

Growing Baldock

Environmental Statement Volume 2: Figures & Appendices

Chapter 6: Air Quality

Appendix 6.6 Assessment of Impacts on Ecological Sites

APPENDIX 6.6 ASSESSMENT OF IMPACTS ON ECOLOGICAL SITES

- 1.1.1 The IAQM A guide to the assessment of air quality impacts on designated nature conservation sites guidance states that:

"The DMRB provides a series of traffic screening criteria. These include the change in Annual Average Daily Traffic (AADT) flows on a given road of 1000 vehicles or 200 heavy duty vehicles (HDVs). These thresholds have been widely used to screen out the need for quantitative assessment of projects/plans in the absence of any other thresholds recognised as being applicable in this context."

- 1.1.2 The Proposed Development generates sufficient traffic volume during the operational phase whereby the 1,000 vehicles threshold, as AADT, is exceeded on the following road links (where a designated habitat site is also situated within 200 m of the road):

- A1 (south of Junction 9)
- A1 (north of Junction 9)
- A505 (north of Baldock)
- London Road

- 1.1.3 This appendix considers the impact of NO_x (Nitrogen Oxides) and NH₃ (Ammonia) concentrations, nutrient nitrogen deposition and acid deposition from operational traffic emissions, associated with the Proposed Development, at the following designated habitat sites:

- Weston Hill Local Nature Reserve (LNR) – 20 m from site boundary
- Ivel Springs LNR & Local Wildlife Site (LWS) – Adjacent to site boundary
- Therfield Heath Site of Scientific Interest (SSSI) – 7 km from site boundary
- Knebworth Woods (SSSI) – 10 km from site boundary
- Margaret's Wood Ancient Woodland (AW) – 7.5 km from site boundary

