a level of recreational activity away from the SAC, as such the loss of these green areas, could result in an increase in recreational pressure upon the SAC, which is then compounded by the provision of an increase in net new dwellings. The sites are as follows:

- SR-0361 (LOU.R5) which from review of aerial mapping appears to comprise existing open amenity green space (Jessel Green);
- SR-0478B (CHIG.R6) which from review of aerial mapping appears to comprise existing open amenity green space.

In Combination

5.31 All authorities that plan to deliver net new housing within 6.2km of the SAC will contribute cumulatively to an in combination recreational pressure effect without mitigation. This will certainly include the London Borough of Waltham Forest and the London Borough of Redbridge. It is the responsibility of each relevant authority to ensure that they mitigate adequately for their contribution to any adverse effect on integrity. The framework for them to do so exists via participation in the MoU and resulting recreation management strategy.

6. Appropriate Assessment: Air Quality at Epping Forest SAC

6.1 Having ascertained earlier that the forecast 'in combination' change in pollutant concentrations (the pollutant dose) will exceed 1% of the critical level for both NOx and ammonia, and that the majority of these emissions are attributable to planned growth in Epping Forest District, it is therefore necessary to undertake further investigation as an appropriate assessment.

6.2 The full data are presented in Appendix F at the rear of this report but this appropriate assessment presents a summary of:

- The difference between scenario DS2 and the 2033 Baseline (i.e. the 'in combination' effect of all housing and employment growth compared to a 2033 situation with no housing and employment growth); and
- The difference between scenario DS2 and each of DS3 to DS5 (i.e. thus identifying the role played by the various mitigation measures that have been considered).

6.3 It also places these changes within the context of the overall change between DS2 (or DS3-DS5) and the 2014 baseline (i.e. the total net change from the start of the plan period to the end, including the role played by any reductions in background concentrations or deposition rates). This is important as it is clearly relevant if one is talking about a net deteriorating situation or a net recovering one.

6.4 As set out earlier in the report the emitted pollutants of relevance to this assessment are NOx and ammonia, both of which contribute to nitrogen deposition (and thus acid deposition). Effects of NOx may arise other than through its role as a source of nitrogen including biochemical effects e.g. enzyme activity, chlorophyll content and physiological effects e.g. CO_2 assimilation or stomatal conductivity, although many of these changes may still be due to increased nitrogen rather than other effects of the gas such as acidity. However the experimental studies that have investigated such physiological and biochemical effects of NOx have used doses far in excess of those measured or forecast at Epping Forest District (hundreds, and in some cases thousands, of micrograms per cubic metre). For example, Das et al (2011)[62] recorded evidence of chlorophyll changes in lichens, also correlated with NO_x at very high concentrations (over 260 µg/m^3). These studies have also attributed the effects to the increase in available nitrogen, but at such high concentrations NO and NO_2 can also increase cellular acidity and inhibit lipid biosynthesis (Wellburn, 1990)[63]. This is reflected in WHO (2000)[64] which states that the '*general effect threshold … would be substantially higher if biomass production* [i.e. growth stimulation] *of crops is not assumed to be an adverse effect*'. In other words, the critical level for NOx is set as low as 30 µgm^{-3} largely because this is the concentration above which the nitrogen-mediated growth effects of the gas are known to occur.

6.5 Since the principal ecologically significant role of NOx is as a source of nitrogen the analysis in this chapter focusses on what effect this may have on nitrogen deposition rates, which also factors in the role of ammonia as a source of nitrogen. Focussing on nitrogen deposition rates in ecological interpretation, rather than relying on scrutiny of NOx concentrations in atmosphere, has the advantage of being habitat specific and more directly relatable to effects on the vegetation. This is because the critical level for NOx is entirely generic; in reality different habitats have varying tolerance to nitrogen. In contrast to NOx, gaseous ammonia is known to be toxic to lower plants (bryophtyes and lichens) at low concentrations, shifting the lichen assemblage from acid loving species to nitrogen loving species, hence the most stringent critical level for ammonia being set at just 1 µgm^{-3}. Therefore,

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

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

[64] WHO 2000 Air Quality Guidelines for Europe, WHO Regional Publications, European Series No. 91 ISBN 92 890 1358 3

ammonia must be considered both as a gas in atmosphere and as a source of nitrogen. The rest of this analysis therefore focusses on nitrogen deposition and ammonia.

6.6 The following policies and site allocations were deemed to potentially have likely significant effects upon Epping Forest SAC, as a result of increased air pollution.

- Policy SP 2 (Spatial Development Strategy 2011-2033). Provides for a minimum of 11,400 new homes, provision for Traveller sites and 23ha of new employment land within Epping Forest District during the Plan period.
- Policy SP 4 Development & Delivery of Garden Communities in the Harlow and Gilston Garden Town provided for through three strategic allocations within Epping Forest District during the Plan period at Latton Priory, Water Lane Area and East of Harlow. A further Garden Community is to be delivered in Gilston (in East Herts District).
- Policy SP 5 Garden Town Communities. Allocates approximately 3,900 dwellings within the three strategic sites of Latton Priory, the Water Lane Area and East of Harlow that lie within Epping Forest District during the Plan period.
- Policy E 1 Employment Sites. Provides for the retention and enhancement of existing employment sites and that redevelopment, renewal, intensification or extension of sites will be encouraged. In addition new employment sites allocations provided for through Policies SP2, SP 5 and Chapter 5.The quantum and location of new employment site allocations is set out at Table 3.1.
- All residential and employment sites in combination

6.7 The subsequent analysis summarises the large and complex dataset that has been generated by the modelling. It focusses on interpreting four future ‘with growth’ scenarios:

- Scenario DS2 (i.e. the full unmitigated in combination scenario);
- Scenario DS3 (i.e. DS2 but with the addition of the physical mitigation measures that were considered at Wake Arms Roundabout, Robin Hood Roundabout and Honey Lane);
- Scenario DS4 (i.e. DS2 but with the addition of the physical mitigation measures at Honey Lane); and
- Scenario DS5 (i.e. DS2 but with 2030 emission factors used rather than 2023 emission factors, as a proxy or sensitivity test for the non-physical mitigation measures set out in the Epping Forest Local Plan through policy T1 and others).

Scenario DS2

Nitrogen Deposition

6.8 The summary table for this scenario and scenario D5, for all links, is provided overleaf. Figure 6 and paragraphs 2.42 – 2.45 at page 22 of this report provide an explanation of the approach to colour coding as an expression of the size of the forecast nitrogen dose, and the approach to converting the dose into a number of years delay in the European site falling below the critical load for nitrogen.

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
Receptor A1									
1	A1_4m	-0.62	0.84	0.22	-2.55	-3.17	-3.39	5	1
2	A1_10m	-0.46	0.58	0.12	-2.59	-3.05	-3.17	3	1
3	A1_20m	-0.33	0.37	0.05	-2.61	-2.93	-2.98	2	0
4	A1_30m	-0.26	0.28	0.01	-2.60	-2.87	-2.88	2	0
5	A1_40m	-0.22	0.22	0.00	-2.60	-2.82	-2.82	1	0
6	A1_50m	-0.19	0.18	-0.01	-2.60	-2.79	-2.78	1	0
7	A1_60m	-0.17	0.15	-0.02	-2.59	-2.76	-2.74	1	0
8	A1_70m	-0.16	0.13	-0.02	-2.59	-2.74	-2.72	1	0
9	A1_80m	-0.15	0.12	-0.03	-2.58	-2.73	-2.70	1	0
10	A1_90m	-0.14	0.11	-0.03	-2.58	-2.71	-2.68	1	0
11	A1_100m	-0.13	0.10	-0.03	-2.57	-2.70	-2.67	1	0
12	A1_110m	-0.12	0.09	-0.03	-2.57	-2.69	-2.66	1	0
13	A1_120m	-0.11	0.08	-0.03	-2.56	-2.68	-2.65	1	0
14	A1_130m	-0.11	0.08	-0.03	-2.56	-2.67	-2.64	1	0
15	A1_140m	-0.10	0.07	-0.03	-2.56	-2.66	-2.63	1	0
16	A1_150m	-0.10	0.07	-0.03	-2.56	-2.65	-2.62	0	0
17	A1_160m	-0.09	0.06	-0.03	-2.55	-2.65	-2.62	0	0
18	A1_170m	-0.09	0.06	-0.03	-2.55	-2.64	-2.61	0	0
19	A1_180m	-0.09	0.06	-0.03	-2.55	-2.64	-2.60	0	0
20	A1_190m	-0.09	0.05	-0.03	-2.55	-2.63	-2.60	0	0
21	A1_200m	-0.08	0.05	-0.03	-2.54	-2.63	-2.59	0	0
Receptor A2									
22	A2_1m	-0.68	0.23	-0.45	-3.29	-3.96	-3.52	1	-2
23	A2_10m	-0.44	0.18	-0.27	-3.00	-3.44	-3.18	1	-2

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
24	A2_20m	-0.33	0.15	-0.18	-2.85	-3.19	-3.00	1	-1
25	A2_30m	-0.27	0.13	-0.14	-2.78	-3.05	-2.91	1	-1
26	A2_40m	-0.23	0.12	-0.11	-2.72	-2.96	-2.85	1	-1
27	A2_50m	-0.21	0.11	-0.10	-2.69	-2.90	-2.80	1	-1
28	A2_60m	-0.19	0.10	-0.08	-2.66	-2.85	-2.77	1	-1
29	A2_70m	-0.17	0.10	-0.07	-2.64	-2.82	-2.74	1	-1
30	A2_80m	-0.16	0.09	-0.07	-2.63	-2.79	-2.72	1	0
31	A2_90m	-0.15	0.09	-0.06	-2.62	-2.77	-2.71	1	0
32	A2_100m	-0.14	0.09	-0.06	-2.61	-2.75	-2.69	1	0
33	A2_110m	-0.14	0.08	-0.05	-2.60	-2.73	-2.68	1	0
34	A2_120m	-0.13	0.08	-0.05	-2.59	-2.72	-2.67	1	0
35	A2_130m	-0.12	0.08	-0.05	-2.58	-2.70	-2.66	1	0
36	A2_140m	-0.12	0.07	-0.05	-2.58	-2.70	-2.65	1	0
37	A2_150m	-0.12	0.07	-0.04	-2.57	-2.69	-2.64	1	0
38	A2_160m	-0.11	0.07	-0.04	-2.57	-2.68	-2.64	0	0
39	A2_170m	-0.11	0.07	-0.04	-2.56	-2.67	-2.63	0	0
40	A2_180m	-0.11	0.07	-0.04	-2.56	-2.66	-2.62	0	0
41	A2_190m	-0.10	0.06	-0.04	-2.56	-2.66	-2.62	0	0
42	A2_200m	-0.10	0.06	-0.04	-2.55	-2.66	-2.62	0	0
Receptor B1									
43	B1_1m	-0.71	0.93	0.23	-1.70	-2.41	-2.63	7	2
44	B1_10m	-0.42	0.48	0.06	-2.27	-2.69	-2.75	3	0
45	B1_20m	-0.32	0.33	0.00	-2.44	-2.76	-2.77	2	0
46	B1_30m	-0.28	0.26	-0.02	-2.51	-2.79	-2.77	2	0
47	B1_40m	-0.25	0.22	-0.03	-2.55	-2.80	-2.77	1	0
48	B1_50m	-0.23	0.19	-0.04	-2.57	-2.80	-2.76	1	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
49	B1_60m	-0.22	0.17	-0.05	-2.59	-2.81	-2.76	1	0
50	B1_70m	-0.21	0.16	-0.05	-2.60	-2.80	-2.75	1	0
51	B1_80m	-0.20	0.14	-0.06	-2.60	-2.80	-2.75	1	0
52	B1_90m	-0.19	0.13	-0.06	-2.61	-2.80	-2.74	1	0
53	B1_100m	-0.19	0.13	-0.06	-2.61	-2.80	-2.74	1	0
54	B1_110m	-0.18	0.12	-0.06	-2.61	-2.79	-2.73	1	0
55	B1_120m	-0.17	0.11	-0.06	-2.61	-2.79	-2.73	1	0
56	B1_130m	-0.17	0.11	-0.06	-2.61	-2.78	-2.72	1	0
57	B1_140m	-0.17	0.10	-0.06	-2.61	-2.78	-2.72	1	0
58	B1_150m	-0.16	0.10	-0.06	-2.61	-2.78	-2.71	1	0
59	B1_160m	-0.16	0.10	-0.06	-2.61	-2.77	-2.71	1	0
60	B1_170m	-0.16	0.09	-0.06	-2.61	-2.77	-2.71	1	0
61	B1_180m	-0.15	0.09	-0.06	-2.61	-2.76	-2.70	1	0
62	B1_190m	-0.15	0.09	-0.06	-2.61	-2.76	-2.70	1	0
63	B1_200m	-0.15	0.09	-0.06	-2.61	-2.76	-2.69	1	0
Receptor B2									
64	B2_1m	-0.58	0.08	-0.50	-2.45	-3.03	-2.53	1	-4
65	B2_10m	-0.33	0.09	-0.25	-2.55	-2.88	-2.63	1	-2
66	B2_20m	-0.25	0.09	-0.16	-2.56	-2.80	-2.65	1	-1
67	B2_30m	-0.21	0.09	-0.11	-2.55	-2.76	-2.65	1	-1
68	B2_40m	-0.18	0.09	-0.09	-2.55	-2.74	-2.65	1	-1
69	B2_50m	-0.17	0.09	-0.07	-2.55	-2.72	-2.65	1	-1
70	B2_60m	-0.16	0.10	-0.06	-2.55	-2.71	-2.65	1	0
71	B2_70m	-0.15	0.10	-0.05	-2.55	-2.70	-2.65	1	0
72	B2_80m	-0.15	0.10	-0.05	-2.55	-2.69	-2.65	1	0
73	B2_90m	-0.14	0.10	-0.04	-2.55	-2.69	-2.65	1	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
74	B2_100m	-0.14	0.10	-0.04	-2.55	-2.69	-2.65	1	0
75	B2_110m	-0.14	0.10	-0.04	-2.55	-2.69	-2.65	1	0
76	B2_120m	-0.14	0.10	-0.03	-2.55	-2.69	-2.65	1	0
77	B2_130m	-0.14	0.11	-0.03	-2.55	-2.69	-2.66	1	0
78	B2_140m	-0.14	0.11	-0.03	-2.55	-2.69	-2.66	1	0
79	B2_150m	-0.14	0.11	-0.03	-2.55	-2.70	-2.67	1	0
80	B2_160m	-0.14	0.11	-0.03	-2.56	-2.70	-2.67	1	0
81	B2_170m	-0.15	0.12	-0.03	-2.56	-2.70	-2.68	1	0
82	B2_180m	-0.15	0.12	-0.03	-2.56	-2.71	-2.68	1	0
83	B2_190m	-0.15	0.13	-0.03	-2.56	-2.72	-2.69	1	0
84	B2_200m	-0.16	0.13	-0.03	-2.57	-2.73	-2.70	1	0
Receptor C1									
85	C1_1m	-1.33	1.26	-0.07	-3.40	-4.73	-4.66	5	0
86	C1_10m	-0.83	0.66	-0.17	-3.18	-4.01	-3.84	3	-1
87	C1_20m	-0.60	0.43	-0.17	-3.04	-3.64	-3.47	2	-1
88	C1_30m	-0.48	0.33	-0.15	-2.95	-3.43	-3.28	2	-1
89	C1_40m	-0.41	0.27	-0.14	-2.89	-3.30	-3.16	2	-1
90	C1_50m	-0.36	0.23	-0.13	-2.85	-3.21	-3.08	1	-1
91	C1_60m	-0.33	0.20	-0.12	-2.82	-3.14	-3.02	1	-1
92	C1_70m	-0.30	0.18	-0.12	-2.79	-3.09	-2.97	1	-1
93	C1_80m	-0.28	0.16	-0.11	-2.77	-3.04	-2.93	1	-1
94	C1_90m	-0.26	0.15	-0.11	-2.75	-3.00	-2.90	1	-1
95	C1_100m	-0.24	0.14	-0.10	-2.73	-2.97	-2.87	1	-1
96	C1_110m	-0.23	0.13	-0.10	-2.72	-2.94	-2.85	1	-1
97	C1_120m	-0.22	0.12	-0.09	-2.70	-2.92	-2.82	1	-1
98	C1_130m	-0.21	0.12	-0.09	-2.69	-2.90	-2.81	1	-1

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
99	C1_140m	-0.20	0.11	-0.09	-2.68	-2.88	-2.79	1	-1
100	C1_150m	-0.19	0.11	-0.08	-2.67	-2.86	-2.77	1	-1
101	C1_160m	-0.18	0.10	-0.08	-2.66	-2.84	-2.76	1	-1
102	C1_170m	-0.18	0.10	-0.08	-2.65	-2.83	-2.75	1	-1
103	C1_180m	-0.17	0.09	-0.08	-2.64	-2.81	-2.74	1	-1
104	C1_190m	-0.17	0.09	-0.07	-2.63	-2.80	-2.72	1	-1
105	C1_200m	-0.16	0.09	-0.07	-2.63	-2.79	-2.71	1	-1
Receptor C2									
106	C2_1m	-0.81	0.69	-0.11	-1.97	-2.78	-2.66	5	-1
107	C2_10m	-0.40	0.28	-0.11	-2.47	-2.87	-2.76	2	-1
108	C2_20m	-0.26	0.17	-0.10	-2.57	-2.83	-2.73	1	-1
109	C2_30m	-0.20	0.12	-0.08	-2.59	-2.79	-2.70	1	-1
110	C2_40m	-0.17	0.09	-0.08	-2.59	-2.75	-2.68	1	-1
111	C2_50m	-0.14	0.08	-0.07	-2.58	-2.73	-2.66	1	0
112	C2_60m	-0.13	0.07	-0.06	-2.58	-2.70	-2.64	0	0
113	C2_70m	-0.12	0.06	-0.06	-2.57	-2.69	-2.63	0	0
114	C2_80m	-0.11	0.05	-0.05	-2.56	-2.67	-2.62	0	0
115	C2_90m	-0.10	0.05	-0.05	-2.56	-2.66	-2.61	0	0
116	C2_100m	-0.09	0.05	-0.05	-2.55	-2.65	-2.60	0	0
117	C2_110m	-0.09	0.04	-0.05	-2.55	-2.64	-2.59	0	0
118	C2_120m	-0.09	0.04	-0.05	-2.54	-2.63	-2.59	0	0
119	C2_130m	-0.08	0.04	-0.04	-2.54	-2.62	-2.58	0	0
120	C2_140m	-0.08	0.04	-0.04	-2.54	-2.62	-2.58	0	0
121	C2_150m	-0.08	0.04	-0.04	-2.54	-2.61	-2.57	0	0
122	C2_160m	-0.08	0.04	-0.04	-2.53	-2.61	-2.57	0	0
123	C2_170m	-0.07	0.03	-0.04	-2.53	-2.61	-2.57	0	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
124	C2_180m	-0.07	0.03	-0.04	-2.53	-2.60	-2.56	0	0
125	C2_190m	-0.07	0.03	-0.04	-2.53	-2.60	-2.56	0	0
126	C2_200m	-0.07	0.03	-0.04	-2.53	-2.60	-2.56	0	0
Receptor D1									
127	D1_1m	-0.75	0.85	0.10	-1.94	-2.70	-2.79	6	1
128	D1_10m	-0.39	0.37	-0.02	-2.36	-2.75	-2.72	3	0
129	D1_20m	-0.27	0.22	-0.04	-2.46	-2.72	-2.68	2	0
130	D1_30m	-0.21	0.16	-0.05	-2.50	-2.70	-2.66	1	0
131	D1_40m	-0.17	0.12	-0.05	-2.52	-2.69	-2.64	1	0
132	D1_50m	-0.15	0.10	-0.05	-2.53	-2.68	-2.63	1	0
133	D1_60m	-0.14	0.09	-0.05	-2.54	-2.67	-2.62	1	0
134	D1_70m	-0.13	0.07	-0.05	-2.54	-2.67	-2.62	1	0
135	D1_80m	-0.12	0.07	-0.05	-2.55	-2.67	-2.62	0	0
136	D1_90m	-0.11	0.06	-0.05	-2.55	-2.66	-2.61	0	0
137	D1_100m	-0.11	0.06	-0.05	-2.56	-2.66	-2.61	0	0
138	D1_110m	-0.10	0.05	-0.05	-2.56	-2.66	-2.61	0	0
139	D1_120m	-0.10	0.05	-0.05	-2.56	-2.66	-2.61	0	0
140	D1_130m	-0.10	0.04	-0.05	-2.57	-2.66	-2.61	0	0
141	D1_140m	-0.10	0.04	-0.05	-2.57	-2.67	-2.61	0	0
142	D1_150m	-0.10	0.04	-0.06	-2.57	-2.67	-2.61	0	0
143	D1_160m	-0.10	0.04	-0.06	-2.58	-2.67	-2.62	0	0
144	D1_170m	-0.09	0.04	-0.06	-2.58	-2.68	-2.62	0	0
145	D1_180m	-0.10	0.04	-0.06	-2.59	-2.68	-2.62	0	0
146	D1_190m	-0.10	0.04	-0.06	-2.59	-2.69	-2.63	0	0
147	D1_200m	-0.10	0.03	-0.06	-2.60	-2.69	-2.63	0	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
Receptor D2									
148	D2_1m	-0.80	0.88	0.09	-2.15	-2.94	-3.03	6	1
149	D2_10m	-0.47	0.42	-0.04	-2.47	-2.94	-2.90	3	0
150	D2_20m	-0.33	0.26	-0.07	-2.55	-2.87	-2.80	2	0
151	D2_30m	-0.26	0.18	-0.08	-2.57	-2.82	-2.75	1	-1
152	D2_40m	-0.21	0.14	-0.08	-2.57	-2.79	-2.71	1	-1
153	D2_50m	-0.18	0.11	-0.07	-2.57	-2.76	-2.68	1	-1
154	D2_60m	-0.16	0.09	-0.07	-2.57	-2.73	-2.66	1	0
155	D2_70m	-0.15	0.08	-0.07	-2.57	-2.71	-2.65	1	0
156	D2_80m	-0.14	0.07	-0.06	-2.56	-2.70	-2.64	1	0
157	D2_90m	-0.13	0.06	-0.06	-2.56	-2.68	-2.62	0	0
158	D2_100m	-0.12	0.06	-0.06	-2.56	-2.67	-2.62	0	0
159	D2_110m	-0.11	0.06	-0.06	-2.55	-2.66	-2.61	0	0
160	D2_120m	-0.10	0.05	-0.05	-2.55	-2.65	-2.60	0	0
161	D2_130m	-0.10	0.05	-0.05	-2.55	-2.65	-2.60	0	0
162	D2_140m	-0.09	0.05	-0.05	-2.54	-2.64	-2.59	0	0
163	D2_150m	-0.09	0.04	-0.05	-2.54	-2.63	-2.58	0	0
164	D2_160m	-0.09	0.04	-0.05	-2.54	-2.63	-2.58	0	0
165	D2_170m	-0.08	0.04	-0.04	-2.54	-2.62	-2.58	0	0
166	D2_180m	-0.08	0.04	-0.04	-2.53	-2.62	-2.57	0	0
167	D2_190m	-0.08	0.04	-0.04	-2.53	-2.61	-2.57	0	0
168	D2_200m	-0.08	0.04	-0.04	-2.53	-2.61	-2.57	0	0
Receptor E1									
169	E1_1m	-0.73	0.10	-0.63	-3.64	-4.36	-3.73	0	-3
170	E1_10m	-0.43	0.06	-0.37	-3.21	-3.65	-3.28	0	-2
171	E1_20m	-0.31	0.05	-0.26	-3.01	-3.32	-3.06	0	-2

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
172	E1_30m	-0.24	0.04	-0.20	-2.89	-3.13	-2.94	0	-1
173	E1_40m	-0.20	0.04	-0.16	-2.82	-3.02	-2.86	0	-1
174	E1_50m	-0.17	0.04	-0.13	-2.76	-2.93	-2.80	0	-1
175	E1_60m	-0.15	0.03	-0.12	-2.73	-2.87	-2.76	0	-1
176	E1_70m	-0.13	0.03	-0.10	-2.69	-2.83	-2.72	0	-1
177	E1_80m	-0.12	0.03	-0.09	-2.67	-2.79	-2.70	0	-1
178	E1_90m	-0.11	0.03	-0.08	-2.65	-2.76	-2.68	0	-1
179	E1_100m	-0.10	0.03	-0.08	-2.63	-2.73	-2.66	0	-1
180	E1_110m	-0.10	0.03	-0.07	-2.61	-2.71	-2.64	0	0
181	E1_120m	-0.09	0.03	-0.06	-2.60	-2.69	-2.63	0	0
182	E1_130m	-0.09	0.03	-0.06	-2.59	-2.68	-2.62	0	0
183	E1_140m	-0.08	0.03	-0.06	-2.58	-2.66	-2.61	0	0
184	E1_150m	-0.08	0.03	-0.05	-2.57	-2.65	-2.60	0	0
185	E1_160m	-0.08	0.03	-0.05	-2.57	-2.64	-2.59	0	0
186	E1_170m	-0.07	0.03	-0.05	-2.56	-2.63	-2.59	0	0
187	E1_180m	-0.07	0.02	-0.05	-2.56	-2.63	-2.58	0	0
188	E1_190m	-0.07	0.03	-0.04	-2.55	-2.62	-2.57	0	0
189	E1_200m	-0.07	0.03	-0.04	-2.55	-2.61	-2.57	0	0
Receptor E2									
190	E2_1m	-1.04	0.16	-0.88	-4.04	-5.08	-4.19	1	-4
191	E2_10m	-0.61	0.11	-0.50	-3.46	-4.06	-3.56	1	-3
192	E2_20m	-0.43	0.09	-0.34	-3.19	-3.62	-3.28	1	-2
193	E2_30m	-0.34	0.08	-0.26	-3.04	-3.38	-3.12	0	-2
194	E2_40m	-0.28	0.07	-0.21	-2.95	-3.23	-3.02	0	-1
195	E2_50m	-0.24	0.06	-0.18	-2.88	-3.12	-2.94	0	-1
196	E2_60m	-0.21	0.06	-0.16	-2.83	-3.04	-2.89	0	-1

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
197	E2_70m	-0.19	0.05	-0.14	-2.79	-2.98	-2.84	0	-1
198	E2_80m	-0.18	0.05	-0.12	-2.75	-2.93	-2.81	0	-1
199	E2_90m	-0.16	0.05	-0.11	-2.73	-2.89	-2.78	0	-1
200	E2_100m	-0.15	0.05	-0.10	-2.70	-2.85	-2.75	0	-1
201	E2_110m	-0.14	0.04	-0.09	-2.69	-2.82	-2.73	0	-1
202	E2_120m	-0.13	0.04	-0.09	-2.67	-2.80	-2.71	0	-1
203	E2_130m	-0.12	0.04	-0.08	-2.65	-2.78	-2.69	0	-1
204	E2_140m	-0.12	0.04	-0.08	-2.64	-2.76	-2.68	0	-1
205	E2_150m	-0.11	0.04	-0.07	-2.63	-2.74	-2.67	0	-1
206	E2_160m	-0.10	0.04	-0.07	-2.62	-2.72	-2.66	0	0
207	E2_170m	-0.10	0.04	-0.06	-2.61	-2.71	-2.65	0	0
208	E2_180m	-0.10	0.03	-0.06	-2.60	-2.70	-2.64	0	0
209	E2_190m	-0.09	0.03	-0.06	-2.60	-2.69	-2.63	0	0
210	E2_200m	-0.09	0.03	-0.06	-2.59	-2.68	-2.62	0	0
Receptor H									
211	H_0m	-0.56	0.62	0.06	-2.60	-3.15	-3.22	4	0
212	H_5m	-0.34	0.36	0.02	-2.57	-2.92	-2.94	2	0
213	H_10m	-0.25	0.26	0.01	-2.55	-2.80	-2.81	2	0
214	H_15m	-0.20	0.21	0.01	-2.53	-2.73	-2.74	1	0
215	H_20m	-0.17	0.18	0.01	-2.51	-2.68	-2.69	1	0
216	H_30m	-0.13	0.14	0.01	-2.49	-2.62	-2.63	1	0
217	H_40m	-0.11	0.12	0.01	-2.48	-2.58	-2.60	1	0
218	H_50m	-0.09	0.11	0.02	-2.47	-2.56	-2.57	1	0
219	H_60m	-0.08	0.10	0.02	-2.46	-2.54	-2.56	1	0
220	H_70m	-0.07	0.09	0.02	-2.45	-2.52	-2.55	1	0
221	H_80m	-0.07	0.09	0.02	-2.45	-2.51	-2.54	1	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
222	H_90m	-0.06	0.09	0.03	-2.44	-2.50	-2.53	1	0
223	H_100m	-0.06	0.09	0.03	-2.44	-2.50	-2.52	1	0
224	H_125m	-0.05	0.09	0.04	-2.42	-2.48	-2.51	1	0
225	H_150m	-0.05	0.09	0.04	-2.41	-2.46	-2.51	1	0
226	H_175m	-0.05	0.10	0.05	-2.40	-2.45	-2.50	1	0
227	H_200m	-0.05	0.11	0.06	-2.39	-2.44	-2.50	1	0
Receptor I									
228	I_1m	-0.98	0.88	-0.11	-2.81	-3.79	-3.69	5	-1
229	I_6m	-0.73	0.64	-0.10	-2.68	-3.41	-3.32	4	-1
230	I_11m	-0.59	0.50	-0.09	-2.63	-3.22	-3.13	3	-1
231	I_16m	-0.49	0.42	-0.08	-2.60	-3.10	-3.02	3	0
232	I_21m	-0.42	0.36	-0.07	-2.58	-3.01	-2.94	2	0
233	I_31m	-0.33	0.29	-0.05	-2.56	-2.89	-2.84	2	0
234	I_41m	-0.28	0.24	-0.03	-2.54	-2.81	-2.78	2	0
235	I_51m	-0.24	0.22	-0.02	-2.52	-2.76	-2.74	2	0
236	I_61m	-0.21	0.20	-0.01	-2.51	-2.72	-2.71	1	0
237	I_71m	-0.19	0.18	-0.01	-2.50	-2.69	-2.68	1	0
238	I_81m	-0.17	0.17	0.00	-2.49	-2.66	-2.66	1	0
239	I_91m	-0.15	0.15	0.00	-2.49	-2.64	-2.64	1	0
240	I_101m	-0.14	0.15	0.00	-2.48	-2.62	-2.63	1	0
241	I_126m	-0.12	0.12	0.01	-2.47	-2.59	-2.60	1	0
242	I_151m	-0.10	0.11	0.01	-2.47	-2.57	-2.58	1	0
243	I_176m	-0.09	0.10	0.01	-2.47	-2.55	-2.56	1	0
244	I_201m	-0.08	0.09	0.01	-2.46	-2.54	-2.55	1	0
Receptor J									

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
245	J_0m	-0.18	0.11	-0.07	-2.62	-2.81	-2.74	1	0
246	J_5m	-0.14	0.10	-0.04	-2.57	-2.70	-2.66	1	0
247	J_10m	-0.12	0.09	-0.03	-2.54	-2.65	-2.63	1	0
248	J_15m	-0.10	0.08	-0.02	-2.52	-2.62	-2.60	1	0
249	J_20m	-0.09	0.08	-0.01	-2.51	-2.60	-2.59	1	0
250	J_30m	-0.08	0.07	-0.01	-2.49	-2.57	-2.57	1	0
251	J_40m	-0.07	0.07	0.00	-2.48	-2.56	-2.55	1	0
252	J_50m	-0.07	0.07	0.00	-2.48	-2.55	-2.55	1	0
253	J_60m	-0.07	0.07	0.00	-2.47	-2.54	-2.54	0	0
254	J_70m	-0.06	0.06	0.00	-2.47	-2.54	-2.54	0	0
255	J_80m	-0.06	0.06	0.00	-2.47	-2.53	-2.53	0	0
256	J_90m	-0.06	0.06	0.00	-2.47	-2.53	-2.53	0	0
257	J_100m	-0.06	0.06	0.00	-2.47	-2.52	-2.53	0	0
258	J_125m	-0.05	0.06	0.00	-2.46	-2.52	-2.52	0	0
259	J_150m	-0.05	0.05	0.00	-2.46	-2.51	-2.52	0	0
260	J_175m	-0.05	0.05	0.00	-2.46	-2.51	-2.51	0	0
261	J_200m	-0.05	0.05	0.00	-2.46	-2.51	-2.51	0	0
Receptor K									
262	K_0m	-0.57	0.99	0.42	-2.19	-2.76	-3.18	6	3
263	K_5m	-0.35	0.56	0.22	-2.34	-2.69	-2.90	4	1
264	K_10m	-0.25	0.39	0.14	-2.39	-2.64	-2.78	3	1
265	K_15m	-0.20	0.30	0.10	-2.41	-2.61	-2.71	2	1
266	K_20m	-0.16	0.24	0.08	-2.42	-2.59	-2.66	2	1
267	K_30m	-0.12	0.17	0.05	-2.44	-2.56	-2.61	1	0
268	K_40m	-0.10	0.13	0.04	-2.45	-2.54	-2.58	1	0
269	K_50m	-0.08	0.11	0.03	-2.45	-2.53	-2.56	1	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
270	K_60m	-0.07	0.09	0.02	-2.45	-2.52	-2.54	1	0
271	K_70m	-0.06	0.08	0.02	-2.45	-2.51	-2.53	1	0
272	K_80m	-0.05	0.07	0.01	-2.45	-2.51	-2.52	0	0
273	K_90m	-0.05	0.06	0.01	-2.45	-2.50	-2.51	0	0
274	K_100m	-0.04	0.05	0.01	-2.45	-2.50	-2.51	0	0
275	K_125m	-0.03	0.04	0.01	-2.46	-2.49	-2.49	0	0
276	K_150m	-0.03	0.03	0.00	-2.46	-2.48	-2.49	0	0
277	K_175m	-0.03	0.03	0.00	-2.46	-2.48	-2.48	0	0
278	K_200m	-0.02	0.02	0.00	-2.46	-2.48	-2.48	0	0
Receptor L									
279	L_0m	-0.23	0.71	0.47	-1.93	-2.17	-2.64	5	3
280	L_5m	-0.15	0.41	0.26	-2.17	-2.32	-2.58	3	2
281	L_10m	-0.11	0.29	0.18	-2.26	-2.37	-2.55	2	1
282	L_15m	-0.10	0.23	0.13	-2.31	-2.40	-2.54	2	1
283	L_20m	-0.08	0.19	0.11	-2.34	-2.42	-2.53	1	1
284	L_30m	-0.07	0.14	0.07	-2.38	-2.44	-2.52	1	1
285	L_40m	-0.06	0.11	0.05	-2.40	-2.46	-2.51	1	0
286	L_50m	-0.05	0.10	0.04	-2.41	-2.46	-2.51	1	0
287	L_60m	-0.05	0.08	0.03	-2.42	-2.47	-2.50	1	0
288	L_70m	-0.04	0.07	0.03	-2.43	-2.47	-2.50	1	0
289	L_80m	-0.04	0.06	0.02	-2.43	-2.47	-2.49	0	0
290	L_90m	-0.04	0.06	0.02	-2.43	-2.47	-2.49	0	0
291	L_100m	-0.04	0.05	0.02	-2.44	-2.47	-2.49	0	0
292	L_125m	-0.03	0.04	0.01	-2.44	-2.47	-2.49	0	0
293	L_150m	-0.03	0.04	0.01	-2.45	-2.47	-2.48	0	0
294	L_175m	-0.03	0.03	0.01	-2.45	-2.47	-2.48	0	0

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
295	L_200m	-0.02	0.03	0.00	-2.45	-2.47	-2.48	0	0
Receptor M									
296	M_0m	-0.10	0.32	0.22	-2.20	-2.29	-2.52	2	2
297	M_5m	-0.07	0.20	0.13	-2.30	-2.37	-2.50	1	1
298	M_10m	-0.05	0.14	0.09	-2.35	-2.40	-2.49	1	1
299	M_15m	-0.04	0.11	0.07	-2.37	-2.42	-2.48	1	1
300	M_20m	-0.04	0.09	0.05	-2.39	-2.43	-2.48	1	0
301	M_30m	-0.03	0.07	0.04	-2.41	-2.44	-2.48	1	0
302	M_40m	-0.03	0.06	0.03	-2.42	-2.44	-2.47	0	0
303	M_50m	-0.03	0.05	0.02	-2.42	-2.45	-2.47	0	0
304	M_60m	-0.02	0.04	0.02	-2.43	-2.45	-2.47	0	0
305	M_70m	-0.02	0.04	0.02	-2.43	-2.45	-2.47	0	0
306	M_80m	-0.02	0.04	0.02	-2.43	-2.45	-2.47	0	0
307	M_90m	-0.02	0.03	0.01	-2.44	-2.46	-2.47	0	0
308	M_100m	-0.02	0.03	0.01	-2.44	-2.46	-2.47	0	0
309	M_125m	-0.02	0.03	0.01	-2.44	-2.46	-2.47	0	0
310	M_150m	-0.02	0.02	0.01	-2.44	-2.46	-2.47	0	0
311	M_175m	-0.02	0.02	0.00	-2.44	-2.46	-2.46	0	0
312	M_200m	-0.01	0.02	0.00	-2.45	-2.46	-2.46	0	0
Receptor N									
313	N_0m	-0.36	1.42	1.06	-1.24	-1.60	-2.65	10	8
314	N_5m	-0.31	1.20	0.89	-1.42	-1.73	-2.62	9	6
315	N_10m	-0.27	1.04	0.77	-1.56	-1.83	-2.60	8	6
316	N_15m	-0.24	0.92	0.68	-1.66	-1.90	-2.58	7	5
317	N_20m	-0.22	0.83	0.61	-1.75	-1.96	-2.57	6	4

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
318	N_30m	-0.18	0.68	0.50	-1.87	-2.05	-2.55	5	4
319	N_40m	-0.16	0.58	0.42	-1.96	-2.12	-2.54	4	3
320	N_50m	-0.14	0.50	0.36	-2.03	-2.16	-2.53	4	3
321	N_60m	-0.12	0.44	0.32	-2.08	-2.20	-2.52	3	2
322	N_70m	-0.11	0.40	0.28	-2.12	-2.23	-2.51	3	2
323	N_80m	-0.10	0.36	0.26	-2.15	-2.25	-2.51	3	2
324	N_90m	-0.09	0.33	0.23	-2.18	-2.27	-2.50	2	2
325	N_100m	-0.09	0.30	0.22	-2.20	-2.29	-2.50	2	2
326	N_125m	-0.08	0.26	0.18	-2.24	-2.31	-2.50	2	1
327	N_150m	-0.07	0.22	0.16	-2.27	-2.34	-2.49	2	1
328	N_175m	-0.06	0.18	0.12	-2.31	-2.37	-2.49	1	1
329	N_200m	-0.05	0.13	0.08	-2.35	-2.40	-2.48	1	1
Receptor O									
330	O_2.5m	-1.05	0.35	-0.70	-2.69	-3.74	-3.04	2	-4
331	O_7.5m	-0.80	0.37	-0.43	-2.70	-3.50	-3.07	2	-3
332	O_12.5m	-0.65	0.39	-0.27	-2.66	-3.31	-3.04	2	-2
333	O_17.5m	-0.56	0.40	-0.15	-2.60	-3.16	-3.01	3	-1
334	O_22.5m	-0.49	0.42	-0.07	-2.55	-3.04	-2.97	3	0
335	O_32.5m	-0.40	0.44	0.04	-2.46	-2.87	-2.90	3	0
336	O_42.5m	-0.34	0.45	0.11	-2.40	-2.75	-2.85	3	1
337	O_52.5m	-0.30	0.45	0.14	-2.37	-2.67	-2.81	3	1
338	O_62.5m	-0.27	0.44	0.17	-2.34	-2.61	-2.78	3	1
339	O_72.5m	-0.24	0.42	0.18	-2.33	-2.58	-2.75	3	1
340	O_82.5m	-0.22	0.41	0.18	-2.32	-2.55	-2.73	3	1
341	O_92.5m	-0.21	0.39	0.19	-2.31	-2.52	-2.71	3	1
342	O_102.5m	-0.19	0.38	0.19	-2.31	-2.50	-2.69	3	1

Lookup ID	Distance from road	DS2-DS5 (effect of mitigation)	DS2-future baseline (effect of growth without mitigation)	DS5-future baseline (effect of growth with mitigation)	DS2-2014 Baseline (net change 2014-2033 excluding mitigation)	DS5-2014 Baseline (net change 2014-2033 including mitigation)	Improvement to 2033 in the absence of growth (2033 Baseline - 2014 baseline)	Years delay in site falling below critical load - unmitigated	Years delay in site falling below critical load - mitigated
343	O_127.5m	-0.16	0.35	0.19	-2.30	-2.46	-2.65	3	1
344	O_152.5m	-0.14	0.33	0.18	-2.29	-2.43	-2.62	2	1
345	O_177.5m	-0.13	0.31	0.18	-2.29	-2.42	-2.60	2	1
346	O_202.5m	-0.12	0.29	0.17	-2.29	-2.41	-2.58	2	1
Receptor P									
347	P_1m	-1.41	0.63	-0.78	-3.92	-5.33	-4.55	3	-3
348	P_6m	-1.15	0.50	-0.66	-3.66	-4.82	-4.16	2	-3
349	P_11m	-0.99	0.42	-0.57	-3.52	-4.51	-3.94	2	-3
350	P_16m	-0.88	0.37	-0.51	-3.41	-4.29	-3.79	2	-3
351	P_21m	-0.80	0.34	-0.46	-3.33	-4.13	-3.67	2	-2
352	P_31m	-0.67	0.29	-0.38	-3.21	-3.88	-3.50	2	-2
353	P_41m	-0.58	0.26	-0.32	-3.12	-3.70	-3.38	1	-2
354	P_51m	-0.51	0.24	-0.27	-3.05	-3.56	-3.29	1	-2
355	P_61m	-0.46	0.22	-0.24	-2.99	-3.44	-3.21	1	-1
356	P_71m	-0.41	0.21	-0.21	-2.94	-3.35	-3.14	1	-1
357	P_81m	-0.38	0.19	-0.18	-2.90	-3.27	-3.09	1	-1
358	P_91m	-0.35	0.18	-0.17	-2.86	-3.21	-3.04	1	-1
359	P_101m	-0.32	0.17	-0.15	-2.83	-3.15	-3.00	1	-1
360	P_126m	-0.27	0.15	-0.12	-2.76	-3.03	-2.91	1	-1
361	P_151m	-0.24	0.13	-0.10	-2.71	-2.95	-2.85	1	-1
362	P_176m	-0.21	0.12	-0.09	-2.68	-2.89	-2.80	1	-1
363	P_201m	-0.19	0.11	-0.08	-2.65	-2.84	-2.76	1	-1

6.9 From the summary table it can be seen that:

- For all modelled transects there is forecast to be a large net reduction in nitrogen deposition by 2033 (represented by the difference between DS2 and the 2014 Baseline) even taking all forecast traffic growth into account and using the precautionary approach taken to allowing for improvements in background concentrations and vehicle emission factors This ranges from a reduction of 4.04 kgN/ha/yr at the closest point of Receptor E2 to the road, to a reduction of 1.24 kgN/ha/yr at the closest point of receptor N to the road.
- Therefore growth 'in combination' (which is dominated by growth in Epping Forest District between 2014 and 2033) does not make the air quality situation worse but rather delays the date at which the European site would be forecast to fall below the critical load.
- The most common patterns for the 'in combination' nitrogen dose are either for growth in combination to cause a 'medium' dose within 5m of the roadside, with a 'small' nitrogen dose up to 10-40m from the roadside (receptors A1, B1, C2, D1, D2, H, I, K, L and P) or for growth in combination to cause a small to negligible dose throughout the transect (receptors A2, B2, E1, E2, J, M and O). The exceptions to these patterns are transect C1, where a large nitrogen dose is forecast at the roadside which rapidly falls to medium by 10m from the road and small or negligible thereafter, and transect N where a large dose is forecast within 10m of the roadside, with a medium dose between 10m and 50m and a small dose thereafter.
- Expressed as a number of years delay in the European site falling below the critical load, these doses typically represent:
  - a 3-7 year delay (most commonly 5-6 years) in reduction of nitrogen deposition at the roadside for transects A1, B1, C1, C2, D1, D2, H, I, K, L and P, falling to a 1-3 year delay 20-40m from the roadside
  - an 8-10 year delay within 10m of the roadside for receptor N, with a 4-7 year delay up to 50m from the roadside; and
  - a negligible 1-2 year delay at the roadside for all other transects, compared to a situation with no growth. Remember that to be cautious the modelling has taken the Defra projections for shifts in the vehicle fleet to 2023 and applied them to 2033, essentially holding back the changes 10 years behind Defra forecasts.

6.10 Even though there is no forecast net deterioration in nitrogen deposition rates, the fact that all development in combination would typically delay the forecast reduction in nitrogen deposition rates that would otherwise occur by the equivalent of c. 5 years up to 5m from the roadside (worst case 10 years) and 3 years up to 20m from the roadside (worst case 7 years) across a range of locations is deemed as a precaution to constitute an adverse effect on the integrity of the SAC (i.e. the ability of the SAC to achieve its conservation objectives). Therefore mitigation to reduce this dose, and therefore reduce or remove the delay in the site falling below the critical load for nitrogen deposition, is required.

Ammonia

6.11 Note that this relates solely to the concentration of the gas in atmosphere, its role in nitrogen deposition has already been discussed. The summary table is provided below. In this case the table is simpler than for nitrogen deposition as there is no forecast improving trend and the data for scenarios DS2 and DS5 are identical.

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
Receptor A1		
1	A1_4m	0.12
2	A1_10m	0.08

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
3	A1_20m	0.05
4	A1_30m	0.04
5	A1_40m	0.03
6	A1_50m	0.02
7	A1_60m	0.02
8	A1_70m	0.02
9	A1_80m	0.02
10	A1_90m	0.01
11	A1_100m	0.01
12	A1_110m	0.01
13	A1_120m	0.01
14	A1_130m	0.01
15	A1_140m	0.01
16	A1_150m	0.01
17	A1_160m	0.01
18	A1_170m	0.01
19	A1_180m	0.01
20	A1_190m	0.01
21	A1_200m	0.01
Receptor A2		
22	A2_1m	0.05
23	A2_10m	0.03
24	A2_20m	0.02
25	A2_30m	0.02
26	A2_40m	0.02
27	A2_50m	0.02
28	A2_60m	0.02
29	A2_70m	0.01
30	A2_80m	0.01
31	A2_90m	0.01
32	A2_100m	0.01
33	A2_110m	0.01
34	A2_120m	0.01
35	A2_130m	0.01
36	A2_140m	0.01
37	A2_150m	0.01
38	A2_160m	0.01
39	A2_170m	0.01
40	A2_180m	0.01
41	A2_190m	0.01

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
42	A2_200m	0.01
Receptor B1		
43	B1_1m	0.12
44	B1_10m	0.06
45	B1_20m	0.04
46	B1_30m	0.03
47	B1_40m	0.03
48	B1_50m	0.02
49	B1_60m	0.02
50	B1_70m	0.02
51	B1_80m	0.02
52	B1_90m	0.02
53	B1_100m	0.02
54	B1_110m	0.02
55	B1_120m	0.02
56	B1_130m	0.01
57	B1_140m	0.01
58	B1_150m	0.01
59	B1_160m	0.01
60	B1_170m	0.01
61	B1_180m	0.01
62	B1_190m	0.01
63	B1_200m	0.01
Receptor B2		
64	B2_1m	0.02
65	B2_10m	0.01
66	B2_20m	0.01
67	B2_30m	0.01
68	B2_40m	0.01
69	B2_50m	0.01
70	B2_60m	0.01
71	B2_70m	0.01
72	B2_80m	0.01
73	B2_90m	0.01
74	B2_100m	0.01
75	B2_110m	0.01
76	B2_120m	0.01
77	B2_130m	0.01
78	B2_140m	0.01

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
79	B2_150m	0.01
80	B2_160m	0.02
81	B2_170m	0.02
82	B2_180m	0.02
83	B2_190m	0.02
84	B2_200m	0.02
Receptor C1		
85	C1_1m	0.21
86	C1_10m	0.10
87	C1_20m	0.06
88	C1_30m	0.05
89	C1_40m	0.04
90	C1_50m	0.03
91	C1_60m	0.03
92	C1_70m	0.02
93	C1_80m	0.02
94	C1_90m	0.02
95	C1_100m	0.02
96	C1_110m	0.02
97	C1_120m	0.02
98	C1_130m	0.02
99	C1_140m	0.02
100	C1_150m	0.01
101	C1_160m	0.01
102	C1_170m	0.01
103	C1_180m	0.01
104	C1_190m	0.01
105	C1_200m	0.01
Receptor C2		
106	C2_1m	0.10
107	C2_10m	0.04
108	C2_20m	0.02
109	C2_30m	0.02
110	C2_40m	0.01
111	C2_50m	0.01
112	C2_60m	0.01
113	C2_70m	0.01
114	C2_80m	0.01
115	C2_90m	0.01

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
116	C2_100m	0.01
117	C2_110m	0.01
118	C2_120m	0.01
119	C2_130m	0.01
120	C2_140m	0.01
121	C2_150m	0.01
122	C2_160m	0.00
123	C2_170m	0.00
124	C2_180m	0.00
125	C2_190m	0.00
126	C2_200m	0.00
Receptor D1		
127	D1_1m	0.12
128	D1_10m	0.05
129	D1_20m	0.03
130	D1_30m	0.02
131	D1_40m	0.02
132	D1_50m	0.01
133	D1_60m	0.01
134	D1_70m	0.01
135	D1_80m	0.01
136	D1_90m	0.01
137	D1_100m	0.01
138	D1_110m	0.01
139	D1_120m	0.01
140	D1_130m	0.01
141	D1_140m	0.01
142	D1_150m	0.01
143	D1_160m	0.01
144	D1_170m	0.01
145	D1_180m	0.01
146	D1_190m	0.01
147	D1_200m	0.01
Receptor D2		
148	D2_1m	0.13
149	D2_10m	0.06
150	D2_20m	0.04
151	D2_30m	0.02
152	D2_40m	0.02

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
153	D2_50m	0.02
154	D2_60m	0.01
155	D2_70m	0.01
156	D2_80m	0.01
157	D2_90m	0.01
158	D2_100m	0.01
159	D2_110m	0.01
160	D2_120m	0.01
161	D2_130m	0.01
162	D2_140m	0.01
163	D2_150m	0.01
164	D2_160m	0.01
165	D2_170m	0.01
166	D2_180m	0.01
167	D2_190m	0.01
168	D2_200m	0.01
Receptor E1		
169	E1_1m	0.02
170	E1_10m	0.01
171	E1_20m	0.01
172	E1_30m	0.01
173	E1_40m	0.01
174	E1_50m	0.01
175	E1_60m	0.01
176	E1_70m	0.01
177	E1_80m	0.00
178	E1_90m	0.00
179	E1_100m	0.00
180	E1_110m	0.00
181	E1_120m	0.00
182	E1_130m	0.00
183	E1_140m	0.00
184	E1_150m	0.00
185	E1_160m	0.00
186	E1_170m	0.00
187	E1_180m	0.00
188	E1_190m	0.00
189	E1_200m	0.00
Receptor E2		

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
190	E2_1m	0.03
191	E2_10m	0.02
192	E2_20m	0.02
193	E2_30m	0.01
194	E2_40m	0.01
195	E2_50m	0.01
196	E2_60m	0.01
197	E2_70m	0.01
198	E2_80m	0.01
199	E2_90m	0.01
200	E2_100m	0.01
201	E2_110m	0.01
202	E2_120m	0.01
203	E2_130m	0.01
204	E2_140m	0.01
205	E2_150m	0.01
206	E2_160m	0.01
207	E2_170m	0.01
208	E2_180m	0.00
209	E2_190m	0.00
210	E2_200m	0.00
Receptor H		
211	H_0m	0.09
212	H_5m	0.05
213	H_10m	0.04
214	H_15m	0.03
215	H_20m	0.02
216	H_30m	0.02
217	H_40m	0.02
218	H_50m	0.01
219	H_60m	0.01
220	H_70m	0.01
221	H_80m	0.01
222	H_90m	0.01
223	H_100m	0.01
224	H_125m	0.01
225	H_150m	0.01
226	H_175m	0.01
227	H_200m	0.01

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
Receptor I		
228	I_1m	0.14
229	I_6m	0.10
230	I_11m	0.07
231	I_16m	0.06
232	I_21m	0.05
233	I_31m	0.04
234	I_41m	0.03
235	I_51m	0.03
236	I_61m	0.03
237	I_71m	0.02
238	I_81m	0.02
239	I_91m	0.02
240	I_101m	0.02
241	I_126m	0.02
242	I_151m	0.01
243	I_176m	0.01
244	I_201m	0.01
Receptor J		
245	J_0m	0.02
246	J_5m	0.02
247	J_10m	0.01
248	J_15m	0.01
249	J_20m	0.01
250	J_30m	0.01
251	J_40m	0.01
252	J_50m	0.01
253	J_60m	0.01
254	J_70m	0.01
255	J_80m	0.01
256	J_90m	0.01
257	J_100m	0.01
258	J_125m	0.01
259	J_150m	0.01
260	J_175m	0.01
261	J_200m	0.01
Receptor K		
262	K_0m	0.14
263	K_5m	0.07

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
264	K_10m	0.05
265	K_15m	0.04
266	K_20m	0.03
267	K_30m	0.02
268	K_40m	0.02
269	K_50m	0.01
270	K_60m	0.01
271	K_70m	0.01
272	K_80m	0.01
273	K_90m	0.01
274	K_100m	0.01
275	K_125m	0.01
276	K_150m	0.00
277	K_175m	0.00
278	K_200m	0.00
Receptor L		
279	L_0m	0.09
280	L_5m	0.05
281	L_10m	0.04
282	L_15m	0.03
283	L_20m	0.02
284	L_30m	0.02
285	L_40m	0.01
286	L_50m	0.01
287	L_60m	0.01
288	L_70m	0.01
289	L_80m	0.01
290	L_90m	0.01
291	L_100m	0.01
292	L_125m	0.01
293	L_150m	0.00
294	L_175m	0.00
295	L_200m	0.00
Receptor M		
296	M_0m	0.04
297	M_5m	0.02
298	M_10m	0.02
299	M_15m	0.01
300	M_20m	0.01

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
301	M_30m	0.01
302	M_40m	0.01
303	M_50m	0.01
304	M_60m	0.01
305	M_70m	0.01
306	M_80m	0.00
307	M_90m	0.00
308	M_100m	0.00
309	M_125m	0.00
310	M_150m	0.00
311	M_175m	0.00
312	M_200m	0.00
Receptor N		
313	N_0m	0.18
314	N_5m	0.15
315	N_10m	0.13
316	N_15m	0.12
317	N_20m	0.10
318	N_30m	0.08
319	N_40m	0.07
320	N_50m	0.06
321	N_60m	0.05
322	N_70m	0.05
323	N_80m	0.04
324	N_90m	0.04
325	N_100m	0.04
326	N_125m	0.03
327	N_150m	0.03
328	N_175m	0.02
329	N_200m	0.02
Receptor O		
330	O_2.5m	0.06
331	O_7.5m	0.06
332	O_12.5m	0.06
333	O_17.5m	0.05
334	O_22.5m	0.05
335	O_32.5m	0.05
336	O_42.5m	0.05
337	O_52.5m	0.05

Lookup ID	Distance from road	Effect of growth in combination (DS2 and DS5)
338	O_62.5m	0.05
339	O_72.5m	0.05
340	O_82.5m	0.05
341	O_92.5m	0.04
342	O_102.5m	0.04
343	O_127.5m	0.04
344	O_152.5m	0.04
345	O_177.5m	0.03
346	O_202.5m	0.03
Receptor P		
347	P_1m	0.15
348	P_6m	0.11
349	P_11m	0.08
350	P_16m	0.07
351	P_21m	0.06
352	P_31m	0.05
353	P_41m	0.04
354	P_51m	0.04
355	P_61m	0.03
356	P_71m	0.03
357	P_81m	0.03
358	P_91m	0.03
359	P_101m	0.03
360	P_126m	0.02
361	P_151m	0.02
362	P_176m	0.02
363	P_201m	0.01

6.12 From the summary table and modelling in Appendix F it can be seen that:

- No net reduction in ammonia concentrations in atmosphere is forecast by 2033 (represented by the difference between DS2 and the 2014 Baseline). This is because there is no existing improving trend for ammonia and no scientifically robust basis to postulate an improving baseline or improved emission factors for ammonia (unlike for NOx).
- Therefore the effect of growth 'in combination' (which is dominated by growth in Epping Forest District between 2014 and 2033) is to cause a deterioration in ammonia concentrations.
- The most common patterns for the 'in combination' ammonia dose are either for growth in combination to cause a 'large' dose within c. 5-6m of the roadside, with a 'medium' dose up to 10-30m from the roadside (receptors A1, B1, C1, C2, D1, D2, I, K and P) or for growth in combination to cause a small to negligible dose throughout the transect (receptors B2, E1, E2, J and M). The biggest exception to these patterns is transect N where a large dose is forecast up to 20m from the roadside and a medium dose up to 70m from the roadside.

