MITIGATION OF AIR QUALITY IMPACTS FOR THE EAST DEVON PEBBLEBED HEATHS

Technical report

Report for: East Devon District Council

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1. INTRODUCTION

1.1 EAST DEVON PEBBLEBED HEATHS

The district of East Devon is located in the county of Devon, and is adjacent to Dorset, Somerset, Mid Devon, and the city of Exeter. There are approximately 150,800 people[1] living in the district area of ~ 815 km^2. East Devon District Council (EDDC) is preparing a new local plan that will cover the period from 2020 through to 2042, which envisages the provision of approximately 21,000 new homes, as well as increased employment and commercial floorspace over the plan period[2]. The East Devon Local Plan (EDLP) has been developed in line with the Government's objectively assessed requirement for housing growth levels.

East Devon is characterised by its exceptional natural features, with over half of the district designated as National Landscape and a World Heritage Site coastline. It also contains numerous nature conservations areas of national and international importance. Increases in road traffic associated with the additional development in the EDLP may have the potential to adversely impact these nature conservation areas through increases in air concentrations of pollutants, particularly oxides of nitrogen and ammonia, and the deposition of these pollutants within sensitive habitats.

The Habitats Regulations Assessment (HRA) work undertaken to date has screened out the potential for adverse impacts at many of the internationally designated sites across the district; however, it has highlighted specific concerns relating to potential impacts on the East Devon Pebblebed Heaths (EDPH) Special Area of Conservation (SAC) and Special Protection Area (SPA).

A significant characteristic of EDPH is the diversity of heathland-associated plant and animal communities that reflect the varied topography, geology, hydrology and water chemistry of the area. It is designated as a SAC primarily due to its Annex 1 habitats of northern Atlantic wet heaths with *Erica tetralix*, its European dry heaths, and its Annex 2 species of the Coenagrion mercurial (Southern Damselfly). EDPH hosts important breeding birds such as the *Caprimulgus europaeus* (European Nightjar) and *Sylvia undata* (Dartford Warbler), which afford the site its SPA status.

1.2 THIS REPORT

This report contains the results of an updated Air Quality HRA of the impacts of road traffic emissions on the EDPH site, and HRA Stage 1 assessment of air quality impacts against screening thresholds. It forms part of the robust evidence base supporting EDDC with the emerging EDLP 2020-2042.

Air quality impacts on the designated site were assessed based on predicted annual average airborne concentrations of NOx and NH_3, together with annual deposition rates of nutrient nitrogen and acid. A sub-regional air dispersion model (RapidAIR) was used to model predicted air quality impacts at locations within the site at a resolution of 3m x 3m. Devon County Council (DCC) provided Annual Average Daily Traffic (AADT) and vehicle speed data for four roads, with supplementary data gathered from Department for Transport (DfT) count points. Supplementary traffic data was scaled using TEMPRO factors provided by DCC. Missing speed data was filled using adjacent link speeds or a national average speed based on road classification.

This information was used in three scenarios to determine the air quality impacts associated with the local plan allocations:

1. 2022 Base Year: This scenario was designed to replicate 2022 traffic conditions within the study area in order to verify the performance of the air dispersion model.
2. 2042 Future Base: This scenario assumed background traffic growth in line with DfT's TEMPRO software (v8.0). Additionally, it included all known current development and infrastructure, as well as all committed development and infrastructure, up to 2042. Development associated with the EDLP was excluded from this scenario. This was a hypothetical scenario against which to test the impacts

[1] East Devon District Council: Census 2021, accessed 22/07/2025: https://eastdevon.gov.uk/council-and-democracy/knowing-east-devon/census-2021/
[2] East Devon Emerging Local Plan 2020-42: Draft (February 2025)

of the EDLP, as it assumes there will be no development within the district up to 2042 other than at sites which already have planning permission.

3. 2042 Future Year with Local Plan: This scenario is equivalent to the ‘2042 Future Base’ scenario, with the addition of development proposed in the EDLP. A comparison of both scenarios made it possible to assess any impacts attributable to the EDLP in isolation.

The contributions attributable to the local plan were compared to the screening threshold of 1% of the Critical Load or Critical Level applicable for each pollutant at the designated site. Likely Significant Effects (LSEs) can be discounted where the model results and analysis indicate that the contribution from the local plan, alone and in-combination with other applicable plans and projects, is below the 1% screening threshold.

Where the screening analysis indicates that LSEs on the designated site cannot not be ruled out, it is recommended that further analysis be undertaken in the form of an HRA Stage 2 Appropriate Assessment. Where the Appropriate Assessment refines areas in which there could potentially be adverse effects related to air pollution, this will inform the development of a mitigation strategy.

2. HABITAT SITE INFORMATION

2.1 BACKGROUND INFORMATION AND QUALIFYING FEATURES

Figure 2-1 provides an overview of the location of the EDPH SAC and SPA.

Figure 2-1 Overview of EDPH SAC & SPA

2.1.1 East Devon Pebblebed Heaths SAC (UK0012602) and SPA (UK9010121)

The East Devon Pebblebed Heaths SAC is the largest block of lowland heath in Devon. The site includes dry and wet heath associated with various mire communities.

The site is designated for the following habitats listed in Annex I:

- European dry heaths
- North Atlantic wet heaths with *Erica tetralix* (wet heathland with cross-leaved heath)

The site is designated for the following species listed in Annex II:

- Southern damselfly *Coenagrion mercurial*

The site has also been granted SPA designation as it hosts at least 1% of the Great Britain population of two species listed in Annex I of the Birds Directive (79/409/EEC) including the European Nightjar *Caprimulgus europaeus* (Breeding) and Dartford warbler *Sylvia undata* (breeding). In particular, the site supports approximately 6.8% of the breeding Dartford Warbler population and 2.4% of the breeding Nightjar population in Great Britain[3].

Several pressures have been listed for the SAC and SPA in the Site Improvement Plan (SIP)[4]. These include:

- Inappropriate scrub control
- Under-grazing
- Changes in land management
- Public access and disturbance
- Air pollution – atmospheric nitrogen deposition
- Water pollution – nutrient enrichment
- Hydrological changes

2.1.2 East Devon Pebblebed Heaths SSSI (1004364)

The site is underpinned by the East Devon Pebblebed Heaths Site of Special Scientific Interest (SSSI) national designation. EDPH is the largest block of lowland heath in Devon and is considered a nationally important representative of the inland Atlantic-climate, lowland heathlands of Britain and north-west Europe. A significant feature of the site is the diversity of heathland associated communities, related to its large area and the range of substrate and topography. The wide range of birds and invertebrates is also an important characteristic supporting its SSSI status.

There are 16 units within the SSSI, all of which have been categorised as dwarf shrub heath lowland. Of the 16 units:

- Three are in ‘favourable’ condition: units 005, 007, 010;
- Three are in ‘unfavourable - no change’ condition: units 006, 014, 016;
- Eight are in ‘unfavourable - recovering’ condition: units 001, 002, 008, 009, 012, 015, 017, 018; and
- Two are in ‘unfavourable - declining’ condition: units 011, 013).

A “Restore” target has been put in place relating to the site supporting processes Conservation Objective. The target states “*Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System[3].”*

[3] Natural England (2019) Supplementary advice on conserving and restoring site features. Available at: https://designatedsites.naturalengland.org.uk/TerrestrialAdvicePDFs/UK9010121.pdf

[4] Natural England (2014) Site Improvement Plan for the East Devon Pebblebed Heaths SAC and East Devon Heaths SPA. Available at: https://publications.naturalengland.org.uk/publication/6234004760035328

2.2 SCREENING THRESHOLDS

Table 2-1 summarizes all of the critical loads for nutrient nitrogen deposition (kgN/ha-year) and acid deposition (kEq/ha-year), as well as the critical levels for airborne ammonia (µg/m^3) and airborne NOx (µg/m^3), applicable to this designated site. The most stringent critical load or critical level (CL) for each pollutant is indicated in bold[5].

The data provided in the table below is derived from APIS and is based on direct effects to the qualifying feature itself. We note that, although the identified species themselves as not sensitive to airborne NH_3 and NOx, the habitats that support these species are sensitive and therefore mitigation will be required to meet the conservation objectives for these species.

Table 2-1 Minimum Critical Load and Critical Level (CL) values and associated sensitive features for East Devon Pebblebed Heaths SAC and SPA

Designation	Sensitive feature	Minimum nutrient nitrogen deposition CLs (kgN/ha-year)	Minimum acid deposition CLs (MinCLMaxN, kEq/ha-year)	Minimum airborne NH_3 CLs (µg/m^3)	Minimum airborne NOx CLs (µg/m^3)
SAC	European dry heaths	**5**	1.205	**1**	**30**
SAC	Northern Atlantic wet heaths with *Erica tetralix*	**5**	1.205	**1**	**30**
SAC	*Coenagrion mercuriale*	**5**	1.205	**1**	**30**
SPA	*Caprimulgus europaeus* (unmanaged broadleafed/coniferous woodland)	**5**	**0.894**	Not sensitive	Not sensitive
SPA	*Caprimulgus europaeus* (dwarf shrub heath)	**5**	1.205		
SPA	*Sylvia undata*	**5**	1.205	Not sensitive	Not sensitive

3. AIR QUALITY HABITATS REGULATIONS ASSESSMENT METHODOLOGY

The assessment of impacts on sites designated for nature conservation was carried out in a stepwise process, designed to comply with Natural England's requirements and good practice for evaluation of the impacts of air pollution on nature conservation sites. The requirements from Natural England were developed primarily for the assessment of designated sites with European (or equivalent international) designation, namely Ramsar sites, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

A detailed methodology for the air quality dispersion modelling is included in Appendix A.

3.1 COULD THE PROPOSED DEVELOPMENT GIVE RISE TO EMISSIONS WHICH ARE LIKELY TO REACH A DESIGNATED SITE

Established guidance from Natural England and National Highways indicates that protected sites falling within 200 metres of the edge of a road affected by a plan or project need to be considered further.

This assessment avoided the need for relying on the assumption of a 200-metre zone of influence by including dispersion modelling of emissions from all roads with available traffic flows across the whole designated site.

[5] Air Pollution Information System, accessed 22/07/2025: https://www.apis.ac.uk/app

The model results shown later in this report indicate that potentially significant effects could occur at distances greater than 200 metres from the road, so using a 200 metre zone is not a robust approach. The approach adopted in this study ensured a robust assessment without relying on a distance-based screening criterion and provided a more detailed and complete assessment for the site.