Figure 6.6.1 Modelled Road Links Near to Ivel Springs and Weston Hill

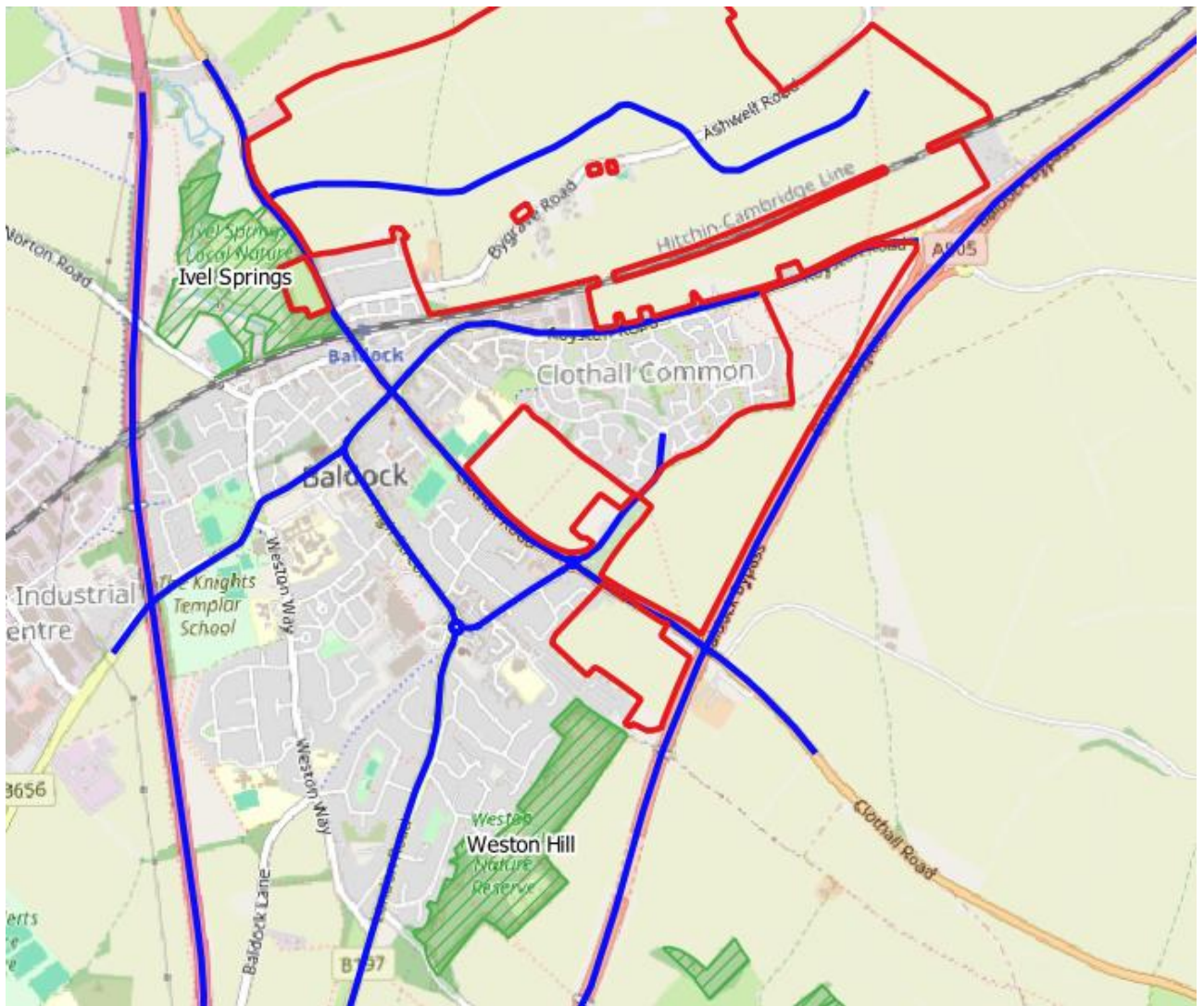
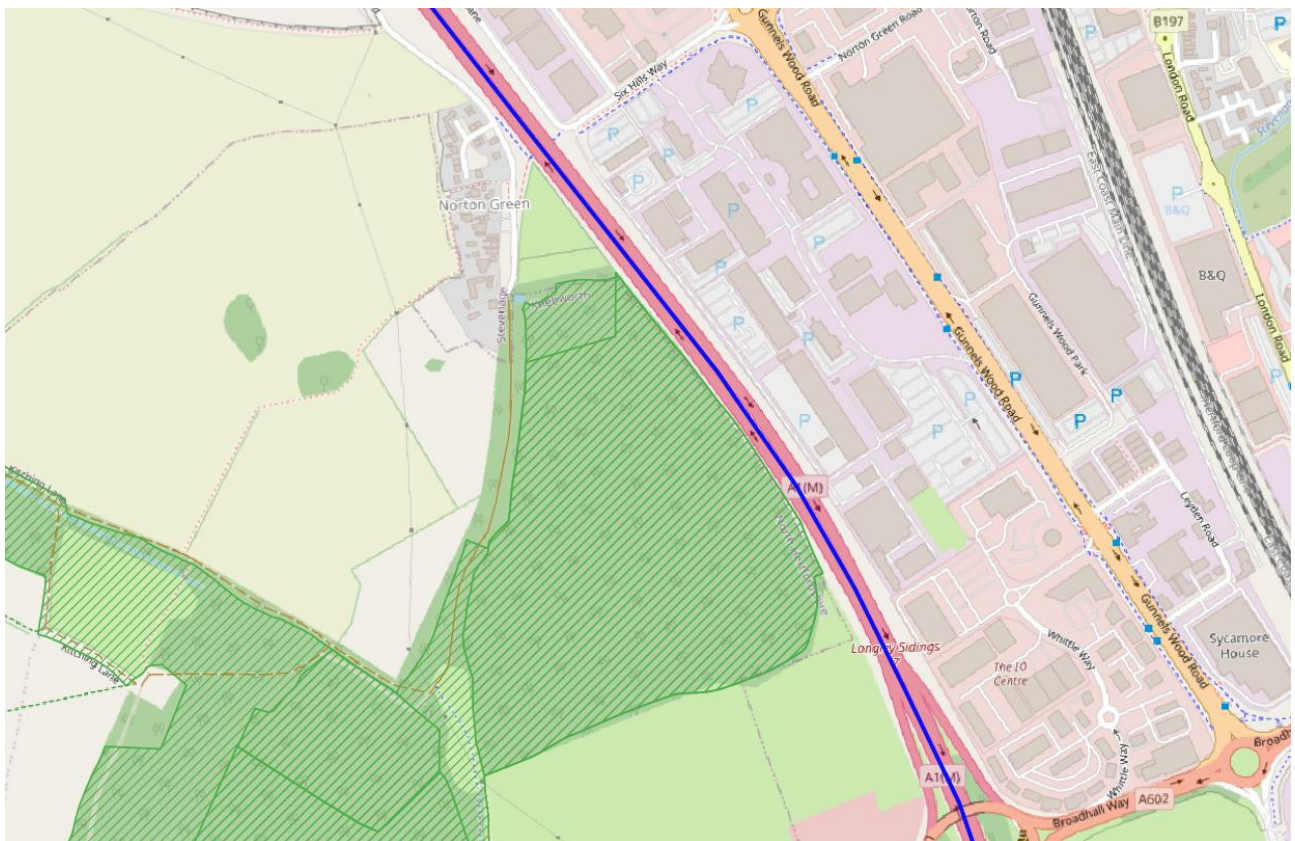