6.13 In considering the effects of growth on ammonia concentrations in atmosphere (as distinct from nitrogen deposition resulting from NOx and ammonia combined) it is important to consider the following:

- At no receptor will growth 'in combination' actually cause an ammonia critical level to be exceeded. Even with no housing or employment growth (or indeed the closure of the modelled roads through the SAC) ammonia concentrations in 2033 would exceed the critical level for lichens as they do so already (being c. 1.1-1.2 μgm^{-3} even at 200m from the roadside). This is due to background ammonia concentrations for the grid squares in which the SAC is situated, which are dominated by non-road sources (particularly agriculture)[65].
- As a result of the development proposals in the Local Plan (including the Garden Town Communities located partly within 6.2 km of the SAC) land is being taken out of agricultural production for development. All intensive agriculture (livestock and particularly fertiliser applied to crops) results in atmospheric emissions of ammonia and this is by far the greatest source of ammonia locally and national. Removing land from intensive agricultural production may therefore reduce background ammonia but is not factored into the modelling summarised above.

6.14 Overall it is therefore considered that the elevated ammonia concentrations forecast for DS2 will not result in an adverse effect on the integrity of the European site (i.e. the coherence of the site's structure and function and its ability to meet its conservation objectives) due to the limited physical extent of the worst-case dose (typically 5m from the roadside), the fact that the most ammonia-sensitive lichens are already likely to have been affected by the elevated background concentrations which are overwhelmingly dominated by non-road sources and the fact that this background may be reduced (and thus the contribution of traffic offset) by the Local Plan taking land out of agricultural production for development. .

Scenarios DS3 and DS4

6.15 Comparison of Scenarios DS2 and DS3 shows that, for nitrogen deposition, delivering physical mitigation measures at Wake Arms Roundabout, Robin Hood Roundabout and Honey Lane would achieve considerable reductions in the nitrogen dose due to growth at modelled receptor transects A1, A2, C1, C2, D1, D2, H, I, K, L, M, N, O and P, due to reducing average maximum queue length and/or duration. In contrast, they would lead to a large deterioration at transect E2. However, Natural England confirmed that they did not consider that the physical mitigation measures at Robin Hood Roundabout and Wake Arms Roundabout could be delivered without having an adverse effect on the integrity of the Epping Forest SAC through permanent loss of woodland habitat for which the SAC is of international importance and this habitat loss would not be offset by the relatively subtle qualitative benefits achieved by even the large forecast improvements in air quality.

6.16 Honey Lane alone (DS4) would achieve considerable reductions in the nitrogen dose at modelled receptor transects B1, C1, C2, D2, P and (particularly) O, the latter of which represents a transect on Honey Lane itself. However, it would convey little to no benefit to the other modelled receptor transects.

6.17 As a result, neither of those two scenarios were considered to provide a viable solution (with regard to Wake Arms Roundabout and Robin Hood Roundabout enhancements) or a sufficiently geographically extensive solution (for Honey Lane improvements on their own) to address the in combination effect that is otherwise forecast under scenario DS2 through nitrogen deposition. Instead the focus was shifted to the other, non-physical infrastructure, measures in the Local Plan, as set out below.

[65] According to ammonia source attribution for the SAC on APIS, traffic is responsible for only 2% of the background ammonia within the 1km grid squares that cover Epping Forest. In contrast 77% is attributed to livestock and fertiliser.

Scenario DS5

6.18 The following policies within the Plan that provide a positive contribution to atmospheric improvements are as follows:

- Policy DM 22: This policy seeks to ensure that residents and Epping Forest SAC are protected from impacts of air pollution, and for the proposer consideration and mitigation for inclusion in development deign to ensure no adverse effects. This policy identifies that larger developments will be required to provide an air quality assessment that includes contributions towards air quality monitoring, including within the Epping Forest SAC. The assessments shall identify mitigation that will address any deterioration in air quality as a result of the development, and these measures will be incorporated into the development proposals. This will also include an assessment of emissions and calculation of the cost of the development to the environment. All assessments for air quality will be undertaken by competent persons. Additionally the Council requires developers to provide improvements that facilitate the uptake of sustainable transport methods.
- The pre-amble to Policy DM 22 specifically states that '*As set out within the Memorandum of Understanding the Council is working with the City of London Corporation, Natural England and other Housing Market Area authorities to address both the requirement to avoid, or effectively mitigate, adverse impacts on the integrity of the SAC from Local Plan-led development and the requirement to prevent deterioration of the SAC features'*, acknowledging the commitment to produce a strategic mitigation strategy.
- The pre-amble to Policy DM 2 (Epping Forest SAC and the Lee Valley SPA) provides a positive contribution to the plan ensuring that no likely significant effects occur as a result of the Plan. It provides for HRA of projects or plans that are '*likely to give rise to significant impact on the integrity of the sites'* and acknowledges Epping Forest SAC's vulnerability to of air pollution.
- Policy T 1 (Sustainable Transport Choices). This policy sets out the Council's commitment to achieve improvements to strategic rail connections and other public transport networks to the wider area, promote transport choice through improvements to public transport services and supporting infrastructure, provide coherent and direct cycling and walking networks to provide a genuine alternative to the car and facilitate a modal shift and to promote opportunities for sustainable transport modes. It also states that the Council will require the provision of electric vehicle charging points in all new development which includes vehicle parking spaces.
- Paragraph 3.80 of the Local Plan explains that the sustainable transport policies seek to widen the choice of travel opportunities using public transport, walking and cycling.
- Paragraph 3.88 states that the Local Plan will ensure the provision of facilities and services in new strategic developments to provide high levels of self-containment and secure the provision of, or financial support for, bus services and walking and cycling facilities.
- Paragraph 3.89 points out that such an approach can be expected to have a wider benefit as it can also provide access to new transport opportunities for existing residents, thus reducing increases in background traffic growth.
- Paragraph 3.90 reiterates that the Council will require the provision of electric vehicle charging points in all new development which includes vehicle parking spaces.
- Policy DM 21 (Local Environmental Impacts, Pollution and Land Contamination). This is a positive development management policy relating to environmental impact, pollution and land contamination. It is a positive policy as it provides for the prevention of detrimental impacts as a result of environmental conditions resulting from new development such as air quality, and provides for the reuse and recycling of building materials and the use of local products, thus reducing atmospheric pollutants further, and the use of water resources during the manufacturing process.
- Policy D 5 (Communications Infrastructure). This is a development management policy relating to communications infrastructure. It is a positive policy: the provision of high speed internet and telecommunications has potential to reduce the need to travel, thus reducing atmospheric pollution.

- Within the Plan, Policy DM 22 (Air Quality) states that larger developments will be required to provide financial contributions towards monitoring of air quality, including within the SAC. This is also echoed by a number of policies within Plan Chapter 5: Places that require larger allocated developments to '*undertake an air quality assessment that identifies the potential impact of the development, together with contributions towards air quality monitoring.*'

Nitrogen deposition

6.19 The summary table for this scenario for all links is provided under the discussion of DS2 above with the results for DS2 and DS5 placed side-by-side. Figure 6 and paragraphs 2.42 – 2.45 at page 22 of this report provide an explanation of the approach to colour coding as an expression of the size of the forecast nitrogen dose, and the approach to converting the dose into a number of years delay in the European site falling below the critical load for nitrogen.

6.20 When the 2030 emission factors are used as a proxy or sensitivity test for the non-physical infrastructure mitigation measures outlined in the Epping Forest Local Plan the following can be observed in comparison to DS2 (unmitigated):

- For all receptor transects except A1, K, L, M and N the nitrogen dose due to all growth in combination (dominated by growth in Epping Forest District) falls to a negligible dose throughout and in some cases may actually be better than the 2033 baseline situation with no growth or Local Plan initiatives.
- Even for transects A1, K, L and M the dose falls to a worst-case 'small' dose within 5-15m from the roadside, equivalent to a worst case delay in reduction of nitrogen deposition of 1-3 years within 5-15m from the roadside and a negligible delay at greater distances. This is considered to be an insignificant delay when it is taken into consideration that;
  - this is offset by net improvements on other transects;
  - It is based on extremely precautionary traffic modelling; and
  - It is based on a cautious estimate of emissions factors, in that the emission factors used as a proxy for the mitigation in this modelling represents the shift in the vehicle fleet that Defra expects by 2030 even in the absence of any local initiatives. As a result the actual benefit of the mitigation could be greater than shown in this modelling.
- Transect N is the only link where a dose greater than 'small' would still be forecast at the roadside even with mitigation; even here, the dose falls to 'medium' within 5m of the roadside and to small before 40m from the roadside. This means the worst-case delay in reduction in nitrogen deposition falls from 10 years to 8 years.

Ammonia

6.21 The mitigation is not forecast to have any effect on ammonia emissions from traffic and the results will thus be identical to the unmitigated DS2 scenario.

6.22 In considering the effects of growth on ammonia concentrations in atmosphere (as distinct from nitrogen deposition resulting from NOx and ammonia combined) it is important to consider the following:

- At no receptor will growth 'in combination' actually cause an ammonia critical level to be exceeded. Even with no housing or employment growth (or indeed the closure of the modelled roads through the SAC) ammonia concentrations in 2033 would exceed the critical level for lichens as they do already (being c. 1.1-1.2 μgm^{-3} even at 200m from the roadside). This is due to background ammonia concentrations for the

grid squares in which the SAC is situated, which are dominated by non-road sources (particularly agriculture)[66].

- The positive ecological effect (including on lichens) of the improvement in nitrogen deposition is likely to at least balance any negative effect on lichens diversity from the deterioration in ammonia concentrations, particularly since the greatest effect (a large dose) will typically be experienced immediately adjacent to the roadside (within 5m on most transects).
- As a result of the development proposals in the Local Plan (including a series of garden villages wholly or partly within 6km of the SAC) land is being taken out of agricultural production for development. This will reduce background ammonia but is not factored into the modelling summarised above.

Conclusion

6.23 Neither potential mitigation scenarios DS3 or DS4 are considered to provide a viable solution (with regard to Wake Arms Roundabout and Robin Hood Roundabout enhancements) or a sufficiently geographically extensive solution (for Honey Lane improvements on their own) to address the in combination effect that is otherwise forecast under scenario DS2 through nitrogen deposition.

6.24 Epping Forest SAC needs to be considered holistically with all transects and pollutants taken together, rather than each transect or pollutant being considered in isolation. The mitigation modelled as DS5 will effectively remove any meaningful delay in the forecast reduction of nitrogen deposition rates (and thus vegetation recovery) on almost all transects, the exception being transect N. Even at transect N the mitigation will improve the situation compared to an unmitigated situation and there is still forecast to be a large net improvement in nitrogen deposition of 1.60 kgN/ha/yr at the roadside. While there will still be an effect on ammonia concentrations in atmosphere, the worst case effect will be extremely localised on almost all transects (within 5m of the road), the positive effect of reducing NOx and nitrogen deposition over a larger area is likely to at least offset this increase in ammonia concentrations and the removal of land from agricultural production may reduce background ammonia concentrations. Overall therefore, it is considered that the delivery of the planned mitigation will ensure that no adverse effect on the integrity of the SAC will arise.

6.25 The next step following this conclusion is for the air quality mitigation measures outlined in the Local Plan and modelled as DS5 to be developed further as part of the air quality mitigation strategy, which Epping Forest District Council is committed to producing during the course of 2019.

[66] According to ammonia source attribution for the SAC on APIS, traffic is responsible for only 2% of the background ammonia within the 1km grid squares that cover Epping Forest. In contrast 77% is attributed to livestock and fertiliser.

7. Appropriate Assessment: Water Abstraction

7.1 The following site allocations and policies could not be dismissed in the initial sift from potentially posing likely significant effects upon the Lee Valley SPA/ Ramsar site internationally designated sites as a result of changes to water levels due to abstraction for public water supply. They are therefore discussed further in this Chapter:

Policies

- Policy SP 2: Spatial Development Strategy 2011-2033
- Policy E 1 (Employment Sites). Provides for new employment sites as well as improvements to existing sites; however no quantum of development is identified.

Site Allocations

- All residential and employment sites in combination

7.2 Policies within the Plan do provide a positive contribution towards reducing the need for water supply as follows:

- The pre-amble to Policy DM 3 (Epping Forest SAC and the Lee Valley SPA) provides a positive contribution to the plan ensuring that no likely significant effects occur as a result of the Plan. It provides for HRA of projects or plans that are *'likely to give rise to significant impact on the integrity of the sites'.*
- Policy DM 19 (Sustainable Water Use). This is a positive development management policy that provides for enhanced water use efficiency, thus reducing the need for water abstraction. This policy also provides for the tightening the consumption of water to 110 litres per person per day or less (i.e. 30% less than the average).

Lee Valley SPA/Ramsar site

7.3 Almost all settlements within Epping Forest District receive their potable water supply through Affinity Water. Within its catchment Affinity Water abstracts water from tributaries of Lee Valley SPA/Ramsar site.

7.4 The Lee Valley SPA/Ramsar site consists of four Sites of Special Scientific Interest, of which Turnford and Cheshunt Pits SSSI, Rye Meads SSSI and Amwell Quarry SSSI all lie on the Hertfordshire/Essex border. Walthamstow Reservoirs SSSI lies within the London Borough of Waltham Forest. Walthamstow Reservoirs is a sealed storage reservoir and part of the public water supply infrastructure for London. Rye Meads is unlikely to ever suffer from a shortage in water quantity due to its close relationship with Rye Meads Wastewater Treatment Works. However, the quarries could theoretically be adversely affected if groundwater abstraction for public water supply was sufficiently great to cause drawdown of water levels.

7.5 Affinity Water's current Water Resource Management Plan covers the period up to 2040 and states that an HRA of the WRMP has been undertaken and that they have been able to demonstrate sufficient alternative supply options to ensure that adverse effects on European sites can be avoided. As such, it can be concluded that delivery of the Epping Forest Local Plan will not result in adverse effects on Lee Valley SPA/Ramsar site through excessive water drawdown, either alone or in combination with other plans and projects.

8. Appropriate Assessment: Water Quality

8.1 The following site allocations and policies could not be dismissed in the initial sift from potentially posing likely significant effects upon the Lee Valley SPA/ Ramsar site internationally designated sites as a result of changes to water quality from treated wastewater discharge. They are therefore considered further in this Chapter:

Policies

- Policy SP 2 (Spatial Development Strategy 2011-2033)
- Policy E 1 (Employment Sites). Provides for new employment sites as well as improvements to existing sites; however no quantum of development is identified.

Site Allocations

- All residential and employment sites in combination

8.2 Policies within the Plan do provide a positive contribution towards good water quality as follows:

- The pre-amble to Policy DM 2 (Epping Forest SAC and the Lee Valley SPA) provides a positive contribution to the plan ensuring that no likely significant effects occur as a result of the Plan. It provides for HRA of projects or plans that are '*likely to give rise to significant impact on the integrity of the sites'*.
- policy DM 16 (Sustainable Drainage Systems). By definition, sustainable drainage systems would not result in likely significant effects upon internationally designated sites. This is a positive policy as it aims to result in a net improvement in water quality discharge to a sewer, improve water quality and reduce runoff.
- Policy DM 18 (On Site Management of Waste Water and Water Supply). This is a positive development management policy as it ensures that the public sewerage network has sufficient capacity to serve existing and new development, thus preventing a reduction in water quality.

Lee Valley SPA/Ramsar site

8.3 Change in water quality is the main pathway through which the Lee Valley SPA/Ramsar site could be adversely affected. Two parts of the Lee Valley SPA/Ramsar site lie within East Herts: Amwell Quarry and Rye Meads. The nearest proposed development site to a part of Lee Valley SPA/Ramsar site is 760m distant, so direct surface water runoff effects on water quality will not arise. However, Rye Meads consists of non-operational land at and around the Rye Meads Wastewater Treatment Works (WwTW). Parts of the SPA consist of open water but other parts consist of fen or marsh vegetation that would theoretically be susceptible to nutrient enrichment from treated wastewater.

8.4 'Poor fens' (i.e. acidic fens) are strongly nitrogen limited. In other words, nitrogen availability is the factor which ultimately controls vegetation response to other nutrients and a small change in nitrogen inputs can result in a major change in the vegetation composition. In contrast, other types of fen with a relatively alkaline pH (called 'rich' fens) such as those at Rye Meads are phosphorus-limited, meaning that phosphorus availability is the factor which ultimately controls vegetation response to other nutrients. This also applies to fluvial flood-plain grasslands like those at Rye Meads SSSI. In a phosphorus limited system, high nitrogen availability will not result in a deleterious effect on vegetation provided that phosphorus availability is controlled[67]. That is not to say that nitrogen inputs would therefore be irrelevant, but it does mean that when nitrogen is already in excess (and phosphorus inputs can be controlled) a proportionate response must be made to the risk posed by small additional nitrogen inputs. Effluent

[67] '*In a nutrient limited system, excess of the non-limiting nutrient may not result in any signs of enrichment in the vegetation as the plants are unable to make use of one nutrient without sufficient amounts of the other'*. Source: Understanding Fen Nutrients http://www.snh.gov.uk/docs/A416930.pdf

discharges from Rye Meads Sewage Treatment Works (STW) into Tollhouse Stream. The stream flows through the SSSI and has been known to back up into the marsh grassland parts of the SSSI during periods of high flow.

8.5 The current discharge consent for Rye Meads WwTW has been subjected to a review by the Environment Agency and Thames Water (Review of Consents) specifically for the purpose of determining whether the current consented phosphorus limits on the discharge are leading to an adverse effect on the Lee Valley SPA/Ramsar site, and if so, to amend the consent in order to avoid such an effect. As such, provided effluent from new development within the Rye Meads catchment can be accommodated within the existing volumetric discharge consent for the WwTW it can be concluded with confidence that an adverse effect on the SPA/Ramsar site is unlikely to occur from this pathway.

8.6 However, once the WwTW ceases to have capacity within its existing discharge consent for effluent from additional dwellings, it will be necessary for Thames Water to apply to the Environment Agency to increase the consented discharge volume, or direct flows to an alternative treatment facility. The Environment Agency is very unlikely to consent to an increase in discharge volume from the WwTW unless the phosphate concentration within the effluent can be further tightened to ensure no deterioration in water quality in Tollhouse Stream. There is a technical limit (known as the limit of Best Available Technology) to how much phosphorus removal a WwTW can incorporate. If this situation arises, there is a risk that future dwellings within the catchment could not be accommodated at Rye Meads WwTW, requiring an alternative treatment solution that does not as yet exist. Investigating these issues was one of the purposes of the Rye Meads Water Cycle Study (2009). Water quality is therefore an important pathway to investigate with regard to future development within the Rye Meads WwTW catchment.

8.7 The Harlow WCS[68] recently undertook a headroom assessment of Rye Meads WwTW in relation to committed and planned future growth scenarios with Harlow and six neighbouring authorities (East Herefordshire, North Hertfordshire, Stevenage, Welwyn Hatfield, Epping Forest and Broxbourne). The catchment of Rye Meads WwTW is expected to accommodate growth within Harlow as well as a large portion of development within the neighbouring six authorities. The WCS states: the *'headroom assessment undertaken by JBA … indicates that Rye Meads has capacity to accommodate growth within Harlow and surrounding authorities over the plan period, within the current permitted DWF discharge of 110 ML/d.*

8.8 *The TWUL RAG assessment classifies Rye Meads WwTW as "green". This reflects the existing WwTW capacity, as well as the treatment capacity of 447,134 Population Equivalent (PE) to be provided by planned upgrades to the WwTW within AMP Cycle 6 (2015 - 2020).'* Even up to the end of AMP9 (i.e. 2035) Rye Meads WwTW has been modelled to continue to have headroom (11% headroom capacity will remain). Additionally permitted levels of ammonia discharged can be managed (i.e. resulting in no deterioration) via the tightening of permits within technically possible limits.

8.9 Once the WwTW ceases to have capacity (the Harlow WCS only assessed up to 2036) within its existing discharge consent for effluent from additional dwellings (Thames Water currently expect that Rye Mead WwTW will have sufficient headroom capacity until 2024), it will be necessary for Thames Water to apply to the Environment Agency to increase the consented discharge volume, or direct flows to an alternative treatment facility. The Environment Agency is very unlikely to consent to an increase in discharge volume from the WwTW unless the phosphate concentration within the effluent can be further tightened to ensure no deterioration in water quality in Tollhouse Stream. There is a technical limit (known as the limit of Best Available Technology) to how much phosphorus removal a WwTW can incorporate. If this situation arises, there is a risk that future dwellings within the catchment could not be accommodated at Rye Meads WwTW, requiring an alternative treatment solution that does not as yet exist. Investigating these issues was one of the purposes of the Rye Meads Water Cycle Study (2009)[69]. Water quality is therefore an important pathway to investigate with regard to future development within the Rye Meads WwTW catchment.

[68] JBA Consulting (2018) Harlow Council Water Cycle Study update (Draft Report)
[69] http://www.harlow.gov.uk/sites/harlow-cms/files/files/documents/files/Rye%20Meads%20Water%20Cycle%20Strategy.pdf [accessed 21/12/2017]

8.10 With regard to Epping Forest District, as identified in Table 3, the Garden Communities around Harlow and the settlement of Lower Sheering are located within the catchment of Rye Meads WwTW, and are likely to provide approximately 3,970 new dwellings between them. The bulk of wastewater volumes treated by the WwTW come from Stevenage, Welwyn Garden City and Harlow but settlements in Epping Forest District also make a contribution, particularly the Garden Towns around Harlow.

8.11 Using less water per person will reduce the impact the new development on the hydraulic capacity at Rye Meads WwTW, allowing more development to be catered for within the existing capacity and delay the need for a larger volumetric discharge consent. A recent (June 2017) Position Statement issued by Thames Water to Epping Forest District Council and other relevant authorities has clarified that from a final effluent stream point of view (this being the relevant stream in terms of phosphate loading of discharged effluent) Rye Meads WwTW is expected to have headroom until 2036. This is beyond the plan period and therefore no capacity issues should arise for growth in the catchment. However, it will be necessary to ensure that development within the catchment of Rye Meads WwTW to keep pace with the provision of wastewater treatment infrastructure and environmental capacity there.

8.12 It is possible to conclude that the Local Plan will not result in a water quality effect on Lee Valley SPA/Ramsar site either alone or in combination with other projects and plans.

9. Summary of Conclusions

9.1 It is considered that with the delivery of the urbanisation/recreational pressure and air quality mitigation packages to which Epping Forest District Council is committed there will be no adverse effect on the integrity of any European sites including Epping Forest SAC.

Appendix A European Designated Sites Background

Epping Forest SAC

Introduction

Part of the Epping Forest SAC is located within Epping Forest District. Approximately 70% of the 1,600 hectare site consists of broadleaved deciduous woodland, and it is one of only a few remaining large-scale examples of ancient wood-pasture in lowland Britain. Epping Forest SAC supports a nationally outstanding assemblage of invertebrates, a major amphibian interest and an exceptional breeding bird community.

Reasons for Designation[70]

Epping Forest qualifies as a SAC for both habitats and species. Firstly, the site contains the Habitats Directive Annex I habitats of:

- Beech forests on acid soils with *Ilex* and sometime *Taxus* in the shrublayer.
- Wet heathland with cross-leaved heath; and
- Dry heath

Secondly, the site contains the Habitats Directive Annex II species Stag beetle *Lucanus cervus*, with widespread and frequent records.

Current Pressures and Threats[71]

- Air pollution
- Under grazing
- Public disturbance
- Changes in species distribution
- Inappropriate water levels
- Water pollution
- Invasive species
- Disease

Conservation Objectives

[70] JNCC (2015) Natura 200 Standard Data Form: Epping Forest SAC
[71] Natural England (2015). Site Improvement Plan: Epping Forest SAC

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

Lee Valley SPA and Ramsar Site

Introduction

The Lee Valley comprises a series of embanked water supply reservoirs, sewage treatment lagoons and former gravel pits along approximately 24 km of the valley. These waterbodies support internationally important numbers of wintering gadwall and shoveler, while the reedbeds support a small but internationally important population of bittern. In addition to the ornithological interest, the site also qualifies as a Ramsar site on account on rare and scarce plants and invertebrates present.

The Lee Valley SPA/Ramsar consists of four Sites of Special Scientific Interest, of which Turnford and Cheshunt Pits SSSI, Rye Meads SSSI and Amwell Quarry SSSI all lie on the Hertfordshire/Essex border. Walthamstow Reservoirs SSSI lies within London Borough of Waltham Forest. The Special Protection Area is managed by the Lee Valley Regional Park Authority and by Thames Water.

Reasons for Designation

The Lee Valley site is designated as an SPA[72]: for its Birds Directive Annex I and Ramsar site under criterion 6[73] for species that over-winter, and these are:

- Bittern Botaurus stellaris;
- Gadwall Anas strepera;
- Shoveler Anas clypeata.

In addition, the site qualifies as a Ramsar under criterion 2[74], by supporting the nationally scarce plant species whorled water-milfoil *Myriophyllum verticillatum* and the rare or vulnerable invertebrate *Micronecta minutissima* (a water-boatman).

Current Pressures and Threats[75]

[72] http://jncc.defra.gov.uk/page-2047-theme=default [accessed 09/11/2017]
[73] http://jncc.defra.gov.uk/pdf/RIS/UK11034.pdf [accessed 09/11/2017]
[74] Ibid

- Water pollution
- Hydrological changes
- Public disturbance
- Inappropriate scrub control
- Fishing
- Air pollution
- Inappropriate cutting and mowing
- Invasive species

Conservation Objectives[76]

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

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

Wormley-Hoddesdonpark Woods SAC

Introduction

This SAC consists of two SSSIs – Wormley-Hoddesdonpark Woods North and Wormley-Hoddesdonpark Woods South and is situated on the southern border of East Herts, with part of the SAC in Broxbourne. The semi-natural woodland is of national importance as an example of lowland south-east sessile oak/hornbeam type with the pedunculate oak/hornbeam variant also present. Additionally, small ponds and streams are important habitats for bryophytes.

Reasons for Designation[77]

Wormley-Hoddesdonpark Woods qualifies as a SAC through its habitats, containing the Habitats Directive Annex I habitat:

- Oak-hornbeam forests – this is one of only two outstanding locations for such habitat in the UK.

Current Pressures and Threats[78]

- Disease

[75] http://publications.naturalengland.org.uk/file/5788502547496960 [accessed 09/11/2017]
[76] http://publications.naturalengland.org.uk/file/5168095937167360 [accessed 09/11/2017]
[77] http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013696 [accessed 09/11/2017]
[78] http://publications.naturalengland.org.uk/file/6541134543192064 [accessed 09/11/2017]

- Invasive species
- Air pollution
- Deer
- Illicit vehicle
- Woodland/ forestry management
- Recreation

Conservation Objectives[79]

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features'), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

[79] http://publications.naturalengland.org.uk/file/6475250191564800 [accessed 09/11/2017]

Appendix B Figures

Figure A1: Locations of Internationally Designated Sites

Figure A2: Location of Site Allocations

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LEGEND

- Epping Forest Boundary
- Buffers
- Residential Allocations
- Lee Valley Ramsar
- Lee Valley SPA

Special Area of Conservation (SAC)

- Epping Forest SAC
- Wormley-Hoddesdon Park Woods SAC

Purpose of Issue: DRAFT

Client: EPPING FOREST DISTRICT COUNCIL

Project Title: EPPING FOREST HRA

Drawing Title: RESIDEINTIAL SITES OVERVIEW

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AECOM Internal Project No.	Scale @ A3
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Drawing Number: FIGURE 3A

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2 0 2 4 6 8 10 km

File Name:\\ba-wip-004.scottwilson.co.uk\44400 - Management Services\60004 - Information Systems\60512493_Epping_Forest_HRA\02_Maps\Figure 3A - Residential Sites Overview.mxd

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- Buffers
- Residential Allocations
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- Lee Valley SPA

Special Area of Conservation (SAC)

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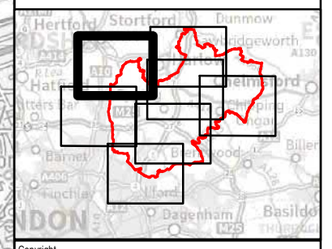
- Wormley-Hoddesdon Park Woods SAC



Purpose of Issue: DRAFT

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Project Title: EPPING FOREST HRA

Drawing Title: RESIDENTIAL SITES

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Special Area of Conservation (SAC)

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- Wormley-Hoddesdon Park Woods SAC

NAZE.R1
NAZE.R3
NAZE.R4
RUR.T3
WAL.T1
WAL.R1
WAL.R2
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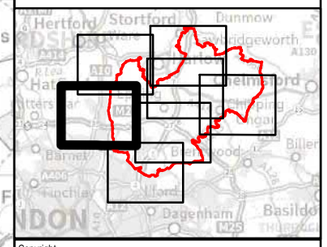
WAL.R6
WAL.R7



Purpose of Issue
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Client
EPPING FOREST DISTRICT COUNCIL

Project Title
EPPING FOREST HRA

Drawing Title
RESIDENTIAL SITES

Drawn	Checked	Approved	Date
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FIGURE 3B.B

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- Buffers
- Residential Allocations
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Special Area of Conservation (SAC)

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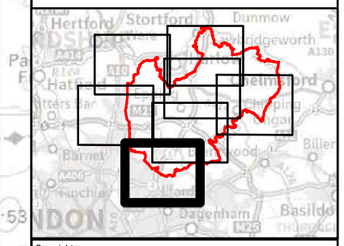

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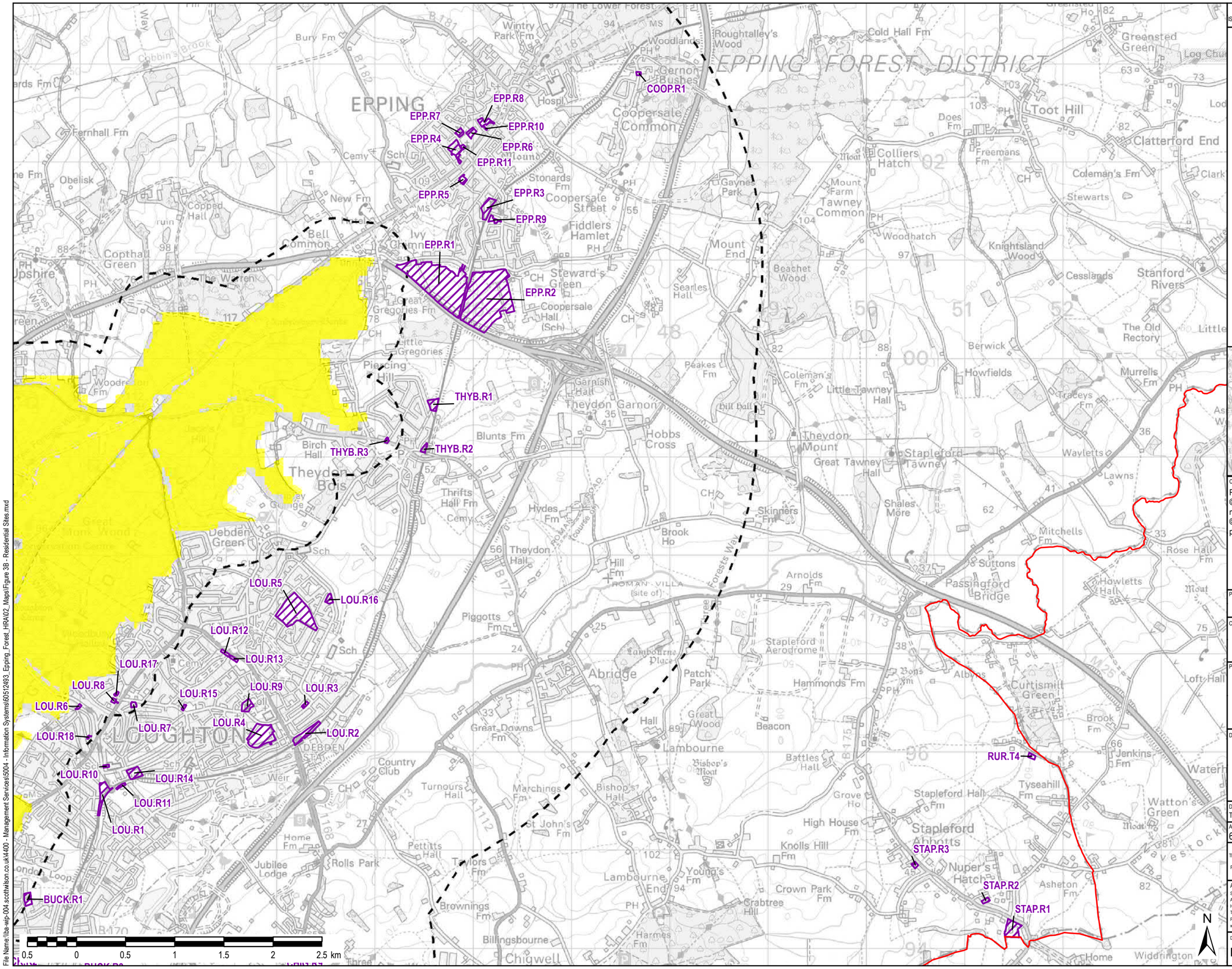

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LEGEND

- Epping Forest Boundary
- Buffers
- Residential Allocations
- Lee Valley Ramsar
- Lee Valley SPA

Special Area of Conservation (SAC)

- Epping Forest SAC
- Wormley-Hoddesdon Park Woods SAC

Purpose of Issue: DRAFT

Client: EPPING FOREST DISTRICT COUNCIL

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Special Area of Conservation (SAC)

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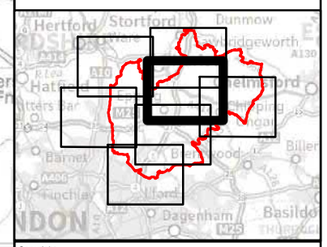

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Project Title: EPPING FOREST HRA

Drawing Title: RESIDENTIAL SITES

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SHR.R3
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SHR.R1
SP 4.3
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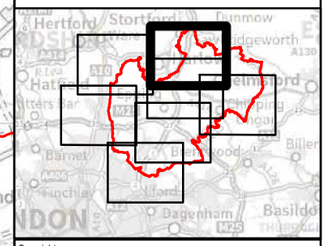
SP 4.1
MORE.T1



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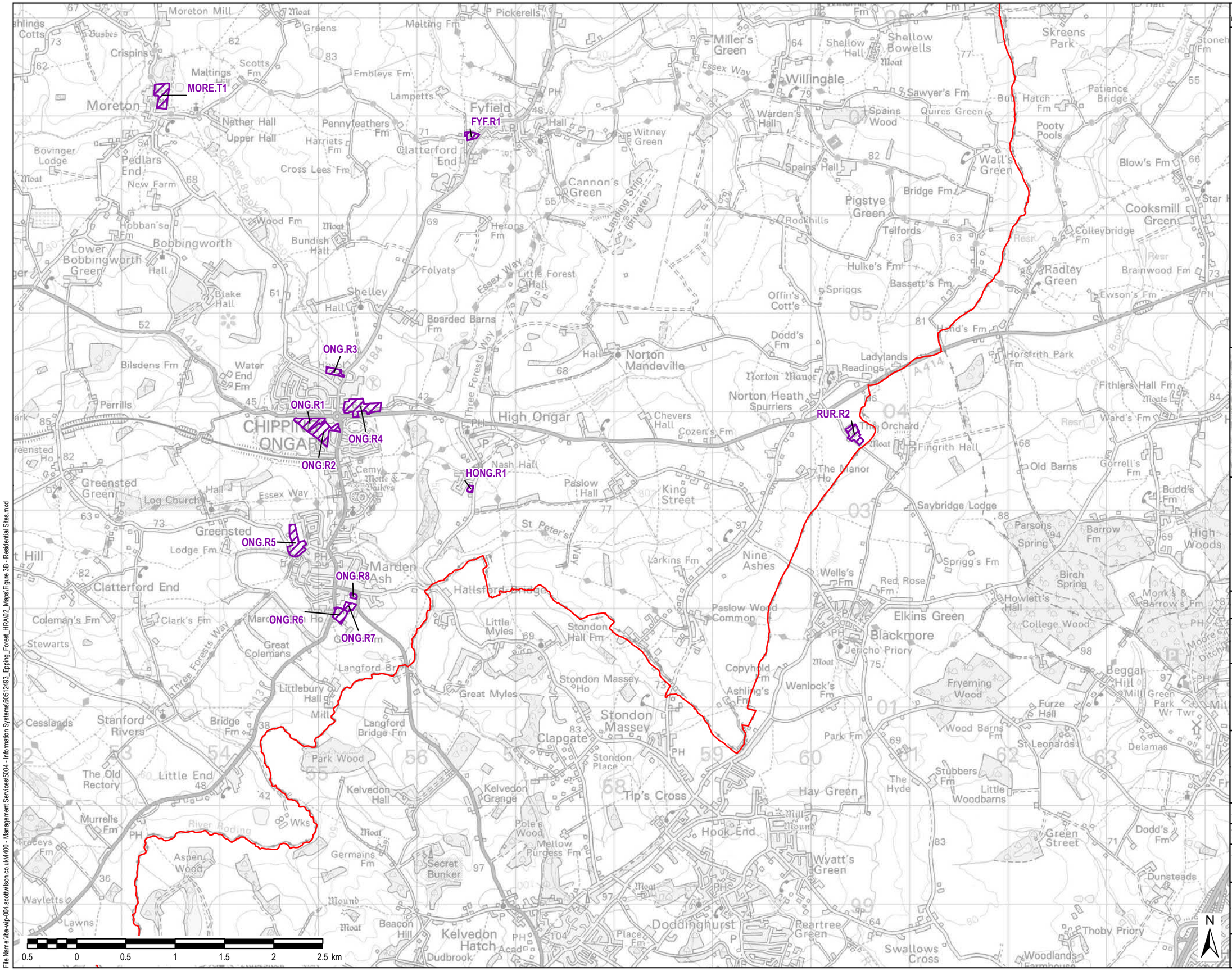

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LEGEND

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Special Area of Conservation (SAC)

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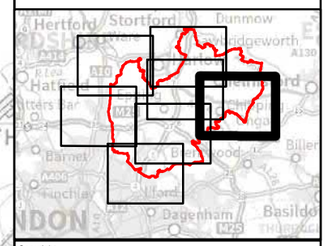

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Project Title: EPPING FOREST HRA

Drawing Title: RESIDENTIAL SITES

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LEGEND

- Epping Forest Boundary
- Buffers
- Employment Allocations
- Lee Valley Ramsar
- Lee Valley SPA

Special Area of Conservation (SAC)

- Epping Forest SAC
- Wormley-Hoddesdon Park Woods SAC

Purpose of Issue: DRAFT

Client: EPPING FOREST DISTRICT COUNCIL

Project Title: EPPING FOREST HRA

Drawing Title: EMPLOYMENT SITES OVERVIEW

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LEGEND

- Epping Forest Boundary
- Buffers
- Employment Allocations
- Lee Valley Ramsar
- Lee Valley SPA

Special Area of Conservation (SAC)

- Epping Forest SAC
- Wormley-Hoddesdon Park Woods SAC

NAZE.E1
NAZE.E2
NAZE.E3
NAZE.E4
NAZE.E5
NAZE.E6
NAZE.E7

0.5 0 0.5 1 1.5 2 2.5 km

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Purpose of Issue: DRAFT

Client: EPPING FOREST DISTRICT COUNCIL

Project Title: EPPING FOREST HRA

Drawing Title: EMPLOYMENT SITES

Drawn	Checked	Approved	Date
TD	JW	JR	11/12/2017

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Rev: 01

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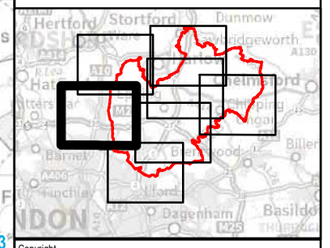
LEGEND

- Epping Forest Boundary
- Buffers
- Employment Allocations
- Lee Valley Ramsar
- Lee Valley SPA

Special Area of Conservation (SAC)

- Epping Forest SAC
- Wormley-Hoddesdon Park Woods SAC



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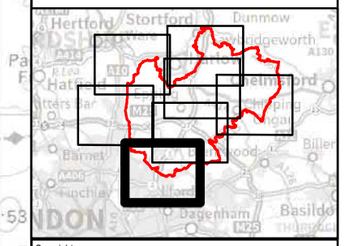
LOU.E1
LOU.E2
RUR.E16
RUR.E17

LOUGHTON
CHINGFORD
CHIGWELL
WOODFORD
WANSTEAD
REDBRIDGE



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0.5 0 0.5 1 1.5 2 2.5 km

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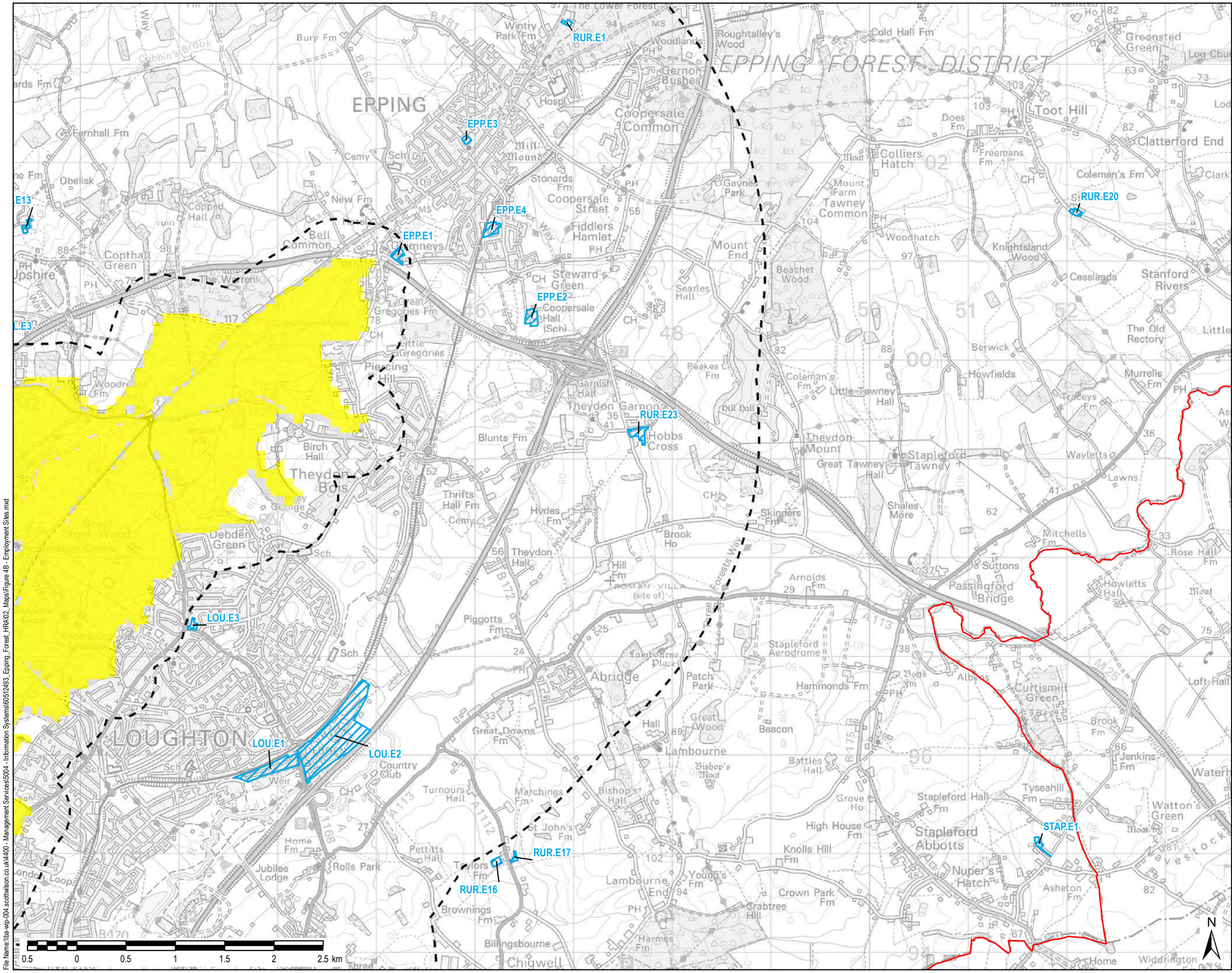

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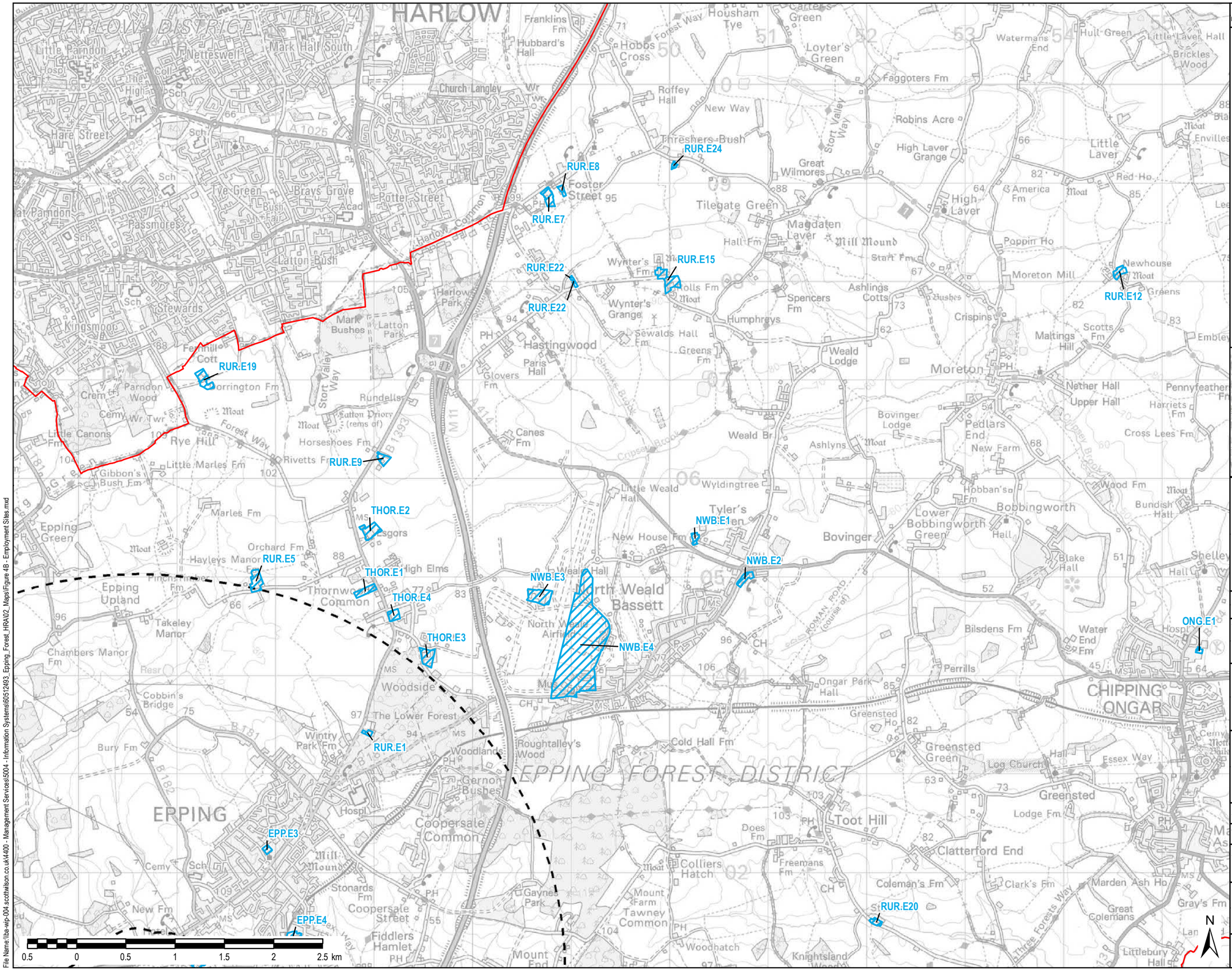

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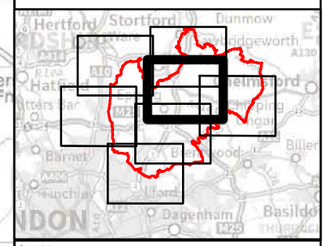

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RUR.E10
LSHR.E1
RUR.E11
RUR.E6
RUR.E2
RUR.E14
RUR.E3
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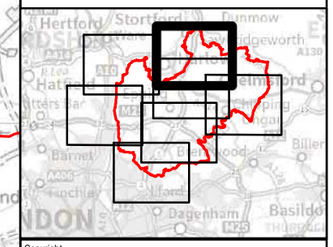
RUR.E19



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0.5 0 0.5 1 1.5 2 2.5 km

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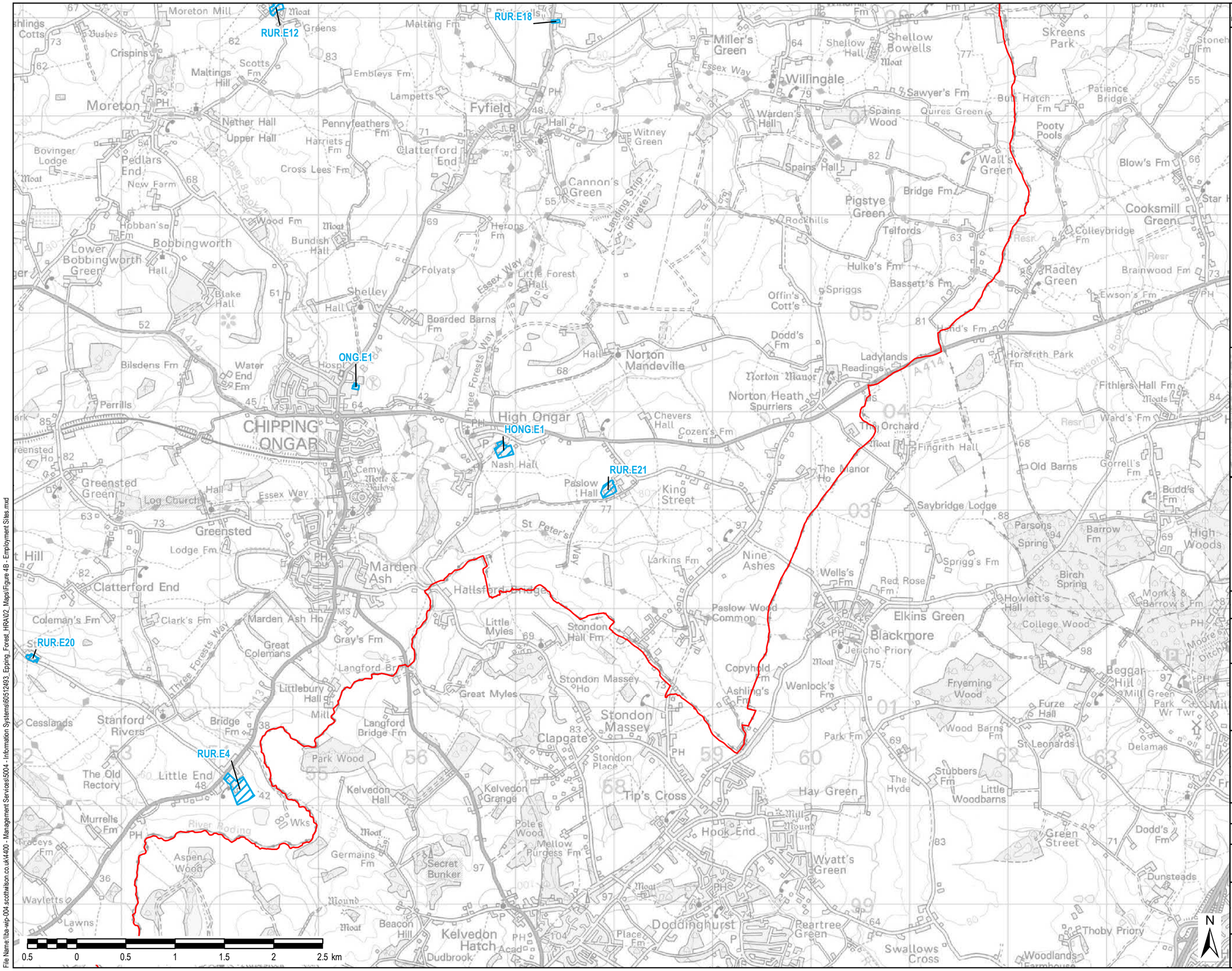

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Rev: 01

Appendix C Traffic Modelling Technical Note

Epping Forest Local Plan

EPPING FOREST DISTRICT COUNCIL

VISSIM Modelling Technical Note

January 2019

Document history and status

Revision	Date	Description	By	Review	Approved
1	November 2017	Draft Report	MT	CH	
2	January 2019	Updated Draft Report	MT	SJ, CH	SJ
3	January 2019	Final Report	MT	SJ, CH	SJ
4	January 2019	Reissue Final with Appendix K	MT	SJ, CH	SJ

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments
1-5.1	Internal	Nov-Dec 2018	SJ	Internal Only
5.2	SJ	18-Jan 2019	EFDC / EFDC	Final for Issue for Client Comment
5.3	SJ	18-Jan 2019	EFDC / AECOM	Final Issue for Reporting
5.4	SJ	21-Jan 2019	EFDC / AECOM	Final Issue with Appendix K

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Project Name

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Document title:	Epping Forest Local Plan – VISSIM Modelling Technical Note
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Date:	January 2019
Client name:	Epping Forest District Council
Client no:	
Project manager:	Simon Jones
Author:	Melanie Tobias
File name:	I:\UNIF\Projects\B3553R5A Epping Forest LP\12. VISSIM\4. Reports\ Epping Forest Local Plan - VISSIM Modelling Report.doc

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Contents

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The sole purpose of this report and the associated services performed by Jacobs is to document the VISSIM micro-simulation modelling developed to date for the Epping Forest Local Plan.