3.2 ARE THE QUALIFYING FEATURES OF THE DESIGNATED SITE SENSITIVE TO AIR POLLUTION IMPACTS

Consideration was given to whether the designated site contains qualifying features that are sensitive to the emissions associated with the planned development. For increased road traffic resulting from the proposed development, the associated emissions include nutrient nitrogen deposition, acid deposition, airborne oxides of nitrogen (NOx) and airborne ammonia (NH_3).

The UK Air Pollution Information System (APIS)[5] was used to gather information on the EDPH site's sensitive features and identify potential sensitivity to air pollution impacts. At this stage, the spatial distribution of qualifying features within the site was not considered.

3.3 COULD A LIKELY SIGNIFICANT EFFECT OCCUR

The next step was to use the dispersion modelling results to predict the air quality impacts associated with changes in traffic flow resulting from the EDLP. For each set of model results (nutrient nitrogen deposition, acid deposition, airborne NOx and airborne NH_3), the contribution attributable to the EDLP was calculated as follows:

(2042 contribution from EDLP) = (2042 Future Year with Local Plan) – (2042 Future Base)

The contribution attributable to the EDLP was then compared to a screening threshold, where the screening threshold for each pollutant / habitat combination was set to 1% of the applicable Critical Load or Critical Level. This approach is supported by online guidance published by Defra and the Environment Agency,[6] and the Institute of Air Quality Management (IAQM)[7]. This screening threshold applies to impacts where background sources of air pollution are already causing pollution levels to be close to or above the relevant assessment criteria.

The 1% criterion is intended to be a threshold below which there is no Likely Significant Effect (LSE) and any impacts can therefore be screened out. Impacts above 1% do not necessarily correspond to the onset of damage to a designated site but should be treated as potentially significant and undergo further detailed assessment.

In view of this guidance, a threshold of a contribution of 1% of the applicable Critical Load or Critical Level was used to screen out any areas where the EDLP is predicted to have no LSE on the EDPH designated site. More detailed evaluation, and potentially mitigation, should be carried out for any areas where the risk of a LSE cannot be screened out.

3.4 IN-COMBINATION ASSESSMENT

Guidance from Natural England[8], developed following the requirements of the Wealden Judgment, advises that the screening thresholds should be applied with consideration to impacts from individual proposed developments and with consideration to in-combination effects.

The NOx pollutant background maps[9] used in the air dispersion model account for existing industrial activity, including large combustion installations, airports and shipping activity. Known industrial sources are modelled explicitly in the baseline year of the background maps, and future-year background maps are derived by incorporating datasets from the UK Department for Business, Energy & Industrial Strategy (BEIS) regarding projected energy and economic activity data for various industrial sectors. The background maps therefore

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[6] Department for Environment, Food and Rural Affairs and Environment Agency, "Air emissions risk assessment for your environmental permit", July 2025.

[7] IAQM, "A guide to the assessment of air quality impacts on designated nature conservation sites", May 2020.

[8] Natural England, "Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations", June 2018.

[9] https://uk-air.defra.gov.uk/data/laqm-background-home

account for future growth in industrial sector emissions, within the limits of current government growth projections.

3.4.1.1 Planned development in adjacent authorities

The district of East Devon shares its borders with Exeter, Teignbridge, Mid Devon, Somerset and Dorset. HRA studies from these neighbouring authorities were searched in order to extract relevant information concerning other sources of in-combination effects; the results of this exercise are summarised below.

Authority	Search Results
Exeter City Council	For the roads included the East Devon study area, the HRA undertaken for the Exeter Local Plan[10] (table 3) sets out that “traffic modelling indicates no increase in traffic as a result of growth in Exeter. No credible evidence of a real risk.” It is therefore clear that increased traffic from the planned development is not expected to contribute to any significant effects on the EDPH, and **in-combination impacts can be ruled out.**
Teignbridge District Council	No traffic or air quality assessment is publicly available for the Teignbridge Local Plan, and therefore it is not possible to quantify any impact as part of this assessment. The Teignbridge Local Plan[11] includes policy statement EN7, which states that “Development that is likely to have a significant effect on a European Wildlife Site with respect to air quality, will not be permitted unless an Appropriate Assessment has ascertained that following mitigation there is no adverse effect on the integrity of the site”. The Local Plan also included supporting policies Policy CC3: Electric Vehicle Infrastructure and Policy CC4: Sustainable Transport and Policy. This was recommended in the supporting HRA and Natural England Statement of Common Ground[12], which concluded that, as a result, no LSEs on the EDPHs site would be expected for the plan alone or in-combination. Therefore, **in-combination impacts can be ruled out.**
Mid Devon District Council	The Local Plan HRAs for all three authorities were reviewed and contained no mention of the EDPHs. Considering this, and due to considerable distance from the EDPH study area, increased traffic from planned development is not expected to contribute to any significant effects on the EDPH, and **in-combination impacts can be ruled out.**
Somerset Council	
Dorset Council	

3.4.1.2 National infrastructure projects

The National Infrastructure Planning website[13] was investigated to identify any potentially relevant major developments. This review did not highlight any relevant projects in the vicinity of the study area.

Other new industrial plans and projects seeking planning permission will need to carry out their own in-combination assessment of effects, where applicable, as part of the HRA process.

[10] Habitats Regulations Assessment of the Exeter Plan Publication Draft, December 2024, available at: https://exeter.gov.uk/planning-services/emerging-planning-policy/the-new-local-plan-the-exeter-plan/publication-draft-exeter-plan-winter-2024-25/

[11] Teignbridge Local Plan 2020-40, November 2023, available at: https://www.teignbridge.gov.uk/evidence

[12] Teignbridge Local Plan 2020-40: Statement of Common Ground, February 2024, available at: https://www.teignbridge.gov.uk/coresubmissiondocuments

[13] National Infrastructure Planning website, accessed 4/9/25: https://national-infrastructure-consenting.planninginspectorate.gov.uk/project-search

4. HRA STAGE 1: AIR QUALITY SCREENING RESULTS

4.1 ASSESSMENT OF AIR QUALITY IMPACTS AGAINST SCREENING THRESHOLDS

This section comprises the outcome of the screening assessment described in Section 3.2.

Table 4-1 compares the maximum modelled process contribution (PC) of the EDLP to the lowest applicable CL. Values in **bold** exceed the 1% screening threshold. This screening exercise represents a precautionary approach, as it assumes that the most sensitive qualifying features (with the lowest CLs) are present in the areas with the highest modelled contribution (typically adjacent to the busiest road).

Table 4-1 Screening results based on dispersion modelling of 2042 Future Year with Local Plan scenario

Pollutant	Deposition type	Minimum CL	Maximum modelled PC	PC as % of CL
Airborne NOx (µg/m³)	n/a	30	1.29	**4 %**
Airborne NH_3 (µg/m³)	n/a	1	0.23	**23 %**
Nutrient nitrogen deposition (kgN/ha-year)	Grassland	5	1.27	**25 %**
	Forest	5	1.95	**39 %**
Acid deposition (kEq/ha-year)	Grassland	0.894	0.09	**10 %**
		1.205		**7 %**
	Forest	0.894	0.14	**16 %**
		1.205		**12 %**

The screening results indicate that all four pollutants exceed the 1% screening threshold for the 2042 process contribution from the EDLP. Therefore, on the basis of available evidence and agreed thresholds, LSE from air quality impacts cannot be ruled out.

4.2 DETAILED ANALYSIS

Adopting a precautionary approach, all pollutants were identified as exceeding 1% of their respective critical loads and critical levels, considering the possible presence of both qualifying feature habitats within the areas of identified exceedances. As an initial consideration for the Stage 2 Appropriate Assessment, this section considers the modelled contributions within the context of existing and forecast background pollution levels for the designated site. An initial analysis of the distribution of habitat types across the site has also been undertaken, in order to understand the potential for LSE in relation to each pollutant, qualifying feature, and SSSI unit.

4.2.1 Airborne NOx

Current background levels of NOx do not exceed 30 µg/m³ within the EDPH site, and it is forecast that future concentrations of NOx will decrease significantly from current levels. The NOx background maps are produced by Defra on a periodic basis and are considered the best available information for future background levels of airborne NOx. There is no basis for reasonable scientific doubt in the forecast NOx levels. Additionally, the background map for the year 2040 (the latest year for which a NOx background map is available) is considered likely to over-predict NOx concentrations in 2042, which is the year applicable for our "Future Year with Local Plan" scenario.

Table 4-2 presents the total modelled NOx concentration for the 2042 “Future Year with Local Plan” scenario. The “Future Year with Local Plan” concentrations were added to the 2040 NOx background maps (with minor road contribution removed). The total NOx concentrations were then point-sampled to determine the maximum predicted environmental contribution (PEC).

Table 4-2 Summary of analysis for the maximum modelled total airborne NOx concentration

Scenario	Minimum CL (µg/m^3)	Maximum 2040 Background NOx (µg/m^3)	Maximum modelled PEC (µg/m^3)	PEC as % of CL
2042 Future Year with Local Plan	30	3.2	9.7	32 %

The PEC for NOx is predicted to be less than 50% of the applicable CL of 30 µg/m^3 throughout the designated site. On the basis of available evidence and agreed thresholds, it can therefore be concluded that no significant adverse effects are anticipated on the designated site from increased airborne NOx concentrations associated with the EDLP. No further investigation is therefore required for airborne NOx concentrations.

