

Report

Bradford Local Plan

## **Air Quality Modelling for Habitats Regulations Assessment**

For City of Bradford Metropolitan District Council

23 September 2026

## Document Control

|                           |                                                           |
|---------------------------|-----------------------------------------------------------|
| <b>Project Title:</b>     | Bradford Local Plan                                       |
| <b>Project Number:</b>    | 17776A-10                                                 |
| <b>Client:</b>            | City of Bradford Metropolitan District Council            |
| <b>Principal Contact:</b> | Stephen Hay                                               |
| <b>Document Title:</b>    | Air Quality Modelling for Habitats Regulations Assessment |
| <b>Document Number:</b>   | 17776A-10-R02-01                                          |
| <b>Prepared By:</b>       | Sam Murphy                                                |
| <b>Reviewed By:</b>       | Ben Marner                                                |

## Revision History

01 23/09/2026



Logika Group is a trading name of Air Quality Consultants Limited (Companies House Registration No: 02814570), Noise Consultants Limited (Companies House Registration No: 10853764) and Logika Consultants Limited (Companies House Registration No: 12381912).

This document has been prepared based on the information provided by the client. Air Quality Consultants Ltd, Noise Consultants Ltd or Logika Consultants Ltd do not accept liability for any changes that may be required due to omissions in this information. Unless otherwise agreed, this document and all other Intellectual Property Rights remain the property of Air Quality Consultants Ltd, Noise Consultants Ltd and/or Logika Consultants Ltd. When issued in electronic format, Air Quality Consultants Ltd, Noise Consultants Ltd or Logika Consultants Ltd do not accept any responsibility for any unauthorised changes made by others.

The Logika Group all operate a formal Quality Management System, which is certified to ISO 9001:2015, a formal Environmental Management System, certified to ISO 14001:2015, and an IT system certified to Cyber Essentials Plus.

When printed by any of the three companies, this report will be on Evolve Office, 100% Recycled paper.

Registered Office: 3rd Floor St Augustine's Court, 1 St. Augustine's Place, Bristol, BS1 4UD Tel: +44(0)117 974 1086

First Floor, 3 – 7 Herbal Hill, London, EC1R 5EJ Tel: +44(0)20 3873 4780

First Floor, Patten House, Moulders Lane, Warrington, WA1 2BA Tel: +44(0)1925 937 195

Nile House, Nile St, Brighton and Hove, Brighton, BN1 1HW Tel: +44(0)20 3873 4780

1 Aire St, Leeds, LS1 4PR Tel: +44(0)20 3873 4780

Avenue du Port, 86c Box 204, 1000 Bruxelles Tel: +44(0)20 3873 4780

## Contents

|    |                          |    |
|----|--------------------------|----|
| 1  | Introduction             | 1  |
| 2  | Assessment Criteria      | 3  |
| 3  | Methodology              | 6  |
| 4  | Dispersion Model Results | 18 |
| 5  | Isopleths                | 28 |
| 6  | References               | 58 |
| 7  | Glossary                 | 60 |
| 8  | Appendices               | 62 |
| A1 | Professional Experience  | 63 |
| A2 | Modelling Methodology    | 64 |
| A3 | Retardation              | 84 |

## Tables

|                                                                                                                                               |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----|
| Table 1: Vegetation and Ecosystem CLes <sup>a</sup>                                                                                           | 4  |
| Table 2: Vegetation and Ecosystem CLos                                                                                                        | 4  |
| Table 3: Summary of Annual Mean NH <sub>3</sub> Monitoring in 2023 (µg/m <sup>3</sup> )                                                       | 9  |
| Table 4: Model Results for Annual Mean NO <sub>x</sub>                                                                                        | 19 |
| Table 5: Model Results for Annual Mean NH <sub>3</sub>                                                                                        | 20 |
| Table 6: Model Results for Nitrogen Deposition                                                                                                | 22 |
| Table 7: Model Results for Acid Deposition                                                                                                    | 24 |
| Table 8: Summary of Air Quality Predictions                                                                                                   | 27 |
| Table A2-1: Summary of Model Inputs                                                                                                           | 64 |
| Table A2-2: Summary of Traffic Data used in the Assessment                                                                                    | 65 |
| Table A2-3: Deposition Velocities Used in This Assessment                                                                                     | 82 |
| Table A2-4: Species Included in Acid Deposition Calculations                                                                                  | 83 |
| Table A3-1: Reduction in Nitrogen Deposition between 2023 and 2043 the Worst-case Transect in Each Designated Site, in kgN/ha/yr <sup>a</sup> | 84 |
| Table A3-2: Years Delay to Reductions in Nitrogen Deposition at the Worst-case Transect in Each Designated Site, in kgN/ha/yr                 | 94 |

## Figures

|                                                                                                       |    |
|-------------------------------------------------------------------------------------------------------|----|
| Figure 1: Designated Sites Included in this Assessment                                                | 1  |
| Figure 2: Study area                                                                                  | 7  |
| Figure 3: Monitoring Locations                                                                        | 9  |
| Figure 4: Receptor Transect Locations – North Pennine Moors                                           | 11 |
| Figure 5: Receptor Transect Locations – South Pennine Moors at Ilkley Moor                            | 12 |
| Figure 6: Receptor Transect Locations – South Pennine Moors (northern section of study area)          | 13 |
| Figure 7: Receptor Transect Locations – South Pennine Moors (eastern section of study area)           | 14 |
| Figure 8: Receptor Transect Locations – South Pennine Moors (southern section of study area)          | 15 |
| Figure 9: Receptor Transect Locations – South Pennine Moors (western section of study area)           | 16 |
| Figure 10: Areas Exceeding 1% of CLe In-Combination in North Pennine Moors                            | 28 |
| Figure 11: Areas Exceeding 1% of CLe In-Isolation in South Pennine Moors at Ilkley Moor               | 29 |
| Figure 12: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors at Ilkley Moor             | 30 |
| Figure 13: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (eastern area)             | 31 |
| Figure 14: Areas Exceeding 1% of CLe In-Isolation in South Pennine Moors (northern area)              | 32 |
| Figure 15: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (northern area)            | 33 |
| Figure 16: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (southern area)            | 34 |
| Figure 17: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (western area)             | 35 |
| Figure 18: Areas Exceeding 1% of CLo In-Combination in North Pennine Moors                            | 36 |
| Figure 19: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors at Ilkley Moor               | 37 |
| Figure 20: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors at Ilkley Moor             | 38 |
| Figure 21: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (eastern area)             | 39 |
| Figure 22: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors (northern area)              | 40 |
| Figure 23: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (northern area)            | 41 |
| Figure 24: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (southern area)            | 42 |
| Figure 25: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (western area)             | 43 |
| Figure 26: Areas Exceeding 1% of CLo In-Combination in North Pennine Moors                            | 44 |
| Figure 27: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors at Ilkley Moor at the SAC    | 45 |
| Figure 28: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors at Ilkley Moor at the SAC  | 46 |
| Figure 29: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (eastern area) at the SAC  | 47 |
| Figure 30: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (northern area) at the SAC | 48 |
| Figure 31: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (southern area) at the SAC | 49 |

|                                                                                                               |    |
|---------------------------------------------------------------------------------------------------------------|----|
| Figure 32: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (western area) at the SAC          | 50 |
| Figure 33: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors at Ilkley Moor at the Phase 2 SPA    | 51 |
| Figure 34: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors at Ilkley Moor at the Phase 2 SPA  | 52 |
| Figure 35: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (eastern area) at the Phase 2 SPA  | 53 |
| Figure 36: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors (northern area) at the Phase 2 SPA   | 54 |
| Figure 37: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (northern area) at the Phase 2 SPA | 55 |
| Figure 38: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (southern area) at the Phase 2 SPA | 56 |
| Figure 39: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (western area) at the Phase 2 SPA  | 57 |

# 1 Introduction

- 1.1 This report has been prepared by Air Quality Consultants Ltd | Part of Logika Group (AQC). It describes the air quality modelling methodology and results to inform the Habitats Regulations Assessment (HRA) of the Bradford Local Plan.
- 1.2 The Local Plan will lead to changes in traffic flows on roads which pass within 200 m of designated nature conservation sites. Road traffic can emit nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>), and some sensitive vegetation may be affected by elevated concentrations of these pollutants. Furthermore, the deposition of both NO<sub>x</sub> and NH<sub>3</sub> can alter the nutrient and acidity balance of some ecosystems, causing changes to their composition and health. This assessment has quantified the changes to NO<sub>x</sub> and NH<sub>3</sub> concentrations that would be caused by the new Local Plan, as well as the changes to nitrogen and acid deposition fluxes. It has considered parts of the following designated sites:
- The North Pennine Moors Area of Conservation (SAC);
  - The North Pennine Moors Special Protection Area (SPA);
  - The South Pennine Moors SAC; and,
  - The South Pennine Moors Phase 2 SPA.
- 1.3 These sites are shown in Figure 1.

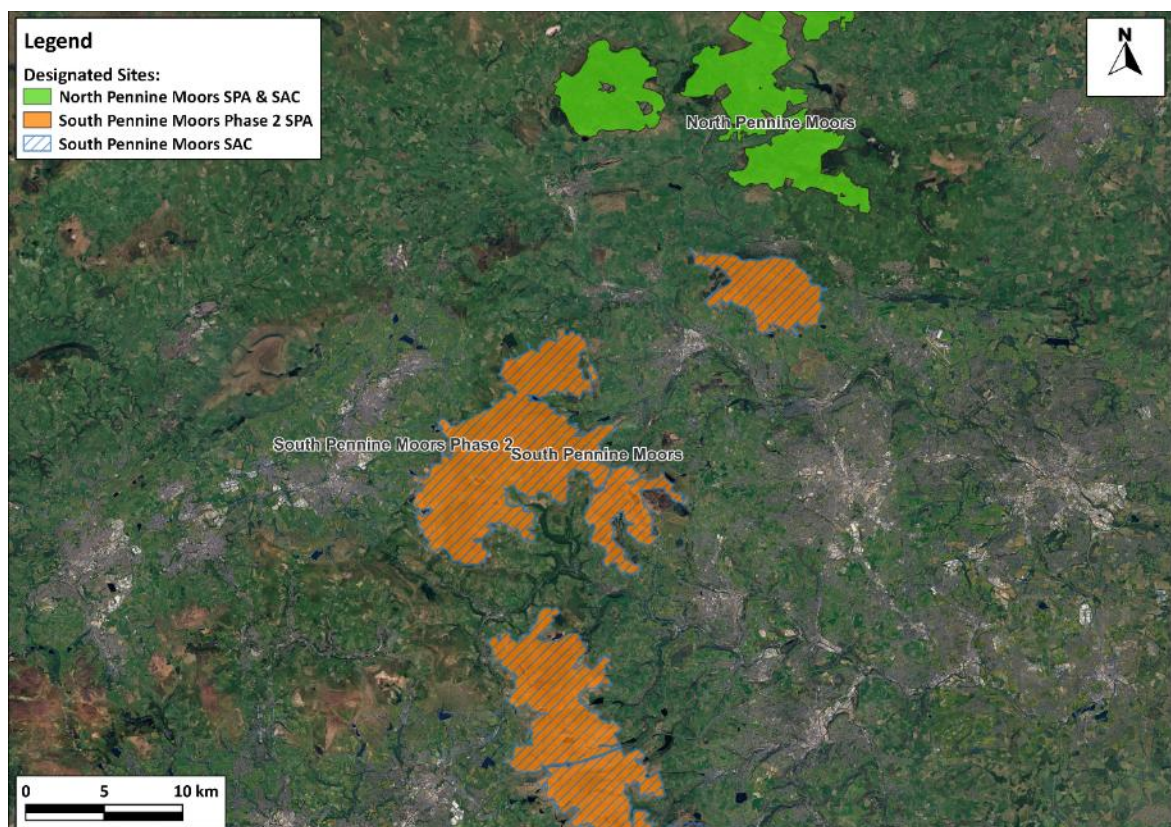


**Figure 1: Designated Sites Included in this Assessment**

Imagery ©2026 Google.

- 1.4 This report describes the scope of the air quality assessment, the modelling methodology, and the modelled results. It compares the results with screening thresholds which can be used to discount the potential for significant effects. However, it does not seek to interpret the results any further than this or reach a conclusion regarding the overall significance of effects; that assessment, including the policy against which the assessment is made, is provided separately by Footprint Ecology.
- 1.5 The professional experience of the consultants involved in the air quality assessment is summarised in Appendix A1.

## 2 Assessment Criteria

### Critical Levels and Critical Loads

- 2.1 European Union (EU) Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets a limit value for annual mean concentrations of nitrogen oxides and for annual and winter mean concentrations of sulphur dioxide<sup>1</sup>. The same values have been set as domestic objectives within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002). The limit values and objectives only apply a) more than 20 km from an agglomeration (about 250,000 people), and b) more than 5 km from Part A industrial sources, motorways and built-up areas of more than 5,000 people.
- 2.2 Critical levels (CLEs) and critical loads (CLOs) are the ambient concentrations and deposition fluxes below which significant harmful effects to sensitive ecosystems are unlikely to occur. Some of the CLEs are set at the same concentrations as the objectives but do not have the same spatial constraints on where they apply. The CLEs relevant to this assessment are set out in Table 1.
- 2.3 The CLE for annual mean NO<sub>x</sub> concentrations is set at the same concentration irrespective of the habitats features of interest. There are two CLEs for NH<sub>3</sub>, with the lower value (1 µg/m<sup>3</sup>) applying only where lichens or bryophytes are present or form a key part of the ecosystem integrity. This reflects the fact that lichens and bryophytes. A short-term (24-hour mean) CLE for NO<sub>x</sub> has also been set, however guidance from the Institute of Air Quality Management (IAQM) (Holman et al, 2020) recommends that: "...only the annual mean NO<sub>x</sub> concentration is used in assessments unless specifically required by a regulator; for instance, as part of an industrial permit application where high, short term peaks in emissions, and consequent ambient concentrations, may occur". Thus the 24-hour mean CLE is not relevant to the current assessment, which is concerned with annual average effects from increased road traffic.
- 2.4 The CLOs are specific to different habitat types. The Air Pollution Information System (APIS) (2026) sets out the CLOs which might apply across the entirety of nationally and internationally-designated sites. This information has been used to define which CLOs are relevant to the locations of interest to this study.
- 2.5 The CLOs for nitrogen deposition are published as ranges. This is because other factors influence how sensitive a habitat may be to additional nitrogen; for example how a site is managed can affect its sensitivity to nitrogen deposition. However, this should not be taken to suggest that the lower-bound value is indicative of potential effects in the study area.
- 2.6 Acid deposition is assessed against the "CLmaxN" value published on APIS (2026). This is the level above which additional deposition will cause acidification.
- 2.7 The CLOs used in this assessment are provided in Table 2. For nitrogen deposition, the same values apply to all sites. For acid deposition the CLOs are different for some designations, as shown in Table 2. Note, that where multiple features with different CLOs are present in the designation, the lowest CLOs has been applied.

---

<sup>1</sup> Sulphur dioxide is no longer emitted in significant quantities from road transport and does not, therefore, require assessing here.

**Table 1: Vegetation and Ecosystem CLe<sup>a</sup>**

| Pollutant                                       | Time Period                | Site | CLe                  |
|-------------------------------------------------|----------------------------|------|----------------------|
| Nitrogen Oxides (expressed as NO <sub>2</sub> ) | Annual Mean <sup>a,b</sup> | All  | 30 µg/m <sup>3</sup> |
| NH <sub>3</sub>                                 | Annual Mean                | All  | 1 µg/m <sup>3</sup>  |

<sup>a</sup> The CLe are defined by the World Health Organisation (WHO, 2000).

<sup>b</sup> Away from major sources (see Paragraph 2.1), this CLe is set as an objective (Defra, 2007) and a limit value (The European Parliament and the Council of the European Union, 2008).

**Table 2: Vegetation and Ecosystem CLo<sub>s</sub>**

| Site                            | Nutrient Nitrogen (kgN/ha/yr) | Acid Deposition 'N <sub>max</sub> ' (keq/ha/yr) |
|---------------------------------|-------------------------------|-------------------------------------------------|
| North Pennine Moors SAC and SPA | 5                             | 0.348                                           |
| South Pennine Moor SAC          | 5                             | 0.569                                           |
| South Pennine Moor Phase 2 SPA  | 5                             | 0.368                                           |

## Screening Thresholds for Predicted Concentrations and Deposition Fluxes

- 2.8 The Environment Agency has published criteria which allow impacts from industrial developments requiring environmental permits to be screened out as insignificant (Environment Agency, 2025). Exceeding these criteria does not mean that there is a significant effect, it simply means that further consideration is required of the potential changes to air quality or deposition. With respect to annual average impacts from most industrial sources, no further assessment is required whenever the change caused by the proposed development (termed by the Environment Agency the Process Contribution, or 'PC') is less than 1% of the relevant CLe or CLo. Furthermore, there is no need to for further assessment if detailed dispersion modelling has shown that the CLe or CLo is not exceeded (i.e. the Predicted Environmental Concentration, or 'PEC' is less than 100% of the CLe or CLo).
- 2.9 The 1% screening criterion is widely accepted by Natural England (e.g. (Natural England, 2025)) and has been tested in the UK High Court (e.g. R (Caffyn) v Shropshire Council 2025 EWHC 1479 (Admin)). For European sites, the 1% criterion should be applied to plans and projects both alone and in-combination. As with the Environment Agency guidance, exceeding 1% of the CLe or CLo does not mean that there will be a significant effect, it is simply a trigger for when further assessment is needed.
- 2.10 The CLe and CLo<sub>s</sub> are defined as the "deposition/concentration ... below which adverse effects on receptors ... do not occur according to present scientific knowledge" (APIS, 2026). There is therefore no reasonable scientific doubt regarding the absence of a significant effect wherever the CLe and CLo<sub>s</sub> are not exceeded, even where the PC exceeds the 1% criterion.
- 2.11 The CLo<sub>s</sub> were recently subject to a detailed review and revision (Bobbink et al., 2022). Prior to that revision, Natural England (2018) referred to earlier work (NECR210, 2016) that there may be adverse effects below the (previously published) CLo<sub>s</sub>. Natural England has not revised its guidance following the CLo revision and therefore, for European sites where there is a restore objective in place, an Appropriate Assessment is required wherever the PC is >1% of the CLe or CLo even when the total

concentration or deposition is below the CLe or CLo. Natural England has confirmed that the potential for adverse effects may still be discounted on the basis that the total concentration or deposition is less than the current CLe or CLo, but procedurally, this should happen at the Appropriate Assessment rather than screening stage of HRA. This modelling report simply considers whether adverse effects can be ruled out solely on the basis of the air quality predictions and has therefore applied the following tests. The potential for a significant effect can be discounted wherever:

- The change (PC), both alone and in-combination, is less than 1% of the relevant CLe or CLo; **OR**
- The total concentration or deposition (PEC) is less than the relevant CLe or CLo.

### 3 Methodology

- 3.1 The assessment has been carried out following current best practice, drawing on the professional expertise of the consultants involved (Appendix A1). Care has also been taken to ensure consistency with guidance issued by the IAQM (Holman et al, 2020) and the Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2021).

#### Study Area

- 3.2 This report has considered the following designated sites; these are the only European sites which are within 200 m of any road within 10 km of the Local Plan area:

- The North Pennine Moors SAC;
- The North Pennine Moors SPA;
- The South Pennine Moors SAC; and,
- The South Pennine Moors Phase 2 SPA.

- 3.3 The assessment has considered all roads within 200 m of the above sites, within 10 km of the plan area. In addition to the above, the A58 from Ripponden to Littleborough, and the B6138 from Mytholmroyd to the A58 / B6138 junction have been included. Whilst further than 10 km from the Local Plan area, these were identified in the HRA screening report so have been included in the study area.

- 3.4 The study area has been split into separate model areas for ease of assessment and reporting, these are shown below in Figure 2.

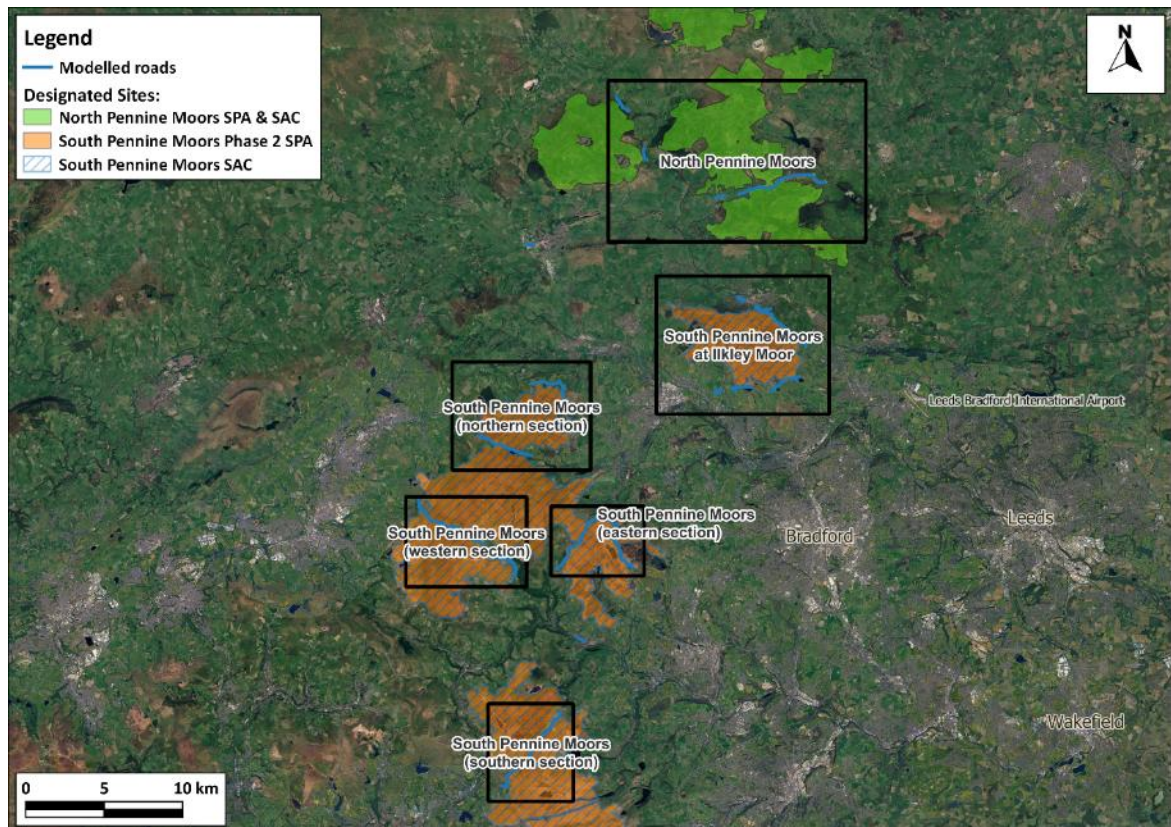


**Figure 2: Study area**

Imagery ©2026 Google.

## In-Combination Projects

- 3.5 Impacts on European sites need to be considered in combination with other relevant projects or plans. Natural England (2018) recommends a pragmatic approach to defining the projects to be included in an in-combination assessment, relying on professional judgement and ensuring that the assessment remains focused on the project seeking permission. The in-combination projects considered here include the emerging and draft Local Plans from neighbouring local authorities: Leeds City Council, Kirklees Council, Calderdale Council, North Yorkshire Council, and Pendle Borough Council.

## Assessment Scenarios

- 3.6 The Plan period is 1<sup>st</sup> April 2025 to 31<sup>st</sup> March 2043. The new Plan will include new allocations, and will also retain elements of the existing Plan which are not yet fully built. To ensure that the assessment fully considers all unbuilt development which will be included in the new Plan, Bradford Metropolitan District Council undertook a review of the different elements which feed traffic growth. These are as follows:

- remaining under construction (UC);
- planning permission (detailed and small sub-allocation outline) (PP);
- other types of permissions (PP);

- allocations – outlines above threshold (5 units net) (A);
- allocations – no current planning status (A);
- regeneration allowances (years 11+ of plan period (2035/36+) (RA);
- windfall allowance (outside of Regeneration Areas) – starting year 4 (2028/29) (WA); and
- strategic investment areas / MDS (Esholt).

3.7 The Council then carried out traffic modelling for the following scenarios:

- A) base year 2023;
- B) 2043 District Base Position. This excludes all the supply elements listed above. In this current report, this scenario is termed '2043 Baseline';
- C) 2043 with the Local Plan. This includes all Local Plan allocations. It includes UC, PP, A, WA, RA and MDS defined above. In this current report, this scenario is termed '2043 With Local Plan'; and
- D) 2043 with the Local Plan with in-combination projects from emerging and draft Local Plans from Leeds, Kirklees, Calderdale, North Yorkshire, and Pendle Councils. In this current report, this scenario is termed '2043 With Local Plan and Emerging Local Plans'.

3.8 These scenarios have been prepared specifically to address the requirements of HRA.

3.9 Dispersion modelling has been used to predict NO<sub>x</sub> and NH<sub>3</sub> concentrations, and nitrogen and acid deposition fluxes in each of the scenarios defined above (A, B, C, D). The model outputs from the three 2043 scenarios have then been compared to derive the impacts of the Local Plan alone and in-combination with other projects and plans:

- the difference between scenarios B and C represents the change (i.e. the PC) caused by the Local Plan alone; and
- the difference between scenarios B and D represents the PC caused by the Local Plan in-combination.

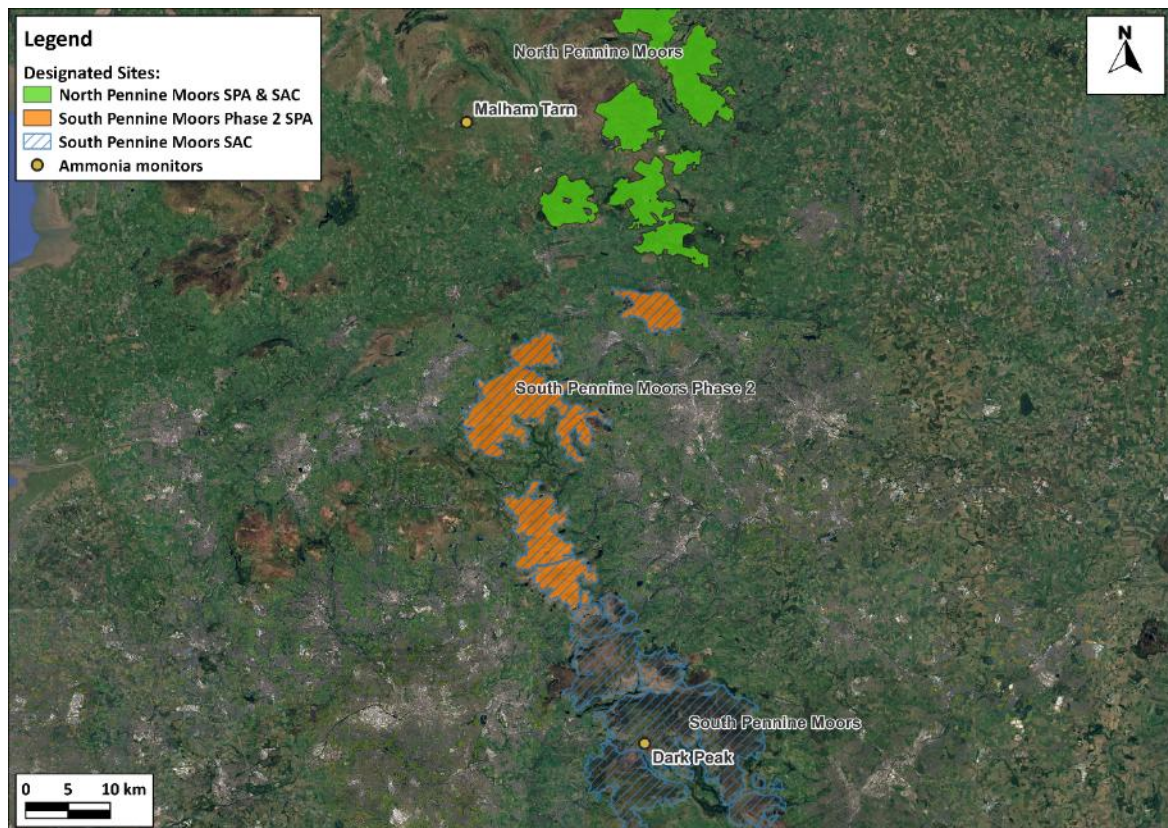
## Monitoring

3.10 Information on existing NO<sub>x</sub> and nitrogen dioxide (NO<sub>2</sub>) concentrations has been obtained by collating the results of monitoring carried close to the designated sites. This has focused on roadside monitoring which is carried out to assess impacts on human health. The measurements have been used here to verify the air quality model as described in Appendix A2.

3.11 Information on existing background NH<sub>3</sub> concentrations has been obtained by collating results of monitoring carried out on behalf of Defra as part of the National Ammonia Monitoring Network (NAMN) (Defra, 2026b). This consists of 95 sites across the UK. The two closest to the study area are discussed here, with annual mean results for the baseline year of 2023 are summarised in Table 3 and the monitoring locations are shown in Figure 3. Both of the measured concentrations are below the CLe of 3 µg/m<sup>3</sup>, with Malham Tarn above the CLe of 1 µg/m<sup>3</sup>, and Dark Peak below this lower CLe. It is noted that while these monitors are the closest to the study area, Malham Tarn is approximately 16 km from the nearest modelled receptors, and Dark Peak is approximately 27 km to the nearest modelled receptor.

**Table 3: Summary of Annual Mean NH<sub>3</sub> Monitoring in 2023 (µg/m<sup>3</sup>)**

| Site        | Annual Mean |
|-------------|-------------|
| Malham Tarn | 1.2         |
| Dark Peak   | 0.7         |

**Figure 3: Monitoring Locations**

Imagery ©2026 Google.

## Modelling Methodology

### Background Concentrations and Fluxes

- 3.12 Background concentrations of NO<sub>x</sub> and NH<sub>3</sub>, and nitrogen and acid nitrogen deposition fluxes, have been taken from APIS (2026). The concentrations and deposition fluxes represent 1 km x 1 km averages. APIS currently presents three-year mean values centred on the calendar year of 2023 and these have been taken to represent conditions in 2023. The APIS data take account of the measurements shown in Table 3 and therefore are similar to the measured concentrations.
- 3.13 Concentrations of NH<sub>3</sub> and deposition fluxes have been adjusted to represent the future using the rate of change predicted for this area using the Business-as-Usual assumptions of the JNCC's Nitrogen Futures project (JNCC, 2020)<sup>2</sup>. Nitrogen Futures only predicted changes to 2030, so the rate of change

<sup>2</sup> A linear rate of change has been assumed between 2017 and the 2030 Business as Usual scenario, with the APIS 2023 data scaled based on the location-specific predicted changes. Acid nitrogen deposition has been calculated from the predicted nitrogen deposition.

predicted by JNCC between 2023 and 2030 has been used to predict concentrations and deposition in 2043 (i.e. only 7 years of change have been accounted for). Given the UK's national and international commitments to reduce emissions, as well as evidence from monitoring across the UK showing significant recent improvements in background concentrations of both NO<sub>x</sub> and NH<sub>3</sub>, this approach is most likely to over-predict in 2043 and therefore provide a conservative assessment. Concentrations of NO<sub>x</sub> in 2043 have been predicted by multiplying the 2023 concentration taken from APIS by the relative change to concentrations (between 2023 and 2040<sup>3</sup>) for each location predicted in Defra's latest (2021-based) national NO<sub>2</sub> maps published for Local Air Quality Management (Defra, 2026a). Background concentrations of NO<sub>2</sub> are only needed to inform the conversion of NO<sub>x</sub> to NO<sub>2</sub>. These have been taken directly from Defra's maps for each relevant year (2023 for the current base year, and 2040 for the future years<sup>3</sup>).

### Influence of Local Road Traffic

- 3.14 Concentrations have been predicted using the ADMS-Roads dispersion model, with emissions of NO<sub>x</sub> derived using Defra's Emissions Factors Toolkit (EFT) (v14.2) (Defra, 2026a), and emissions of NH<sub>3</sub> derived using AQC's Calculator for Road Emissions of Ammonia (CREAM) (v2A) (AQC, 2025). Traffic flows have been derived from the Bradford strategic traffic model, supplied by Bradford Metropolitan District Council. The model results for NO<sub>x</sub> and NO<sub>2</sub> have been verified against local measurements where monitoring was available to do so. Details of the model inputs and the model verification are provided in Appendix A2. Deposition fluxes have been calculated from the predicted concentrations of NO<sub>2</sub> and NH<sub>3</sub>. Details of the method for calculating deposition are provided in Appendix A2.

### Receptors

- 3.15 Impacts have been predicted at receptors arranged along transects running perpendicular to affected roads<sup>4</sup>. The transects begin at the closest part of the designated site to the road<sup>5</sup>. Within designated sites, receptors have been placed at every 2 m from the road, up to 200 m from the road. Where the designated site is set back more than 2 m from the road, an additional receptor has been placed at the point closest to the road. Additional receptors have been placed at various points in and around each SAC, using source-oriented grids, with a spacing of 2 m, 3 m, 5 m, 9 m, 17 m, 33 m, 65 m, 129 m and 200 m from the road<sup>6</sup>. These additional receptors have been used to generate isopleths.
- 3.16 All receptors have been modelled at a height of 1.5 m for consistency with Defra's national modelling which feeds into the background data used in this assessment. The roadside transects are shown in Figure 4 to Figure 9.

<sup>3</sup> The furthest year for which predictions can currently be reliably made in Defra's latest (2021-based) national NO<sub>2</sub> maps.

<sup>4</sup> At complex junctions transect might not be directly perpendicular to all surrounding roads and are positioned with professional judgement in order to capture the worst case impacts.

<sup>5</sup> Following guidance from the IAQM (Holman et al, 2020), impacts have not been predicted within 2 m of roads.

<sup>6</sup> These distances are used because they broadly reflect the expected rate at which concentrations of NO<sub>x</sub> and ammonia reduce with distance from roads. This provides an efficient way to more precisely show the predicted changes when modelling a large number of receptors.