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1 Introduction

Jacobs were commissioned by Epping Forest District Council (EFDC) to prepare a package of VISSIM microsimulation traffic models of the Epping Forest Special Area of Conservation (SAC) to support the Epping Forest District Local Plan Submission Version (LPSV).

The models have been specifically developed to provide forecast traffic data for an air quality assessment being prepared by AECOM. It was agreed at the outset that the VISSIM modelling software provided the necessary speed, traffic and network performance outputs required to assess the more detailed traffic related impacts to air quality.

The PTV VISSIM version 9.00-03 software was used in the development of the models for this study. The 2017 base models include AM and PM peak hours, which have been calibrated and validated in line with the Transport for London (TfL) VISSIM Model Audit Process (VMAP). The calibrated and validated peak hour base models have also been used to develop peak, inter-peak and out of peak models to assess the impact of Annual Average Daily Traffic (AADT) flows for the base year and 2033 as the end of the Plan period. Interim year traffic forecasts have also been provided for information purposes but have not been modelled in detail.

This Technical Note provides details to demonstrate the calibration and validation of the VISSIM models. A series of scenarios have been tested to assess the incremental and combined impact of traffic growth resulting from the EFD Local Plan Submission Version as well as growth in the other Housing Market Area (HMA) Districts and other neighbouring Districts and London Boroughs. Combinations of potential mitigation measures, including infrastructure changes, have also been tested to align with options being tested in a separate Transport Assessment Report in support of the LPSV. Details and a summary of outputs provided to AECOM of the scenarios tested are presented in this report. Please note, given the different data sets and modelling software used, results presented in this report may vary from outputs presented in the separate Transport Assessment Report, which provides a more detailed appraisal of the ‘worst-case’ peak hours and overall network mitigation.

2 Purpose and Scope of the Modelling

The primary purpose of this work is to provide traffic modelling outputs, such as predicted AADT traffic flows, expected queue lengths, duration of queue, average vehicle speed, and percentage of heavy goods vehicles to the air quality consultants.

The models were developed in line with the Transport for London (TfL) VISSIM Model Audit Process (VMAP) as a good source of industry best practice and to ensure consistency in the approach to model development.

A study area was agreed with Natural England and AECOM to include the highway network specifically within the Epping Forest Special Area of Conservation (SAC). The study area consists of 5 junctions centred on the intersection of the A121 / B1393 / A104 / B172 at the 5-arm roundabout known locally as 'Wake Arms Roundabout'. The study area extends west towards the M25 Junction 26, as far as the A121 Woodgreen / Honey Lane junction, south towards the A104 / Earl's Path 'Robinhood Roundabout' and further west to include a section of Avey Lane up to the A112 Sewardstone Road. Figure 2.1 shows the extent of the VISSIM modelling and the key junctions to be analysed.

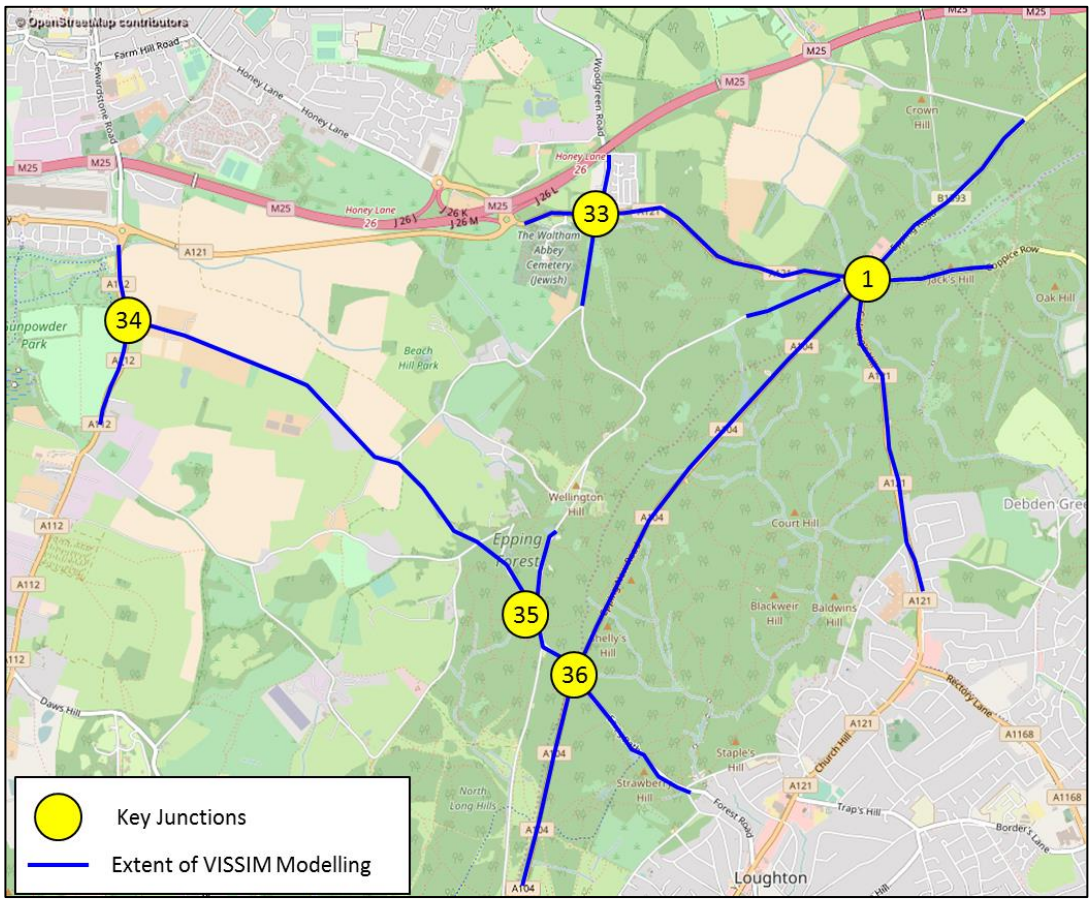

Figure 2-1: VISSIM Modelling Scope

The model extents encompass the following junctions:

- Junction 1: Wake Arms Roundabout – B1393 Epping Road/ B172/ A121 Golding's Hill/ A104 Epping New Road/ A121 Woodridden Hill (Wake Arms Roundabout)
- Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane
- Junction 34: A112 Sewardstone Road/ Avey Lane
- Junction 35: High Beech/ Cross Roads/ High Beech Loughton
- Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

3 Skeleton Model Build

3.1 Simulation Parameters

The model was prepared using TfL's VISSIM modelling template (VISSIM 5.40 template) as the underlying basis for industry-standard best practice model parameters. All parameters in the model use those set out in the template unless otherwise noted in this report.

The simulation period is 3600 seconds for the peak hour plus a 900 second warm up period and a 900 second cool down period (total 5400 seconds).

The simulation resolution is set to 5.

3.2 Model Units

The measurement units have been left unchanged from the TfL VISSIM template. Model distances are therefore in metres and kilometres, speed in mph and acceleration in m/s^2.

3.3 Map Background

The model was coded using scaled aerial images incorporated within the VISSIM software.

3.4 Functions

No changes to the maximum and desired acceleration/deceleration profiles have been made from the TfL VISSIM 5.40 template.

3.1 Desired Speed Distributions

No changes have been made from the TfL VISSIM 5.40 Template.

3.2 Vehicle Data

No changes have been made to those vehicle types and vehicle classes in the TfL VISSIM template.

The model contains 3 Vehicle/User Classes:

- Cars/Taxis;
- Light Goods Vehicles (LGVs) / Medium Good Vehicles (MGVs); and
- Heavy Goods Vehicles (HGVs).

Cyclists and motorcyclists have not been included in the models.

3.3 Driving Behaviour

One new driving behaviour parameter set has been added to the model. This is called "Urban Merge". This is a duplicate of "Urban (motorized)" behaviour but with the minimum headway (front/rear) set to 0.30 metres. "Advanced Merging" has also been applied to assess more realistic lane change behaviour. These were coded at the following locations:

- Link 19 at Wake Arm Roundabout
- Links 37, 42, 43 and 44 at Robin Hood Roundabout

No other changes have been made to the default TfL VISSIM template driver behaviour settings.

3.4 Link Types

A new link type has been created called “Urban (motorized)_merge”. This uses the new driving behaviour parameter set described above.

3.5 Route Assignment Choice

The model was set up using dynamic assignment methods. However, as there is no route choice within the model, it is essentially a static model.

3.6 Network Structure

The network structure has been coded so that it matches the network layout and has been calibrated so that on-site behaviour is replicated.

4 Model Calibration

4.1 Survey Data

Traffic count surveys were carried out to determine the existing traffic flow patterns and period of peak hours at the roads and junctions around the study area. Automatic Number Plate Recognition (ANPR) surveys were undertaken on a single neutral day in February 2017 over the period 07:00 to 19:00 to determine the origin-destination movements through the network. Automatic Traffic Counts (ATCs) were conducted over two-week periods to provide confidence that the traffic flow data was representative of the neutral month.

Figure 4-1 below shows the locations of the ANPR and ATC surveys:

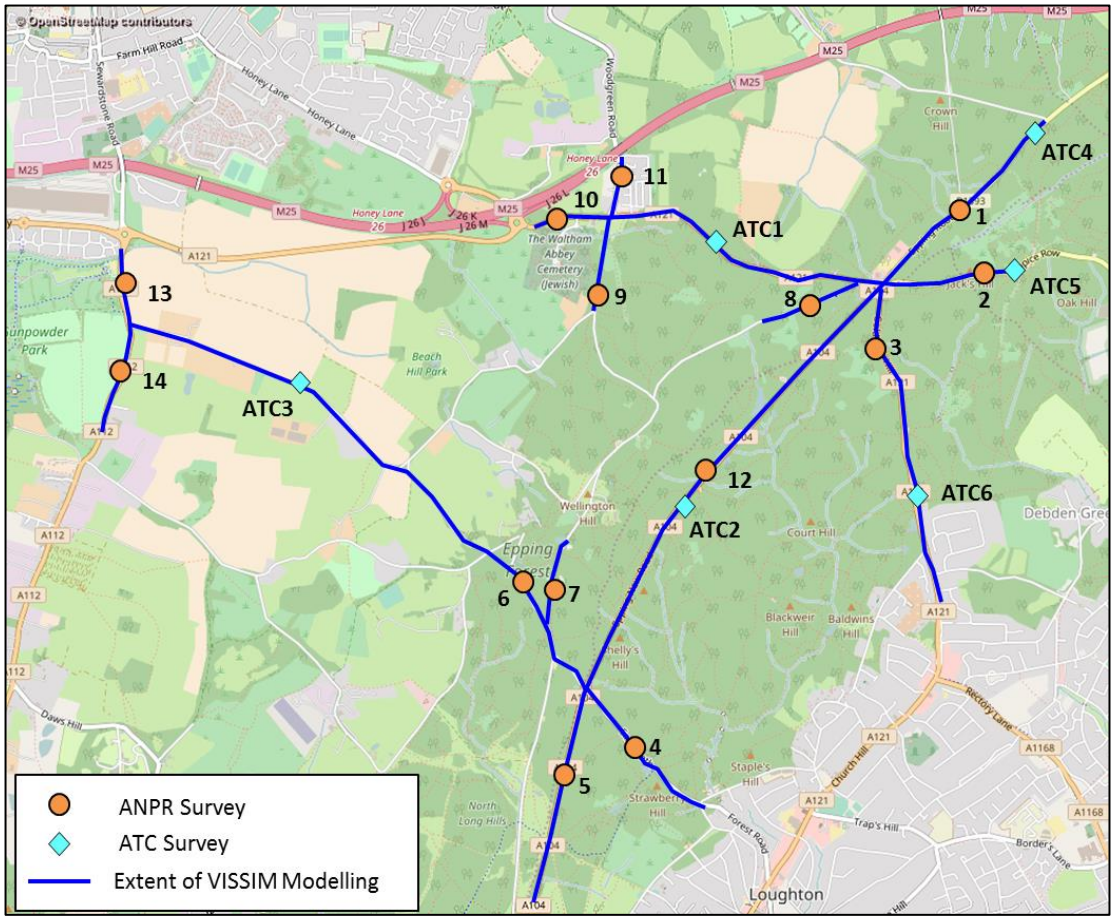

Figure 4-1: Traffic Survey Locations

4.2 Derivation of Peak Hours

An analysis of the traffic surveys was undertaken to determine the busiest hour for each of the peaks. The analysis showed that the busiest hours were 07:00 to 08:00 for the weekday AM peak and 17:00 – 18:00 for the weekday PM peak.

The simulation start time and simulation periods for each of the two modelled periods are shown in Table 4-1:

Table 4-1: Model Simulation Start Time and Period

	Simulation Start Time	Simulation Period	Model Period
Weekday AM Peak	06:45	5400	07:00 to 08:00
Weekday PM Peak	16:45	5400	17:00 to 18:00

For each of the two peaks, the first 15 minutes represents the warm-up period and the last 15 minutes represents the cool-down period.

While the model has been set up using dynamic assignment methods, it is essentially a static model due to the lack of route choice options in the study area. Vehicle demand inputs have therefore been coded using origin and destination data taken directly from the ANPR survey. These were then factored based on the ANPR link count and ATC data.

The AM and PM peak hour models have been expanded to cover Inter-peak (IP) and Out of Peak (OP) average hour assessments using factors derived from observed count profiles. While these models were required to provide outputs for air quality assessments across the 24-hour period, it was not deemed proportionate to undertake a full re-validation exercise on specific observed data for these less congested time periods.

4.3 Public Transport

Bus routes and frequencies have been obtained online. However, the majority of bus schedules are outside of the modelled peak hours[1]. Thus, only route 66 has been included in the base modelling. The bus start times coded into the model have been offset from each other using a randomising algorithm so that buses do not enter the network at the same time.

4.4 Traffic Signal Data

No signalised junctions are present within the modelled study area.

4.5 Priority Rules / Conflict Areas

Priority rules have been used throughout the model to replicate give-way junctions, yellow boxes and other important observed behavioural characteristics. These have been calibrated so that the behaviour in the model matches those observed on site.

4.6 Reduced Speed Areas

Reduced speeds areas (RSAs) have been used to reduce vehicle speeds at bends and to calibrate stopline saturation flows. The speed profile used across turning movements varies according to the turn radii, with sharper turns having a lower speed profile than more gentle turns. It was also used as one of the indicators for the comparisons of observed speeds and journey time.

4.7 Link and Connector Structure / Network Operation

The network structure has been coded so that it matches the network layout and has been calibrated over multiple random seeds (see next section) so that on-site behaviour is replicated.

.

[1] http://www.essexbus.info

5 Model Validation

5.1 Traffic Flow Comparisons

Vehicle demand matrices were based on the origin and destination data taken directly from the ANPR surveys. ANPR data were also analysed and converted into turning movements. ATCs were carried out to ensure data was representative of a neutral period.

Checks were undertaken to ensure that the survey data were analysed correctly.

The traffic flows measured from VISSIM are the average of 5 random seed runs. These have been validated using the GEH statistic for all links and turning movements in the model. The model was considered validated if at least 85% of turning movements had a GEH of 5 or less. The tables below summarise the GEH statistic results for both link and turning movements.

The full traffic flow validation results are provided in Appendix A and Appendix B. It should be noted that, while a formal validation exercise was not undertaken for the IP and OP periods, the model outputs were also sense-checked against observed traffic counts and flow profiles.

Table 5-1: Link Flow GEH Statistic Summary Results

	AM Peak	PM Peak
Number of turning movements	12	12
Percentage with a GEH of less than 5	92%	100%
Percentage with a GEH of less than 7.5	100%	100%

Table 5-2: Turning Flow GEH Statistics Summary Results

	AM Peak	PM Peak
Number of turning movements	66	66
Percentage with a GEH of less than 5	89%	91%
Percentage with a GEH of less than 7.5	94%	97%

5.2 Queue Length Analysis

The models have not been validated against observed queue lengths. This is principally because journey times are considered to be a better and more accurate validation criterion. As the TfL Modelling Guidelines state, queue survey data, whilst not a validation criterion, is useful when determining bottlenecks within the network. The model has therefore been checked to ensure that queues and areas of high congestion reasonably reflect what has been observed on street.

5.3 Journey Time Comparisons

Journey time surveys were carried out on a neutral day in April 2017 along three routes in the study area. Data from the TrafficMaster dataset (2016) were also analysed as supplementary data to get a good representation of a neutral time period. Figure 5-1 shows the journey time validation routes used for the purposes of this modelling:

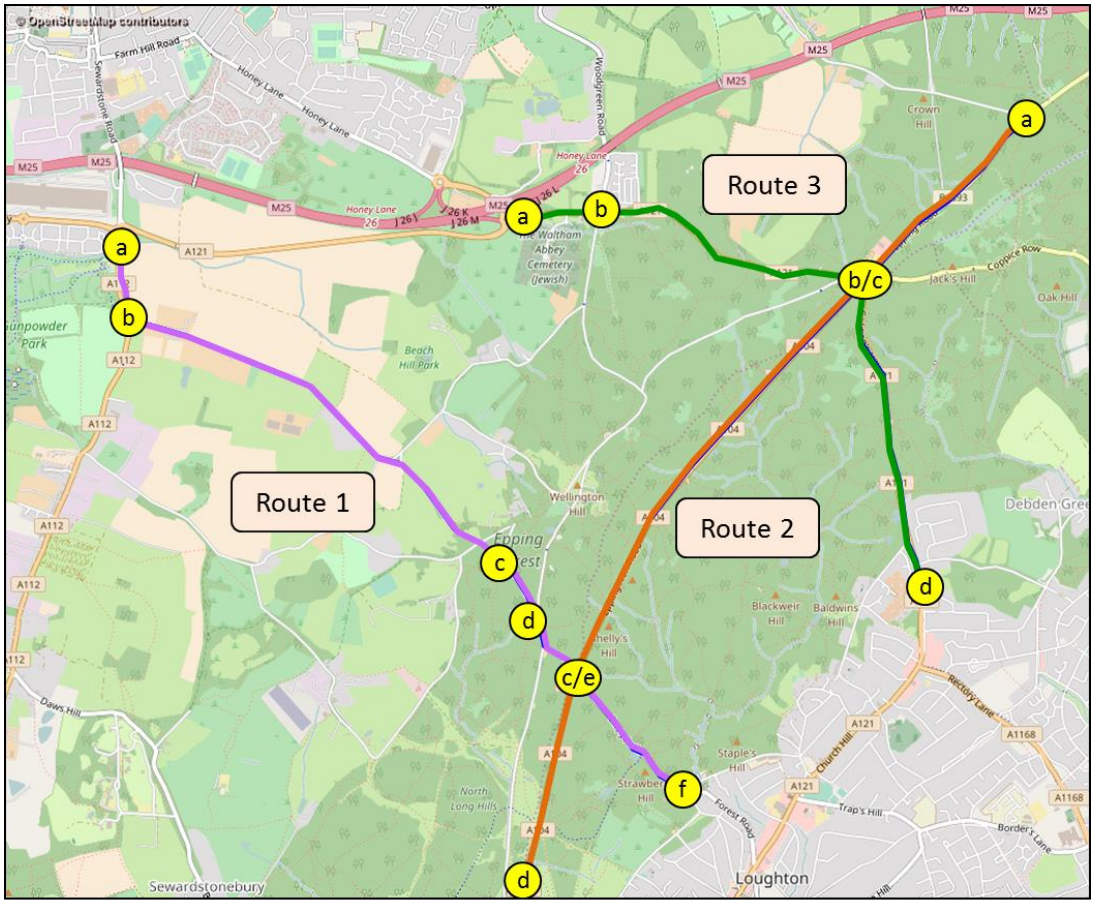

Figure 5-1: Journey Time Routes

Modelled journey times (both individual segment and total journey time) are within 15% of the observed on-street journey times. A detailed comparison is shown in Appendix C. The VISSIM journey time results are the average of the 5 random seed runs.

5.4 Error Logs

All of the model runs did generate error files. However, these error files were checked, and, in all cases, the error files generated were of a small size. The number of vehicles being removed from the network is generally less than 10. The error files are therefore deemed to be non-critical and have been considered to be acceptable. Small error files with non-critical error messages are acceptable within TfL VMAP.

5.5 Other Modelling Issues

There are no other base modelling issues noted at this stage.

6 Future Model Development and Assumptions

6.1 Introduction

The calibrated base model networks were used as the basis for development of the 2033 proposed scenario models.

Seven scenarios have been considered:

- **Scenario 1: 2033 Baseline** – Future scenario reflecting no Local Plan in place and 'skeleton' TEMPro growth.
- **Scenario 2: 2033 Do Nothing** – As per Scenario 1 but with traffic growth factors in non-HMA authorities to 2033.
- **Scenario 3: 2033 Do Minimum** – As per Scenario 2 but with traffic growth factors in Epping Forest District (EFD) due to existing planning permissions.
- **Scenario 4: 2033 Do Something 1** – As per Scenario 3 but with traffic growth factors in Uttlesford, East Hertfordshire and Harlow Districts due to housing/employment currently without planning permission (i.e. that portion of growth which is set by the Local Plans within other HMA authorities).
- **Scenario 5: 2033 Do Something 2** – As per Scenario 4 but with traffic growth factors in EFD due to housing/employment currently without planning permission (i.e. that portion of growth which is set by the Local Plan Submission Version).
- **Scenario 6: 2033 Do Something 3** – As per Scenario 5 but builds in the traffic flow/speed effects of the proposed physical mitigation measures at Wake Arms Roundabout, Robinhood Roundabout and A121 / Woodgreen / Forest Side junction.
- **Scenario 7: 2033 Do Something 4** – As per Scenario 5 but builds in the traffic flow/speed effects of the proposed physical mitigation measures only at A121 / Woodgreen / Forest Side junction.

6.2 Traffic Growth

Overall traffic growth for each of the scenarios has been derived from a range of sources including the Department for Transport (DfT) TEMPro v7.2 planning tool, 2015 Road Traffic Forecasts (RTF) data for Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs), and Local Plan Submission Version (LPSV) development traffic extracted from the EFD Spreadsheet Model. The data has been applied incrementally to generate the different levels of traffic growth expected by 2033 in each of the scenarios listed above. The data was also used to provide retrospective growth, to generate traffic levels for 2014, and to also provide interim year traffic growth for 2021, 2025 and 2029. It should be noted that only 2033 forecast scenarios were modelled in the VISSIM assessment periods and any earlier interim data was provided for information purposes to inform the cumulative impact across the Local Plan period.

In the first instance, the TEMPro v7.2 planning tool was interrogated for the average weekday period to determine external and background traffic growth forecasts throughout the District. TEMPro provides a forecast level of growth for an area, based on the predicted level of employment and housing specified in the regional development forecast for origins and destinations. The system allows adjustments to be made to jobs and housing numbers to reflect the most up to date planning data. This generally represents growth outside the District including other HMA authorities, Harlow, Uttlesford and East Hertfordshire, as well as neighbouring Broxbourne and eastern outer London Boroughs likely to have some level of impact on the Special Area of Conservation (SAC). The data also accounts for anticipated changes in car ownership.

The review and adjustment of TEMPro for the neighbouring authorities, both within the Housing Market Area (HMA) and the adjacent outer London Boroughs, sought to add in adopted Local Plan information, where possible, and supplement with emerging Local Plan information where known. These adjustments would therefore account for the full anticipated Local Plan growth in the wider area rather than just adopted Plan information including growth at Stansted Airport and London Plan targets. Appendix K includes details of the adjustments made to Local Authority planning assumptions for the interim assessment years up to 2033.

The fully adjusted TEMPro growth from outside of the District accounts for 26.6% growth. However, this would only apply to through-traffic travelling through the EFD road network, given all other trips either have an origin or destination in EFD and this growth would be picked up by the addition of the EFD Local Plan. Analysis of 2011 Census Journey to Work (JTW) data and the wider Harlow VISUM model indicates that less than 1% of traffic is typically through-traffic using the EFD road network, with the remainder having a journey purpose within the District. As a conservative approach, a higher 3% assumption of through-traffic has been assumed and applied as a weighting factor to this wider growth.

In addition to TEMPro growth, separate 2015 Road Traffic Forecasts (RTF) growth for goods vehicles (LGV / HGV) has been weighted and applied to the overall calculation. 2017-2033 growth factors have been extracted for Eastern England (40% growth for LGVs and 14.8% growth for HGVs).

Analysis of existing traffic data calculates that 11.3% of all traffic within EFD are LGVs and 1.84% are HGVs. The additional goods vehicles growth has been weighted on this basis and applied to the overall TEMPro calculation.

The combined calculation and assumptions used to determine traffic growth for the 2017-2033 model forecasts are summarised in Table 6-1. It should be noted that existing traffic and background traffic growth have not been adjusted to account for any realistic sustainable transport improvements, i.e. modal shift opportunities for existing residents/workers arising from potential new transport improvements coming forward across the Local Plan period. The growth forecasts are therefore considered a robust worst-case.

Table 6-1: 2017-2033 Combined TEMPro / RTF Forecast Traffic Growth Factors

Scenario	2014	2017	2021	2025	2029	2033
2014 Base Year	0.962					
Scenario 1: 2033 Baseline			1.040	1.091	1.113	1.137
Scenario 2: 2033 Do Nothing			1.041	1.093	1.115	1.139
Scenario 3: 2033 Do Minimum			1.041	1.093	1.115	1.139
Scenario 4: 2033 Do Something 1			1.042	1.094	1.117	1.142
Scenario 5: 2033 Do Something 2			1.042	1.094	1.117	1.142
Scenario 6: 2033 Do Something 3			1.042	1.094	1.117	1.142
Scenario 7: 2033 Do Something 4			1.042	1.094	1.117	1.142

The TEMPro / RTF Growth Factors have been combined with the assigned EFD committed and LPSV development traffic, from the separate EFD Spreadsheet Model, to generate each scenario on the following basis:

- Scenario 1 – All housing and employment growth removed from EFD and applicable external authorities to reflect minor increases in car ownership and general economic climate to provide 'skeleton' traffic growth only;
- Scenario 2 – Scenario 1 with the addition of housing and employment growth applied to Non-HMA authorities;
- Scenario 3 – Scenario 2 with the addition of committed and existing permission development traffic within EFD;
- Scenario 4 – Scenario 3 with the addition of housing and employment growth applied to HMA authorities (excluding EFD);
- Scenarios 5-7 – Scenario 4 with the addition of EFD LPSV development traffic.

6.3 Proposed Road Improvements

The following table and figures summarise the proposed highway improvement schemes tested in the VISSIM model for Scenarios 6 and 7. It should be noted that design options are concept drawings for Local Plan testing and illustrative purposes. Designs make initial consideration of likely constraints and deliverability but would be subject to more detailed design and feasibility as or when they came forward.

Junction		Mitigation Summary
1	A121/B1393 Wake Arms PH - Epping Forest	A121-Woodridden Hill: Flare extensions, and improvement on entry lane from single lane to a 40m single lane plus flare approach A1393 Epping Road: Flare extensions to existing single lane plus 100m flare approach, including improvement to existing single lane exits to two lane exits for 150m B172: Flare extensions to existing single lane plus 30m flare approach A121 Golding's Hill: Flare extensions, and improvement on entry lane from single lane to a 65m single lane plus flare approach Exit lane to be improved to two-lane exit for 25m A104 Epping New Road: Flare extensions, and improvement on entry lane from single lane to a 40m single lane plus flare approach Improved circulatory movements with increased Inscribed Circle Diameter to 65m
2	A104 New Epping Road Robin Hood Roundabout	A104 Epping New Road (N): Addition of 65m flare entry lane A104 Epping New Road (S): Addition of 15m flare entry lane, including improvement to existing single lane exits to two lane exits for 65m
3	A121 Honey Lane Woodgreen Rd	A121 Honey Lane: Local widening and addition of eastbound and westbound ghost island right turn Woodgreen Road: Realignment and consolidation into a single two-way minor arm

Table 6-2: Highway Schemes Mitigation Measures

Figures 6.1-6.3 illustrate the potential improvements at Wake Arms Roundabout, Robin Hood Roundabout and A121 / Woodgreen / Forest Side junction.

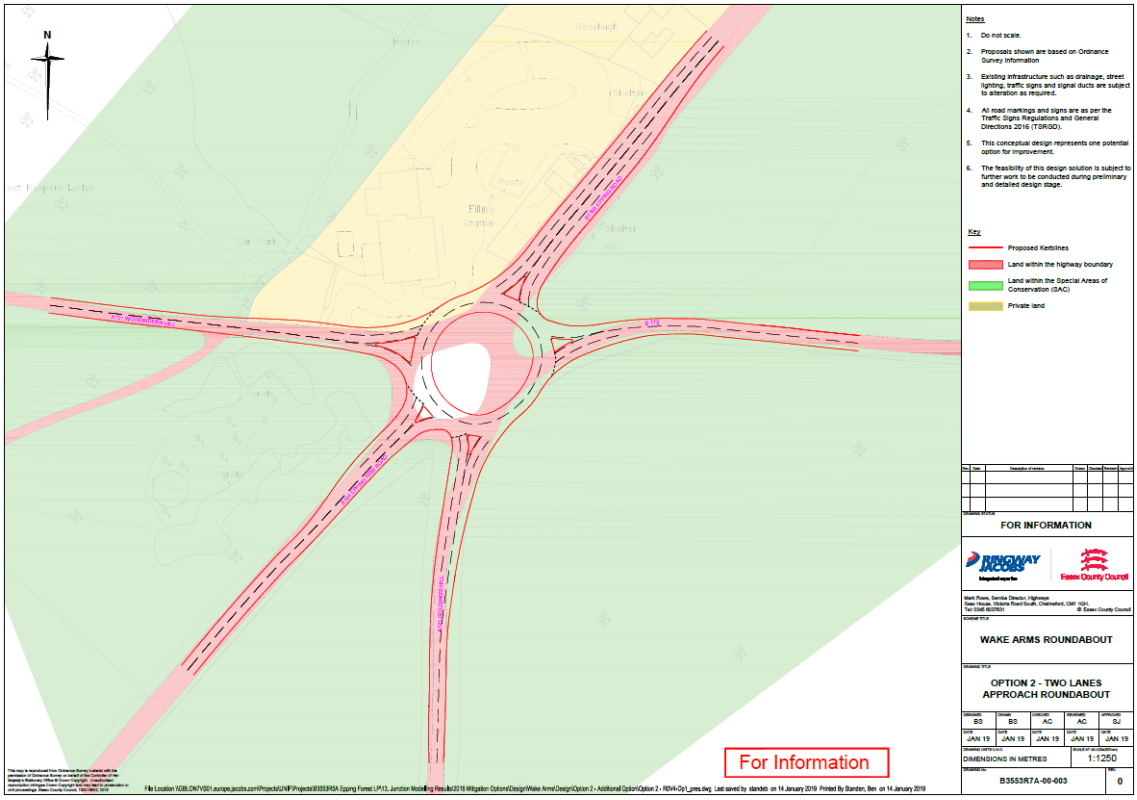

Figure 6-1: Proposed Improvements to Wake Arms Roundabout (Not to Scale / Illustrative Only)

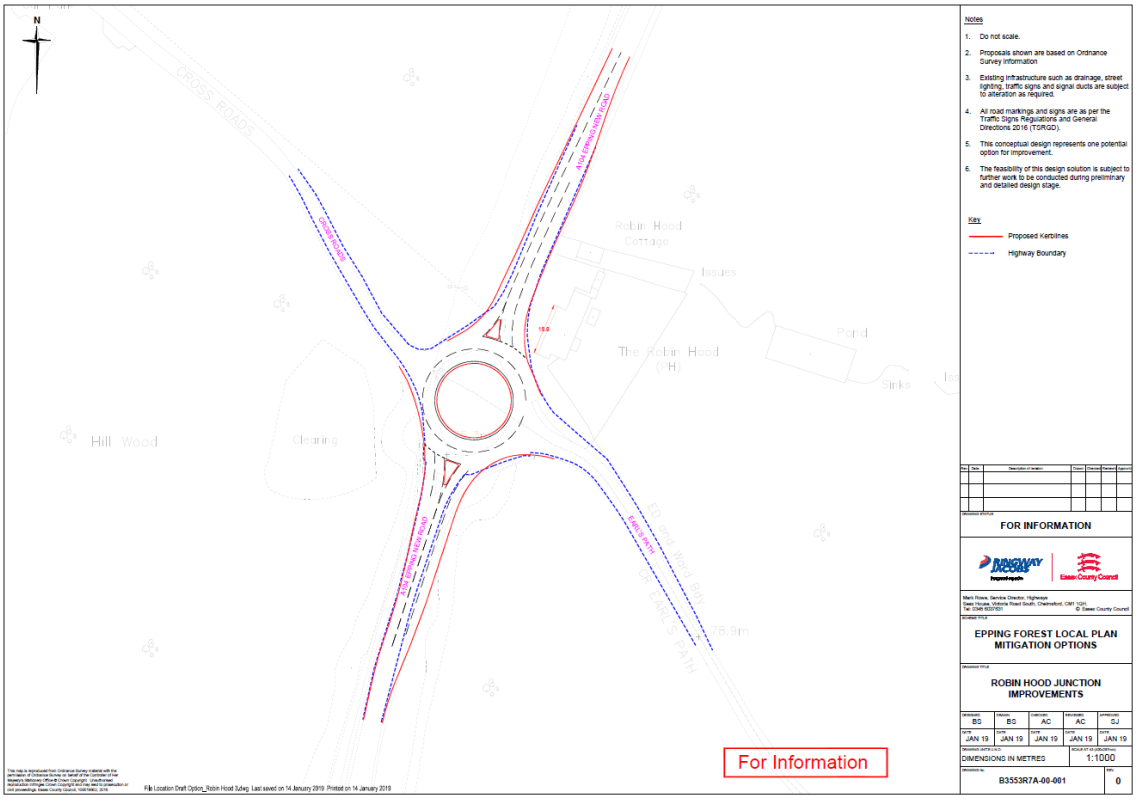

Figure 6-2: Proposed Improvements to Robin Hood Roundabout (No to Scale / Illustrative Only)

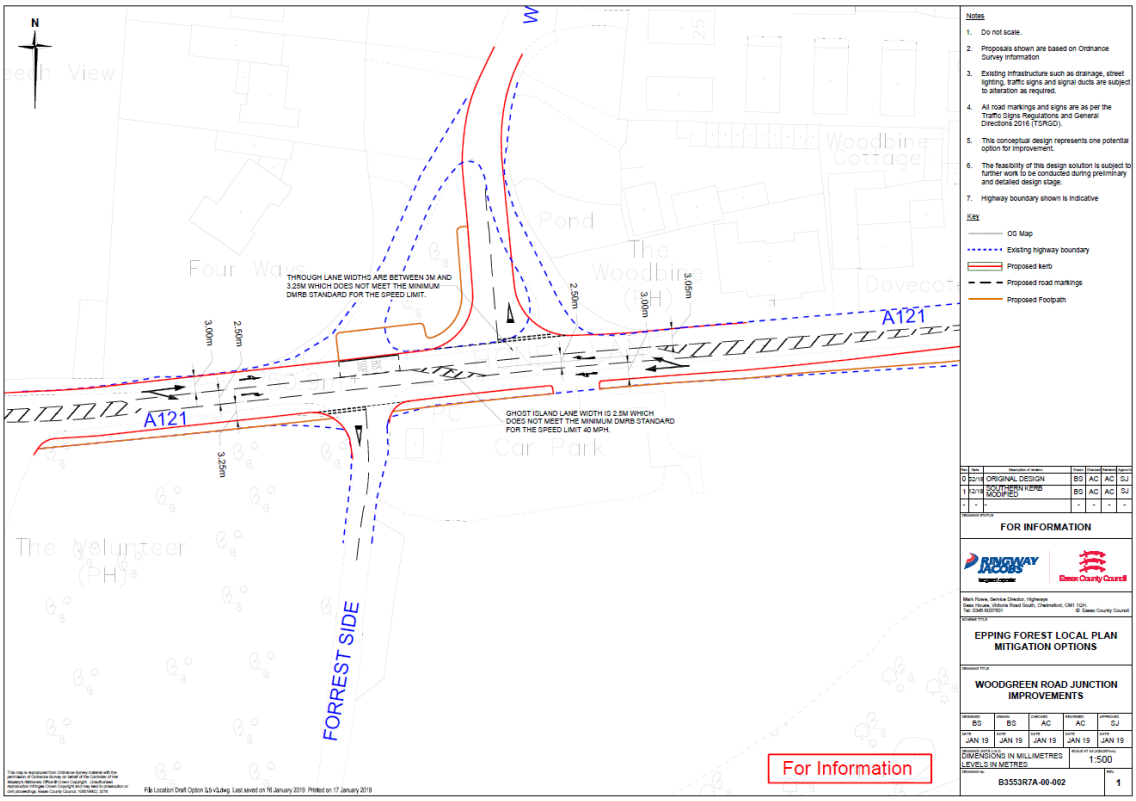

Figure 6-3: Proposed Improvements to A121 Honey Lane / Woodgreen / Forest Side Junction (Not to Scale / Illustrative Only)

The M25/Waltham Abbey Junction is not specifically included in the VISSIM model area. A separate improvement scheme has been considered at this junction as part of the wider Transport Assessment of the Local Plan, which has been accounted for by adjusting the reduced speed area parameter on the boundary of the model (i.e. improvement from 10-12 mph to 20 mph).

7 Transport Modelling Outputs

7.1 Introduction

The transport model is used to provide predictions on how the local developments will impact the air quality and performance of the five key junctions in the study area. The following outputs were provided to AECOM for their air quality consultants:

- Annual Average Daily Traffic (AADT)
- Maximum Average Queue Length
- Average Queue Duration
- Average Speeds
- Peak Period Journey Time Comparisons

Details of each of the outputs above are presented in the following sections below.

7.2 Annual Average Daily Traffic (AADT)

The AADTs were calculated by converting the 2017 modelled peak hour flows to average daily flows using factors derived from observed traffic counts. The 2033 DS2, DS3 and DS4 AADTs were then calculated by factoring the 2017 AADTs using TEMPro / RTF plus EFD Local Plan growth.

The increase in demand applied in scenarios DS2, DS3 and DS4 resulted in some delays observed in the modelled network during the peak periods. This resulted in unreleased demand (around 10% of the total demand) occurring at the end of each modelled period leading to inconsistencies when future traffic flows were expanded to AADTs, particularly when mitigation schemes were added to the network. Unreleased demand are trips that could not leave the zones due to delays and queues, particularly along B1393 Epping Road. A separate sensitivity test was undertaken using the existing West Essex / East Hertfordshire (WEEH) Strategic VISUM model to obtain an order of magnitude of the level of trips that could divert to other parts of the wider network during periods of increased congestion. It should be noted that this was not a detailed traffic reassignment test and was used to ensure that a realistic level (rather than unconstrained level) of AADT was tested in each of the scenarios for consistency.

Sensitivity test results indicated that around 10% -12% of the traffic that uses Epping Road (B1393) could divert to other routes to avoid the increased delay. While the VISSIM model demands were not modified, adjustments were then made to the AADTs to ensure that they were not underestimated and applied across scenarios DS2, DS3 and DS4.

Figure 7-1 to Figure 7-5 provide a layout for each junction and Table 7-1 to Table 7-5 provide the corresponding AADTs for each of the five key junctions for all scenarios tested.

Junction 1: Wake Arms Roundabout

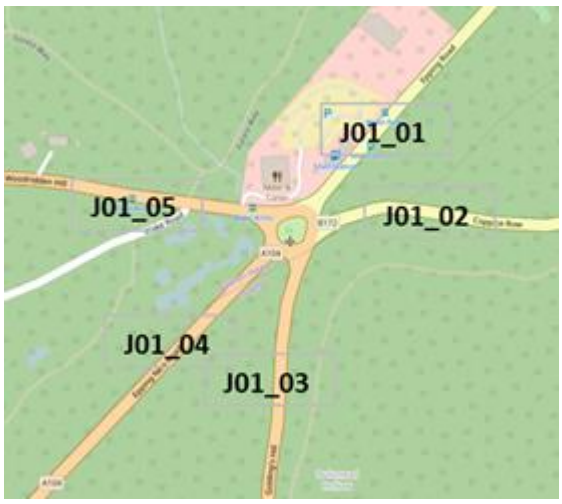

Figure 7-1: Junction 1 – Layout

	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	19,056	19,404	22,063	22,102	22,160	22,218	23,166	23,166	23,166
J01_02	8,502	8,441	9,597	9,614	9,647	9,672	9,730	9,730	9,730
J01_03	19,470	19,792	22,503	22,543	22,581	22,640	22,866	22,866	22,866
J01_04	14,304	15,019	17,076	17,106	17,130	17,175	17,601	17,601	17,601
J01_05	23,806	24,490	27,845	27,894	27,972	28,045	28,719	28,719	28,719
Total	**85,138**	**87,145**	**99,084**	**99,258**	**99,489**	**99,751**	**102,083**	**102,083**	**102,083**

Table 7-1: Junction 1 AADT (2033)

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

Figure 7-2: Junction 33 – Layout

	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	2,148	2,212	2,515	2,520	2,528	2,534	2,538	2,538	2,538
J33_02	24,006	24,490	27,845	27,894	27,942	28,015	28,409	28,409	28,409
J33_03	2,154	2,212	2,515	2,520	2,543	2,549	2,609	2,609	2,609
J33_04	23,988	24,490	27,845	27,894	28,006	28,079	28,777	28,777	28,777
Total	**52,297**	**53,404**	**60,720**	**60,827**	**61,018**	**61,179**	**62,335**	**62,335**	**62,335**

Table 7-2: Junction 33 AADT (2033)

Junction 34: A112 Sewardstone Road/ Avey Lane

Figure 7-3: Junction 34 – Layout

	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	14,435	15,019	17,076	17,106	17,154	17,199	17,424	17,424	17,424
J34_02	2,104	2,212	2,515	2,520	2,566	2,572	2,798	2,798	2,798
J34_03	14,410	15,019	17,076	17,106	17,106	17,151	17,151	17,151	17,151
Total	**30,950**	**32,249**	**36,668**	**36,732**	**36,826**	**36,923**	**37,374**	**37,374**	**37,374**

Table 7-3: Junction 34 AADT (2033)

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

Figure 7-4: Junction 35 – Layout

	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	1,075	1,106	1,258	1,260	1,290	1,293	1,345	1,345	1,345
J35_02	2,130	2,212	2,515	2,520	2,579	2,585	2,854	2,854	2,854
J35_03	1,058	1,106	1,258	1,260	1,305	1,308	1,515	1,515	1,515
Total	**4,264**	**4,425**	**5,031**	**5,040**	**5,174**	**5,187**	**5,715**	**5,715**	**5,715**

Table 7-4: Junction 35 AADT (2033)

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

Figure 7-5: Junction 36 – Layout

	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	14,165	15,019	17,076	17,106	17,125	17,170	17,654	17,654	17,654
J36_02	2,121	2,212	2,515	2,520	2,559	2,565	2,711	2,711	2,711
J36_03	14,492	15,019	17,076	17,106	17,151	17,196	17,741	17,741	17,741
J36_04	2,138	2,212	2,515	2,520	2,599	2,605	2,874	2,874	2,874
Total	**32,917**	**34,462**	**39,183**	**39,252**	**39,434**	**39,537**	**40,981**	**40,981**	**40,981**

Table 7-5: Junction 36 AADT (2033)

7.3 Maximum Average Queue Length Comparison

Maximum average queue lengths were calculated based on the default VISSIM configuration parameters. This is in line with the TfL Modelling Guidelines which states that VISSIM measures queue lengths according to a set of parameters based on vehicle speeds and headways. Changing these parameters is not advisable and will result in different queue lengths being reported where in fact modelled queues have not actually changed.

Junction 1: Wake Arms Roundabout

Junction 1 and its corresponding modelled maximum average queue lengths are presented in Table 7-6 and Table 7-7 for the peak periods. When compared to the base model, all future scenarios show significant increases in modelled queue lengths, particularly DS2 and DS4. Generally, applying the mitigation schemes in DS3, does not make any significant changes to Wake Arms Roundabout but it improves the queue length of Epping Road (J01_01).

	Queue Length AM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC01_QL01	412	409	458	461	470	481	480	401	483
JC01_QL02	62	266	487	488	495	494	496	495	495
JC01_QL03	412	489	492	489	488	486	487	490	487
JC01_QL04	41	50	118	160	44	71	35	77	49
JC01_QL05	3	4	7	5	15	13	13	48	15

Table 7-6: Junction 1 - Average AM Peak Queue Length

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC01_QL01	16	15	24	21	29	28	397	198	498
JC01_QL02	7	9	33	26	57	63	314	396	6
JC01_QL03	402	440	470	470	478	482	480	485	489
JC01_QL04	92	121	482	483	482	482	488	468	489
JC01_QL05	12	9	13	14	11	12	248	303	281

Table 7-7: Junction 1 – Average PM Peak Queue Length

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

Junction 33 and its corresponding modelled maximum average queue lengths are presented in Table 7-8 and Table 7-9. Unlike Junction 1, DS3 and DS4 show significant improvements in queue length to Junction 33. This is primarily related to the mitigation schemes implemented at this junction that allow a faster flow of traffic.

	Queue Length AM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC33_QL01	16	10	22	42	38	26	103	2	3
JC33_QL02	81	27	135	197	251	196	233	1	0
JC33_QL03	10	12	54	43	125	134	435	5	1
JC33_QL04	1	1	2	2	3	2	3	7	0

Table 7-8: Junction 33 – Average AM Peak Queue Length

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC33_QL01	5	4	13	8	10	9	19	11	5
JC33_QL02	1	21	42	12	12	9	39	1	1
JC33_QL03	18	32	14	17	40	24	360	4	1
JC33_QL04	3	20	11	8	7	7	48	120	48

Table 7-9: Junction 33 – Average PM Peak Queue Length

Junction 34: A112 Sewardstone Road/ Avey Lane

Junction 34 and its corresponding average queue length for the peak hours are presented in Table 7-10 and Table 7-11. This junction is non-signalised and priority is given to through movements along Sewardstone Road, hence, increases in modelled queue lengths are observed along Avey Lane.

	Queue Length AM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC34_QL01	0	0	0	0	0	0	0	0	0
JC34_QL02	7	9	49	61	243	256	490	499	494
JC34_QL03	5	14	23	27	77	63	61	58	59

Table 7-10: Junction 34 – Average AM Peak Queue Length

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC34_QL01	0	0	0	0	0	0	0	0	0
JC34_QL02	9	12	60	57	176	156	500	501	497
JC34_QL03	3	3	11	12	10	6	9	9	9

Table 7-11: Junction 34 – Average PM Peak Queue Length

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

Junction 35 and its corresponding average modelled queue lengths for the peak periods are presented in Table 7-12 and Table 7-13. The increase in queues, particularly in the PM peak for DS2 and DS4, is due to the traffic backlog from Junctions 1 and 36.

	Queue Length AM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC35_QL01	1	1	1	1	2	2	5	0	5
JC35_QL02	1	2	2	3	6	5	5	7	7
JC35_QL03	0	0	0	0	0	0	0	0	0

Table 7-12: Junction 35 – Average AM Peak Queue Length

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC35_QL01	0	0	0	0	1	1	355	0	355
JC35_QL02	0	0	0	0	1	2	354	1	364
JC35_QL03	0	0	0	0	0	0	219	0	191

Table 7-13: Junction 35 – Average PM Peak Queue Length

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

Junction 36 and its corresponding average modelled queue lengths for the peak period are presented in Table 7-14 and Table 7-15. The combined mitigation schemes in DS3 at Junction 1 and 36 have improved the queue length. The reduced delays are mainly due to the removal of the traffic backlog from Junction 1.

	Queue Length AM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC36_QL01	59	91	94	92	200	240	404	21	458
JC36_QL02	4	3	4	4	9	9	37	40	18
JC36_QL03	31	39	124	146	478	476	487	6	487
JC36_QL04	8	8	28	37	20	21	49	3	59

Table 7-14: Junction 36 – Average AM Peak Queue Length

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC36_QL01	16	15	28	23	50	44	76	164	100
JC36_QL02	1	1	1	2	2	2	52	258	79
JC36_QL03	9	9	12	13	20	19	500	433	496
JC36_QL04	1	2	3	3	5	5	401	132	402

Table 7-15: Junction 36 – Average PM Peak Queue Length

The inter-peak (IP) and off-peak (OP) periods' maximum average queue length data are presented in Appendix D and Appendix E.

7.4 Average Queue Duration

Table 7-16 to Table 7-25 show the average queue duration for each of the five key junctions for all scenarios tested. It refers to the total time (mins) that vehicles would spend in queue conditions. In general, DS3 provides the most beneficial impacts in terms of less queuing time observed.

Junction 1: Wake Arms Roundabout

	AM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	0.73	0.80	4.52	4.32	5.81	6.09	8.06	2.23	9.24
J01_02	0.47	0.98	5.41	5.10	8.06	7.37	5.33	11.94	4.51
J01_03	2.65	4.13	9.35	9.05	9.75	9.10	12.42	9.99	7.39
J01_04	0.64	0.75	1.10	1.21	1.97	1.97	3.34	0.71	2.77
J01_05	0.11	0.13	0.28	0.25	0.52	0.56	0.86	0.22	0.08

Table 7-16: Junction 1 – Average AM Peak Queue Duration

	PM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	0.13	0.14	0.19	0.19	0.21	0.22	1.09	0.63	16.16
J01_02	0.15	0.20	0.45	0.34	0.52	0.54	2.03	3.34	0.07
J01_03	1.08	2.15	5.52	5.90	6.92	7.04	9.92	9.21	9.22
J01_04	0.68	0.93	4.74	4.64	5.62	6.08	10.28	4.86	13.42
J01_05	0.11	0.12	0.14	0.16	0.18	0.16	0.83	0.78	0.93

Table 7-17: Junction 1 – Average PM Peak Queue Duration

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	AM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	0.26	0.29	0.43	0.53	0.58	0.43	0.89	0.04	0.04
J33_02	2.52	3.40	6.42	6.41	7.41	7.43	8.97	5.00	5.04
J33_03	0.24	0.21	0.88	0.76	1.96	2.07	5.24	0.11	0.03
J33_04	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02

Table 7-18: Junction 33 – Average AM Peak Queue Duration

	PM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	0.14	0.20	0.23	0.15	0.20	0.20	0.33	0.11	0.07
J33_02	0.95	1.50	4.56	4.68	3.84	3.97	6.57	3.69	8.29
J33_03	0.25	0.34	0.36	0.42	0.92	0.51	7.14	0.09	0.03
J33_04	0.01	0.03	0.02	0.03	0.05	0.04	0.07	0.12	0.06

Table 7-19: Junction 33 – Average PM Peak Queue Duration

Junction 34: A112 Sewardstone Road/ Avey Lane

	AM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	0.00	0.00	0.01	0.01	0.03	0.03	0.04	0.04	0.04
J34_02	0.58	0.68	2.99	4.03	9.85	9.65	19.33	19.58	19.56
J34_03	0.02	0.06	0.10	0.10	0.20	0.17	0.18	0.18	0.18

Table 7-20: Junction 34 – Average AM Peak Queue Duration

	PM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J34_02	0.44	0.60	1.86	1.57	4.63	4.91	15.55	15.94	16.02
J34_03	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01

Table 7-21: Junction 34 – Average PM Peak Queue Duration

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	AM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	0.01	0.01	0.02	0.02	0.03	0.02	0.05	0.00	0.05
J35_02	0.24	0.29	0.71	0.73	2.00	1.92	3.20	0.65	2.57
J35_03	0.01	0.03	0.04	0.05	0.07	0.07	0.07	0.07	0.07

Table 7-22: Junction 35 – Average AM Peak Queue Duration

	PM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	0.00	0.01	0.01	0.01	0.01	0.01	0.09	0.00	0.16
J35_02	0.23	0.44	1.15	1.20	1.83	1.86	0.94	2.11	1.02
J35_03	0.01	0.01	0.02	0.02	0.01	0.01	1.48	0.01	1.60

Table 7-23: Junction 35 – Average PM Peak Queue Duration

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	AM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	0.78	1.04	3.02	2.89	3.92	3.90	5.36	2.92	5.99
J36_02	0.07	0.07	0.07	0.09	0.13	0.11	0.34	0.53	0.20
J36_03	0.18	0.23	0.54	0.56	2.31	2.16	4.25	0.05	3.48
J36_04	0.06	0.09	0.15	0.18	0.15	0.17	0.22	0.05	0.24

Table 7-24: Junction 36 – Average AM Peak Queue Duration

	PM (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	0.37	0.60	1.51	1.55	2.36	2.37	2.14	2.15	5.96
J36_02	0.02	0.02	0.02	0.03	0.03	0.03	0.19	1.04	0.44
J36_03	0.05	0.07	0.09	0.10	0.13	0.12	1.76	1.36	2.10
J36_04	0.02	0.03	0.05	0.05	0.06	0.06	2.49	0.45	3.62

Table 7-25: Junction 36 – Average PM Peak Queue Duration

The inter-peak (IP) and off-peak (OP) periods' queue duration data are presented in Appendix F and Appendix G.