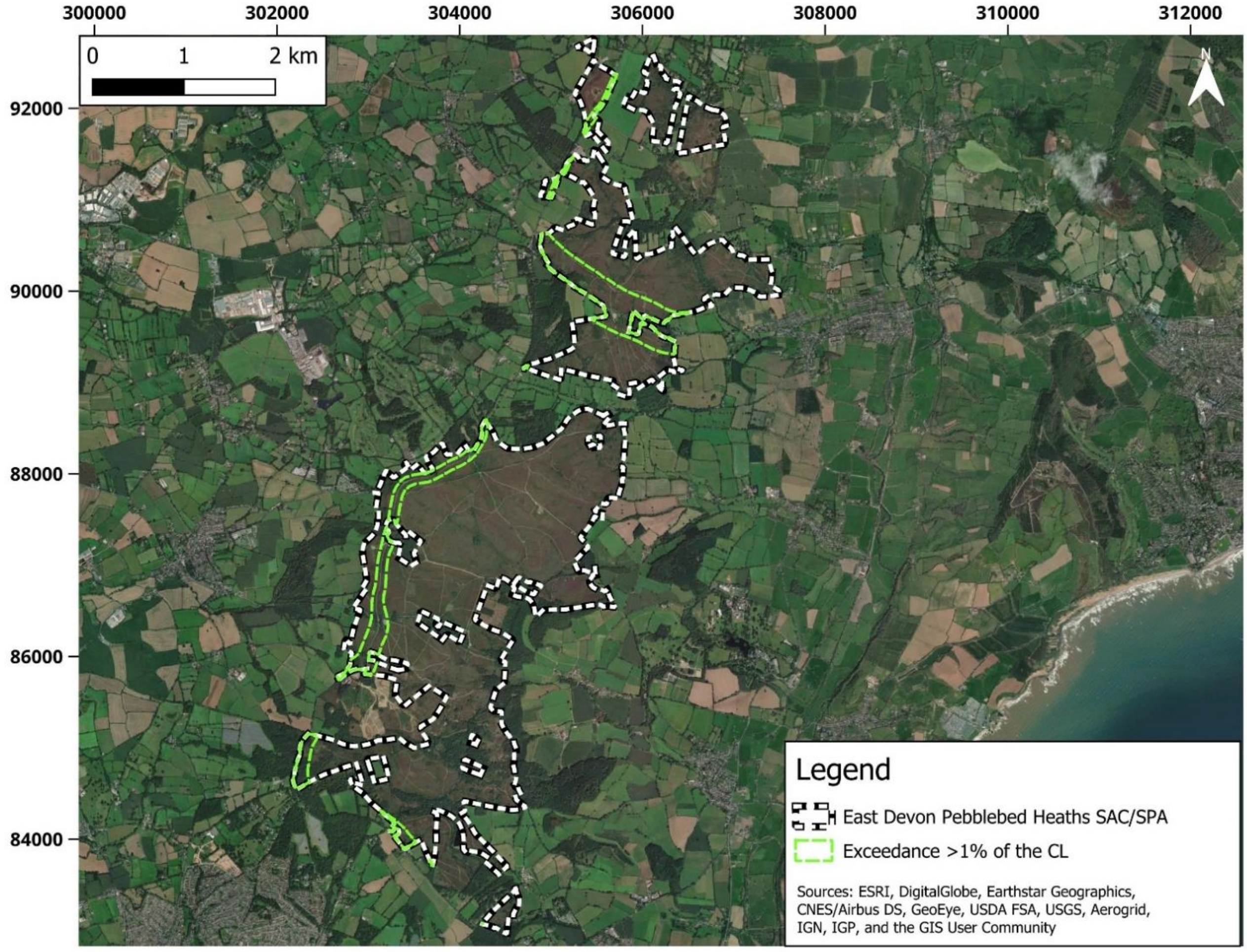
4.2.2 Airborne NH_3

Figure 4-1 illustrates the areas where the modelled NH_3 process contribution from the EDLP is predicted to exceed 1% of the CL (1 µg/m^3).

The maximum NH_3 background concentration from APIS for 2020-22 is 2.047 µg/m^3, which already exceeds the CL of 1 µg/m^3, and therefore the NH_3 PEC is also predicted to be greater than 100% of the CL.

On this basis, adverse effects on the site from NH_3 cannot be completely ruled out, and it is recommended that further analysis be undertaken in the form of an Appropriate Assessment to refine areas in which there could potentially be adverse effects based on modelled concentrations and presence of relevant habitats and species.

Figure 4-1 Overview of screening results for the NH_3 PC, assuming a CL of 1 µg/m³



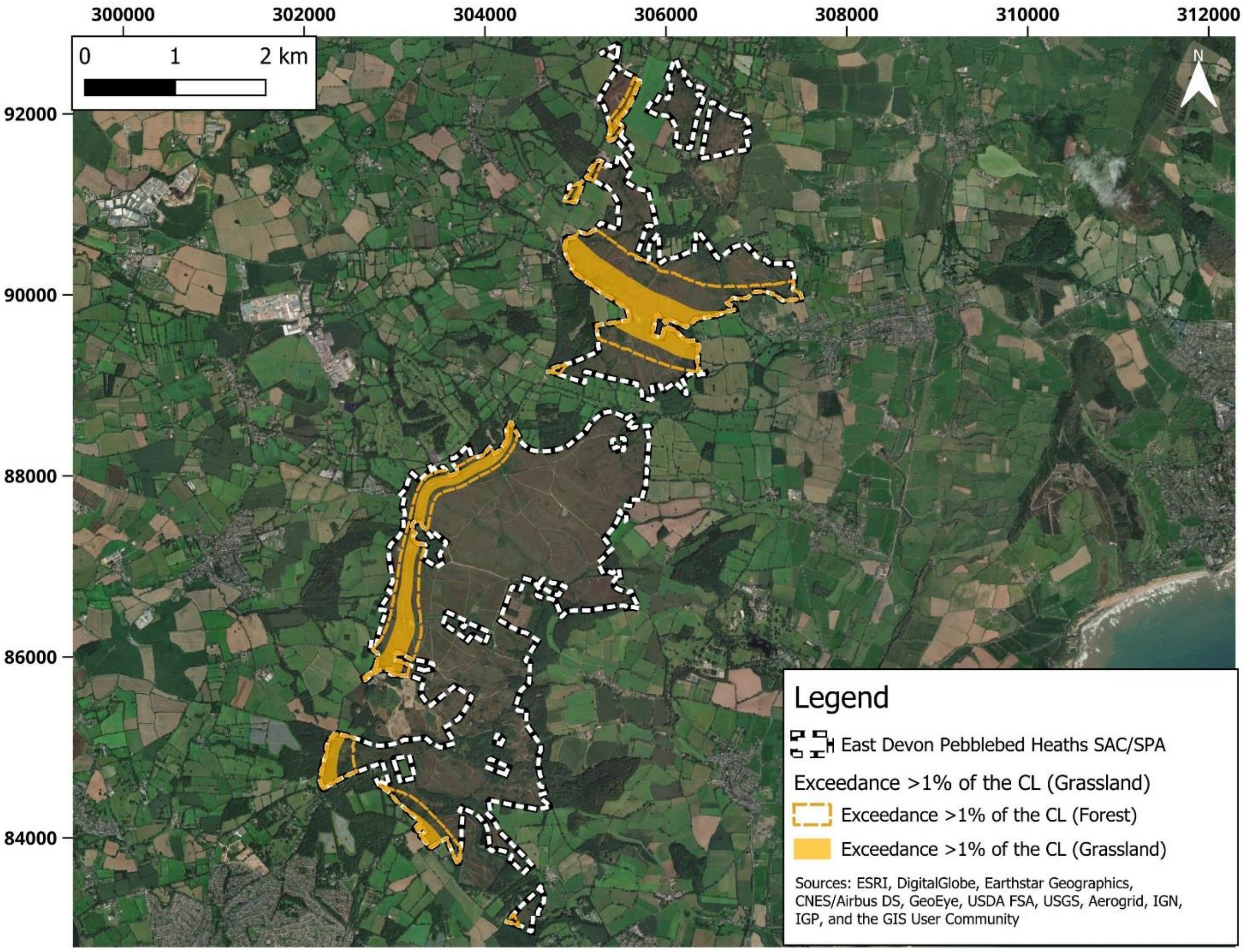
4.2.3 Nitrogen deposition

Figure 4-2 illustrates the areas where the modelled nitrogen deposition process contribution from the EDLP is predicted to exceed 1% of the CL (5 kgN/ha-year). The figure provides a comparison of deposition calculated using the deposition velocity factor for forest, and the factor for grassland.

The maximum background nitrogen deposition (2020-22) available from APIS is 15.8 kgN/ha-year for short vegetation and 28.9 kgN/ha-year for tall vegetation. Both of these background values are already well above the CL of 5 kgN/ha-year, and therefore the nitrogen deposition PEC is also predicted to be greater than 100% of the CL.

On this basis, adverse effects on the site from nitrogen deposition cannot be ruled out, and it is recommended that further analysis be undertaken in the form of an Appropriate Assessment to refine areas in which there could potentially be adverse effects based on modelled deposition rates and presence of relevant habitats and species.

Figure 4-2 Overview of screening results for nitrogen deposition PC, assuming a CL of 5 kgN/ha-year



4.2.4 Acid deposition

The most stringent CL for acid deposition on the EDPH designated site was 0.894 kEq/ha-year, for the species *Caprimulgus europaeus* (European nightjar). According to APIS, this CL is allocated for the "unmanaged broadleafed/coniferous woodland" habitat type. However, a value of 1.205 kEq/ha-year is also assigned to the *Caprimulgus europaeus* on APIS, under the habitat type "Dwarf shrub heath". Additionally, 1.205 kEq/ha-year is the acid deposition CL applicable for all other qualifying features under the site's SAC and SPA designation.

According to Natural England's Priority Habitats Inventory mapping[14], the EDPH site does include areas of deciduous woodland. However, breeding nightjar is more closely associated with lowland heath and forage in open grassland and moorland habitats[15]. There is evidence that the species will utilise recently felled or planted conifer plantations for breeding. Additionally, the Conservation Advice for the site states that "*They can be found throughout the site with their nesting habitat comprising predominantly low heath or grassland with small patches of dry, bare ground, sometimes around a young tree*"[16].

As a precautionary approach for the screening assessment, the exceedance areas for the modelled acid deposition process contribution from the EDLP were calculated against both CLs:

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[14] Natural England, Priority Habitats Inventory, May 2025. Available at: https://naturalengland-defra.opendata.arcgis.com/datasets/Defra::priority-habitats-inventory-england/about

[15] British Trust of Ornithology. Nightjar *Caprimulgus europaeus*. Retrieved from Nightjar | BTO

[16] Natural England (2019) European Site Conservation Objectives: Supplementary advice on conserving and restoring site features – East Devon Heaths SPA. UK9010121_East Devon Heaths_SPA_Published 10 Jul 2024

- Figure 4-3 illustrates the areas where the modelled acid deposition process contribution from the EDLP is predicted to exceed 1% of the unmanaged broadleafed/coniferous woodland CL (0.894 kEq/ha-year), assuming forest (tall vegetation) deposition rates. This would be considered the most conservative approach; and
- Figure 4-4 illustrates the areas where the modelled acid deposition process contribution from the EDLP is predicted to exceed 1% of the Dwarf shrub heath CL (1.205 kEq/ha-year), assuming moorland (short vegetation) deposition rates. This would be considered a less conservative, though likely a more realistic, approach.

The maximum background acid deposition (2020-22) available from APIS is 1.148 kgN/ha-year for short vegetation and 2.115 kgN/ha-year for tall vegetation.

Taking the most conservative approach of adding the background for tall vegetation (2.115 kgN/ha-year) to the PC modelled assuming a forest deposition rate (0.139 kEq/ha-year), and comparing this to the more stringent CL for woodland (0.894 kEq/ha-year) results in a PEC which is 252% of the CL.