Figure 6.6.3 Modelled Road Links Near to Therfield Heath



Figure 6.6.4 Modelled Road Links Near to Knebworth Woods



Approach

- 1.1.4 Concentrations of NO_x and NH₃ have been predicted using the same model and methodology as used in the assessment of human-health receptors (see ES Chapter 6: Air Quality). The receptor points have been modelled at ground level. Emission rates for NH₃ were calculated using Air Quality Consultants' Calculator for Road Emissions of Ammonia (v2A).
- 1.1.5 The process contribution (PC), i.e. the difference between the with and without development concentrations and, if appropriate, the predicted environmental concentration (PECs) have been calculated for comparison with the relevant critical level/load. The PEC has been calculated by adding the PC to the background levels at each designated site which have been derived from the UK Air Pollution Information System (APIS) database [1].

Critical Levels

- 1.1.6 Critical levels are maximum atmospheric concentrations of pollutants for the protection of vegetation and ecosystems and are specified within relevant European air quality directives and corresponding UK air quality regulations.

Critical Loads

- 1.1.7 Critical loads refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. Nutrient nitrogen deposition and acid deposition are considered in this appendix.

Critical Loads - Nutrient N Deposition

- 1.1.8 Percentage contributions to total nutrient nitrogen deposition have been derived from the modelled NO_x (converted to NO₂ using Defra's NO_x to NO₂ calculator – v9.1) and NH₃ concentrations. Deposition rates have been calculated using empirical methods recommended by the Environment Agency, as follows:
- The dry deposition flux ($\mu\text{g.m}^{-2}.\text{s}^{-1}$) has been calculated by multiplying the ground level NO₂ concentrations ($\mu\text{g.m}^{-3}$) by the deposition velocity of 0.003 m.s⁻¹ for forests/tall vegetation habitats and 0.0015 m.s⁻¹ for grassland/short vegetation habitats. Units of $\mu\text{g.m}^{-2}.\text{s}^{-1}$ have been converted to units of kg.ha⁻¹.year⁻¹ by multiplying the dry deposition flux by the standard conversion factor of 96 for NO₂.
 - The NH₃ dry deposition flux ($\mu\text{g.m}^{-2}.\text{s}^{-1}$) has been calculated by multiplying the ground level NH₃ concentrations ($\mu\text{g.m}^{-3}$) by the deposition velocity of 0.03 m.s⁻¹ for forests/tall vegetation habitats and 0.02 m.s⁻¹ for grassland/short vegetation habitats. Units of $\mu\text{g.m}^{-2}.\text{s}^{-1}$ have been converted to units of kg.ha⁻¹.year⁻¹ by multiplying the dry deposition flux by the standard conversion factor of 260 for NH₃.
 - Predicted contributions to nutrient nitrogen deposition have been calculated from the sum of the NO₂ and NH₃ contributions and compared with the relevant critical load range for the habitat types associated with the assessed designated sites. These have been derived from the APIS database.

Critical Loads - Acidification

- 1.1.9 The acid deposition rate, in equivalents $\text{keq.ha}^{-1}.\text{year}^{-1}$, has been calculated by multiplying the dry deposition flux ($\text{kg.ha}^{-1}.\text{year}^{-1}$) by a conversion factor of 0.071428 for N. This takes into account the degree to which a chemical species is acidifying, calculated as the proportion of N within the molecule.
- 1.1.10 Wet deposition in the near field is not significant compared with dry deposition for N [2] and therefore for the purposes of this assessment, wet deposition has not been considered.
- 1.1.11 Predicted contributions to acid deposition have been calculated and compared with the critical load function for the habitat types associated with the designated sites as derived from the APIS database.

Significance Criteria

- 1.1.12 Maximum PCs and PECs of NO_x , NH_3 and N/acid deposition have been compared against the relevant critical levels/loads for the relevant habitat type/interest feature. The Environment Agency guidelines [3] state that:

'To screen out a PC for any substance so that you don't need to do any further assessment of it, the PC must meet the following criteria:

- *The short-term PC is less than 10% of the short term environmental standard*
- *the long-term PC is less than 1% of the long-term environmental standard*

If you meet this criteria you don't need to do any further assessment of the substance.