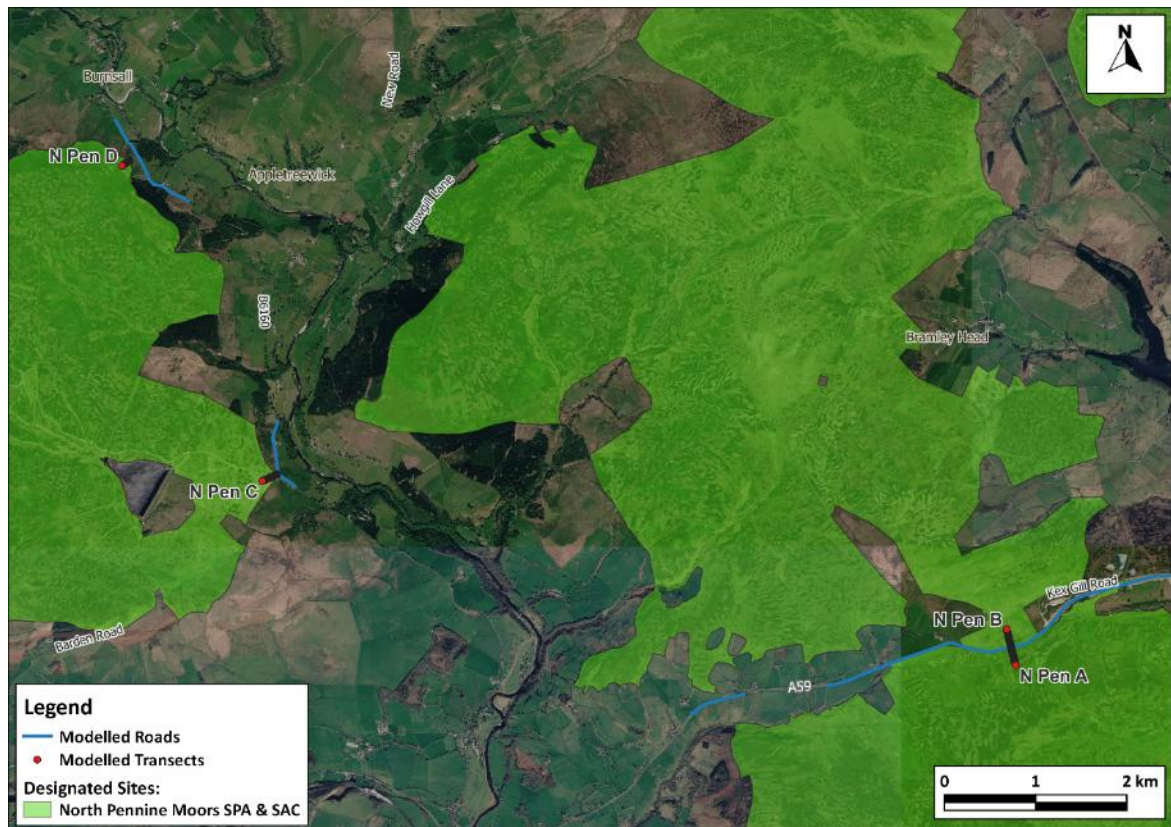


**Figure 4: Receptor Transect Locations – North Pennine Moors**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

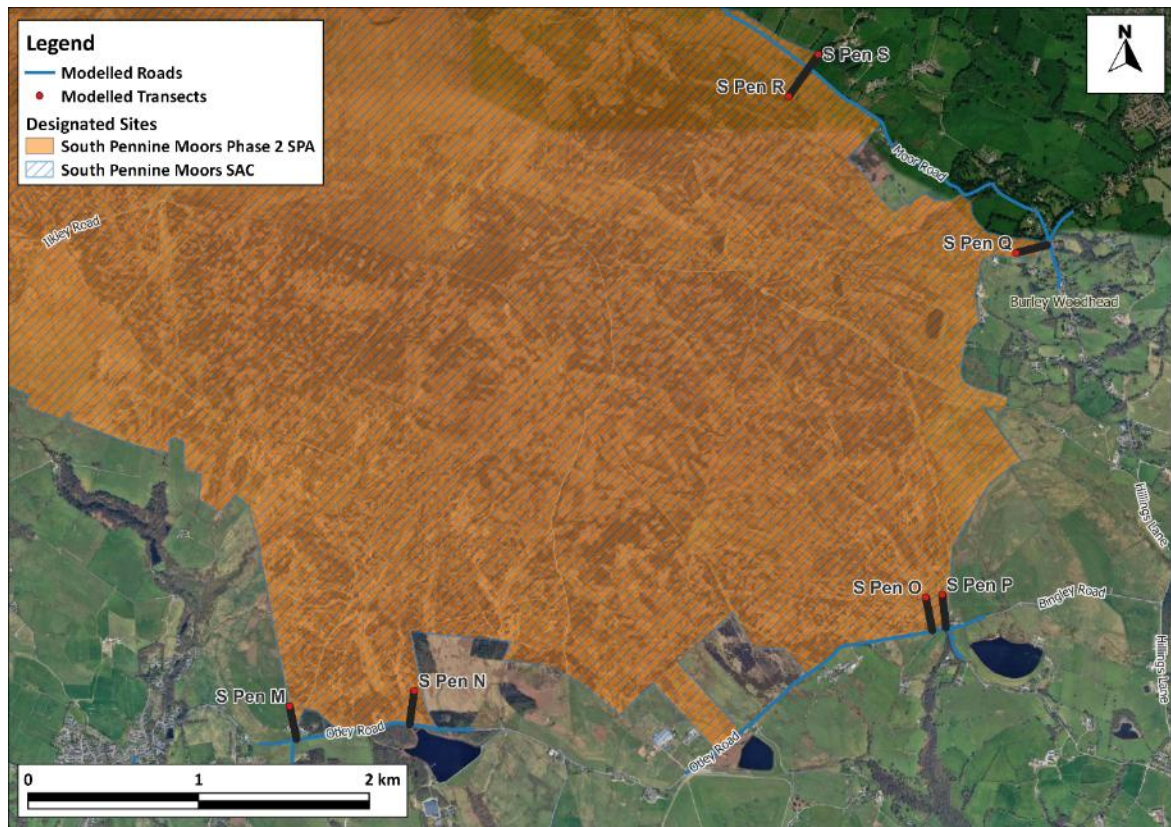


**Figure 5: Receptor Transect Locations – South Pennine Moors at Ilkley Moor**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

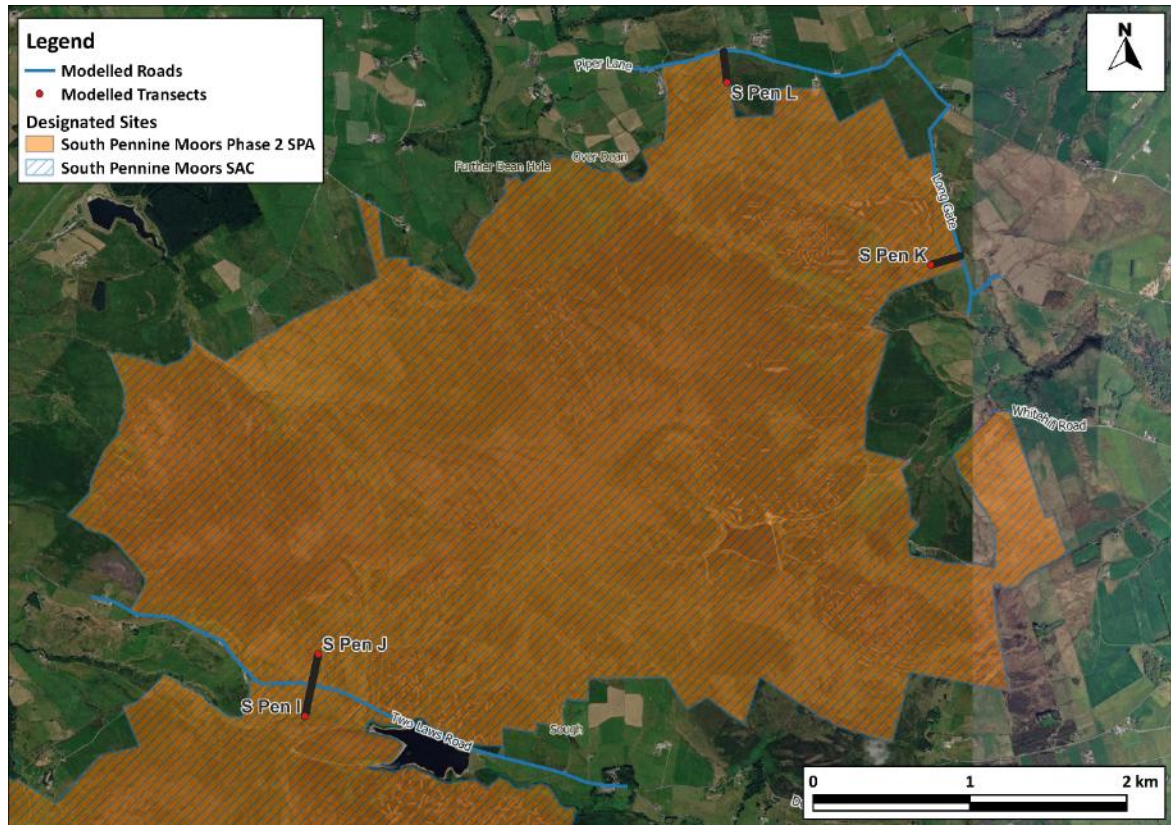


**Figure 6: Receptor Transect Locations – South Pennine Moors (northern section of study area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.



17776A-10

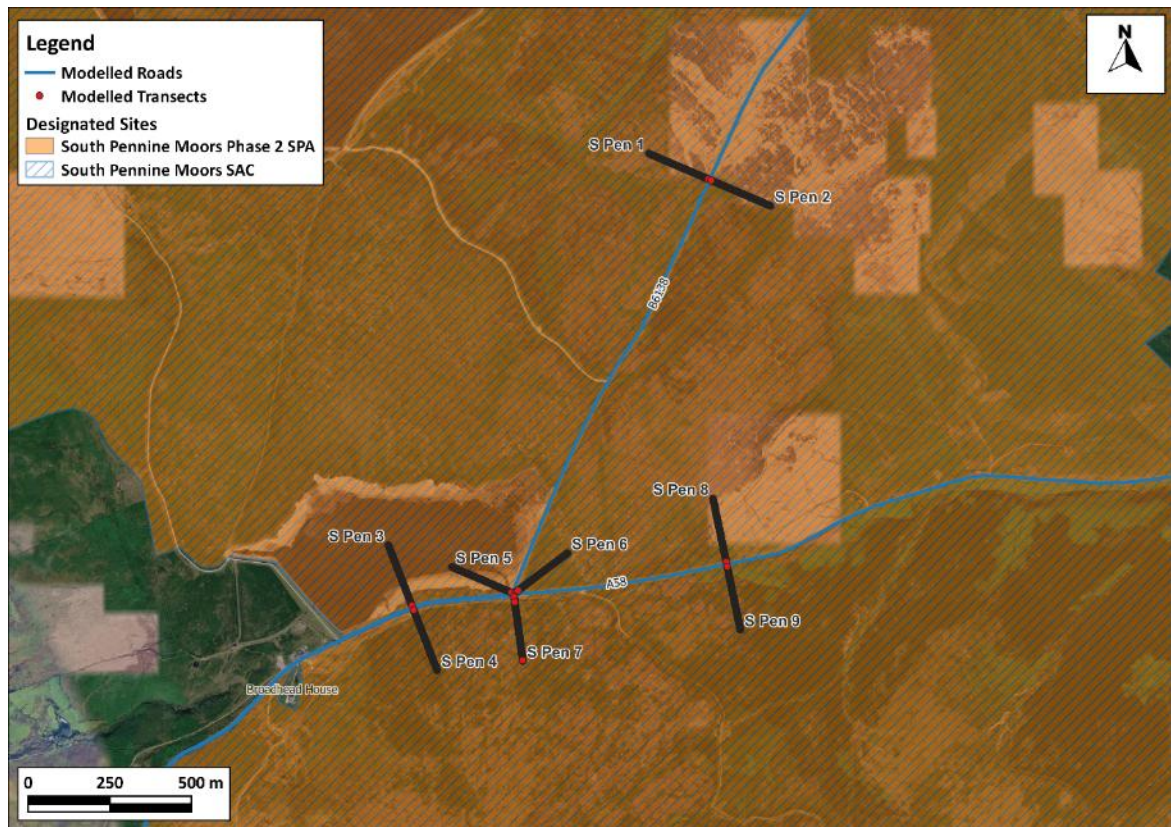


**Figure 8: Receptor Transect Locations – South Pennine Moors (southern section of study area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

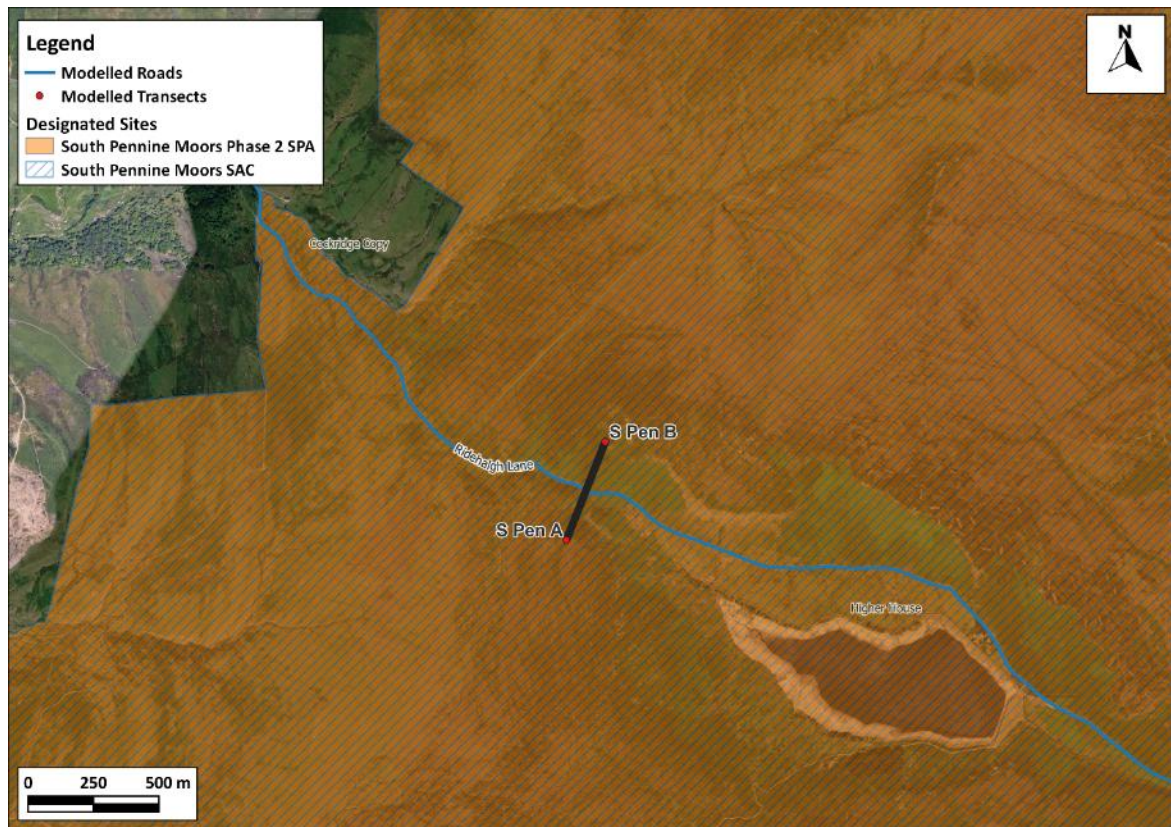


**Figure 9: Receptor Transect Locations – South Pennine Moors (western section of study area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

## Uncertainty

- 3.17 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 3.18 An important stage in the process of modelling road traffic emissions of is model verification, which involves comparing the model output with measured concentrations. Where the model has been verified and adjusted at available monitoring sites, there can be confidence in the prediction of base year (2023) concentrations. This has been undertaken at existing NO<sub>2</sub> monitoring locations where the traffic is free flowing, the monitoring site is located outside of major built up areas, and avoiding locations where the effects of street canyons or other urban features might affect dispersion. This is to ensure that the monitoring sites match the setting of the receptors. A single model wide adjustment has been applied. Further details are in Appendix A2.
- 3.19 Development of the CREAM model, which has been used in this assessment, included verifying the emissions model, combined with the ADMS-Roads dispersion model, against measurements from the densest roadside NH<sub>3</sub> monitoring network in Europe (AQC, 2025). The modelling has thus been verified as far as is possible.
- 3.20 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of

projections as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.

## 4 Dispersion Model Results

### Results Along Transects

- 4.1 Table 4 to Table 7 set out the concentrations and deposition fluxes at each transect for the receptor located closest to the road, as well as the changes relative to the CLes and CLos. As explained in Paragraph 3.15, the transects begin at the edge of the designated site closest to the road (for example the N Pen A Transect at North Pennine Moors SAC and SPA, shown in Table A3-1, represents the designated site at 2 m from the edge of the adjacent road). The effects from road traffic are greatest closest to roads and therefore the values presented in Table 4 to Table 7 represent the worst-case for each transect. Results for each other transect point (i.e. at 2 m increments out to 200 m) have been provided to Footprint Ecology to inform the HRA.
- 4.2 The results for the North Pennine Moors SAC and the North Pennine Moors SPA are reported together as these designations cover the same area and are assessed against the same CLes and CLos. Similarly, the South Pennine Moors SAC and the South Pennine Moors Phase 2 SPA are reported together, except for acid deposition where they are assessed against different CLos so are reported separately.
- 4.3 For most of the transects, the changes cause by the Local Plan alone in Table 4 to Table 7 is a negative number. In these locations, the Local Plan is predicted to reduce traffic emissions and therefore have a beneficial effect on concentrations and deposition. This is a result of either a forecast reduction in total traffic flows, a change in speed, or a change in the fleet mix (e.g. a reduction in forecast Heavy Duty Vehicle numbers). The only transects where the Local Plan is predicted to cause an increase to concentrations or fluxes are South Pennine Moors transects K, L, M, N, Q, R, and S. Over the rest of the study area, the Local Plan will improve air quality. The impacts of the Local Plan in-combination with other emerging Plans are mostly adverse, but it remains the case that the Plan itself has a beneficial effect and that the adverse effects from the adjacent emerging plans would be greater without the Bradford Local Plan.
- 4.4 Natural England's Standard Advice for Air Quality Impacts for Local Plans considers impacts in the context of the degree of 'retardation' to ongoing reductions in nitrogen deposition. This calculation is provided in Appendix A3.
- 4.5 For the reasons explained in Paragraph 4.3, in most areas the Local Plan is predicted to accelerate improvements. For example, at the North Pennine Moors transect B, the Local Plan will accelerate the improvements by between 0.24 and 1.62 years (due to improvements compared to the 2043 Baseline scenario). The highest retardation for the Local Plan in-combination is at South Pennine Moors transect O, where the Local Plan in-combination will retard the improvements by between 0.82 and 6.20 years; but it should be reiterated that the retardation at this location would be even greater without the Bradford Local Plan, which itself will have a beneficial effect.

NO<sub>x</sub>Table 4: Model Results for Annual Mean NO<sub>x</sub>

| Transect                                | Distance from Road Edge (m) | Total NOx Concentration (µg/m³) |              |              |                         |                                                     | Change as % of CLe |                       |
|-----------------------------------------|-----------------------------|---------------------------------|--------------|--------------|-------------------------|-----------------------------------------------------|--------------------|-----------------------|
|                                         |                             | CLe                             | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & and Emergi ng Local Plans | Alone (C-B)        | In Combin ation (D-B) |
| North Pennine Moors SAC and SPA         |                             |                                 |              |              |                         |                                                     |                    |                       |
| N Pen A                                 | 2                           | 30                              | 23.8         | 4.5          | 4.5                     | 4.6                                                 | -0.1               | 0.3                   |
| N Pen B                                 | 2                           | 30                              | 25.0         | 4.5          | 4.5                     | 4.6                                                 | -0.1               | 0.3                   |
| N Pen C                                 | 19.9                        | 30                              | 5.2          | 2.9          | 2.9                     | 2.9                                                 | 0.0                | 0.0                   |
| N Pen D                                 | 94.2                        | 30                              | 5.0          | 2.9          | 2.9                     | 2.9                                                 | 0.0                | 0.0                   |
| South Pennine Moors SAC and Phase 2 SPA |                             |                                 |              |              |                         |                                                     |                    |                       |
| S Pen A                                 | 2                           | 30                              | 11.3         | 4.3          | 4.3                     | 4.3                                                 | -0.2               | 0.1                   |
| S Pen B                                 | 2                           | 30                              | 13.4         | 4.6          | 4.5                     | 4.6                                                 | -0.3               | 0.1                   |
| S Pen C                                 | 2                           | 30                              | 19.1         | 5.4          | 5.4                     | 5.5                                                 | -0.1               | 0.1                   |
| S Pen D                                 | 2                           | 30                              | 19.7         | 5.5          | 5.5                     | 5.6                                                 | -0.1               | 0.1                   |
| S Pen E                                 | 2                           | 30                              | 15.0         | 5.1          | 5.1                     | 5.2                                                 | -0.1               | 0.1                   |
| S Pen F                                 | 2                           | 30                              | 18.8         | 5.4          | 5.4                     | 5.5                                                 | -0.1               | 0.1                   |
| S Pen G                                 | 2                           | 30                              | 10.4         | 4.9          | 4.9                     | 4.9                                                 | -0.1               | 0.1                   |
| S Pen H                                 | 2                           | 30                              | 12.7         | 5.2          | 5.2                     | 5.3                                                 | -0.2               | 0.2                   |
| S Pen I                                 | 2                           | 30                              | 10.6         | 4.3          | 4.2                     | 4.3                                                 | -0.4               | 0.0                   |
| S Pen J                                 | 2                           | 30                              | 12.3         | 4.6          | 4.4                     | 4.6                                                 | -0.6               | 0.0                   |
| S Pen K                                 | 2.2                         | 30                              | 5.7          | 3.5          | 3.5                     | 3.5                                                 | 0.0                | 0.0                   |
| S Pen L                                 | 2                           | 30                              | 6.6          | 3.7          | 3.7                     | 3.7                                                 | 0.1                | 0.2                   |
| S Pen M                                 | 2.6                         | 30                              | 21.3         | 6.4          | 6.4                     | 6.4                                                 | 0.0                | 0.1                   |
| S Pen N                                 | 2                           | 30                              | 24.0         | 6.7          | 6.7                     | 6.7                                                 | 0.0                | 0.2                   |
| S Pen O                                 | 2                           | 30                              | 27.9         | 7.1          | 7.1                     | 7.2                                                 | -0.1               | 0.3                   |
| S Pen P                                 | 5.4                         | 30                              | 23.9         | 6.8          | 6.8                     | 6.8                                                 | 0.0                | 0.2                   |
| S Pen Q                                 | 12.7                        | 30                              | 13.6         | 5.9          | 5.9                     | 5.9                                                 | 0.1                | 0.2                   |

| Transect | Distance from Road Edge (m) | Total NO <sub>x</sub> Concentration (µg/m <sup>3</sup> ) |              |              |                         |                                                | Change as % of CLe |                      |
|----------|-----------------------------|----------------------------------------------------------|--------------|--------------|-------------------------|------------------------------------------------|--------------------|----------------------|
|          |                             | CLe                                                      | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & Emerging Local Plans | Alone (C-B)        | In Combination (D-B) |
| S Pen R  | 2                           | 30                                                       | 15.5         | 6.0          | 6.0                     | 6.0                                            | 0.1                | 0.2                  |
| S Pen S  | 2                           | 30                                                       | 19.7         | 6.4          | 6.4                     | 6.4                                            | 0.2                | 0.3                  |
| S Pen 1  | 2                           | 30                                                       | 12.1         | 5.6          | 5.5                     | 5.6                                            | -0.2               | 0.0                  |
| S Pen 2  | 2                           | 30                                                       | 13.3         | 5.7          | 5.6                     | 5.7                                            | -0.3               | 0.1                  |
| S Pen 3  | 2                           | 30                                                       | 61.7         | 13.4         | 13.0                    | 13.4                                           | -1.3               | 0.1                  |
| S Pen 4  | 2                           | 30                                                       | 60.5         | 13.8         | 13.4                    | 13.8                                           | -1.4               | 0.1                  |
| S Pen 5  | 2                           | 30                                                       | 65.9         | 14.1         | 13.7                    | 14.2                                           | -1.6               | 0.1                  |
| S Pen 6  | 2                           | 30                                                       | 65.2         | 13.8         | 13.3                    | 13.9                                           | -1.8               | 0.2                  |
| S Pen 7  | 2                           | 30                                                       | 54.4         | 12.6         | 12.2                    | 12.6                                           | -1.3               | 0.1                  |
| S Pen 8  | 2                           | 30                                                       | 53.8         | 11.7         | 11.2                    | 11.7                                           | -1.6               | 0.2                  |
| S Pen 9  | 2                           | 30                                                       | 48.1         | 11.2         | 10.7                    | 11.2                                           | -1.4               | 0.2                  |

## Ammonia

**Table 5: Model Results for Annual Mean NH<sub>3</sub>**

| Transect                        | Distance from Road Edge (m) | Total NH <sub>3</sub> Concentration (µg/m <sup>3</sup> ) |              |              |                         |                                                     | Change as % of Cle |                       |
|---------------------------------|-----------------------------|----------------------------------------------------------|--------------|--------------|-------------------------|-----------------------------------------------------|--------------------|-----------------------|
|                                 |                             | Cle                                                      | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & and Emergi ng Local Plans | Alone (C-B)        | In Combin ation (D-B) |
| North Pennine Moors SAC and SPA |                             |                                                          |              |              |                         |                                                     |                    |                       |
| N Pen A                         | 2                           | 1                                                        | 2.6          | 2.8          | 2.8                     | 2.9                                                 | -2.4               | 6.5                   |
| N Pen B                         | 2                           | 1                                                        | 2.6          | 2.8          | 2.7                     | 2.8                                                 | -2.4               | 6.6                   |
| N Pen C                         | 19.9                        | 1                                                        | 1.2          | 1.3          | 1.3                     | 1.3                                                 | -0.8               | -0.2                  |

| Transect                                       | Distance from Road Edge (m) | Total NH <sub>3</sub> Concentration (µg/m <sup>3</sup> ) |              |              |                         |                                                | Change as % of CLe |                      |
|------------------------------------------------|-----------------------------|----------------------------------------------------------|--------------|--------------|-------------------------|------------------------------------------------|--------------------|----------------------|
|                                                |                             | CLe                                                      | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & Emerging Local Plans | Alone (C-B)        | In Combination (D-B) |
| N Pen D                                        | 94.2                        | 1                                                        | 1.2          | 1.3          | 1.3                     | 1.3                                            | -0.2               | 0.0                  |
| <b>South Pennine Moors SAC and Phase 2 SPA</b> |                             |                                                          |              |              |                         |                                                |                    |                      |
| S Pen A                                        | 2                           | 1                                                        | 1.4          | 1.6          | 1.6                     | 1.6                                            | -6.0               | 2.1                  |
| S Pen B                                        | 2                           | 1                                                        | 1.5          | 1.9          | 1.8                     | 1.9                                            | -8.7               | 3.1                  |
| S Pen C                                        | 2                           | 1                                                        | 1.9          | 2.0          | 2.0                     | 2.0                                            | -2.7               | 2.3                  |
| S Pen D                                        | 2                           | 1                                                        | 2.0          | 2.1          | 2.0                     | 2.1                                            | -3.0               | 2.6                  |
| S Pen E                                        | 2                           | 1                                                        | 1.6          | 1.7          | 1.7                     | 1.7                                            | -1.8               | 1.6                  |
| S Pen F                                        | 2                           | 1                                                        | 1.9          | 2.0          | 1.9                     | 2.0                                            | -2.7               | 2.3                  |
| S Pen G                                        | 2                           | 1                                                        | 1.2          | 1.3          | 1.3                     | 1.3                                            | -1.8               | 2.0                  |
| S Pen H                                        | 2                           | 1                                                        | 1.4          | 1.5          | 1.5                     | 1.5                                            | -3.3               | 3.6                  |
| S Pen I                                        | 2                           | 1                                                        | 1.6          | 1.9          | 1.8                     | 1.9                                            | -11.2              | 0.0                  |
| S Pen J                                        | 2                           | 1                                                        | 1.7          | 2.2          | 2.0                     | 2.2                                            | -15.4              | 0.0                  |
| S Pen K                                        | 2.2                         | 1                                                        | 1.2          | 1.3          | 1.3                     | 1.3                                            | 0.2                | 0.3                  |
| S Pen L                                        | 2                           | 1                                                        | 1.3          | 1.4          | 1.4                     | 1.4                                            | 1.1                | 2.6                  |
| S Pen M                                        | 2.6                         | 1                                                        | 2.1          | 2.1          | 2.1                     | 2.1                                            | 0.8                | 4.1                  |
| S Pen N                                        | 2                           | 1                                                        | 2.3          | 2.2          | 2.2                     | 2.3                                            | 0.2                | 4.5                  |
| S Pen O                                        | 2                           | 1                                                        | 2.4          | 2.6          | 2.6                     | 2.7                                            | -1.5               | 6.1                  |
| S Pen P                                        | 5.4                         | 1                                                        | 2.2          | 2.4          | 2.4                     | 2.4                                            | -1.1               | 5.9                  |
| S Pen Q                                        | 12.7                        | 1                                                        | 1.6          | 1.7          | 1.7                     | 1.7                                            | 0.9                | 1.9                  |
| S Pen R                                        | 2                           | 1                                                        | 1.8          | 1.8          | 1.8                     | 1.8                                            | 1.4                | 2.7                  |
| S Pen S                                        | 2                           | 1                                                        | 2.0          | 2.0          | 2.1                     | 2.1                                            | 2.5                | 5.0                  |
| S Pen 1                                        | 2                           | 1                                                        | 1.2          | 1.4          | 1.3                     | 1.4                                            | -5.6               | 1.1                  |
| S Pen 2                                        | 2                           | 1                                                        | 1.3          | 1.5          | 1.4                     | 1.5                                            | -7.8               | 1.6                  |
| S Pen 3                                        | 2                           | 1                                                        | 4.2          | 5.4          | 5.3                     | 5.4                                            | -5.2               | -0.2                 |
| S Pen 4                                        | 2                           | 1                                                        | 4.1          | 5.6          | 5.5                     | 5.6                                            | -4.7               | -0.2                 |

| Transect | Distance from Road Edge (m) | Total NH <sub>3</sub> Concentration (µg/m <sup>3</sup> ) |              |              |                         |                                                | Change as % of CLe |                      |
|----------|-----------------------------|----------------------------------------------------------|--------------|--------------|-------------------------|------------------------------------------------|--------------------|----------------------|
|          |                             | CLe                                                      | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & Emerging Local Plans | Alone (C-B)        | In Combination (D-B) |
| S Pen 5  | 2                           | 1                                                        | 4.5          | 5.8          | 5.7                     | 5.8                                            | -10.3              | 1.1                  |
| S Pen 6  | 2                           | 1                                                        | 4.5          | 5.7          | 5.5                     | 5.7                                            | -14.7              | 2.3                  |
| S Pen 7  | 2                           | 1                                                        | 3.7          | 4.9          | 4.9                     | 4.9                                            | -5.7               | 0.4                  |
| S Pen 8  | 2                           | 1                                                        | 3.7          | 4.3          | 4.2                     | 4.3                                            | -6.8               | 1.4                  |
| S Pen 9  | 2                           | 1                                                        | 3.3          | 4.0          | 4.0                     | 4.1                                            | -5.7               | 1.2                  |