Taking the less conservative approach of adding the background for short vegetation (1.148 kgN/ha-year) to the PC modelled assuming a grassland deposition rate (0.090 kgN/ha-year) and comparing this to the CL for heath (1.205 kEq/ha-year) results in a PEC which marginally exceeds the CL at 103% in very limited areas.

On this basis, adverse effects on the site from acid deposition cannot be ruled out, and it is recommended that further analysis be undertaken in the form of an Appropriate Assessment to refine areas in which there could potentially be adverse effects based on modelled deposition rates and presence of relevant habitats and species. It may be possible to exclude. If it is possible to use deposition rates and minimum critical load for heathland, this would enable the risk of impacts due to acid deposition to be screened out across most or all of the habitat site.

Figure 4-3 Overview of screening results for acid deposition PC, assuming a forest deposition rate and a CL of 0.894 kEq/ha-year

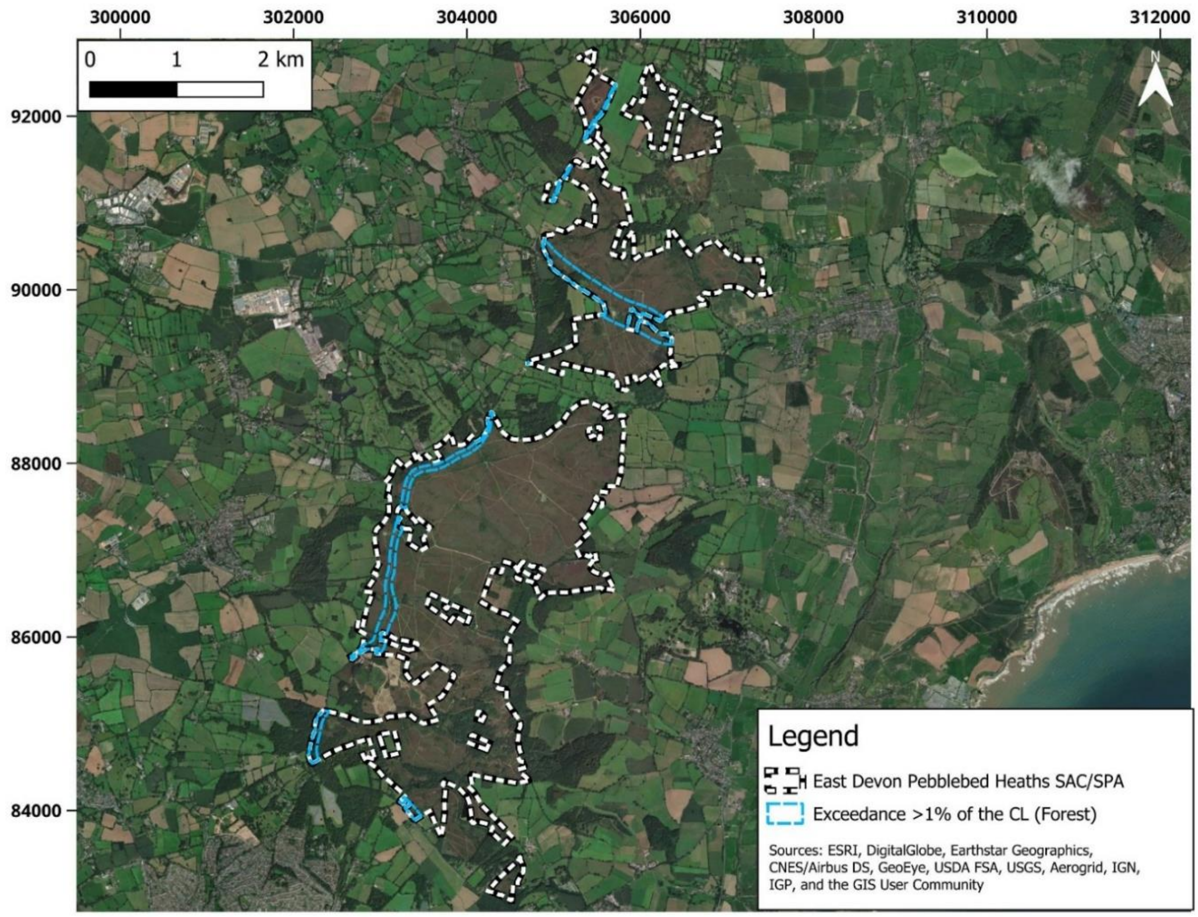
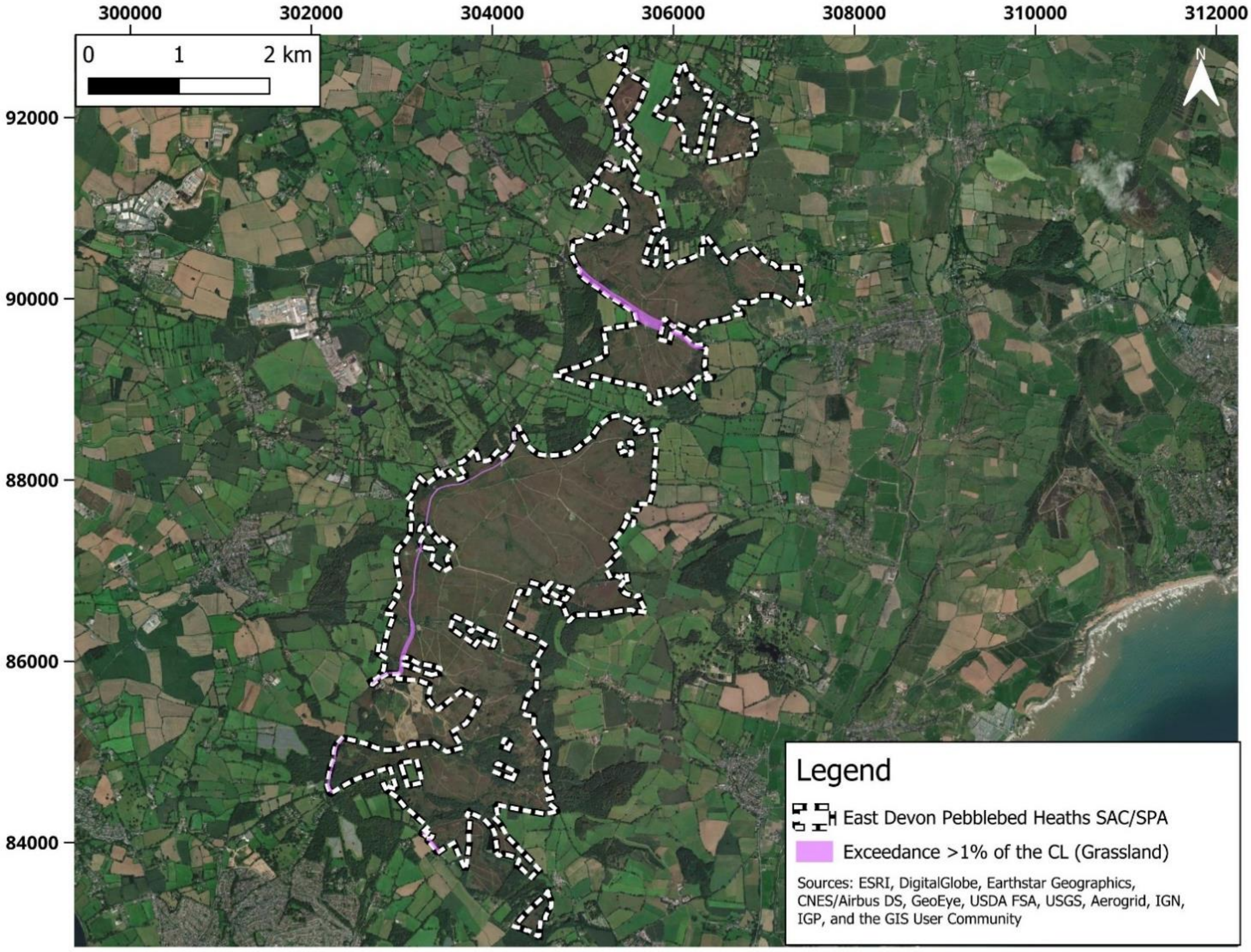


Figure 4-4 Overview of screening results for acid deposition PC, assuming a grassland deposition rate and a CL of 1.205 kEq/ha-year



4.2.5 Spatial analysis

The table below describes the features and SSSI units for which LSE can be ruled out. Supporting maps are available for each pollutant within Appendix B.

Table 4-3 Spatial screening for LSE on the East Devon Pebblebed Heaths SAC and SPA

Designation	Sensitive feature	Spatial analysis	Potential for LSE?
SAC	European dry heaths	This habitat is located throughout the site and is found in all SSSI Units. Several units are located outside the exceedance areas for all pollutants and can therefore be screened out: 002, 005, 012, 017, and 018.	**No** – SSSI units 002, 005, 012, 017, and 018. **Yes** – all other units
SAC	Northern Atlantic wet heaths with *Erica tetralix*	Lowland fens can be used as a proxy for this habitat type. According to Natural England's PHI mapping, it is solely located in SSSI units 011 and 017, entirely outside of the exceedance areas for all pollutants.	**No**
SAC	Southern damselfly *Coenagrion mercuriale*	The supporting habitat for this feature is wet heaths. Lowland fens can be used as a proxy for this habitat type. According to Natural England's PHI mapping, it is solely located in SSSI units 011 and 017, entirely outside of the exceedance areas for all pollutants.	**No**
SPA	European nightjar *Caprimulgus europaeus* (unmanaged broadleaved / coniferous woodland)	According to APIS, the feature itself is not sensitive to NH_3. However, there is potential for impacts on the supporting woodland habitat and therefore the supporting processes on which this feature relies.	**Yes**
SPA	European nightjar *Caprimulgus europaeus* (dwarf shrub heath)	According to APIS, the feature itself is not sensitive to NH_3. However, there is potential for impacts on the supporting heathland habitat and therefore the supporting processes on which this feature relies.	**No** – SSSI units 002, 005, 012, 017, and 018. **Yes** – all other units
SPA	Dartford warbler *Sylvia undata*	According to APIS, the feature itself is not sensitive to NH_3. However, there is potential for impacts on the supporting habitat and the supporting processes on which this feature relies.	**No** – SSSI units 002, 005, 012, 017, and 018. **Yes** – all other units

5. CONCLUSIONS AND RECOMMENDATIONS

This report has presented the updated dispersion modelling results of road traffic impacts from the EDLP 2020-42 on the EDPH SAC and SPA. Impacts from airborne NOx, airborne NH3, nitrogen deposition, and acid deposition were modelled across the entirety of the designated site. The results have been considered within the context of a HRA Stage 1 assessment against screening thresholds, and the below conclusions have been reached.