If you don't meet it you need to carry out a second stage of screening to determine the impact of the PEC.'

- 1.1.13 It continues by stating that:

'If your long-term PC is greater than 1% and your PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – you don't need to assess them any further.'

- 1.1.14 For local nature sites i.e. LNRs and ancient woodlands, it states:

"If your emissions meet both of the following criteria they're insignificant – you don't need to assess them any further:

- *the short-term PC is less than 100% of the short-term environmental standard*
- *the long-term PC is less than 100% of the long-term environmental standard*

You don't need to calculate PEC for local nature sites. If your PC exceeds the screening criteria you need to do detailed modelling."

- 1.1.15 Whilst it is noted that the Environment Agency guidelines relate to permitted installations, the guidelines have been applied within this assessment in the absence of any specific planning guidance which provides alternative assessment criteria. It is noted that both Natural England and IAQM guidance documents make reference to the application of the 1% assessment criterion.
- 1.1.16 Note that an in-combination assessment, as discussed within Natural England's road traffic emissions and Habitats Regulations guidance, has been scoped out of this assessment based on the designation of the assessed habitat sites (i.e. SSSI, AW and LNR) and the findings of preceding case-law relating to in-combination assessments being required for European and international sites.

Results

- 1.1.17 The ambient NO_x and NH₃ concentrations as well as the existing deposition rates have been obtained from APIS. The highest deposition rates have been obtained taking into account the various habitats across the sites. The lowest critical load ranges for nitrogen deposition and acid deposition have been also obtained from APIS [4].
- 1.1.18 The maximum predicted annual-mean NO_x concentrations are compared with the critical level in Table A1. The maximum predicted annual-mean NH₃ concentrations are compared with the critical level in Table A.2. The maximum predicted nutrient N deposition rates are compared with the critical load in Table A3. The maximum predicted acid deposition rates are compared with the critical load function in Table A4.

Table 6.6.1 Predicted NO_x Concentrations at Designated Sites

Designated Site	Annual Mean CL ($\mu\text{g.m}^{-3}$)	Annual Mean NO _x PC ($\mu\text{g.m}^{-3}$)	NO _x PC as % of CL
Weston Hill (LNR)	30	0.03	<1
Ivel Springs (LNR)	30	0.13	<1
Therfield Heath (SSSI)	30	0.06	<1
Margaret's Wood (AW)	30	0.12	<1
Knebworth Woods (SSSI)	30	0.16	<1

Note:

Consistent with the Institute of Air Quality Management's "A guide to the assessment of air quality impacts on designated nature conservation sites" [5], the PC as a % of the CL has been rounded to the nearest integer.

Table 6.6.2 Predicted NH₃ Concentrations at Designated Sites

Designated Site	Annual Mean CL ($\mu\text{g.m}^{-3}$)	Annual Mean NH ₃ PC ($\mu\text{g.m}^{-3}$)	NH ₃ PC as % of CL	AC	PEC ($\mu\text{g.m}^{-3}$)	PEC/CL (%)
Weston Hill (LNR)	1	0.01	1	-	-	-
Ivel Springs (LNR)	1	0.04	4	-	-	-
Therfield Heath (SSSI)	1	0.02	2	1.4	1.4	140
Unnamed (AW)	1	0.05	5	-	-	-
Knebworth Woods (SSSI)	1	0.07	7	1.2	1.2	123

Note:

Consistent with the Institute of Air Quality Management's "A guide to the assessment of air quality impacts on designated nature conservation sites" [6], the PC as a % of the CL has been rounded to the nearest integer.

Table 6.6.3 Predicted Nutrient N Deposition at Designated Sites

Designated Site	CL (kgN.ha ⁻¹ .yr ⁻¹)	NO _x PC (kgN.ha ⁻¹ .yr ⁻¹)	NH ₃ PC (kgN.ha ⁻¹ .yr ⁻¹)	Total N Dep	PC/CL (%)	AC	PEC (kgN.ha ⁻¹ .yr ⁻¹)	PEC/CL (%)
Weston Hill (LNR)	5	0.01	0.09	0.09	2	-	-	-
Ivel Springs (LNR)	5	0.02	0.35	0.37	7	-	-	-
Therfield Heath (SSSI)	10	0.01	0.15	0.16	2	9.1	9.2	92
Margaret's Wood (AW)	10	0.02	0.38	0.40	4	-	-	-
Knebworth Woods (SSSI)*	15	0.02	0.52	0.54	4	26.8	27.3	182

Note:

Critical loads (CLs) for nutrient nitrogen deposition are provided as a range. In this case, the lower limit of the CL range has been used in the assessment.