7.5 Average Speeds

Table 7-26 to Table 7-35 show the average peak hour speeds (mph) for each of the five key junctions for all scenarios tested. Results show that there is minimal difference in terms of speed improvements when comparing DS2, DS3 and DS4.

Junction 1: Wake Arms Roundabout

	AM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	30.20	29.64	28.90	29.06	28.00	27.94	25.63	26.41	24.87
J01_02	33.62	33.53	32.10	32.55	29.85	30.09	31.28	27.92	31.32
J01_03	31.58	31.44	29.20	29.27	28.62	29.10	27.40	28.51	29.55
J01_04	25.58	25.43	25.12	25.08	25.49	25.06	25.59	24.49	25.62
J01_05	22.20	21.81	21.20	21.38	20.91	20.80	20.83	23.28	23.60

Table 7-26: Junction 1 – Average AM Peak Speeds

	PM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	31.16	30.91	30.99	31.00	30.82	30.82	30.26	29.94	22.69
J01_02	33.33	33.25	33.07	32.96	32.76	32.87	32.85	32.96	33.29
J01_03	30.90	30.76	28.18	27.88	27.30	27.29	26.26	26.75	26.98
J01_04	25.61	25.86	25.39	25.29	23.65	23.72	22.97	23.52	22.46
J01_05	21.75	20.49	17.91	17.88	24.31	24.62	20.78	23.50	24.06

Table 7-27: Junction 1 – Average PM Peak Speeds

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	AM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83
J33_02	22.20	21.81	21.20	21.38	20.91	20.80	20.83	23.28	23.60
J33_03	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83
J33_04	22.20	21.81	21.20	21.38	20.91	20.80	20.83	23.28	23.60

Table 7-28: Junction 33 – Average AM Peak Speeds

	PM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12
J33_02	21.75	20.49	17.91	17.88	24.31	24.62	20.78	23.50	24.06
J33_03	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12
J33_04	21.75	20.49	17.91	17.88	24.31	24.62	20.78	23.50	24.06

Table 7-29: Junction 33 – Average PM Peak Speeds

Junction 34: A112 Sewardstone Road/ Avey Lane

	AM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	22.20	21.81	21.20	21.38	20.91	20.80	20.83	23.28	23.60
J34_02	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83
J34_03	22.20	21.81	21.20	21.38	20.91	20.80	20.83	23.28	23.60

Table 7-30: Junction 34 – Average AM Peak Speeds

	PM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	21.75	20.49	17.91	17.88	24.31	24.62	20.78	23.50	24.06
J34_02	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12
J34_03	21.75	20.49	17.91	17.88	24.31	24.62	20.78	23.50	24.06

Table 7-31: Junction 34 – Average PM Peak Speeds

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	AM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83
J35_02	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83
J35_03	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83

Table 7-32: Junction 35 – Average AM Peak Speeds

	PM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12
J35_02	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12
J35_03	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12

Table 7-33: Junction 35 – Average PM Peak Speeds

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	AM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	25.58	25.43	25.12	25.08	25.49	25.06	25.59	24.49	25.62
J36_02	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83
J36_03	25.58	25.43	25.12	25.08	25.49	25.06	25.59	24.49	25.62
J36_04	31.63	31.81	31.36	31.04	30.94	31.42	29.91	29.59	29.83

Table 7-34: Junction 36 – Average AM Peak Speeds

	PM (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	25.61	25.86	25.39	25.29	23.65	23.72	22.97	23.52	22.46
J36_02	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12
J36_03	25.61	25.86	25.39	25.29	23.65	23.72	22.97	23.52	22.46
J36_04	32.13	31.27	32.03	31.67	31.21	31.23	29.18	29.13	29.12

Table 7-35: Junction 36 – Average PM Peak Speeds

The inter-peak (IP) and off-peak (OP) periods average speed data are presented in Appendix H and Appendix I.

7.6 Journey Time Comparison

The Sections below summarise the journey time comparison for all scenarios tested. Results show that, generally, the DS2 scenario, without any highway mitigation measures, has the most detrimental impact in terms of increasing travel times for all three journey time routes for both AM and PM peak periods. In comparison, the potential improvements at Wake Arms Roundabout, Robinhood Roundabout and A121 / Woodgreen / Forest Side junction DS3, have enhanced the overall travel time for most of the routes.

Route 1: A112 to Forest Road

Figure 7-6 shows the alignment of journey time Route 1 and Figure 7-7 to Figure 7-10 presents the comparison of travel time per route section.

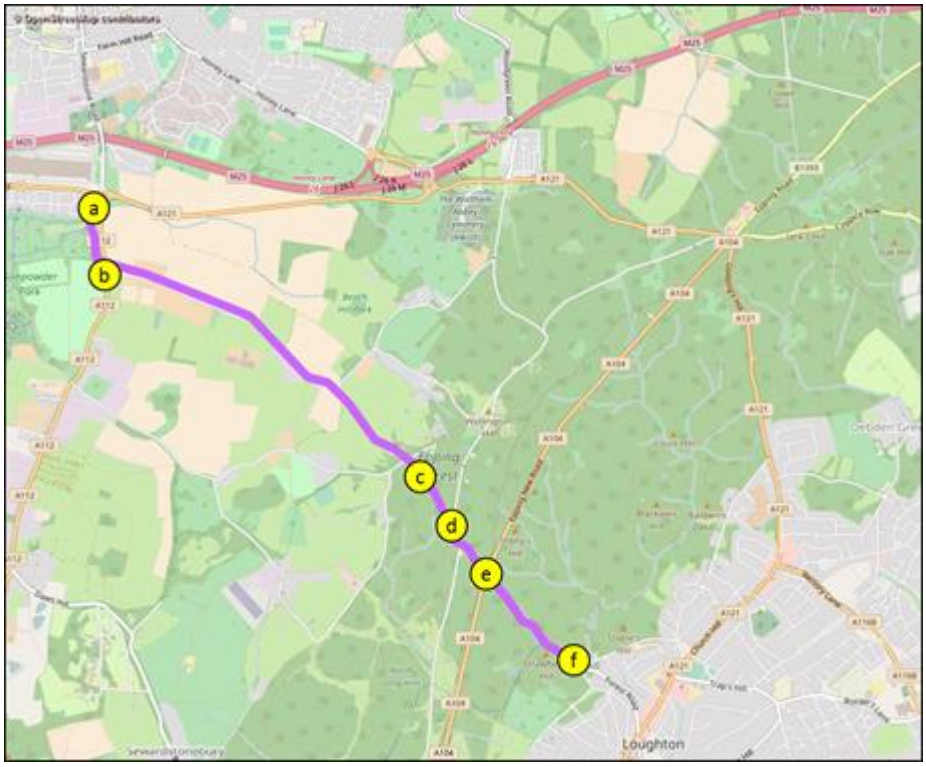

Figure 7-6: Journey Time Route 1 Alignment

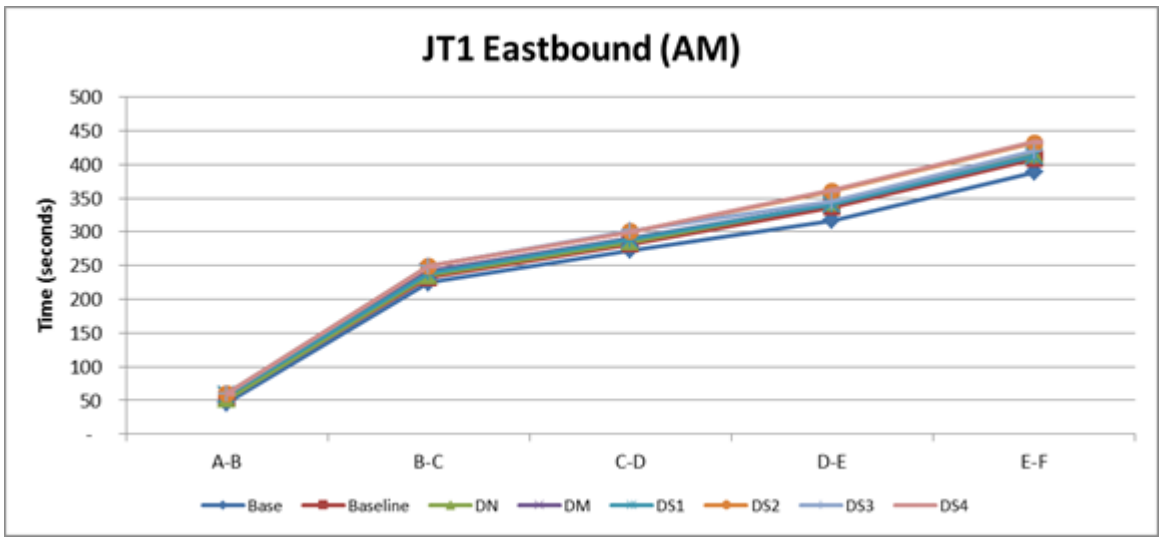

Figure 7-7: Journey Time Route 1 Comparison, Eastbound (AM Peak)

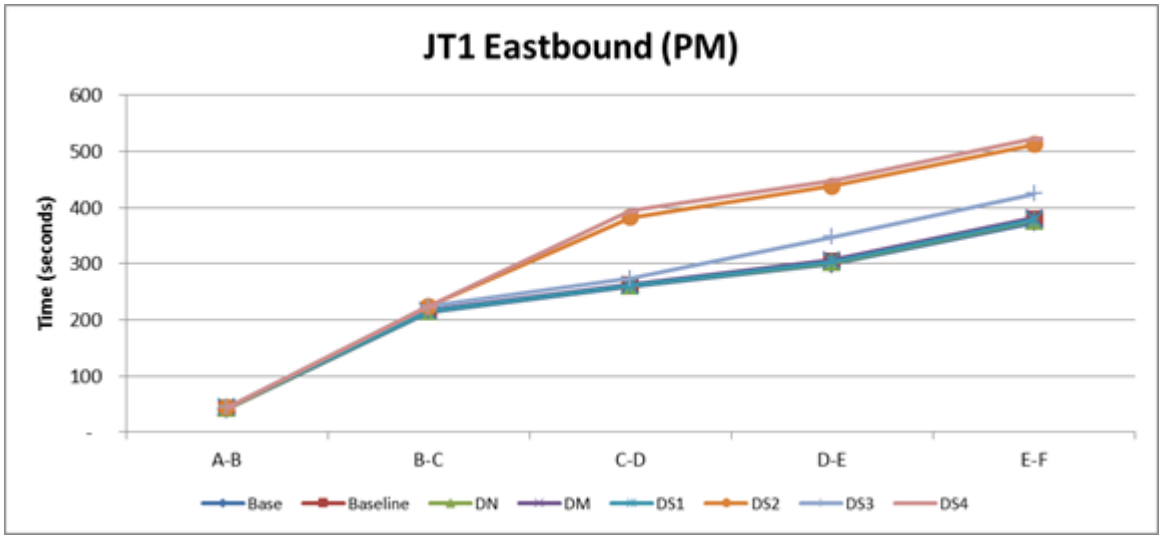

Figure 7-8: Journey Time Route 1 Comparison, Eastbound (PM Peak)

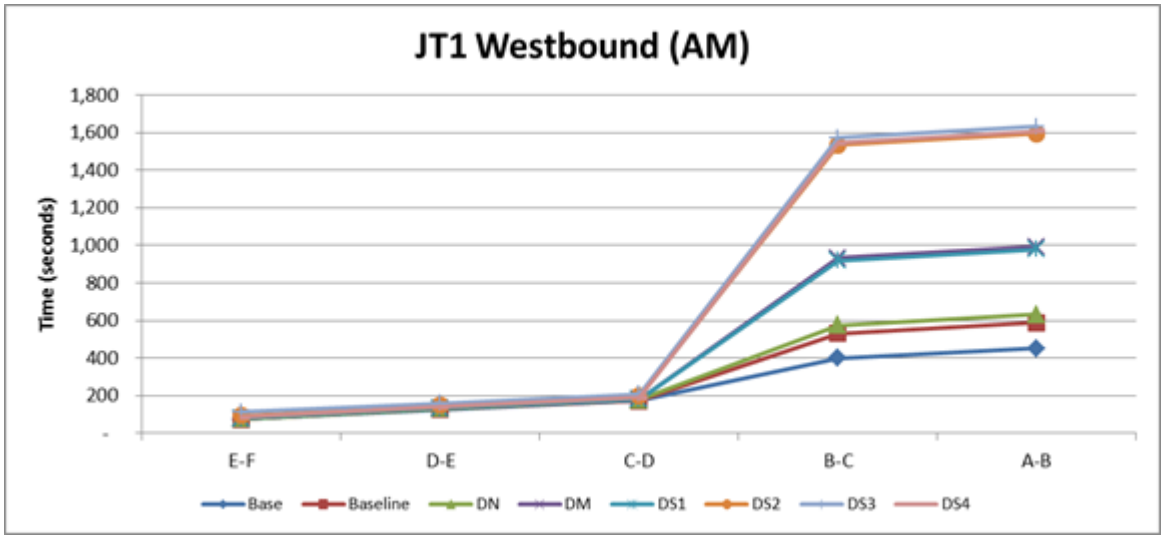

Figure 7-9: Journey Time Route 1 Comparison, Westbound (AM Peak)

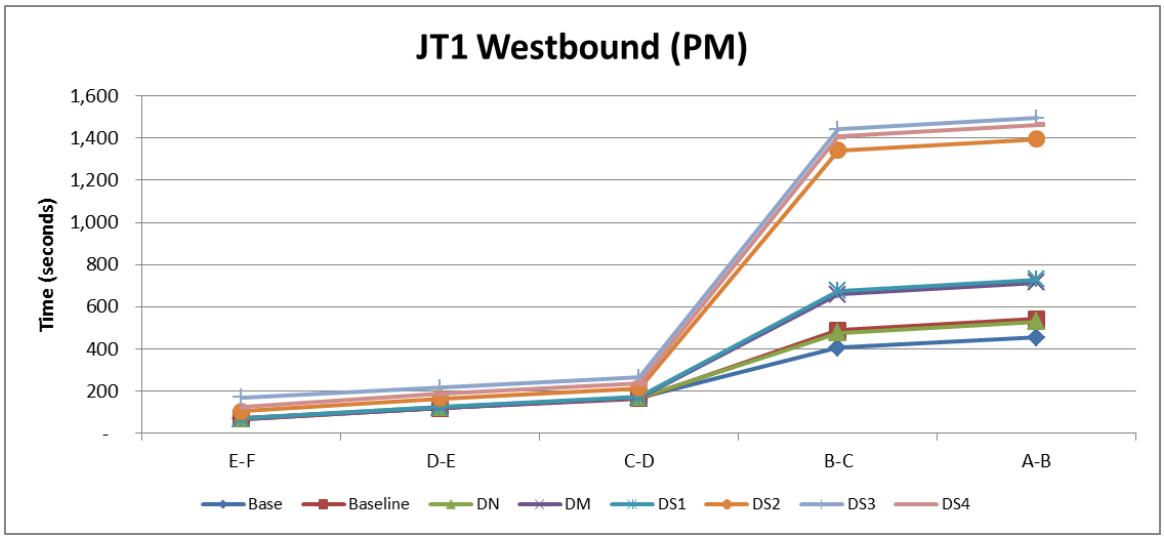

Figure 7-10: Journey Time Route 1 Comparison, Westbound (PM Peak)

Route 2: Epping Road to Epping New Road

Figure 7-11 shows the alignment of journey time Route 2 while Figure 7-12 to Figure 7-15 presents the comparison of travel time per route section.

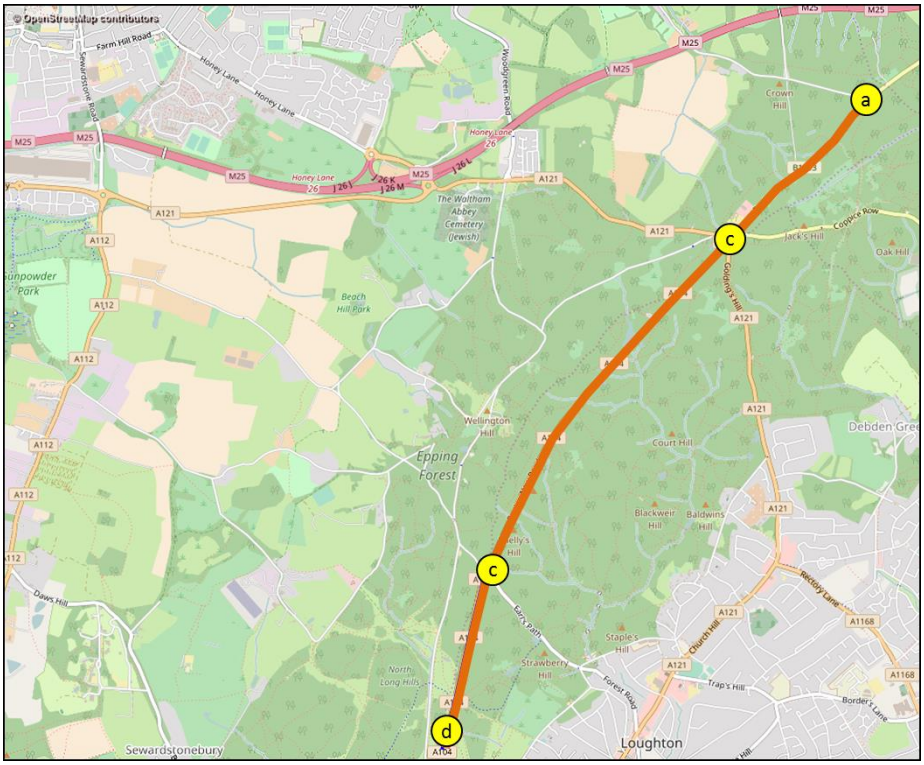

Figure 7-11: Journey Time Route 2 Alignment

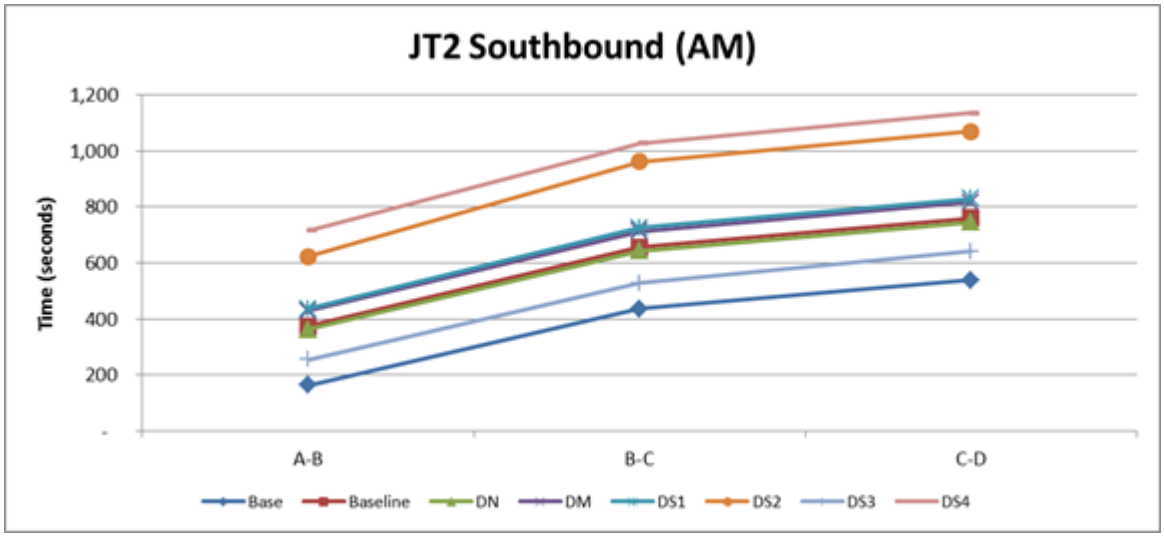

Figure 7-12: Journey Time Route 2 Comparison, Southbound (AM Peak)

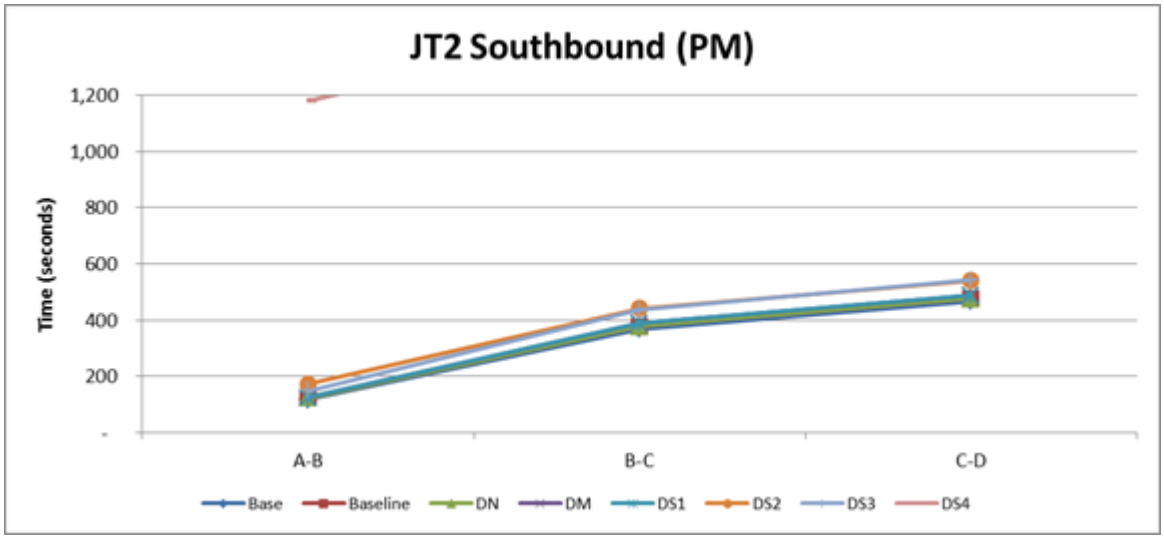

Figure 7-13: Journey Time Route 2 Comparison, Southbound (PM Peak)

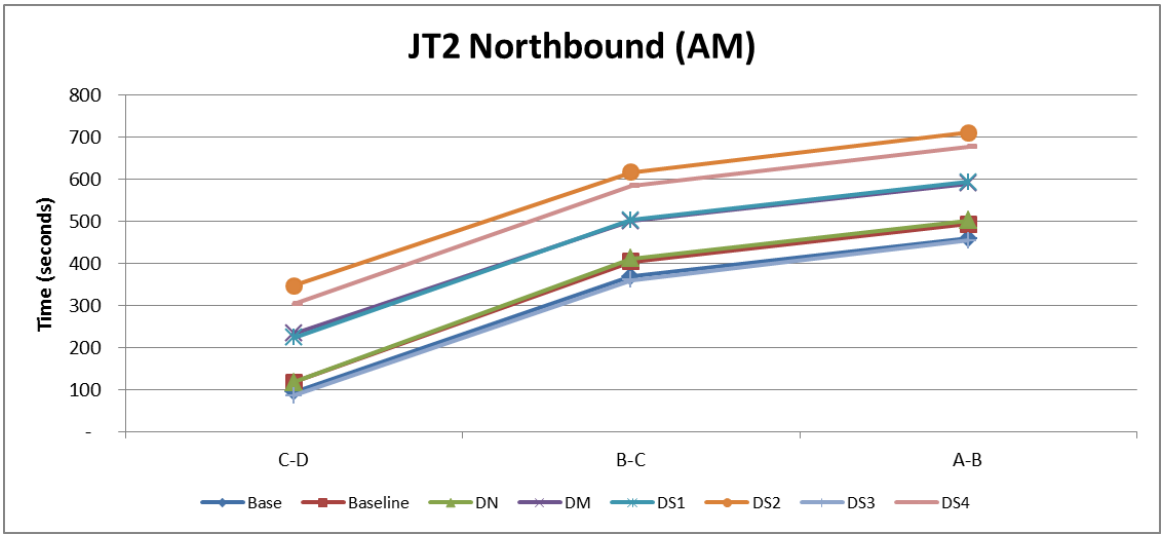

Figure 7-14: Journey Time Route 2 Comparison, Northbound (AM Peak)

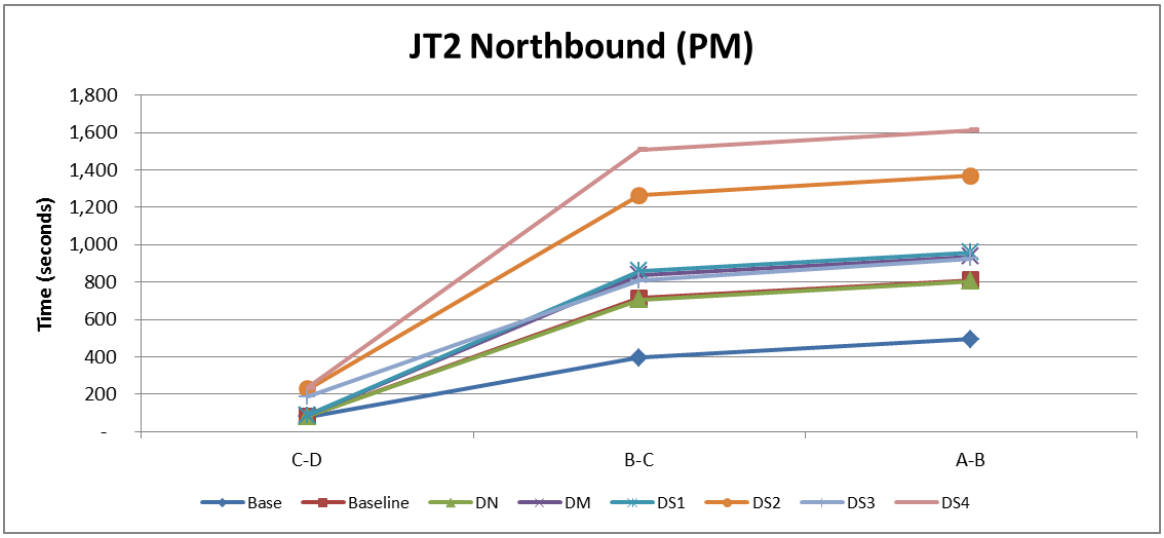

Figure 7-15: Journey Time Route 2 Comparison, Northbound (PM Peak)

Route 3: Honey Lane to B172

Figure 7-16 shows the alignment of journey time Route 3 and Figure 7-17 to Figure 7-20 presents the comparison of travel time per route section.

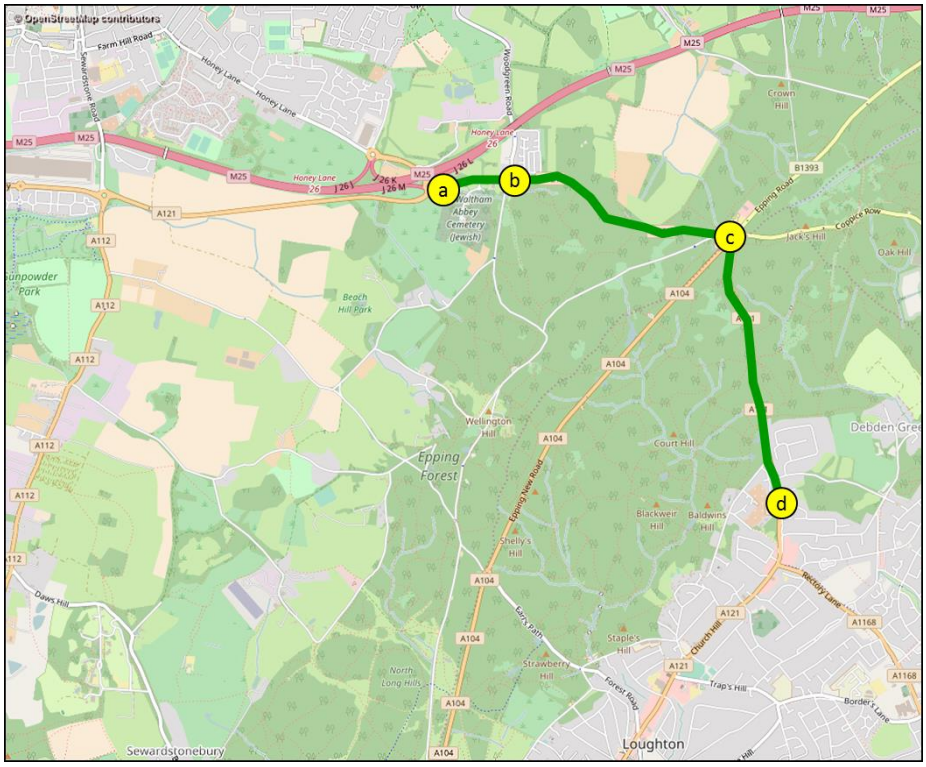

Figure 7-16: Journey Time Route 3 Alignment

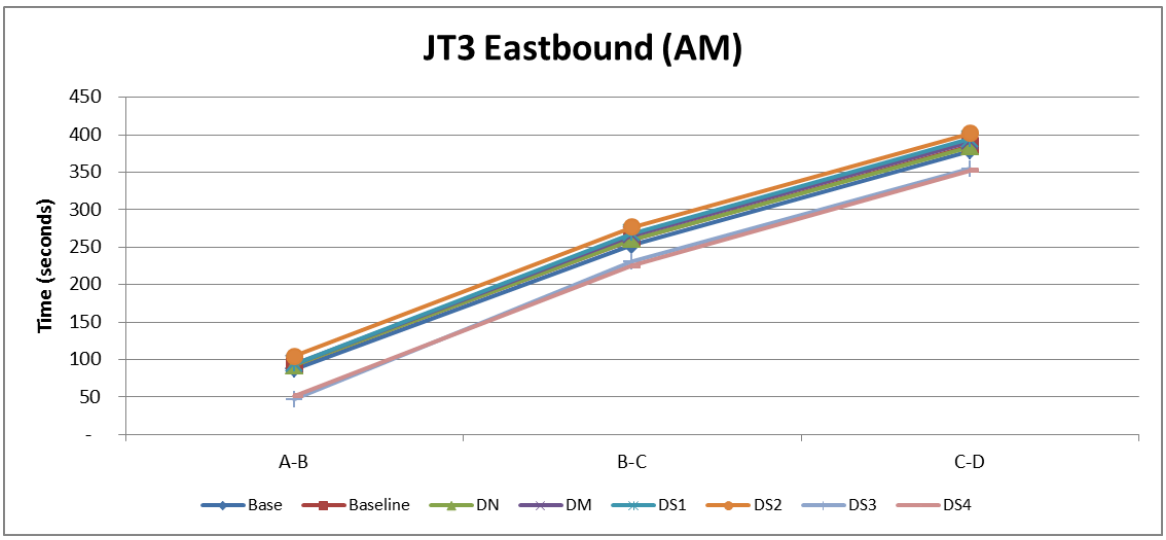

Figure 7-17: Journey Time Route 3 Comparison, Eastbound (AM Peak)

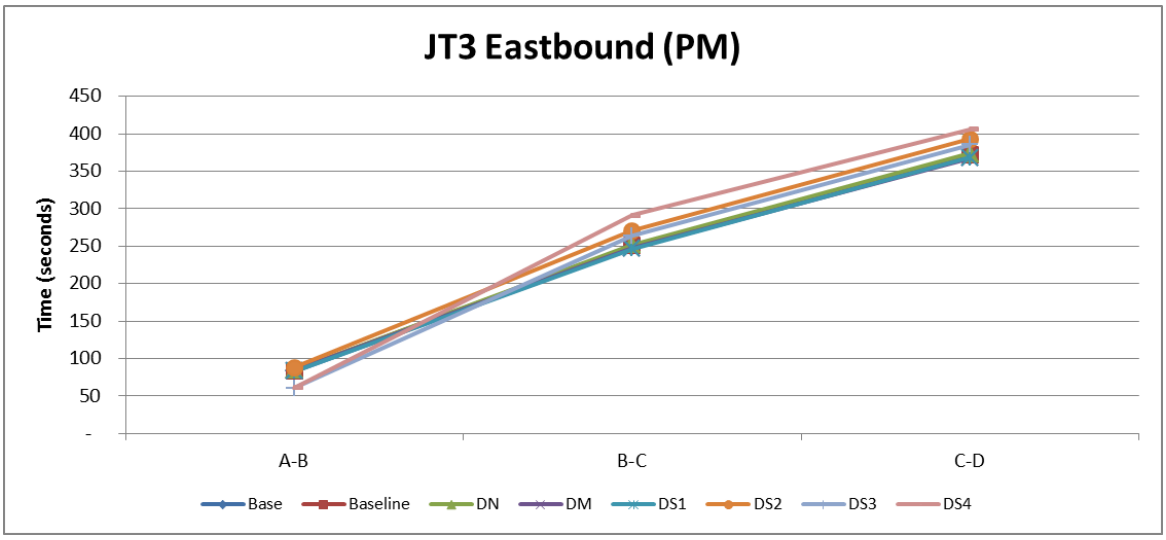

Figure 7-18: Journey Time Route 3 Comparison, Eastbound (PM Peak)

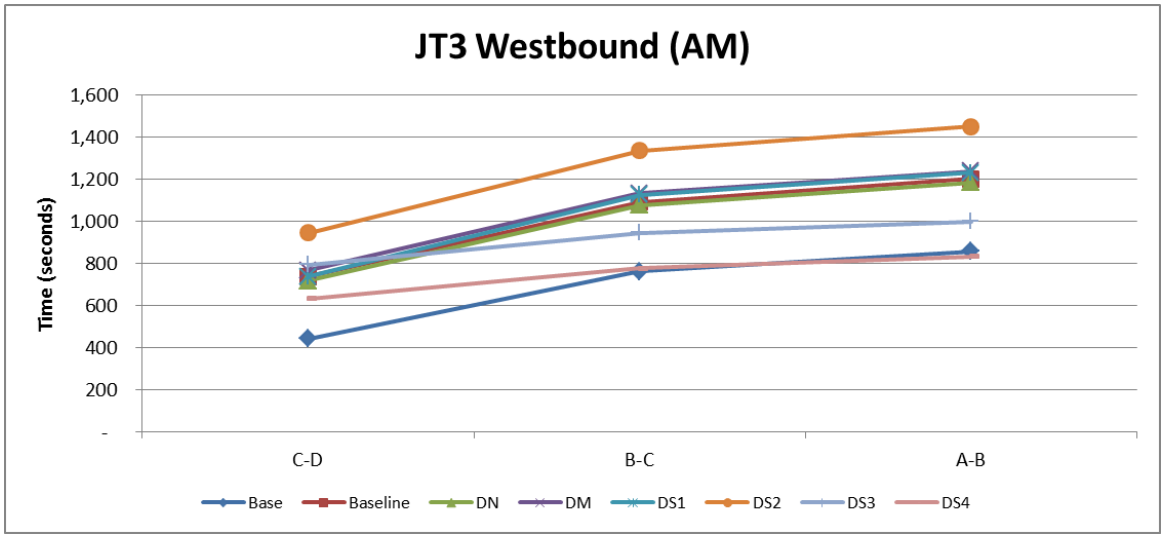

Figure 7-19: Journey Time Route 3 Comparison, Westbound (AM Peak)

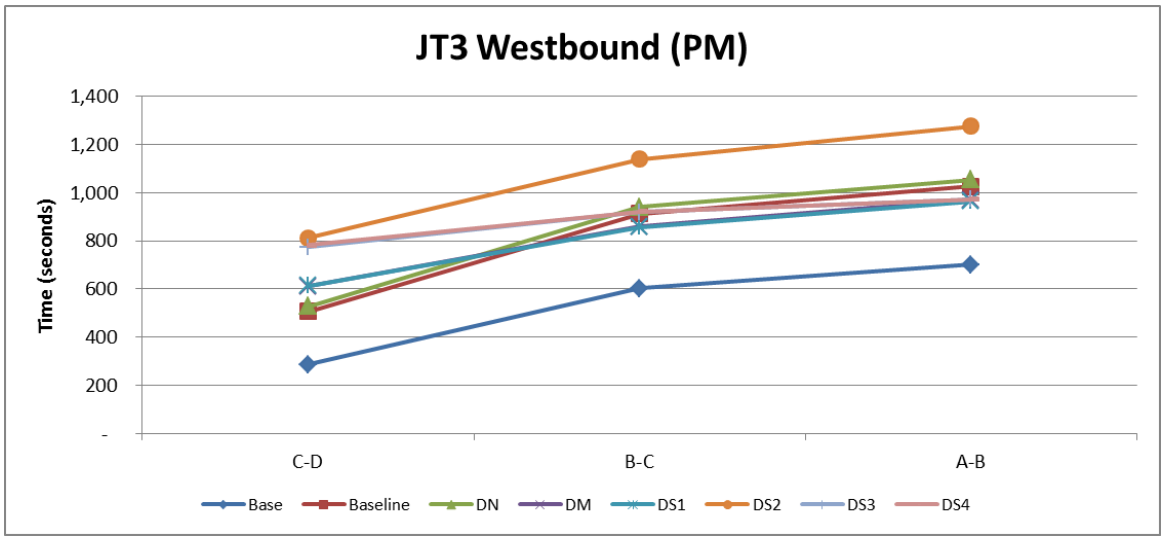

Figure 7-20: Journey Time Route 3 Comparison, Westbound (PM Peak)

The inter-peak (IP) and off-peak (OP) periods journey time comparisons are presented in Appendix J.

8 Summary

Jacobs were commissioned by Epping Forest District Council (EFDC) to prepare a package of VISSIM microsimulation traffic models of the Epping Forest Special Area of Conservation (SAC) to support the Epping Forest District LPSV.

The models have been specifically developed to provide forecast traffic data for an air quality assessment being prepared by AECOM. It was agreed at the outset that the VISSIM modelling software provided the necessary speed, traffic and network performance outputs required to assess the more detailed traffic related impacts to air quality.

This technical note details the base model calibration and validation of the VISSIM models. The note demonstrates that the models validate sufficiently in line with the TfL Modelling Guidelines and Model Audit Process and can be considered fit for purpose.

A series of scenarios were undertaken to test the impacts of planned local developments on the Epping Forest Special Area of Conservation (SAC). Mitigation highway schemes were also tested to appraise their impacts in improving the future year traffic conditions.

Overall, the DS3 scenario, which includes potential mitigation options at Wake Arms Roundabout, Robinhood Roundabout and A121 / Woodgreen / Forest Side junction, predicts better modelled journey times and queue length across the study area.

Appendix A. Link Flow Validation

AM Peak Traffic Comparison						
ATC No.	Road Name	Direction	Observed Traffic Volumes	Modelled Traffic Volumes	Difference-Total	GEH Total Vehicles
ATC 1	Woodridden Hill	EB	795	820	25	0.86
		WB	863	890	27	0.90
ATC 2	Epping New Road (South of Wake Arm Rbt)	NB	437	455	18	0.84
		SB	779	842	63	2.20
ATC 3	Avey Ln	EB	163	185	22	1.65
		WB	56	82	26	3.14
ATC 4	Epping New Road (North of Wake Arm Rbt)	NB	496	458	-38	1.75
		SB	802	958	156	5.26
ATC 5	B 172	EB	159	105	-54	4.69
		WB	433	489	56	2.60
ATC 6	Goldling's Hill	NB	524	588	64	2.73
		SB	767	729	-38	1.40

PM Peak Traffic Comparison							
ATC No.	Road Name	Direction	Link Number	Observed Traffic Volumes	Modelled Traffic Volumes	Difference-Total	GEH Total Veh
ATC 1	Woodridden Hill	EB	11	756	667	-89	3.35
		WB	12	878	816	-62	2.13
ATC 2	Epping New Road (South of Wake Arm Rbt)	NB	36	536	541	5	0.21
		SB	35	484	531	47	2.07
ATC 3	Avey Ln	EB	54	111	93	-18	1.77
		WB	53	93	95	2	0.23
ATC 4	Epping New Road (North of Wake Arm Rbt)	NB	21	696	769	74	2.72
		SB	59	666	689	23	0.87
ATC 5	B 172	EB	23	292	278	-14	0.85
		WB	24	320	314	-6	0.35
ATC 6	Goldling's Hill	NB	30	727	764	37	1.37
		SB	29	683	590	-93	3.69

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Appendix B. Turning Flow Validation

AM Peak Traffic Comparison							
Junction No	Junction Name	Junction Arm	Direction	Observed Traffic Volumes	Modelled Traffic Volumes	Difference-Total	GEH Total Veh
JC1	Wake Arms Roundabout	A (B1393 - Epping Road)	A - A	113	155	41.54	3.59
			A - B	0	0	0.00	0.00
			A - C	129	237	107.89	7.97
			A - D	434	305	-129.42	6.73
			A - E	155	174	19.43	1.52
		B (B172)	B - A	12	9	-3.02	0.93
			B - B	12	7	-5.13	1.66
			B - C	26	45	18.58	3.11
			B - D	152	178	25.95	2.02
			B - E	290	213	-76.73	4.84
		C (A121 - Golding's Hill)	C - A	138	144	6.02	0.51
			C - B	11	8	-2.60	0.85
			C - C	5	10	4.50	1.62
			C - D	17	43	25.60	4.66
			C - E	352	309	-43.12	2.37
		D (A104- Epping New Road)	D -A	143	134	-8.84	0.75
			D - B	27	32	4.57	0.84
			D - C	10	13	2.71	0.80
			D - D	62	0	-62.29	11.16
			D - E	260	248	-11.76	0.74
		E (A121- Woodridden Hill)	E - A	32	22	-9.68	1.87
			E - B	66	60	-6.32	0.80
			E - C	382	419	36.73	1.84
			E - D	333	314	-19.02	1.06
			E -E	16	13	-3.25	0.85
JC33	Woodgreen Rd/ Woodridden Hill/ Forest Side/ Honey Ln	A (Woodgreen Rd)	A - A	3	3	-0.16	0.09
			A - B	155	152	-2.51	0.20
			A - C	24	21	-2.78	0.59
			A - D	31	25	-5.88	1.11
		B (A121 - Woodridden Hill)	B - A	55	51	-3.94	0.54
			B - C	46	47	0.60	0.09
			B - D	969	766	-203.04	6.89
		C (Forest Side)	C - A	9	6	-2.57	0.95
			C - B	117	136	18.52	1.64
			C - D	76	57	-18.99	2.33
		D (A121 - Honey Ln)	D - A	14	12	-1.84	0.51
			D - B	525	529	3.92	0.17
			D - C	72	57	-15.09	1.88
JC34			A - B	147	172	24.53	1.94

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AM Peak Traffic Comparison							
Junction No	Junction Name	Junction Arm	Direction	Observed Traffic Volumes	Modelled Traffic Volumes	Difference-Total	GEH Total Veh
	Sewardstone Rd/ Avey Ln	A (A112 - Sewardstone Rd - North Arm)	A - C	1134	1139	4.74	0.14
		B (Avey Ln)	B - A	31	57	25.58	3.85
			B - C	19	23	4.02	0.88
		C (A112 - Sewardstone Rd - South Arm)	C - A	486	490	4.33	0.20
			C - B	7	16	9.02	2.66
JC35	High Beech/Cross Roads/ High Beech Loughton	A (High Beech)	A - B	140	143	2.69	0.23
			A - C	2	1	-0.69	0.60
		B (Crossroads)	B - A	260	221	-39.49	2.54
			B - C	49	82	33.29	4.12
		C (High Beech Loughton	C - A	4	2	-1.93	1.12
			C - B	151	177	26.48	2.07
JC36	Epping New Rd/ Earl's Path/ Cross Roads	A (A104 - Epping New Rd - North Arm)	A - A	169	13	-156.42	16.38
			A - B	133	95	-37.85	3.55
			A - C	994	670	-323.59	11.22
			A - D	99	52	-46.70	5.38
		B (Earl's Path)	B - A	72	64	-7.64	0.93
			B - B	3	2	-1.11	0.70
			B - C	24	32	7.66	1.44
			B - D	74	72	-2.16	0.25
		C (A104 - Epping New Rd - South Arm)	C - A	357	375	18.31	0.96
			C - B	25	24	-0.72	0.15
			C - C	8	8	0.33	0.12
			C - D	136	148	11.68	0.98
		D (Cross Roads)	D - A	12	11	-0.99	0.29
			D - B	80	59	-21.04	2.52
			D - C	199	207	8.20	0.58
			D - D	52	34	-17.51	2.68

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PM Peak Traffic Comparison							
Junction No	Junction Name	Junction Arm	Direction	Observed Traffic Volumes	Modelled Traffic Volumes	Difference-Total	GEH Total Veh
JC1	Wake Arms Roundabout	A (B1393 - Epping Road)	A - A	14	43	28.66	5.35
			A - B	43	70	26.85	3.57
			A - C	342	346	4.06	0.22
			A - D	162	166	3.73	0.29
			A - E	80	68	-12.13	1.41
		B (B172)	B - A	77	127	49.75	4.92
			B - B	12	13	1.45	0.41
			B - C	54	46	-8.06	1.14
			B - D	47	42	-4.92	0.74
			B - E	114	88	-26.32	2.62
		C (A121 - Golding's Hill)	C - A	361	361	0.12	0.01
			C - B	47	88	40.80	4.96
			C - C	7	7	0.45	0.17
			C - D	34	91	56.53	7.14
			C - E	251	182	-69.21	4.70
		D (A104- Epping New Road)	D -A	90	117	27.14	2.67
			D - B	50	32	-18.39	2.87
			D - C	17	13	-4.44	1.14
			D - D	35	0	-35.14	8.38
			D - E	401	372	-28.73	1.46
		E (A121- Woodridden Hill)	E - A	122	120	-1.93	0.18
			E - B	107	70	-36.93	3.93
			E - C	245	179	-65.89	4.53
			E - D	257	234	-22.72	1.45
			E -E	65	110	45.08	4.82
JC33	Woodgreen Rd/ Woodridden Hill/ Forest Side/ Honey Ln	A (Woodgreen Rd)	A - A	4	2	-2.26	1.28
			A - B	71	55	-16.14	2.03
			A - C	8	6	-1.76	0.67
			A - D	39	51	11.85	1.77
		B (A121 - Woodridden Hill)	B - A	112	61	-51.31	5.51
			B - C	124	114	-10.10	0.93
			B - D	926	633	-293.03	10.50
		C (Forest Side)	C - A	13	8	-4.71	1.46
			C - B	40	42	2.08	0.33
			C - D	135	130	-5.02	0.44
		D (A121 - Honey Ln)	D - A	60	99	39.28	4.41
			D - B	666	563	-102.58	4.14
			D - C	192	186	-5.54	0.40
JC34			A - B	75	84	8.98	1.01

JACOBS

PM Peak Traffic Comparison							
Junction No	Junction Name	Junction Arm	Direction	Observed Traffic Volumes	Modelled Traffic Volumes	Difference-Total	GEH Total Veh
	Sewardstone Rd/ Avey Ln	A (A112 - Sewardstone Rd - North Arm)	A - C	772	793	20.79	0.74
		B (Avey Ln)	B - A	125	82	-42.74	4.20
			B - C	25	15	-10.21	2.28
		C (A112 - Sewardstone Rd - South Arm)	C - A	961	990	29.09	0.93
			C - B	32	10	-21.58	4.73
JC35	High Beech/Cross Roads/ High Beech Loughton	A (High Beech)	A - B	302	227	-74.76	4.60
			A - C	3	1	-1.78	1.29
		B (Crossroads)	B - A	171	153	-17.64	1.39
			B - C	70	93	23.34	2.59
		C (High Beech Loughton	C - A	1	0	-1.25	1.58
			C - B	105	92	-13.35	1.34
JC36	Epping New Rd/ Earl's Path/ Cross Roads	A (A104 - Epping New Rd - North Arm)	A - A	40	6	-34.46	7.15
			A - B	117	86	-31.43	3.12
			A - C	331	384	53.27	2.82
			A - D	44	53	9.33	1.34
		B (Earl's Path)	B - A	93	89	-4.17	0.44
			B - B	8	3	-4.55	1.98
			B - C	23	16	-6.71	1.53
			B - D	39	52	12.72	1.88
		C (A104 - Epping New Rd - South Arm)	C - A	385	360	-24.95	1.29
			C - B	0	3	3.00	0.00
			C - C	5	3	-1.92	0.96
			C - D	85	103	18.24	1.88
		D (Cross Roads)	D - A	80	84	3.69	0.41
			D - B	86	46	-40.28	4.95
			D - C	176	148	-27.53	2.16
			D - D	35	37	2.17	0.36

JACOBS

Appendix C. Journey Time Validation

Scenario	Route	Direction	Section	Description	Distance (m)	Observed Average Travel Time (seconds)	Modelled Average Travel Time (seconds)	Difference	Variation
AM PEAK	JT1	EB	A-B	Meridian Way/Sewardstone Rd - Avey Ln	448	42	47	4	0.10
			B-C	Avey Ln/Sewardstone Rd - Mott St	2340	187	178	-9	-0.05
			C-D	Mott St - High Beach	395	48	48	0	0.01
			D-E	High Beach - Epping New Rd Roundabout	512	51	46	15	-0.10
			E-F	Epping New Rd Roundabout - Earl's Path/Staples Rd	906	76	72	-4	-0.06
		WB	F-E	Epping New Rd Roundabout - Earl's Path/Staples Rd	818	86	75	18	-0.13
			E-D	High Beach - Epping New Rd Roundabout	596	46	52	-29	0.12
			D-C	Mott St - High Beach	396	52	46	-5	-0.11
			C-B	Avey Ln/Sewardstone Rd - Mott St	2341	219	225	6	0.03
			B-A	Meridian Way/Sewardstone Rd - Avey Ln	450	57	54	-3	-0.06
	JT2	SB	A-B	B1393 Epping Rd to Wake Arms Roundabout	1213	174	165	73	-0.06
			B-C	Wake Arms Roundabout to A104 Epping New Rd mid-point	2738	155	275	121	0.78
			C-D	Robin Hood Roundabout to A104 Epping New Rd (south)	882	113	103	-10	-0.09
		NB	D-C	A104 Epping New Rd (south) to Robin Hood Roundabout	808	85	95	10	0.11
			C-B	Robin Hood Roundabout to A104 Epping New Rd	2719	196	277	81	0.41
			B-A	B1393 Epping Rd to Wake Arms Roundabout	1284	77	90	13	0.18
	JT3	EB	A-B	A121 Honey Ln / M25 J26 to A121 Honey Ln j/w Forest Side	480	92	88	-4	-0.05
			B-C	A121 Honey Ln j/w Forest Side to A121 Wake Arms r'bout	1523	164	165	2	0.01
			C-D	A121 Wake Arms r'bout to A121 Goldings Hill	1457	132	126	32	-0.05
		WB	D-C	A121 Goldings Hill to A121 Wake Arms r'bout	1339	353	400	46	0.13
			C-B	A121 Wake Arms r'bout to A121 Honey Ln j/w Forest Side	1640	343	337	-6	-0.02
			B-A	A121 Honey Ln / M25 J26 to A121 Honey Ln j/w Forest Side	471	106	94	-13	-0.12

JACOBS

Scenario	Route	Direction	Section	Description	Distance (m)	Observed Average Travel Time (seconds)	Modelled Average Travel Time (seconds)	Difference	Variation
PM PEAK	JT1	EB	A-B	Meridian Way/Sewardstone Rd - Avey Ln	448	37	41	10	0.12
			B-C	Avey Ln/Sewardstone Rd - Mott St	2340	193	173	-21	-0.11
			C-D	Mott St - High Beach	395	47	46	-1	-0.02
			D-E	High Beach - Epping New Rd Roundabout	512	35	39	5	0.14
			E-F	Epping New Rd Roundabout - Earl's Path/Staples Rd	906	77	74	-3	-0.03
		WB	F-E	Epping New Rd Roundabout - Earl's Path/Staples Rd	818	60	68	9	0.14
			E-D	High Beach - Epping New Rd Roundabout	596	48	51	-20	0.06
			D-C	Mott St - High Beach	396	54	48	-6	-0.11
			C-B	Avey Ln/Sewardstone Rd - Mott St	2341	262	238	33	-0.09
			B-A	Meridian Way/Sewardstone Rd - Avey Ln	450	75	49	-26	-0.34
	JT2	SB	A-B	B1393 Epping Rd to Wake Arms Roundabout	1213	107	118	38	0.10
			B-C	Wake Arms Roundabout to A104 Epping New Rd mid-point	2738	149	250	101	0.68
			C-D	Robin Hood Roundabout to A104 Epping New Rd (south)	882	105	99	-7	-0.06
		NB	D-C	A104 Epping New Rd (south) to Robin Hood Roundabout	808	87	80	-6	-0.07
			C-B	Robin Hood Roundabout to A104 Epping New Rd	2719	338	315	-23	-0.07
			B-A	B1393 Epping Rd to Wake Arms Roundabout	1284	82	99	17	0.21
	JT3	EB	A-B	A121 Honey Ln / M25 J26 to A121 Honey Ln j/w Forest Side	480	77	83	6	0.08
			B-C	A121 Honey Ln j/w Forest Side to A121 Wake Arms r'bout	1523	160	165	5	0.03
			C-D	A121 Wake Arms r'bout to A121 Goldings Hill	1457	117	121	29	0.03
		WB	D-C	A121 Goldings Hill to A121 Wake Arms r'bout	1339	255	286	100	0.12
			C-B	A121 Wake Arms r'bout to A121 Honey Ln j/w Forest Side	1640	337	316	-21	-0.06
			B-A	A121 Honey Ln / M25 J26 to A121 Honey Ln j/w Forest Side	471	102	99	-3	-0.03