Review of background levels

- **Airborne NOx:** Although the maximum modelled PC exceeds the threshold of 1% of the applicable CL under the HRA Stage 1 screening assessment, preliminary considerations for the HRA Stage 2 Appropriate Assessment indicate that the maximum PEC does not exceed or approach the CL. It can therefore be concluded that no LSEs are anticipated (pre-mitigation) from the increased airborne NOx concentrations associated with the EDLP in isolation. No further attention was given to airborne NOx.
- **Airborne NH_3:** The maximum modelled PC exceeds the threshold of 1% of the applicable CL under the HRA Stage 1 screening assessment. Preliminary considerations for the HRA Stage 2 Appropriate Assessment indicate that the maximum background concentration already exceeds the CL, and therefore the PEC is also predicted to be greater than 100% of the CL. As a result, LSEs (pre-mitigation) from the increased airborne NH_3 concentrations associated with the EDLP in isolation cannot be ruled out.
- **Nitrogen deposition:** The maximum modelled PCs, for both forest and grassland deposition rates, exceed the threshold of 1% of the applicable CL under the HRA Stage 1 screening assessment. Preliminary considerations for the HRA Stage 2 Appropriate Assessment indicate that the maximum background values for both short and tall vegetation already exceed the CL, and therefore the PEC is also predicted to be greater than 100% of the CL. As a result, LSEs (pre-mitigation) from the increased nitrogen deposition associated with the EDLP in isolation cannot be ruled out.
- **Acid deposition:** Under the Stage 1 screening assessment, the maximum modelled PCs, for both forest and grassland deposition rates, exceed the threshold of 1% of the CL when compared to both potentially applicable CLs. Preliminary considerations for the HRA Stage 2 Appropriate Assessment indicate that, when the most conservative approach is taken, the PEC exceeds 100% of the more stringent CL for woodland. Taking the less conservative, but potentially more realistic approach, indicates that the PEC marginally exceeds 100% of the heathland CL in very limited areas of the site. On this basis, LSEs (pre-mitigation) from the increased acid deposition associated with the EDLP in isolation cannot be ruled out at this stage. Any measures taken to mitigate the potential impacts of airborne ammonia and nitrogen deposition would be expected to also effectively mitigate any impacts due to acid deposition.

Spatial analysis

LSE can be screened out for:

- Two of the site's five qualifying features (Northern Atlantic wet heaths with *Erica tetralix* and the Southern damselfly *Coenagrion mercuriale*) as they are located completely outside of the exceedance zones for all pollutants.
- LSE can be screened out for five of the site's sixteen SSSI units (002, 005, 012, 017, 018), as they are located completely outside of the exceedance zones for all pollutants.

In summary, for the EDLP in isolation and in-combination, any LSE from airborne NOx can be discounted for all qualifying features across the site. For the remaining pollutants, LSE can be completely discounted for some features and some areas of the site, however the potential for adverse impacts remains in some areas of the site, for European dry heaths, the European nightjar and the Dartford warbler.

A mitigation strategy ("*ED21793_East Devon Pebblebed Heaths_Mitigation Strategy_i1*") has been developed in parallel with and drawing on the outputs from the HRA Stage 1 screening undertaken in this technical report, focussing on the following features:

- European dry heaths
- European nightjar *Caprimulgus europaeus*
- Dartford warbler *Sylvia undata*

In the following areas of the site:

- North/South along the B3180, < 400 m from the road (SSSI units 1, 6, 7, 9, 10, 11, 14);
- East/West along the A3052 Exeter Road, < 600 m from the road (SSSI units 7,8);
- Bystock Nature Reserve & Withycombe Raleigh Common adjacent to B3179, < 300 m from the road (SSSI units 15, 16); and
- Dalditch Common, < 150 m from the road (SSSI unit 13).

The mitigation strategy report outlines the recommendations for next steps.

APPENDICES

APPENDIX A AIR QUALITY MODELLING METHODOLOGY

A.1 AIR QUALITY MODELLING SYSTEM

The RapidAIR Urban Air Quality Modelling Platform was used to predict air pollutant concentrations for this study. This is Ricardo Energy & Environment's proprietary modelling system developed for urban air pollution assessment.

RapidAIR has been developed to provide graphic and numerical outputs which are comparable with other models used widely in the United Kingdom. The model approach is based on loose-coupling of three elements:

- Road traffic emissions modelling conducted using fleet specific algorithms to prepare grams/kilometre/second (g km^{-1} s^{-1}) emission rates of NOx (via the Defra Emissions Factors Toolkit (EFT)[17]) and NH_3 (via RapidEMS, which incorporates emissions factors from the Calculator for Road Emissions of Ammonia (CREAM)[18]).
- Convolution of an emissions grid with dispersion kernels derived from the USEPA AERMOD[19] model, at resolutions ranging from 1 m to 20 m. AERMOD provides the algorithms which govern the dispersion of the emissions and is an accepted international model for road traffic studies.
- Running the kernel-based RapidAIR model and using GIS software to prepare dispersion fields of concentration for further analysis via a set of Python/arcpy decision-support tools coded by Ricardo.

RapidAIR includes an automated meteorological processor based on AERMET which obtains and processes meteorological data of a format suitable for use in AERMOD. Surface meteorological data is obtained from the NOAA online repository[20] and upper air data is downloaded from the NOAA Radiosonde database.[21]

The model produces high resolution concentration fields at the city scale (down to a 1 m scale) so is ideal for spatially detailed compliance modelling. The combination of an internationally recognised model code and careful parameterisation matching international best practice makes RapidAIR ideal for this study. A validation study has been conducted in London using the same datasets as the 2011 Defra air quality model inter-comparison study.[22] Using the LAEI (London Atmospheric Emissions Inventory) 2008 data and the measurements for the same time period the model performance is consistent (and across some metrics performs better) than other modelling solutions currently in use in the UK.[23] This validation study has been published in *Environmental Modelling and Software*, in partnership with the University of Strathclyde.[24]

A.2 MODEL DOMAIN

Dispersion modelling was carried out to forecast levels of air pollutants at a 3m x 3m grid resolution across the entire East Devon Pebblebed Heaths designated site. A grid height of 1.5m was modelled. Dispersion modelling was carried out for three scenarios which are summarised in Table A 1

The required data was then extracted from the grid results to provide a detailed evaluation of air quality impacts at locations within the designated site.

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[17] Defra Emissions Factors Toolkit v13.1, available at https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/

[18] Air Quality Consultants, Calculator for Road Emissions of Ammonia (CREAM) v2, available at https://www.aqconsultants.co.uk/resources

[19] https://www3.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod

[20] ftp://ftp.ncdc.noaa.gov/pub/data/noaa

[21] https://www.esrl.noaa.gov/roabs/

[22] https://uk-air.defra.gov.uk/research/air-quality-modelling?view=intercomparison

[23] The 2008 LAEI dataset was used in this context as a benchmarking study, to compare the performance of RapidAIR to other modelling systems. The 2008 LAEI dataset was not used as an input in the current modelling study.

[24] Masey, Nicola, Scott Hamilton, and Iain J. Beverland. "Development and evaluation of the RapidAIR® dispersion model, including the use of geospatial surrogates to represent street canyon effects." *Environmental Modelling & Software* (2018). DOI: https://doi.org/10.1016/j.envsoft.2018.05.014

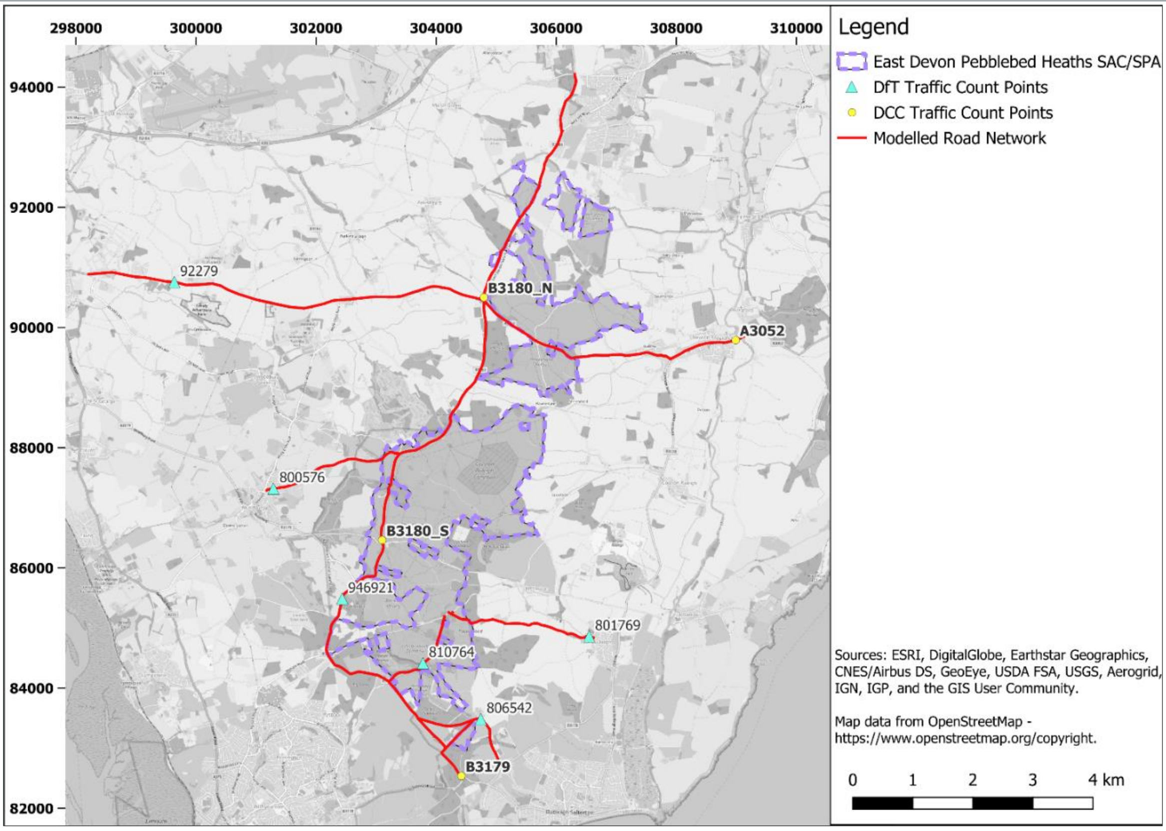
Table A 1 List of modelling scenarios carried out

Scenario	Description
2022 Base Year	This scenario was designed to replicate 2022 traffic conditions within the study area in order to verify the performance of the air dispersion model.
2042 Future Base	This scenario assumed background traffic growth in line with DfT's TEMPRO software (v8.0). Additionally, it included all known current development and infrastructure, as well as all committed development and infrastructure, up to 2042. Development associated with the EDLP was excluded from this scenario. This was a hypothetical scenario against which to test the impacts of the EDLP, as it assumes there will be no development within the district up to 2042 other than at sites which already have planning permission.
2042 Future Year with Local Plan	This scenario is equivalent to the '2042 Future Base' scenario, with the addition of development proposed in the EDLP. A comparison of both scenarios made it possible to assess any impacts attributable to the EDLP in isolation.