## Nitrogen Deposition

**Table 6: Model Results for Nitrogen Deposition**

| Transect                                | Distance from Road Edge (m) | Total Nitrogen Deposition (kgN/ha/yr) |              |              |                         |                                                     | Change as % of CLo |                       |
|-----------------------------------------|-----------------------------|---------------------------------------|--------------|--------------|-------------------------|-----------------------------------------------------|--------------------|-----------------------|
|                                         |                             | CLo                                   | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & and Emergi ng Local Plans | Alone (C-B)        | In Combin ation (D-B) |
| North Pennine Moors SAC and SPA         |                             |                                       |              |              |                         |                                                     |                    |                       |
| N Pen A                                 | 2                           | 5                                     | 25.8         | 24.8         | 24.7                    | 25.2                                                | -2.6               | 6.9                   |
| N Pen B                                 | 2                           | 5                                     | 26.4         | 24.8         | 24.6                    | 25.1                                                | -2.6               | 7.0                   |
| N Pen C                                 | 19.9                        | 5                                     | 17.7         | 17.0         | 17.0                    | 17.0                                                | -0.8               | -0.2                  |
| N Pen D                                 | 94.2                        | 5                                     | 17.6         | 16.9         | 16.9                    | 16.9                                                | -0.2               | 0.0                   |
| South Pennine Moors SAC and Phase 2 SPA |                             |                                       |              |              |                         |                                                     |                    |                       |
| S Pen A                                 | 2                           | 5                                     | 20.6         | 20.5         | 20.2                    | 20.6                                                | -6.3               | 2.2                   |
| S Pen B                                 | 2                           | 5                                     | 21.5         | 21.9         | 21.4                    | 22.0                                                | -9.1               | 3.2                   |
| S Pen C                                 | 2                           | 5                                     | 24.9         | 23.2         | 23.0                    | 23.3                                                | -2.9               | 2.5                   |
| S Pen D                                 | 2                           | 5                                     | 25.1         | 23.7         | 23.5                    | 23.8                                                | -3.2               | 2.7                   |

| Transect | Distance from Road Edge (m) | Total Nitrogen Deposition (kgN/ha/yr) |              |              |                         |                                                | Change as % of CLo |                      |
|----------|-----------------------------|---------------------------------------|--------------|--------------|-------------------------|------------------------------------------------|--------------------|----------------------|
|          |                             | CLo                                   | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & Emerging Local Plans | Alone (C-B)        | In Combination (D-B) |
| S Pen E  | 2                           | 5                                     | 23.0         | 21.6         | 21.5                    | 21.7                                           | -1.9               | 1.7                  |
| S Pen F  | 2                           | 5                                     | 24.7         | 23.1         | 23.0                    | 23.2                                           | -2.8               | 2.5                  |
| S Pen G  | 2                           | 5                                     | 20.7         | 19.7         | 19.6                    | 19.8                                           | -1.9               | 2.1                  |
| S Pen H  | 2                           | 5                                     | 21.6         | 20.7         | 20.5                    | 20.8                                           | -3.5               | 3.9                  |
| S Pen I  | 2                           | 5                                     | 21.0         | 21.7         | 21.2                    | 21.7                                           | -11.9              | -0.1                 |
| S Pen J  | 2                           | 5                                     | 21.8         | 23.1         | 22.3                    | 23.1                                           | -16.2              | -0.1                 |
| S Pen K  | 2.2                         | 5                                     | 18.8         | 18.2         | 18.2                    | 18.3                                           | 0.2                | 0.4                  |
| S Pen L  | 2                           | 5                                     | 19.3         | 18.8         | 18.8                    | 18.9                                           | 1.2                | 2.7                  |
| S Pen M  | 2.6                         | 5                                     | 21.4         | 19.3         | 19.4                    | 19.5                                           | 0.9                | 4.3                  |
| S Pen N  | 2                           | 5                                     | 22.5         | 20.2         | 20.2                    | 20.5                                           | 0.2                | 4.7                  |
| S Pen O  | 2                           | 5                                     | 23.4         | 22.3         | 22.3                    | 22.7                                           | -1.6               | 6.5                  |
| S Pen P  | 5.4                         | 5                                     | 22.1         | 21.0         | 21.0                    | 21.3                                           | -1.1               | 6.3                  |
| S Pen Q  | 12.7                        | 5                                     | 18.1         | 17.3         | 17.3                    | 17.4                                           | 1.0                | 2.0                  |
| S Pen R  | 2                           | 5                                     | 19.0         | 17.8         | 17.9                    | 18.0                                           | 1.5                | 2.9                  |
| S Pen S  | 2                           | 5                                     | 20.7         | 19.3         | 19.4                    | 19.6                                           | 2.7                | 5.3                  |
| S Pen 1  | 2                           | 5                                     | 20.1         | 19.3         | 19.0                    | 19.4                                           | -5.9               | 1.2                  |
| S Pen 2  | 2                           | 5                                     | 20.7         | 19.9         | 19.5                    | 20.0                                           | -8.3               | 1.7                  |
| S Pen 3  | 2                           | 5                                     | 38.3         | 40.7         | 40.4                    | 40.7                                           | -5.9               | -0.2                 |
| S Pen 4  | 2                           | 5                                     | 37.9         | 41.8         | 41.6                    | 41.8                                           | -5.4               | -0.2                 |
| S Pen 5  | 2                           | 5                                     | 40.1         | 43.2         | 42.6                    | 43.2                                           | -11.4              | 1.2                  |
| S Pen 6  | 2                           | 5                                     | 40.0         | 42.4         | 41.6                    | 42.5                                           | -15.9              | 2.5                  |
| S Pen 7  | 2                           | 5                                     | 35.7         | 38.4         | 38.0                    | 38.4                                           | -6.5               | 0.5                  |
| S Pen 8  | 2                           | 5                                     | 35.4         | 35.0         | 34.7                    | 35.1                                           | -7.7               | 1.5                  |
| S Pen 9  | 2                           | 5                                     | 33.3         | 33.7         | 33.3                    | 33.7                                           | -6.5               | 1.3                  |

## Acid Deposition

**Table 7: Model Results for Acid Deposition**

| Transect                        | Distance from Road Edge (m) | Total Nitrogen Acid Deposition (keq/ha/yr) |              |              |                         |                                                     | Change as % of CLo |                       |
|---------------------------------|-----------------------------|--------------------------------------------|--------------|--------------|-------------------------|-----------------------------------------------------|--------------------|-----------------------|
|                                 |                             | CLo                                        | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & and Emergi ng Local Plans | Alone (C-B)        | In Combin ation (D-B) |
| North Pennine Moors SAC and SPA |                             |                                            |              |              |                         |                                                     |                    |                       |
| N Pen A                         | 2                           | 0.348                                      | 1.8          | 1.8          | 1.8                     | 1.8                                                 | -2.6               | 7.1                   |
| N Pen B                         | 2                           | 0.348                                      | 1.9          | 1.8          | 1.8                     | 1.8                                                 | -2.7               | 7.1                   |
| N Pen C                         | 19.9                        | 0.348                                      | 1.3          | 1.2          | 1.2                     | 1.2                                                 | -0.9               | -0.2                  |
| N Pen D                         | 94.2                        | 0.348                                      | 1.3          | 1.2          | 1.2                     | 1.2                                                 | -0.2               | 0.0                   |
| South Pennine Moors SAC         |                             |                                            |              |              |                         |                                                     |                    |                       |
| S Pen A                         | 2                           | 0.569                                      | 1.5          | 1.5          | 1.4                     | 1.5                                                 | -4.0               | 1.4                   |
| S Pen B                         | 2                           | 0.569                                      | 1.5          | 1.6          | 1.5                     | 1.6                                                 | -5.7               | 2.0                   |
| S Pen C                         | 2                           | 0.569                                      | 1.8          | 1.7          | 1.6                     | 1.7                                                 | -1.8               | 1.5                   |
| S Pen D                         | 2                           | 0.569                                      | 1.8          | 1.7          | 1.7                     | 1.7                                                 | -2.0               | 1.7                   |
| S Pen E                         | 2                           | 0.569                                      | 1.6          | 1.5          | 1.5                     | 1.5                                                 | -1.2               | 1.0                   |
| S Pen F                         | 2                           | 0.569                                      | 1.8          | 1.7          | 1.6                     | 1.7                                                 | -1.8               | 1.5                   |
| S Pen G                         | 2                           | 0.569                                      | 1.5          | 1.4          | 1.4                     | 1.4                                                 | -1.2               | 1.3                   |
| S Pen H                         | 2                           | 0.569                                      | 1.5          | 1.5          | 1.5                     | 1.5                                                 | -2.2               | 2.4                   |
| S Pen I                         | 2                           | 0.569                                      | 1.5          | 1.6          | 1.5                     | 1.6                                                 | -7.4               | 0.0                   |
| S Pen J                         | 2                           | 0.569                                      | 1.6          | 1.7          | 1.6                     | 1.7                                                 | -10.2              | 0.0                   |
| S Pen K                         | 2.2                         | 0.569                                      | 1.3          | 1.3          | 1.3                     | 1.3                                                 | 0.1                | 0.2                   |
| S Pen L                         | 2                           | 0.569                                      | 1.4          | 1.3          | 1.3                     | 1.4                                                 | 0.7                | 1.7                   |
| S Pen M                         | 2.6                         | 0.569                                      | 1.5          | 1.4          | 1.4                     | 1.4                                                 | 0.5                | 2.7                   |
| S Pen N                         | 2                           | 0.569                                      | 1.6          | 1.4          | 1.4                     | 1.5                                                 | 0.1                | 3.0                   |
| S Pen O                         | 2                           | 0.569                                      | 1.7          | 1.6          | 1.6                     | 1.6                                                 | -1.0               | 4.1                   |
| S Pen P                         | 5.4                         | 0.569                                      | 1.6          | 1.5          | 1.5                     | 1.5                                                 | -0.7               | 3.9                   |
| S Pen Q                         | 12.7                        | 0.569                                      | 1.3          | 1.2          | 1.2                     | 1.2                                                 | 0.6                | 1.3                   |

| Transect                               | Distance from Road Edge (m) | Total Nitrogen Acid Deposition (keq/ha/yr) |              |              |                         |                                                | Change as % of CLo |                      |
|----------------------------------------|-----------------------------|--------------------------------------------|--------------|--------------|-------------------------|------------------------------------------------|--------------------|----------------------|
|                                        |                             | CLo                                        | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & Emerging Local Plans | Alone (C-B)        | In Combination (D-B) |
| S Pen R                                | 2                           | 0.569                                      | 1.4          | 1.3          | 1.3                     | 1.3                                            | 0.9                | 1.8                  |
| S Pen S                                | 2                           | 0.569                                      | 1.5          | 1.4          | 1.4                     | 1.4                                            | 1.7                | 3.3                  |
| S Pen 1                                | 2                           | 0.569                                      | 1.4          | 1.4          | 1.5                     | 1.4                                            | -0.7               | 0.7                  |
| S Pen 2                                | 2                           | 0.569                                      | 1.5          | 1.4          | 1.4                     | 1.4                                            | -3.7               | 1.0                  |
| S Pen 3                                | 2                           | 0.569                                      | 2.7          | 2.9          | 1.4                     | 2.9                                            | -5.2               | -0.1                 |
| S Pen 4                                | 2                           | 0.569                                      | 2.7          | 3.0          | 2.9                     | 3.0                                            | -3.7               | -0.1                 |
| S Pen 5                                | 2                           | 0.569                                      | 2.9          | 3.1          | 3.0                     | 3.1                                            | -3.4               | 0.7                  |
| S Pen 6                                | 2                           | 0.569                                      | 2.9          | 3.0          | 3.0                     | 3.0                                            | -7.2               | 1.6                  |
| S Pen 7                                | 2                           | 0.569                                      | 2.6          | 2.7          | 3.0                     | 2.7                                            | -10.0              | 0.3                  |
| S Pen 8                                | 2                           | 0.569                                      | 2.5          | 2.5          | 2.7                     | 2.5                                            | -4.1               | 1.0                  |
| S Pen 9                                | 2                           | 0.569                                      | 2.4          | 2.4          | 2.5                     | 2.4                                            | -4.9               | 0.8                  |
| <b>South Pennine Moors Phase 2 SPA</b> |                             |                                            |              |              |                         |                                                |                    |                      |
| S Pen A                                | 2                           | 0.368                                      | 1.5          | 1.5          | 1.4                     | 1.5                                            | -6.1               | 2.2                  |
| S Pen B                                | 2                           | 0.368                                      | 1.5          | 1.6          | 1.5                     | 1.6                                            | -8.9               | 3.2                  |
| S Pen C                                | 2                           | 0.368                                      | 1.8          | 1.7          | 1.6                     | 1.7                                            | -2.8               | 2.4                  |
| S Pen D                                | 2                           | 0.368                                      | 1.8          | 1.7          | 1.7                     | 1.7                                            | -3.1               | 2.6                  |
| S Pen E                                | 2                           | 0.368                                      | 1.6          | 1.5          | 1.5                     | 1.5                                            | -1.9               | 1.6                  |
| S Pen F                                | 2                           | 0.368                                      | 1.8          | 1.7          | 1.6                     | 1.7                                            | -2.7               | 2.4                  |
| S Pen G                                | 2                           | 0.368                                      | 1.5          | 1.4          | 1.4                     | 1.4                                            | -1.9               | 2.1                  |
| S Pen H                                | 2                           | 0.368                                      | 1.5          | 1.5          | 1.5                     | 1.5                                            | -3.4               | 3.7                  |
| S Pen I                                | 2                           | 0.368                                      | 1.5          | 1.6          | 1.5                     | 1.6                                            | -11.5              | -0.1                 |
| S Pen J                                | 2                           | 0.368                                      | 1.6          | 1.7          | 1.6                     | 1.7                                            | -15.8              | -0.1                 |
| S Pen K                                | 2.2                         | 0.368                                      | 1.3          | 1.3          | 1.3                     | 1.3                                            | 0.2                | 0.3                  |
| S Pen L                                | 2                           | 0.368                                      | 1.4          | 1.3          | 1.3                     | 1.4                                            | 1.1                | 2.7                  |
| S Pen M                                | 2.6                         | 0.368                                      | 1.5          | 1.4          | 1.4                     | 1.4                                            | 0.8                | 4.2                  |

| Transect | Distance from Road Edge (m) | Total Nitrogen Acid Deposition (keq/ha/yr) |              |              |                         |                                                | Change as % of CLo |                      |
|----------|-----------------------------|--------------------------------------------|--------------|--------------|-------------------------|------------------------------------------------|--------------------|----------------------|
|          |                             | CLo                                        | A) 2023 Base | B) 2043 Base | C) 2043 With Local Plan | D) 2043 With Local Plan & Emerging Local Plans | Alone (C-B)        | In Combination (D-B) |
| S Pen N  | 2                           | 0.368                                      | 1.6          | 1.4          | 1.4                     | 1.5                                            | 0.2                | 4.6                  |
| S Pen O  | 2                           | 0.368                                      | 1.7          | 1.6          | 1.6                     | 1.6                                            | -1.6               | 6.3                  |
| S Pen P  | 5.4                         | 0.368                                      | 1.6          | 1.5          | 1.5                     | 1.5                                            | -1.1               | 6.1                  |
| S Pen Q  | 12.7                        | 0.368                                      | 1.3          | 1.2          | 1.2                     | 1.2                                            | 1.0                | 1.9                  |
| S Pen R  | 2                           | 0.368                                      | 1.4          | 1.3          | 1.3                     | 1.3                                            | 1.4                | 2.8                  |
| S Pen S  | 2                           | 0.368                                      | 1.5          | 1.4          | 1.4                     | 1.4                                            | 2.6                | 5.1                  |
| S Pen 1  | 2                           | 0.368                                      | 1.4          | 1.4          | 1.4                     | 1.4                                            | -5.7               | 1.2                  |
| S Pen 2  | 2                           | 0.368                                      | 1.5          | 1.4          | 1.4                     | 1.4                                            | -8.0               | 1.6                  |
| S Pen 3  | 2                           | 0.368                                      | 2.7          | 2.9          | 2.9                     | 2.9                                            | -5.7               | -0.2                 |
| S Pen 4  | 2                           | 0.368                                      | 2.7          | 3.0          | 3.0                     | 3.0                                            | -5.3               | -0.2                 |
| S Pen 5  | 2                           | 0.368                                      | 2.9          | 3.1          | 3.0                     | 3.1                                            | -11.1              | 1.2                  |
| S Pen 6  | 2                           | 0.368                                      | 2.9          | 3.0          | 3.0                     | 3.0                                            | -15.5              | 2.4                  |
| S Pen 7  | 2                           | 0.368                                      | 2.6          | 2.7          | 2.7                     | 2.7                                            | -6.3               | 0.5                  |
| S Pen 8  | 2                           | 0.368                                      | 2.5          | 2.5          | 2.5                     | 2.5                                            | -7.5               | 1.5                  |
| S Pen 9  | 2                           | 0.368                                      | 2.4          | 2.4          | 2.4                     | 2.4                                            | -6.3               | 1.3                  |

## Summary

4.6 Table 8 summarises the air quality predictions at the worst-case location within each designated site. As explained in Paragraph 2.11, the potential for significant adverse effects can be ruled out wherever the PC is less than 1% of the CLe/CLo or the PEC is less than the relevant CLe/CLo. For HRAs, the test against the PEC may also need to be described within an appropriate assessment, but Table 8 nevertheless summarises which impacts can ultimately be disregarded solely on the basis of the air quality predictions. Table 8 does not screen out impacts where there is an adverse change in combination even if the change in isolation is beneficial. It therefore provides a highly precautionary summary.

**Table 8: Summary of Air Quality Predictions**

| Pollutant                                      | CLe/<br>CLo | PC Alone<br><1% of<br>CLe/CLo | PC In<br>Combination<br><1% of<br>CLe/CLo | PEC <<br>CLe/CLo | Screens Out |
|------------------------------------------------|-------------|-------------------------------|-------------------------------------------|------------------|-------------|
| <b>North Pennine Moors SAC and SPA</b>         |             |                               |                                           |                  |             |
| Annual Mean NO <sub>x</sub>                    | 30          | Y                             | Y                                         | Y                | Y           |
| Annual Mean NH <sub>3</sub>                    | 1           | Y                             | N                                         | N                | N           |
| Nitrogen Deposition                            | 5           | Y                             | N                                         | N                | N           |
| Acid Deposition                                | 0.348       | Y                             | N                                         | N                | N           |
| <b>South Pennine Moors SAC and Phase 2 SPA</b> |             |                               |                                           |                  |             |
| NO <sub>x</sub>                                | 30          | Y                             | Y                                         | Y                | Y           |
| NH <sub>3</sub>                                | 1           | N                             | N                                         | N                | N           |
| Nitrogen Deposition                            | 5           | N                             | N                                         | N                | N           |
| Acid Deposition to<br>the SAC                  | 0.569       | N                             | N                                         | N                | N           |
| Acid Deposition to<br>the Phase 2 SPA          | 0.368       | N                             | N                                         | N                | N           |

4.7 On the basis of the observations in Table 8, it is possible to discount the impacts on annual mean NO<sub>x</sub> at all sites. It is not possible to discount the following impacts in all areas of the sites:

- North Pennine Moors SAC and SPA - NH<sub>3</sub> concentrations, nitrogen deposition and acid deposition; and,
- South Pennine Moors SAC and Phase 2 SPA - NH<sub>3</sub> concentrations, nitrogen deposition and acid deposition.

4.8 For these sites/pollutants, further assessment is provided by Footprint Ecology. Notwithstanding this, it is noted that the Local Plan alone has only beneficial effects on concentrations and deposition over the whole of the North Pennine Moors, and at all but seven transects (K, L, M, N, Q, R, and S; see Figure 5 to Figure 9) in the South Pennine Moors.

## 5 Isopleths

- 5.1 As the assessment has been unable to classify all of the impacts as insignificant (as shown in Table 8), isopleths have been plotted to show the areas over which the 1% of CLe/CLo screening criterion is exceeded. These are presented in Figure 10 to Figure 39, below. Isopleths are shown wherever the 1% criterion is exceeded within a habitat, even where the potential for a significant effect has already been discounted on the basis that the total does not exceed the CLe or CLo. Isopleths are not shown if the 1% criterion is not exceeded and therefore most of the isopleths relate only to impacts in-combination. It should be reiterated that exceeding the 1% criterion does not mean that there will be a significant effect. It simply means that impacts cannot be screened out at this stage. However, the potential for significant effects in-combination can be discounted to all areas outside the lines shown in Figure 10 to Figure 39. More detailed contours have also been provided to Footprint Ecology to inform the HRA.
- 5.2 It should be noted that these plots are intended to show impacts within the designated sites; outside of the designated sites, the isopleths will be less accurate.

### Ammonia



**Figure 10: Areas Exceeding 1% of CLe In-Combination in North Pennine Moors**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

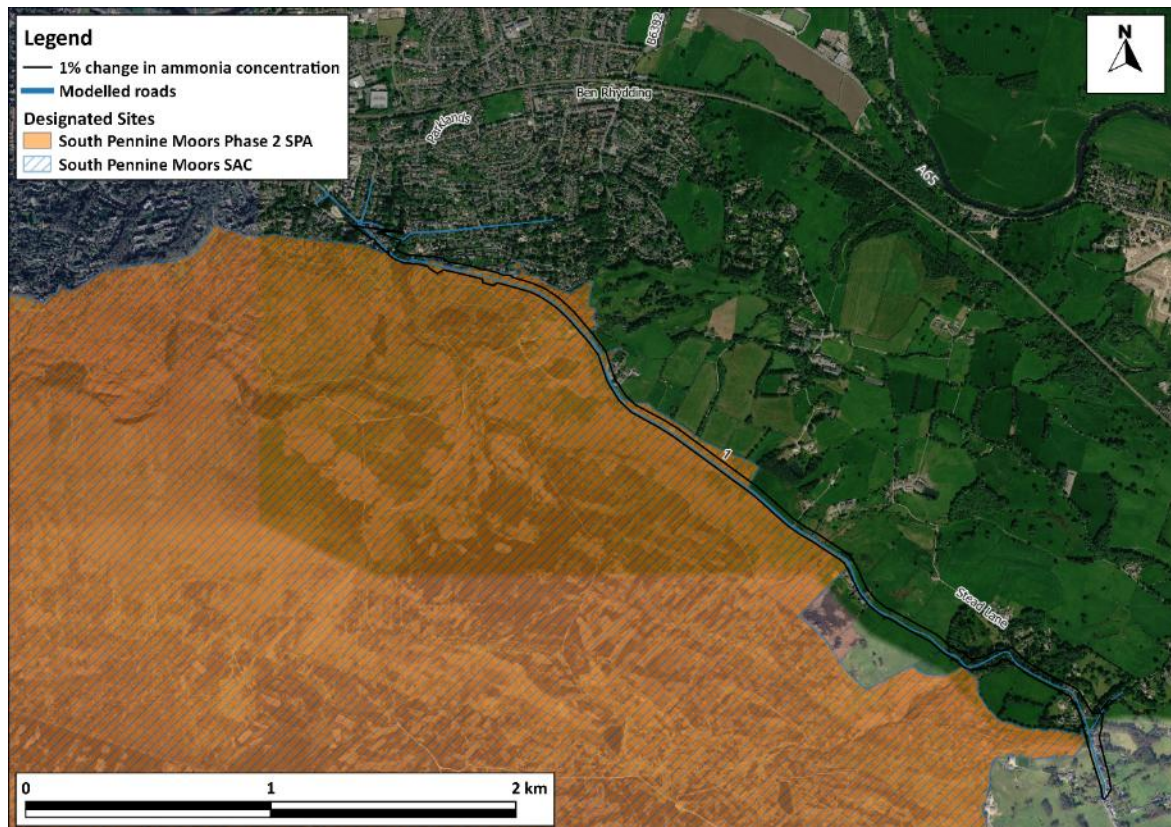


**Figure 11: Areas Exceeding 1% of CLe In-Isolation in South Pennine Moors at Ilkley Moor**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

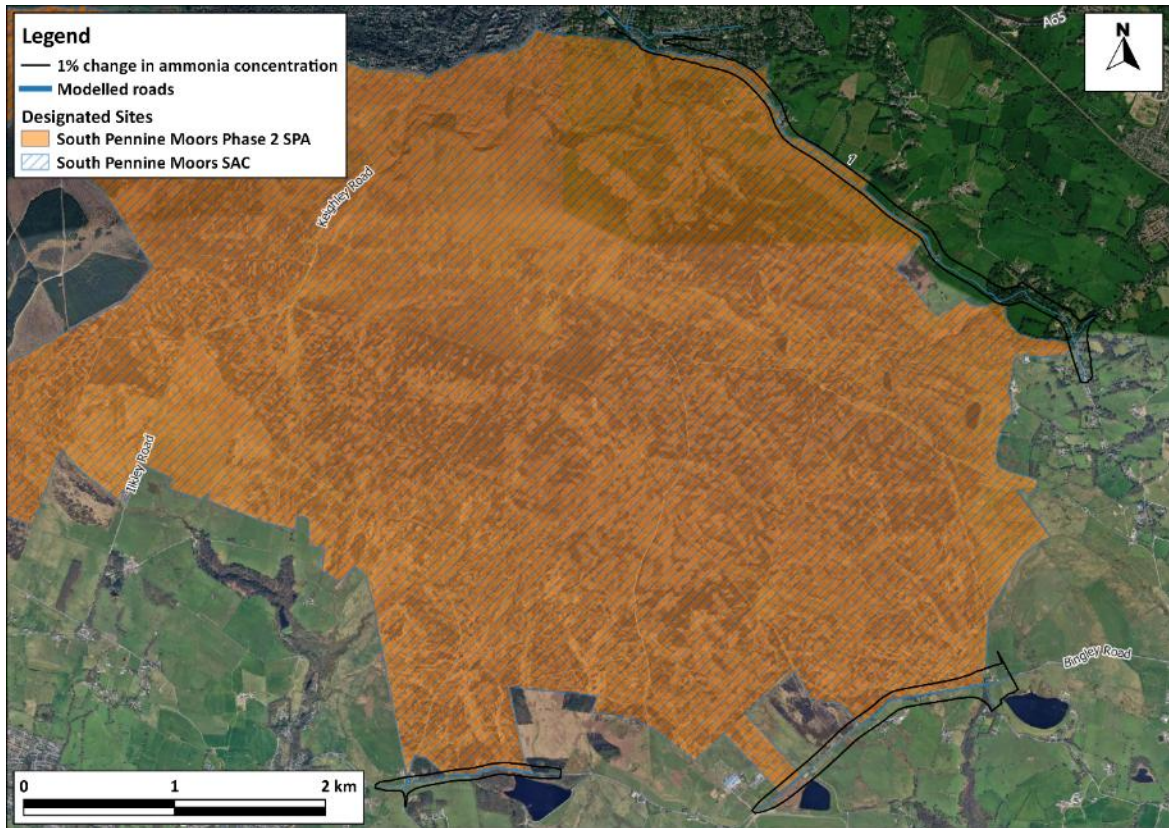


**Figure 12: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors at Ilkley Moor**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

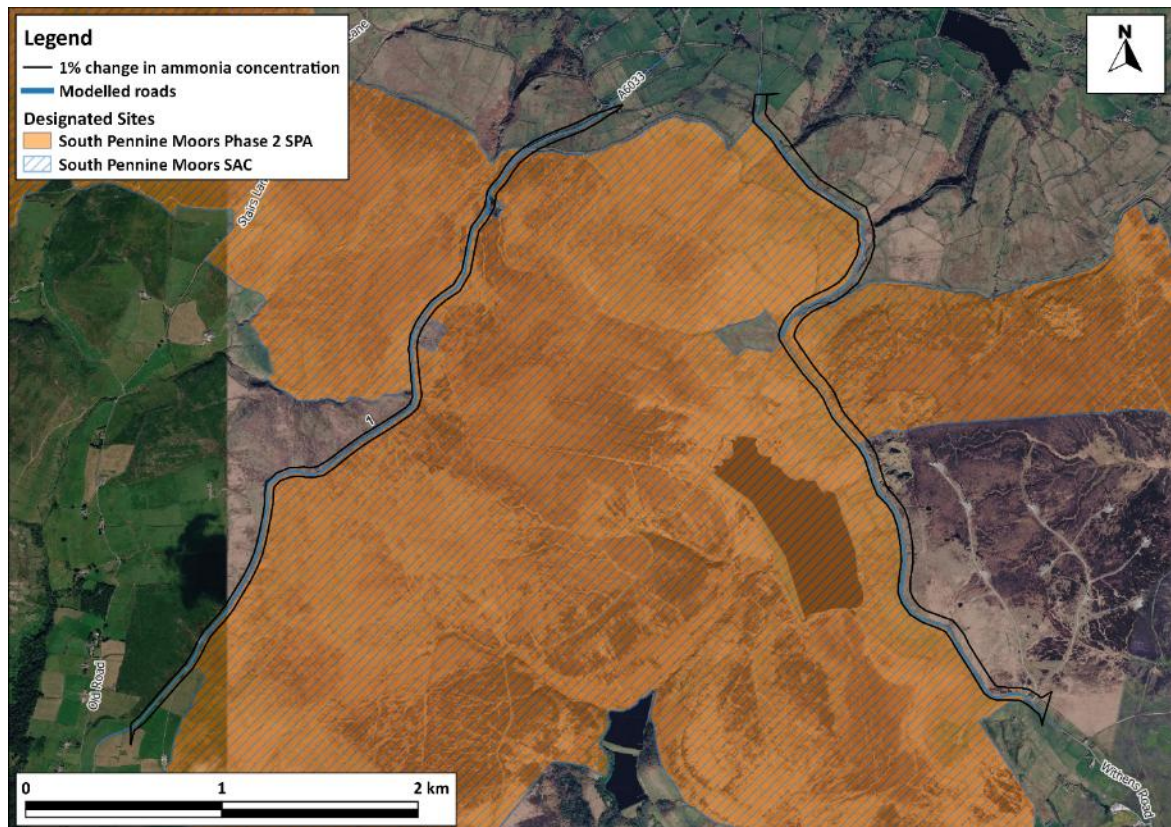


**Figure 13: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (eastern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

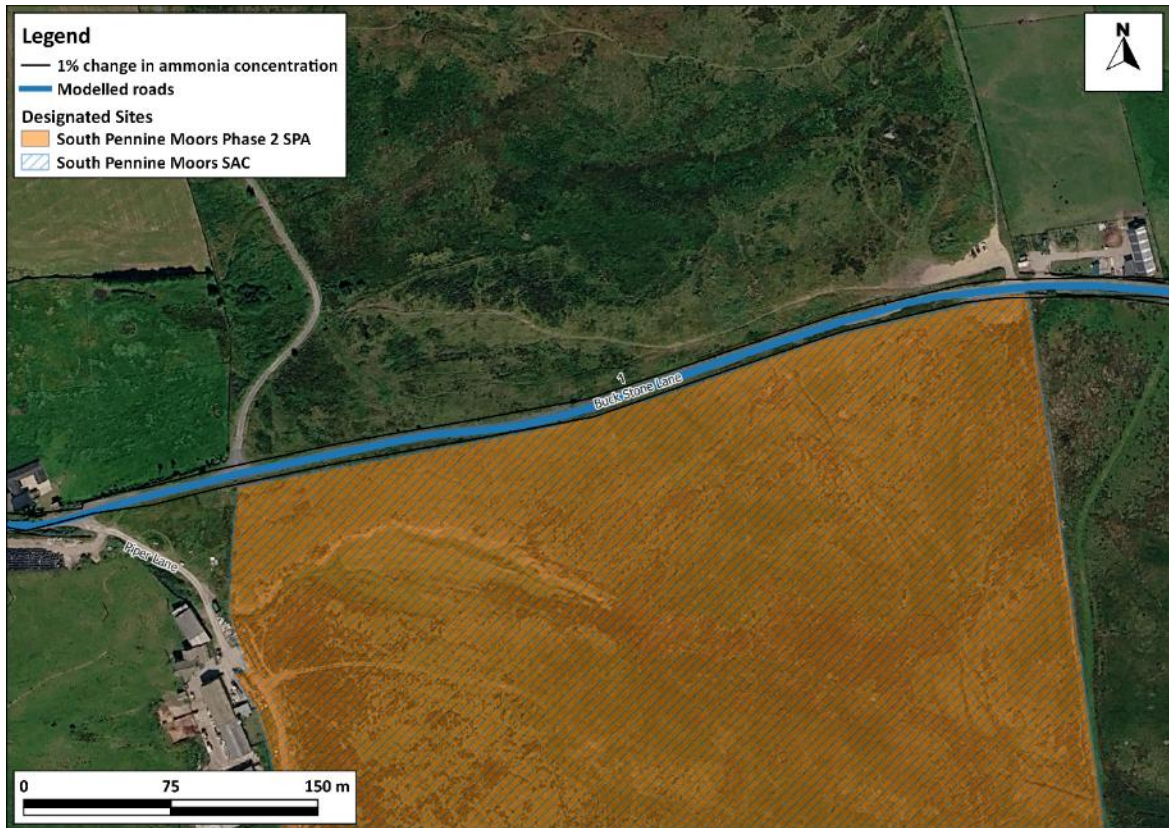


**Figure 14: Areas Exceeding 1% of CLe In-Isolation in South Pennine Moors (northern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

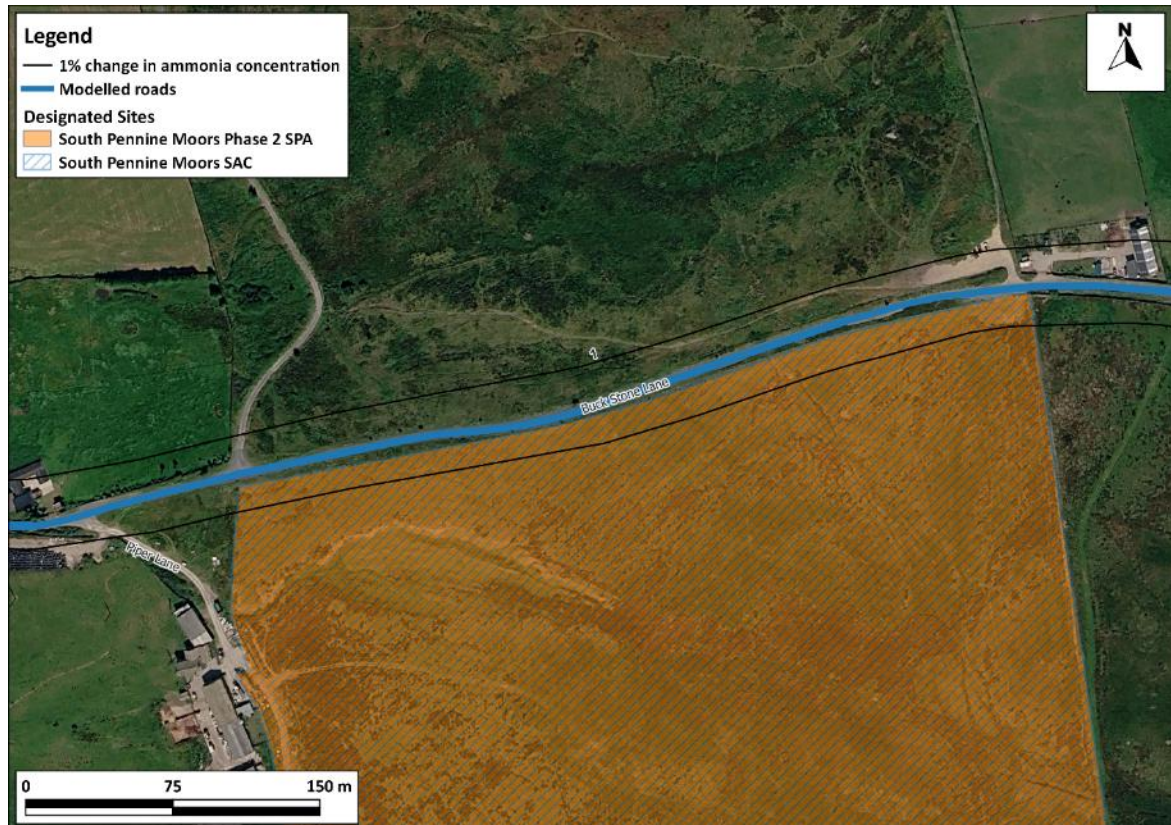


**Figure 15: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (northern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