Appendix D. Maximum Average Queue Length Comparisons (IP)

Junction 1: Wake Arms Roundabout

	Queue Length IP (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC01_QL01	8	13	23	26	65	27	452	277	492
JC01_QL02	2	2	3	3	5	5	14	5	3
JC01_QL03	8	9	39	29	97	131	481	75	119
JC01_QL04	17	18	59	60	158	180	486	18	418
JC01_QL05	3	4	5	7	9	8	7	4	37

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	Queue Length IP (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC33_QL01	4	5	15	11	19	27	42	1	1
JC33_QL02	19	2	197	277	335	310	415	8	0
JC33_QL03	3	3	11	13	35	20	76	0	0
JC33_QL04	1	1	1	9	12	5	7	9	2

Junction 34: A112 Sewardstone Road/ Avey Lane

	Queue Length IP (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC34_QL01	0	0	0	0	0	0	0	0	0
JC34_QL02	4	5	7	7	9	9	29	25	21
JC34_QL03	1	1	2	2	2	3	2	2	2

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	Queue Length IP (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC35_QL01	0	0	0	0	0	0	0	0	0
JC35_QL02	0	0	0	0	0	0	0	0	1
JC35_QL03	0	0	0	0	0	0	0	0	0

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	Queue Length IP (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC36_QL01	7	8	15	13	21	13	34	2	18
JC36_QL02	1	0	1	1	1	1	1	2	1
JC36_QL03	7	12	17	13	14	19	47	2	33
JC36_QL04	0	1	2	1	2	1	6	0	5

Appendix E. Maximum Average Queue Length Comparisons (OP)

Junction 1: Wake Arms Roundabout

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC01_QL01	0	0	0	0	0	0	0	0	0
JC01_QL02	0	0	0	0	0	0	0	0	0
JC01_QL03	0	0	0	0	0	0	0	0	0
JC01_QL04	0	0	0	0	0	0	1	0	1
JC01_QL05	0	0	0	0	0	0	0	0	0

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC33_QL01	0	0	0	0	0	0	0	0	0
JC33_QL02	0	0	0	0	0	0	0	0	0
JC33_QL03	0	0	0	0	0	0	0	0	0
JC33_QL04	0	0	0	0	0	0	0	0	0

Junction 34: A112 Sewardstone Road/ Avey Lane

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC34_QL01	0	0	0	0	0	0	0	0	0
JC34_QL02	0	0	0	0	0	0	0	0	0
JC34_QL03	0	0	0	0	0	0	0	0	0

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC35_QL01	0	0	0	0	0	0	0	0	0
JC35_QL02	0	0	0	0	0	0	0	0	0
JC35_QL03	0	0	0	0	0	0	0	0	0

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	Queue Length PM (metres)								
	2014	2017	Baseline	Do Nothing	Do Minimum	Do Something 1	Do Something 2	Do Something 3	Do Something 4
JC36_QL01	0	0	0	0	0	0	1	0	0
JC36_QL02	0	0	0	0	0	0	0	0	0
JC36_QL03	0	0	0	0	0	0	0	0	0
JC36_QL04	0	0	0	0	0	0	0	0	0

Appendix F. Average Queue Duration (IP)

Junction 1: Wake Arms Roundabout

	IP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	0.13	0.18	0.29	0.32	0.50	0.35	2.90	1.52	13.63
J01_02	0.04	0.04	0.06	0.06	0.04	0.06	0.20	0.10	0.06
J01_03	0.08	0.09	0.23	0.22	0.33	0.41	3.75	0.70	0.54
J01_04	0.26	0.31	0.56	0.56	0.81	0.85	5.07	0.23	2.96
J01_05	0.06	0.07	0.13	0.12	0.17	0.16	0.33	0.04	0.14

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	IP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	0.16	0.25	0.69	0.60	0.74	0.76	1.19	0.04	0.04
J33_02	0.27	0.33	2.18	2.20	2.78	2.96	6.11	0.69	2.34
J33_03	0.17	0.18	0.36	0.38	0.58	0.58	2.03	0.01	0.02
J33_04	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.03

Junction 34: A112 Sewardstone Road/ Avey Lane

	IP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J34_02	0.23	0.22	0.35	0.36	0.41	0.40	0.82	0.62	0.96
J34_03	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	IP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J35_02	0.08	0.09	0.16	0.14	0.16	0.17	0.38	0.13	0.48
J35_03	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	IP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	0.19	0.22	0.35	0.34	0.47	0.42	1.85	0.88	4.75
J36_02	0.01	0.01	0.02	0.02	0.01	0.03	0.02	0.04	0.02
J36_03	0.05	0.05	0.10	0.08	0.10	0.11	0.23	0.02	0.18
J36_04	0.02	0.03	0.04	0.04	0.04	0.04	0.08	0.01	0.07

Appendix G. Average Queue Duration (OP)

Junction 1: Wake Arms Roundabout

	OP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
J01_02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01
J01_03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01
J01_04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02
J01_05	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	OP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J33_02	0.02	0.02	0.02	0.03	0.03	0.02	0.03	0.01	0.02
J33_03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
J33_04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction 34: A112 Sewardstone Road/ Avey Lane

	OP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J34_02	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.02
J34_03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	OP (minutes)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J35_02	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01
J35_03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	OP (minutes)								
	2014 Base	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02
J36_02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J36_03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J36_04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix H. Average Speeds (IP)

Junction 1: Wake Arms Roundabout

	IP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	31.78	31.49	31.44	31.32	31.00	31.19	30.05	30.35	24.40
J01_02	33.15	33.30	33.34	33.38	33.20	33.26	33.32	33.09	33.17
J01_03	31.59	31.66	31.41	31.41	31.46	31.41	30.63	30.98	31.07
J01_04	26.11	25.90	25.64	25.48	25.36	25.29	25.05	24.91	25.55
J01_05	24.91	25.05	21.82	22.08	21.83	21.94	21.29	23.31	23.60

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	IP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03
J33_02	24.91	25.05	21.82	22.08	21.83	21.94	21.29	23.31	23.60
J33_03	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03
J33_04	24.91	25.05	21.82	22.08	21.83	21.94	21.29	23.31	23.60

Junction 34: A112 Sewardstone Road/ Avey Lane

	IP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	24.91	25.05	21.82	22.08	21.83	21.94	21.29	23.31	23.60
J34_02	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03
J34_03	24.91	25.05	21.82	22.08	21.83	21.94	21.29	23.31	23.60

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	IP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03
J35_02	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03
J35_03	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	IP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	26.11	25.90	25.64	25.48	25.36	25.29	25.05	24.91	25.55
J36_02	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03
J36_03	26.11	25.90	25.64	25.48	25.36	25.29	25.05	24.91	25.55
J36_04	32.10	32.26	31.67	31.67	31.09	31.35	30.05	30.06	30.03

Appendix I. Average Speeds (OP)

Junction 1: Wake Arms Roundabout

	OP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J01_01	33.96	33.80	33.56	33.65	33.12	33.44	32.96	32.95	32.35
J01_02	35.82	35.50	35.31	35.25	35.04	35.21	35.16	35.11	34.79
J01_03	33.35	33.40	33.07	33.07	33.23	33.30	32.95	33.08	32.92
J01_04	31.68	31.43	30.96	31.14	30.26	30.41	29.44	29.93	29.53
J01_05	30.35	30.22	29.74	29.73	29.81	29.69	28.64	29.00	29.03

Junction 33: Woodgreen Road/ A121 Woodridden Hill/ Forest Side/ A121 Honey Lane

	OP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J33_01	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15
J33_02	30.35	30.22	29.74	29.73	29.81	29.69	28.64	29.00	29.03
J33_03	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15
J33_04	30.35	30.22	29.74	29.73	29.81	29.69	28.64	29.00	29.03

Junction 34: A112 Sewardstone Road/ Avey Lane

	OP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J34_01	30.35	30.22	29.74	29.73	29.81	29.69	28.64	29.00	29.03
J34_02	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15
J34_03	30.35	30.22	29.74	29.73	29.81	29.69	28.64	29.00	29.03

Junction 35: High Beech/ Cross Roads/ High Beech Loughton

	OP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J35_01	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15
J35_02	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15
J35_03	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15

Junction 36: A104 Epping New Road/ Earle's Path/ Cross Roads (Robin Hood Roundabout)

	OP (mph)								
	2014	2017 Base	Baseline	DN	DM	DS1	DS2	DS3	DS4
J36_01	31.68	31.43	30.96	31.14	30.26	30.41	29.44	29.93	29.53
J36_02	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15
J36_03	31.68	31.43	30.96	31.14	30.26	30.41	29.44	29.93	29.53
J36_04	34.51	35.05	34.21	33.69	34.99	34.77	33.34	33.48	34.15

Appendix J. Journey Time Comparisons (IP and OP)

Route 1: A112 to Forest Road

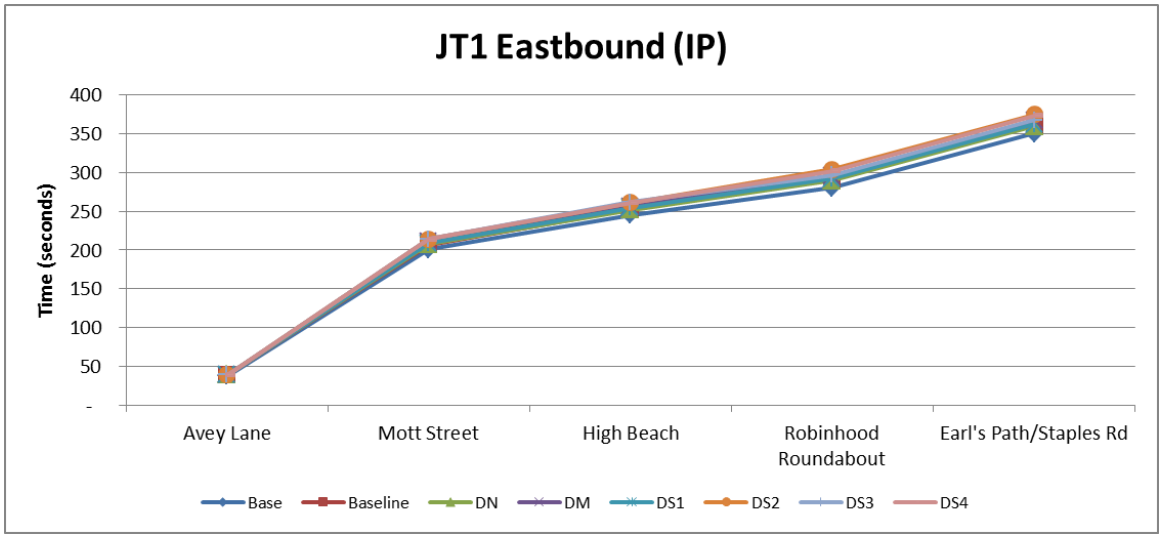


Figure 8-1: Journey Time Route 1 Comparison, Eastbound (IP Peak)

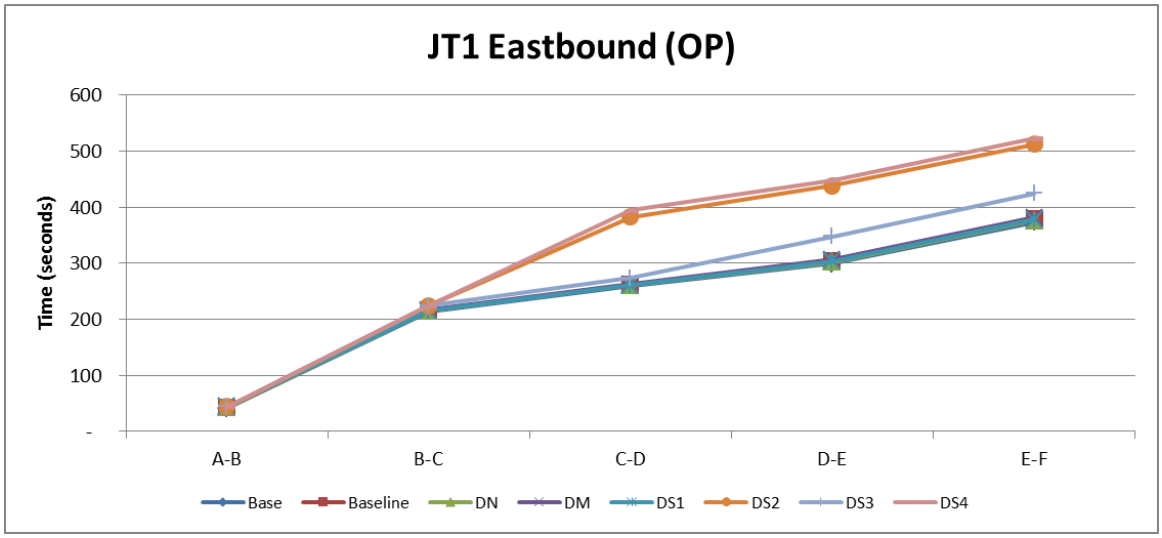


Figure 8-2: Journey Time Route 1 Comparison, Eastbound (OP Peak)

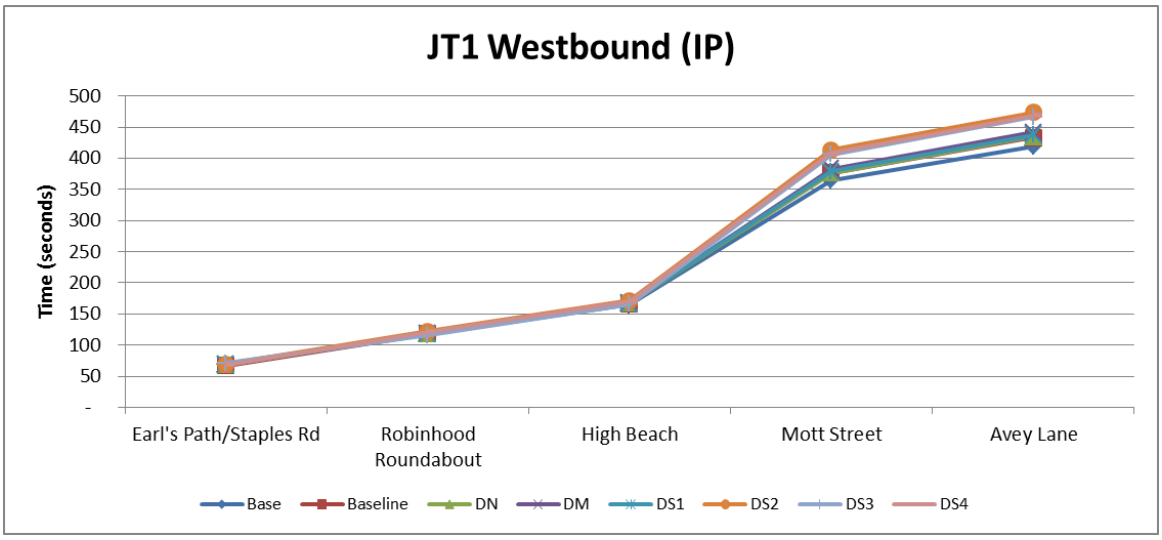


Figure 8-3: Journey Time Route 1 Comparison, Westbound (IP Peak)

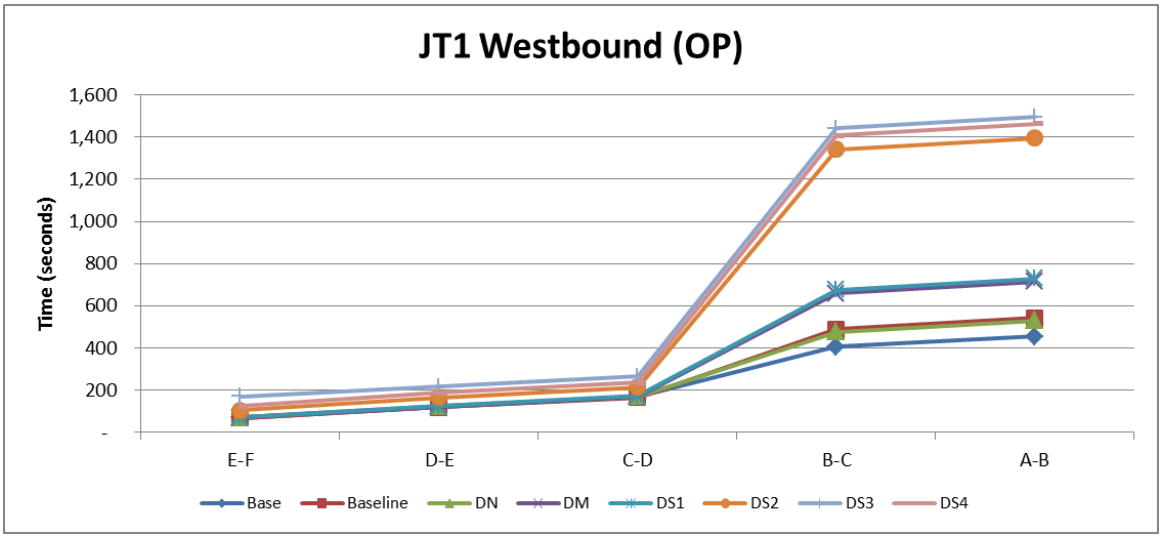


Figure 8-4: Journey Time Route 1 Comparison, Westbound (OP Peak)

Route 2: Epping Road to Epping New Road

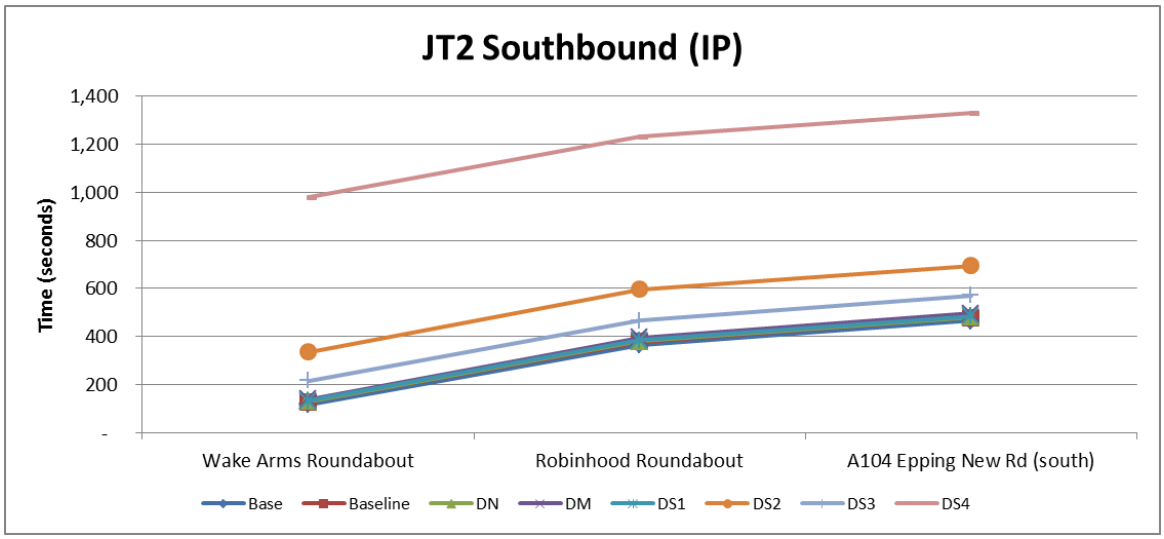


Figure 8-5: Journey Time Route 2 Comparison, Southbound (IP Peak)

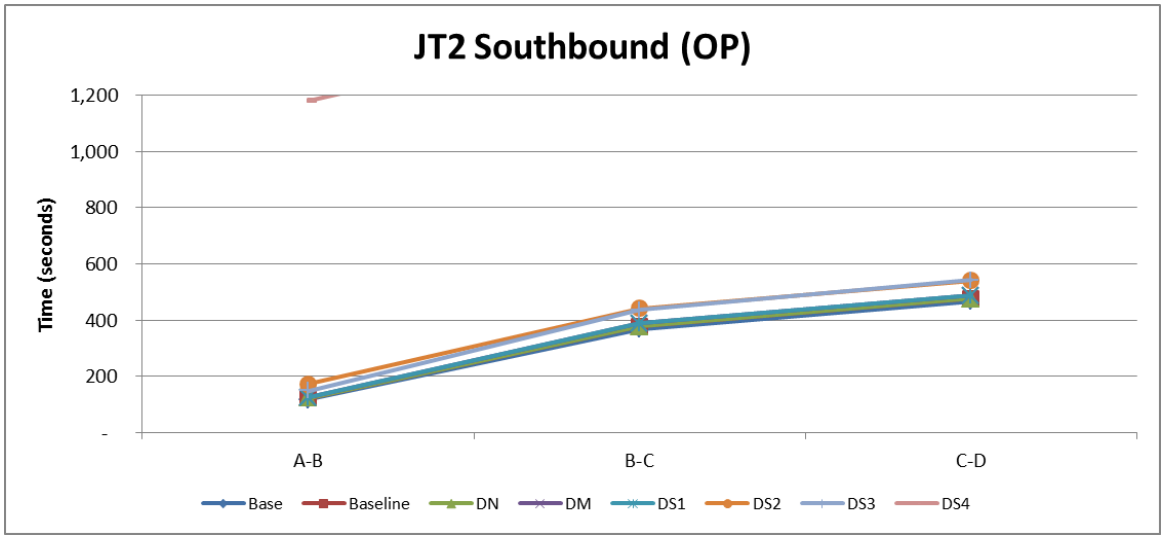


Figure 8-6: Journey Time Route 2 Comparison, Southbound (OP Peak)

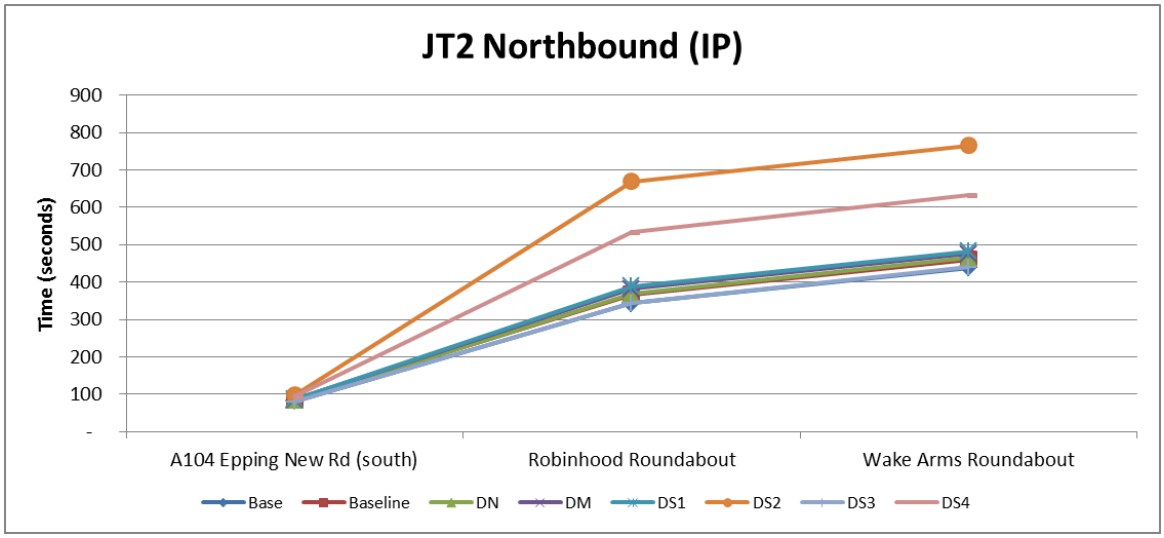


Figure 8-7: Journey Time Route 2 Comparison, Northbound (IP Peak)

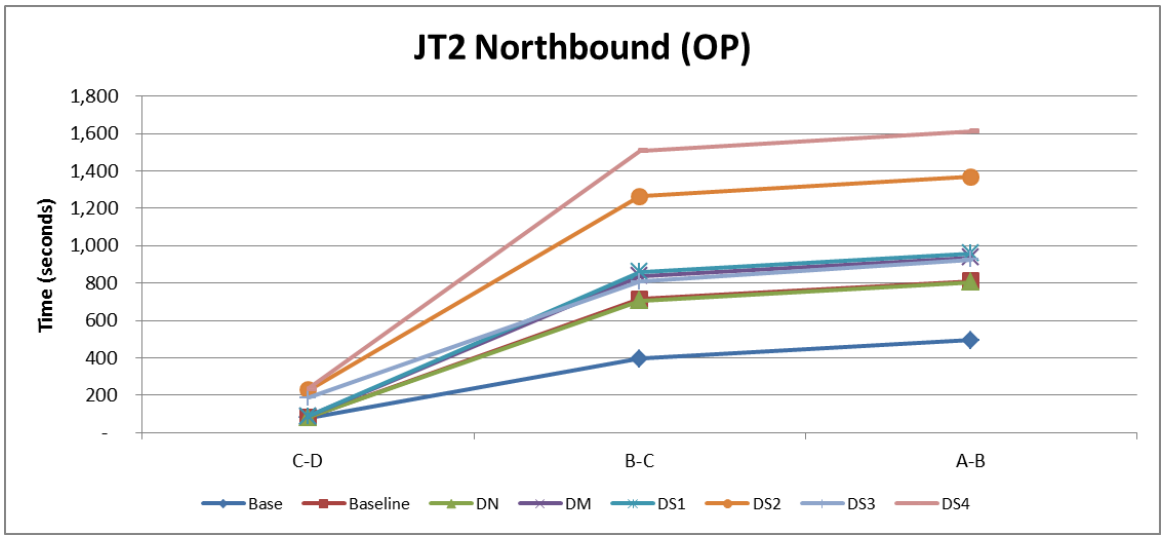


Figure 8-8: Journey Time Route 2 Comparison, Northbound (OP Peak)

7.2.2 Route 3: Honey Lane to B172

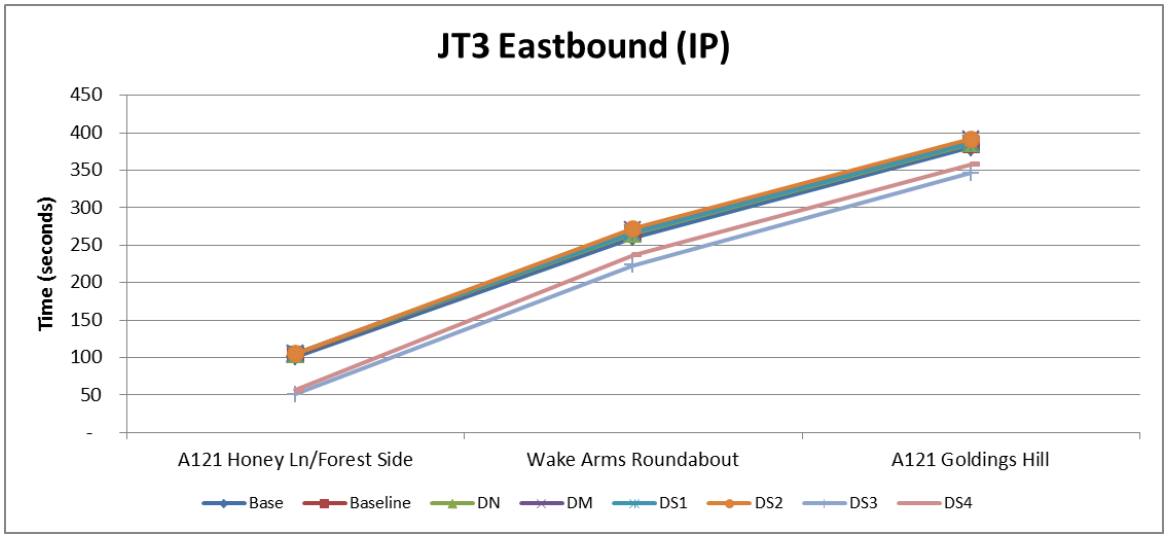


Figure 8-9: Journey Time Route 3 Comparison, Eastbound (IP Peak)

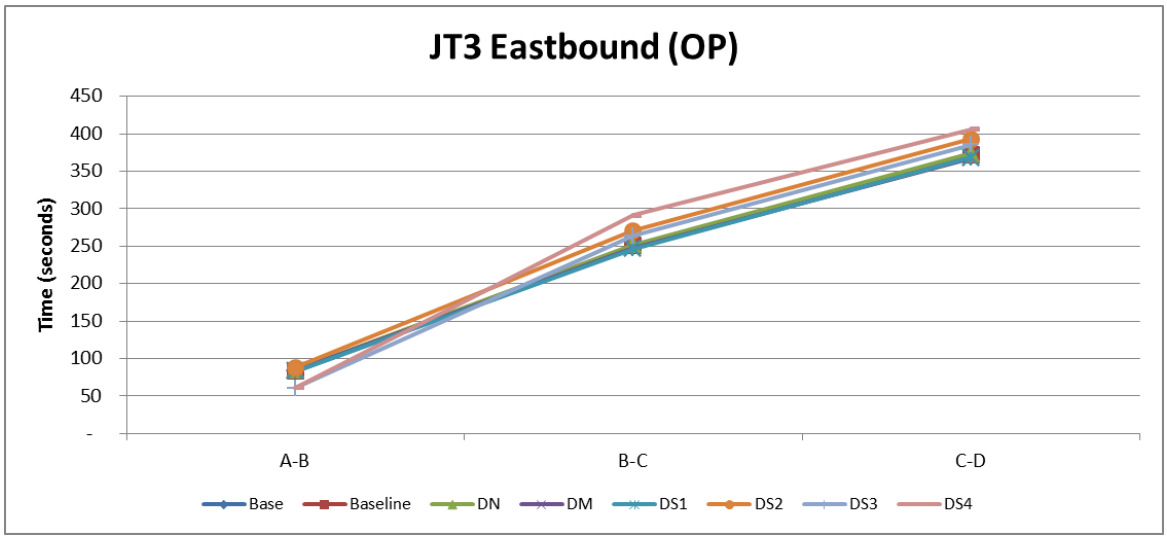


Figure 8-10: Journey Time Route 3 Comparison, Eastbound (OP Peak)

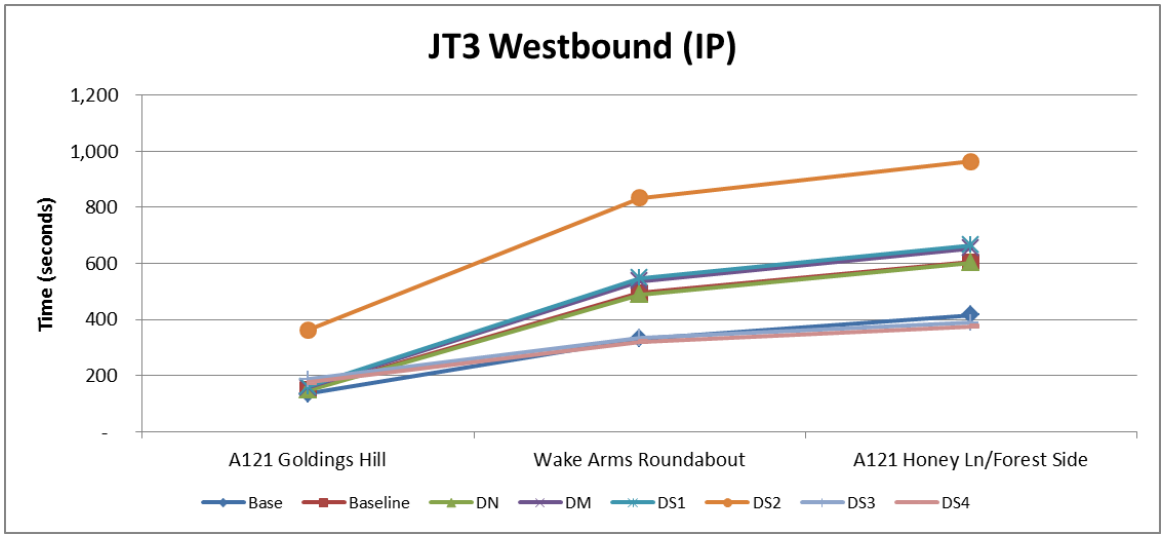


Figure 8-11: Journey Time Route 3 Comparison, Westbound (IP Peak)

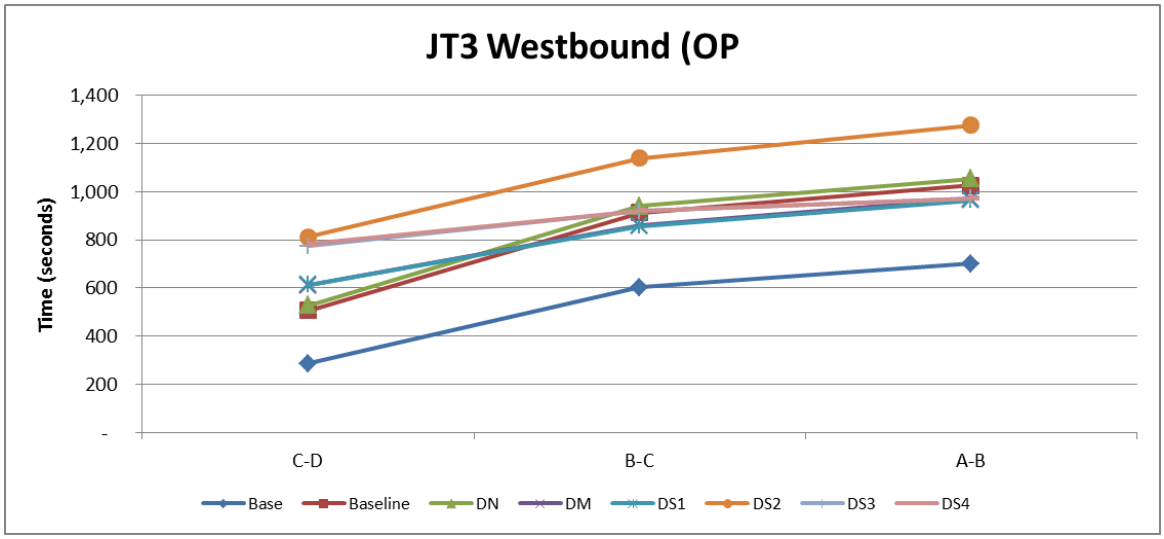


Figure 8-12: Journey Time Route 3 Comparison, Westbound (OP Peak)

Appendix K. Updated TEMPro Planning Assumptions

2014-2017

		TEMPro						Adjustment		Input to TEMPro	
Level	Area	Base HH	Base Jobs	Future HH	Future Jobs	Net HH	Net Jobs	Net HH	Net Jobs	Future HH	Future Jobs
Authority	Epping Forest	53130	51667	54037	53334	907	1667	654	1,304	53,784	52,971
Authority	Harlow	35920	43059	37053	44402	1133	1343	718	1,043	36,638	44,102
Authority	Uttlesford	33335	43682	35041	45107	1706	1425	1,739	1,301	35,074	44,983
Authority	Broxbourne	38746	42425	39759	43895	1013	1470	728	722	39,474	43,147
Authority	East Hertfordshire	58886	63318	60969	65377	2083	2059	1,796	1,448	60,682	64,766
Authority	Hackney	107147	116193	111873	120296	4726	4103	413	0	107,560	116,193
Authority	Haringey	106579	91121	111469	94588	4890	3467	3,806	2,870	110,385	93,991
Authority	Newham	108277	117251	115066	121736	6789	4485	7,838	0	116,115	117,251
Authority	Enfield	122840	119174	125315	123838	2475	4664	1,858	765	124,698	119,939
Authority	Redbridge	102511	88794	105762	92112	3251	3318	3,571	789	106,082	89,583
Authority	Waltham Forest	99604	89194	101938	92675	2334	3481	2,394	1,421	101,998	90,615

2017-2021

		TEMPro						Adjustment		Input to TEMPro	
Level	Area	Base HH	Base Jobs	Future HH	Future Jobs	Net HH	Net Jobs	Net HH	Net Jobs	Future HH	Future Jobs
Authority	Epping Forest	54037	53334	54905	54488	868	1154	2,615	2,174	56,652	55,508
Authority	Harlow	37053	44402	38328	45356	1275	954	2,180	1,739	39,233	46,141
Authority	Uttlesford	35041	45107	37187	46164	2146	1057	3,321	2,168	38,362	47,275
Authority	Broxbourne	39759	43895	41069	44690	1310	795	2,034	1,806	41,793	45,701
Authority	East Hertfordshire	60969	65377	63781	66708	2812	1331	4,423	2,413	65,392	67,790
Authority	Hackney	111873	120296	117373	123294	5500	2998	7,638	5,750	119,511	126,046
Authority	Haringey	111469	94588	119787	96856	8318	2268	7,510	4,783	118,979	99,371
Authority	Newham	115066	121736	126732	124509	11666	2773	16,685	15,000	131,751	136,736
Authority	Enfield	125315	123838	128885	127142	3570	3304	4,883	3,824	130,198	127,662
Authority	Redbridge	105762	92112	111951	94388	6189	2276	6,245	1,316	112,007	93,428
Authority	Waltham Forest	101938	92675	105505	94937	3567	2262	4,310	2,368	106,248	95,043

2017-2025

		TEMPro						Adjustment		Input to TEMPro	
Level	Area	Base HH	Base Jobs	Future HH	Future Jobs	Net HH	Net Jobs	Net HH	Net Jobs	Future HH	Future Jobs
Authority	Epping Forest	54037	53334	55746	55135	1709	1801	6,880	3,913	60,917	57,247
Authority	Harlow	37053	44402	39246	45895	2193	1493	4,121	3,130	41,174	47,532
Authority	Uttlesford	35041	45107	38659	46711	3618	1604	5,959	3,903	41,000	49,010
Authority	Broxbourne	39759	43895	42177	45222	2418	1327	3,660	3,250	43,419	47,145
Authority	East Hertfordshire	60969	65377	66198	67500	5229	2123	8,226	4,343	69,195	69,720
Authority	Hackney	111873	120296	120422	124756	8549	4460	15,138	11,500	127,011	131,796
Authority	Haringey	111469	94588	127425	98006	15956	3418	13,518	8,609	124,987	103,197
Authority	Newham	115066	121736	138621	125987	23555	4251	32,747	30,000	147,813	151,736
Authority	Enfield	125315	123838	131894	128649	6579	4811	9,986	6,882	135,301	130,720
Authority	Redbridge	105762	92112	115893	95510	10131	3398	12,178	2,368	117,940	94,480
Authority	Waltham Forest	101938	92675	108438	96067	6500	3392	7,758	4,263	109,696	96,938

2017-2029

		TEMPro						Adjustment		Input to TEMPro	
Level	Area	Base HH	Base Jobs	Future HH	Future Jobs	Net HH	Net Jobs	Net HH	Net Jobs	Future HH	Future Jobs
Authority	Epping Forest	54037	53334	56540	55706	2503	2372	9,984	5,652	64,021	58,986
Authority	Harlow	37053	44402	40226	46370	3173	1968	6,062	4,522	43,115	48,924
Authority	Uttlesford	35041	45107	40088	47195	5047	2088	8,878	5,638	43,919	50,745
Authority	Broxbourne	39759	43895	43254	45690	3495	1795	5,287	4,694	45,046	48,589
Authority	East Hertfordshire	60969	65377	68643	68199	7674	2822	12,030	6,274	72,999	71,651
Authority	Hackney	111873	120296	124021	126049	12148	5753	22,638	17,250	134,511	137,546
Authority	Haringey	111469	94588	135183	99020	23714	4432	16,850	12,435	128,319	107,023
Authority	Newham	115066	121736	150156	127289	35090	5553	35,330	45,000	150,396	166,736
Authority	Enfield	125315	123838	134846	129982	9531	6144	14,361	9,941	139,676	133,779
Authority	Redbridge	105762	92112	119560	96497	13798	4385	14,321	3,421	120,083	95,533
Authority	Waltham Forest	101938	92675	111279	97062	9341	4387	11,206	6,158	113,144	98,833

2017-2033

		TEMPro						Adjustment		Input to TEMPro	
Level	Area	Base HH	Base Jobs	Future HH	Future Jobs	Net HH	Net Jobs	Net HH	Net Jobs	Future HH	Future Jobs
Authority	Epping Forest	54037	53334	57291	56319	3254	2985	11,979	7,391	66,016	60,725
Authority	Harlow	37053	44402	41176	46880	4123	2478	8,003	5,913	45,056	50,315
Authority	Uttlesford	35041	45107	41502	47714	6461	2607	11,766	7,373	46,807	52,480
Authority	Broxbourne	39759	43895	44296	46193	4537	2298	6,914	6,139	46,673	50,034
Authority	East Hertfordshire	60969	65377	71019	68950	10050	3573	15,833	8,204	76,802	73,581
Authority	Hackney	111873	120296	127643	127437	15770	7141	30,138	23,000	142,011	143,296
Authority	Haringey	111469	94588	142901	100109	31432	5521	19,290	16,261	130,759	110,849
Authority	Newham	115066	121736	161623	128690	46557	6954	37,913	60,000	152,979	181,736
Authority	Enfield	125315	123838	137768	131414	12453	7576	16,600	13,000	141,915	136,838
Authority	Redbridge	105762	92112	123142	97560	17380	5448	15,613	4,474	121,375	96,586
Authority	Waltham Forest	101938	92675	114101	98131	12163	5456	14,654	8,053	116,592	100,728

Appendix D Air Quality Modelling Technical Note

Epping Forest District Council - Local Plan Air Quality Modelling

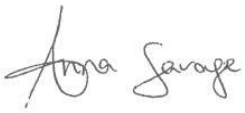
Air Quality Technical Report

Epping Forest District Council

Project reference: EFDC_AQ_modelling

17 January 2019

Quality information

Prepared by	Checked by	Verified by	Approved by
			
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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Table of Contents

Figures

Tables

1. Introduction

1.1 This technical note provides an overview of the air quality modelling study that has been undertaken using dispersion modelling to predict likely effects at selected receptors in Epping Forest Special Area of Conservation (SAC). The dispersion model, ADMS-Roads (version 4.1) has been used to model nitrogen oxides (NO_x) and ammonia (NH_3) emissions from road traffic sources.

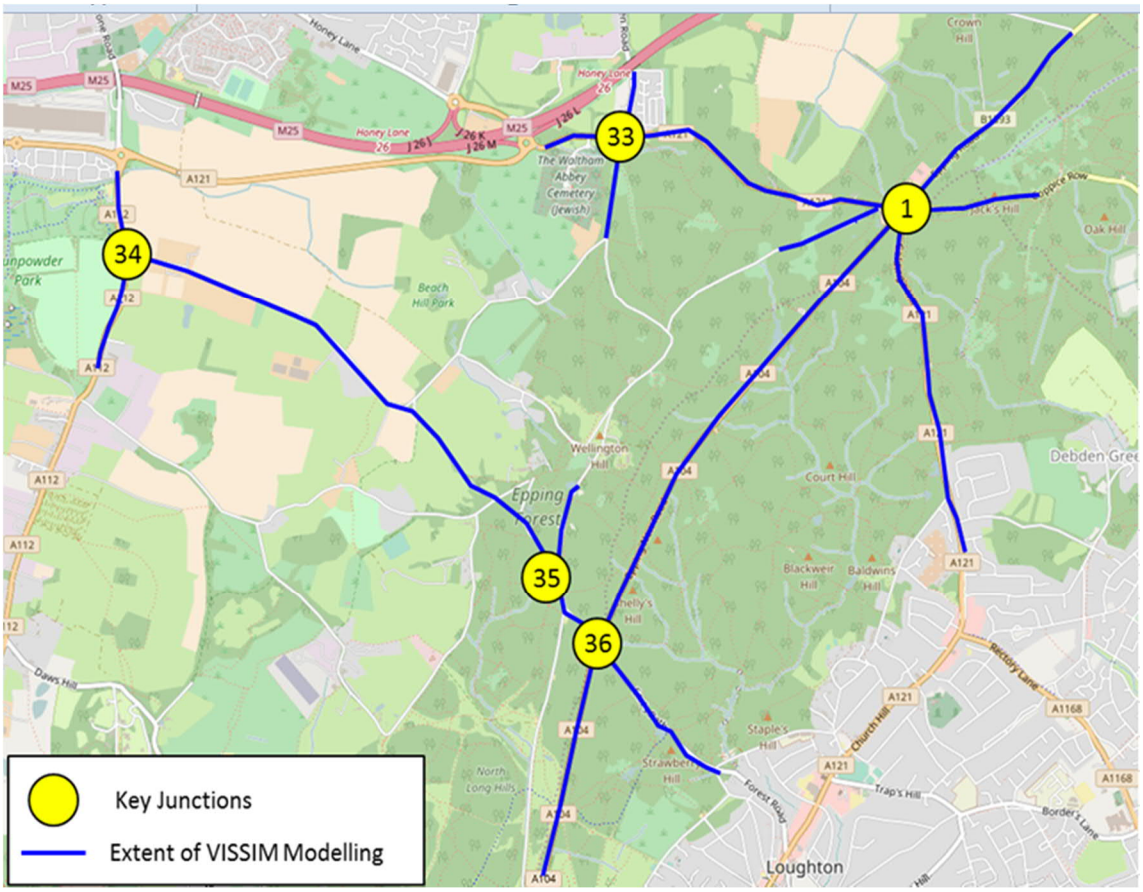
1.2 There are two components to each modelled scenario; daily traffic flow and queuing traffic, both of which are modelled using ADMS-Roads which has been developed by Cambridge Environmental Research Consultants (CERC).

1.3 Emissions from other non-road sources are included within background concentrations and have not been explicitly modelled.

2. Model setup

2.1 An external consultant (Jacobs) provided road traffic data, including 24 hour annual average daily traffic (AADT) flows, percentage heavy duty vehicles (HDV), peak hour traffic flows, queue lengths/ duration and average speeds for the road network within Epping Forest, as depicted in Figure 1. The 24 hour AADT, average speeds and HDV percentages have been used in the air quality modelling. Note that junction 34 was not included in the air quality modelling domain as it is outside the SAC.

Figure 1: Extent of road traffic data flows



2.2 The Department of Environment, Food and Rural Affairs (Defra's) Emissions Factors Toolkit (EFT)[1] was used to calculate emissions of NOx from road traffic. The EFT does not include NH_3 emissions. Therefore, a methodology derived by AECOM using the National Atmospheric Emissions Inventory (NAEI) 'Fleet Weighted Road Transport Emission Factor 2016'[2] was used to calculate emissions of NH_3 from road traffic.

2.3 Ordnance Survey (OS) mapping was used to geo-reference the road network using GIS software. Aerial photography and a walkover survey of the site were used to determine road widths to feed into the ADMS Roads model.

2.4 10-minute queue data for a typical hour within each time period (morning peak (AM) 07:00-10:00h, inter-peak (IP) 10:00-16:00h, evening peak (PM) 16:00-19:00h, Off-peak (OP) 19:00-07:00h) were provided by Jacobs. The maximum 10-minute average queue length was selected to represent the queue length for the duration of each time period. These distances were allocated into 25 meter (m) bands, and modelled in addition to the 24 hour AADT flows on each road link. The 'allocated' queue lengths are presented in Appendix A.

2.5 The methodology outlined by CERC to represent queues[3] using ADMS Roads has been followed whereby a representative 24 hour AADT of 30,000 vehicles is used for the traffic flow on the link, with the percentage HDV matching that of the actual traffic flow of the link in the queue location. A speed of 5km/hr is applied.

2.6 No changes in road alignment or width were made between the scenarios.

Table 1: ADMS Roads model conditions

Variables	ADMS Roads Model Input
Surface roughness at source	1m (0.2m at Meteorological Site)
Minimum Monin-Obukhov length for stable conditions	10m
Terrain types	Flat
Receptor locations	Transects with x, y coordinates determined by GIS, z (receptor heights) =various
Emissions	NOx, NH_3
Emission factors	EFT Version 8.0.1 emissions factors dataset
Meteorological data	1 year (2017) hourly sequential data from Stansted Airport meteorological station
Emission profiles	Queuing traffic in AM, IP and PM periods (no queuing in OP)
Model output	Long-term annual mean NOx concentrations Long-term annual mean NH_3 concentrations

3. Receptors and model output

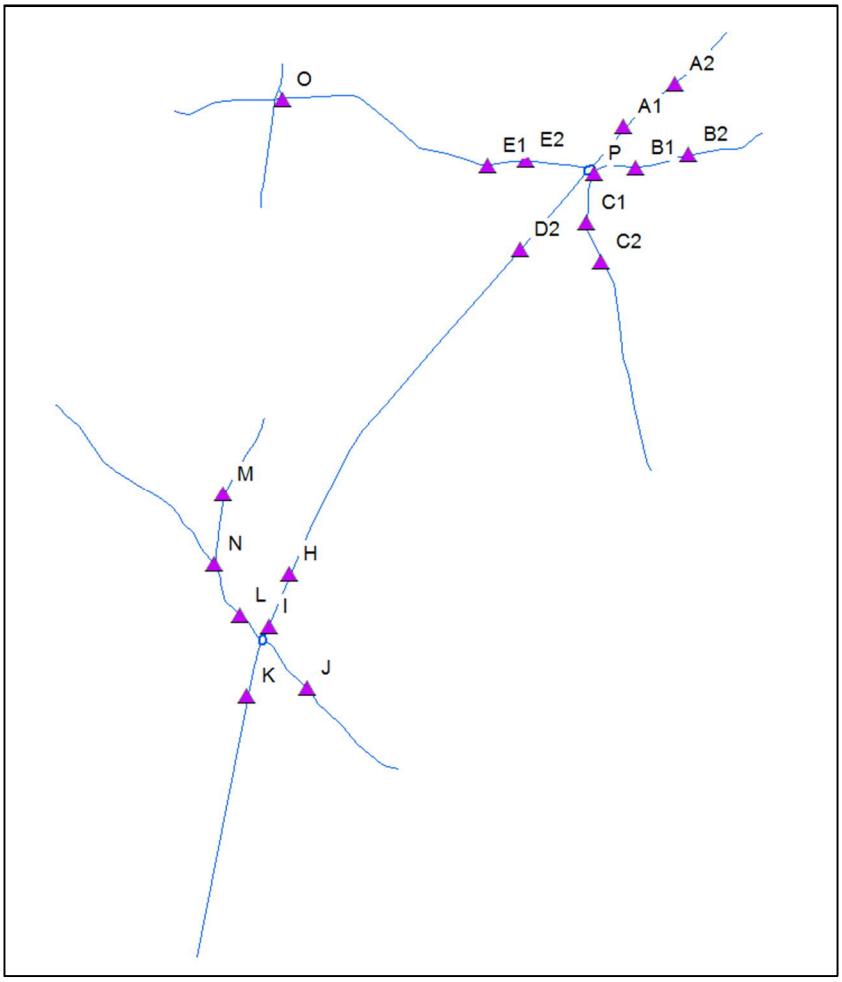
3.1 Annual mean NO_2 and NH_3 concentrations have been modelled at 19 transects perpendicular to road links, each one comprising of up to 21 receptors. The first receptor in each transect is located at the closest point within the SAC to the road link e.g. 0m, with subsequent receptors located up to 200m from the road consistent with best practice.

3.2 Figure 2 indicates the extent of the of the air quality model domain, and the locations of the first receptor in each transect (numbered A – P).

3.3 Appendix B shows the geographical layout of the modelled transects and Appendix C presents the labelled road junction links that are included in the air quality model.

[1] https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
[2] http://naei.beis.gov.uk/data/ef-transport
[3] CERC (2004), 'Modelling queuing traffic', Cambridge Environmental Research Consultants Ltd., 20 August 2004

Figure 2: Extent of road links and locations of receptors / transects in model domain



4. Scenarios

4.1 Due to the uncertainty in the rate with which projected future vehicle emission rates and background pollution concentrations are improving, a conservative assumption has been made that conditions (NO_x and NH_3 emission factors, vehicle fleet, background pollutant concentrations) in 2023 are representative of conditions in 2033 (the year of assessment). This approach is widely accepted within the professional air quality community. It accounts for known recent improvements in vehicle technologies (new standard Euro 6/VI vehicles), whilst excluding the more distant and therefore more uncertain projections on the evolution of the vehicle fleet, emission reductions and wider initiatives to improve air quality. Assuming no improvement would result in higher concentrations of pollutants than in the existing situation, as there are anticipated to be additional vehicles in 2033 which is not a realistic scenario. The approach adopted therefore provides a more realistic impression of conditions in 2033 than assuming no improvement in emission rates or background concentrations, but still remains conservative and defensible. In addition to the 'Do Something' (DS) scenarios that assume a future year of 2023, an additional with mitigation" scenario has been modelled. For that scenario, NO_x emission factors for 2030 have been utilised to represent "with mitigation" e.g. the implications of Policy T1 including uptake of electric vehicles. Background concentrations were not changed from the original DS scenario.