A.3 TRAFFIC ACTIVITY DATA

Annual average daily traffic (AADT) vehicle numbers and average vehicle speeds were provided by Devon County Council for four discrete count points on the following roads: A3052, B3179, B3180_N and B3180_S. AADT was provided for all three scenarios, with the exception of B3179, for which only the Local Plan contribution data was available. The 2022 baseline data for B3179 was supplemented with AADT from a representative DfT count point (see section A.4) and scaled to 2042 to represent the 2042 baseline using the TEMPRO 2022 to 2042 scaling factor provided by the Council. Figure A 1 shows the locations of the DCC and supplementary DfT traffic count point locations with respect to the modelled road network.

Figure A 1 Modelled road links and traffic count points



A.4 SUPPLEMENTARY TRAFFIC DATA FOR AIR QUALITY MODELLING

Supplementary AADT and fleet composition data (vehicle type flows) were taken from representative DfT count points. Where available, 2022 AADT and vehicle class flows were used, however, for some count points, the latest available data was for 2019. DfT's TEMPRO software (v8.0) was used to determine a localised AADT scaling factor for 2019 to 2022, and the resulting factor (0.9364) was applied to the 2019 AADT.

All 2022 AADT from the DfT count points was scaled to 2042 using the same TEMPRO 2022 to 2042 scaling factor provided by the Council, that was used for the DCC count points.

A.5 TRAFFIC SPEED DATA

Speed data was provided from the Council in road shapefile format, and a sense-check completed to ensure there were no unrealistic road speeds. In the case of some links with missing speed data, these were gap-filled by using the speed from the adjacent link. Additionally, there was a section of the A3052 to the east of the model domain which was missing speed data. This was a longer section of road where the speed limit changed to 30mph, so for this road it was not considered appropriate to gap-fill with the speed from the adjacent link. This road was surveyed in Google Street view, and it was considered appropriate to use the national average speed for rural classified local A roads (33.4mph)[25].

A.6 FLEET COMPOSITION

DfT count point data was used to determine fleet composition breakdown into cars, light goods vehicles (LGVs), heavy goods vehicles (HGVs) and buses. NAEI (National Atmospheric Emissions Inventory) fleet split information was then applied to further split cars and LGVs into electric, petrol and diesel categories, based on national average fleet composition information for rural roads for 2022, and for 2042 for the future year scenarios.

For 2042, DfT fleet compositions were scaled according to factors calculated from national rural fleet compositions in 2022 and 2042, as provided in the NAEI fleet projections for those years (base year 2022, published July 2022).[26] This ensured that the 2042 scenarios captured predicted increases in proportions of electric cars and electric LGVs in the fleet.

DfT vehicle flows were normalised according to the percentage light and heavy flow provided in the DCC traffic data for road links represented by the A3052, B3180_N and B3180_S count points.

A.7 EMISSION FACTORS

Vehicle emission factors were obtained for NOx from Defra's Emissions Factors Toolkit (EFT)[17] and for NH_3 via RapidEMS. RapidEMS incorporates emissions factors from the Calculator for Road Emissions of Ammonia (CREAM)[18] and links directly to Ricardo's RapidAIR dispersion modelling system.

The input for RapidEMS consists of a basic fleet split based on vehicle categories (diesel cars, petrol cars, LGVs, articulated HGVs, rigid HGVs, and buses) according to the traffic activity information specified in Section A.6. RapidEMS is used to provide a more detailed parameterization of vehicle fleets in 2042 including all vehicles up to and including Euro 6/VI.

A.8 METEOROLOGICAL DATA

RapidAIR includes an automated meteorological processor based on AERMET which obtains and processes meteorological data of a format suitable for use in AERMOD. Surface meteorological data is obtained from the

[25] Department for Transport, "Accredited official statistics – Travel time measures for local 'A' roads January to December 2023 report", https://www.gov.uk/government/statistics/travel-time-measures-for-the-strategic-road-network-and-local-a-roads-january-to-december-2023/travel-time-measures-for-local-a-roads-january-to-december-2023-report#urbanrural-split, accessed 03/07/2025.

[26] National Atmospheric Emissions Inventory, "Emission factors for transport", http://naei.beis.gov.uk/data/ef-transport , accessed 26/06/2025.

NOAA online repository[27] and upper air data is downloaded from the NOAA Radiosonde database[28]. Meteorological data for 2022 was used in order to enable the model validation for this study.

For this study, 2022 surface meteorological data was obtained from three stations (Exeter, Dunkeswell Aerodrome and Liscombe, in that priority order) and upper air meteorological data was obtained from two stations (Cornwall and East Sussex). RapidMET was used to carry out data filling where necessary according to the methodology provided by the USEPA in their “Meteorological Monitoring Guidance for Regulatory Modelling Applications” guidance document[29]. Data gaps from the primary meteorological station (Exeter and Cornwall) are first filled using data from the other nearby stations (Dunkeswell Aerodrome then Liscombe for the surface station and East Sussex for the upper air station).

A.9 REFERENCE YEAR MODELLING AND MODEL VERIFICATION

This section provides a summary of the model verification process and the derivation of linear adjustment factors to improve model performance.

Verification of the model involves comparison of the modelled results with any local monitoring data at relevant locations; this helps to identify how the model is performing and if any adjustments should be applied. The verification process involves checking and refining the model input data with the aim of reducing uncertainties and produce model outputs that are in better agreement with the monitoring results. This can be followed by adjustment of the modelled results if required to reproduce measured levels as accurately as possible. The relevant procedures are set out in Defra’s LAQM.TG(22) guidance.[30] This recommends making the adjustment to the road contribution of the pollutant only and not the background concentration these are combined with.

A.9.1 Oxides of nitrogen (NOx) and nitrogen dioxide (NO_2) model verification and adjustment

The approach outlined in Chapter 4 of LAQM.TG(22) has been used in this case. To verify the model, the predicted annual mean Road NOx concentrations were compared with concentrations measured at the various monitoring sites during 2022.

Prior to conducting the model verification, a review of the monitoring site available from EDDC’s 2023 Annual Status Report (ASR)[31] was conducted to define the monitoring sites relevant to include within the verification. Six NO_2 diffusion tube monitoring sites located on the modelled road network (adjacent to the A3052) with 2022 annual mean NO_2 concentrations available were used in the model verification.

The modelled vs measured concentrations at each of the monitoring locations were compared. Refinements were subsequently made to the model inputs to improve model performance where possible, and a linear **adjustment factor of 2.5195** was calculated for the road emissions component of the NOx model.

Total NOx was calculated as the sum of the adjusted NOx road contribution from RapidAIR and the Defra base year 2021 background maps for 2022 (with primary, trunk and motorway sources removed from the background map). Total NO_2 concentrations at specified receptors were obtained from background and adjusted road NOx concentrations using the latest version of the NOx to NO_2 calculator provided by Defra (v9.1). Where annual NO_2 concentration maps were required, total NO_2 was derived using the following equation:

$$(NO_2 \text{ in } \mu g/m^3) = -0.0016(NOx \text{ in } \mu g/m^3)^2 + 0.5204(NOx \text{ in } \mu g/m^3) + 1.3638$$

A plot comparing modelled and monitored total NO_2 concentrations during 2022 is presented in Figure A 2.

[27] ftp://ftp.ncdc.noaa.gov/pub/data/noaa

[28] https://www.esrl.noaa.gov/roabs/

[29] United States Environmental Protection Agency, “Meteorological Monitoring Guidance for Regulatory Modelling Applications” available via https://www3.epa.gov/scram001/guidance/met/mmgrma.pdf , accessed June 2019.

[30] Defra, LAQM.TG(22), May 2025. Available at: https://laqm.defra.gov.uk/air-quality/featured/uk-regions-exc-london-technical-guidance/

[31] East Devon District Council Annual Status Report 2023. Available at: https://eastdevon.gov.uk/environmental-health-and-wellbeing/land-air-and-water-pollution/air-quality/air-quality-in-east-devon/

To evaluate model performance and uncertainty, the Root Mean Square Error (RMSE) for the observed vs predicted NO_2 annual mean concentrations was calculated, as detailed in Technical Guidance LAQM.TG(22). This guidance indicates that an RMSE of up to 4 µg/m^3 is ideal, and an RMSE of up to 10 µg/m^3 is acceptable. The calculated RMSE is presented in Table A 2. In this case the RMSE was calculated at 4.1916 µg/m^3.

Figure A 2 Predicted annual average NO_2 concentrations against measured concentrations at monitoring locations. The 10% and 25% confidence intervals are also plotted.