Consistent with the Institute of Air Quality Management's "A guide to the assessment of air quality impacts on designated nature conservation sites" [5], the PC as a % of the CL has been rounded to the nearest integer.

*The project's ecologist has advised that there are no grassland compartments within 200 m of the affected road and therefore it is only the ancient woodland that is relevant at Knebworth Woods. Therefore, the critical load used is for the ancient woodland.

Table 6.6.4 Predicted Acid Deposition at Designated Sites

Designated Site	CLMax S (keq.ha ⁻¹ .yr ⁻¹)	CL Min N (keq.ha ⁻¹ .yr ⁻¹)	CL Max N (keq.ha ⁻¹ .yr ⁻¹)	PC (keq.ha ⁻¹ .yr ⁻¹)	PC/CL (%)
Weston Hill (LNR)	4	0.86	4.86	0.01	<1
Ivel Springs (LNR)	4	0.86	4.86	0.03	1
Therfield Heath (SSSI)	10.78	0.14	10.92	0.01	<1
Margaret's Wood (AW)	1.69	0.14	1.83	0.03	2
Knebworth Woods (SSSI)*	6.47	0.14	1.71	0.04	2

Note:

CLF = Critical Load Function. Consistent with the Institute of Air Quality Management's "A guide to the assessment of air quality impacts on designated nature conservation sites" [5], the PC as a % of the CL has been rounded to the nearest integer.

*The project's ecologist has advised that there are no grassland compartments within 200 m of the affected road and therefore it is only the ancient woodland that is relevant at Knebworth Woods. Therefore, the critical load used is for the ancient woodland.

Annual-mean NO_x

- 1.1.19 The maximum annual-mean NO_x PC does not exceed 1% of the critical level for any of the habitats and can therefore be screened out as insignificant.

Annual Mean NH₃

- 1.1.20 The maximum annual-mean NH₃ PC does not exceed 10% of the critical level at the local nature sites i.e. LNR or the AW and the impacts can be screened out as insignificant. At the SSSIs the NH₃ PC exceeds 1% of the critical level and the impacts cannot be screened out as insignificant. When the PCs are added to the background concentrations, the resulting PECs exceeds the critical level. This is due to the high existing background concentrations. On that basis, the impacts cannot be screened out as insignificant at any habitats and the results have been passed to the project's ecologist to describe the significance of the effects in **Chapter 11: Ecology**.

Nutrient N Deposition

- 1.1.21 The maximum annual-mean N deposition PC does not exceed 10% of the critical load at the local nature sites i.e. LNR or the AW. At the SSSIs the N deposition PC exceeds 1% of the critical load and the impacts cannot be screened out as insignificant. When the PCs are added to the background deposition, the resulting PEC exceeds the critical load at the Knebworth Woods SSSI. This is due to the high existing background deposition. On that basis, the impacts cannot be screened out as insignificant and the results have been passed to the project's ecologist to describe the significance of the effects in **Chapter 11: Ecology**.

Acid Deposition

- 1.1.22 The maximum annual-mean acid deposition PC does not exceed 10% of the critical load at the local nature sites i.e. LNR or the AW. At the Knebworth Woods SSSIs the acid deposition PC exceeds 1% of the critical load and the impacts cannot be screened out as insignificant. When the PC is added to the background deposition, the resulting PEC exceeds the critical load at the Knebworth Woods SSSI. This is due to the high existing background deposition. On that basis, the impacts cannot be screened out as insignificant and the results have been passed to the project's ecologist to describe the significance of the effects in **Chapter 11: Ecology**.

1 Air Pollution Information Systems, www.apis.ac.uk

2 Approaches to modelling local nitrogen deposition and concentrations in the context of Natura 2000 - Topic 4

3 Air emissions risk assessment for your environmental permit

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| 4 | Data downloaded from APIS September 2024 |
| 5 | IAQM, 2020. A guide to the assessment of air quality impacts on designated nature conservation sites |
| 6 | IAQM, 2020. A guide to the assessment of air quality impacts on designated nature conservation sites |