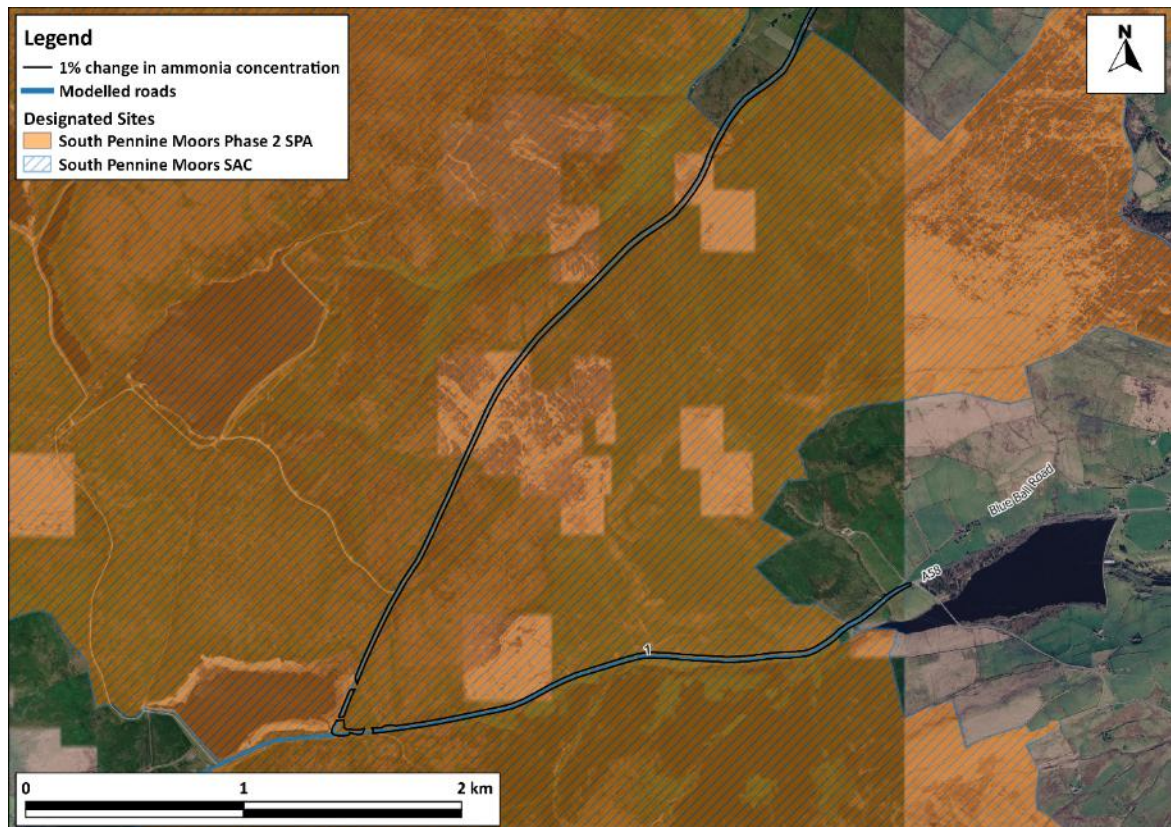


**Figure 16: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (southern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

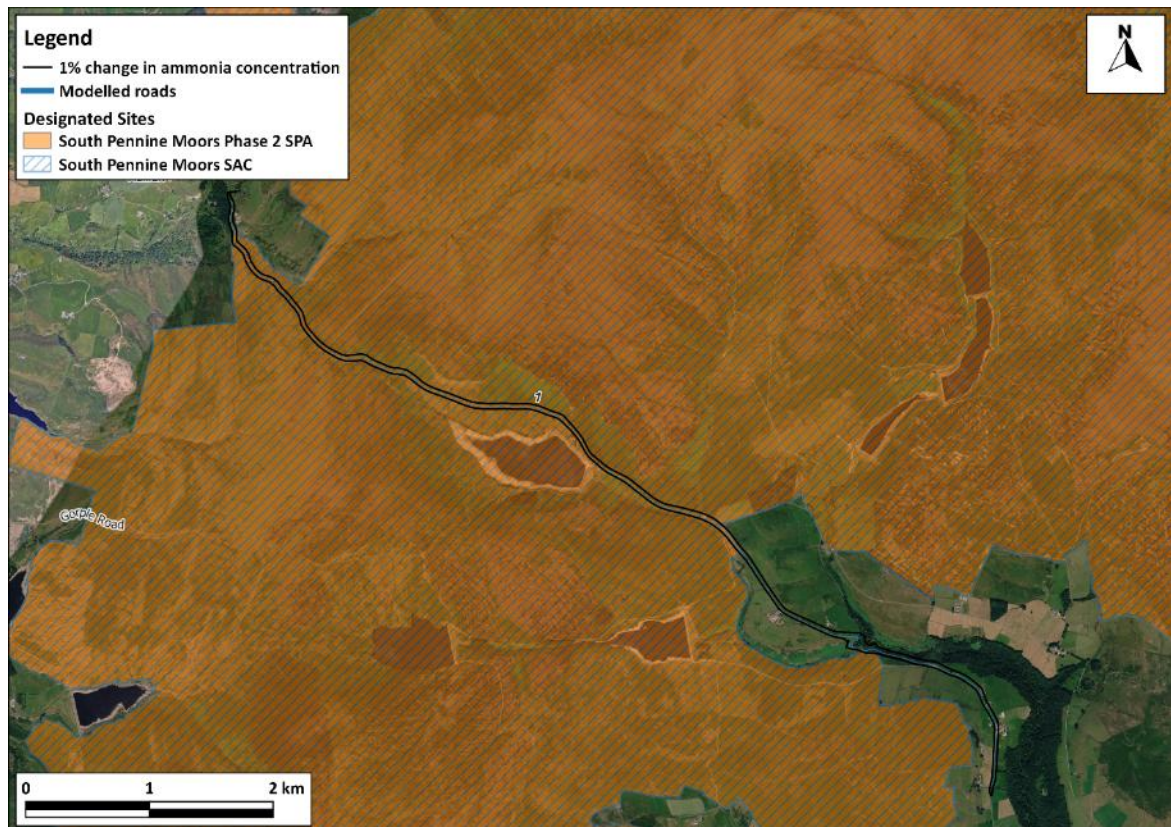


**Figure 17: Areas Exceeding 1% of CLe In-Combination in South Pennine Moors (western area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

## Nitrogen Deposition



**Figure 18: Areas Exceeding 1% of CLo In-Combination in North Pennine Moors**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

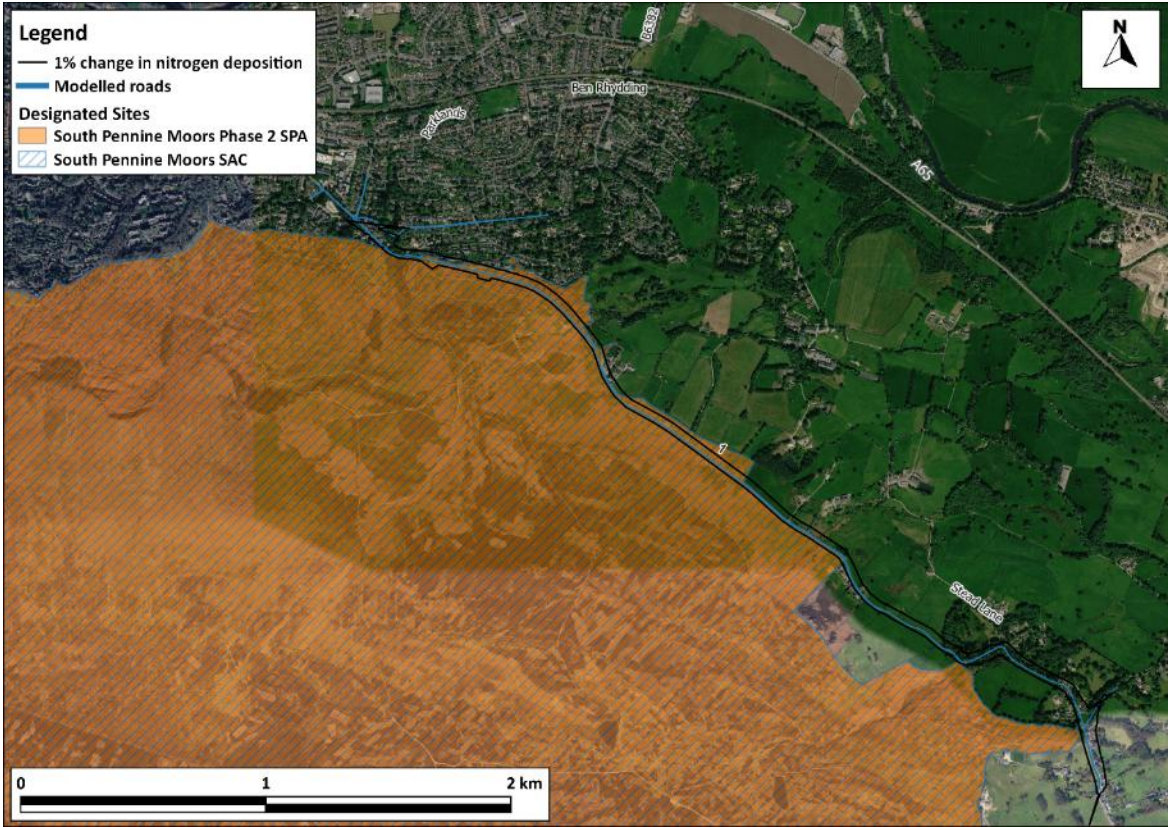


Figure 19: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors at Ilkley Moor

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

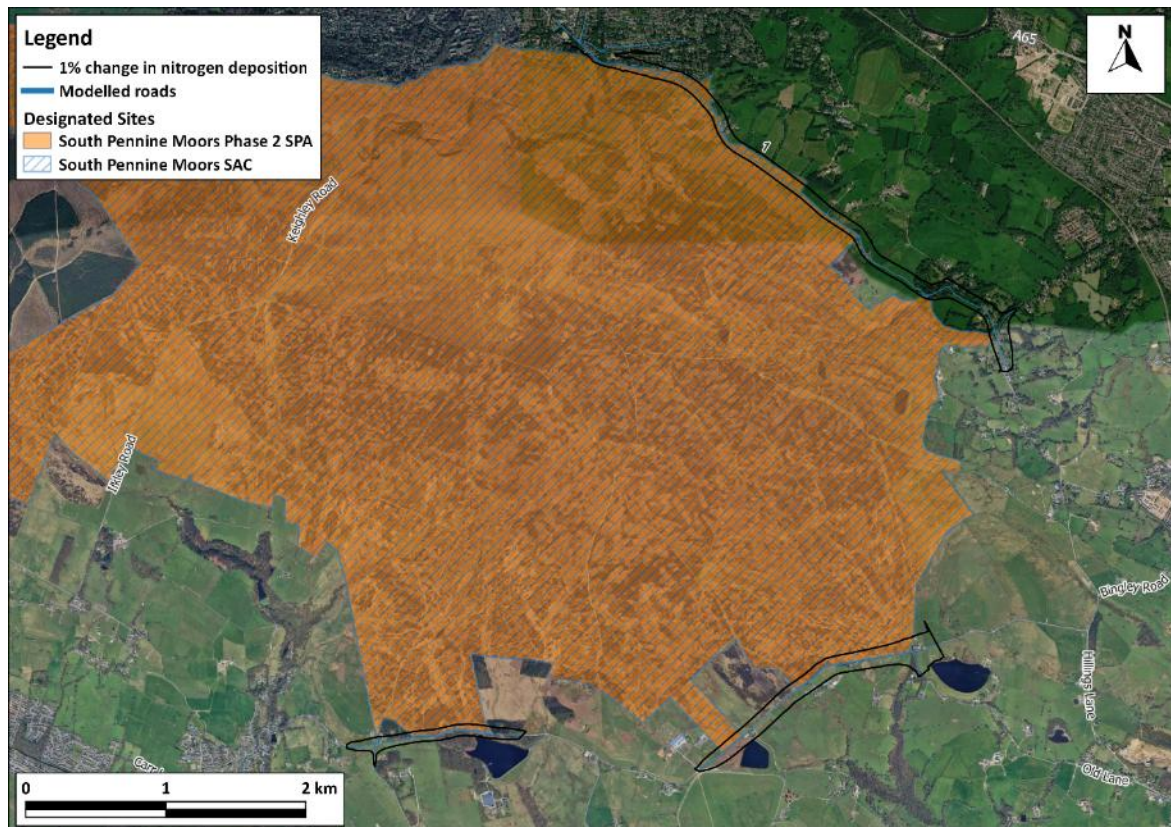


**Figure 20: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors at Ilkley Moor**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

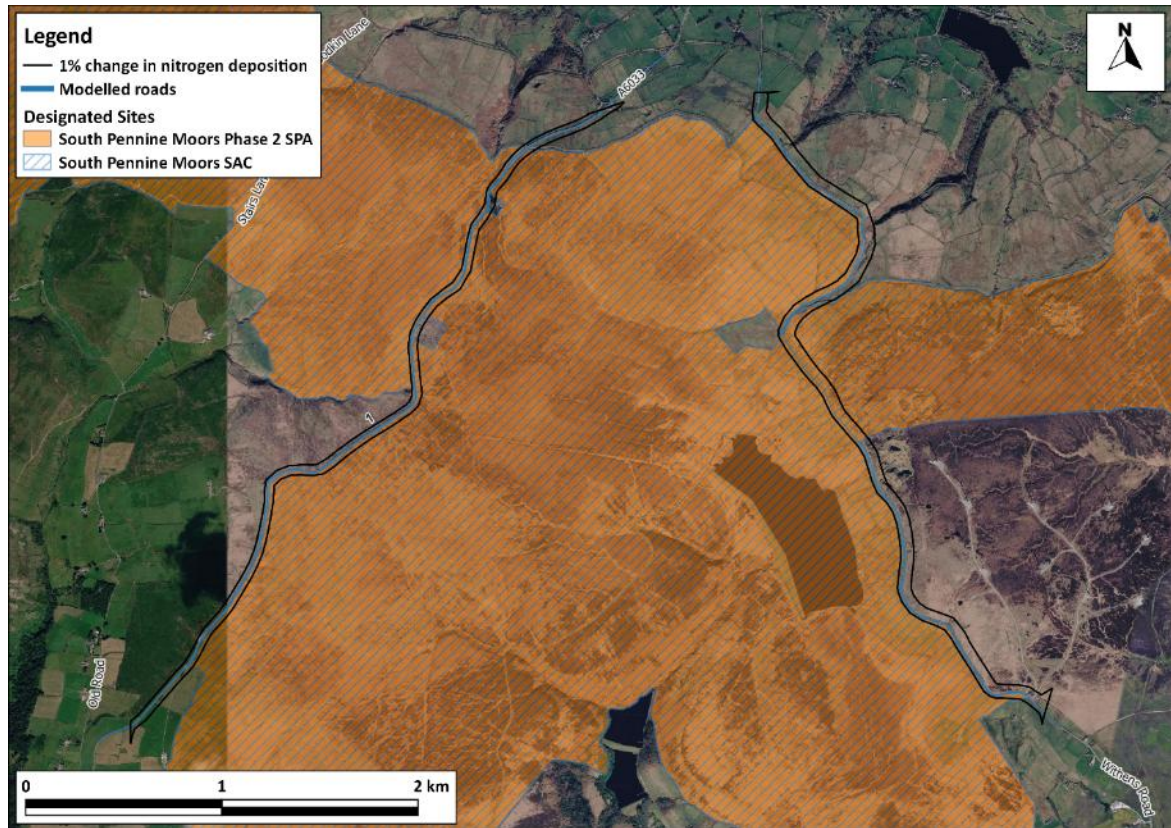


**Figure 21: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (eastern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

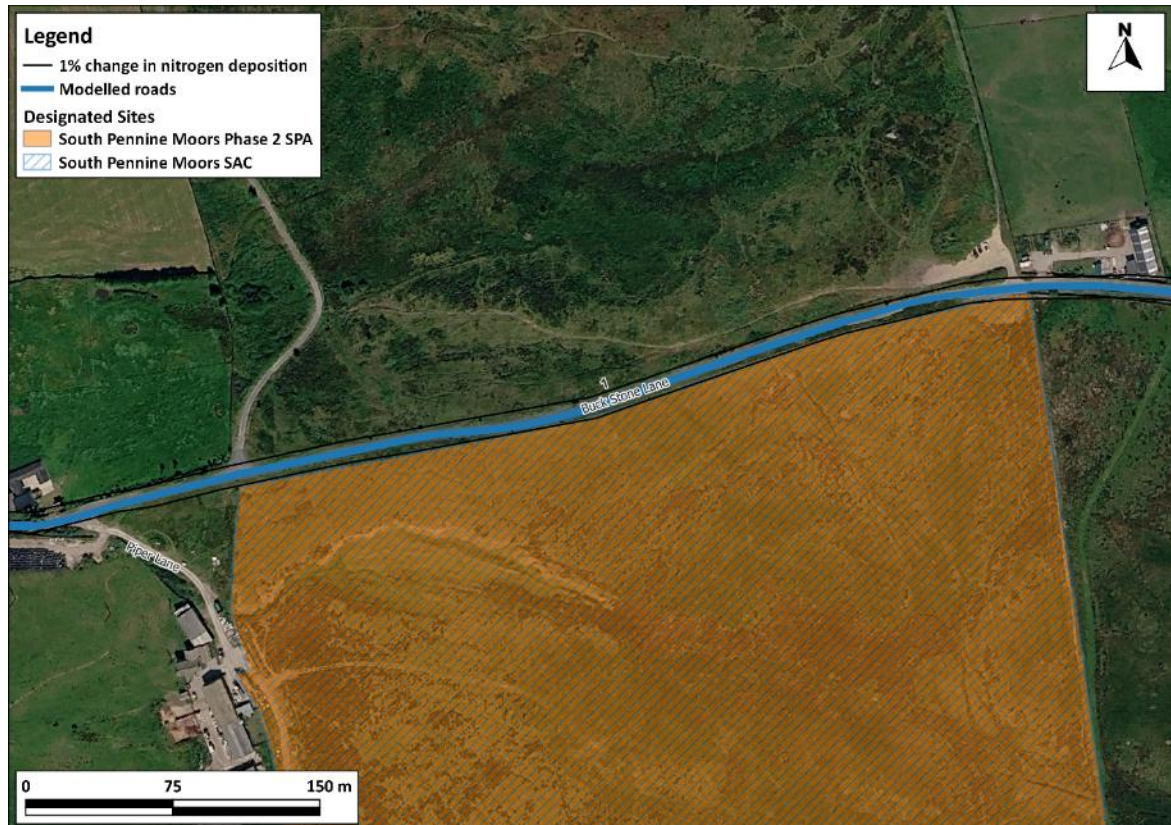


**Figure 22: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors (northern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

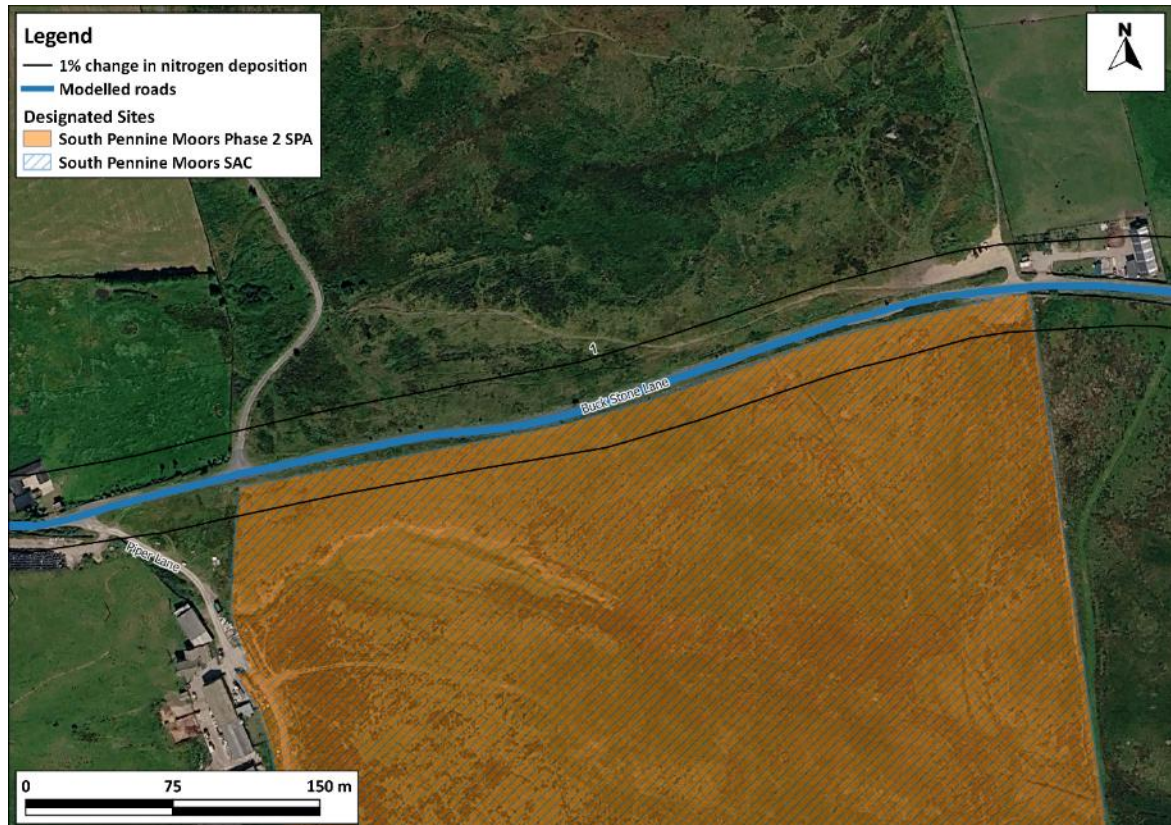


**Figure 23: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (northern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

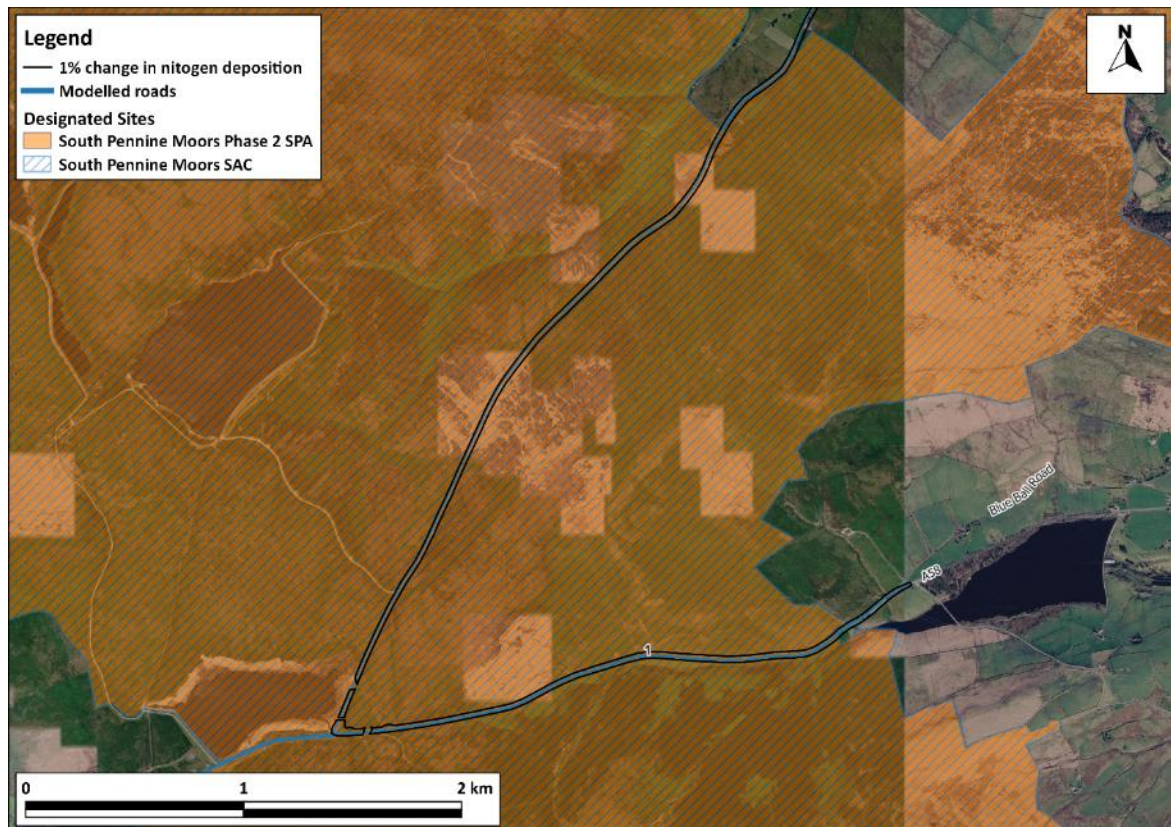


**Figure 24: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (southern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

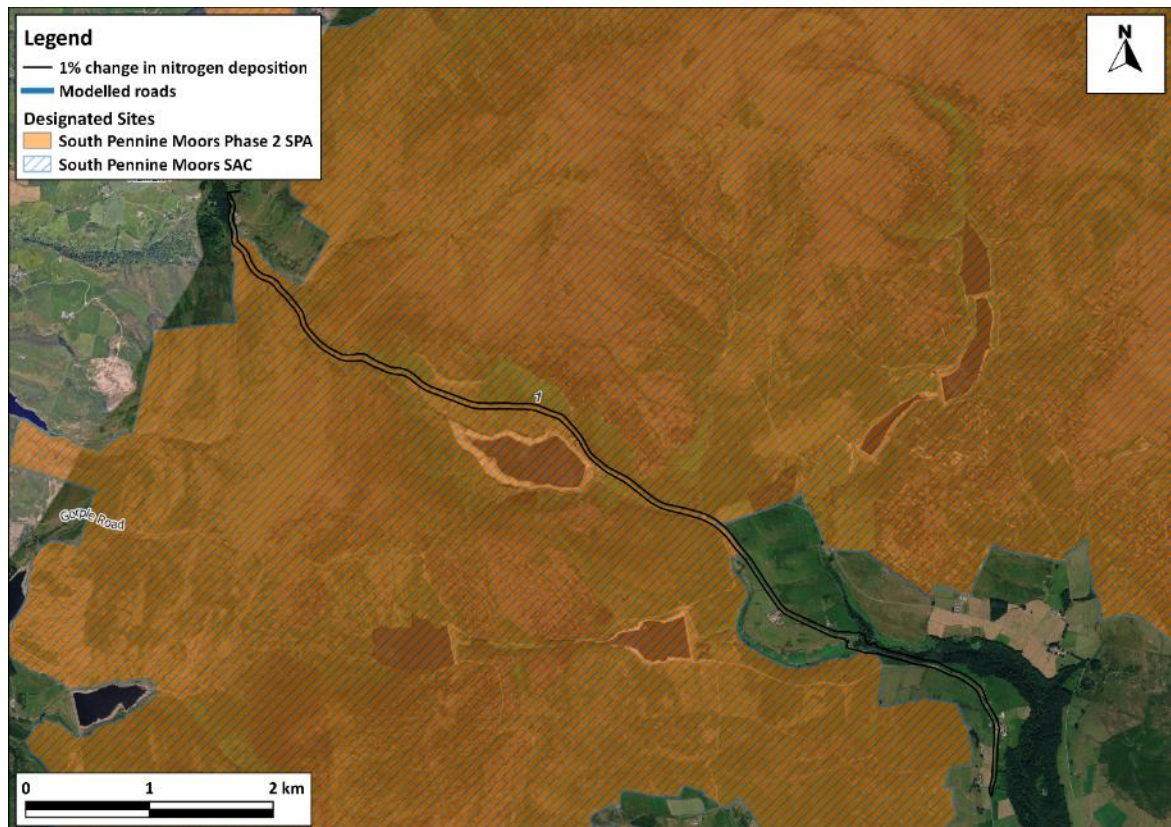


**Figure 25: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (western area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

## Acid Deposition

### *Acid Disposition at the North Pennine Moors SAC and SPA*



**Figure 26: Areas Exceeding 1% of CLo In-Combination in North Pennine Moors**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

### Acid Disposition at the South Pennine Moors SAC

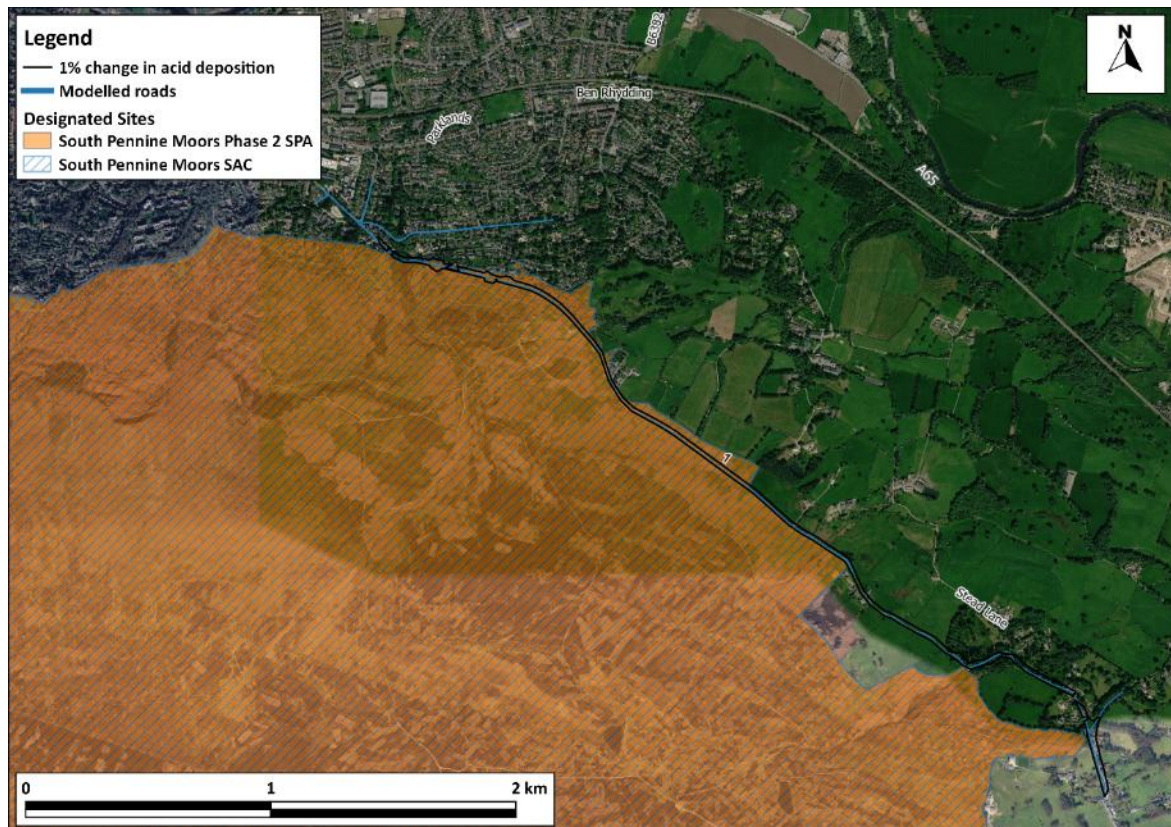


**Figure 27: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors at Ilkley Moor at the SAC**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

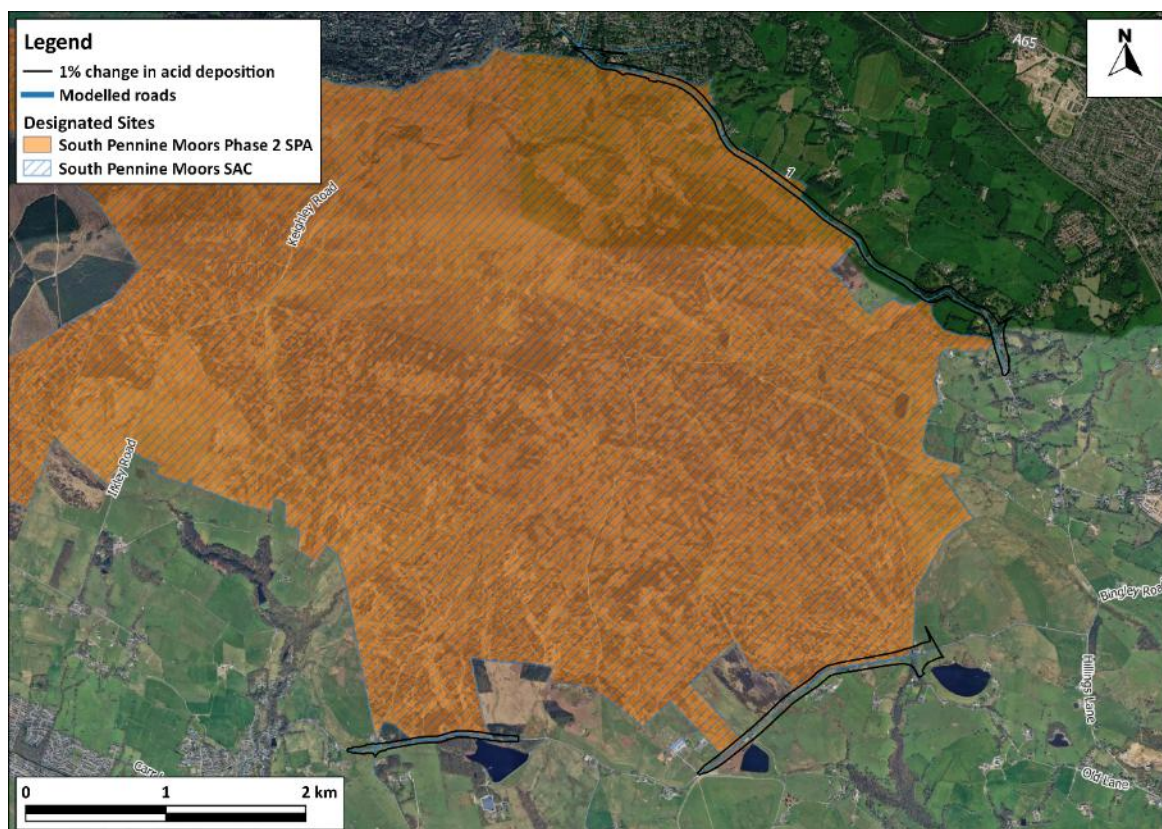


**Figure 28: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors at Ilkley Moor at the SAC**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