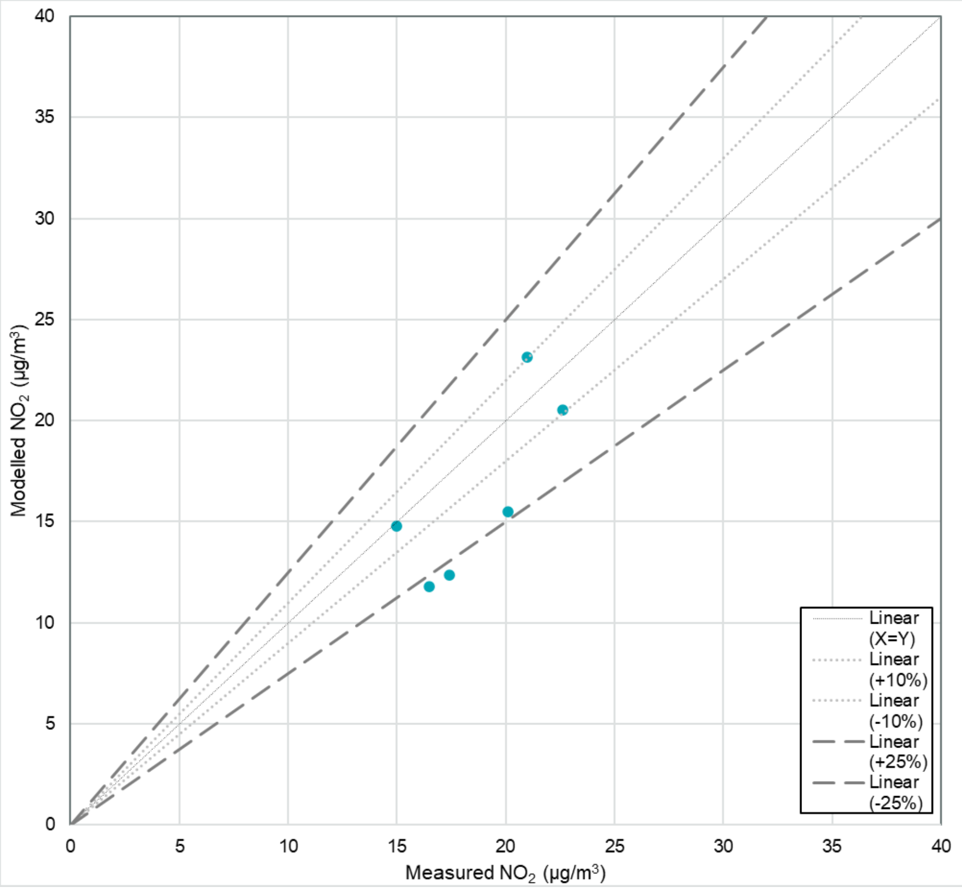


Table A 2 Modelled and measured NO_2 concentrations for the 2022 reference year and calculated RMSE value

Site ID	Measured NO_2 2022 (µg/m^3)	Total Modelled NO_2 (µg/m^3)	Difference (µg/m^3)
N72	15.0	13.9	-1.1
N84	16.5	11.1	-5.4
N64_GP	17.4	11.7	-5.7
N65	22.6	19.2	-3.4
N82	21.0	21.7	0.7
N83	20.1	14.6	-5.5
		RMSE	**4.1916**

A.9.2 Ammonia (NH_3) model verification and adjustment

The "Development of CREAM Emissions Model Version 2" documentation[32] states that "CREAM V2 has been calibrated against ambient measurements using predictions made with ADMS-Roads. In most cases, this negates the requirement to verify model outputs against local measurements (although in those cases where

[32] Air Quality Consultants, February 2025, Development of CREAM Emissions Model Version 2. Available at: https://www.aqconsultants.co.uk/resources

roadside NH_3 measurements are available, local verification may still be helpful". There are no monitoring locations for NH_3 located within the study area, and therefore no further adjustment to the modelled concentrations for NH_3 were made.

A.10 FUTURE SCENARIO MODELLING

A.10.1 Airborne pollutant concentrations

For the two future scenarios, RapidAIR was used to generate pollutant concentration maps across the entire designated site at a 3m x 3m resolution. These maps were generated using transport model traffic activity data from the appropriate future scenario, emission factors calculated using the EFT and RapidEMS, and 2022 meteorological data.

Pollutant concentration maps for road-only contributions (NOx, NO_2, and NH_3) were calculated using the adjustment factor described in Section A.9. Maps for total pollutant concentrations (NOx and NO_2) were calculated by adding the road-only concentration maps to the appropriate pollutant background map from the LAQM website. As the Defra base year 2021 background maps don't extend beyond 2040, 2040 background maps were used for the future modelling year of 2042 (with primary, trunk and motorway sources removed from the background map).

A.10.2 Pollutant deposition

Dry deposition rates of nutrient nitrogen and acid were calculated by multiplying the 1.5 m height level air concentration of the appropriate pollutants by the appropriate deposition velocity, followed by multiplication with a conversion factor.

Deposition velocities and conversion factors were obtained from Environment Agency guidance,[33] and are provided in the tables below.

Table A 3 Deposition velocities for NO_2 and NH_3

Pollutant	Vegetation type	Deposition velocity (m/s)
NO_2	Grassland (sites with short vegetation)	0.0015
	Woodland (sites with tall vegetation)	0.003
NH_3	Grassland (sites with short vegetation)	0.02
	Woodland (sites with tall vegetation)	0.03

Table A 4 Dry deposition conversion factors

Pollutant	Conversion factor for nitrogen deposition (from µg/m²-s to kgN/ha-year)	Conversion factor for acid deposition (from µg/m²-s to kEq/ha-year)
NO_2	95.9	6.84
NH_3	260	18.5

A.10.3 Model years and considerations

This study assesses air pollution concentrations across the study area for a future scenario in 2042. It is therefore important to consider the model results for future scenarios in the context of emerging trends in emissions.

Total emissions of NOx in the UK decreased by 79 % between 1990 and 2023. This was primarily caused by a decline in coal use and modernisation of the road transport fleet. Road transport contributed 30 % of NOx

[33] Environment Agency, "AQTAG06: Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air," March 2014

emissions in 2023. Due to the replacement of older vehicles in the fleet with those that meet stricter emissions standards, and the more recent uptake of electric vehicles, annual emissions from road transport decreased by 70 % between 2005 and 2023[34]. I can therefore be considered appropriate to base future decisions on further anticipated reductions in baseline NOx concentrations with a high degree of confidence, as these are based on firm policy commitments, are technically achievable, and are already being observed in practice.

Total emissions of NH_3 decreased by 14% between 1990 and 2023. As the primary contributor, agriculture made up 87 % of NH_3 emissions in 2023, with a slight increase observed since 2010. Contributions from road transport have steadily decreased since 2000, with the introduction of new vehicle emission standards and uptake of electric vehicles as also mentioned above. Road transport contributed 2 % of NH3 emissions in 2023 compared with 7 % in 2002[35].

A.11 SOURCES OF MODEL UNCERTAINTY

There are a number of sources of model uncertainty inherent in this type of study, as discussed below:

- Uncertainties in the amount and distribution of development accounted for in the transport modelling. Household projections are revised from time to time and may vary from the values included in the transport model. Additionally, the transport model accounts for development growth and associated increases in background traffic within the core and buffer regions of the model. However, there will also be future development in the ‘external’ region which has not been included explicitly in the transport model.
- The amount and distribution of development described in the EDLP will be subject to refinement as individual local plans are developed in further detail.
- Uncertainties introduced by the need to extend the transport model data to cover the full area of potential concern.
    - Uncertainties in the traffic model outputs on modelled road links, with regards to number of vehicles, type of vehicles and vehicle speed. These include uncertainties in calculating the number of EVs in the fleet in both the 2022 and 2042 fleets, and using national NAEI projections for EVs rather than localised data.
    - Uncertainties in predicting baseline traffic activity data for 2022 using supplementary DfT traffic flow counts for 2019 which were scaled to 2022 using a TEMPRO scaling factor.
    - Uncertainties in predicting baseline traffic activity data for 2042, using a TEMPRO scaling factor to scale the 2022 data.
- Uncertainties in the real-world emissions from Euro 6/VI vehicles. Early real-world emission test results of Euro 6 vehicles indicate mixed results, ranging from vehicles which met the Euro 6 standards under real-world driving emissions to vehicles which displayed NOx emissions up to 12 times higher than the Euro 6 standard.[36,37] However, the increasing use of real-world emissions tests is likely to intensify pressure on vehicle manufacturers to comply with more stringent Euro standards. If real-world emissions do not decrease as anticipated, East Devon may wish to review the current study in the context of updated emission parameters at some point in the future.
- Uncertainties in the background maps used to develop model adjustment factors and predict total modelled concentrations, with regards to other sources of pollution, such as industrial sources, domestic heating, port activity and forest fires.
- Uncertainties resulting from the lack of monitoring data for ammonia (NH_3). We have adopted a conservative approach in our analysis by using the NOx model adjustment factors we derived. This is

[34] Defra, Trends in total annual emissions of nitrogen oxides in the UK, 1990 to 2023 (accessed August 2025). Available at: https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-nitrogen-oxides-nox#trends-in-total-annual-emissions-of-nitrogen-oxides-in-the-uk-1990-to-2023

[35] Defra, Trends in total annual emissions of ammonia in the UK, 1990 to 2023 (accessed August 2025). Available at: https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-ammonia-nh3#trends-in-total-annual-emissions-of-ammonia-in-the-uk-1990-to-2023

[36] The Real Urban Emissions Initiative, https://www.trueinitiative.org/.

[37] Emissions Analytics, EQUA Index, https://equaindex.com/equa-air-quality-index/.

expected to result in an over-prediction of the impacts associated with NH_3, including airborne NH_3 concentrations, nitrogen deposition and acid deposition. The incorporation of monitoring data for NH_3 would result in a more robust model.

- Uncertainties in the dispersion modelling process. These are accounted for so far as possible through the model verification process, but there inevitably remain some differences between modelled concentrations and the levels that would be measured in practice.

The use of a robust model verification process and adoption of a conservative approach is designed to take account of these uncertainties, ensuring that air quality impacts are more likely to be over-estimated than under-estimated.