4.2 The projected fleet (and hence emission factors) for NH_3 have been maintained at 2023 for the "with mitigation" scenarios. A conservative approach has been taken whereby no change in NH_3 emissions from road traffic beyond the 2023 vehicle fleet have been implemented due to uncertainty in the magnitude of emissions from the fraction of the vehicle fleet operating on alternative technologies e.g. hybrid vehicles.

4.3 As the current version of Defra's EFT and background concentrations (EFT2017_v8.0.1.xlsb and 2015-based backgrounds[4]) only go back to 2015, 2014 emission factors and background concentrations of NOx have been derived by applying the ratio of 2014/2015 EFs and backgrounds from the previous Defra EFT and background maps (EFT2016_v7.0.xlsb and 2013-based maps[5]). This provides a scaling factor to estimate 2014-equivalent emissions.

4.4 Background concentrations of NO_x and NO_2 were obtained from Defra's background maps for the 1x1 km grid squares within which the kerbside receptor (i.e. nearest to the road) was located. The background concentrations were adjusted to remove contributions from trunk and primary A-roads, with reference to Defra's NOx adjustment for NOx sector removal tool. This avoids the double-counting of emissions as these roads are modelled in the assessment using ADMS-Roads. Within each scenario, the background concentration was kept constant at all receptors along the respective transect to avoid a step change.

4.5 Table 2 outlines the data used in the calculations for each modelled scenario.

[4] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015
[5] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013

Table 2: Modelled scenario input details

Scenario	Traffic data	Defra NOx emission factor year	NOx & NO_2 background concentration year from Defra 1x1 km maps[a]	Vehicle fleet for NH_3 emission factor derivation	Nitrogen deposition rate (kgN/ha/yr) from APIS [b]	NH_3 background concentration ($\mu g/m^3$) from APIS
2014	2014 Baseline	2015 (factored to 2014)	2015 (factored to 2014)	2014	14.7 kgN/ha/yr	1.09 $\mu g/m^3$
2017	2017 Projected	2017	2017	2017	13.8 kgN/ha/yr	1.09 $\mu g/m^3$
DN	2033 Do Nothing	2023	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$
DM	2033 Do Minimum	2023	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$
DS1	2033 Do Something 1	2023	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$
DS2	2033 Do Something 2	2023	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$
DS3	2033 Do Something 3	2023	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$
DS4	2033 Do Something 4	2023	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$
DS5	2033 Do Something 2	2030	2023	2023	12.3 kgN/ha/yr	1.09 $\mu g/m^3$

Notes: [a] NOx and NO_2 background concentration varies by transect location

[b] Applied 2% change in N deposition (kgN/ha/yr) per year from APIS baseline data year (2014) to 'Vehicle fleet' year e.g. for DS1 scenario, 2% decrease per year applied from 2014 to 2023

5. Monitoring and Verification

5.1 Diffusion tube monitoring of NO_2 and NH_3 is currently underway across Epping Forest SAC, from kerbside locations to approximately 200m from the kerb. The study also included background NO_2 and NH_3 monitoring locations in the Forest well away from roads, an additional NO_2 background location within the Forest, and a co-located NO_2 monitoring site with an automatic monitoring station in Enfield. The monitoring locations are shown in Appendix D.

5.2 Five transects included NO_2 and NH_3 monitoring sites along the full 200m from the road. For the remaining transects, NO_2 monitoring sites were chosen using the same approximate spacing up to 40m from the kerb. The 200m transect extent was selected as it is well documented that the contribution to NOx and NO_2 from road traffic is unlikely to extend notably beyond this distance from the road. Similarly, the contribution to NH_3 concentrations from road traffic is unlikely to extend significantly beyond 40m from the road based on observations of the rates of reduction in NH_3 monitoring transects for NH_3 away from roads.

5.3 Triplicate tubes at each location for each month were assessed for their precision as part of the QA/QC process for reporting these results. Over the monitoring period, any unreliable data were discarded due to factors such as tube contamination of water droplets, insects or spiders and their nests, and also when results were found to be spuriously low or high, relative to other similar sites. The coefficient of variance (CV) of the triplicate tubes was ensured to be less than 20%, indicating good precision.

5.4 At the time of modelling, six months of NO_2 monitoring data were available for comparison with modelled data (May-November 2018). A local bias adjustment factor, calculated from the colocation with the continuous monitor, was applied to the diffusion tube concentrations. The period mean was annualised to provide 2017 annual mean equivalent concentrations for comparison with modelled data.

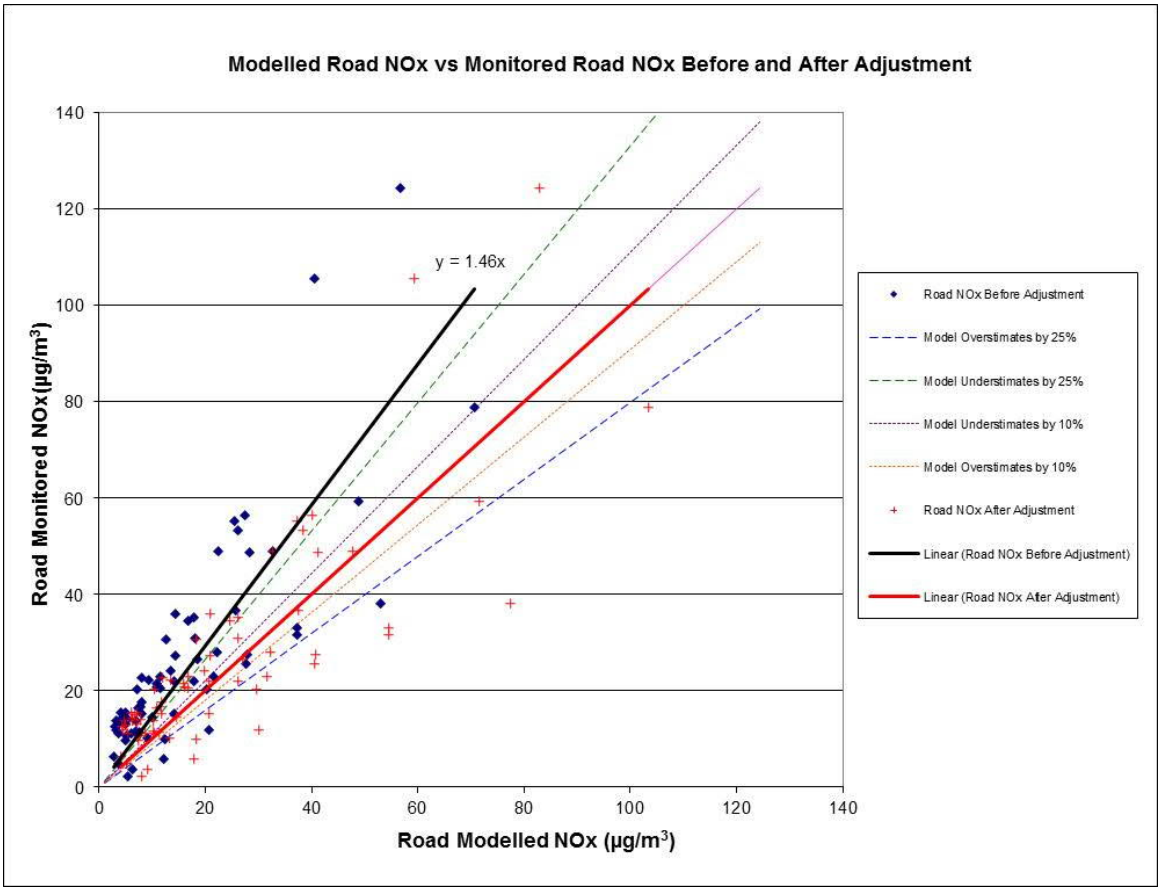
5.5 Modelled and monitored NO_x concentrations were compared in accordance with the Local Air Quality Management Technical Guidance (LAQM.TG(16))[6] verification methodology.

5.6 Figure 3 shows monitored and modelled NO_x concentrations before and after adjustment. The figure shows that the model systematically under predicts monitored concentrations. To account for the dispersion model bias, the predicted road contribution NH_3 and NO_x output from the model were adjusted by the calculated factor of 1.46 (RMSE of 5.6 µg/m^3). This factor was applied to the outputs of all scenarios.

5.7 Defra's NO_x-NO_2 calculator (v6.1)[7] was used to convert adjusted modelled NO_x outputs to total NO_2 concentrations.

[6] Defra (2016), Local Air Quality Management, Technical Guidance, LAQM TG(16).
[7] https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v6.1.xls

Figure 3: Modelled and measured annual mean NOx before and after adjustment



6. Pollutant Information

6.1 Current data from the Air Pollution Information System (APIS) for the Epping Forest SAC have been used to calculate total nitrogen deposition. These are data for the three year average 2013-2015[8] and include the average nitrogen deposition rate, critical load, and ammonia concentration for the relevant 5x5 km grid squares in the SAC. Data for each transect have been selected based upon the location of the receptor closest to the road. 'Dwarf shrub heath' has been selected as the most sensitive habitat to nitrogen impacts.

6.2 The average nitrogen deposition rate (kgN/ha/yr) for 2013-2015 was assumed to be representative of conditions in 2014. A 2% decrease in nitrogen deposition per year was applied. For example, for scenario DS1, the 2% decrease per year was applied from 2014 to 2023 (the 'emission factor year' of the scenario).

6.3 The modelling of ammonia has used 2016 road transport emission factors from the National Atmospheric Emissions Inventory website (NAEI[9]) combined with vehicle fleet composition form the EFT. The NAEI provides average ammonia emission factors for various types of road transport and road types (urban, rural, motorway) in grams per kilometre (g/km). The exhaust emission factors take into account average speed across the UK for each of the road types. The roads in Epping Forest are considered to be 'rural'.

6.4 The application of a 0.1 factor to NO_2 concentrations has been used to replicate a 0.001 m/s deposition rate for NO_2, from Highways England's Design Manual for Roads and Bridges (DMRB) guidance HA 207/07[10]. It is assumed that this displays a linear relationship and holds for other deposition rates and pollutants. A factor of 2 has been used to equate to a deposition rate of 0.02 m/s for NH_3, as taken from ADMS Roads User Guide v4.1.

[8] http://www.apis.ac.uk/
[9] NAEI: RoadtransportEFs_NAEI16_v1.0.xlsx (http://naei.beis.gov.uk/data/ef-transport)
[10] Highways England's Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1 HA 207/07

Appendix A Modelled queue lengths (metres) in air quality model

AM period modelled queue lengths (metres) in air quality model[11]

	AM								
Queue ID	**2014**	**2017**	**Baseline**	**DN**	**DM**	**DS1**	**DS2**	**DS3**	**DS4**
JC01_QL02	50	275	475	500	500	500	500	500	500
JC01_QL03	400	500	500	500	500	475	475	500	475
JC01_QL04	50	50	125	150	50	75	25	75	50
JC01_QL05	0	0	0	0	25	25	25	50	25
JC01_QL01	400	400	450	450	475	475	475	400	475
JC36_QL02	0	0	0	0	0	0	25	50	25
JC36_QL03	25	50	125	150	475	475	475	0	475
JC36_QL04	0	0	25	25	25	25	50	0	50
JC36_QL01	50	100	100	100	200	250	400	25	450
JC35_QL02	0	0	0	0	0	0	0	0	0
JC35_QL03	0	0	0	0	0	0	0	0	0
JC35_QL01	0	0	0	0	0	0	0	0	0
JC33_QL02	75	25	125	200	250	200	225	0	0
JC33_QL03	0	0	50	50	125	125	425	0	0
JC33_QL04	0	0	0	0	0	0	0	0	0
JC33_QL01	25	0	25	50	50	25	100	0	0

[11] *Queue data for 2023 and 2030 are the same in periods

Inter-peak (IP) period modelled queue lengths (metres) in air quality model

	IP								
Queue ID	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
JC01_QL02	0	0	0	0	0	0	25	0	0
JC01_QL03	0	0	50	25	100	125	475	75	125
JC01_QL04	25	25	50	50	150	175	475	25	425
JC01_QL05	0	0	0	0	0	0	0	0	25
JC01_QL01	0	25	25	25	75	25	450	275	500
JC36_QL02	0	0	0	0	0	0	0	0	0
JC36_QL03	0	0	25	25	25	25	50	0	25
JC36_QL04	0	0	0	0	0	0	0	0	0
JC36_QL01	0	0	25	25	25	25	25	0	25
JC35_QL02	0	0	0	0	0	0	0	0	0
JC35_QL03	0	0	0	0	0	0	0	0	0
JC35_QL01	0	0	0	0	0	0	0	0	0
JC33_QL02	25	0	200	275	325	300	425	0	0
JC33_QL03	0	0	0	25	25	25	75	0	0
JC33_QL04	0	0	0	0	0	0	0	0	0
JC33_QL01	0	0	25	0	25	25	50	0	0

PM period modelled queue lengths (metres) in air quality model

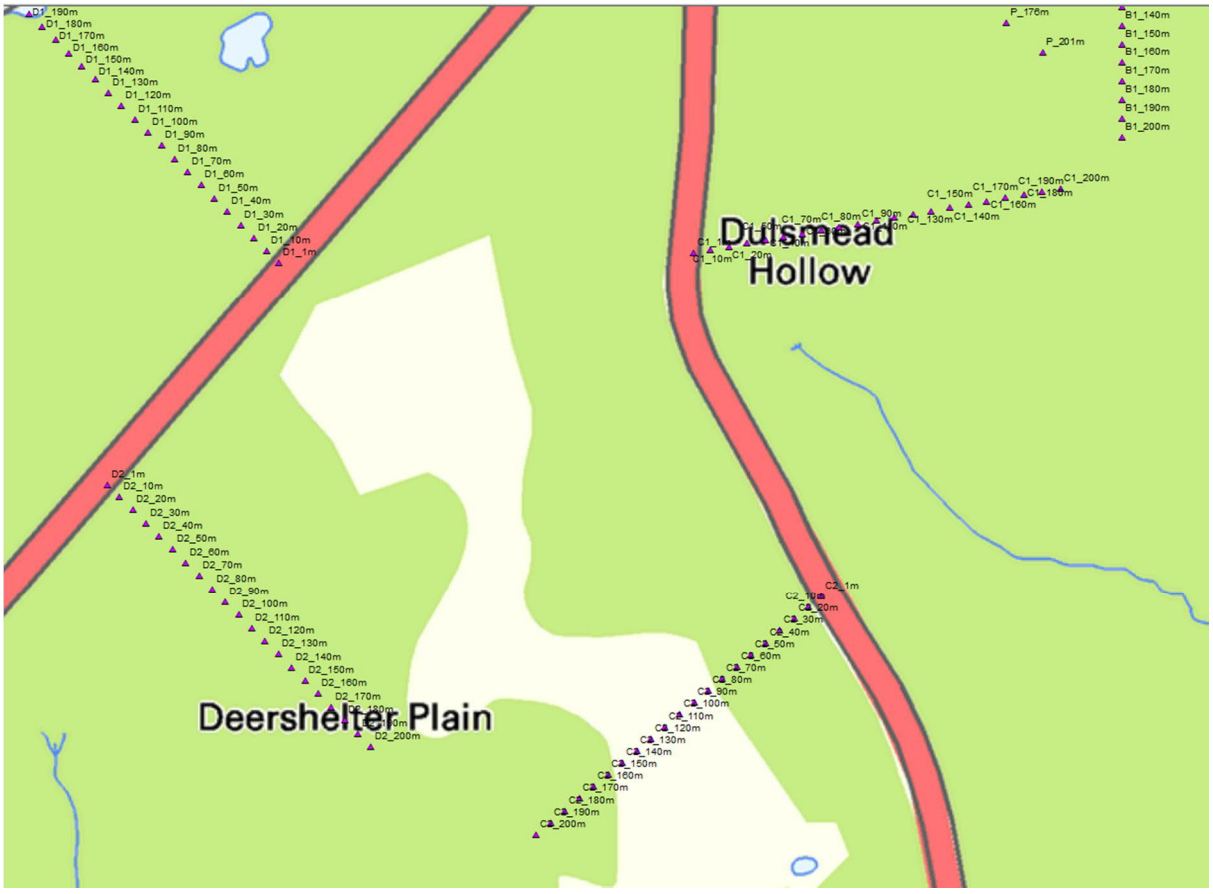
PM									
Queue ID	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
JC01_QL02	0	0	25	25	50	75	325	400	0
JC01_QL03	400	450	475	475	475	475	475	475	500
JC01_QL04	100	125	475	475	475	475	500	475	500
JC01_QL05	0	0	25	25	0	0	250	300	275
JC01_QL01	25	25	25	25	25	25	400	200	500
JC36_QL02	0	0	0	0	0	0	50	250	75
JC36_QL03	0	0	0	25	25	25	500	425	500
JC36_QL04	0	0	0	0	0	0	400	125	400
JC36_QL01	25	25	25	25	50	50	75	175	100
JC35_QL02	0	0	0	0	0	0	350	0	375
JC35_QL03	0	0	0	0	0	0	225	0	200
JC35_QL01	0	0	0	0	0	0	350	0	350
JC33_QL02	0	25	50	0	0	0	50	0	0
JC33_QL03	25	25	25	25	50	25	350	0	0
JC33_QL04	0	25	0	0	0	0	50	125	50
JC33_QL01	0	0	25	0	0	0	25	0	0

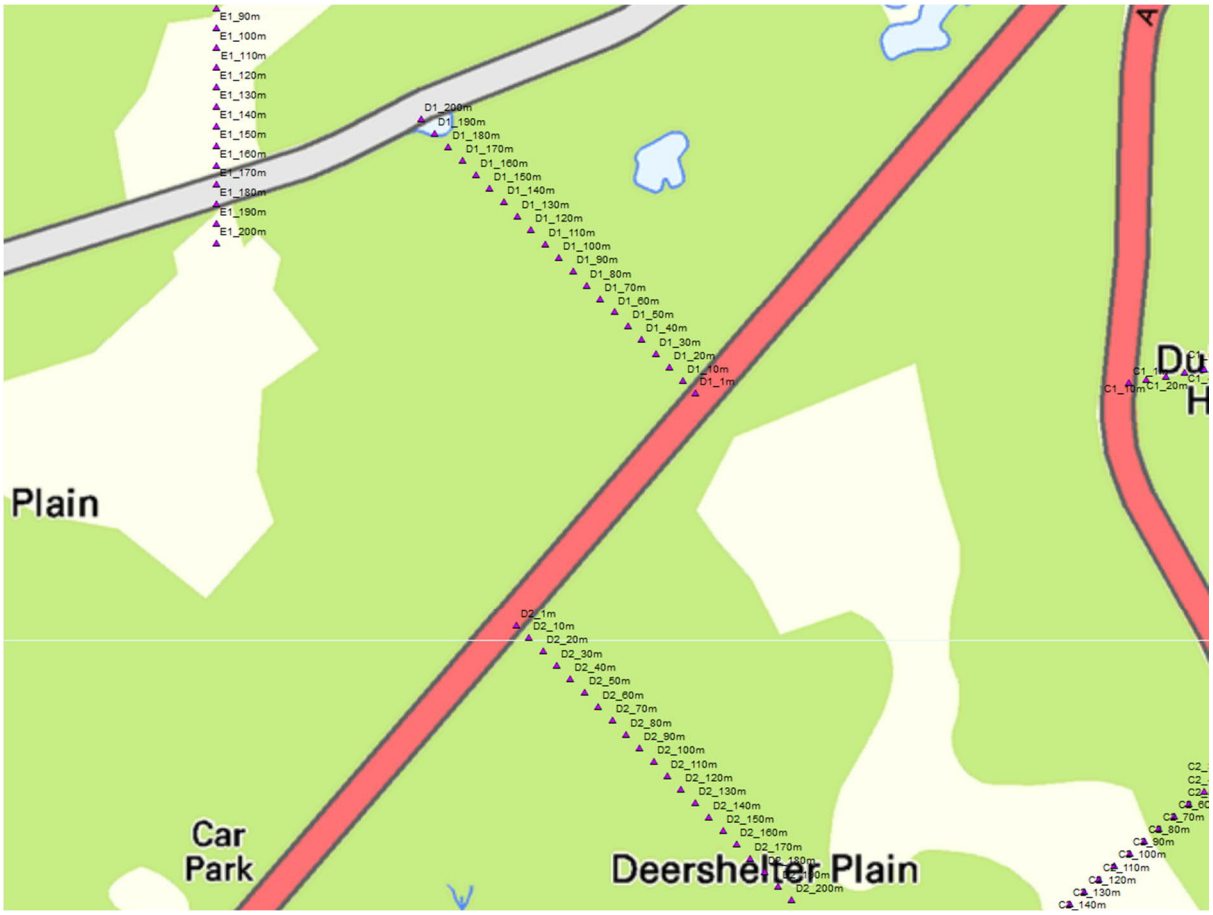
Off-peak (OP) period modelled queue lengths (metres) in air quality model

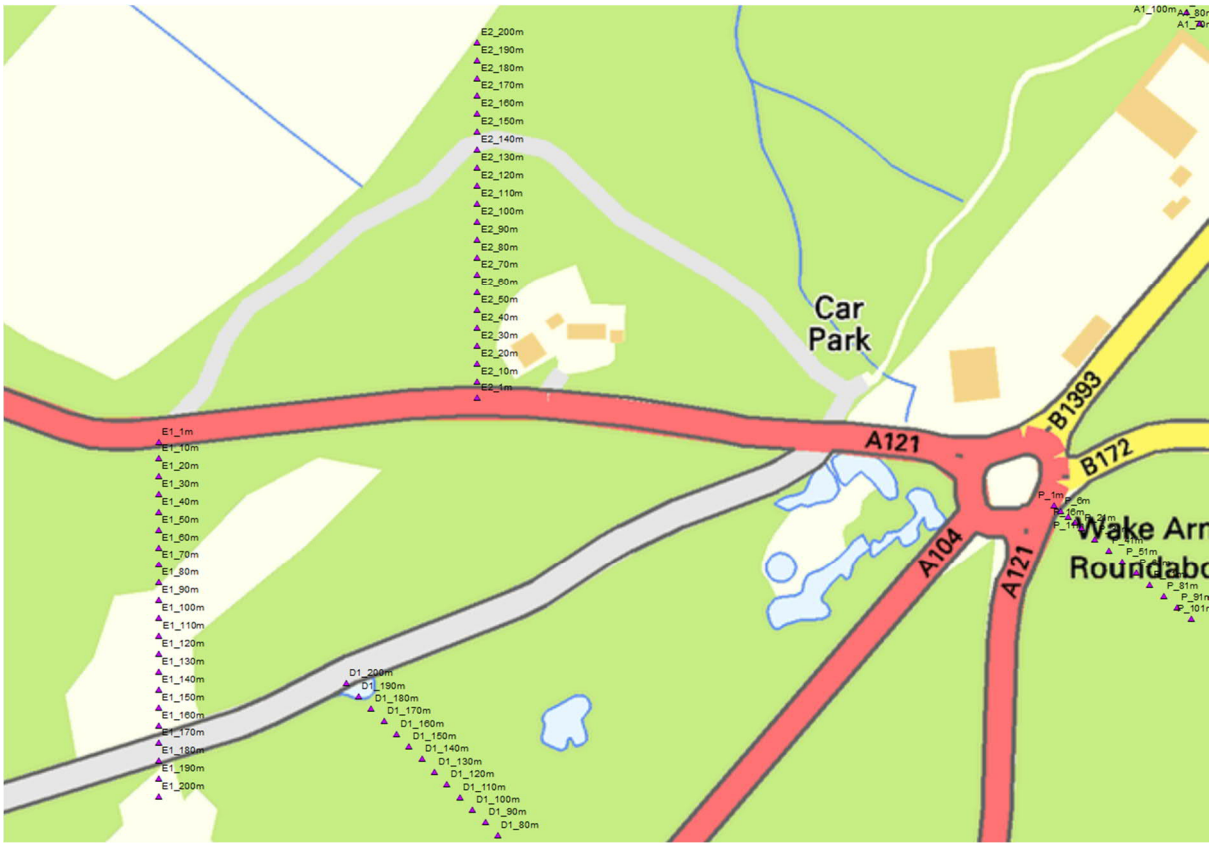
	OP								
	2014	2017	Baseline	DN	DM	DS1	DS2	DS3	DS4
JC01_QL02	0	0	0	0	0	0	0	0	0
JC01_QL03	0	0	0	0	0	0	0	0	0
JC01_QL04	0	0	0	0	0	0	0	0	0
JC01_QL05	0	0	0	0	0	0	0	0	0
JC01_QL01	0	0	0	0	0	0	0	0	0
JC36_QL02	0	0	0	0	0	0	0	0	0
JC36_QL03	0	0	0	0	0	0	0	0	0
JC36_QL04	0	0	0	0	0	0	0	0	0
JC36_QL01	0	0	0	0	0	0	0	0	0
JC35_QL02	0	0	0	0	0	0	0	0	0
JC35_QL03	0	0	0	0	0	0	0	0	0
JC35_QL01	0	0	0	0	0	0	0	0	0
JC33_QL02	0	0	0	0	0	0	0	0	0
JC33_QL03	0	0	0	0	0	0	0	0	0
JC33_QL04	0	0	0	0	0	0	0	0	0
JC33_QL01	0	0	0	0	0	0	0	0	0

Appendix B Air quality transect locations


EPPING ROAD
Riding School
Jack's Hill
B1393
B172


Dutsmead Hollow
Deershelter Plain


Plain
Car Park
Deershelter Plain


Car Park
A121
B1393
B172
A104
A121


Ford
Kate's Cellar
Shelley's Hill
Car Park
CROSS ROADS
PH
A104


PH
A104
Car Park


M_200m
M_175m
M_150m
M_125m
M_100m
M_90m
M_80m
M_70m
M_60m
M_50m
M_40m
M_30m
M_5m
M_0m
PW
N_200m
N_175m
N_150m
N_125m
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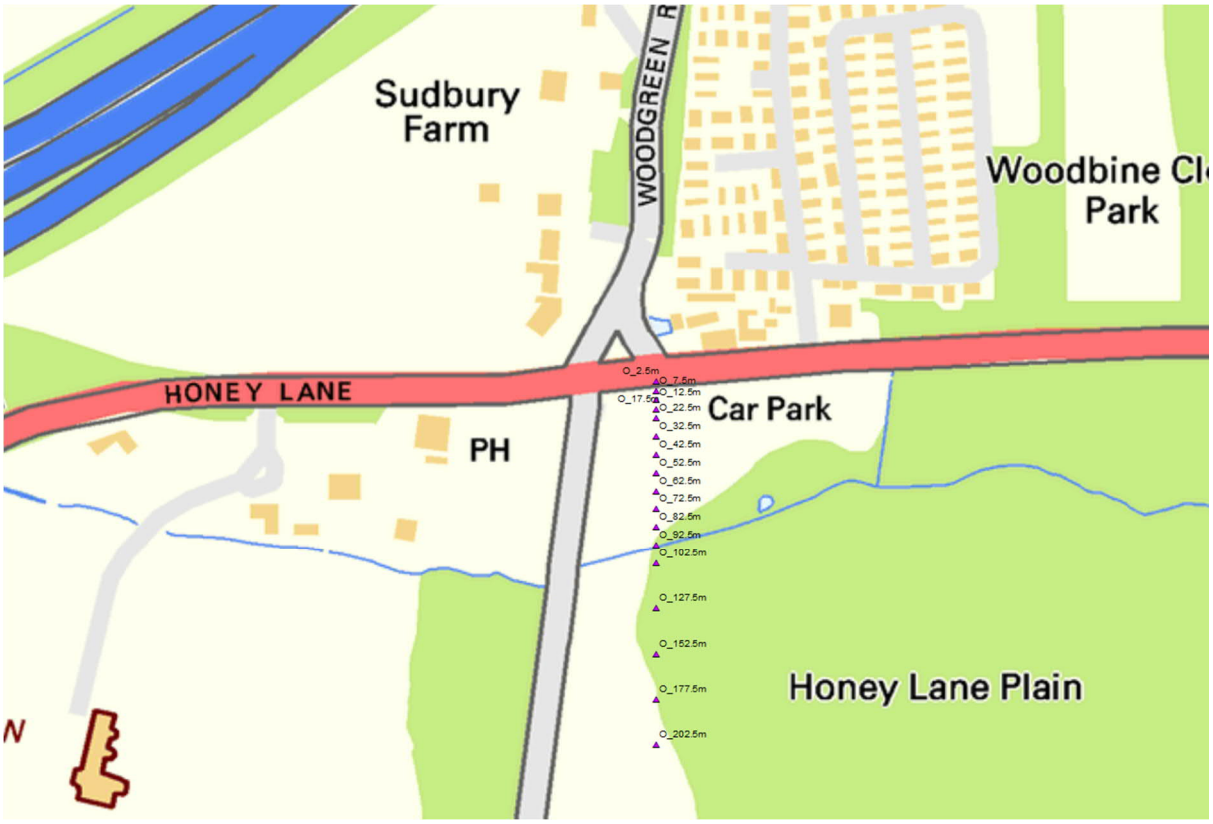
N_30m
N_20m
N_5m


Sudbury Farm
WOODGREEN R
Woodbine Cl
Park
HONEY LANE
PH
Car Park
O_2.5m
O_7.5m
O_12.5m
O_17.5m
O_22.5m
O_32.5m
O_42.5m
O_52.5m
O_62.5m
O_72.5m
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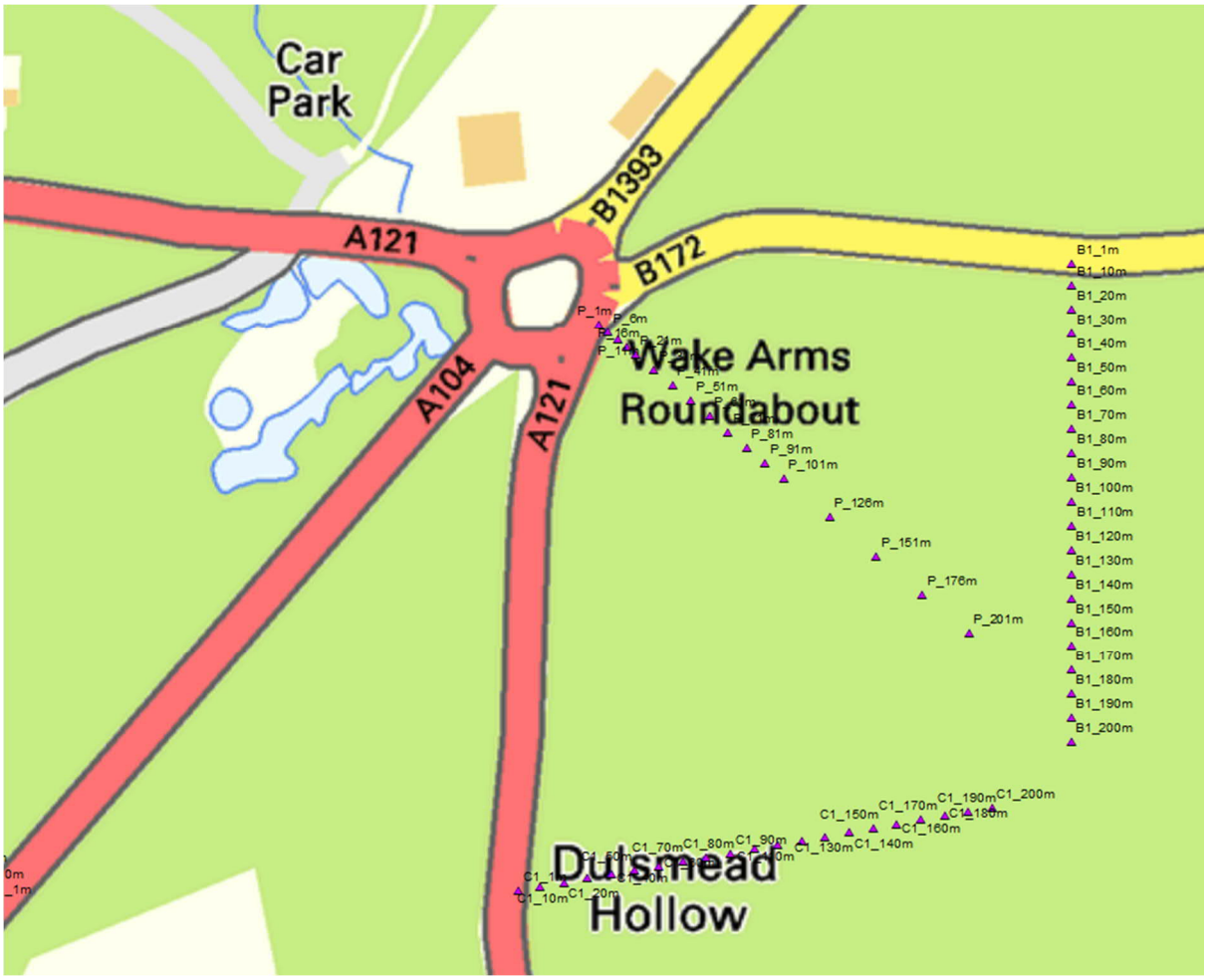
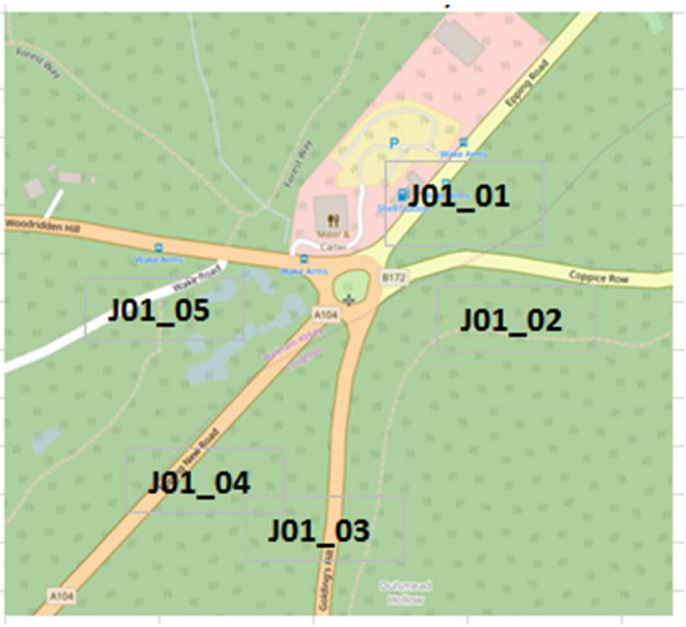
O_152.5m
O_177.5m
O_202.5m
Honey Lane Plain

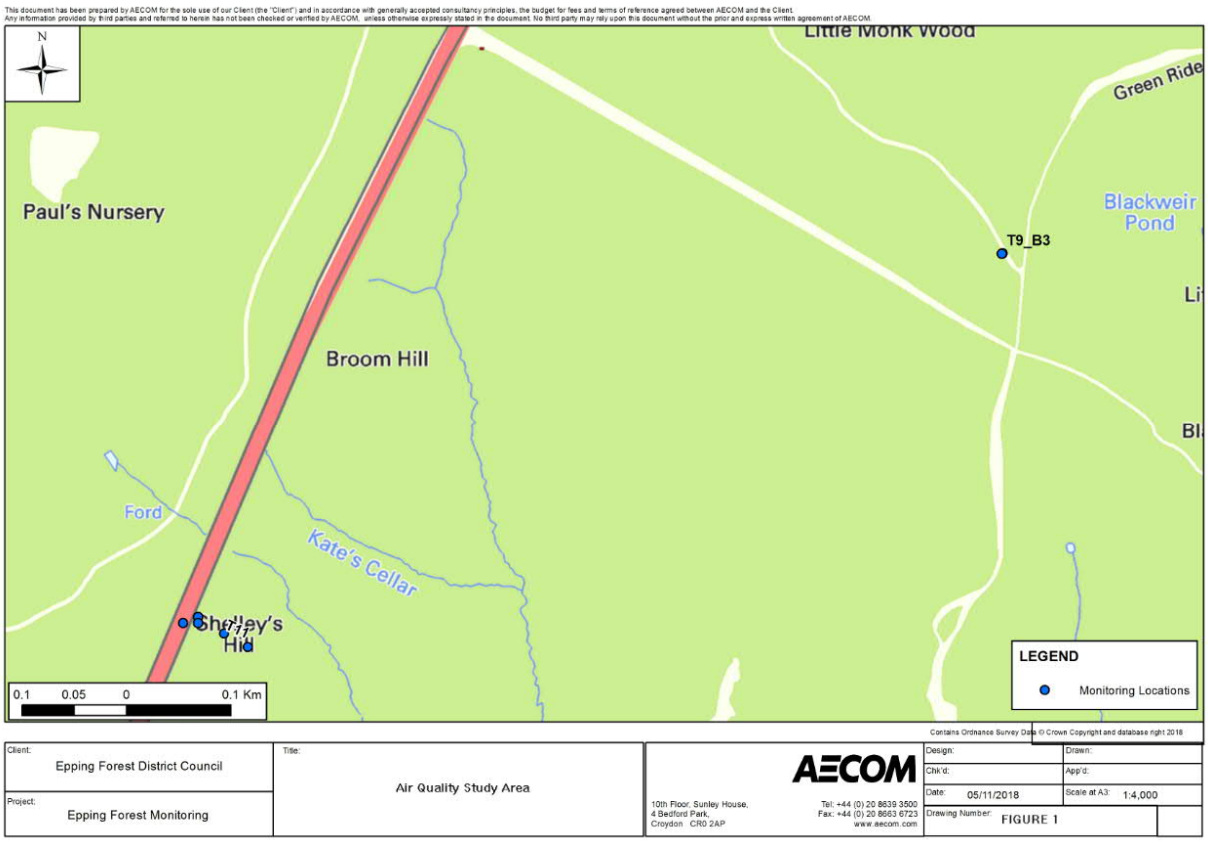

Car Park
A121
B1393
B172
A104
A121
Wake Arms Roundabout
P_1m
P_6m
P_16m
P_51m
P_81m
P_91m
P_101m
P_126m
P_151m
P_176m
P_201m
B1_1m
B1_10m
B1_20m
B1_30m
B1_40m
B1_50m
B1_60m
B1_70m
B1_80m
B1_90m
B1_100m
B1_110m
B1_120m
B1_130m
B1_140m
B1_150m
B1_160m
B1_170m
B1_180m
B1_190m
B1_200m
C1_150m
C1_170m
C1_190m
C1_200m
C1_160m
C1_130m
C1_140m
C1_70m
C1_80m
C1_90m
C1_10m
C1_20m
Dutsmead Hollow

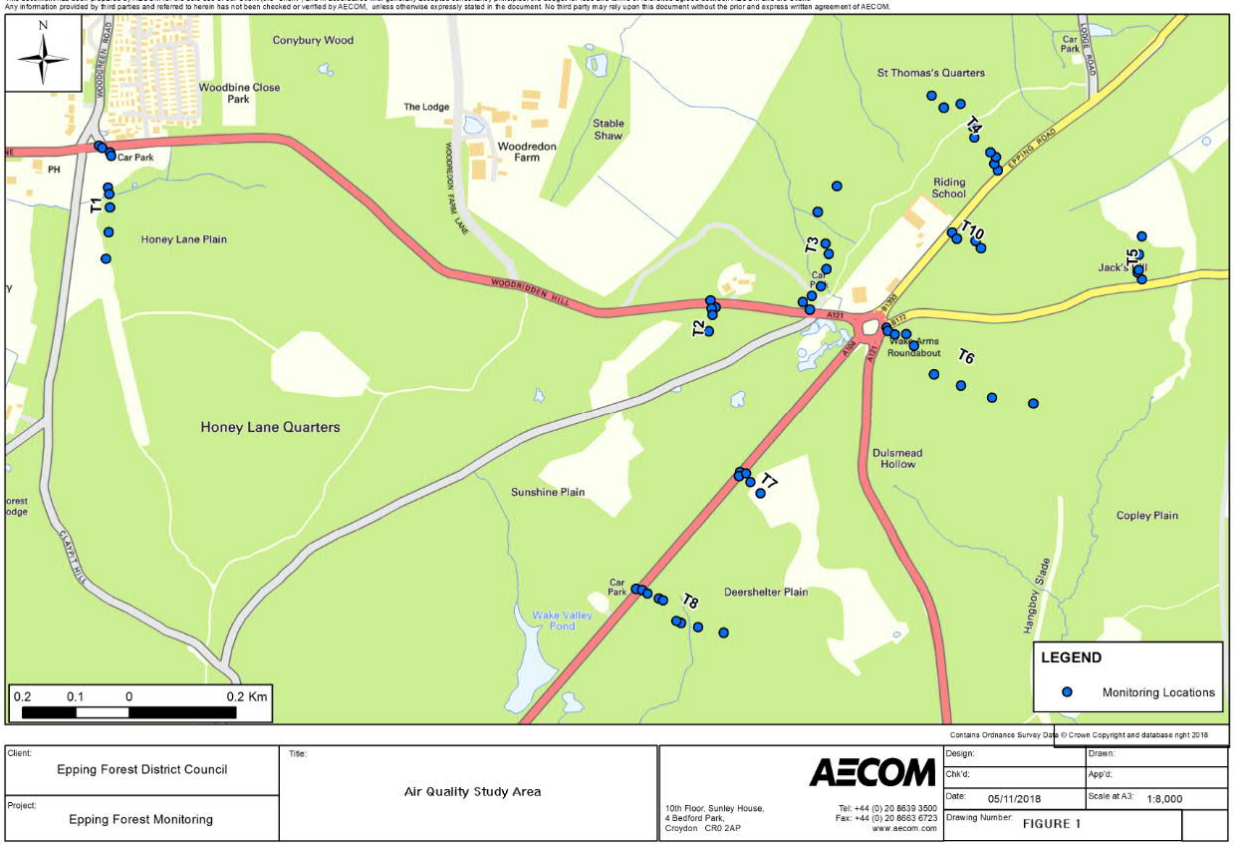
Appendix C Modelled road traffic junctions


J01_01
J01_02
J01_03
J01_04
J01_05
Epping Road
Coppice Row
Woodridden Hill
Wake Arms
B172
A104
Forest Way


J35_01
J35_02
J35_03
High Beech Loughton
Paul's Nursery Road

Appendix D Air quality monitoring locations





Client: Epping Forest District Council	Title: Air Quality Study Area	AECOM 10th Floor, Sunley House, 4 Bedford Park, Croydon CR0 2AP. Tel: +44 (0) 20 8639 3500 Fax: +44 (0) 20 8663 6723 www.aecom.com	Design: Drawn: Chk'd: App'd: Date: 05/11/2018 Scale at A3: 1:8,000 Drawing Number: FIGURE 1
Project: Epping Forest Monitoring			

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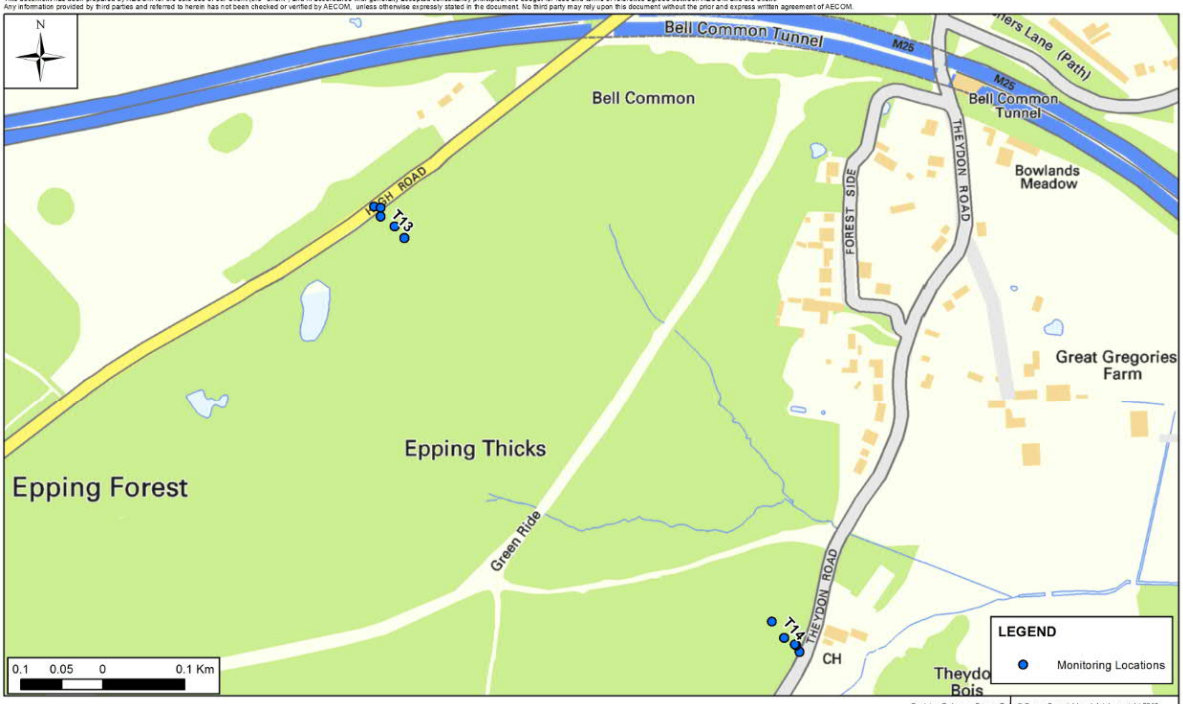
Project: Epping Forest Monitoring			



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Project: Epping Forest Monitoring			

Appendix E Interim Year Air Quality Modelling Note

The analysis below presents the results of the annual emissions drop-off calculations for intermediate years. Defra's EFT v8.0.1 has been used to calculate the annual drop-off of emissions to determine if there is a risk of an intermediate year having higher emissions than the scenarios currently modelled by AECOM using detailed dispersion modelling techniques.

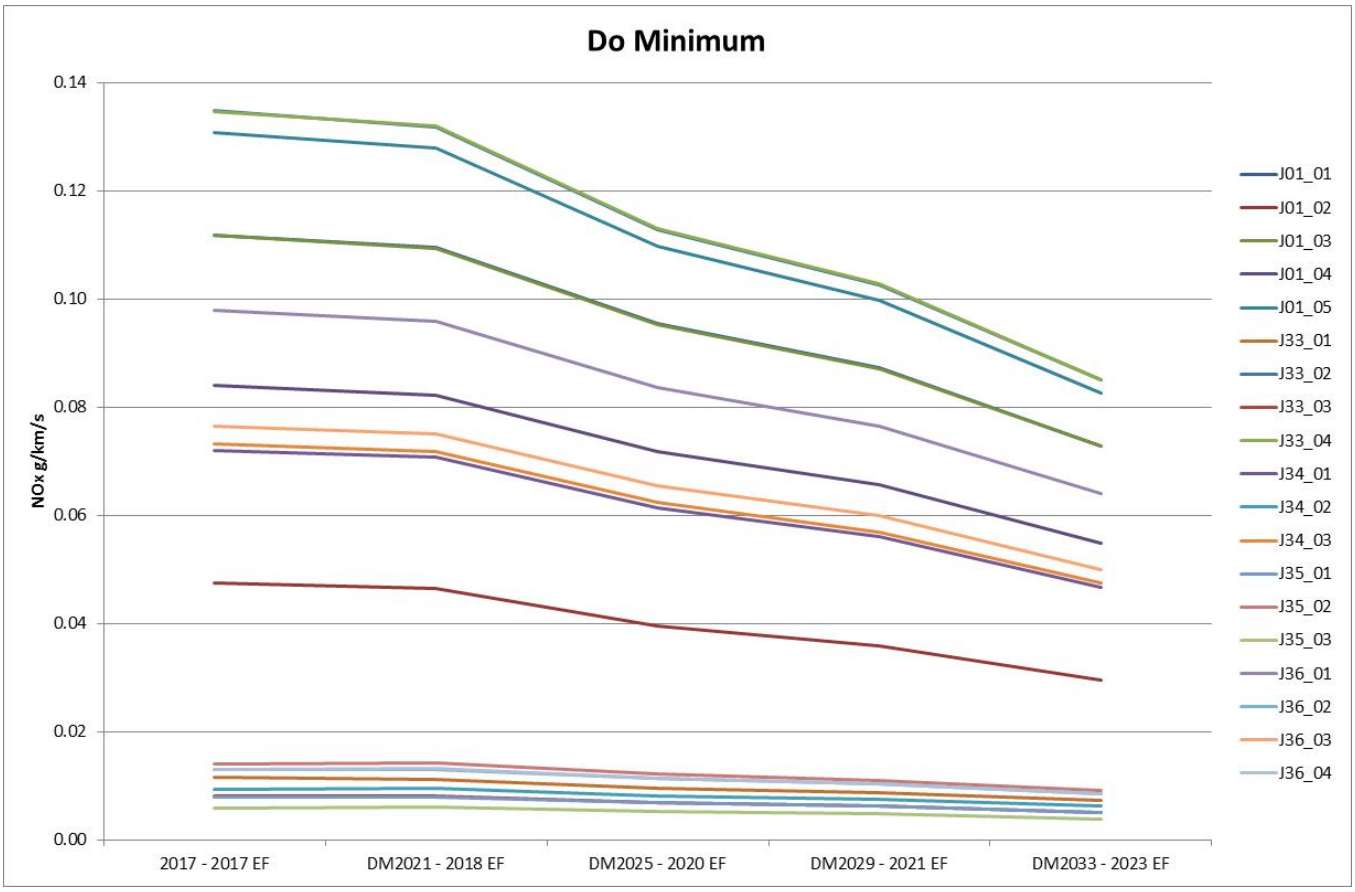
The NOx emission rates from road traffic have been calculated in the same manner as was used for the dispersion modelling, assuming partial improvements when compared to Defra predictions. The emission year associated with each year of traffic data is as follows:

- Base 2017 traffic with 2017 emission rates (as presented in the dispersion model assessment);
- 2021 traffic with 2018 emission rates;
- 2025 traffic with 2020 emission rates;
- 2029 traffic with 2021 emission rates; and
- 2033 traffic with 2023 emission rates (as presented in the dispersion model assessment).

Figure 1, for the 'with' (DS2), and Figure 2, 'without' (DM) plan scenarios, show the NOx emission rates (g/km/s) per link for each of the above interim years.

These plots demonstrate that for both the DM and DS2 scenarios, emission rates are projected to fall year on year for each link, despite the growth in traffic projected from 2017 to 2033. Small differences can be seen between DM and DS2 on a link-by-link basis due to the additional traffic from the local plan incorporated into the DS2 traffic flows.

This analysis has not been carried through into the dispersion modelling assessment as it is considered that this presentation of emission rates clearly falling is sufficient to illustrate that there are no points where the increase in traffic due to growth or the local plan offsets the improvements in emission rates over time, even when applying conservative assumptions on improvements in emission rates.


Do Minimum
NOx g/km/s
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
2017 - 2017 EF
DM2021 - 2018 EF
DM2025 - 2020 EF
DM2029 - 2021 EF
DM2033 - 2023 EF
J01_01
J01_02
J01_03
J01_04
J01_05
J33_01
J33_02
J33_03
J33_04
J34_01
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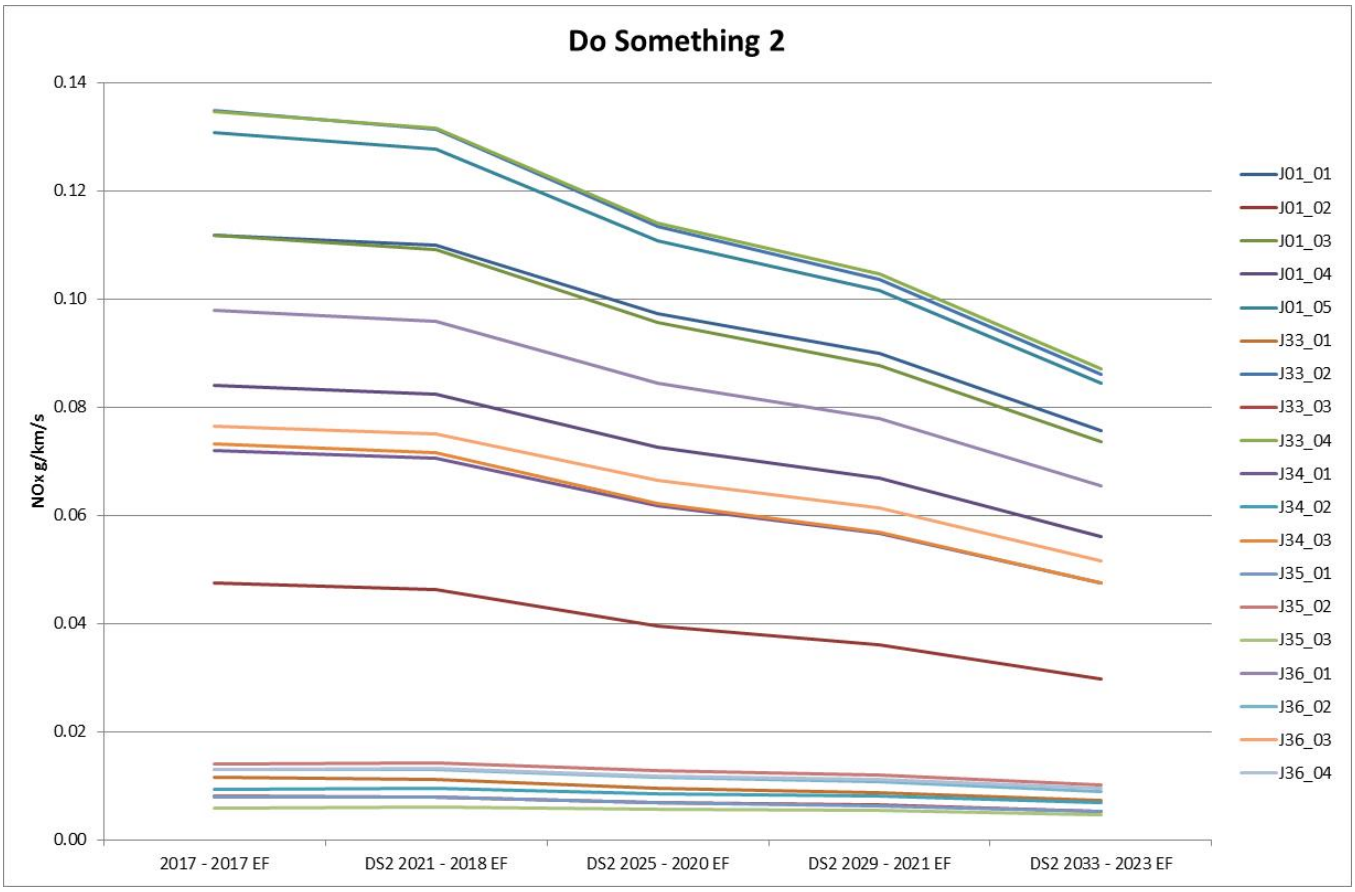
J36_02
J36_03
J36_04



The assessment has taken into account the following assumptions:

- Unconstrained traffic data for the 2017, DM and DS2 scenarios have been used;
- HDV% derived from ATC counts for the 2017, DM and DS2 scenarios have been applied;
- Current speed limits have been applied as each link speed;
- The presented emission rates do not account for any queues nor slowing at junctions; and
- A verification factor has not been applied to the presented results.