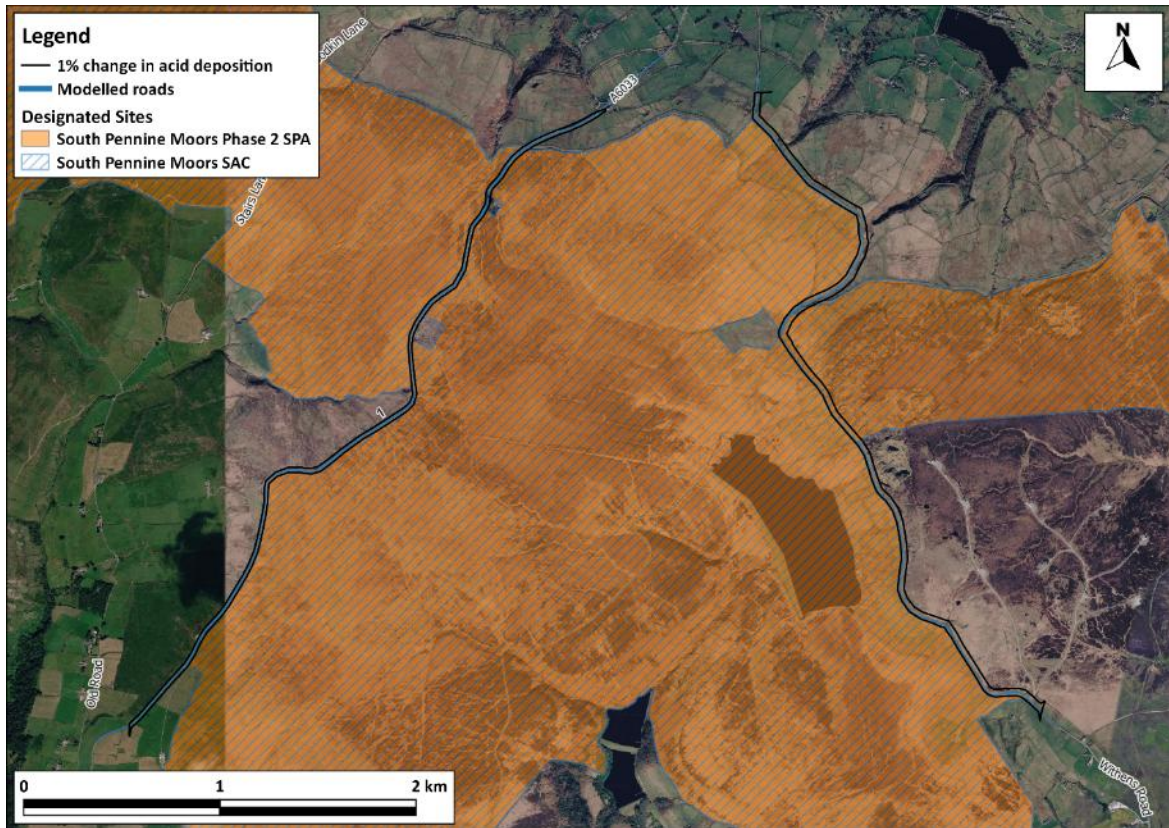


**Figure 29: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (eastern area) at the SAC**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

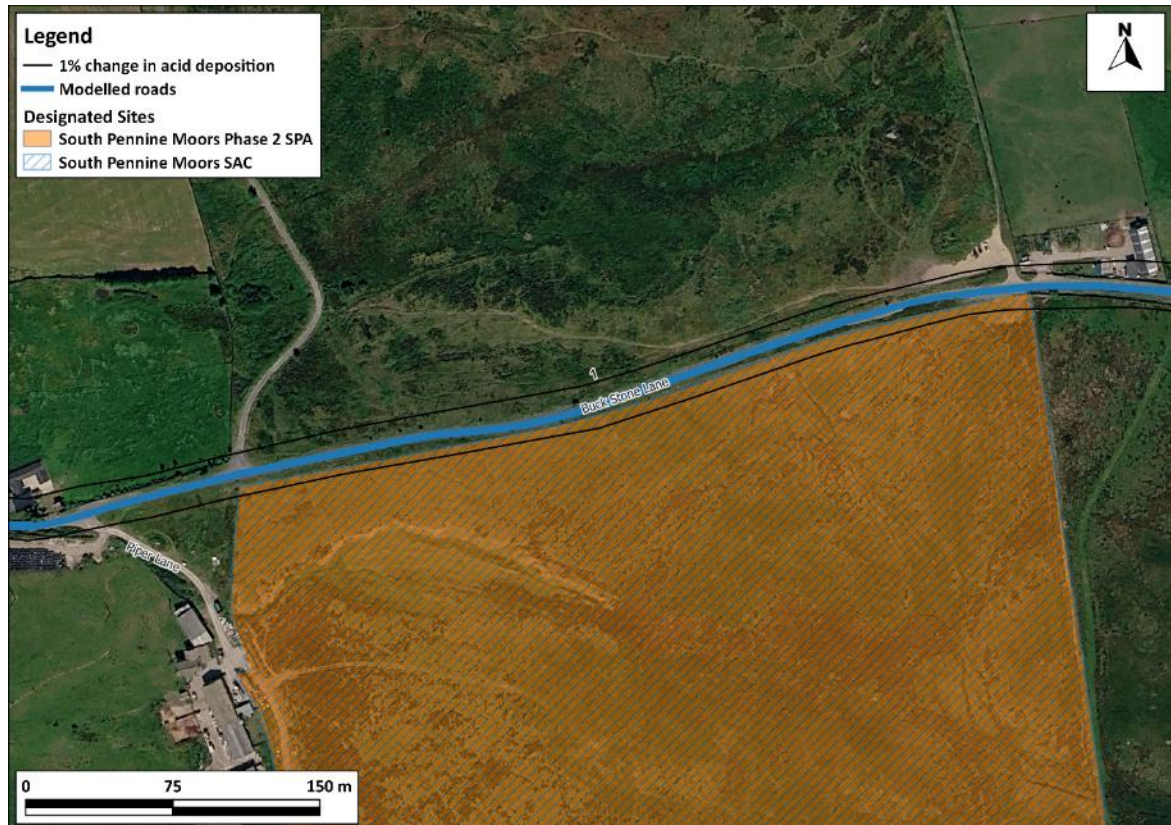


**Figure 30: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (northern area) at the SAC**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

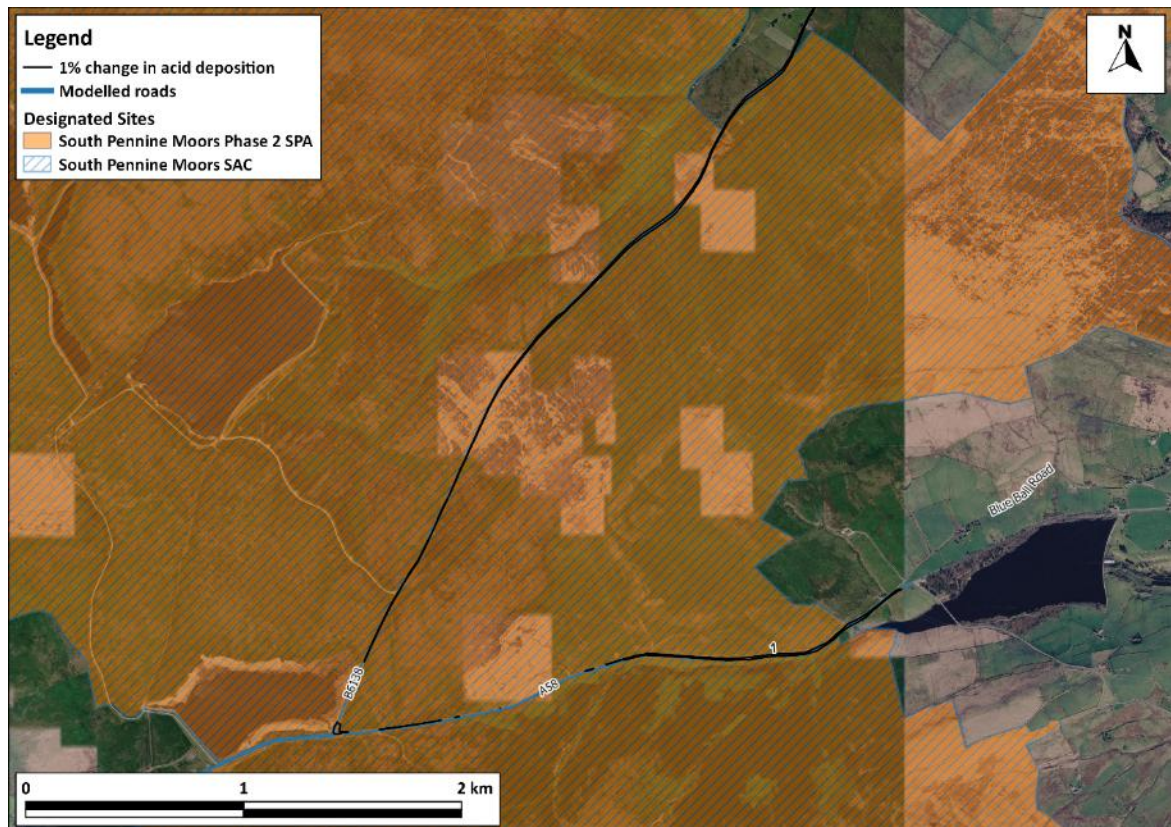


**Figure 31: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (southern area) at the SAC**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

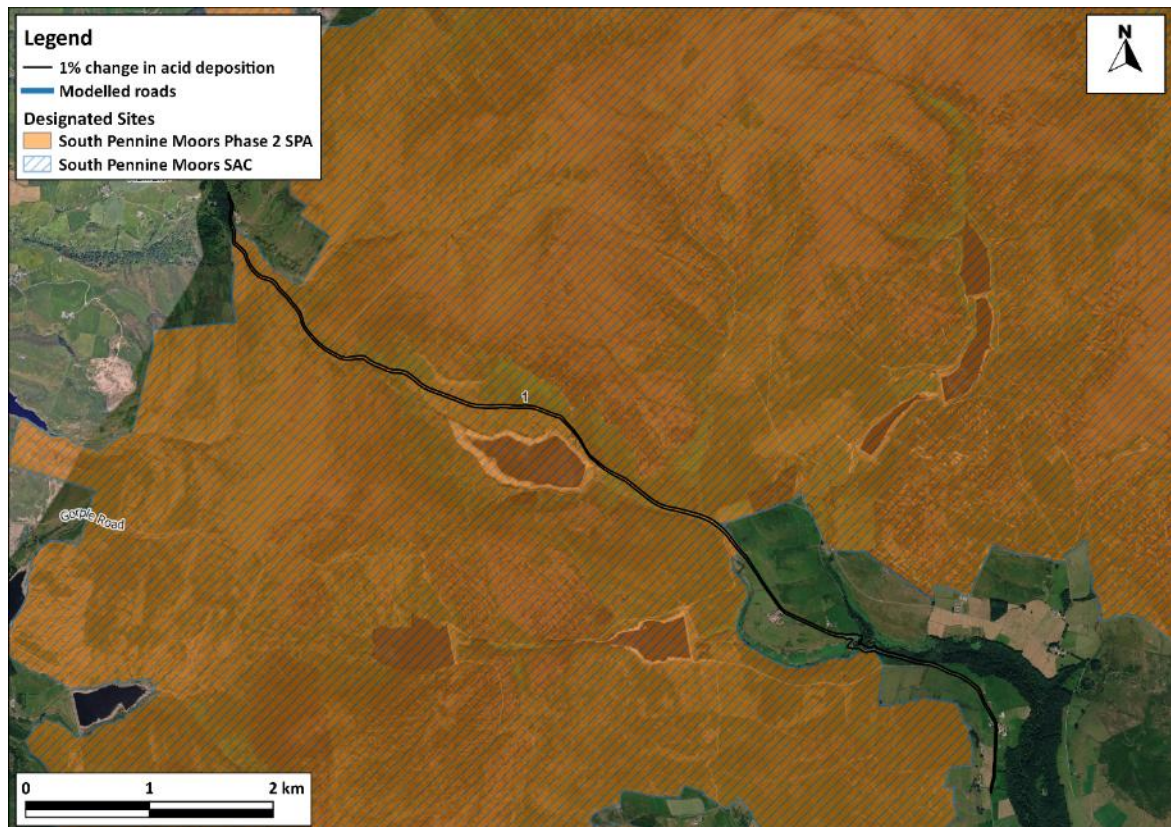


**Figure 32: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (western area) at the SAC**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

### Acid Disposition at the South Pennine Moors Phase 2 SPA

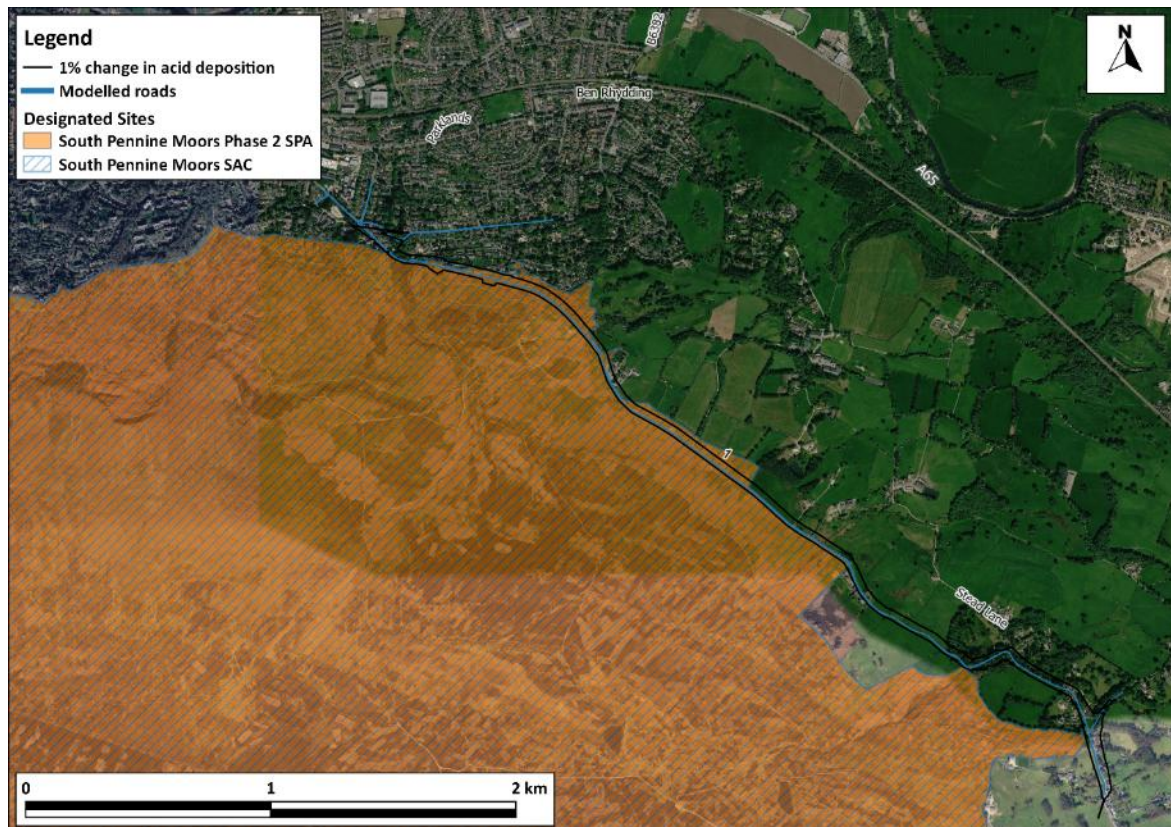


**Figure 33: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors at Ilkley Moor at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

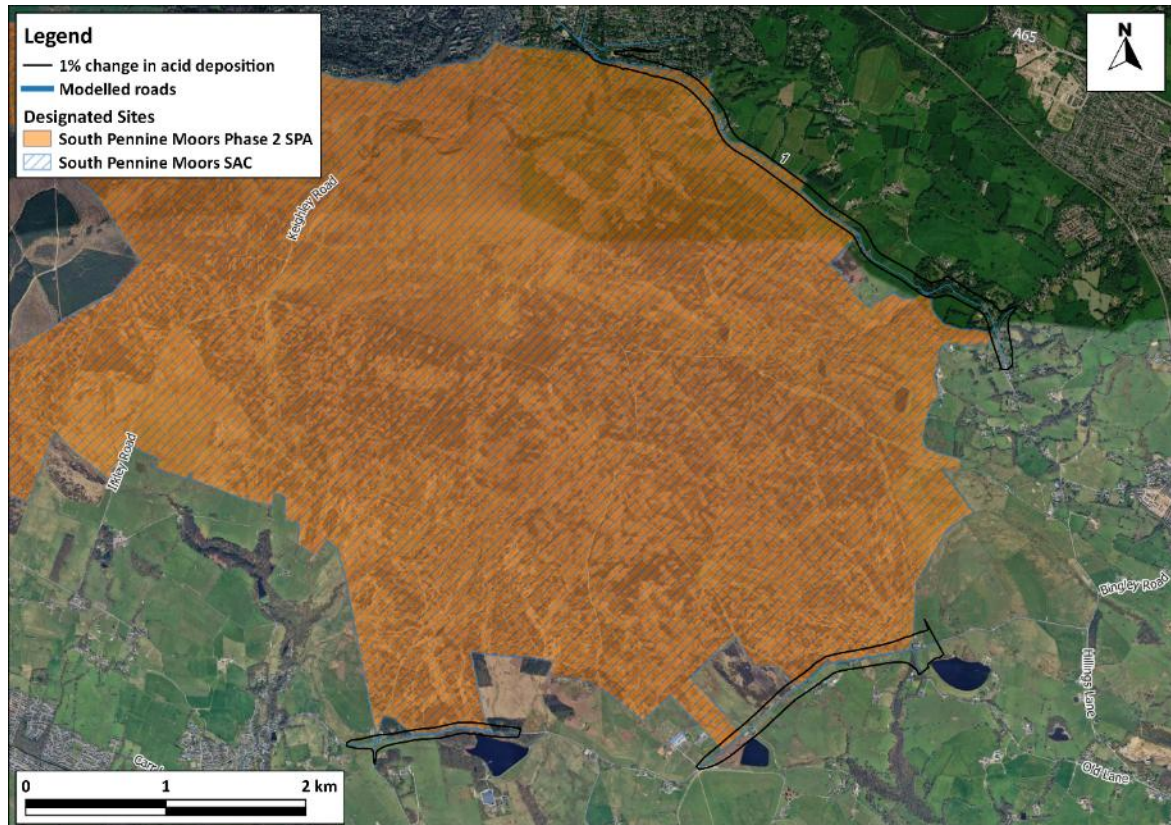


**Figure 34: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors at Ilkley Moor at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

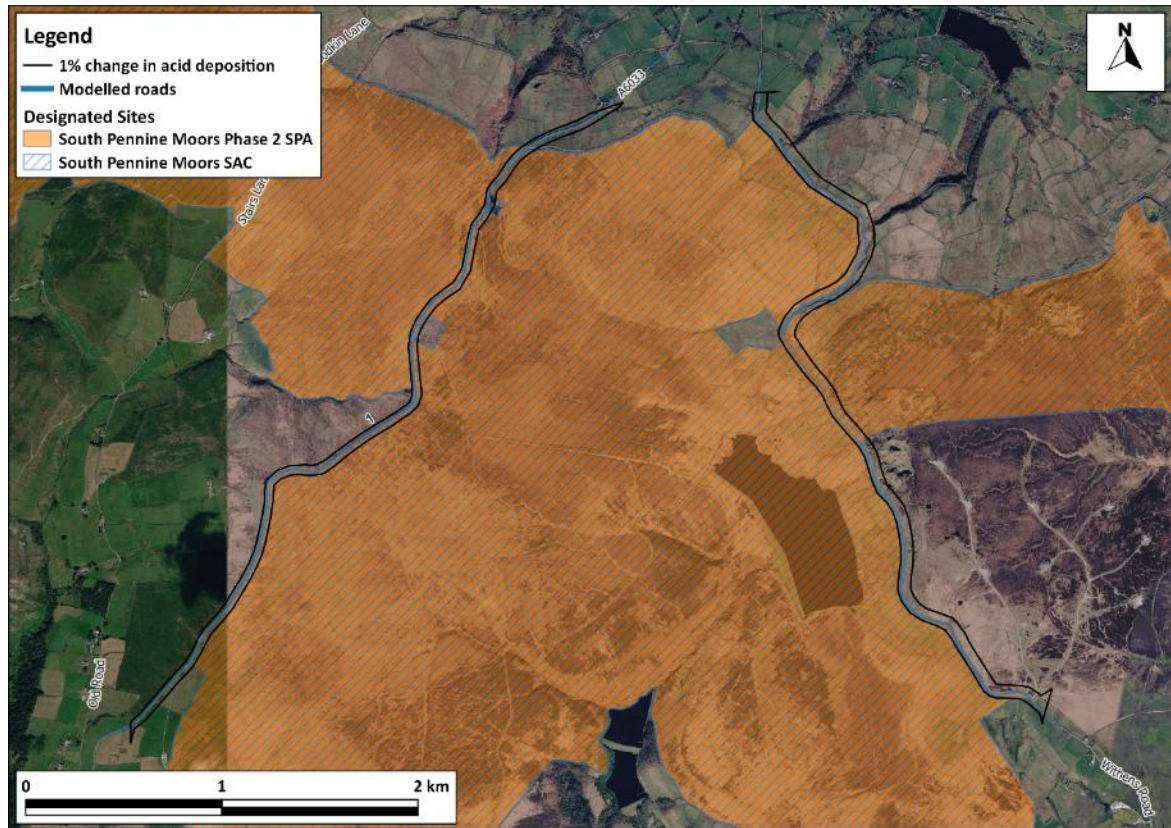


**Figure 35: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (eastern area) at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

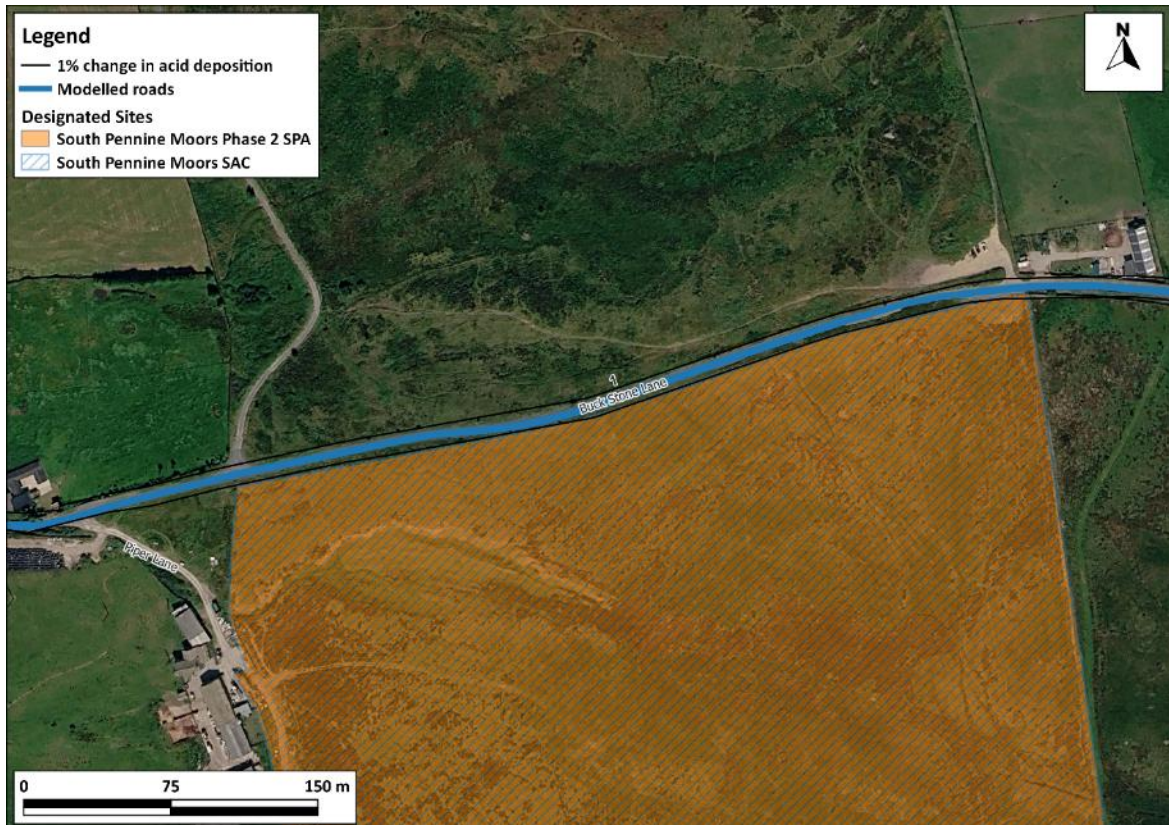


**Figure 36: Areas Exceeding 1% of CLo In-Isolation in South Pennine Moors (northern area) at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

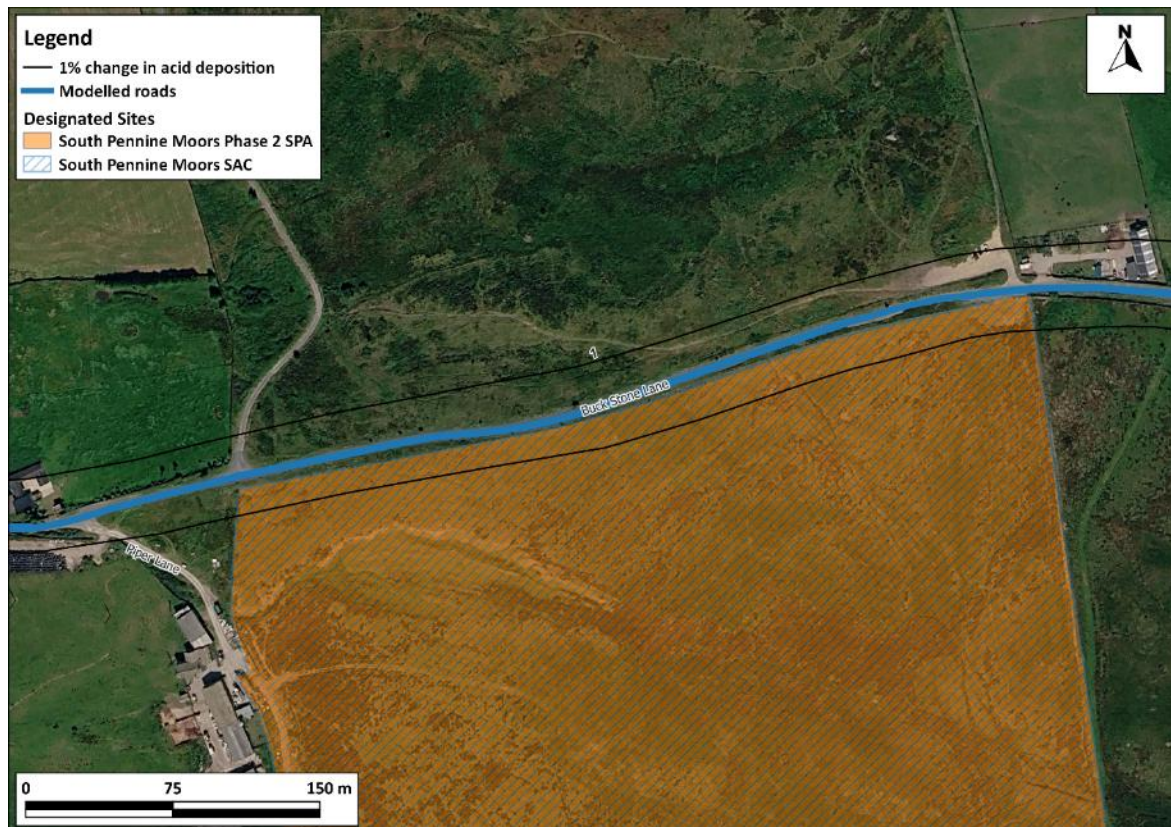


**Figure 37: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (northern area) at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

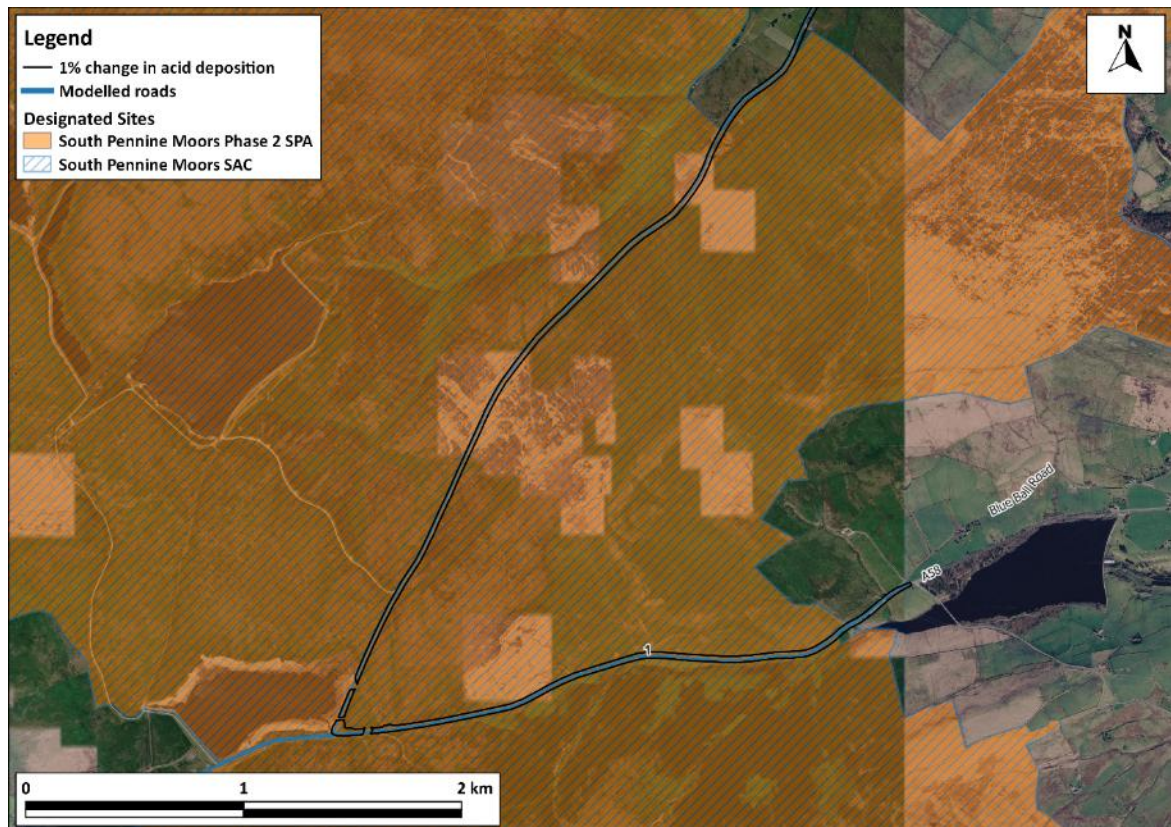


**Figure 38: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (southern area) at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

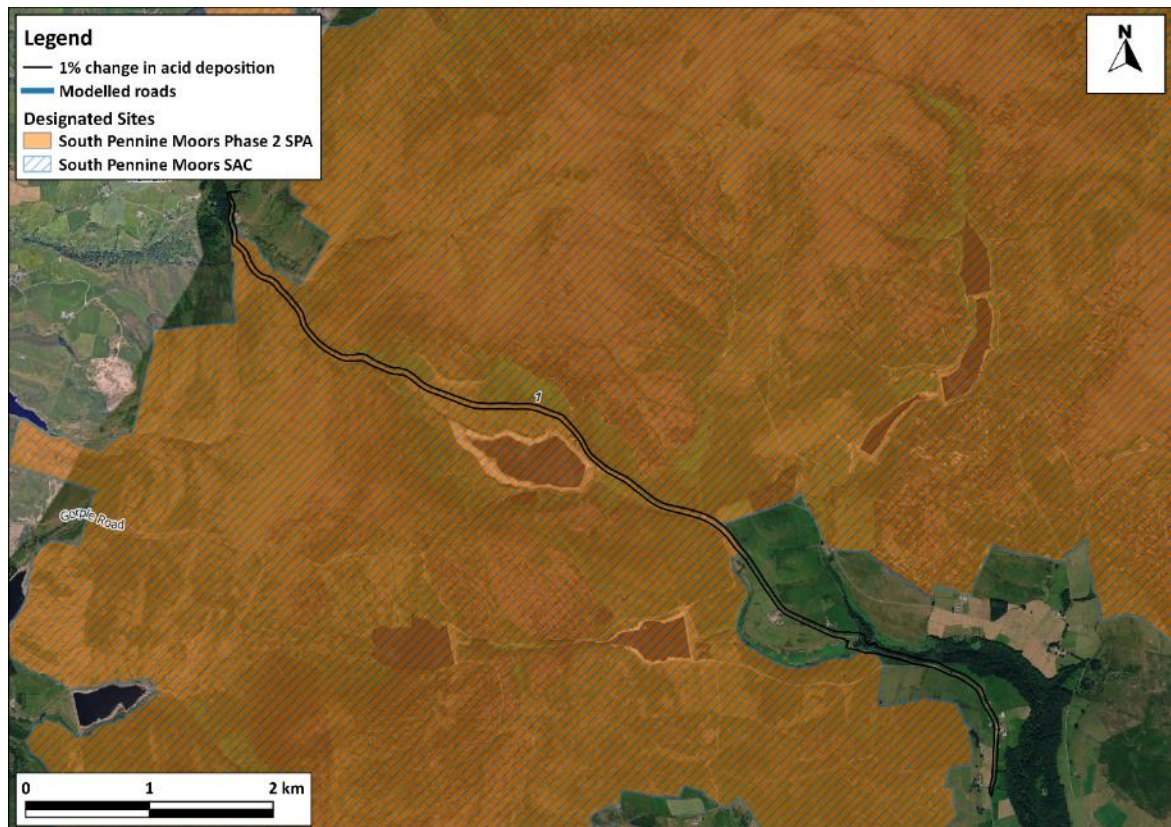


**Figure 39: Areas Exceeding 1% of CLo In-Combination in South Pennine Moors (western area) at the Phase 2 SPA**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

## 6 References

APIS (2026) APIS, [Online], Available: <http://www.apis.ac.uk/>.

AQC (2020) 'Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-sensitive Habitats', no. <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=3aa4ec2e-ee4e-4908-bc7a-aeb0231b4b37>.

AQC (2025) *Development of CREAM Emissions Model Version 2*, <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=ec071bfa-8d88-47a3-969e-874ab8f2f653>.

AQTAG (2011) AQTAG06 - *Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air*.

Bobbink et al. (2022) 'Review and revision of empirical critical loads of nitrogen for Europe', pp. [https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-10-12\\_texte\\_110-2022\\_review\\_revision\\_empirical\\_critical\\_loads.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-10-12_texte_110-2022_review_revision_empirical_critical_loads.pdf).

CIEEM (2021) 'Advice on Ecological Assessment of Air Quality Impacts. Chartered Institute of Ecology and Environmental Management. Winchester, UK.'

Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, Defra.