APPENDIX B DETAILED MAPS OF EXCEEDANCE AREAS

Figure B 1 EDPH North: Detailed screening results for the NH_3 PC, assuming a CL of 1 µg/m[3]

Figure B 2 EDPH South: Detailed screening results for the NH_3 PC, assuming a CL of 1 µg/m^3

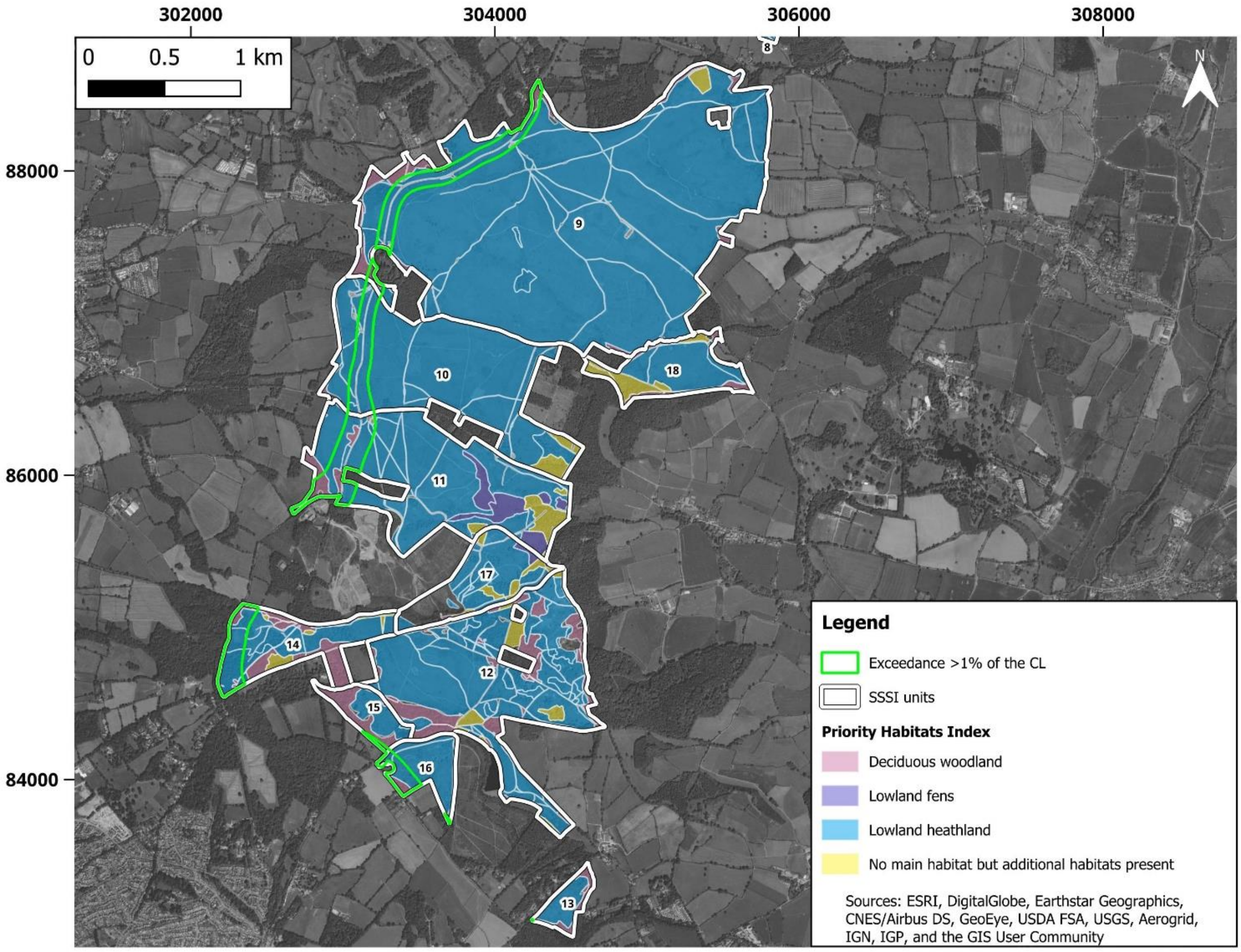


Figure B 3 EDPH North: Detailed screening results for nitrogen deposition PC, assuming a CL of 5 kgN/ha-year

Figure B 4 EDPH South: Detailed screening results for nitrogen deposition PC, assuming a CL of 5 kgN/ha-year

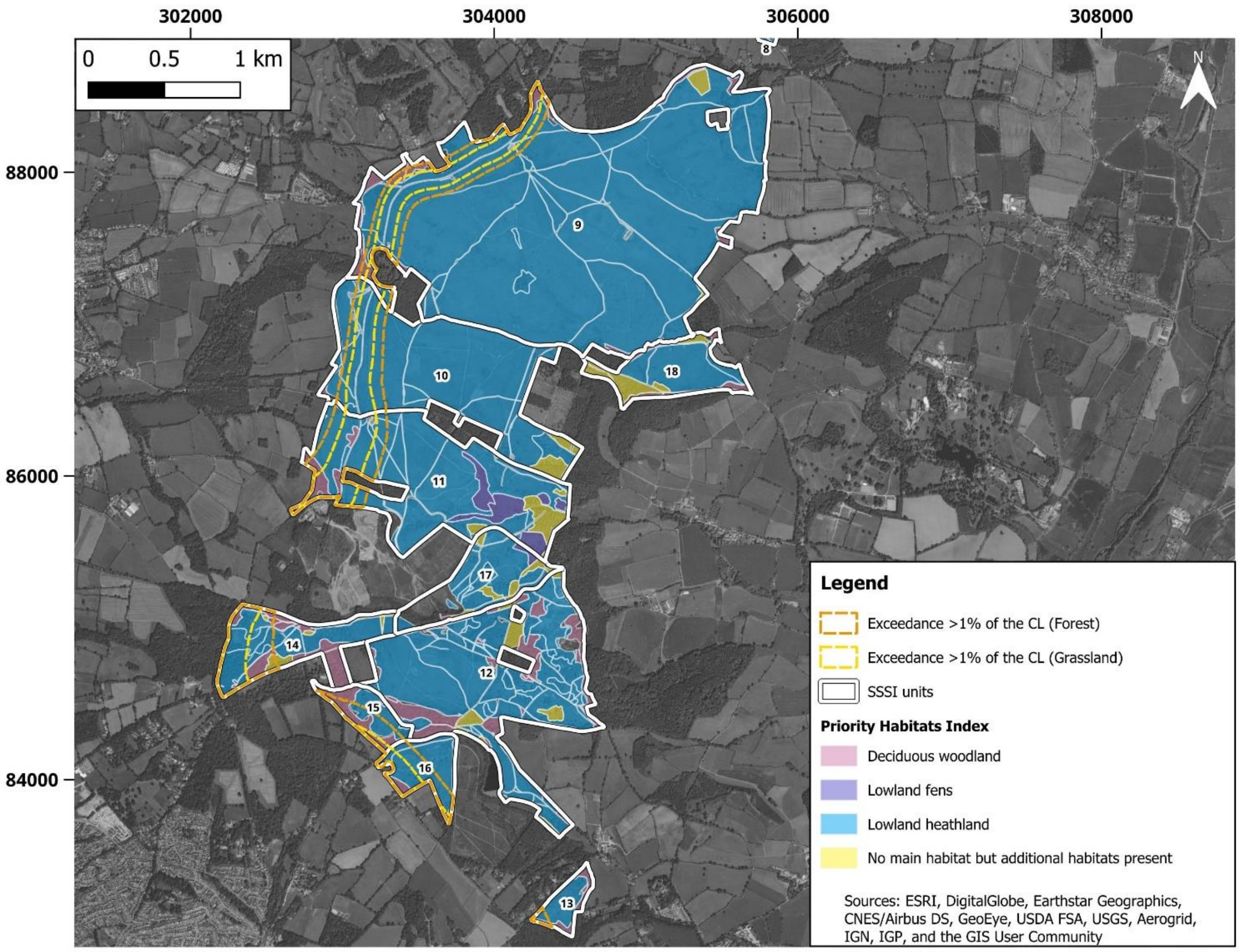
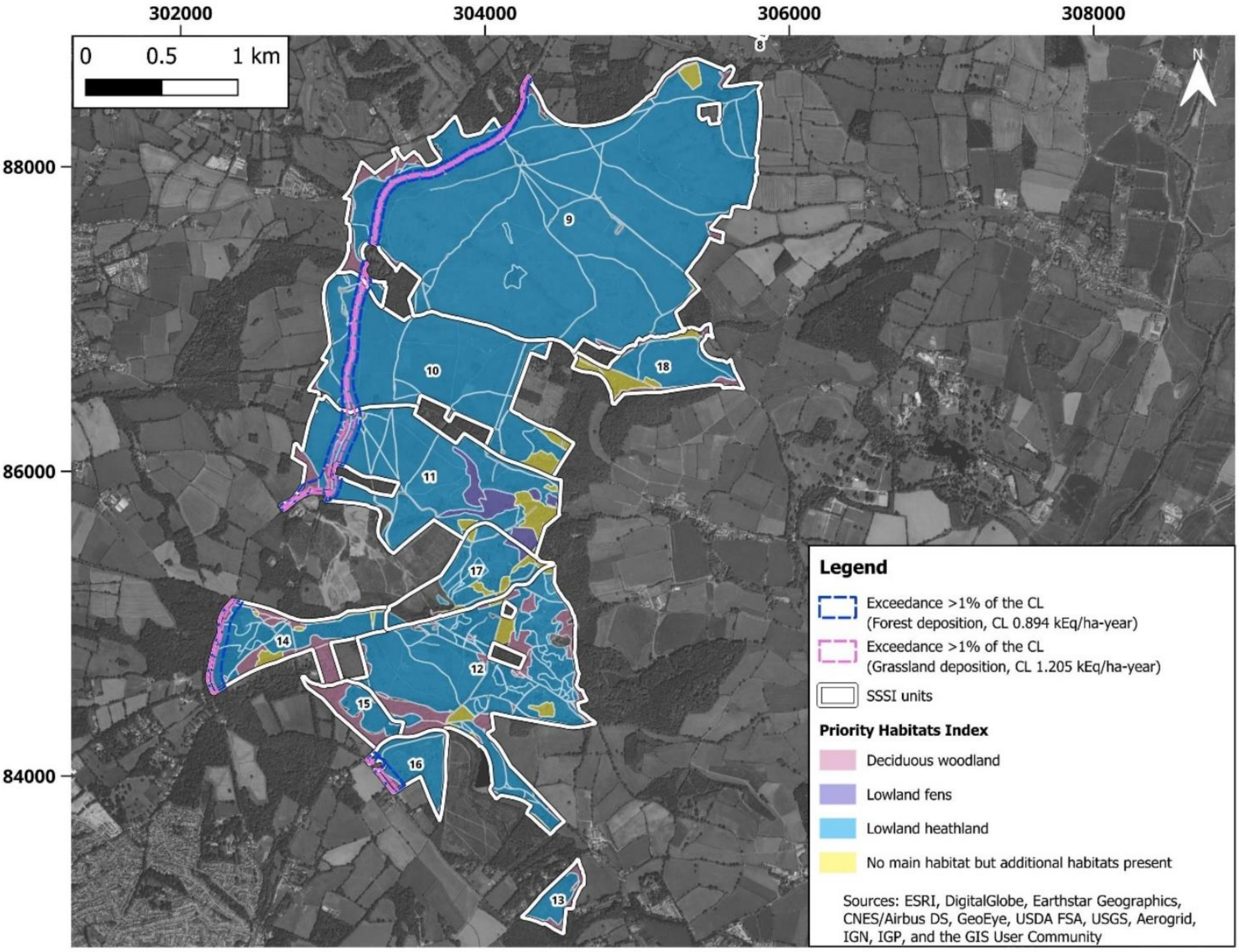


Figure B 5 EDPH North: Detailed screening results for acid deposition PC

Figure B 6 EDPH South: Detailed screening results for acid deposition PC



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