Appendix F Air Quality Modelling Results

Receptor A1

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
1	A1_4m	4	1.60	1.56	1.60	1.60	1.61	1.61	1.72	1.69	1.72	1.72	70.11	58.13	40.05	40.07	40.37	40.32	52.57	48.36	52.94	39.77	17.95	16.66	14.56	14.57	14.59	14.59	15.40	15.14	15.42	14.79
2	A1_10m	10	1.46	1.43	1.46	1.46	1.46	1.46	1.54	1.52	1.54	1.54	57.30	47.84	33.31	33.32	33.57	33.52	41.62	38.93	41.77	32.49	17.11	15.91	13.94	13.94	13.96	13.96	14.52	14.34	14.52	14.06
3	A1_20m	20	1.35	1.33	1.35	1.35	1.35	1.35	1.40	1.39	1.40	1.40	47.52	39.99	28.17	28.18	28.38	28.35	33.45	31.82	33.43	27.09	16.44	15.33	13.46	13.46	13.47	13.47	13.83	13.72	13.83	13.50
4	A1_30m	30	1.30	1.28	1.30	1.30	1.30	1.30	1.34	1.33	1.33	1.34	42.69	36.11	25.64	25.64	25.82	25.79	29.49	28.32	29.40	24.48	16.10	15.03	13.22	13.22	13.23	13.23	13.49	13.41	13.49	13.23
5	A1_40m	40	1.26	1.25	1.27	1.27	1.27	1.27	1.30	1.29	1.29	1.30	39.77	33.77	24.11	24.11	24.27	24.25	27.14	26.22	27.01	22.94	15.89	14.85	13.07	13.07	13.08	13.08	13.29	13.23	13.28	13.07
6	A1_50m	50	1.24	1.23	1.24	1.24	1.25	1.25	1.27	1.26	1.27	1.27	37.78	32.18	23.07	23.08	23.21	23.20	25.56	24.81	25.41	21.91	15.75	14.73	12.97	12.97	12.98	12.98	13.15	13.10	13.14	12.96
7	A1_60m	60	1.23	1.22	1.23	1.23	1.23	1.23	1.25	1.24	1.25	1.25	36.33	31.01	22.31	22.31	22.44	22.42	24.42	23.78	24.26	21.17	15.65	14.64	12.90	12.90	12.91	12.91	13.06	13.01	13.04	12.88
8	A1_70m	70	1.21	1.21	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	35.21	30.12	21.73	21.73	21.85	21.84	23.56	23.00	23.39	20.61	15.57	14.57	12.85	12.85	12.85	12.85	12.98	12.94	12.97	12.82
9	A1_80m	80	1.20	1.20	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	34.32	29.41	21.26	21.27	21.37	21.36	22.88	22.38	22.71	20.17	15.50	14.52	12.80	12.80	12.81	12.81	12.92	12.89	12.91	12.77
10	A1_90m	90	1.20	1.19	1.20	1.20	1.20	1.20	1.21	1.21	1.21	1.21	33.59	28.82	20.88	20.88	20.98	20.97	22.33	21.87	22.16	19.82	15.45	14.47	12.76	12.77	12.77	12.77	12.87	12.84	12.86	12.74
11	A1_100m	100	1.19	1.18	1.19	1.19	1.19	1.19	1.21	1.20	1.20	1.21	32.97	28.33	20.56	20.56	20.65	20.65	21.87	21.45	21.70	19.52	15.40	14.43	12.73	12.74	12.74	12.74	12.83	12.80	12.82	12.71
12	A1_110m	110	1.18	1.18	1.19	1.19	1.19	1.19	1.20	1.20	1.20	1.20	32.45	27.91	20.28	20.29	20.37	20.37	21.49	21.09	21.31	19.27	15.37	14.40	12.71	12.71	12.72	12.72	12.80	12.77	12.79	12.68
13	A1_120m	120	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	31.99	27.54	20.05	20.05	20.13	20.13	21.15	20.79	20.98	19.06	15.33	14.37	12.69	12.69	12.69	12.69	12.77	12.74	12.76	12.66
14	A1_130m	130	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	31.59	27.22	19.84	19.84	19.91	19.91	20.86	20.51	20.69	18.87	15.30	14.35	12.67	12.67	12.67	12.67	12.74	12.72	12.73	12.63
15	A1_140m	140	1.17	1.17	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	31.23	26.93	19.65	19.66	19.73	19.72	20.60	20.28	20.44	18.70	15.28	14.33	12.65	12.65	12.65	12.66	12.72	12.70	12.71	12.62
16	A1_150m	150	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	30.91	26.68	19.49	19.49	19.56	19.55	20.38	20.06	20.21	18.56	15.26	14.31	12.63	12.63	12.64	12.64	12.70	12.68	12.69	12.60
17	A1_160m	160	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.17	1.17	1.18	30.63	26.45	19.34	19.34	19.40	19.40	20.17	19.87	20.01	18.43	15.23	14.29	12.62	12.62	12.62	12.62	12.68	12.66	12.67	12.59
18	A1_170m	170	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	30.37	26.24	19.20	19.20	19.26	19.26	19.99	19.70	19.82	18.31	15.22	14.27	12.61	12.61	12.61	12.61	12.66	12.65	12.65	12.57
19	A1_180m	180	1.16	1.16	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	30.13	26.05	19.07	19.08	19.13	19.13	19.82	19.54	19.66	18.20	15.20	14.26	12.59	12.60	12.60	12.60	12.65	12.63	12.64	12.56
20	A1_190m	190	1.16	1.15	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	29.91	25.87	18.96	18.96	19.02	19.01	19.66	19.40	19.50	18.10	15.18	14.24	12.58	12.58	12.59	12.59	12.64	12.62	12.63	12.55
21	A1_200m	200	1.16	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	29.71	25.71	18.85	18.86	18.91	18.91	19.52	19.27	19.36	18.01	15.17	14.23	12.57	12.57	12.58	12.58	12.62	12.61	12.61	12.54

Receptor A2

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
22	A2_1m	1	1.83	1.79	1.88	1.88	1.88	1.88	1.92	1.91	1.93	1.92	80.50	66.86	45.95	45.98	46.47	46.45	48.94	47.86	51.29	35.05	18.99	17.62	15.48	15.48	15.51	15.51	15.71	15.64	15.83	15.03
23	A2_10m	10	1.54	1.51	1.57	1.57	1.57	1.57	1.60	1.59	1.60	1.60	57.46	48.14	33.61	33.63	34.00	33.98	35.86	34.81	37.58	27.21	17.42	16.20	14.24	14.25	14.27	14.27	14.42	14.35	14.52	13.98
24	A2_20m	20	1.41	1.39	1.43	1.43	1.43	1.43	1.45	1.44	1.46	1.45	47.33	39.91	28.18	28.20	28.50	28.49	30.08	29.08	31.46	23.76	16.69	15.56	13.69	13.69	13.71	13.72	13.84	13.77	13.92	13.51
25	A2_30m	30	1.35	1.33	1.36	1.36	1.36	1.36	1.38	1.37	1.39	1.38	42.12	35.68	25.40	25.41	25.67	25.66	27.10	26.14	28.23	21.97	16.31	15.22	13.40	13.41	13.42	13.43	13.54	13.47	13.61	13.27
26	A2_40m	40	1.31	1.29	1.31	1.32	1.32	1.32	1.33	1.33	1.34	1.33	38.94	33.10	23.69	23.70	23.94	23.93	25.26	24.36	26.21	20.88	16.08	15.02	13.23	13.23	13.25	13.25	13.35	13.29	13.41	13.12
27	A2_50m	50	1.28	1.27	1.29	1.29	1.29	1.29	1.30	1.30	1.31	1.30	36.74	31.33	22.53	22.54	22.74	22.74	23.99	23.13	24.78	20.12	15.91	14.87	13.11	13.11	13.12	13.12	13.22	13.16	13.27	13.01
28	A2_60m	60	1.26	1.25	1.26	1.26	1.27	1.27	1.28	1.27	1.28	1.28	35.16	30.05	21.69	21.69	21.88	21.88	23.06	22.26	23.73	19.56	15.79	14.77	13.02	13.02	13.04	13.04	13.13	13.07	13.17	12.94
29	A2_70m	70	1.24	1.23	1.25	1.25	1.25	1.25	1.26	1.26	1.27	1.26	33.93	29.06	21.04	21.05	21.22	21.21	22.34	21.58	22.90	19.13	15.70	14.69	12.95	12.95	12.97	12.97	13.05	13.00	13.09	12.88
30	A2_80m	80	1.23	1.22	1.24	1.24	1.24	1.24	1.25	1.24	1.25	1.25	32.96	28.29	20.53	20.54	20.70	20.69	21.77	21.06	22.24	18.79	15.62	14.63	12.90	12.90	12.91	12.91	13.00	12.95	13.03	12.84
31	A2_90m	90	1.22	1.21	1.23	1.23	1.23	1.23	1.24	1.23	1.24	1.24	32.18	27.66	20.13	20.13	20.27	20.27	21.30	20.64	21.70	18.52	15.57	14.57	12.86	12.86	12.87	12.87	12.95	12.90	12.97	12.80
32	A2_100m	100	1.21	1.21	1.22	1.22	1.22	1.22	1.23	1.22	1.23	1.23	31.52	27.14	19.79	19.79	19.92	19.92	20.91	20.29	21.24	18.28	15.52	14.53	12.82	12.83	12.83	12.84	12.91	12.87	12.93	12.77
33	A2_110m	110	1.21	1.20	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	30.97	26.70	19.50	19.51	19.63	19.63	20.58	20.00	20.86	18.09	15.47	14.50	12.79	12.80	12.80	12.80	12.88	12.84	12.89	12.74
34	A2_120m	120	1.20	1.19	1.20	1.20	1.21	1.21	1.22	1.21	1.22	1.22	30.50	26.33	19.26	19.27	19.38	19.39	20.30	19.75	20.53	17.92	15.44	14.46	12.77	12.77	12.78	12.78	12.85	12.81	12.86	12.72
35	A2_130m	130	1.20	1.19	1.20	1.20	1.20	1.20	1.21	1.21	1.21	1.21	30.09	26.01	19.06	19.06	19.17	19.17	20.06	19.54	20.24	17.78	15.41	14.44	12.75	12.75	12.76	12.76	12.82	12.79	12.84	12.70

36	A2_140m	140	1.19	1.18	1.19	1.20	1.20	1.20	1.21	1.20	1.21	1.21	29.74	25.73	18.88	18.89	18.99	18.99	19.85	19.36	19.99	17.65	15.38	14.42	12.73	12.73	12.74	12.74	12.80	12.77	12.81	12.69
37	A2_150m	150	1.19	1.18	1.19	1.19	1.19	1.19	1.20	1.20	1.20	1.20	29.44	25.49	18.73	18.73	18.83	18.83	19.66	19.20	19.78	17.54	15.36	14.40	12.71	12.72	12.72	12.72	12.79	12.75	12.79	12.67
38	A2_160m	160	1.18	1.18	1.19	1.19	1.19	1.19	1.20	1.19	1.20	1.20	29.17	25.27	18.59	18.60	18.69	18.69	19.50	19.06	19.58	17.44	15.34	14.38	12.70	12.70	12.71	12.71	12.77	12.74	12.77	12.66
39	A2_170m	170	1.18	1.18	1.18	1.19	1.19	1.19	1.19	1.19	1.19	1.19	28.93	25.08	18.48	18.48	18.57	18.57	19.35	18.94	19.41	17.35	15.32	14.36	12.69	12.69	12.70	12.70	12.75	12.73	12.76	12.65
40	A2_180m	180	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	28.73	24.92	18.38	18.38	18.47	18.47	19.23	18.83	19.27	17.28	15.30	14.35	12.68	12.68	12.69	12.69	12.74	12.71	12.75	12.64
41	A2_190m	190	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	28.55	24.78	18.29	18.29	18.37	18.38	19.12	18.74	19.13	17.21	15.29	14.34	12.67	12.67	12.68	12.68	12.73	12.71	12.73	12.63
42	A2_200m	200	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.18	1.19	1.19	28.39	24.65	18.21	18.21	18.29	18.30	19.02	18.66	19.02	17.15	15.28	14.33	12.66	12.66	12.67	12.67	12.72	12.70	12.72	12.62

Receptor B1

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup		Distance	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
ID	Road Link	From Road (m)																														
43	B1_1m	1	1.58	1.63	1.68	1.68	1.68	1.69	1.80	1.79	1.70	1.80	68.93	73.81	50.85	50.80	51.22	51.30	66.21	65.78	52.11	50.73	17.87	17.50	15.24	15.24	15.27	15.27	16.17	16.15	15.34	15.47
44	B1_10m	10	1.38	1.39	1.42	1.42	1.42	1.42	1.48	1.47	1.44	1.48	51.12	49.29	34.55	34.53	34.85	34.93	41.80	41.31	35.80	33.38	16.67	15.90	13.92	13.92	13.94	13.95	14.40	14.36	14.02	13.98
45	B1_20m	20	1.32	1.32	1.34	1.34	1.34	1.35	1.38	1.38	1.36	1.38	45.72	42.13	29.82	29.80	30.09	30.17	34.68	34.17	31.02	28.35	16.29	15.41	13.52	13.52	13.54	13.55	13.85	13.82	13.61	13.53
46	B1_30m	30	1.29	1.29	1.31	1.31	1.31	1.31	1.34	1.33	1.32	1.34	43.16	38.86	27.67	27.65	27.92	28.00	31.43	30.91	28.81	26.06	16.11	15.18	13.34	13.34	13.36	13.36	13.60	13.56	13.43	13.32
47	B1_40m	40	1.27	1.27	1.29	1.29	1.29	1.29	1.31	1.31	1.30	1.31	41.61	36.94	26.41	26.40	26.65	26.73	29.54	29.02	27.50	24.74	16.00	15.05	13.23	13.23	13.25	13.26	13.45	13.42	13.32	13.20
48	B1_50m	50	1.26	1.26	1.27	1.27	1.27	1.27	1.30	1.29	1.28	1.30	40.53	35.66	25.58	25.56	25.81	25.88	28.28	27.75	26.62	23.87	15.92	14.96	13.16	13.16	13.18	13.18	13.35	13.32	13.24	13.12
49	B1_60m	60	1.25	1.25	1.26	1.26	1.26	1.26	1.28	1.28	1.27	1.28	39.72	34.73	24.97	24.96	25.19	25.26	27.37	26.84	25.97	23.24	15.87	14.89	13.11	13.11	13.12	13.13	13.28	13.24	13.19	13.06
50	B1_70m	70	1.24	1.24	1.25	1.25	1.26	1.26	1.27	1.27	1.27	1.27	39.07	34.01	24.50	24.49	24.71	24.78	26.68	26.14	25.46	22.76	15.82	14.84	13.07	13.07	13.08	13.09	13.22	13.19	13.14	13.02
51	B1_80m	80	1.24	1.23	1.25	1.25	1.25	1.25	1.27	1.26	1.26	1.27	38.54	33.44	24.13	24.12	24.33	24.40	26.13	25.59	25.04	22.38	15.78	14.80	13.04	13.04	13.05	13.06	13.18	13.14	13.11	12.98
52	B1_90m	90	1.24	1.23	1.24	1.24	1.24	1.25	1.26	1.26	1.25	1.26	38.08	32.96	23.82	23.81	24.01	24.08	25.67	25.13	24.69	22.07	15.75	14.77	13.01	13.01	13.02	13.03	13.14	13.11	13.08	12.95
53	B1_100m	100	1.23	1.22	1.24	1.24	1.24	1.24	1.25	1.25	1.25	1.25	37.67	32.56	23.55	23.54	23.74	23.80	25.29	24.74	24.39	21.81	15.72	14.74	12.99	12.99	13.00	13.01	13.11	13.07	13.05	12.93
54	B1_110m	110	1.23	1.22	1.23	1.23	1.24	1.24	1.25	1.25	1.24	1.25	37.31	32.20	23.32	23.31	23.50	23.56	24.96	24.40	24.13	21.58	15.70	14.71	12.97	12.97	12.98	12.99	13.09	13.05	13.03	12.91
55	B1_120m	120	1.22	1.22	1.23	1.23	1.23	1.23	1.25	1.24	1.24	1.25	36.99	31.89	23.12	23.11	23.29	23.35	24.67	24.11	23.90	21.39	15.68	14.69	12.95	12.95	12.96	12.97	13.06	13.02	13.01	12.89
56	B1_130m	130	1.22	1.22	1.23	1.23	1.23	1.23	1.24	1.24	1.24	1.24	36.69	31.62	22.93	22.93	23.10	23.16	24.41	23.85	23.68	21.22	15.66	14.67	12.93	12.93	12.95	12.95	13.04	13.00	12.99	12.87
57	B1_140m	140	1.22	1.21	1.23	1.23	1.23	1.23	1.24	1.23	1.23	1.24	36.41	31.37	22.77	22.76	22.93	22.98	24.18	23.61	23.49	21.07	15.64	14.65	12.92	12.92	12.93	12.94	13.02	12.98	12.98	12.86
58	B1_150m	150	1.22	1.21	1.22	1.22	1.22	1.23	1.24	1.23	1.23	1.24	36.16	31.14	22.62	22.62	22.77	22.82	23.98	23.40	23.32	20.93	15.62	14.64	12.91	12.91	12.92	12.92	13.01	12.97	12.96	12.84
59	B1_160m	160	1.22	1.21	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	35.92	30.94	22.48	22.48	22.63	22.68	23.79	23.21	23.15	20.81	15.60	14.62	12.90	12.90	12.91	12.91	12.99	12.95	12.95	12.83
60	B1_170m	170	1.21	1.21	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	35.71	30.75	22.36	22.36	22.50	22.55	23.63	23.04	23.01	20.70	15.59	14.61	12.89	12.89	12.90	12.90	12.98	12.94	12.94	12.82
61	B1_180m	180	1.21	1.21	1.22	1.22	1.22	1.22	1.23	1.22	1.23	1.23	35.50	30.58	22.25	22.24	22.38	22.43	23.47	22.88	22.87	20.60	15.58	14.59	12.88	12.88	12.89	12.89	12.97	12.92	12.92	12.81
62	B1_190m	190	1.21	1.20	1.22	1.22	1.22	1.22	1.23	1.22	1.22	1.23	35.32	30.42	22.14	22.14	22.27	22.32	23.33	22.74	22.74	20.50	15.56	14.58	12.87	12.87	12.88	12.88	12.95	12.91	12.91	12.80
63	B1_200m	200	1.21	1.20	1.21	1.21	1.22	1.22	1.23	1.22	1.22	1.23	35.14	30.28	22.04	22.04	22.17	22.21	23.20	22.61	22.63	20.42	15.55	14.57	12.86	12.86	12.87	12.87	12.94	12.90	12.90	12.79

Receptor B2

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup		Distance	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
ID	Road Link	From Road (m)																														
64	B2_1m	1	1.57	1.54	1.68	1.68	1.68	1.68	1.70	1.70	1.69	1.70	63.83	51.61	49.10	49.05	49.32	49.33	50.18	50.63	49.72	38.17	17.77	16.41	15.23	15.23	15.25	15.25	15.32	15.34	15.29	14.74
65	B2_10m	10	1.36	1.34	1.40	1.40	1.40	1.40	1.42	1.42	1.41	1.42	44.84	37.23	31.87	31.86	32.02	32.03	33.06	33.41	32.58	26.57	16.46	15.31	13.83	13.83	13.84	13.84	13.92	13.94	13.89	13.58
66	B2_20m	20	1.29	1.27	1.31	1.31	1.31	1.31	1.33	1.33	1.32	1.33	38.54	32.49	26.40	26.39	26.52	26.53	27.62	27.90	27.15	22.92	16.01	14.94	13.37	13.37	13.38	13.38	13.46	13.47	13.42	13.21
67	B2_30m	30	1.25	1.24	1.27	1.27	1.27	1.27	1.28	1.28	1.28	1.28	35.60	30.29	23.90	23.90	24.01	24.03	25.15	25.34	24.69	21.28	15.80	14.77	13.15	13.15	13.16	13.16	13.24	13.25	13.21	13.04
68	B2_40m	40	1.23	1.22	1.25	1.25	1.25	1.25	1.26	1.26	1.26	1.26	33.94	29.04	22.50	22.50	22.61	22.62	23.77	23.86	23.32	20.36	15.68	14.67	13.03	13.03	13.04	13.04	13.12	13.13	13.09	12.94
69	B2_50m	50	1.22	1.21	1.23	1.23	1.23	1.23	1.25	1.24	1.24	1.25	32.89	28.26	21.61	21.61	21.72	21.73	22.91	22.89	22.47	19.78	15.60	14.60	12.95	12.95	12.96	12.96	13.05	13.05	13.02	12.88
70	B2_60m	60	1.21	1.21	1.22	1.22	1.22	1.22	1.24	1.23	1.23	1.24	32.19	27.73	21.02	21.02	21.13	21.14	22.33	22.22	21.92	19.39	15.55	14.56	12.90	12.90	12.91	12.91	13.00	12.99	12.97	12.84
71	B2_70m	70	1.21	1.20	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	31.71	27.37	20.61	20.61	20.71	20.73	21.93	21.74	21.55	19.13	15.51	14.53	12.87	12.87	12.87	12.88	12.96	12.95	12.94	12.81
72	B2_80m	80	1.20	1.20	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	31.37	27.12	20.32	20.32	20.42	20.43	21.66	21.38	21.30	18.94	15.49	14.51	12.84	12.84	12.85	12.85	12.94	12.92	12.92	12.79
73	B2_90m	90	1.20	1.19	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	31.15	26.95	20.11	20.11	20.21	20.22	21.46	21.12	21.14	18.81	15.47	14.50	12.82	12.82	12.83	12.83	12.92	12.90	12.90	12.78

74	B2_100m	100	1.20	1.19	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	31.00	26.84	19.96	19.96	20.07	20.08	21.33	20.93	21.05	18.73	15.46	14.49	12.81	12.81	12.82	12.82	12.91	12.88	12.89	12.77
75	B2_110m	110	1.20	1.19	1.21	1.21	1.21	1.21	1.22	1.21	1.22	1.22	30.92	26.78	19.86	19.86	19.97	19.98	21.26	20.79	21.01	18.67	15.46	14.49	12.80	12.80	12.81	12.81	12.91	12.87	12.89	12.77
76	B2_120m	120	1.20	1.19	1.20	1.20	1.21	1.21	1.22	1.21	1.22	1.22	30.90	26.75	19.80	19.80	19.91	19.92	21.22	20.69	21.01	18.64	15.45	14.48	12.80	12.80	12.81	12.81	12.90	12.87	12.89	12.77
77	B2_130m	130	1.20	1.19	1.20	1.20	1.21	1.21	1.22	1.21	1.22	1.22	30.92	26.77	19.77	19.77	19.88	19.89	21.22	20.63	21.05	18.64	15.46	14.49	12.80	12.80	12.81	12.81	12.90	12.86	12.89	12.76
78	B2_140m	140	1.20	1.19	1.21	1.21	1.21	1.21	1.22	1.21	1.22	1.22	30.98	26.81	19.77	19.77	19.89	19.90	21.25	20.60	21.12	18.65	15.46	14.49	12.80	12.80	12.81	12.81	12.91	12.86	12.90	12.77
79	B2_150m	150	1.20	1.19	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	31.09	26.89	19.80	19.80	19.92	19.93	21.31	20.60	21.24	18.69	15.47	14.50	12.80	12.80	12.81	12.81	12.92	12.87	12.91	12.77
80	B2_160m	160	1.20	1.20	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	31.24	27.00	19.85	19.86	19.98	19.98	21.41	20.63	21.38	18.74	15.48	14.51	12.81	12.81	12.82	12.82	12.92	12.87	12.92	12.78
81	B2_170m	170	1.21	1.20	1.21	1.21	1.21	1.21	1.23	1.22	1.23	1.23	31.43	27.14	19.93	19.94	20.06	20.07	21.54	20.69	21.57	18.82	15.49	14.52	12.82	12.82	12.83	12.83	12.94	12.88	12.94	12.79
82	B2_180m	180	1.21	1.20	1.21	1.21	1.21	1.22	1.23	1.22	1.23	1.23	31.67	27.33	20.05	20.05	20.19	20.19	21.71	20.78	21.80	18.92	15.51	14.53	12.83	12.83	12.84	12.84	12.95	12.89	12.96	12.80
83	B2_190m	190	1.21	1.20	1.22	1.22	1.22	1.22	1.23	1.23	1.24	1.23	31.97	27.55	20.19	20.20	20.34	20.34	21.91	20.91	22.08	19.05	15.54	14.55	12.85	12.85	12.86	12.86	12.97	12.90	12.98	12.82
84	B2_200m	200	1.22	1.21	1.22	1.22	1.22	1.22	1.24	1.23	1.24	1.24	32.32	27.83	20.37	20.38	20.53	20.53	22.16	21.06	22.42	19.21	15.56	14.57	12.86	12.87	12.88	12.88	13.00	12.92	13.01	12.84

Receptor C1

Lookup		Distance	Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
			2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
ID	Road Link	From Road (m)																														
85	C1_1m	1	2.58	2.47	2.60	2.60	2.60	2.60	2.80	2.62	2.62	2.80	175.08	142.13	97.03	97.14	97.38	97.53	119.51	97.60	98.05	84.88	23.70	21.80	19.05	19.06	19.07	19.08	20.31	19.11	19.14	18.97
86	C1_10m	10	1.90	1.85	1.92	1.92	1.92	1.92	2.02	1.93	1.94	2.02	105.19	86.33	59.83	59.89	60.09	60.21	70.36	60.28	60.75	51.85	19.97	18.45	16.13	16.14	16.15	16.16	16.79	16.18	16.21	15.96
87	C1_20m	20	1.64	1.60	1.65	1.65	1.66	1.66	1.71	1.66	1.67	1.71	78.43	64.86	45.40	45.44	45.62	45.74	51.94	45.80	46.27	39.48	18.39	17.05	14.92	14.93	14.94	14.95	15.36	14.96	14.99	14.76
88	C1_30m	30	1.52	1.49	1.53	1.53	1.53	1.53	1.58	1.54	1.54	1.58	66.16	55.01	38.75	38.79	38.96	39.08	43.60	39.14	39.59	33.89	17.63	16.37	14.35	14.35	14.37	14.38	14.68	14.39	14.42	14.20
89	C1_40m	40	1.45	1.43	1.46	1.46	1.46	1.46	1.49	1.47	1.47	1.49	59.01	49.26	34.87	34.90	35.08	35.19	38.76	35.26	35.69	30.66	17.17	15.97	14.01	14.01	14.03	14.04	14.28	14.05	14.08	13.87
90	C1_50m	50	1.40	1.38	1.41	1.41	1.41	1.41	1.44	1.42	1.42	1.44	54.33	45.50	32.33	32.36	32.53	32.65	35.61	32.71	33.13	28.56	16.87	15.70	13.79	13.79	13.80	13.81	14.02	13.82	13.85	13.66
91	C1_60m	60	1.37	1.35	1.37	1.38	1.38	1.38	1.40	1.38	1.39	1.40	50.93	42.78	30.49	30.51	30.69	30.80	33.34	30.88	31.27	27.05	16.64	15.50	13.62	13.63	13.64	13.65	13.83	13.66	13.69	13.50
92	C1_70m	70	1.34	1.33	1.35	1.35	1.35	1.35	1.37	1.36	1.36	1.37	48.41	40.76	29.13	29.14	29.32	29.43	31.66	29.51	29.89	25.93	16.47	15.36	13.50	13.50	13.52	13.52	13.68	13.54	13.56	13.38
93	C1_80m	80	1.32	1.31	1.33	1.33	1.33	1.33	1.35	1.34	1.34	1.35	46.37	39.13	28.03	28.04	28.22	28.32	30.32	28.42	28.77	25.04	16.33	15.24	13.40	13.40	13.42	13.43	13.57	13.44	13.46	13.29
94	C1_90m	90	1.31	1.29	1.31	1.31	1.31	1.31	1.33	1.32	1.32	1.33	44.73	37.83	27.15	27.16	27.34	27.44	29.24	27.55	27.88	24.34	16.22	15.14	13.32	13.33	13.34	13.35	13.47	13.36	13.38	13.22
95	C1_100m	100	1.29	1.28	1.30	1.30	1.30	1.30	1.32	1.30	1.31	1.32	43.35	36.74	26.41	26.42	26.60	26.69	28.34	26.82	27.12	23.75	16.13	15.06	13.26	13.26	13.27	13.28	13.40	13.29	13.31	13.16
96	C1_110m	110	1.28	1.27	1.29	1.29	1.29	1.29	1.30	1.29	1.29	1.30	42.18	35.81	25.79	25.79	25.97	26.05	27.59	26.20	26.48	23.25	16.05	14.99	13.20	13.20	13.21	13.22	13.33	13.23	13.26	13.10
97	C1_120m	120	1.27	1.26	1.28	1.28	1.28	1.28	1.29	1.28	1.28	1.29	41.17	35.01	25.25	25.25	25.42	25.50	26.93	25.66	25.92	22.82	15.98	14.93	13.15	13.15	13.16	13.17	13.27	13.19	13.21	13.06
98	C1_130m	130	1.26	1.25	1.27	1.27	1.27	1.27	1.28	1.27	1.28	1.28	40.28	34.31	24.77	24.78	24.94	25.02	26.37	25.20	25.43	22.46	15.91	14.88	13.11	13.11	13.12	13.13	13.22	13.14	13.16	13.02
99	C1_140m	140	1.25	1.24	1.26	1.26	1.26	1.26	1.27	1.26	1.27	1.27	39.49	33.68	24.35	24.35	24.51	24.59	25.86	24.78	25.00	22.13	15.86	14.83	13.07	13.07	13.08	13.09	13.18	13.11	13.12	12.98
100	C1_150m	150	1.25	1.24	1.25	1.25	1.25	1.25	1.27	1.26	1.26	1.27	38.79	33.13	23.98	23.98	24.14	24.20	25.42	24.42	24.61	21.84	15.81	14.79	13.04	13.04	13.05	13.05	13.14	13.07	13.09	12.95
101	C1_160m	160	1.24	1.23	1.24	1.25	1.25	1.25	1.26	1.25	1.25	1.26	38.14	32.62	23.64	23.64	23.79	23.85	25.02	24.09	24.25	21.58	15.76	14.75	13.00	13.01	13.02	13.02	13.11	13.04	13.05	12.92
102	C1_170m	170	1.23	1.23	1.24	1.24	1.24	1.24	1.25	1.25	1.25	1.25	37.57	32.17	23.33	23.33	23.48	23.54	24.66	23.79	23.93	21.35	15.72	14.72	12.98	12.98	12.99	12.99	13.07	13.01	13.03	12.90
103	C1_180m	180	1.23	1.22	1.23	1.23	1.24	1.24	1.25	1.24	1.24	1.25	37.03	31.75	23.05	23.05	23.19	23.24	24.33	23.51	23.64	21.13	15.69	14.69	12.95	12.95	12.96	12.97	13.04	12.99	13.00	12.87
104	C1_190m	190	1.22	1.22	1.23	1.23	1.23	1.23	1.24	1.23	1.24	1.24	36.54	31.37	22.79	22.79	22.92	22.97	24.02	23.26	23.37	20.94	15.65	14.66	12.93	12.93	12.94	12.94	13.02	12.97	12.97	12.85
105	C1_200m	200	1.22	1.21	1.22	1.22	1.23	1.23	1.24	1.23	1.23	1.24	36.09	31.01	22.54	22.54	22.68	22.72	23.75	23.02	23.12	20.76	15.62	14.63	12.91	12.91	12.92	12.92	12.99	12.94	12.95	12.83

Receptor C2

Lookup		Distance	Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
			2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
ID	Road Link	From Road (m)																														
106	C2_1m	1	1.74	1.80	1.86	1.87	1.87	1.87	1.97	1.88	1.88	1.97	73.78	79.25	55.10	55.15	55.26	55.18	65.98	55.43	55.56	48.36	18.55	18.20	15.89	15.89	15.90	15.90	16.58	15.93	15.94	15.77
107	C2_10m	10	1.40	1.41	1.44	1.44	1.44	1.44	1.48	1.45	1.45	1.48	46.94	44.95	32.10	32.13	32.20	32.11	36.20	32.35	32.50	28.39	16.68	15.87	13.93	13.93	13.93	13.93	14.21	13.95	13.96	13.81
108	C2_20m	20	1.30	1.30	1.32	1.32	1.32	1.32	1.34	1.32	1.33	1.34	38.59	35.25	25.57	25.59	25.65	25.57	27.90	25.79	25.95	22.89	16.08	15.17	13.34	13.35	13.35	13.35	13.51	13.37	13.38	13.25
109	C2_30m	30	1.25	1.25	1.27	1.27	1.27	1.27	1.28	1.27	1.27	1.28	34.65	31.00	22.70	22.71	22.77	22.70	24.31	22.89	23.05	20.53	15.79	14.85	13.08	13.08	13.09	13.09	13.20	13.10	13.11	13.00
110	C2_40m	40	1.23	1.22	1.24	1.24	1.24	1.24	1.25	1.24	1.24	1.25	32.34	28.64	21.10	21.11	21.16	21.12	22.35	21.28	21.44	19.25	15.62	14.67	12.94	12.94	12.94	12.94	13.03	12.95	12.97	12.86
111	C2_50m	50	1.21	1.20	1.22	1.22	1.22	1.22	1.23	1.22	1.22	1.23	30.79	27.13	20.08	20.09	20.14	20.11	21.11	20.25	20.42	18.44	15.50	14.56	12.84	12.84	12.85	12.85	12.92	12.86	12.87	12.78

112	C2_60m	60	1.20	1.19	1.20	1.20	1.20	1.20	1.21	1.21	1.21	1.21	29.69	26.09	19.37	19.38	19.43	19.41	20.27	19.54	19.70	17.90	15.42	14.47	12.78	12.78	12.78	12.78	12.84	12.79	12.81	12.72
113	C2_70m	70	1.19	1.18	1.19	1.19	1.19	1.19	1.20	1.20	1.20	1.20	28.87	25.33	18.87	18.88	18.92	18.91	19.66	19.03	19.19	17.51	15.36	14.42	12.73	12.73	12.73	12.73	12.79	12.75	12.76	12.67
114	C2_80m	80	1.18	1.18	1.18	1.19	1.19	1.19	1.19	1.19	1.19	1.19	28.22	24.75	18.48	18.49	18.53	18.52	19.20	18.64	18.80	17.21	15.31	14.37	12.70	12.70	12.70	12.70	12.75	12.71	12.72	12.64
115	C2_90m	90	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.18	1.18	1.19	27.71	24.30	18.18	18.19	18.23	18.22	18.84	18.33	18.49	16.98	15.27	14.34	12.67	12.67	12.67	12.67	12.72	12.68	12.69	12.62
116	C2_100m	100	1.17	1.17	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	27.29	23.93	17.93	17.94	17.98	17.98	18.55	18.08	18.23	16.80	15.24	14.31	12.64	12.64	12.65	12.65	12.69	12.66	12.67	12.59
117	C2_110m	110	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.17	1.17	1.18	26.95	23.63	17.73	17.74	17.78	17.78	18.31	17.88	18.03	16.65	15.22	14.28	12.63	12.63	12.63	12.63	12.67	12.64	12.65	12.58
118	C2_120m	120	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	26.65	23.38	17.56	17.57	17.61	17.61	18.12	17.71	17.85	16.52	15.19	14.27	12.61	12.61	12.61	12.61	12.65	12.62	12.63	12.56
119	C2_130m	130	1.16	1.16	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	26.40	23.16	17.42	17.43	17.46	17.46	17.95	17.56	17.70	16.41	15.18	14.25	12.60	12.60	12.60	12.60	12.64	12.61	12.62	12.55
120	C2_140m	140	1.16	1.15	1.16	1.16	1.16	1.16	1.17	1.16	1.17	1.17	26.19	22.98	17.29	17.30	17.34	17.34	17.80	17.43	17.57	16.32	15.16	14.23	12.58	12.58	12.59	12.59	12.62	12.60	12.61	12.54
121	C2_150m	150	1.16	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	26.00	22.82	17.19	17.19	17.23	17.23	17.67	17.32	17.46	16.24	15.15	14.22	12.57	12.58	12.58	12.58	12.61	12.59	12.60	12.53
122	C2_160m	160	1.15	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	25.83	22.68	17.09	17.10	17.13	17.14	17.56	17.22	17.36	16.17	15.13	14.21	12.57	12.57	12.57	12.57	12.60	12.58	12.59	12.52
123	C2_170m	170	1.15	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	25.68	22.56	17.01	17.01	17.04	17.05	17.46	17.13	17.27	16.10	15.12	14.20	12.56	12.56	12.56	12.56	12.59	12.57	12.58	12.52
124	C2_180m	180	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	1.16	1.16	25.55	22.44	16.93	16.94	16.97	16.97	17.37	17.06	17.19	16.04	15.11	14.19	12.55	12.55	12.55	12.55	12.58	12.56	12.57	12.51
125	C2_190m	190	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	25.43	22.35	16.86	16.87	16.90	16.90	17.29	16.98	17.11	15.99	15.10	14.18	12.54	12.54	12.55	12.55	12.58	12.55	12.56	12.51
126	C2_200m	200	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.15	1.16	1.16	25.32	22.25	16.80	16.80	16.84	16.84	17.21	16.92	17.04	15.94	15.10	14.18	12.54	12.54	12.54	12.54	12.57	12.55	12.56	12.50

Receptor D1

Lookup ID	Road Link	Distance From Road (m)	Annual Mean NH_3 (ug/m^3) 2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	Annual Mean NOx (ug/m^3) 2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	Annual Mean Total N Dep (kg N/ha/yr) 2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
127	D1_1m	1	1.65	1.63	1.75	1.75	1.75	1.76	1.88	1.77	1.87	1.88	70.66	59.62	48.99	48.97	49.27	49.33	62.02	49.95	61.65	45.82	18.09	16.86	15.29	15.30	15.31	15.32	16.14	15.38	16.12	15.39
128	D1_10m	10	1.37	1.36	1.41	1.41	1.41	1.42	1.46	1.42	1.46	1.46	47.41	40.35	31.57	31.56	31.72	31.76	36.80	32.08	36.46	29.18	16.48	15.40	13.76	13.76	13.77	13.77	14.12	13.80	14.10	13.73
129	D1_20m	20	1.28	1.27	1.31	1.31	1.31	1.31	1.34	1.32	1.34	1.34	40.15	34.33	26.27	26.27	26.38	26.41	29.37	26.64	29.06	24.32	15.95	14.93	13.27	13.27	13.28	13.28	13.49	13.31	13.47	13.23
130	D1_30m	30	1.24	1.24	1.26	1.26	1.26	1.26	1.28	1.27	1.28	1.28	36.78	31.55	23.84	23.85	23.93	23.96	26.03	24.15	25.73	22.15	15.71	14.71	13.05	13.05	13.05	13.06	13.21	13.08	13.19	13.00
131	D1_40m	40	1.22	1.21	1.23	1.23	1.23	1.23	1.25	1.24	1.25	1.25	34.87	29.97	22.47	22.48	22.55	22.57	24.15	22.74	23.88	20.94	15.56	14.58	12.92	12.92	12.93	12.93	13.04	12.94	13.03	12.87
132	D1_50m	50	1.21	1.20	1.22	1.22	1.22	1.22	1.23	1.22	1.23	1.23	33.65	28.96	21.61	21.61	21.68	21.70	22.98	21.85	22.71	20.17	15.47	14.50	12.84	12.84	12.84	12.85	12.94	12.86	12.92	12.79
133	D1_60m	60	1.20	1.19	1.20	1.20	1.21	1.21	1.22	1.21	1.21	1.22	32.82	28.27	21.02	21.03	21.08	21.10	22.18	21.24	21.93	19.66	15.41	14.45	12.78	12.79	12.79	12.79	12.87	12.80	12.85	12.74
134	D1_70m	70	1.19	1.18	1.20	1.20	1.20	1.20	1.21	1.20	1.20	1.21	32.22	27.77	20.59	20.60	20.65	20.67	21.60	20.80	21.36	19.28	15.36	14.40	12.74	12.74	12.75	12.75	12.82	12.76	12.80	12.69
135	D1_80m	80	1.18	1.18	1.19	1.19	1.19	1.19	1.20	1.19	1.20	1.20	31.78	27.40	20.27	20.28	20.33	20.34	21.17	20.47	20.94	19.00	15.33	14.37	12.71	12.72	12.72	12.72	12.78	12.73	12.77	12.66
136	D1_90m	90	1.18	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	31.45	27.12	20.04	20.04	20.09	20.10	20.85	20.22	20.62	18.80	15.30	14.35	12.69	12.69	12.70	12.70	12.75	12.71	12.74	12.64
137	D1_100m	100	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.18	1.19	1.19	31.21	26.92	19.86	19.86	19.90	19.92	20.60	20.04	20.38	18.63	15.29	14.33	12.68	12.68	12.68	12.68	12.73	12.69	12.72	12.62
138	D1_110m	110	1.17	1.17	1.18	1.18	1.18	1.18	1.19	1.18	1.18	1.19	31.02	26.76	19.72	19.72	19.76	19.77	20.40	19.89	20.19	18.51	15.27	14.32	12.66	12.66	12.67	12.67	12.71	12.68	12.70	12.61
139	D1_120m	120	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	30.90	26.65	19.61	19.62	19.65	19.66	20.25	19.78	20.04	18.41	15.26	14.31	12.65	12.65	12.66	12.66	12.70	12.67	12.69	12.60
140	D1_130m	130	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	30.82	26.57	19.54	19.54	19.58	19.59	20.14	19.70	19.93	18.33	15.26	14.31	12.65	12.65	12.65	12.65	12.69	12.66	12.68	12.59
141	D1_140m	140	1.17	1.17	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	30.77	26.53	19.49	19.49	19.52	19.53	20.05	19.64	19.85	18.28	15.25	14.30	12.64	12.64	12.64	12.65	12.68	12.66	12.67	12.59
142	D1_150m	150	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	30.76	26.51	19.46	19.46	19.49	19.50	20.00	19.60	19.79	18.23	15.25	14.30	12.64	12.64	12.64	12.64	12.68	12.65	12.67	12.58
143	D1_160m	160	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	30.79	26.53	19.44	19.45	19.48	19.48	19.96	19.59	19.75	18.21	15.25	14.30	12.64	12.64	12.64	12.64	12.68	12.65	12.66	12.58
144	D1_170m	170	1.17	1.17	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	30.85	26.56	19.45	19.46	19.48	19.49	19.95	19.59	19.74	18.19	15.26	14.30	12.64	12.64	12.64	12.64	12.68	12.65	12.66	12.58
145	D1_180m	180	1.17	1.17	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	30.94	26.62	19.48	19.48	19.50	19.51	19.96	19.61	19.75	18.19	15.26	14.31	12.64	12.64	12.64	12.64	12.68	12.65	12.66	12.58
146	D1_190m	190	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	31.06	26.71	19.52	19.52	19.54	19.55	19.98	19.65	19.77	18.20	15.27	14.32	12.64	12.64	12.65	12.65	12.68	12.66	12.67	12.58
147	D1_200m	200	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	31.21	26.82	19.57	19.58	19.59	19.60	20.03	19.70	19.81	18.22	15.28	14.32	12.65	12.65	12.65	12.65	12.68	12.66	12.67	12.59

Receptor D2

Lookup ID	Road Link	Distance From Road (m)	Annual Mean NH_3 (ug/m^3) 2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	Annual Mean NOx (ug/m^3) 2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	Annual Mean Total N Dep (kg N/ha/yr) 2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
148	D2_1m	1	1.74	1.72	1.84	1.84	1.84	1.84	1.97	1.86	1.90	1.97	77.93	65.99	50.59	50.58	50.93	50.99	64.22	51.76	57.00	46.98	18.57	17.33	15.54	15.54	15.56	15.57	16.42	15.64	15.97	15.63
149	D2_10m	10	1.46	1.45	1.51	1.51	1.51	1.51	1.57	1.52	1.55	1.57	54.94	46.81	34.87	34.87	35.07	35.11	40.98	35.57	38.34	31.69	17.02	15.90	14.12	14.12	14.13	14.14	14.54	14.18	14.37	14.08

150	D2_20m	20	1.35	1.34	1.38	1.38	1.38	1.39	1.42	1.39	1.41	1.42	45.70	39.10	28.92	28.92	29.07	29.09	32.50	29.42	31.02	26.18	16.36	15.31	13.56	13.56	13.57	13.57	13.81	13.60	13.71	13.49
151	D2_30m	30	1.30	1.29	1.32	1.32	1.32	1.32	1.34	1.33	1.34	1.34	41.01	35.18	25.95	25.96	26.07	26.09	28.40	26.35	27.40	23.55	16.02	15.00	13.28	13.28	13.28	13.29	13.45	13.31	13.38	13.20
152	D2_40m	40	1.26	1.26	1.28	1.28	1.28	1.28	1.30	1.29	1.29	1.30	38.16	32.81	24.17	24.18	24.28	24.29	26.02	24.51	25.28	22.02	15.81	14.81	13.10	13.11	13.11	13.11	13.24	13.13	13.19	13.03
153	D2_50m	50	1.24	1.23	1.25	1.25	1.25	1.26	1.27	1.26	1.26	1.27	36.26	31.23	22.99	23.00	23.08	23.10	24.48	23.29	23.89	21.05	15.67	14.69	12.99	12.99	13.00	13.00	13.10	13.02	13.06	12.92
154	D2_60m	60	1.22	1.22	1.24	1.24	1.24	1.24	1.25	1.24	1.24	1.25	34.90	30.10	22.16	22.17	22.24	22.25	23.41	22.43	22.92	20.37	15.57	14.60	12.91	12.91	12.91	12.92	13.00	12.93	12.97	12.84
155	D2_70m	70	1.21	1.21	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	33.85	29.23	21.52	21.53	21.60	21.61	22.60	21.76	22.19	19.87	15.49	14.53	12.85	12.85	12.85	12.85	12.93	12.87	12.90	12.78
156	D2_80m	80	1.20	1.20	1.21	1.21	1.21	1.21	1.22	1.21	1.22	1.22	33.03	28.55	21.02	21.03	21.09	21.10	21.98	21.25	21.62	19.48	15.43	14.47	12.80	12.80	12.80	12.80	12.87	12.82	12.84	12.73
157	D2_90m	90	1.19	1.19	1.20	1.20	1.20	1.20	1.21	1.21	1.21	1.21	32.37	28.00	20.62	20.63	20.69	20.70	21.49	20.84	21.17	19.17	15.38	14.43	12.76	12.76	12.76	12.76	12.82	12.78	12.80	12.70
158	D2_100m	100	1.19	1.18	1.19	1.19	1.20	1.20	1.20	1.20	1.20	1.20	31.81	27.55	20.30	20.30	20.36	20.37	21.09	20.49	20.79	18.92	15.34	14.39	12.73	12.73	12.73	12.73	12.79	12.74	12.77	12.67
159	D2_110m	110	1.18	1.18	1.19	1.19	1.19	1.19	1.20	1.19	1.19	1.20	31.35	27.16	20.02	20.02	20.08	20.09	20.75	20.21	20.48	18.72	15.31	14.36	12.70	12.70	12.70	12.70	12.75	12.72	12.74	12.64
160	D2_120m	120	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	30.95	26.83	19.78	19.79	19.84	19.85	20.47	19.96	20.22	18.54	15.28	14.34	12.68	12.68	12.68	12.68	12.73	12.69	12.71	12.62
161	D2_130m	130	1.17	1.17	1.18	1.18	1.18	1.18	1.19	1.18	1.18	1.19	30.61	26.55	19.58	19.59	19.64	19.65	20.23	19.76	19.99	18.40	15.25	14.31	12.66	12.66	12.66	12.66	12.70	12.67	12.69	12.61
162	D2_140m	140	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	30.31	26.31	19.41	19.41	19.46	19.47	20.02	19.57	19.79	18.27	15.23	14.29	12.64	12.64	12.64	12.64	12.68	12.65	12.67	12.59
163	D2_150m	150	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.17	1.18	1.18	30.05	26.09	19.25	19.26	19.30	19.31	19.84	19.41	19.62	18.16	15.21	14.28	12.62	12.62	12.63	12.63	12.67	12.64	12.65	12.58
164	D2_160m	160	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	29.82	25.90	19.12	19.13	19.17	19.18	19.68	19.28	19.47	18.06	15.19	14.26	12.61	12.61	12.61	12.61	12.65	12.62	12.64	12.56
165	D2_170m	170	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	29.61	25.74	19.00	19.01	19.05	19.06	19.54	19.15	19.34	17.97	15.17	14.25	12.60	12.60	12.60	12.60	12.64	12.61	12.63	12.55
166	D2_180m	180	1.16	1.16	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	29.43	25.59	18.90	18.90	18.94	18.95	19.41	19.04	19.22	17.90	15.16	14.23	12.59	12.59	12.59	12.59	12.63	12.60	12.61	12.54
167	D2_190m	190	1.16	1.15	1.16	1.16	1.16	1.16	1.17	1.16	1.17	1.17	29.26	25.45	18.80	18.81	18.84	18.85	19.30	18.94	19.11	17.83	15.15	14.22	12.58	12.58	12.58	12.58	12.62	12.59	12.60	12.54
168	D2_200m	200	1.16	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	29.11	25.33	18.72	18.72	18.76	18.77	19.20	18.85	19.01	17.77	15.14	14.21	12.57	12.57	12.57	12.57	12.61	12.58	12.59	12.53

Receptor E1

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
169	E1_1m	1	1.82	1.78	1.87	1.87	1.87	1.87	1.89	1.89	1.89	1.89	94.35	76.40	51.67	51.67	51.31	51.38	52.85	51.76	51.68	37.84	19.39	17.90	15.65	15.66	15.64	15.65	15.75	15.70	15.70	15.03
170	E1_10m	10	1.50	1.48	1.52	1.52	1.52	1.53	1.53	1.53	1.53	1.53	63.16	51.81	35.61	35.62	35.43	35.47	36.38	35.69	35.66	27.90	17.46	16.19	14.18	14.18	14.17	14.18	14.24	14.21	14.21	13.81
171	E1_20m	20	1.37	1.35	1.38	1.38	1.39	1.39	1.39	1.39	1.39	1.39	50.70	41.97	29.20	29.20	29.09	29.11	29.81	29.27	29.27	23.95	16.63	15.47	13.57	13.58	13.57	13.58	13.63	13.59	13.60	13.32
172	E1_30m	30	1.31	1.29	1.31	1.31	1.32	1.32	1.32	1.32	1.32	1.32	44.37	37.00	25.97	25.98	25.90	25.91	26.49	26.04	26.05	21.97	16.20	15.10	13.27	13.27	13.27	13.27	13.31	13.28	13.29	13.07
173	E1_40m	40	1.27	1.26	1.27	1.27	1.27	1.27	1.28	1.28	1.28	1.28	40.53	33.98	24.03	24.03	23.98	23.99	24.50	24.09	24.12	20.79	15.94	14.87	13.08	13.08	13.08	13.08	13.12	13.09	13.10	12.92
174	E1_50m	50	1.24	1.23	1.24	1.24	1.25	1.25	1.25	1.25	1.25	1.25	37.94	31.96	22.73	22.74	22.70	22.71	23.17	22.80	22.83	20.01	15.76	14.72	12.96	12.96	12.96	12.96	12.99	12.97	12.97	12.82
175	E1_60m	60	1.22	1.21	1.22	1.22	1.23	1.23	1.23	1.23	1.23	1.23	36.07	30.51	21.81	21.81	21.79	21.79	22.22	21.87	21.91	19.45	15.63	14.61	12.87	12.87	12.87	12.87	12.90	12.88	12.88	12.75
176	E1_70m	70	1.21	1.20	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	34.65	29.41	21.12	21.12	21.10	21.11	21.51	21.18	21.22	19.04	15.52	14.52	12.80	12.80	12.80	12.80	12.83	12.81	12.81	12.70
177	E1_80m	80	1.20	1.19	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	33.55	28.56	20.58	20.59	20.58	20.58	20.96	20.64	20.69	18.72	15.45	14.46	12.75	12.75	12.75	12.75	12.78	12.76	12.76	12.66
178	E1_90m	90	1.19	1.18	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	32.66	27.88	20.16	20.16	20.16	20.16	20.52	20.22	20.26	18.47	15.38	14.40	12.71	12.71	12.71	12.71	12.74	12.72	12.72	12.62
179	E1_100m	100	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.18	1.19	1.19	31.94	27.33	19.81	19.82	19.81	19.82	20.17	19.87	19.92	18.27	15.33	14.36	12.67	12.67	12.68	12.68	12.70	12.68	12.69	12.60
180	E1_110m	110	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	31.33	26.87	19.52	19.53	19.53	19.53	19.88	19.59	19.64	18.10	15.29	14.33	12.65	12.65	12.65	12.65	12.67	12.65	12.66	12.58
181	E1_120m	120	1.17	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	30.83	26.48	19.29	19.29	19.30	19.30	19.63	19.35	19.40	17.96	15.25	14.30	12.62	12.62	12.62	12.62	12.65	12.63	12.64	12.56
182	E1_130m	130	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	30.40	26.15	19.08	19.09	19.10	19.10	19.42	19.15	19.20	17.84	15.22	14.27	12.60	12.60	12.60	12.61	12.63	12.61	12.62	12.54
183	E1_140m	140	1.16	1.16	1.16	1.16	1.16	1.16	1.17	1.16	1.17	1.17	30.03	25.87	18.91	18.92	18.93	18.93	19.25	18.97	19.03	17.74	15.19	14.25	12.59	12.59	12.59	12.59	12.61	12.59	12.60	12.53
184	E1_150m	150	1.16	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	29.71	25.63	18.76	18.77	18.78	18.78	19.09	18.83	18.89	17.65	15.17	14.23	12.57	12.57	12.57	12.57	12.60	12.58	12.58	12.52
185	E1_160m	160	1.15	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	29.43	25.42	18.63	18.64	18.65	18.65	18.96	18.70	18.76	17.58	15.15	14.21	12.56	12.56	12.56	12.56	12.59	12.57	12.57	12.51
186	E1_170m	170	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	29.20	25.24	18.52	18.53	18.54	18.54	18.85	18.59	18.65	17.51	15.13	14.20	12.55	12.55	12.55	12.55	12.57	12.56	12.56	12.50
187	E1_180m	180	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.15	1.15	1.16	28.99	25.08	18.43	18.43	18.45	18.45	18.75	18.49	18.56	17.46	15.12	14.19	12.54	12.54	12.54	12.54	12.56	12.55	12.55	12.49
188	E1_190m	190	1.15	1.14	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	28.80	24.95	18.34	18.35	18.36	18.36	18.66	18.41	18.47	17.41	15.11	14.18	12.53	12.53	12.53	12.53	12.56	12.54	12.54	12.49
189	E1_200m	200	1.15	1.14	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	28.65	24.83	18.27	18.27	18.29	18.29	18.59	18.33	18.40	17.36	15.10	14.17	12.52	12.52	12.53	12.53	12.55	12.53	12.54	12.48