Defra (2026a) *Local Air Quality Management (LAQM) Support Website*, Available: <http://laqm.defra.gov.uk/>.

Defra (2026b) Defra NAMN Archive, [Online], Available: <https://uk-air.defra.gov.uk/interactive-map?network=namn>.

Defra Air Quality Expert Group (2020) *Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK- Rapid evidence review*, Available: [https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2007010844\\_Estimation\\_of\\_Changes\\_in\\_Air\\_Pollution\\_During\\_COVID-19\\_outbreak\\_in\\_the\\_UK.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2007010844_Estimation_of_Changes_in_Air_Pollution_During_COVID-19_outbreak_in_the_UK.pdf).

DfT (2025) *Road traffic statistics*, [Online], Available: <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>.

Environment Agency (2025) *Air emissions risk assessment for your environmental permit*, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> edition, Available: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

Holman et al (2020) *A guide to the assessment of air quality impacts on designated nature conservation sites. IAQM. Version 1.1*, <https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>.

JNCC (2020) *Nitrogen Futures*, <https://jncc.gov.uk/our-work/nitrogen-futures/>.

Natural England (2018) 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001)', pp. <http://publications.naturalengland.org.uk/publication/4720542048845824>.

Natural England (2025) *Air pollution and development: advice for local authorities: How to assess sector-specific planning applications that could affect air quality on a protected site.*, <https://www.gov.uk/guidance/air-pollution-and-development-advice-for-local-authorities> edition.

NECR210 (2016) 'Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance', pp. <https://publications.naturalengland.org.uk/publication/5354697970941952>.

*The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002)*, HMSO, Available: <https://www.legislation.gov.uk/uksi/2002/3043/contents/made>.

*The Air Quality (England) Regulations 2000 Statutory Instrument 928 (2000)*, HMSO, Available: <http://www.legislation.gov.uk/uksi/2000/928/contents/made>.

The European Parliament and the Council of the European Union (2008) *Directive 2008/50/EC of the European Parliament and of the Council*, Available: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0050>.

WHO (2000) *Air Quality Guidelines for Europe; 2nd Edition*. [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0005/74732/E71922.pdf](http://www.euro.who.int/__data/assets/pdf_file/0005/74732/E71922.pdf).

## 7 Glossary

|                   |                                                                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AADT              | Annual Average Daily Traffic                                                                                                                                                                                         |
| ADMS-Roads        | Atmospheric Dispersion Modelling System model for Roads                                                                                                                                                              |
| APIS              | Air Pollution Information System                                                                                                                                                                                     |
| AQC               | Air Quality Consultants                                                                                                                                                                                              |
| CLe               | Critical Level - concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge     |
| CLo               | Critical Load – a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge |
| CREAM             | Calculator for Road Emissions of AMmonia                                                                                                                                                                             |
| Defra             | Department for Environment, Food and Rural Affairs                                                                                                                                                                   |
| DfT               | Department for Transport                                                                                                                                                                                             |
| EFT               | Emissions Factors Toolkit                                                                                                                                                                                            |
| EU                | European Union                                                                                                                                                                                                       |
| Exceedance        | A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure                                             |
| HDV               | Heavy Duty Vehicles (> 3.5 tonnes)                                                                                                                                                                                   |
| IAQM              | Institute of Air Quality Management                                                                                                                                                                                  |
| JNCC              | Joint Nature Conservation Committee                                                                                                                                                                                  |
| kph               | Kilometres Per hour                                                                                                                                                                                                  |
| LAQM              | Local Air Quality Management                                                                                                                                                                                         |
| LDV               | Light Duty Vehicles (<3.5 tonnes)                                                                                                                                                                                    |
| µg/m <sup>3</sup> | Microgrammes per cubic metre                                                                                                                                                                                         |
| NAMN              | National Ammonia Monitoring Network                                                                                                                                                                                  |
| NO                | Nitric oxide                                                                                                                                                                                                         |
| NO <sub>2</sub>   | Nitrogen dioxide                                                                                                                                                                                                     |
| NO <sub>x</sub>   | Nitrogen oxides (taken to be NO <sub>2</sub> + NO)                                                                                                                                                                   |
| Objectives        | A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards                                           |

should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides

|     |                                       |
|-----|---------------------------------------|
| PC  | Process Contribution                  |
| PEC | Predicted Environmental Concentration |
| SAC | Special Area of Conservation          |
| WHO | World Health Organisation             |

# 8 Appendices

## A1 Professional Experience

### Dr Ben Marner, BSc (Hons) PhD CSci MEnvSc MIAQM

Dr Marner is the Director of Air Quality Modelling and Assessment at AQC and has more than 20 years' relevant experience. He has been responsible for air quality and greenhouse gas assessments of road schemes, rail schemes, airports, power stations, waste incinerators, commercial developments and residential developments in the UK and abroad. He has acted as expert witness at public inquiries, where he has presented evidence on health-related air quality impacts, the impacts of air quality on sensitive ecosystems, and greenhouse gas impacts. He has developed a range of widely-used air quality models and contributed to the development of best practice. Dr Marner has provided support and advice to foreign governments, Highways England, Transport Scotland, Transport for London, Greater London Authority, the Joint Nature Conservation Committee, the Environment Agency, and numerous local authorities. He is a Member of the Institute of Air Quality Management and a Chartered Scientist. He currently advises the UK Government on air quality as part of its Air Quality Expert Group (AQEG), where his specific area of expertise relates to air quality assessment in the development control process, and has separately provided advice on air quality issues to Defra's Chief Scientific Adviser, the UK Chief Medical Officer, and the UK Chief Planner.

### Sam Murphy, MSci AMEnvSc

Mr Murphy is a Senior Air Quality Consultant with over five years of experience. He has previously worked in both medium-sized and large multidisciplinary consultancies and holds a Master's degree in Environmental Sciences from the University of East Anglia. Mr Murphy has extensive experience supporting built environment projects with air quality consultancy, including housing-led, mixed-use, and industrial developments. His experience spans the full project lifecycle, from early-stage due diligence and feasibility studies through to planning applications, discharge of planning conditions, detailed design, and contributions to Environmental Statement chapters. He is an Associate Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

## A2 Modelling Methodology

### Model Inputs

- A2.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5.1). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 14.2) published by Defra (Defra, 2026a) and CREAM V2A published by AQC (AQC, 2025). Model input parameters are summarised in Table A2-1 and, where considered necessary, discussed further below.

**Table A2-1: Summary of Model Inputs**

| Model Parameter                              | Value Used                                                                                   |
|----------------------------------------------|----------------------------------------------------------------------------------------------|
| Terrain Effects Modelled?                    | Yes. Separate terrain files were input to ADMS for each model area (see Figure 2).           |
| Variable Surface Roughness File Used?        | Yes. Separate surface roughness files were input to ADMS for each model area (see Figure 2). |
| Urban Canopy Flow Used?                      | No                                                                                           |
| Advanced Street Canyons Modelled?            | No                                                                                           |
| Noise Barriers Modelled?                     | No                                                                                           |
| Meteorological Monitoring Site               | Bingley                                                                                      |
| Meteorological Data Year                     | 2023                                                                                         |
| Dispersion Site Surface Roughness Length (m) | N/A (variable surface roughness file used)                                                   |
| Dispersion Site Minimum MO Length (m)        | 1                                                                                            |
| Met Site Surface Roughness Length (m)        | 0.2                                                                                          |
| Met Site Minimum MO Length (m)               | 1                                                                                            |
| Gradients?                                   | No                                                                                           |

- A2.2 AADT flows, diurnal flow profiles, speeds, and vehicle fleet composition data have been provided by Bradford Metropolitan District Council. Traffic speeds have been estimated based on professional judgement, taking account of the provided speed data, road layout, and the proximity to a junction. The traffic data used in this assessment are summarised in Table A2-2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (DfT, 2025).

Table A2-2: Summary of Traffic Data used in the Assessment

| Road Link   | 2023  |       |             | 2043 Base |       |             | 2043 With Local Plan |       |             | 2043 With Local Plan and Emerging Local Plans |       |             |
|-------------|-------|-------|-------------|-----------|-------|-------------|----------------------|-------|-------------|-----------------------------------------------|-------|-------------|
|             | AADT  | %HDV  | Speed (kph) | AADT      | %HDV  | Speed (kph) | AADT                 | %HDV  | Speed (kph) | AADT                                          | %HDV  | Speed (kph) |
| 16304-16303 | 79    | 7.02  | 38          | 278       | 0.08  | 38          | 332                  | 0.00  | 38          | 377                                           | 0.00  | 38          |
| 16304-70429 | 79    | 7.02  | 37          | 278       | 0.08  | 37          | 332                  | 0.00  | 37          | 377                                           | 0.00  | 37          |
| 16324-16304 | 0     | 0.00  | 37          | 0         | 0.00  | 37          | 0                    | 0.00  | 37          | 0                                             | 0.00  | 37          |
| 74865-14863 | 4927  | 10.65 | 73          | 11775     | 8.38  | 67          | 9616                 | 9.27  | 69          | 12239                                         | 6.75  | 66          |
| 74891-74972 | 904   | 2.56  | 37          | 1786      | 1.86  | 37          | 1875                 | 3.88  | 37          | 2088                                          | 4.11  | 37          |
| 74972-70429 | 1235  | 2.63  | 36          | 2565      | 1.62  | 35          | 2724                 | 2.78  | 35          | 3020                                          | 2.88  | 35          |
| 14877-11209 | 14339 | 2.90  | 75          | 19114     | 2.70  | 71          | 18558                | 2.65  | 71          | 19600                                         | 2.73  | 70          |
| 21563-11209 | 14339 | 2.90  | 76          | 19114     | 2.70  | 72          | 18558                | 2.65  | 72          | 19600                                         | 2.73  | 72          |
| 24930-14877 | 3457  | 9.66  | 33          | 5587      | 8.57  | 31          | 5084                 | 9.11  | 32          | 6162                                          | 7.93  | 31          |
| 28040-79292 | 40073 | 8.30  | 45          | 50070     | 7.26  | 25          | 49101                | 7.17  | 26          | 50341                                         | 7.21  | 24          |
| 28106-79292 | 4386  | 5.46  | 62          | 7474      | 3.64  | 61          | 5804                 | 4.26  | 61          | 7837                                          | 3.41  | 60          |
| 79292-79294 | 41424 | 7.87  | 29          | 50309     | 7.07  | 16          | 49823                | 6.87  | 16          | 50295                                         | 7.05  | 16          |
| 74910-24914 | 4922  | 11.37 | 74          | 10237     | 6.21  | 70          | 8945                 | 7.24  | 71          | 10476                                         | 6.75  | 69          |
| 70596-70588 | 1395  | 19.93 | 80          | 2546      | 14.16 | 80          | 1974                 | 15.76 | 80          | 2416                                          | 14.65 | 80          |
| 70596-79954 | 15078 | 25.05 | 83          | 23159     | 12.04 | 75          | 20986                | 16.00 | 77          | 24079                                         | 12.21 | 73          |
| 79024-79026 | 4987  | 5.36  | 44          | 7326      | 4.86  | 43          | 6112                 | 5.19  | 43          | 8074                                          | 4.68  | 43          |
| 12919-14652 | 21199 | 5.29  | 19          | 22799     | 4.94  | 16          | 22460                | 5.18  | 17          | 22780                                         | 5.19  | 16          |

| Road Link   | 2023  |       |             | 2043 Base |      |             | 2043 With Local Plan |      |             | 2043 With Local Plan and Emerging Local Plans |      |             |
|-------------|-------|-------|-------------|-----------|------|-------------|----------------------|------|-------------|-----------------------------------------------|------|-------------|
|             | AADT  | %HDV  | Speed (kph) | AADT      | %HDV | Speed (kph) | AADT                 | %HDV | Speed (kph) | AADT                                          | %HDV | Speed (kph) |
| 12919-14657 | 14412 | 5.65  | 24          | 14926     | 5.40 | 23          | 14721                | 5.58 | 23          | 14977                                         | 5.58 | 23          |
| 12919-18123 | 6787  | 4.46  | 30          | 7873      | 4.03 | 25          | 7738                 | 4.44 | 25          | 7804                                          | 4.45 | 25          |
| 14350-17856 | 559   | 1.36  | 35          | 767       | 1.01 | 35          | 974                  | 0.95 | 35          | 965                                           | 0.96 | 35          |
| 14389-18083 | 1333  | 2.07  | 33          | 2268      | 2.42 | 33          | 2343                 | 3.09 | 33          | 2526                                          | 2.76 | 33          |
| 14391-18098 | 5272  | 10.13 | 34          | 6449      | 7.76 | 34          | 6398                 | 7.61 | 34          | 6829                                          | 6.82 | 33          |
| 14653-14652 | 4897  | 2.19  | 37          | 5630      | 2.08 | 36          | 5675                 | 2.21 | 36          | 5714                                          | 2.18 | 36          |
| 14666-17801 | 3188  | 1.63  | 28          | 3201      | 1.69 | 25          | 3638                 | 1.68 | 25          | 3667                                          | 1.68 | 25          |
| 17801-12926 | 8439  | 6.24  | 49          | 10410     | 5.21 | 47          | 10755                | 5.54 | 47          | 11241                                         | 5.36 | 46          |
| 17801-18125 | 8806  | 4.81  | 25          | 10523     | 4.15 | 24          | 10856                | 4.37 | 24          | 11256                                         | 4.27 | 24          |
| 17856-11237 | 8983  | 6.74  | 32          | 9348      | 6.01 | 32          | 9376                 | 6.00 | 32          | 9984                                          | 5.56 | 32          |
| 17856-14384 | 8649  | 7.02  | 31          | 8978      | 6.27 | 31          | 9194                 | 6.09 | 31          | 9775                                          | 5.69 | 31          |
| 17884-12926 | 9069  | 5.81  | 24          | 10702     | 5.07 | 23          | 11110                | 5.39 | 22          | 11640                                         | 5.19 | 22          |
| 18083-14384 | 5544  | 9.87  | 34          | 6349      | 7.79 | 33          | 6552                 | 7.39 | 33          | 7176                                          | 6.73 | 33          |
| 18083-18098 | 5795  | 9.56  | 21          | 7507      | 7.11 | 19          | 7733                 | 6.88 | 19          | 8470                                          | 6.25 | 18          |
| 18098-14393 | 564   | 3.53  | 37          | 1186      | 2.65 | 37          | 1473                 | 3.12 | 37          | 1772                                          | 3.42 | 36          |
| 18117-17801 | 771   | 6.72  | 36          | 892       | 6.06 | 31          | 982                  | 6.18 | 31          | 1005                                          | 6.14 | 31          |
| 18121-14652 | 19407 | 5.50  | 23          | 21129     | 5.09 | 22          | 20747                | 5.35 | 22          | 21114                                         | 5.36 | 22          |
| 18125-12924 | 7456  | 5.61  | 30          | 9178      | 4.74 | 28          | 9374                 | 5.05 | 28          | 9756                                          | 4.89 | 28          |

| Road Link   | 2023  |       |             | 2043 Base |       |             | 2043 With Local Plan |       |             | 2043 With Local Plan and Emerging Local Plans |       |             |
|-------------|-------|-------|-------------|-----------|-------|-------------|----------------------|-------|-------------|-----------------------------------------------|-------|-------------|
|             | AADT  | %HDV  | Speed (kph) | AADT      | %HDV  | Speed (kph) | AADT                 | %HDV  | Speed (kph) | AADT                                          | %HDV  | Speed (kph) |
| 18125-14670 | 5884  | 1.85  | 40          | 6760      | 1.77  | 40          | 7184                 | 1.81  | 40          | 7242                                          | 1.80  | 40          |
| 18129-12926 | 2307  | 0.00  | 31          | 3216      | 0.00  | 30          | 3390                 | 0.00  | 30          | 3471                                          | 0.00  | 30          |
| 41234-41235 | 10291 | 8.82  | 60          | 7437      | 14.32 | 41          | 7129                 | 15.53 | 40          | 7653                                          | 14.69 | 39          |
| 41234-11231 | 13954 | 7.38  | 41          | 16158     | 6.00  | 36          | 15891                | 6.17  | 36          | 17072                                         | 5.71  | 35          |
| 41909-41234 | 3666  | 3.35  | 71          | 8730      | 2.23  | 66          | 8773                 | 2.04  | 66          | 9430                                          | 1.62  | 66          |
| 21556-28106 | 24181 | 14.30 | 32          | 31785     | 9.74  | 23          | 30265                | 10.73 | 25          | 31985                                         | 9.86  | 22          |
| 16304-16303 | 79    | 7.02  | 38          | 278       | 0.08  | 38          | 332                  | 0.00  | 38          | 377                                           | 0.00  | 38          |
| 16304-70429 | 79    | 7.02  | 37          | 278       | 0.08  | 37          | 332                  | 0.00  | 37          | 377                                           | 0.00  | 37          |
| 16324-16304 | 0     | 0.00  | 37          | 0         | 0.00  | 37          | 0                    | 0.00  | 37          | 0                                             | 0.00  | 37          |
| 74865-14863 | 4927  | 10.65 | 73          | 11775     | 8.38  | 67          | 9616                 | 9.27  | 69          | 12239                                         | 6.75  | 66          |
| 74891-74972 | 904   | 2.56  | 37          | 1786      | 1.86  | 37          | 1875                 | 3.88  | 37          | 2088                                          | 4.11  | 37          |
| 74972-70429 | 1235  | 2.63  | 36          | 2565      | 1.62  | 35          | 2724                 | 2.78  | 35          | 3020                                          | 2.88  | 35          |
| 14877-11209 | 14339 | 2.90  | 75          | 19114     | 2.70  | 71          | 18558                | 2.65  | 71          | 19600                                         | 2.73  | 70          |
| 21563-11209 | 14339 | 2.90  | 76          | 19114     | 2.70  | 72          | 18558                | 2.65  | 72          | 19600                                         | 2.73  | 72          |
| 24930-14877 | 3457  | 9.66  | 33          | 5587      | 8.57  | 31          | 5084                 | 9.11  | 32          | 6162                                          | 7.93  | 31          |
| 28040-79292 | 40073 | 8.30  | 45          | 50070     | 7.26  | 25          | 49101                | 7.17  | 26          | 50341                                         | 7.21  | 24          |
| 28106-79292 | 4386  | 5.46  | 62          | 7474      | 3.64  | 61          | 5804                 | 4.26  | 61          | 7837                                          | 3.41  | 60          |
| 79292-79294 | 41424 | 7.87  | 29          | 50309     | 7.07  | 16          | 49823                | 6.87  | 16          | 50295                                         | 7.05  | 16          |

| Road Link   | 2023  |       |             | 2043 Base |       |             | 2043 With Local Plan |       |             | 2043 With Local Plan and Emerging Local Plans |       |             |
|-------------|-------|-------|-------------|-----------|-------|-------------|----------------------|-------|-------------|-----------------------------------------------|-------|-------------|
|             | AADT  | %HDV  | Speed (kph) | AADT      | %HDV  | Speed (kph) | AADT                 | %HDV  | Speed (kph) | AADT                                          | %HDV  | Speed (kph) |
| 74910-24914 | 4922  | 11.37 | 74          | 10237     | 6.21  | 70          | 8945                 | 7.24  | 71          | 10476                                         | 6.75  | 69          |
| 70596-70588 | 1395  | 19.93 | 80          | 2546      | 14.16 | 80          | 1974                 | 15.76 | 80          | 2416                                          | 14.65 | 80          |
| 70596-79954 | 15078 | 25.05 | 83          | 23159     | 12.04 | 75          | 20986                | 16.00 | 77          | 24079                                         | 12.21 | 73          |
| 79024-79026 | 4987  | 5.36  | 44          | 7326      | 4.86  | 43          | 6112                 | 5.19  | 43          | 8074                                          | 4.68  | 43          |
| 12919-14652 | 21199 | 5.29  | 19          | 22799     | 4.94  | 16          | 22460                | 5.18  | 17          | 22780                                         | 5.19  | 16          |
| 12919-14657 | 14412 | 5.65  | 24          | 14926     | 5.40  | 23          | 14721                | 5.58  | 23          | 14977                                         | 5.58  | 23          |
| 12919-18123 | 6787  | 4.46  | 30          | 7873      | 4.03  | 25          | 7738                 | 4.44  | 25          | 7804                                          | 4.45  | 25          |
| 14350-17856 | 559   | 1.36  | 35          | 767       | 1.01  | 35          | 974                  | 0.95  | 35          | 965                                           | 0.96  | 35          |
| 14389-18083 | 1333  | 2.07  | 33          | 2268      | 2.42  | 33          | 2343                 | 3.09  | 33          | 2526                                          | 2.76  | 33          |
| 14391-18098 | 5272  | 10.13 | 34          | 6449      | 7.76  | 34          | 6398                 | 7.61  | 34          | 6829                                          | 6.82  | 33          |
| 14653-14652 | 4897  | 2.19  | 37          | 5630      | 2.08  | 36          | 5675                 | 2.21  | 36          | 5714                                          | 2.18  | 36          |
| 14666-17801 | 3188  | 1.63  | 28          | 3201      | 1.69  | 25          | 3638                 | 1.68  | 25          | 3667                                          | 1.68  | 25          |
| 17801-12926 | 8439  | 6.24  | 49          | 10410     | 5.21  | 47          | 10755                | 5.54  | 47          | 11241                                         | 5.36  | 46          |
| 17801-18125 | 8806  | 4.81  | 25          | 10523     | 4.15  | 24          | 10856                | 4.37  | 24          | 11256                                         | 4.27  | 24          |
| 17856-11237 | 8983  | 6.74  | 32          | 9348      | 6.01  | 32          | 9376                 | 6.00  | 32          | 9984                                          | 5.56  | 32          |
| 17856-14384 | 8649  | 7.02  | 31          | 8978      | 6.27  | 31          | 9194                 | 6.09  | 31          | 9775                                          | 5.69  | 31          |
| 17884-12926 | 9069  | 5.81  | 24          | 10702     | 5.07  | 23          | 11110                | 5.39  | 22          | 11640                                         | 5.19  | 22          |
| 18083-14384 | 5544  | 9.87  | 34          | 6349      | 7.79  | 33          | 6552                 | 7.39  | 33          | 7176                                          | 6.73  | 33          |

| Road Link   | 2023  |       |             | 2043 Base |       |             | 2043 With Local Plan |       |             | 2043 With Local Plan and Emerging Local Plans |       |             |
|-------------|-------|-------|-------------|-----------|-------|-------------|----------------------|-------|-------------|-----------------------------------------------|-------|-------------|
|             | AADT  | %HDV  | Speed (kph) | AADT      | %HDV  | Speed (kph) | AADT                 | %HDV  | Speed (kph) | AADT                                          | %HDV  | Speed (kph) |
| 18083-18098 | 5795  | 9.56  | 21          | 7507      | 7.11  | 19          | 7733                 | 6.88  | 19          | 8470                                          | 6.25  | 18          |
| 18098-14393 | 564   | 3.53  | 37          | 1186      | 2.65  | 37          | 1473                 | 3.12  | 37          | 1772                                          | 3.42  | 36          |
| 18117-17801 | 771   | 6.72  | 36          | 892       | 6.06  | 31          | 982                  | 6.18  | 31          | 1005                                          | 6.14  | 31          |
| 18121-14652 | 19407 | 5.50  | 23          | 21129     | 5.09  | 22          | 20747                | 5.35  | 22          | 21114                                         | 5.36  | 22          |
| 18125-12924 | 7456  | 5.61  | 30          | 9178      | 4.74  | 28          | 9374                 | 5.05  | 28          | 9756                                          | 4.89  | 28          |
| 18125-14670 | 5884  | 1.85  | 40          | 6760      | 1.77  | 40          | 7184                 | 1.81  | 40          | 7242                                          | 1.80  | 40          |
| 18129-12926 | 2307  | 0.00  | 31          | 3216      | 0.00  | 30          | 3390                 | 0.00  | 30          | 3471                                          | 0.00  | 30          |
| 41234-41235 | 10291 | 8.82  | 60          | 7437      | 14.32 | 41          | 7129                 | 15.53 | 40          | 7653                                          | 14.69 | 39          |
| 41234-11231 | 13954 | 7.38  | 41          | 16158     | 6.00  | 36          | 15891                | 6.17  | 36          | 17072                                         | 5.71  | 35          |
| 41909-41234 | 3666  | 3.35  | 71          | 8730      | 2.23  | 66          | 8773                 | 2.04  | 66          | 9430                                          | 1.62  | 66          |
| 21556-28106 | 24181 | 14.30 | 32          | 31785     | 9.74  | 23          | 30265                | 10.73 | 25          | 31985                                         | 9.86  | 22          |
| 16304-16303 | 79    | 7.02  | 38          | 278       | 0.08  | 38          | 332                  | 0.00  | 38          | 377                                           | 0.00  | 38          |
| 16304-70429 | 79    | 7.02  | 37          | 278       | 0.08  | 37          | 332                  | 0.00  | 37          | 377                                           | 0.00  | 37          |
| 16324-16304 | 0     | 0.00  | 37          | 0         | 0.00  | 37          | 0                    | 0.00  | 37          | 0                                             | 0.00  | 37          |
| 74865-14863 | 4927  | 10.65 | 73          | 11775     | 8.38  | 67          | 9616                 | 9.27  | 69          | 12239                                         | 6.75  | 66          |
| 74891-74972 | 904   | 2.56  | 37          | 1786      | 1.86  | 37          | 1875                 | 3.88  | 37          | 2088                                          | 4.11  | 37          |
| 74972-70429 | 1235  | 2.63  | 36          | 2565      | 1.62  | 35          | 2724                 | 2.78  | 35          | 3020                                          | 2.88  | 35          |
| 14877-11209 | 14339 | 2.90  | 75          | 19114     | 2.70  | 71          | 18558                | 2.65  | 71          | 19600                                         | 2.73  | 70          |

| Road Link   | 2023  |       |             | 2043 Base |       |             | 2043 With Local Plan |       |             | 2043 With Local Plan and Emerging Local Plans |       |             |
|-------------|-------|-------|-------------|-----------|-------|-------------|----------------------|-------|-------------|-----------------------------------------------|-------|-------------|
|             | AADT  | %HDV  | Speed (kph) | AADT      | %HDV  | Speed (kph) | AADT                 | %HDV  | Speed (kph) | AADT                                          | %HDV  | Speed (kph) |
| 21563-11209 | 14339 | 2.90  | 76          | 19114     | 2.70  | 72          | 18558                | 2.65  | 72          | 19600                                         | 2.73  | 72          |
| 24930-14877 | 3457  | 9.66  | 33          | 5587      | 8.57  | 31          | 5084                 | 9.11  | 32          | 6162                                          | 7.93  | 31          |
| 28040-79292 | 40073 | 8.30  | 45          | 50070     | 7.26  | 25          | 49101                | 7.17  | 26          | 50341                                         | 7.21  | 24          |
| 28106-79292 | 4386  | 5.46  | 62          | 7474      | 3.64  | 61          | 5804                 | 4.26  | 61          | 7837                                          | 3.41  | 60          |
| 79292-79294 | 41424 | 7.87  | 29          | 50309     | 7.07  | 16          | 49823                | 6.87  | 16          | 50295                                         | 7.05  | 16          |
| 74910-24914 | 4922  | 11.37 | 74          | 10237     | 6.21  | 70          | 8945                 | 7.24  | 71          | 10476                                         | 6.75  | 69          |
| 70596-70588 | 1395  | 19.93 | 80          | 2546      | 14.16 | 80          | 1974                 | 15.76 | 80          | 2416                                          | 14.65 | 80          |
| 70596-79954 | 15078 | 25.05 | 83          | 23159     | 12.04 | 75          | 20986                | 16.00 | 77          | 24079                                         | 12.21 | 73          |
| 79024-79026 | 4987  | 5.36  | 44          | 7326      | 4.86  | 43          | 6112                 | 5.19  | 43          | 8074                                          | 4.68  | 43          |
| 12919-14652 | 21199 | 5.29  | 19          | 22799     | 4.94  | 16          | 22460                | 5.18  | 17          | 22780                                         | 5.19  | 16          |
| 12919-14657 | 14412 | 5.65  | 24          | 14926     | 5.40  | 23          | 14721                | 5.58  | 23          | 14977                                         | 5.58  | 23          |

### A2.3

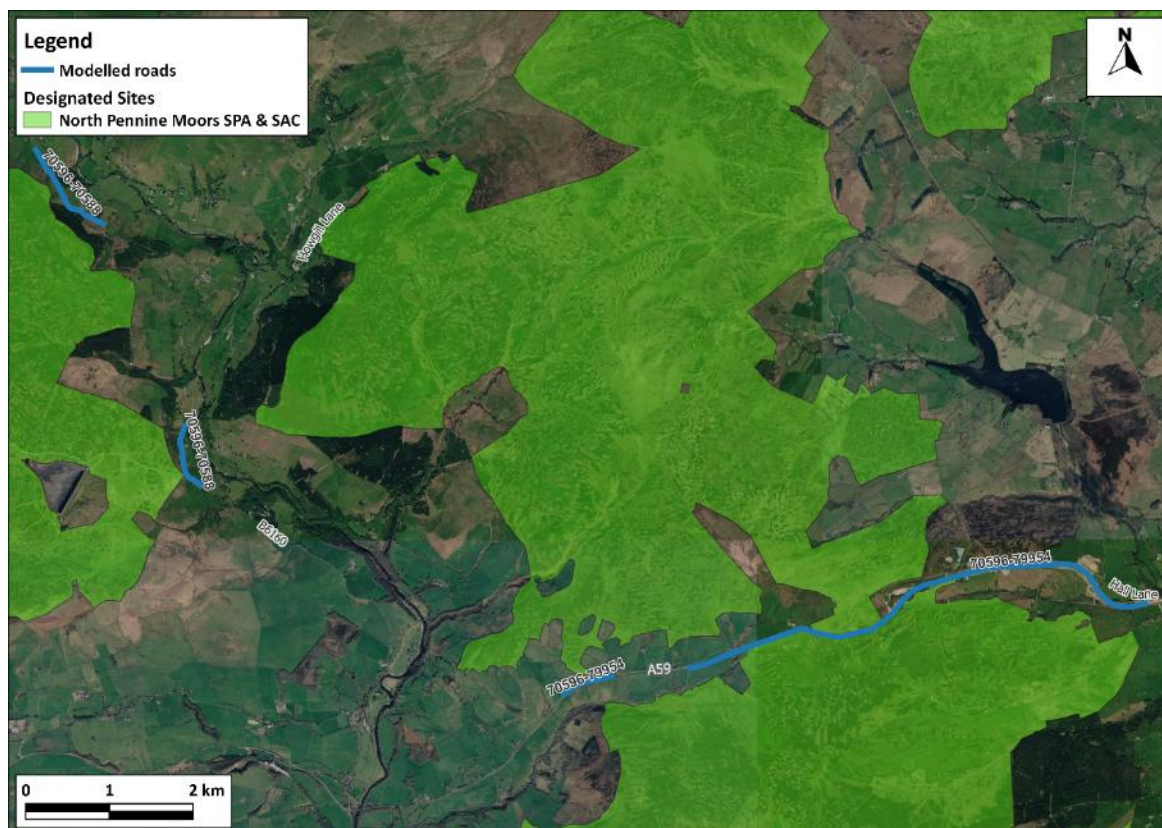


**Figure A2-1: Modelled Road Network – North Pennine Moors**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.





17776A-10

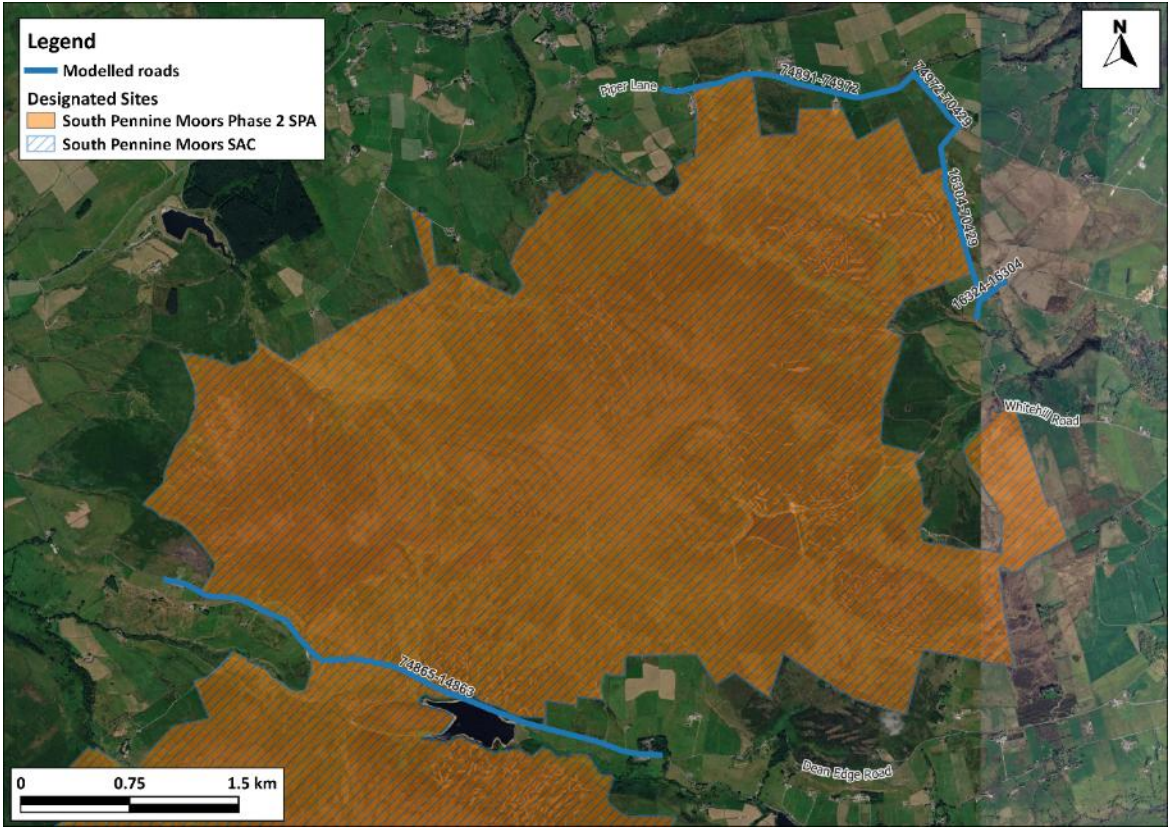


Figure A2-4: Modelled Road Network & – in South Pennine Moors (northern area)

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

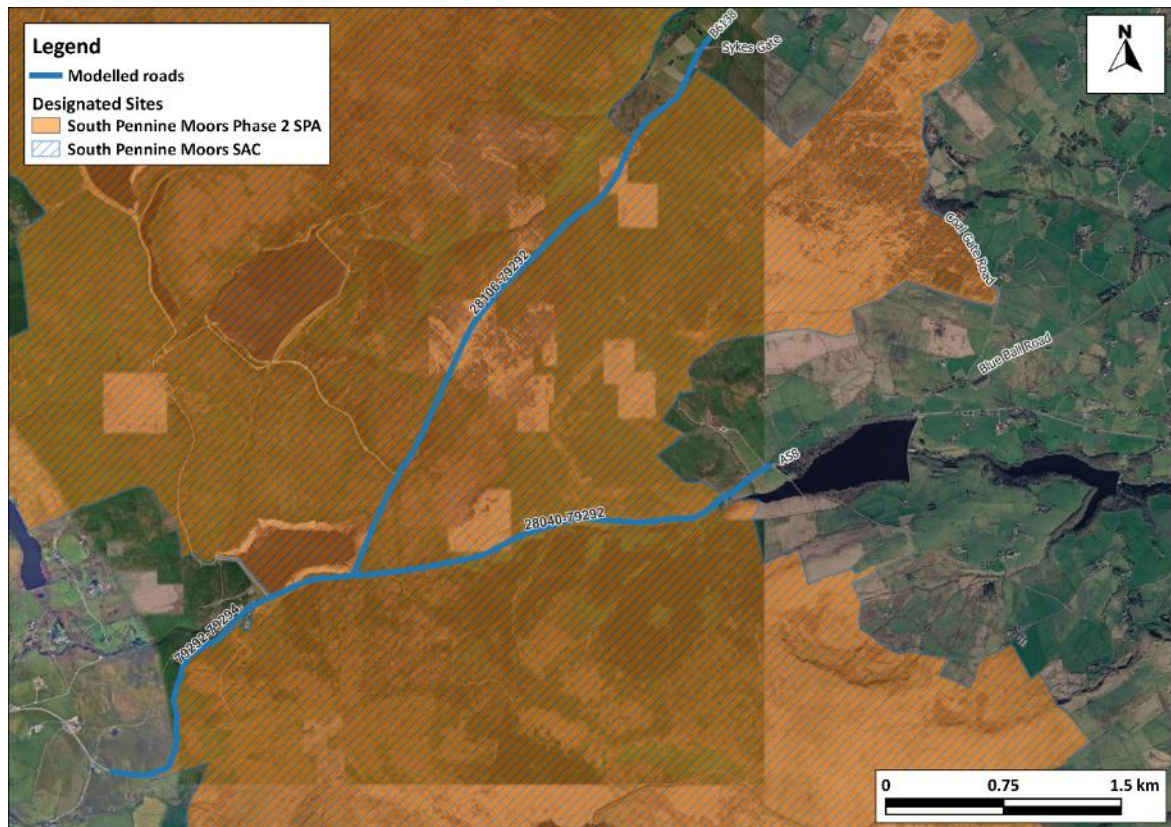


**Figure A2-5: Modelled Road Network – in South Pennine Moors (southern area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

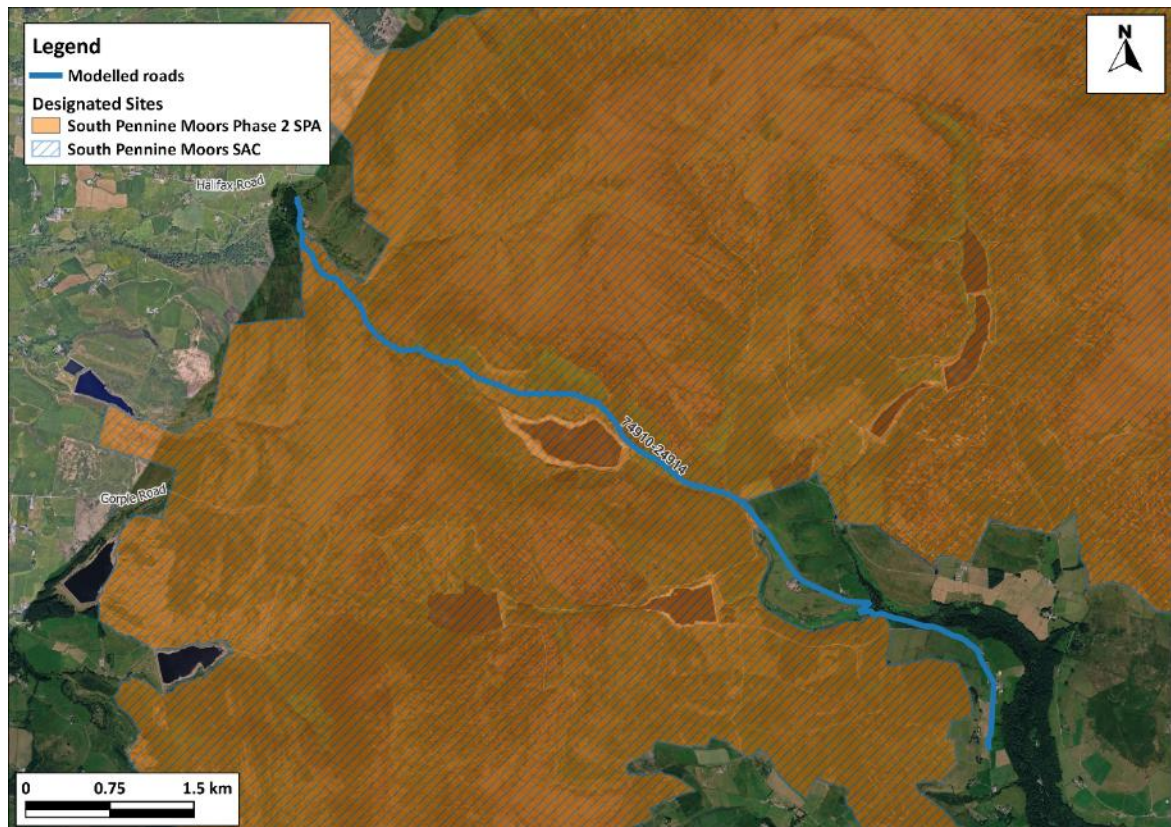


**Figure A2-6: Modelled Road Network – in South Pennine Moors (western area)**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

- A2.4 Hourly sequential meteorological data in sectors of 10 degrees from Bingley for 2023 have been used in the model. The Bingley meteorological monitoring station is located at Bradford West Substation, approximately 8 km to the northwest of the centre of Bradford. It is the nearest monitoring station representative of meteorological conditions at the designated sites. Both the designated sites and the Bingley meteorological monitoring station will be influenced by the effects of inland meteorology. A wind rose for the site for 2023 is provided in Figure A2-7. The station is operated by the UK Met Office. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

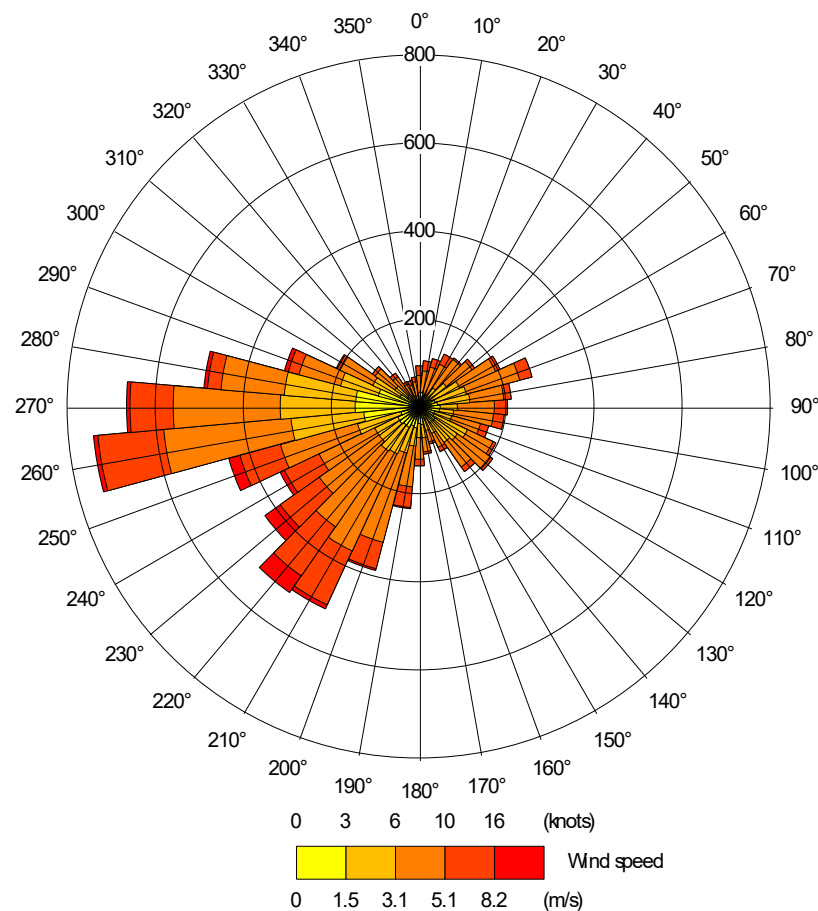


**Figure A2-7: Wind Rose**

## Model Verification

A2.5 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to systematically under-predict roadside NO<sub>2</sub> concentrations. To account for this, it is preferable to adjust the model against local measurements. The model was run to predict annual mean NO<sub>2</sub> concentrations during 2023 at monitoring sites DT263 and DT287 (both Bradford Metropolitan District Council monitoring sites), and monitoring sites MY04 and MY05 (both Calderdale Council monitoring sites). These sites were selected because they are located along roads with free flowing traffic at distance from junctions, they are located in rural areas or on the edge of smaller urban areas, and they are not located within street canyons or adjacent to other features which could affect dispersion of roadside pollutants. This is necessary to ensure that they represent similar settings to the receptors used in this assessment. They are also located adjacent to roads with available traffic data. Concentrations have been modelled at the heights of the monitors. The designated sites and model areas considered in this assessment are spread out from one another but in general have similar dispersion environments being rural in location and adjacent to roads with largely free flowing traffic. For this reason, a single adjustment factor has been calculated using the monitoring sites modelled, for application to all modelled roads.

## Nitrogen Dioxide

A2.6 Most NO<sub>2</sub> is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO<sub>x</sub> =

NO + NO<sub>2</sub>). The model output of road-NO<sub>x</sub> (i.e. the component of total NO<sub>x</sub> coming from road traffic) has been compared with the 'measured' road-NO<sub>x</sub>. Measured road-NO<sub>x</sub> has been calculated from the measured NO<sub>2</sub> concentration and the predicted background NO<sub>2</sub> concentration using the NO<sub>x</sub> from NO<sub>2</sub> calculator (Version 9.1) available on the Defra LAQM Support website (Defra, 2026a).

- A2.7 An adjustment factor has been determined as the ratio of the 'measured' road contribution and the model derived road contribution. This factor has then been applied to the modelled road-NO<sub>x</sub> concentration for each receptor to provide adjusted modelled road-NO<sub>x</sub> concentrations. The total NO<sub>2</sub> concentrations have then been determined by combining the adjusted modelled road-NO<sub>x</sub> concentrations with the predicted background NO<sub>2</sub> concentration within the NO<sub>x</sub> to NO<sub>2</sub> calculator (Defra, 2026a).
- A2.8 AADT flows, diurnal flow profiles, speeds, and vehicle fleet composition data used in the model verification are summarised in Table A2-2.
- A2.9 The road and verification site are shown in Figure A2-8 to Figure A2-10 below.



**Figure A2-8: Modelled Road Network - Bradford Verification in Ilkley**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.



Figure A2-9: Modelled Road Network - Bradford Verification in East Morton

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

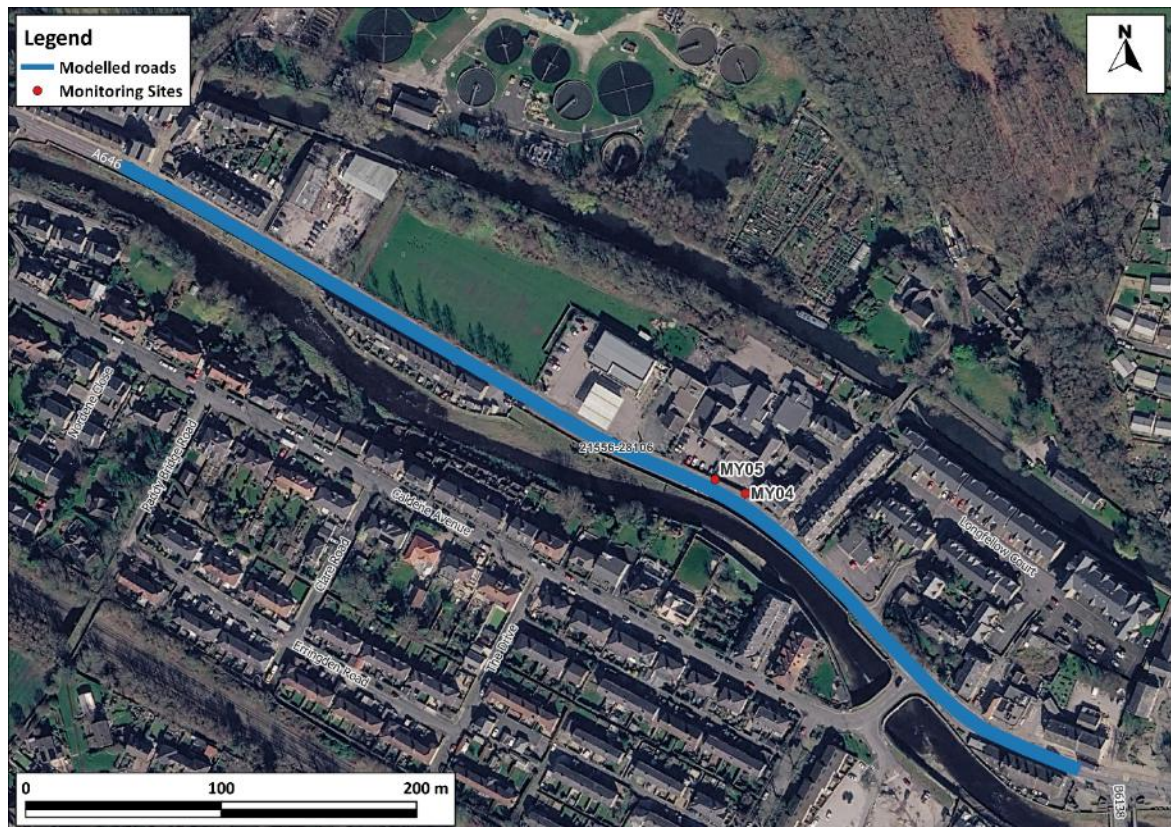


**Figure A2-10: Modelled Road Network - Calderdale Verification in Mytholmroyd**

Imagery ©2026 Airbus, Landsat / Copernicus, Maxar Technologies.

- A2.10 The unadjusted model has under predicted the road-NO<sub>x</sub> contribution; this is a common experience with this and most other road traffic emissions dispersion models. An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A2-11). The calculated adjustment factor of 1.28 has been applied to the modelled road-NO<sub>x</sub> concentration for each receptor to provide adjusted modelled road-NO<sub>x</sub> concentrations.
- A2.11 The total NO<sub>2</sub> concentrations have then been determined by combining the adjusted modelled road-NO<sub>x</sub> concentrations with the predicted background NO<sub>2</sub> concentration within the NO<sub>x</sub> to NO<sub>2</sub> calculator. Figure A2-12 compares final adjusted modelled total NO<sub>2</sub> at each of the monitoring sites to measured total NO<sub>2</sub>, and shows a close agreement. A secondary adjustment of 0.99 has then been applied to the total NO<sub>2</sub> calculated to give a final NO<sub>2</sub> concentration.

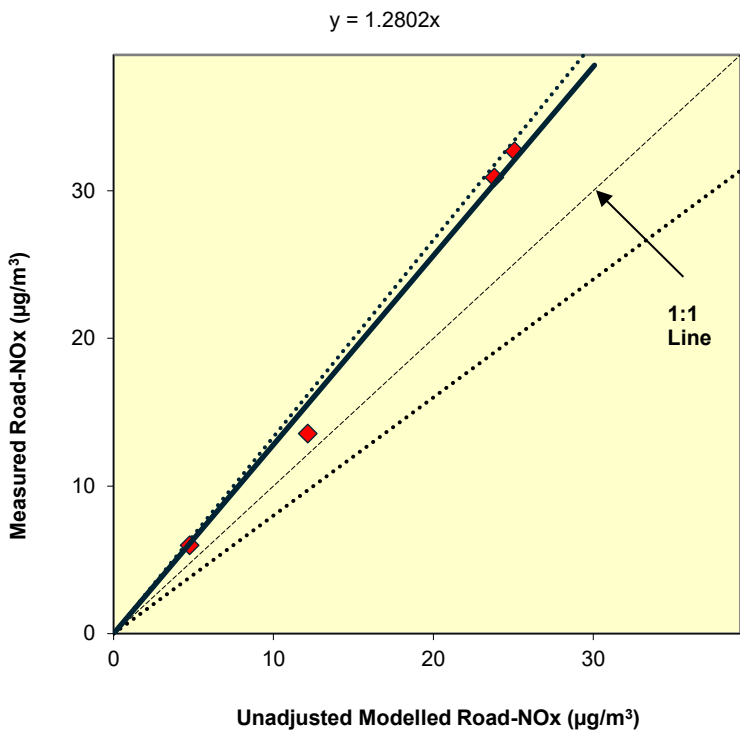


Figure A2-11: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations. The dashed lines show  $\pm 25\%$ .

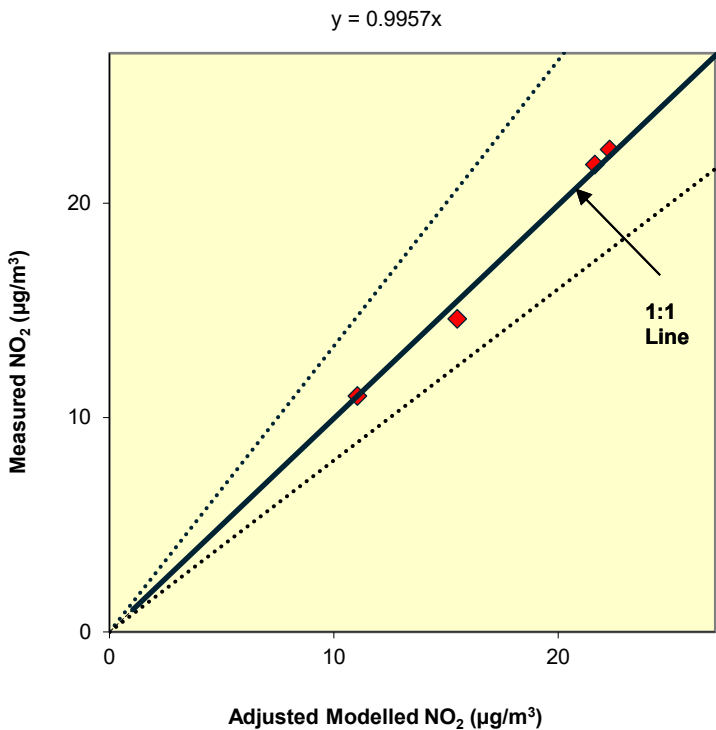


Figure A2-12: Comparison of Measured Total NO<sub>2</sub> to Final Adjusted Modelled Total NO<sub>2</sub> Concentrations. The dashed lines show  $\pm 25\%$ .

## Ammonia

- A2.12 Development of the CREAM emissions models (AQC, 2020; 2025) included verification of concentrations predicted using the ADMS-Roads dispersion model and measured traffic data against ambient measurements from the most detailed network of roadside monitoring sites which has ever been run in the UK. No further adjustment to the model predictions is considered appropriate.

## Post-processing

- A2.13 The model predicts road-NO<sub>x</sub> concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO<sub>2</sub>, has been processed through the NO<sub>x</sub> to NO<sub>2</sub> calculator available on the Defra LAQM Support website (Defra, 2026a). The traffic mix within the calculator has been set to "All UK traffic". The calculator predicts the component of NO<sub>2</sub> based on the adjusted road-NO<sub>x</sub> and the background NO<sub>2</sub>.

## Deposition Rates

- A2.14 Deposition has not been included within the dispersion model. Instead, deposition has been calculated from the predicted ambient concentrations using the deposition velocities set out in Table A2-3. This means that no depletion is accounted for, providing a worst-case assessment. Deposition velocities refer to a height above ground, typically 1 or 2 m, although in practice the precise height makes little difference and here they have been applied to concentrations predicted at a height of 1.5 m above ground. The velocities are applied simply by multiplying a concentration (µg/m<sup>3</sup>) by the velocity (m/s) to predict a deposition flux (µg/m<sup>2</sup>/s) and then scaling by time and area to represent kg/ha/yr of the nitrogen component of the molecule.

**Table A2-3: Deposition Velocities Used in This Assessment**

| Pollutant       | Deposition Velocity (m/s)                     | Reference             |
|-----------------|-----------------------------------------------|-----------------------|
| NO <sub>2</sub> | 0.0015 m/s (Grassland);<br>0.003 m/s (Forest) | AQTAG06 (AQTAG, 2011) |
| NH <sub>3</sub> | 0.02 m/s (Grassland);<br>0.03 m/s (Forest)    | AQTAG06 (AQTAG, 2011) |

- A2.15 Wet deposition of the emitted pollutants close to the emission source will be restricted to wash-out, or below cloud scavenging. For this to occur, rain droplets must come into contact with the gas molecules before they hit the ground. Falling raindrops displace the air around them, effectively pushing gasses away. AQTAG06 guidance (AQTAG, 2011) is that the wet deposition of sulphur dioxide, NO<sub>2</sub> and NH<sub>3</sub> is not significant within a short range. It has thus not been included.
- A2.16 Deposition may have an acidifying effect through the release of acid protons during chemical transformation in the soil or biota. Thus, even alkaline gases such as NH<sub>3</sub> can have an acidifying effect. The acidity CLoS are expressed as equivalents ('eq'), referring to the molar equivalent of potential acidity. This is calculated from the mass (in g) of the deposited element, taking account of both its atomic mass and its valency. The acidifying potential (in eq) of both ammonium (NH<sub>4</sub><sup>+</sup>) and nitrate (NO<sub>3</sub><sup>-</sup>) is 1/14 times the deposited mass in grammes (with 14 being the atomic mass of nitrogen). The species included in the calculation of acid deposition, and their calculated acidifying potentials, are set out in Table A2-4.

**Table A2-4: Species Included in Acid Deposition Calculations**

| Pollutant                                             | Calculation (kg deposition to keq) |
|-------------------------------------------------------|------------------------------------|
| N (from deposited NO <sub>2</sub> , NH <sub>3</sub> ) | 0.071                              |

## A3 Retardation

- A3.1 Nitrogen deposition in the future will be less than in 2023. This is because of natural turnover of the vehicle fleet as well the response to policies to reduce emissions from many sectors across Europe. Natural England sometimes requests that the degree of 'retardation' to ongoing reductions in nitrogen deposition should be calculated, and that this should be done assuming a linear trajectory (in this case between 2023 and 2043) which also continues at the same rate afterwards<sup>7</sup>. This calculation has focused on the transects within each site with the highest PC alone, and highest PC in-combination with other projects and plans. Note that for the North Pennine Moors, there is no increase in nitrogen deposition for PC alone impacts and therefore only one transect is reported for this site (as there is not a transect with a 'highest' PC alone).
- A3.2 As explained in Paragraph 3.13, background deposition has been assumed to change between 2023 and 2043 based on JNCC's Nitrogen Futures Business-as-Usual modelling, but only allowing 7 years of change because Nitrogen Futures did not make predictions beyond 2030. The total reductions to 2043 are therefore highly likely to have been under-predicted, which makes the 'retardation' calculation particularly worst-case.
- A3.3 The first step of the 'retardation' calculation is to show the magnitude of improvement which is forecast between 2023 Baseline and the 2043 Baseline, and between 2023 Baseline and the 2043 With Local Plan and Emerging Local Plans scenario. These improvements are shown in Table A3-1, expressed both as the 20-year total and as the change per year. For example, deposition at 2 m from the road along the North Pen B Transect in the North Pennine Moors SAC and SPA site is expected to be 1.60 kgN/ha/yr lower in 2043 than in 2023 if there is no Local Plan or emerging Local Plans in this 20-year period. With the Local Plan and Emerging Local Plan traffic growth, deposition will be 1.26 kgN/ha/yr lower than in 2023.

**Table A3-1: Reduction in Nitrogen Deposition between 2023 and 2043 the Worst-case Transect in Each Designated Site, in kgN/ha/yr<sup>a</sup>**

| Transect                        | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|---------------------------------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|                                 |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| North Pennine Moors SAC and SPA |                        |                                                |          |                                                                              |          |
| N Pen B                         | 2                      | -1.60                                          | -0.08    | -1.26                                                                        | -0.06    |
| N Pen B                         | 4                      | -1.54                                          | -0.08    | -1.24                                                                        | -0.06    |
| N Pen B                         | 6                      | -1.48                                          | -0.07    | -1.22                                                                        | -0.06    |
| N Pen B                         | 8                      | -1.43                                          | -0.07    | -1.20                                                                        | -0.06    |
| N Pen B                         | 10                     | -1.39                                          | -0.07    | -1.18                                                                        | -0.06    |

<sup>7</sup> In practice, the first of these assumptions is invalid and the second one is also unlikely to be true, however this is the only robust basis to provide this calculation which is sometimes required by Natural England.

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| N Pen B  | 12                     | -1.35                                          | -0.07    | -1.16                                                                        | -0.06    |
| N Pen B  | 14                     | -1.31                                          | -0.07    | -1.14                                                                        | -0.06    |
| N Pen B  | 16                     | -1.28                                          | -0.06    | -1.12                                                                        | -0.06    |
| N Pen B  | 18                     | -1.26                                          | -0.06    | -1.10                                                                        | -0.06    |
| N Pen B  | 20                     | -1.23                                          | -0.06    | -1.09                                                                        | -0.05    |
| N Pen B  | 22                     | -1.20                                          | -0.06    | -1.07                                                                        | -0.05    |
| N Pen B  | 24                     | -1.18                                          | -0.06    | -1.06                                                                        | -0.05    |
| N Pen B  | 26                     | -1.16                                          | -0.06    | -1.04                                                                        | -0.05    |
| N Pen B  | 28                     | -1.14                                          | -0.06    | -1.03                                                                        | -0.05    |
| N Pen B  | 30                     | -1.13                                          | -0.06    | -1.02                                                                        | -0.05    |
| N Pen B  | 32                     | -1.11                                          | -0.06    | -1.01                                                                        | -0.05    |
| N Pen B  | 34                     | -1.10                                          | -0.05    | -1.00                                                                        | -0.05    |
| N Pen B  | 36                     | -1.08                                          | -0.05    | -0.99                                                                        | -0.05    |
| N Pen B  | 38                     | -1.07                                          | -0.05    | -0.98                                                                        | -0.05    |
| N Pen B  | 40                     | -1.06                                          | -0.05    | -0.97                                                                        | -0.05    |
| N Pen B  | 42                     | -1.05                                          | -0.05    | -0.96                                                                        | -0.05    |
| N Pen B  | 44                     | -1.04                                          | -0.05    | -0.95                                                                        | -0.05    |
| N Pen B  | 46                     | -1.03                                          | -0.05    | -0.95                                                                        | -0.05    |
| N Pen B  | 48                     | -1.02                                          | -0.05    | -0.94                                                                        | -0.05    |
| N Pen B  | 50                     | -1.01                                          | -0.05    | -0.93                                                                        | -0.05    |
| N Pen B  | 52                     | -1.00                                          | -0.05    | -0.93                                                                        | -0.05    |
| N Pen B  | 54                     | -0.99                                          | -0.05    | -0.92                                                                        | -0.05    |
| N Pen B  | 56                     | -0.98                                          | -0.05    | -0.91                                                                        | -0.05    |
| N Pen B  | 58                     | -0.98                                          | -0.05    | -0.91                                                                        | -0.05    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| N Pen B  | 60                     | -0.97                                          | -0.05    | -0.90                                                                        | -0.05    |
| N Pen B  | 62                     | -0.96                                          | -0.05    | -0.90                                                                        | -0.04    |
| N Pen B  | 64                     | -0.96                                          | -0.05    | -0.89                                                                        | -0.04    |
| N Pen B  | 66                     | -0.95                                          | -0.05    | -0.89                                                                        | -0.04    |
| N Pen B  | 68                     | -0.95                                          | -0.05    | -0.89                                                                        | -0.04    |
| N Pen B  | 70                     | -0.94                                          | -0.05    | -0.88                                                                        | -0.04    |
| N Pen B  | 72                     | -0.94                                          | -0.05    | -0.88                                                                        | -0.04    |
| N Pen B  | 74                     | -0.93                                          | -0.05    | -0.87                                                                        | -0.04    |
| N Pen B  | 76                     | -0.92                                          | -0.05    | -0.87                                                                        | -0.04    |
| N Pen B  | 78                     | -0.92                                          | -0.05    | -0.87                                                                        | -0.04    |
| N Pen B  | 80                     | -0.92                                          | -0.05    | -0.86                                                                        | -0.04    |
| N Pen B  | 82                     | -0.91                                          | -0.05    | -0.86                                                                        | -0.04    |
| N Pen B  | 84                     | -0.91                                          | -0.05    | -0.86                                                                        | -0.04    |
| N Pen B  | 86                     | -0.90                                          | -0.05    | -0.86                                                                        | -0.04    |
| N Pen B  | 88                     | -0.90                                          | -0.05    | -0.85                                                                        | -0.04    |
| N Pen B  | 90                     | -0.90                                          | -0.04    | -0.85                                                                        | -0.04    |
| N Pen B  | 92                     | -0.89                                          | -0.04    | -0.85                                                                        | -0.04    |
| N Pen B  | 94                     | -0.89                                          | -0.04    | -0.85                                                                        | -0.04    |
| N Pen B  | 96                     | -0.89                                          | -0.04    | -0.84                                                                        | -0.04    |
| N Pen B  | 98                     | -0.89                                          | -0.04    | -0.84                                                                        | -0.04    |
| N Pen B  | 100                    | -0.88                                          | -0.04    | -0.84                                                                        | -0.04    |
| N Pen B  | 102                    | -0.88                                          | -0.04    | -0.84                                                                        | -0.04    |
| N Pen B  | 104                    | -0.88                                          | -0.04    | -0.83                                                                        | -0.04    |
| N Pen B  | 106                    | -0.87                                          | -0.04    | -0.83                                                                        | -0.04    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| N Pen B  | 108                    | -0.87                                          | -0.04    | -0.83                                                                        | -0.04    |
| N Pen B  | 110                    | -0.87                                          | -0.04    | -0.83                                                                        | -0.04    |
| N Pen B  | 112                    | -0.87                                          | -0.04    | -0.83                                                                        | -0.04    |
| N Pen B  | 114                    | -0.87                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 116                    | -0.86                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 118                    | -0.86                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 120                    | -0.86                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 122                    | -0.86                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 124                    | -0.86                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 126                    | -0.85                                          | -0.04    | -0.82                                                                        | -0.04    |
| N Pen B  | 128                    | -0.85                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 130                    | -0.85                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 132                    | -0.85                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 134                    | -0.85                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 136                    | -0.84                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 138                    | -0.84                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 140                    | -0.84                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 142                    | -0.84                                          | -0.04    | -0.81                                                                        | -0.04    |
| N Pen B  | 144                    | -0.84                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B  | 146                    | -0.84                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B  | 148                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B  | 150                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B  | 152                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B  | 154                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |

| Transect                                       | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|------------------------------------------------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|                                                |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| N Pen B                                        | 156                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B                                        | 158                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B                                        | 160                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B                                        | 162                    | -0.83                                          | -0.04    | -0.80                                                                        | -0.04    |
| N Pen B                                        | 164                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 166                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 168                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 170                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 172                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 174                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 176                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 178                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 180                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 182                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 184                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 186                    | -0.82                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 188                    | -0.81                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 190                    | -0.81                                          | -0.04    | -0.79                                                                        | -0.04    |
| N Pen B                                        | 192                    | -0.81                                          | -0.04    | -0.78                                                                        | -0.04    |
| N Pen B                                        | 194                    | -0.81                                          | -0.04    | -0.78                                                                        | -0.04    |
| N Pen B                                        | 196                    | -0.81                                          | -0.04    | -0.78                                                                        | -0.04    |
| N Pen B                                        | 198                    | -0.81                                          | -0.04    | -0.78                                                                        | -0.04    |
| N Pen B                                        | 200                    | -0.81                                          | -0.04    | -0.78                                                                        | -0.04    |
| <b>South Pennine Moors SAC and Phase 2 SPA</b> |                        |                                                |          |                                                                              |          |
| S Pen O                                        | 2                      | -1.05                                          | -0.05    | -0.73                                                                        | -0.04    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| S Pen O  | 4                      | -1.03                                          | -0.05    | -0.73                                                                        | -0.04    |
| S Pen O  | 6                      | -1.00                                          | -0.05    | -0.73                                                                        | -0.04    |
| S Pen O  | 8                      | -0.98                                          | -0.05    | -0.73                                                                        | -0.04    |
| S Pen O  | 10                     | -0.95                                          | -0.05    | -0.73                                                                        | -0.04    |
| S Pen O  | 12                     | -0.93                                          | -0.05    | -0.73                                                                        | -0.04    |
| S Pen O  | 14                     | -0.91                                          | -0.05    | -0.73                                                                        | -0.04    |
| S Pen O  | 16                     | -0.89                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 18                     | -0.87                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 20                     | -0.85                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 22                     | -0.83                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 24                     | -0.82                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 26                     | -0.80                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 28                     | -0.79                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 30                     | -0.78                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 32                     | -0.77                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 34                     | -0.75                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 36                     | -0.74                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 38                     | -0.73                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 40                     | -0.72                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 42                     | -0.71                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 44                     | -0.71                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen O  | 46                     | -0.70                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 48                     | -0.69                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 50                     | -0.68                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 52                     | -0.67                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 54                     | -0.67                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 56                     | -0.66                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 58                     | -0.66                                          | -0.03    | -0.73                                                                        | -0.04    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| S Pen O  | 60                     | -0.65                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 62                     | -0.64                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 64                     | -0.64                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 66                     | -0.63                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 68                     | -0.63                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 70                     | -0.62                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 72                     | -0.62                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 74                     | -0.62                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 76                     | -0.61                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 78                     | -0.61                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 80                     | -0.60                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 82                     | -0.60                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 84                     | -0.60                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 86                     | -0.59                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 88                     | -0.59                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 90                     | -0.59                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 92                     | -0.58                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 94                     | -0.58                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 96                     | -0.58                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 98                     | -0.58                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 100                    | -0.57                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 102                    | -0.57                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 104                    | -0.57                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 106                    | -0.56                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 108                    | -0.56                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 110                    | -0.56                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 112                    | -0.56                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 114                    | -0.56                                          | -0.03    | -0.73                                                                        | -0.04    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| S Pen O  | 116                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 118                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 120                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 122                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 124                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 126                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 128                    | -0.55                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 130                    | -0.54                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 132                    | -0.54                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 134                    | -0.54                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 136                    | -0.54                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 138                    | -0.54                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 140                    | -0.54                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 142                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 144                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 146                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 148                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 150                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 152                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 154                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 156                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 158                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 160                    | -0.53                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 162                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 164                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 166                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 168                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 170                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| S Pen O  | 172                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 174                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 176                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 178                    | -0.52                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 180                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 182                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 184                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 186                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 188                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 190                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 192                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 194                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 196                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 198                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen O  | 200                    | -0.51                                          | -0.03    | -0.73                                                                        | -0.04    |
| S Pen S  | 2                      | -1.41                                          | -0.07    | -1.15                                                                        | -0.06    |
| S Pen S  | 4                      | -1.29                                          | -0.06    | -1.06                                                                        | -0.05    |
| S Pen S  | 6                      | -1.20                                          | -0.06    | -1.00                                                                        | -0.05    |
| S Pen S  | 8                      | -1.13                                          | -0.06    | -0.95                                                                        | -0.05    |
| S Pen S  | 10                     | -1.08                                          | -0.05    | -0.91                                                                        | -0.05    |
| S Pen S  | 12                     | -1.03                                          | -0.05    | -0.88                                                                        | -0.04    |
| S Pen S  | 14                     | -0.99                                          | -0.05    | -0.85                                                                        | -0.04    |
| S Pen S  | 16                     | -0.96                                          | -0.05    | -0.83                                                                        | -0.04    |
| S Pen S  | 18                     | -0.93                                          | -0.05    | -0.81                                                                        | -0.04    |
| S Pen S  | 20                     | -0.91                                          | -0.05    | -0.79                                                                        | -0.04    |
| S Pen S  | 22                     | -0.88                                          | -0.04    | -0.77                                                                        | -0.04    |
| S Pen S  | 24                     | -0.86                                          | -0.04    | -0.76                                                                        | -0.04    |
| S Pen S  | 26                     | -0.84                                          | -0.04    | -0.75                                                                        | -0.04    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| S Pen S  | 28                     | -0.82                                          | -0.04    | -0.73                                                                        | -0.04    |
| S Pen S  | 30                     | -0.81                                          | -0.04    | -0.72                                                                        | -0.04    |
| S Pen S  | 32                     | -0.79                                          | -0.04    | -0.71                                                                        | -0.04    |
| S Pen S  | 34                     | -0.78                                          | -0.04    | -0.70                                                                        | -0.04    |
| S Pen S  | 36                     | -0.77                                          | -0.04    | -0.69                                                                        | -0.03    |
| S Pen S  | 38                     | -0.76                                          | -0.04    | -0.68                                                                        | -0.03    |
| S Pen S  | 40                     | -0.75                                          | -0.04    | -0.68                                                                        | -0.03    |
| S Pen S  | 42                     | -0.74                                          | -0.04    | -0.67                                                                        | -0.03    |
| S Pen S  | 44                     | -0.73                                          | -0.04    | -0.66                                                                        | -0.03    |
| S Pen S  | 46                     | -0.72                                          | -0.04    | -0.66                                                                        | -0.03    |
| S Pen S  | 48                     | -0.71                                          | -0.04    | -0.65                                                                        | -0.03    |
| S Pen S  | 50                     | -0.70                                          | -0.04    | -0.64                                                                        | -0.03    |
| S Pen S  | 52                     | -0.69                                          | -0.03    | -0.64                                                                        | -0.03    |
| S Pen S  | 54                     | -0.69                                          | -0.03    | -0.63                                                                        | -0.03    |
| S Pen S  | 56                     | -0.68                                          | -0.03    | -0.63                                                                        | -0.03    |
| S Pen S  | 58                     | -0.67                                          | -0.03    | -0.62                                                                        | -0.03    |
| S Pen S  | 60                     | -0.67                                          | -0.03    | -0.62                                                                        | -0.03    |
| S Pen S  | 62                     | -0.66                                          | -0.03    | -0.61                                                                        | -0.03    |
| S Pen S  | 64                     | -0.66                                          | -0.03    | -0.61                                                                        | -0.03    |
| S Pen S  | 66                     | -0.65                                          | -0.03    | -0.61                                                                        | -0.03    |
| S Pen S  | 68                     | -0.65                                          | -0.03    | -0.60                                                                        | -0.03    |
| S Pen S  | 70                     | -0.64                                          | -0.03    | -0.60                                                                        | -0.03    |
| S Pen S  | 72                     | -0.64                                          | -0.03    | -0.59                                                                        | -0.03    |
| S Pen S  | 74                     | -0.63                                          | -0.03    | -0.59                                                                        | -0.03    |
| S Pen S  | 76                     | -0.63                                          | -0.03    | -0.59                                                                        | -0.03    |
| S Pen S  | 78                     | -0.63                                          | -0.03    | -0.59                                                                        | -0.03    |
| S Pen S  | 80                     | -0.62                                          | -0.03    | -0.58                                                                        | -0.03    |
| S Pen S  | 82                     | -0.62                                          | -0.03    | -0.58                                                                        | -0.03    |

| Transect | Distance from Road (m) | Change from '2023 Baseline' to '2043 Baseline' |          | Change from '2023 Baseline' to '2043 With Local Plan & Emerging Local Plans' |          |
|----------|------------------------|------------------------------------------------|----------|------------------------------------------------------------------------------|----------|
|          |                        | over 20 years                                  | per year | over 20 years                                                                | per year |
| S Pen S  | 84                     | -0.61                                          | -0.03    | -0.58                                                                        | -0.03    |
| S Pen S  | 86                     | -0.61                                          | -0.03    | -0.58                                                                        | -0.03    |
| S Pen S  | 88                     | -0.61                                          | -0.03    | -0.57                                                                        | -0.03    |
| S Pen S  | 90                     | -0.60                                          | -0.03    | -0.57                                                                        | -0.03    |
| S Pen S  | 92                     | -0.60                                          | -0.03    | -0.57                                                                        | -0.03    |
| S Pen S  | 94                     | -0.60                                          | -0.03    | -0.56                                                                        | -0.03    |
| S Pen S  | 95.7                   | -0.60                                          | -0.03    | -0.56                                                                        | -0.03    |

<sup>a</sup> The majority of values are shown as negatives since they are reductions over time.

A3.4 The next step is to divide the PC by the 'per year' improvements to the 2043 Baseline. These results are shown in Table A3-2. At the North Pen B Transect in the North Pennine Moors SAC and SPA site, the Local Plan alone will accelerate the improvements by between 0.24 and 1.62 years (due to improvements compared to the 2043 Baseline scenario), while the Local Plan in-combination, will retard the improvements by between 0.64 and 4.34 years. At Transect S Pen O in the South Pennine Moors SAC and Phase 2 SPA site, the Local Plan alone will accelerate the improvements by between 0.14 and 1.53 years, while the Local Plan in-combination, will retard the improvements by between 0.82 and 6.20 years. At Transect S Pen S in the South Pennine Moors SAC and Phase 2 SPA site, the Local Plan alone will retard the improvements by between 0.60 and 1.91 years, while the Local Plan in-combination, will retard the improvements by between 1.13 and 3.75 years.

A3.5 It should be stressed that this calculation is highly precautionary. While this is the only approach to using JNCC's forecasts with which Natural England currently agrees, it assumes that the UK will break a raft of long-standing legal commitments to reduce emissions and environmental impacts in the future. In addition to this, regarding the years after 2043, which are invoked by the concept of a 'delay' while these years have not been modelled, it is reasonable to expect a significant volume of electric vehicles in the fleet by this time, which have no local emissions of NO<sub>x</sub> or NH<sub>3</sub>. This means that the years of delay statistics are likely to have been significantly overpredicted.

**Table A3-2: Years Delay to Reductions in Nitrogen Deposition at the Worst-case Transect in Each Designated Site, in kgN/ha/yr**

| Transect                        | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|---------------------------------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|                                 |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| North Pennine Moors SAC and SPA |                        |                  |                             |                           |                             |
| N Pen B                         | 2                      | -0.13            | -1.62                       | 0.35                      | 4.34                        |
| N Pen B                         | 4                      | -0.11            | -1.42                       | 0.30                      | 3.85                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| N Pen B  | 6                      | -0.10            | -1.29                       | 0.26                      | 3.50                        |
| N Pen B  | 8                      | -0.09            | -1.20                       | 0.23                      | 3.22                        |
| N Pen B  | 10                     | -0.08            | -1.12                       | 0.21                      | 3.01                        |
| N Pen B  | 12                     | -0.07            | -1.05                       | 0.19                      | 2.83                        |
| N Pen B  | 14                     | -0.07            | -1.00                       | 0.17                      | 2.66                        |
| N Pen B  | 16                     | -0.06            | -0.92                       | 0.16                      | 2.55                        |
| N Pen B  | 18                     | -0.06            | -0.90                       | 0.15                      | 2.41                        |
| N Pen B  | 20                     | -0.05            | -0.87                       | 0.14                      | 2.29                        |
| N Pen B  | 22                     | -0.05            | -0.83                       | 0.13                      | 2.20                        |
| N Pen B  | 24                     | -0.05            | -0.80                       | 0.13                      | 2.12                        |
| N Pen B  | 26                     | -0.04            | -0.75                       | 0.12                      | 2.07                        |
| N Pen B  | 28                     | -0.04            | -0.75                       | 0.11                      | 1.98                        |
| N Pen B  | 30                     | -0.04            | -0.73                       | 0.11                      | 1.92                        |
| N Pen B  | 32                     | -0.04            | -0.68                       | 0.10                      | 1.88                        |
| N Pen B  | 34                     | -0.04            | -0.66                       | 0.10                      | 1.83                        |
| N Pen B  | 36                     | -0.03            | -0.64                       | 0.10                      | 1.78                        |
| N Pen B  | 38                     | -0.03            | -0.65                       | 0.09                      | 1.71                        |
| N Pen B  | 40                     | -0.03            | -0.64                       | 0.09                      | 1.67                        |
| N Pen B  | 42                     | -0.03            | -0.60                       | 0.09                      | 1.63                        |
| N Pen B  | 44                     | -0.03            | -0.58                       | 0.08                      | 1.59                        |
| N Pen B  | 46                     | -0.03            | -0.60                       | 0.08                      | 1.56                        |
| N Pen B  | 48                     | -0.03            | -0.56                       | 0.08                      | 1.52                        |
| N Pen B  | 50                     | -0.03            | -0.57                       | 0.07                      | 1.46                        |
| N Pen B  | 52                     | -0.03            | -0.53                       | 0.07                      | 1.46                        |
| N Pen B  | 54                     | -0.03            | -0.55                       | 0.07                      | 1.40                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| N Pen B  | 56                     | -0.03            | -0.51                       | 0.07                      | 1.41                        |
| N Pen B  | 58                     | -0.03            | -0.53                       | 0.07                      | 1.35                        |
| N Pen B  | 60                     | -0.02            | -0.49                       | 0.07                      | 1.36                        |
| N Pen B  | 62                     | -0.02            | -0.49                       | 0.06                      | 1.33                        |
| N Pen B  | 64                     | -0.02            | -0.51                       | 0.06                      | 1.28                        |
| N Pen B  | 66                     | -0.02            | -0.47                       | 0.06                      | 1.29                        |
| N Pen B  | 68                     | -0.02            | -0.46                       | 0.06                      | 1.27                        |
| N Pen B  | 70                     | -0.02            | -0.49                       | 0.06                      | 1.22                        |
| N Pen B  | 72                     | -0.02            | -0.45                       | 0.06                      | 1.23                        |
| N Pen B  | 74                     | -0.02            | -0.44                       | 0.06                      | 1.21                        |
| N Pen B  | 76                     | -0.02            | -0.47                       | 0.05                      | 1.17                        |
| N Pen B  | 78                     | -0.02            | -0.43                       | 0.05                      | 1.18                        |
| N Pen B  | 80                     | -0.02            | -0.42                       | 0.05                      | 1.16                        |
| N Pen B  | 82                     | -0.02            | -0.42                       | 0.05                      | 1.15                        |
| N Pen B  | 84                     | -0.02            | -0.44                       | 0.05                      | 1.10                        |
| N Pen B  | 86                     | -0.02            | -0.44                       | 0.05                      | 1.09                        |
| N Pen B  | 88                     | -0.02            | -0.40                       | 0.05                      | 1.10                        |
| N Pen B  | 90                     | -0.02            | -0.39                       | 0.05                      | 1.09                        |
| N Pen B  | 92                     | -0.02            | -0.39                       | 0.05                      | 1.08                        |
| N Pen B  | 94                     | -0.02            | -0.39                       | 0.05                      | 1.03                        |
| N Pen B  | 96                     | -0.02            | -0.41                       | 0.05                      | 1.02                        |
| N Pen B  | 98                     | -0.02            | -0.38                       | 0.05                      | 1.04                        |
| N Pen B  | 100                    | -0.02            | -0.37                       | 0.05                      | 1.03                        |
| N Pen B  | 102                    | -0.02            | -0.37                       | 0.04                      | 1.02                        |
| N Pen B  | 104                    | -0.02            | -0.36                       | 0.04                      | 1.01                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| N Pen B  | 106                    | -0.02            | -0.36                       | 0.04                      | 0.96                        |
| N Pen B  | 108                    | -0.02            | -0.39                       | 0.04                      | 0.95                        |
| N Pen B  | 110                    | -0.02            | -0.38                       | 0.04                      | 0.94                        |
| N Pen B  | 112                    | -0.02            | -0.35                       | 0.04                      | 0.96                        |
| N Pen B  | 114                    | -0.01            | -0.34                       | 0.04                      | 0.96                        |
| N Pen B  | 116                    | -0.01            | -0.34                       | 0.04                      | 0.94                        |
| N Pen B  | 118                    | -0.01            | -0.34                       | 0.04                      | 0.94                        |
| N Pen B  | 120                    | -0.01            | -0.33                       | 0.04                      | 0.90                        |
| N Pen B  | 122                    | -0.01            | -0.33                       | 0.04                      | 0.89                        |
| N Pen B  | 124                    | -0.02            | -0.36                       | 0.04                      | 0.88                        |
| N Pen B  | 126                    | -0.02            | -0.36                       | 0.04                      | 0.87                        |
| N Pen B  | 128                    | -0.01            | -0.32                       | 0.04                      | 0.89                        |
| N Pen B  | 130                    | -0.01            | -0.32                       | 0.04                      | 0.88                        |
| N Pen B  | 132                    | -0.01            | -0.32                       | 0.04                      | 0.88                        |
| N Pen B  | 134                    | -0.01            | -0.31                       | 0.04                      | 0.87                        |
| N Pen B  | 136                    | -0.01            | -0.31                       | 0.04                      | 0.86                        |
| N Pen B  | 138                    | -0.01            | -0.31                       | 0.03                      | 0.82                        |
| N Pen B  | 140                    | -0.01            | -0.30                       | 0.03                      | 0.81                        |
| N Pen B  | 142                    | -0.01            | -0.30                       | 0.03                      | 0.81                        |
| N Pen B  | 144                    | -0.01            | -0.30                       | 0.03                      | 0.80                        |
| N Pen B  | 146                    | -0.01            | -0.33                       | 0.03                      | 0.79                        |
| N Pen B  | 148                    | -0.01            | -0.33                       | 0.03                      | 0.79                        |
| N Pen B  | 150                    | -0.01            | -0.29                       | 0.03                      | 0.81                        |
| N Pen B  | 152                    | -0.01            | -0.29                       | 0.03                      | 0.81                        |
| N Pen B  | 154                    | -0.01            | -0.29                       | 0.03                      | 0.80                        |

| Transect                                       | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|------------------------------------------------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|                                                |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| N Pen B                                        | 156                    | -0.01            | -0.28                       | 0.03                      | 0.79                        |
| N Pen B                                        | 158                    | -0.01            | -0.28                       | 0.03                      | 0.79                        |
| N Pen B                                        | 160                    | -0.01            | -0.28                       | 0.03                      | 0.75                        |
| N Pen B                                        | 162                    | -0.01            | -0.28                       | 0.03                      | 0.74                        |
| N Pen B                                        | 164                    | -0.01            | -0.27                       | 0.03                      | 0.74                        |
| N Pen B                                        | 166                    | -0.01            | -0.27                       | 0.03                      | 0.73                        |
| N Pen B                                        | 168                    | -0.01            | -0.27                       | 0.03                      | 0.72                        |
| N Pen B                                        | 170                    | -0.01            | -0.27                       | 0.03                      | 0.72                        |
| N Pen B                                        | 172                    | -0.01            | -0.30                       | 0.03                      | 0.71                        |
| N Pen B                                        | 174                    | -0.01            | -0.30                       | 0.03                      | 0.71                        |
| N Pen B                                        | 176                    | -0.01            | -0.30                       | 0.03                      | 0.70                        |
| N Pen B                                        | 178                    | -0.01            | -0.26                       | 0.03                      | 0.73                        |
| N Pen B                                        | 180                    | -0.01            | -0.26                       | 0.03                      | 0.72                        |
| N Pen B                                        | 182                    | -0.01            | -0.26                       | 0.03                      | 0.72                        |
| N Pen B                                        | 184                    | -0.01            | -0.25                       | 0.03                      | 0.71                        |
| N Pen B                                        | 186                    | -0.01            | -0.25                       | 0.03                      | 0.71                        |
| N Pen B                                        | 188                    | -0.01            | -0.25                       | 0.03                      | 0.67                        |
| N Pen B                                        | 190                    | -0.01            | -0.25                       | 0.03                      | 0.66                        |
| N Pen B                                        | 192                    | -0.01            | -0.25                       | 0.03                      | 0.66                        |
| N Pen B                                        | 194                    | -0.01            | -0.24                       | 0.03                      | 0.65                        |
| N Pen B                                        | 196                    | -0.01            | -0.24                       | 0.03                      | 0.65                        |
| N Pen B                                        | 198                    | -0.01            | -0.24                       | 0.03                      | 0.64                        |
| N Pen B                                        | 200                    | -0.01            | -0.24                       | 0.03                      | 0.64                        |
| <b>South Pennine Moors SAC and Phase 2 SPA</b> |                        |                  |                             |                           |                             |
| S Pen O                                        | 2                      | -0.08            | -1.53                       | 0.33                      | 6.20                        |
| S Pen O                                        | 4                      | -0.07            | -1.31                       | 0.28                      | 5.34                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| S Pen O  | 6                      | -0.06            | -1.17                       | 0.24                      | 4.81                        |
| S Pen O  | 8                      | -0.05            | -1.07                       | 0.22                      | 4.41                        |
| S Pen O  | 10                     | -0.05            | -0.96                       | 0.20                      | 4.10                        |
| S Pen O  | 12                     | -0.04            | -0.89                       | 0.18                      | 3.87                        |
| S Pen O  | 14                     | -0.04            | -0.87                       | 0.16                      | 3.64                        |
| S Pen O  | 16                     | -0.03            | -0.79                       | 0.15                      | 3.46                        |
| S Pen O  | 18                     | -0.03            | -0.74                       | 0.14                      | 3.31                        |
| S Pen O  | 20                     | -0.03            | -0.71                       | 0.13                      | 3.17                        |
| S Pen O  | 22                     | -0.03            | -0.67                       | 0.13                      | 3.05                        |
| S Pen O  | 24                     | -0.03            | -0.64                       | 0.12                      | 2.95                        |
| S Pen O  | 26                     | -0.02            | -0.62                       | 0.11                      | 2.82                        |
| S Pen O  | 28                     | -0.02            | -0.59                       | 0.11                      | 2.76                        |
| S Pen O  | 30                     | -0.02            | -0.57                       | 0.10                      | 2.69                        |
| S Pen O  | 32                     | -0.02            | -0.55                       | 0.10                      | 2.57                        |
| S Pen O  | 34                     | -0.02            | -0.53                       | 0.09                      | 2.50                        |
| S Pen O  | 36                     | -0.02            | -0.51                       | 0.09                      | 2.44                        |
| S Pen O  | 38                     | -0.02            | -0.50                       | 0.09                      | 2.38                        |
| S Pen O  | 40                     | -0.02            | -0.48                       | 0.09                      | 2.36                        |
| S Pen O  | 42                     | -0.02            | -0.47                       | 0.08                      | 2.28                        |
| S Pen O  | 44                     | -0.02            | -0.45                       | 0.08                      | 2.23                        |
| S Pen O  | 46                     | -0.02            | -0.44                       | 0.08                      | 2.18                        |
| S Pen O  | 48                     | -0.01            | -0.43                       | 0.07                      | 2.14                        |
| S Pen O  | 50                     | -0.01            | -0.42                       | 0.07                      | 2.10                        |
| S Pen O  | 52                     | -0.01            | -0.41                       | 0.07                      | 2.06                        |
| S Pen O  | 54                     | -0.01            | -0.40                       | 0.07                      | 2.02                        |
| S Pen O  | 56                     | -0.01            | -0.39                       | 0.07                      | 1.98                        |
| S Pen O  | 58                     | -0.01            | -0.38                       | 0.06                      | 1.95                        |
| S Pen O  | 60                     | -0.01            | -0.37                       | 0.06                      | 1.92                        |
| S Pen O  | 62                     | -0.01            | -0.41                       | 0.06                      | 1.84                        |
| S Pen O  | 64                     | -0.01            | -0.35                       | 0.06                      | 1.85                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| S Pen O  | 66                     | -0.01            | -0.35                       | 0.06                      | 1.83                        |
| S Pen O  | 68                     | -0.01            | -0.38                       | 0.06                      | 1.75                        |
| S Pen O  | 70                     | -0.01            | -0.33                       | 0.06                      | 1.77                        |
| S Pen O  | 72                     | -0.01            | -0.32                       | 0.05                      | 1.74                        |
| S Pen O  | 74                     | -0.01            | -0.32                       | 0.05                      | 1.67                        |
| S Pen O  | 76                     | -0.01            | -0.31                       | 0.05                      | 1.69                        |
| S Pen O  | 78                     | -0.01            | -0.31                       | 0.05                      | 1.67                        |
| S Pen O  | 80                     | -0.01            | -0.30                       | 0.05                      | 1.65                        |
| S Pen O  | 82                     | -0.01            | -0.29                       | 0.05                      | 1.58                        |
| S Pen O  | 84                     | -0.01            | -0.29                       | 0.05                      | 1.60                        |
| S Pen O  | 86                     | -0.01            | -0.28                       | 0.05                      | 1.58                        |
| S Pen O  | 88                     | -0.01            | -0.28                       | 0.05                      | 1.56                        |
| S Pen O  | 90                     | -0.01            | -0.27                       | 0.04                      | 1.49                        |
| S Pen O  | 92                     | -0.01            | -0.27                       | 0.04                      | 1.47                        |
| S Pen O  | 94                     | -0.01            | -0.32                       | 0.04                      | 1.45                        |
| S Pen O  | 96                     | -0.01            | -0.26                       | 0.04                      | 1.48                        |
| S Pen O  | 98                     | -0.01            | -0.26                       | 0.04                      | 1.46                        |
| S Pen O  | 100                    | -0.01            | -0.25                       | 0.04                      | 1.45                        |
| S Pen O  | 102                    | -0.01            | -0.25                       | 0.04                      | 1.37                        |
| S Pen O  | 104                    | -0.01            | -0.24                       | 0.04                      | 1.36                        |
| S Pen O  | 106                    | -0.01            | -0.24                       | 0.04                      | 1.34                        |
| S Pen O  | 108                    | -0.01            | -0.24                       | 0.04                      | 1.38                        |
| S Pen O  | 110                    | -0.01            | -0.23                       | 0.04                      | 1.36                        |
| S Pen O  | 112                    | -0.01            | -0.23                       | 0.04                      | 1.34                        |
| S Pen O  | 114                    | -0.01            | -0.23                       | 0.04                      | 1.33                        |
| S Pen O  | 116                    | -0.01            | -0.22                       | 0.04                      | 1.26                        |
| S Pen O  | 118                    | -0.01            | -0.22                       | 0.03                      | 1.25                        |
| S Pen O  | 120                    | -0.01            | -0.22                       | 0.03                      | 1.23                        |
| S Pen O  | 122                    | -0.01            | -0.22                       | 0.03                      | 1.22                        |
| S Pen O  | 124                    | -0.01            | -0.21                       | 0.03                      | 1.21                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| S Pen O  | 126                    | -0.01            | -0.21                       | 0.03                      | 1.24                        |
| S Pen O  | 128                    | -0.01            | -0.21                       | 0.03                      | 1.23                        |
| S Pen O  | 130                    | -0.01            | -0.20                       | 0.03                      | 1.22                        |
| S Pen O  | 132                    | -0.01            | -0.20                       | 0.03                      | 1.20                        |
| S Pen O  | 134                    | -0.01            | -0.20                       | 0.03                      | 1.14                        |
| S Pen O  | 136                    | -0.01            | -0.20                       | 0.03                      | 1.13                        |
| S Pen O  | 138                    | -0.01            | -0.19                       | 0.03                      | 1.12                        |
| S Pen O  | 140                    | -0.01            | -0.19                       | 0.03                      | 1.10                        |
| S Pen O  | 142                    | -0.01            | -0.19                       | 0.03                      | 1.09                        |
| S Pen O  | 144                    | 0.00             | -0.19                       | 0.03                      | 1.08                        |
| S Pen O  | 146                    | 0.00             | -0.18                       | 0.03                      | 1.07                        |
| S Pen O  | 148                    | 0.00             | -0.18                       | 0.03                      | 1.11                        |
| S Pen O  | 150                    | 0.00             | -0.18                       | 0.03                      | 1.10                        |
| S Pen O  | 152                    | 0.00             | -0.18                       | 0.03                      | 1.09                        |
| S Pen O  | 154                    | 0.00             | -0.18                       | 0.03                      | 1.08                        |
| S Pen O  | 156                    | 0.00             | -0.17                       | 0.03                      | 1.07                        |
| S Pen O  | 158                    | 0.00             | -0.17                       | 0.03                      | 1.00                        |
| S Pen O  | 160                    | 0.00             | -0.17                       | 0.03                      | 0.99                        |
| S Pen O  | 162                    | 0.00             | -0.17                       | 0.03                      | 0.98                        |
| S Pen O  | 164                    | 0.00             | -0.17                       | 0.03                      | 0.97                        |
| S Pen O  | 166                    | 0.00             | -0.16                       | 0.03                      | 0.96                        |
| S Pen O  | 168                    | 0.00             | -0.16                       | 0.02                      | 0.95                        |
| S Pen O  | 170                    | 0.00             | -0.16                       | 0.02                      | 0.95                        |
| S Pen O  | 172                    | 0.00             | -0.16                       | 0.02                      | 0.94                        |
| S Pen O  | 174                    | 0.00             | -0.16                       | 0.02                      | 0.93                        |
| S Pen O  | 176                    | 0.00             | -0.16                       | 0.02                      | 0.92                        |
| S Pen O  | 178                    | 0.00             | -0.15                       | 0.02                      | 0.91                        |
| S Pen O  | 180                    | -0.01            | -0.21                       | 0.02                      | 0.90                        |
| S Pen O  | 182                    | 0.00             | -0.15                       | 0.02                      | 0.95                        |
| S Pen O  | 184                    | 0.00             | -0.15                       | 0.02                      | 0.94                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| S Pen O  | 186                    | 0.00             | -0.15                       | 0.02                      | 0.93                        |
| S Pen O  | 188                    | 0.00             | -0.15                       | 0.02                      | 0.92                        |
| S Pen O  | 190                    | 0.00             | -0.14                       | 0.02                      | 0.92                        |
| S Pen O  | 192                    | 0.00             | -0.14                       | 0.02                      | 0.85                        |
| S Pen O  | 194                    | 0.00             | -0.14                       | 0.02                      | 0.84                        |
| S Pen O  | 196                    | 0.00             | -0.14                       | 0.02                      | 0.84                        |
| S Pen O  | 198                    | 0.00             | -0.14                       | 0.02                      | 0.83                        |
| S Pen O  | 200                    | 0.00             | -0.14                       | 0.02                      | 0.82                        |
| S Pen S  | 2                      | 0.13             | 1.91                        | 0.27                      | 3.75                        |
| S Pen S  | 4                      | 0.12             | 1.81                        | 0.23                      | 3.54                        |
| S Pen S  | 6                      | 0.10             | 1.72                        | 0.20                      | 3.39                        |
| S Pen S  | 8                      | 0.09             | 1.65                        | 0.18                      | 3.22                        |
| S Pen S  | 10                     | 0.08             | 1.56                        | 0.16                      | 3.06                        |
| S Pen S  | 12                     | 0.08             | 1.52                        | 0.15                      | 2.97                        |
| S Pen S  | 14                     | 0.07             | 1.44                        | 0.14                      | 2.83                        |
| S Pen S  | 16                     | 0.07             | 1.39                        | 0.13                      | 2.73                        |
| S Pen S  | 18                     | 0.06             | 1.34                        | 0.12                      | 2.63                        |
| S Pen S  | 20                     | 0.06             | 1.32                        | 0.12                      | 2.54                        |
| S Pen S  | 22                     | 0.06             | 1.25                        | 0.11                      | 2.46                        |
| S Pen S  | 24                     | 0.05             | 1.21                        | 0.10                      | 2.39                        |
| S Pen S  | 26                     | 0.05             | 1.14                        | 0.10                      | 2.28                        |
| S Pen S  | 28                     | 0.05             | 1.14                        | 0.09                      | 2.22                        |
| S Pen S  | 30                     | 0.04             | 1.11                        | 0.09                      | 2.15                        |
| S Pen S  | 32                     | 0.04             | 1.08                        | 0.08                      | 2.13                        |
| S Pen S  | 34                     | 0.04             | 1.05                        | 0.08                      | 2.04                        |
| S Pen S  | 36                     | 0.04             | 1.03                        | 0.08                      | 2.02                        |
| S Pen S  | 38                     | 0.04             | 0.96                        | 0.07                      | 1.94                        |
| S Pen S  | 40                     | 0.04             | 0.98                        | 0.07                      | 1.89                        |
| S Pen S  | 42                     | 0.04             | 0.95                        | 0.07                      | 1.84                        |
| S Pen S  | 44                     | 0.03             | 0.93                        | 0.07                      | 1.84                        |

| Transect | Distance from Road (m) | Local Plan Alone |                             | Local Plan In Combination |                             |
|----------|------------------------|------------------|-----------------------------|---------------------------|-----------------------------|
|          |                        | PC (kg/N/ha/yr)  | Years Delay <sup>a, b</sup> | PC (kg/N/ha/yr)           | Years Delay <sup>a, b</sup> |
| S Pen S  | 46                     | 0.03             | 0.91                        | 0.06                      | 1.76                        |
| S Pen S  | 48                     | 0.03             | 0.85                        | 0.06                      | 1.72                        |
| S Pen S  | 50                     | 0.03             | 0.87                        | 0.06                      | 1.68                        |
| S Pen S  | 52                     | 0.03             | 0.85                        | 0.06                      | 1.64                        |
| S Pen S  | 54                     | 0.03             | 0.79                        | 0.06                      | 1.61                        |
| S Pen S  | 56                     | 0.03             | 0.78                        | 0.05                      | 1.54                        |
| S Pen S  | 58                     | 0.03             | 0.80                        | 0.05                      | 1.55                        |
| S Pen S  | 60                     | 0.03             | 0.79                        | 0.05                      | 1.51                        |
| S Pen S  | 62                     | 0.02             | 0.73                        | 0.05                      | 1.49                        |
| S Pen S  | 64                     | 0.02             | 0.72                        | 0.05                      | 1.42                        |
| S Pen S  | 66                     | 0.02             | 0.75                        | 0.05                      | 1.43                        |
| S Pen S  | 68                     | 0.02             | 0.73                        | 0.05                      | 1.41                        |
| S Pen S  | 70                     | 0.02             | 0.68                        | 0.04                      | 1.38                        |
| S Pen S  | 72                     | 0.02             | 0.66                        | 0.04                      | 1.36                        |
| S Pen S  | 74                     | 0.02             | 0.65                        | 0.04                      | 1.29                        |
| S Pen S  | 76                     | 0.02             | 0.64                        | 0.04                      | 1.27                        |
| S Pen S  | 78                     | 0.02             | 0.68                        | 0.04                      | 1.29                        |
| S Pen S  | 80                     | 0.02             | 0.66                        | 0.04                      | 1.27                        |
| S Pen S  | 82                     | 0.02             | 0.61                        | 0.04                      | 1.25                        |
| S Pen S  | 84                     | 0.02             | 0.60                        | 0.04                      | 1.23                        |
| S Pen S  | 86                     | 0.02             | 0.59                        | 0.04                      | 1.17                        |
| S Pen S  | 88                     | 0.02             | 0.58                        | 0.03                      | 1.15                        |
| S Pen S  | 90                     | 0.02             | 0.57                        | 0.03                      | 1.13                        |
| S Pen S  | 92                     | 0.02             | 0.56                        | 0.03                      | 1.11                        |
| S Pen S  | 94                     | 0.02             | 0.60                        | 0.03                      | 1.15                        |
| S Pen S  | 95.7                   | 0.02             | 0.60                        | 0.03                      | 1.13                        |

<sup>a</sup> i.e. the PC divided by the 'per year' reductions to the 2043 Baseline scenario.

<sup>b</sup> negative numbers equate to an acceleration in the reduction of nitrogen deposition in these areas due to the Local Plan alone causing decreases in nitrogen deposition compared to the 2043 Baseline scenario.



London • Bristol • Warrington • Leeds • Brighton • Brussels