Receptor E2

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									

Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
190	E2_1m	1	2.21	2.15	2.29	2.29	2.30	2.30	2.32	2.40	2.34	2.32	132.76	106.63	71.33	71.33	70.76	70.88	73.39	82.48	73.08	50.21	21.58	19.87	17.38	17.39	17.37	17.38	17.54	18.08	17.55	16.50
191	E2_10m	10	1.68	1.65	1.71	1.71	1.72	1.72	1.73	1.76	1.74	1.73	80.79	65.64	44.57	44.57	44.31	44.37	45.96	48.90	45.93	33.67	18.57	17.17	15.01	15.01	15.00	15.00	15.11	15.31	15.13	14.51
192	E2_20m	20	1.49	1.47	1.51	1.51	1.51	1.51	1.52	1.54	1.53	1.52	62.25	51.01	35.04	35.04	34.88	34.92	36.18	37.29	36.05	27.80	17.40	16.13	14.12	14.12	14.12	14.12	14.21	14.29	14.21	13.78
193	E2_30m	30	1.40	1.38	1.41	1.41	1.41	1.41	1.42	1.43	1.42	1.42	53.32	43.98	30.46	30.47	30.36	30.39	31.46	31.91	31.27	24.98	16.81	15.62	13.69	13.69	13.69	13.69	13.77	13.80	13.76	13.43
194	E2_40m	40	1.34	1.33	1.35	1.35	1.35	1.35	1.36	1.37	1.36	1.36	47.98	39.78	27.75	27.75	27.67	27.70	28.65	28.79	28.42	23.30	16.45	15.31	13.43	13.43	13.43	13.44	13.50	13.52	13.49	13.22
195	E2_50m	50	1.31	1.29	1.31	1.31	1.31	1.31	1.32	1.32	1.32	1.32	44.37	36.97	25.94	25.94	25.88	25.91	26.76	26.74	26.52	22.18	16.20	15.10	13.26	13.26	13.26	13.26	13.32	13.33	13.31	13.08
196	E2_60m	60	1.28	1.27	1.28	1.28	1.28	1.29	1.29	1.29	1.29	1.29	41.76	34.93	24.63	24.64	24.59	24.61	25.40	25.29	25.15	21.37	16.02	14.94	13.14	13.14	13.14	13.14	13.19	13.19	13.18	12.98
197	E2_70m	70	1.26	1.25	1.26	1.26	1.26	1.26	1.27	1.27	1.27	1.27	39.77	33.38	23.65	23.66	23.62	23.64	24.36	24.20	24.11	20.76	15.88	14.82	13.04	13.04	13.04	13.04	13.10	13.09	13.08	12.90
198	E2_80m	80	1.24	1.23	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	38.19	32.16	22.87	22.88	22.86	22.87	23.55	23.36	23.30	20.29	15.77	14.73	12.97	12.97	12.97	12.97	13.02	13.01	13.00	12.84
199	E2_90m	90	1.23	1.22	1.23	1.23	1.23	1.23	1.24	1.24	1.24	1.24	36.91	31.17	22.25	22.26	22.24	22.25	22.89	22.68	22.64	19.90	15.68	14.66	12.91	12.91	12.91	12.91	12.95	12.94	12.94	12.79
200	E2_100m	100	1.22	1.21	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	35.85	30.36	21.74	21.75	21.73	21.74	22.34	22.12	22.10	19.58	15.61	14.59	12.86	12.86	12.86	12.86	12.90	12.89	12.89	12.75
201	E2_110m	110	1.21	1.20	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	34.96	29.67	21.31	21.32	21.31	21.32	21.88	21.65	21.64	19.31	15.54	14.54	12.81	12.82	12.82	12.82	12.86	12.84	12.84	12.72
202	E2_120m	120	1.20	1.19	1.20	1.20	1.20	1.21	1.21	1.21	1.21	1.21	34.20	29.09	20.94	20.95	20.94	20.95	21.49	21.26	21.25	19.09	15.49	14.50	12.78	12.78	12.78	12.78	12.82	12.81	12.81	12.69
203	E2_130m	130	1.19	1.19	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	33.54	28.58	20.62	20.63	20.63	20.64	21.15	20.92	20.92	18.89	15.44	14.46	12.75	12.75	12.75	12.75	12.79	12.77	12.77	12.67
204	E2_140m	140	1.19	1.18	1.19	1.19	1.19	1.19	1.20	1.20	1.20	1.20	32.97	28.14	20.35	20.35	20.36	20.36	20.85	20.62	20.63	18.72	15.40	14.42	12.72	12.72	12.72	12.72	12.76	12.74	12.75	12.64
205	E2_150m	150	1.18	1.18	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	32.46	27.75	20.10	20.11	20.11	20.12	20.59	20.36	20.37	18.56	15.37	14.39	12.70	12.70	12.70	12.70	12.74	12.72	12.72	12.63
206	E2_160m	160	1.18	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	32.01	27.40	19.88	19.89	19.90	19.91	20.36	20.13	20.14	18.43	15.33	14.36	12.68	12.68	12.68	12.68	12.71	12.70	12.70	12.61
207	E2_170m	170	1.17	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	31.61	27.09	19.69	19.70	19.71	19.71	20.15	19.92	19.93	18.30	15.30	14.34	12.66	12.66	12.66	12.66	12.69	12.68	12.68	12.59
208	E2_180m	180	1.17	1.17	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	31.25	26.82	19.51	19.52	19.53	19.54	19.96	19.73	19.75	18.19	15.28	14.32	12.64	12.64	12.64	12.64	12.68	12.66	12.66	12.58
209	E2_190m	190	1.17	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	30.92	26.56	19.36	19.37	19.38	19.38	19.79	19.56	19.58	18.09	15.25	14.30	12.63	12.63	12.63	12.63	12.66	12.64	12.65	12.57
210	E2_200m	200	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	30.62	26.33	19.21	19.22	19.23	19.23	19.63	19.41	19.42	18.00	15.23	14.28	12.61	12.61	12.61	12.61	12.64	12.63	12.63	12.56

Receptor H

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
211	H_0m	0	1.55	1.54	1.58	1.58	1.58	1.58	1.66	1.60	1.66	1.66	60.19	51.18	35.40	35.43	35.84	36.11	44.45	36.59	44.46	33.28	17.54	16.36	14.32	14.33	14.35	14.37	14.94	14.42	14.94	14.39
212	H_5m	5	1.37	1.35	1.38	1.38	1.38	1.39	1.43	1.39	1.43	1.43	44.47	38.21	27.09	27.11	27.41	27.66	32.19	27.89	32.20	25.59	16.44	15.37	13.50	13.50	13.52	13.54	13.86	13.57	13.86	13.52
213	H_10m	10	1.29	1.28	1.30	1.30	1.30	1.30	1.34	1.31	1.34	1.34	38.11	32.96	23.71	23.73	23.99	24.22	27.38	24.36	27.40	22.60	15.97	14.96	13.16	13.16	13.18	13.20	13.42	13.21	13.43	13.17
214	H_15m	15	1.25	1.24	1.26	1.26	1.26	1.26	1.28	1.26	1.28	1.28	34.54	30.01	21.82	21.84	22.07	22.28	24.72	22.38	24.74	20.95	15.71	14.72	12.97	12.97	12.99	13.00	13.18	13.02	13.18	12.98
215	H_20m	20	1.22	1.21	1.23	1.23	1.23	1.23	1.25	1.23	1.25	1.25	32.26	28.13	20.61	20.63	20.84	21.04	23.05	21.12	23.07	19.91	15.54	14.57	12.85	12.85	12.86	12.88	13.03	12.89	13.03	12.86
216	H_30m	30	1.19	1.18	1.19	1.19	1.19	1.20	1.21	1.20	1.21	1.21	29.54	25.88	19.17	19.18	19.37	19.54	21.08	19.60	21.10	18.70	15.33	14.39	12.70	12.70	12.72	12.73	12.84	12.74	12.84	12.71
217	H_40m	40	1.17	1.17	1.17	1.17	1.17	1.18	1.19	1.18	1.19	1.19	27.98	24.59	18.34	18.35	18.52	18.67	19.97	18.73	19.98	18.02	15.21	14.29	12.62	12.62	12.63	12.64	12.74	12.65	12.74	12.63
218	H_50m	50	1.16	1.15	1.16	1.16	1.16	1.16	1.17	1.16	1.17	1.17	26.95	23.74	17.80	17.81	17.97	18.10	19.26	18.16	19.27	17.59	15.14	14.22	12.56	12.56	12.57	12.58	12.67	12.59	12.67	12.58
219	H_60m	60	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	26.23	23.15	17.42	17.43	17.58	17.69	18.77	17.76	18.78	17.29	15.08	14.17	12.52	12.53	12.54	12.54	12.62	12.55	12.62	12.54
220	H_70m	70	1.14	1.14	1.14	1.14	1.15	1.15	1.16	1.15	1.16	1.16	25.70	22.71	17.14	17.15	17.29	17.39	18.42	17.46	18.43	17.08	15.04	14.13	12.50	12.50	12.51	12.51	12.59	12.52	12.59	12.52
221	H_80m	80	1.14	1.13	1.14	1.14	1.14	1.14	1.15	1.14	1.15	1.15	25.29	22.37	16.92	16.93	17.07	17.15	18.17	17.22	18.17	16.93	15.01	14.11	12.47	12.47	12.48	12.49	12.56	12.50	12.56	12.50
222	H_90m	90	1.13	1.13	1.14	1.14	1.14	1.14	1.15	1.14	1.15	1.15	24.96	22.10	16.75	16.76	16.89	16.96	17.97	17.04	17.97	16.81	14.99	14.08	12.46	12.46	12.47	12.47	12.55	12.48	12.55	12.48
223	H_100m	100	1.13	1.13	1.13	1.13	1.13	1.13	1.14	1.14	1.14	1.14	24.70	21.89	16.61	16.62	16.74	16.81	17.82	16.89	17.81	16.72	14.97	14.07	12.44	12.44	12.45	12.46	12.53	12.46	12.53	12.47
224	H_125m	125	1.12	1.12	1.13	1.13	1.13	1.13	1.14	1.13	1.14	1.14	24.23	21.50	16.36	16.37	16.48	16.53	17.58	16.61	17.57	16.59	14.93	14.04	12.42	12.42	12.43	12.43	12.51	12.44	12.50	12.45
225	H_150m	150	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.13	1.13	1.13	23.93	21.25	16.21	16.22	16.31	16.34	17.48	16.43	17.47	16.55	14.91	14.02	12.40	12.40	12.41	12.41	12.49	12.42	12.49	12.44
226	H_175m	175	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.12	1.13	1.13	23.73	21.09	16.10	16.11	16.20	16.22	17.49	16.32	17.47	16.57	14.89	14.00	12.39	12.39	12.40	12.40	12.49	12.41	12.49	12.44
227	H_200m	200	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.12	1.13	1.13	23.62	20.99	16.04	16.05	16.13	16.15	17.59	16.25	17.57	16.66	14.88	13.99	12.38	12.38	12.39	12.39	12.50	12.40	12.50	12.45

Receptor I

	Annual Mean NH_3 (ug/m^3)	Annual Mean NOx (ug/m^3)	Annual Mean Total N Dep (kg N/ha/yr)

Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
228	I_1m	1	1.89	1.88	1.96	1.97	2.04	2.04	2.10	2.00	2.11	2.10	109.65	94.63	65.56	65.63	74.31	74.41	79.48	67.34	79.69	57.03	20.20	18.93	16.52	16.52	17.05	17.06	17.39	16.66	17.40	16.41
229	I_6m	6	1.64	1.64	1.70	1.70	1.74	1.75	1.80	1.73	1.80	1.80	81.23	71.25	50.17	50.24	54.99	55.07	59.77	51.75	60.02	44.13	18.61	17.48	15.29	15.30	15.60	15.61	15.93	15.42	15.94	15.19
230	I_11m	11	1.51	1.51	1.56	1.57	1.59	1.59	1.64	1.59	1.64	1.64	67.02	59.08	42.08	42.16	45.25	45.31	49.43	43.53	49.71	37.35	17.76	16.69	14.63	14.63	14.84	14.84	15.13	14.74	15.14	14.54
231	I_16m	16	1.44	1.44	1.48	1.48	1.50	1.50	1.54	1.50	1.54	1.54	58.34	51.51	37.00	37.08	39.30	39.36	42.98	38.38	43.28	33.12	17.22	16.18	14.20	14.21	14.36	14.36	14.62	14.31	14.64	14.12
232	I_21m	21	1.38	1.38	1.42	1.42	1.44	1.44	1.47	1.44	1.47	1.47	52.53	46.39	33.53	33.62	35.33	35.38	38.62	34.88	38.93	30.26	16.85	15.83	13.91	13.92	14.03	14.04	14.27	14.02	14.29	13.84
233	I_31m	31	1.32	1.32	1.34	1.35	1.36	1.36	1.38	1.36	1.39	1.38	45.20	39.88	29.07	29.17	30.33	30.38	33.08	30.42	33.38	26.62	16.37	15.38	13.53	13.54	13.62	13.62	13.82	13.63	13.84	13.48
234	I_41m	41	1.28	1.28	1.30	1.30	1.31	1.31	1.33	1.31	1.33	1.33	40.74	35.90	26.33	26.42	27.32	27.37	29.72	27.69	29.99	24.43	16.08	15.10	13.30	13.30	13.37	13.37	13.54	13.40	13.56	13.26
235	I_51m	51	1.25	1.25	1.27	1.27	1.27	1.28	1.30	1.28	1.30	1.30	37.71	33.20	24.46	24.55	25.29	25.34	27.45	25.82	27.69	22.94	15.87	14.90	13.13	13.14	13.19	13.20	13.35	13.24	13.37	13.11
236	I_61m	61	1.23	1.23	1.24	1.25	1.25	1.25	1.27	1.26	1.27	1.27	35.51	31.25	23.11	23.20	23.84	23.88	25.81	24.46	26.02	21.88	15.72	14.76	13.02	13.02	13.07	13.07	13.21	13.12	13.23	13.00
237	I_71m	71	1.22	1.21	1.23	1.23	1.23	1.23	1.25	1.24	1.25	1.25	33.83	29.76	22.07	22.16	22.73	22.77	24.55	23.41	24.73	21.06	15.61	14.65	12.93	12.93	12.97	12.98	13.11	13.03	13.12	12.92
238	I_81m	81	1.20	1.20	1.21	1.21	1.22	1.22	1.24	1.23	1.24	1.24	32.51	28.60	21.27	21.35	21.87	21.91	23.56	22.57	23.72	20.41	15.52	14.57	12.86	12.86	12.90	12.90	13.02	12.95	13.03	12.85
239	I_91m	91	1.19	1.19	1.20	1.20	1.21	1.21	1.22	1.22	1.22	1.22	31.43	27.65	20.62	20.70	21.17	21.21	22.74	21.88	22.89	19.89	15.44	14.50	12.80	12.81	12.84	12.84	12.95	12.89	12.96	12.80
240	I_101m	101	1.18	1.18	1.19	1.19	1.20	1.20	1.21	1.21	1.21	1.21	30.55	26.89	20.09	20.17	20.60	20.64	22.07	21.31	22.21	19.45	15.38	14.44	12.75	12.76	12.79	12.79	12.90	12.84	12.91	12.76
241	I_126m	126	1.17	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	28.89	25.45	19.11	19.17	19.53	19.58	20.80	20.21	20.90	18.63	15.26	14.34	12.66	12.67	12.70	12.70	12.79	12.75	12.80	12.67
242	I_151m	151	1.16	1.16	1.16	1.16	1.17	1.17	1.18	1.17	1.18	1.18	27.73	24.46	18.43	18.49	18.80	18.84	19.89	19.41	19.98	18.04	15.18	14.26	12.60	12.61	12.63	12.63	12.71	12.68	12.72	12.61
243	I_176m	176	1.15	1.15	1.15	1.15	1.16	1.16	1.17	1.16	1.17	1.17	26.87	23.73	17.93	17.98	18.25	18.29	19.22	18.81	19.28	17.61	15.12	14.21	12.56	12.56	12.58	12.58	12.65	12.62	12.66	12.57
244	I_201m	201	1.14	1.14	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	26.22	23.18	17.55	17.60	17.84	17.87	18.70	18.35	18.75	17.27	15.07	14.16	12.52	12.53	12.54	12.55	12.61	12.58	12.61	12.53

Receptor J

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
245	J_0m	0	1.26	1.25	1.26	1.26	1.27	1.27	1.28	1.28	1.28	1.28	36.72	31.77	23.11	23.18	23.49	23.51	24.53	24.77	24.50	21.12	15.73	14.73	12.99	12.99	13.02	13.02	13.10	13.12	13.10	12.92
246	J_5m	5	1.21	1.20	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.23	33.16	28.87	21.24	21.30	21.58	21.60	22.48	22.73	22.46	19.92	15.46	14.50	12.79	12.80	12.82	12.82	12.89	12.91	12.89	12.75
247	J_10m	10	1.19	1.18	1.19	1.19	1.20	1.20	1.21	1.21	1.21	1.21	31.38	27.43	20.31	20.36	20.63	20.65	21.45	21.72	21.43	19.32	15.32	14.38	12.70	12.70	12.72	12.72	12.78	12.80	12.79	12.67
248	J_15m	15	1.17	1.17	1.18	1.18	1.18	1.18	1.19	1.19	1.19	1.19	30.32	26.56	19.75	19.80	20.06	20.08	20.83	21.11	20.82	18.96	15.24	14.30	12.64	12.64	12.66	12.66	12.72	12.74	12.72	12.62
249	J_20m	20	1.17	1.16	1.17	1.17	1.17	1.17	1.18	1.18	1.18	1.18	29.62	26.00	19.39	19.43	19.69	19.70	20.42	20.70	20.42	18.72	15.19	14.26	12.60	12.60	12.62	12.62	12.68	12.70	12.68	12.59
250	J_30m	30	1.15	1.15	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	28.76	25.30	18.94	18.98	19.23	19.24	19.92	20.18	19.91	18.42	15.12	14.20	12.55	12.56	12.57	12.58	12.63	12.65	12.63	12.55
251	J_40m	40	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	28.24	24.88	18.67	18.71	18.94	18.96	19.60	19.84	19.61	18.24	15.08	14.16	12.52	12.53	12.54	12.55	12.60	12.61	12.60	12.52
252	J_50m	50	1.14	1.14	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	27.88	24.59	18.48	18.52	18.75	18.76	19.39	19.59	19.39	18.11	15.05	14.14	12.51	12.51	12.53	12.53	12.57	12.59	12.57	12.50
253	J_60m	60	1.14	1.14	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.15	27.62	24.38	18.35	18.38	18.60	18.62	19.23	19.39	19.23	18.01	15.03	14.12	12.49	12.49	12.51	12.51	12.56	12.57	12.56	12.49
254	J_70m	70	1.14	1.14	1.14	1.14	1.14	1.14	1.15	1.15	1.15	1.15	27.42	24.22	18.24	18.28	18.49	18.50	19.10	19.23	19.11	17.94	15.02	14.11	12.48	12.48	12.50	12.50	12.54	12.55	12.54	12.48
255	J_80m	80	1.14	1.13	1.14	1.14	1.14	1.14	1.15	1.15	1.15	1.15	27.25	24.08	18.16	18.19	18.40	18.41	18.99	19.09	19.00	17.87	15.00	14.10	12.47	12.47	12.49	12.49	12.53	12.54	12.53	12.47
256	J_90m	90	1.13	1.13	1.14	1.14	1.14	1.14	1.14	1.15	1.14	1.14	27.12	23.97	18.08	18.12	18.32	18.33	18.90	18.97	18.91	17.82	14.99	14.09	12.46	12.47	12.48	12.48	12.52	12.53	12.52	12.47
257	J_100m	100	1.13	1.13	1.13	1.14	1.14	1.14	1.14	1.14	1.14	1.14	27.00	23.88	18.02	18.05	18.25	18.26	18.82	18.86	18.83	17.77	14.98	14.08	12.46	12.46	12.47	12.47	12.52	12.52	12.52	12.46
258	J_125m	125	1.13	1.13	1.13	1.13	1.13	1.13	1.14	1.14	1.14	1.14	26.76	23.68	17.90	17.93	18.11	18.12	18.66	18.64	18.67	17.67	14.97	14.07	12.44	12.45	12.46	12.46	12.50	12.50	12.50	12.45
259	J_150m	150	1.13	1.13	1.13	1.13	1.13	1.13	1.14	1.14	1.14	1.14	26.57	23.53	17.80	17.83	18.00	18.01	18.53	18.46	18.54	17.59	14.95	14.05	12.43	12.44	12.45	12.45	12.49	12.48	12.49	12.44
260	J_175m	175	1.13	1.12	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	26.41	23.41	17.72	17.74	17.91	17.92	18.42	18.31	18.43	17.52	14.94	14.04	12.43	12.43	12.44	12.44	12.48	12.47	12.48	12.43
261	J_200m	200	1.12	1.12	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	26.28	23.30	17.65	17.67	17.83	17.84	18.32	18.18	18.33	17.46	14.93	14.04	12.42	12.42	12.43	12.43	12.47	12.46	12.47	12.42

Receptor K

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup ID	Road Link	Distance From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
262	K_0m	0	1.51	1.49	1.53	1.53	1.59	1.59	1.66	1.60	1.66	1.66	58.59	49.48	34.44	34.49	41.52	41.56	49.07	42.14	49.02	37.38	17.28	16.10	14.11	14.11	14.58	14.58	15.10	14.64	15.09	14.52

263	K_5m	5	1.34	1.33	1.35	1.35	1.38	1.38	1.42	1.39	1.42	1.42	44.18	37.79	26.94	26.98	30.71	30.74	34.97	31.20	34.94	28.20	16.26	15.20	13.36	13.36	13.62	13.62	13.92	13.67	13.92	13.58
264	K_10m	10	1.27	1.26	1.27	1.28	1.30	1.30	1.33	1.30	1.33	1.33	38.23	32.97	23.83	23.87	26.36	26.38	29.33	26.75	29.30	24.55	15.83	14.82	13.05	13.05	13.23	13.23	13.44	13.26	13.44	13.19
265	K_15m	15	1.23	1.22	1.23	1.23	1.25	1.25	1.27	1.26	1.27	1.27	34.97	30.32	22.13	22.16	24.00	24.02	26.28	24.33	26.26	22.57	15.59	14.60	12.88	12.88	13.01	13.01	13.18	13.04	13.17	12.98
266	K_20m	20	1.20	1.20	1.21	1.21	1.22	1.22	1.24	1.23	1.24	1.24	32.91	28.65	21.05	21.09	22.54	22.55	24.39	22.81	24.37	21.35	15.43	14.47	12.77	12.77	12.87	12.88	13.01	12.90	13.01	12.85
267	K_30m	30	1.17	1.17	1.18	1.18	1.19	1.19	1.20	1.19	1.20	1.20	30.43	26.63	19.75	19.78	20.77	20.78	22.11	20.98	22.09	19.89	15.25	14.31	12.64	12.64	12.71	12.71	12.81	12.73	12.81	12.69
268	K_40m	40	1.16	1.15	1.16	1.16	1.17	1.17	1.18	1.17	1.18	1.18	28.99	25.47	19.00	19.03	19.77	19.78	20.82	19.94	20.80	19.06	15.14	14.21	12.56	12.56	12.62	12.62	12.69	12.63	12.69	12.60
269	K_50m	50	1.15	1.14	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.16	28.05	24.70	18.51	18.53	19.11	19.12	19.97	19.25	19.95	18.51	15.07	14.15	12.51	12.51	12.55	12.55	12.62	12.57	12.62	12.54
270	K_60m	60	1.14	1.14	1.14	1.14	1.14	1.14	1.15	1.15	1.15	1.15	27.38	24.16	18.16	18.18	18.65	18.66	19.38	18.77	19.36	18.13	15.02	14.11	12.48	12.48	12.51	12.51	12.56	12.52	12.56	12.50
271	K_70m	70	1.13	1.13	1.13	1.13	1.14	1.14	1.14	1.14	1.14	1.14	26.89	23.76	17.90	17.92	18.31	18.32	18.94	18.42	18.93	17.85	14.98	14.07	12.45	12.45	12.48	12.48	12.53	12.49	12.52	12.47
272	K_80m	80	1.13	1.13	1.13	1.13	1.13	1.13	1.14	1.13	1.14	1.14	26.50	23.44	17.70	17.72	18.05	18.05	18.60	18.14	18.58	17.64	14.95	14.05	12.43	12.43	12.45	12.45	12.49	12.46	12.49	12.44
273	K_90m	90	1.12	1.12	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	26.19	23.19	17.54	17.55	17.84	17.84	18.33	17.92	18.31	17.46	14.93	14.03	12.41	12.41	12.43	12.43	12.47	12.44	12.47	12.42
274	K_100m	100	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.13	1.13	1.13	25.93	22.99	17.40	17.42	17.66	17.67	18.10	17.74	18.09	17.32	14.90	14.01	12.40	12.40	12.42	12.42	12.45	12.42	12.45	12.41
275	K_125m	125	1.12	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	25.46	22.60	17.16	17.17	17.35	17.35	17.70	17.41	17.68	17.06	14.87	13.98	12.37	12.37	12.39	12.39	12.41	12.39	12.41	12.38
276	K_150m	150	1.11	1.11	1.11	1.11	1.11	1.11	1.12	1.11	1.12	1.12	25.13	22.33	16.98	16.99	17.13	17.13	17.41	17.18	17.40	16.88	14.84	13.96	12.36	12.36	12.37	12.37	12.39	12.37	12.39	12.36
277	K_175m	175	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	24.88	22.14	16.85	16.86	16.97	16.97	17.21	17.02	17.20	16.75	14.83	13.94	12.34	12.34	12.35	12.35	12.37	12.36	12.37	12.34
278	K_200m	200	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	24.70	21.99	16.76	16.76	16.85	16.85	17.05	16.89	17.04	16.65	14.81	13.93	12.33	12.33	12.34	12.34	12.36	12.34	12.36	12.33

Receptor L

Lookup		Distance	Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
ID	Road Link	From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
279	L_0m	0	1.19	1.19	1.20	1.20	1.20	1.20	1.29	1.22	1.29	1.29	29.84	26.00	19.32	19.36	19.52	19.53	29.28	20.85	29.25	24.80	15.36	14.40	12.72	12.72	12.74	12.74	13.43	12.84	13.42	13.19
280	L_5m	5	1.16	1.15	1.16	1.16	1.16	1.16	1.21	1.17	1.21	1.21	27.10	23.79	17.90	17.93	18.06	18.07	23.57	19.05	23.54	20.80	15.15	14.22	12.57	12.57	12.58	12.58	12.98	12.66	12.98	12.83
281	L_10m	10	1.14	1.14	1.15	1.15	1.15	1.15	1.18	1.16	1.18	1.18	26.04	22.93	17.35	17.38	17.49	17.50	21.39	18.28	21.37	19.27	15.06	14.15	12.51	12.51	12.52	12.53	12.80	12.59	12.80	12.69
282	L_15m	15	1.14	1.13	1.14	1.14	1.14	1.14	1.17	1.15	1.17	1.17	25.45	22.46	17.04	17.07	17.18	17.19	20.21	17.83	20.19	18.45	15.02	14.11	12.48	12.48	12.49	12.49	12.71	12.54	12.71	12.62
283	L_20m	20	1.13	1.13	1.13	1.14	1.14	1.14	1.16	1.14	1.16	1.16	25.06	22.14	16.84	16.87	16.97	16.98	19.45	17.52	19.43	17.91	14.99	14.09	12.46	12.46	12.47	12.47	12.65	12.51	12.65	12.57
284	L_30m	30	1.13	1.12	1.13	1.13	1.13	1.13	1.15	1.13	1.15	1.15	24.56	21.74	16.58	16.61	16.70	16.71	18.52	17.11	18.50	17.27	14.95	14.05	12.43	12.44	12.44	12.44	12.57	12.47	12.57	12.51
285	L_40m	40	1.12	1.12	1.12	1.13	1.13	1.13	1.14	1.13	1.14	1.14	24.24	21.48	16.41	16.44	16.53	16.53	17.96	16.84	17.94	16.88	14.93	14.03	12.42	12.42	12.42	12.43	12.53	12.45	12.53	12.47
286	L_50m	50	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.13	1.13	1.13	24.00	21.29	16.28	16.31	16.40	16.40	17.58	16.65	17.56	16.62	14.91	14.02	12.40	12.41	12.41	12.41	12.50	12.43	12.50	12.45
287	L_60m	60	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.12	1.13	1.13	23.81	21.14	16.18	16.21	16.29	16.30	17.30	16.51	17.28	16.42	14.90	14.00	12.39	12.40	12.40	12.40	12.48	12.42	12.47	12.43
288	L_70m	70	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.12	1.13	1.13	23.66	21.01	16.10	16.12	16.21	16.21	17.08	16.39	17.06	16.27	14.88	13.99	12.39	12.39	12.39	12.39	12.46	12.41	12.46	12.41
289	L_80m	80	1.12	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	23.53	20.90	16.02	16.05	16.13	16.14	16.90	16.29	16.88	16.15	14.87	13.99	12.38	12.38	12.39	12.39	12.44	12.40	12.44	12.40
290	L_90m	90	1.11	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	23.41	20.81	15.96	15.98	16.07	16.07	16.75	16.21	16.73	16.05	14.87	13.98	12.37	12.38	12.38	12.38	12.43	12.39	12.43	12.39
291	L_100m	100	1.11	1.11	1.11	1.11	1.12	1.12	1.12	1.12	1.12	1.12	23.31	20.73	15.91	15.93	16.01	16.02	16.62	16.13	16.61	15.97	14.86	13.97	12.37	12.37	12.38	12.38	12.42	12.39	12.42	12.39
292	L_125m	125	1.11	1.11	1.11	1.11	1.11	1.11	1.12	1.11	1.12	1.12	23.10	20.56	15.79	15.80	15.89	15.89	16.38	15.99	16.36	15.80	14.84	13.96	12.36	12.36	12.36	12.36	12.40	12.37	12.40	12.37
293	L_150m	150	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	22.94	20.42	15.69	15.71	15.79	15.79	16.20	15.87	16.18	15.68	14.83	13.95	12.35	12.35	12.36	12.36	12.38	12.36	12.38	12.36
294	L_175m	175	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	22.80	20.31	15.61	15.63	15.71	15.71	16.05	15.78	16.04	15.58	14.82	13.94	12.34	12.34	12.35	12.35	12.37	12.35	12.37	12.35
295	L_200m	200	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	22.68	20.21	15.55	15.56	15.64	15.64	15.94	15.70	15.92	15.51	14.81	13.93	12.33	12.33	12.34	12.34	12.36	12.35	12.36	12.34

Receptor M

Lookup		Distance	Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
ID	Road Link	From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
296	M_0m	0	1.13	1.13	1.13	1.13	1.13	1.13	1.17	1.13	1.17	1.17	27.51	24.25	18.34	18.36	18.40	18.41	22.85	18.51	22.80	21.02	14.94	14.04	12.42	12.42	12.43	12.43	12.74	12.44	12.74	12.65
297	M_5m	5	1.12	1.12	1.12	1.12	1.12	1.12	1.14	1.12	1.14	1.14	26.71	23.62	17.94	17.95	17.99	17.99	20.68	18.07	20.64	19.47	14.88	13.99	12.38	12.38	12.38	12.38	12.58	12.39	12.57	12.51
298	M_10m	10	1.11	1.11	1.11	1.11	1.12	1.12	1.13	1.12	1.13	1.13	26.35	23.33	17.76	17.76	17.80	17.80	19.73	17.86	19.68	18.79	14.85	13.97	12.36	12.36	12.36	12.36	12.50	12.37	12.50	12.45
299	M_15m	15	1.11	1.11	1.11	1.11	1.11	1.11	1.13	1.11	1.13	1.13	26.14	23.16	17.65	17.65	17.68	17.69	19.19	17.75	19.15	18.41	14.83	13.95	12.35	12.35	12.35	12.35	12.46	12.36	12.46	12.42
300	M_20m	20	1.11	1.11	1.11	1.11	1.11	1.11	1.12	1.11	1.12	1.12	26.00	23.05	17.58	17.58	17.61	17.62	18.86	17.67	18.82	18.17	14.82	13.94	12.34	12.34	12.35	12.35	12.44	12.35	12.43	12.40

301	M_30m	30	1.11	1.11	1.11	1.11	1.11	1.11	1.12	1.11	1.12	1.12	25.83	22.91	17.49	17.49	17.52	17.53	18.46	17.57	18.42	17.89	14.81	13.93	12.33	12.33	12.34	12.34	12.40	12.34	12.40	12.37
302	M_40m	40	1.11	1.10	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	25.72	22.83	17.43	17.44	17.47	17.47	18.23	17.51	18.19	17.73	14.80	13.92	12.33	12.33	12.33	12.33	12.38	12.33	12.38	12.36
303	M_50m	50	1.10	1.10	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	25.65	22.77	17.40	17.40	17.43	17.43	18.07	17.47	18.04	17.62	14.80	13.92	12.32	12.32	12.33	12.33	12.37	12.33	12.37	12.35
304	M_60m	60	1.10	1.10	1.10	1.10	1.11	1.11	1.11	1.11	1.11	1.11	25.59	22.73	17.37	17.37	17.40	17.40	17.96	17.44	17.93	17.54	14.79	13.92	12.32	12.32	12.32	12.32	12.36	12.33	12.36	12.34
305	M_70m	70	1.10	1.10	1.10	1.10	1.10	1.10	1.11	1.11	1.11	1.11	25.55	22.69	17.35	17.35	17.38	17.38	17.88	17.42	17.84	17.48	14.79	13.91	12.32	12.32	12.32	12.32	12.36	12.32	12.35	12.34
306	M_80m	80	1.10	1.10	1.10	1.10	1.10	1.10	1.11	1.10	1.11	1.11	25.52	22.66	17.33	17.33	17.36	17.36	17.81	17.40	17.78	17.43	14.79	13.91	12.32	12.32	12.32	12.32	12.35	12.32	12.35	12.33
307	M_90m	90	1.10	1.10	1.10	1.10	1.10	1.10	1.11	1.10	1.11	1.11	25.48	22.64	17.31	17.32	17.34	17.34	17.75	17.38	17.72	17.40	14.78	13.91	12.31	12.31	12.32	12.32	12.35	12.32	12.35	12.33
308	M_100m	100	1.10	1.10	1.10	1.10	1.10	1.10	1.11	1.10	1.11	1.11	25.46	22.62	17.30	17.30	17.33	17.33	17.71	17.37	17.68	17.36	14.78	13.91	12.31	12.31	12.32	12.32	12.34	12.32	12.34	12.32
309	M_125m	125	1.10	1.10	1.10	1.10	1.10	1.10	1.11	1.10	1.11	1.11	25.41	22.58	17.27	17.27	17.30	17.30	17.62	17.34	17.59	17.30	14.78	13.90	12.31	12.31	12.31	12.31	12.34	12.32	12.33	12.32
310	M_150m	150	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	25.36	22.54	17.25	17.25	17.27	17.28	17.55	17.31	17.53	17.26	14.77	13.90	12.31	12.31	12.31	12.31	12.33	12.31	12.33	12.31
311	M_175m	175	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	25.33	22.51	17.23	17.23	17.25	17.26	17.50	17.29	17.48	17.22	14.77	13.90	12.31	12.31	12.31	12.31	12.33	12.31	12.32	12.31
312	M_200m	200	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	25.29	22.49	17.21	17.21	17.23	17.24	17.46	17.27	17.43	17.19	14.77	13.90	12.30	12.30	12.31	12.31	12.32	12.31	12.32	12.31

Receptor N

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup		Distance	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
ID	Road Link	From Road (m)																														
313	N_0m	0	1.19	1.19	1.20	1.20	1.20	1.20	1.38	1.22	1.38	1.38	33.36	28.96	21.35	21.38	21.52	21.54	41.86	22.12	41.80	34.65	15.38	14.42	12.73	12.73	12.74	12.74	14.14	12.80	14.14	13.78
314	N_5m	5	1.18	1.17	1.18	1.18	1.19	1.19	1.33	1.20	1.33	1.33	32.03	27.90	20.68	20.70	20.83	20.84	37.91	21.35	37.85	31.83	15.28	14.33	12.66	12.66	12.67	12.67	13.86	12.72	13.85	13.55
315	N_10m	10	1.17	1.16	1.17	1.17	1.17	1.17	1.30	1.18	1.30	1.30	31.09	27.15	20.20	20.22	20.33	20.35	35.07	20.79	35.02	29.80	15.21	14.27	12.61	12.61	12.62	12.62	13.65	12.67	13.65	13.38
316	N_15m	15	1.16	1.16	1.16	1.16	1.17	1.17	1.28	1.17	1.28	1.28	30.39	26.59	19.84	19.86	19.96	19.97	32.94	20.37	32.88	28.27	15.15	14.23	12.57	12.57	12.58	12.58	13.49	12.62	13.49	13.25
317	N_20m	20	1.15	1.15	1.16	1.16	1.16	1.16	1.26	1.17	1.26	1.26	29.83	26.14	19.55	19.57	19.67	19.68	31.24	20.04	31.19	27.06	15.11	14.19	12.54	12.54	12.55	12.55	13.37	12.59	13.36	13.15
318	N_30m	30	1.14	1.14	1.15	1.15	1.15	1.15	1.23	1.16	1.23	1.23	29.02	25.48	19.13	19.15	19.24	19.24	28.74	19.55	28.69	25.27	15.05	14.14	12.50	12.50	12.51	12.51	13.18	12.54	13.18	13.00
319	N_40m	40	1.14	1.14	1.14	1.14	1.14	1.14	1.21	1.15	1.21	1.21	28.44	25.02	18.84	18.85	18.93	18.94	26.98	19.21	26.92	24.00	15.01	14.10	12.47	12.47	12.48	12.48	13.05	12.51	13.05	12.89
320	N_50m	50	1.13	1.13	1.13	1.13	1.14	1.14	1.20	1.14	1.20	1.20	28.01	24.68	18.62	18.63	18.70	18.71	25.66	18.94	25.59	23.06	14.98	14.07	12.45	12.45	12.46	12.46	12.95	12.48	12.95	12.81
321	N_60m	60	1.13	1.13	1.13	1.13	1.13	1.13	1.19	1.14	1.18	1.19	27.68	24.41	18.45	18.46	18.53	18.53	24.64	18.75	24.58	22.33	14.95	14.05	12.43	12.43	12.44	12.44	12.87	12.46	12.87	12.75
322	N_70m	70	1.13	1.12	1.13	1.13	1.13	1.13	1.18	1.13	1.18	1.18	27.42	24.20	18.31	18.32	18.39	18.39	23.84	18.59	23.76	21.76	14.93	14.04	12.42	12.42	12.42	12.42	12.81	12.44	12.81	12.70
323	N_80m	80	1.12	1.12	1.12	1.12	1.13	1.13	1.17	1.13	1.17	1.17	27.20	24.03	18.20	18.21	18.27	18.28	23.20	18.46	23.11	21.30	14.91	14.02	12.41	12.41	12.41	12.41	12.76	12.43	12.76	12.66
324	N_90m	90	1.12	1.12	1.12	1.12	1.12	1.12	1.16	1.13	1.16	1.16	27.03	23.89	18.12	18.13	18.18	18.19	22.68	18.35	22.58	20.92	14.90	14.01	12.40	12.40	12.40	12.40	12.72	12.42	12.72	12.63
325	N_100m	100	1.12	1.12	1.12	1.12	1.12	1.12	1.16	1.13	1.16	1.16	26.89	23.78	18.05	18.06	18.11	18.11	22.26	18.27	22.15	20.63	14.89	14.00	12.39	12.39	12.40	12.40	12.69	12.41	12.69	12.61
326	N_125m	125	1.12	1.12	1.12	1.12	1.12	1.12	1.15	1.12	1.15	1.15	26.66	23.60	17.93	17.94	17.98	17.99	21.53	18.13	21.36	20.10	14.87	13.99	12.38	12.38	12.38	12.38	12.64	12.40	12.63	12.56
327	N_150m	150	1.12	1.11	1.12	1.12	1.12	1.12	1.14	1.12	1.14	1.14	26.50	23.46	17.84	17.85	17.90	17.90	20.94	18.03	20.65	19.67	14.86	13.98	12.37	12.37	12.37	12.37	12.59	12.39	12.57	12.52
328	N_175m	175	1.11	1.11	1.11	1.11	1.12	1.12	1.14	1.12	1.13	1.14	26.34	23.33	17.76	17.76	17.81	17.81	20.24	17.93	19.80	19.17	14.85	13.97	12.36	12.36	12.36	12.37	12.54	12.38	12.51	12.48
329	N_200m	200	1.11	1.11	1.11	1.11	1.11	1.11	1.13	1.11	1.12	1.13	26.15	23.18	17.66	17.67	17.71	17.71	19.44	17.82	18.98	18.59	14.84	13.95	12.35	12.35	12.35	12.36	12.48	12.37	12.45	12.43

Receptor O

			Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
Lookup		Distance	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
ID	Road Link	From Road (m)																														
330	O_2.5m	2.5	1.92	1.82	2.12	2.04	2.08	2.07	2.18	1.91	1.90	2.18	132.65	94.56	91.57	81.30	85.53	84.53	97.19	60.16	59.80	71.61	20.81	18.57	17.77	17.21	17.45	17.40	18.12	16.02	16.00	17.07
331	O_7.5m	7.5	1.67	1.61	1.79	1.75	1.78	1.77	1.85	1.67	1.67	1.85	100.65	74.85	66.89	61.03	64.07	63.06	72.72	47.82	47.46	54.83	19.16	17.34	16.09	15.75	15.93	15.88	16.46	14.97	14.95	15.66
332	O_12.5m	12.5	1.55	1.50	1.63	1.60	1.62	1.62	1.68	1.54	1.54	1.68	83.80	64.10	54.36	50.66	53.22	52.21	60.37	41.31	40.96	46.41	18.24	16.65	15.19	14.97	15.13	15.07	15.58	14.40	14.38	14.93
333	O_17.5m	17.5	1.47	1.43	1.53	1.51	1.53	1.52	1.58	1.47	1.46	1.58	73.33	57.17	46.83	44.33	46.70	45.69	53.02	37.25	36.91	41.43	17.64	16.19	14.63	14.48	14.63	14.57	15.04	14.04	14.02	14.48
334	O_22.5m	22.5	1.41	1.38	1.46	1.45	1.46	1.46	1.51	1.41	1.41	1.51	66.19	52.32	41.81	40.04	42.33	41.34	48.17	34.46	34.13	38.15	17.22	15.87	14.25	14.14	14.29	14.23	14.67	13.79	13.77	14.18
335	O_32.5m	32.5	1.34	1.32	1.37	1.36	1.38	1.38	1.43	1.34	1.34	1.43	57.01	45.87	35.49	34.53	36.77	35.85	42.10	30.81	30.50	34.08	16.67	15.43	13.77	13.70	13.85	13.79	14.20	13.47	13.45	13.80
336	O_42.5m	42.5	1.30	1.28	1.32	1.31	1.33	1.33	1.37	1.30	1.30	1.37	51.33	41.78	31.66	31.08	33.29	32.52	38.37	28.50	28.21	31.60	16.32	15.15	13.46	13.42	13.57	13.52	13.91	13.26	13.24	13.57
337	O_52.5m	52.5	1.27	1.25	1.28	1.28	1.30	1.29	1.33	1.27	1.27	1.33	47.47	38.95	29.10	28.72	30.86	30.25	35.75	26.88	26.62	29.86	16.07	14.95	13.26	13.23	13.38	13.34	13.70	13.12	13.10	13.40
338	O_62.5m	62.5	1.24	1.23	1.26	1.25	1.27	1.27	1.31	1.25	1.25	1.31	44.67	36.88	27.28	27.03	29.05	28.58	33.76	25.68	25.44	28.53	15.89	14.80	13.11	13.09	13.23	13.20	13.55	13.01	12.99	13.28

339	O_72.5m	72.5	1.23	1.22	1.24	1.23	1.25	1.25	1.28	1.23	1.23	1.28	42.54	35.31	25.94	25.75	27.63	27.28	32.17	24.75	24.53	27.47	15.75	14.69	13.00	12.99	13.12	13.09	13.42	12.93	12.91	13.18
340	O_82.5m	82.5	1.21	1.20	1.22	1.22	1.23	1.23	1.27	1.22	1.22	1.27	40.86	34.06	24.90	24.77	26.48	26.21	30.89	24.00	23.81	26.61	15.64	14.60	12.91	12.91	13.02	13.00	13.32	12.86	12.85	13.10
341	O_92.5m	92.5	1.20	1.19	1.21	1.21	1.22	1.22	1.25	1.21	1.20	1.25	39.50	33.05	24.09	23.99	25.50	25.29	29.85	23.39	23.22	25.92	15.55	14.53	12.85	12.84	12.94	12.93	13.24	12.80	12.79	13.03
342	O_102.5m	102.5	1.19	1.18	1.20	1.20	1.21	1.21	1.24	1.20	1.20	1.24	38.37	32.21	23.43	23.36	24.65	24.48	28.99	22.88	22.72	25.35	15.48	14.47	12.79	12.79	12.87	12.86	13.17	12.76	12.75	12.98
343	O_127.5m	127.5	1.17	1.17	1.18	1.18	1.18	1.18	1.22	1.18	1.18	1.22	36.26	30.64	22.25	22.21	23.00	22.89	27.38	21.91	21.79	24.28	15.34	14.36	12.69	12.69	12.74	12.73	13.04	12.67	12.66	12.88
344	O_152.5m	152.5	1.16	1.16	1.17	1.17	1.17	1.17	1.20	1.17	1.17	1.20	34.81	29.55	21.46	21.44	21.90	21.83	26.23	21.23	21.14	23.52	15.24	14.28	12.62	12.62	12.65	12.65	12.95	12.61	12.60	12.80
345	O_177.5m	177.5	1.15	1.15	1.16	1.16	1.16	1.16	1.19	1.16	1.16	1.19	33.76	28.77	20.90	20.90	21.18	21.12	25.36	20.74	20.67	22.95	15.17	14.22	12.57	12.57	12.59	12.59	12.88	12.56	12.56	12.75
346	O_202.5m	202.5	1.15	1.14	1.15	1.15	1.15	1.15	1.18	1.15	1.15	1.18	32.96	28.18	20.49	20.48	20.67	20.63	24.65	20.37	20.31	22.47	15.11	14.17	12.53	12.53	12.55	12.54	12.82	12.53	12.53	12.70

Receptor P

Lookup		Distance	Annual Mean NH_3 (ug/m^3)										Annual Mean NOx (ug/m^3)										Annual Mean Total N Dep (kg N/ha/yr)									
ID	Road Link	From Road (m)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)	2014 (2014 EF)	2017 (2017 EF)	Baseline (2023 EF)	DN (2023 EF)	DM (2023 EF)	DS1 (2023 EF)	DS2 (2023 EF)	DS3 (2023 EF)	DS4 (2023 EF)	DS5 (2030 EF)
347	P_1m	1	2.51	2.44	2.63	2.63	2.63	2.64	2.78	2.76	2.76	2.78	181.94	146.56	100.21	99.95	100.61	100.94	109.12	107.12	106.76	73.85	23.79	21.90	19.24	19.23	19.26	19.28	19.87	19.76	19.75	18.46
348	P_6m	6	2.18	2.12	2.27	2.27	2.27	2.28	2.37	2.36	2.36	2.37	145.41	117.60	81.78	81.44	82.35	82.63	88.79	86.79	86.39	61.64	21.94	20.22	17.78	17.76	17.81	17.83	18.28	18.17	18.15	17.12
349	P_11m	11	1.99	1.94	2.06	2.06	2.07	2.07	2.15	2.13	2.13	2.15	124.53	101.02	70.95	70.57	71.63	71.88	76.88	74.98	74.59	54.37	20.84	19.23	16.91	16.89	16.95	16.97	17.33	17.22	17.20	16.33
350	P_16m	16	1.86	1.82	1.92	1.92	1.93	1.93	1.99	1.98	1.98	1.99	110.56	89.91	63.54	63.12	64.27	64.51	68.75	66.96	66.63	49.34	20.09	18.55	16.31	16.28	16.35	16.37	16.68	16.57	16.56	15.80
351	P_21m	21	1.77	1.73	1.82	1.82	1.83	1.83	1.88	1.87	1.87	1.88	100.17	81.66	57.90	57.48	58.68	58.92	62.61	60.94	60.67	45.50	19.52	18.03	15.85	15.83	15.90	15.92	16.19	16.09	16.07	15.39
352	P_31m	31	1.65	1.61	1.68	1.68	1.69	1.69	1.73	1.72	1.72	1.73	85.79	70.26	49.98	49.57	50.79	51.02	54.01	52.52	52.37	40.08	18.71	17.31	15.20	15.18	15.26	15.27	15.49	15.40	15.40	14.83
353	P_41m	41	1.56	1.53	1.59	1.59	1.60	1.60	1.63	1.62	1.62	1.63	76.02	62.52	44.50	44.15	45.32	45.55	48.11	46.74	46.68	36.33	18.14	16.80	14.76	14.73	14.81	14.83	15.02	14.93	14.93	14.44
354	P_51m	51	1.50	1.48	1.52	1.52	1.53	1.53	1.56	1.55	1.55	1.56	68.95	56.93	40.53	40.24	41.31	41.54	43.83	42.54	42.55	33.60	17.72	16.43	14.43	14.41	14.48	14.50	14.67	14.58	14.59	14.16
355	P_61m	61	1.45	1.43	1.47	1.47	1.48	1.48	1.51	1.50	1.50	1.51	63.53	52.66	37.49	37.27	38.22	38.45	40.54	39.32	39.38	31.50	17.39	16.14	14.18	14.16	14.23	14.24	14.40	14.32	14.32	13.94
356	P_71m	71	1.42	1.40	1.43	1.43	1.44	1.44	1.47	1.46	1.46	1.47	59.28	49.31	35.12	34.95	35.79	36.02	37.97	36.79	36.88	29.85	17.12	15.92	13.98	13.97	14.02	14.04	14.19	14.11	14.12	13.77
357	P_81m	81	1.39	1.37	1.40	1.40	1.41	1.41	1.43	1.42	1.42	1.43	55.82	46.58	33.21	33.07	33.81	34.03	35.87	34.74	34.84	28.51	16.91	15.73	13.82	13.81	13.86	13.88	14.01	13.94	13.94	13.63
358	P_91m	91	1.36	1.35	1.38	1.38	1.38	1.38	1.40	1.39	1.40	1.40	52.96	44.34	31.64	31.54	32.19	32.39	34.15	33.06	33.16	27.41	16.73	15.58	13.69	13.68	13.72	13.74	13.87	13.80	13.80	13.52
359	P_101m	101	1.34	1.33	1.35	1.35	1.36	1.36	1.38	1.37	1.37	1.38	50.55	42.44	30.32	30.24	30.81	31.00	32.69	31.64	31.74	26.48	16.57	15.44	13.57	13.57	13.61	13.62	13.75	13.68	13.68	13.42
360	P_126m	126	1.30	1.29	1.31	1.31	1.32	1.32	1.33	1.33	1.33	1.33	45.94	38.81	27.83	27.79	28.20	28.36	29.90	28.95	29.02	24.70	16.27	15.19	13.36	13.36	13.39	13.40	13.51	13.45	13.45	13.24
361	P_151m	151	1.28	1.26	1.28	1.28	1.29	1.29	1.30	1.29	1.30	1.30	42.64	36.21	26.06	26.03	26.35	26.47	27.89	27.02	27.07	23.42	16.06	15.00	13.21	13.21	13.23	13.24	13.34	13.28	13.29	13.11
362	P_176m	176	1.25	1.24	1.26	1.26	1.26	1.26	1.28	1.27	1.27	1.28	40.18	34.27	24.74	24.73	24.97	25.07	26.38	25.59	25.62	22.45	15.89	14.86	13.10	13.09	13.11	13.12	13.21	13.16	13.16	13.01
363	P_201m	201	1.24	1.23	1.24	1.24	1.24	1.25	1.26	1.25	1.25	1.26	38.27	32.77	23.72	23.71	23.91	23.99	25.19	24.48	24.49	21.70	15.77	14.76	13.01	13.01	13.02	13.02	13.11	13.06	13.07	12.93