Report

HRA for the Greater Cambridge Local Plan

Air Quality Modelling for Ecological Assessment

For Greater Cambridge Shared Planning Services

3 November 2026

Air Quality CONSULTANTS | PART OF Logika Group

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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 Greater Cambridge Local Plan.

1.2 The Local Plan will lead to changes in traffic flows on roads which pass within 200 metres of European Habitat Sites. Road traffic can emit nitrogen oxides (NOx) and ammonia (NH_3), and some sensitive vegetation may be affected by elevated concentrations of these pollutants. Furthermore, the deposition of both NOx and NH_3 can alter the nutrient and acidity balance of some ecosystems, causing changes to their composition and health. This assessment has quantified the changes to NOx and NH_3 concentrations that would be caused by the new Local Plan, as well as the changes to nitrogen and acid deposition fluxes. It has considered the following European Habitat Sites:

- Devil's Dyke Special Area of Conservation (SAC);
- Ouse Washes SAC/Special Protection Area (SPA)/Ramsar site; and
- Portholme SAC.

1.3 These sites are shown in Figure 1.



Figure 1: European Habitat Sites Included in this Assessment

Map Data ©2026 Google.

Alt Text: a map depicting the locations and boundaries of the European Habitat Sites Ouse Washes, Portholme, and Devil's Dyke.

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; ecological assessment, is provided separately by Land Use Consultants (LUC).

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 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.

2.2 The CLe for annual mean NOx concentrations is set at the same concentration irrespective of the habitats features of interest. There are two CLes for NH_3, with the lower value (1 microgrammes per cubic metre) applying only where lichens or bryophytes are present or form a key part of the ecosystem integrity, with the higher value (3 microgrammes per cubic metre) typically applying otherwise. A short-term (24-hour mean) CLe for NOx has also been set, however guidance from the Institute of Air Quality Management (IAQM) (Holman et al, 2020) recommends that: "…only the annual mean NOx 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.

2.3 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.

2.4 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.

2.5 Acid deposition is assessed against the "CLmaxN" value published on APIS (2026). This is the level above which additional deposition will cause acidification.

2.6 The CLos used in this assessment are provided in Table 2. The same values apply to all three sites.

Table 1: Vegetation and Ecosystem CLes [a]

Pollutant	Time Period	Site	CIe (micrograms per cubic metre)
Nitrogen Oxides (expressed as NO_2)	Annual Mean [a,b]	All	30
NH_3	Annual Mean	Ouse Washes & Portholme	3
NH_3	Annual Mean	Devil's Dyke	1

[a] The CLes are defined by the World Health Organisation (WHO, 2000).

[b] 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 CLos

Site	Nutrient Nitrogen (kilograms of nitrogen per hectare per year)	Acid Deposition 'N_{max}' (kilogram equivalent per hectare per year)
Ouse Washes SAC/SPA/Ramsar	10	4.856
Portholme SAC	10	4.856
Devil's Dyke SAC	10	4.856

Screening Thresholds for Predicted Concentrations and Deposition Fluxes

2.7 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 for further assessment if detailed dispersion modelling has shown that the CLe or CLo is not exceeded (that is the Predicted Environmental Concentration, or 'PEC' is less than 100% of the CLe or CLo).

2.8 The 1% screening criterion is widely accepted by Natural England (for example (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.

2.9 The CLes and CLos 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 CLes and CLos are not exceeded, even where the PC exceeds the 1% criterion.

2.10 The CLos 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) CLos. 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). It has been undertaken in line 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 European Habitat Sites; these are the only European sites which are within 200 metres of any strategic road within 10 kilometre of the Plan area (the 10 kilometre study area is based on guidance published by the Joint Nature Conservation Committee (AQC, 2021)):

- Devil's Dyke SAC – adjacent to the A14 and A1304;
- Ouse Washes SAC/SPA/Ramsar site – adjacent to the A1123 and A142; and
- Portholme SAC – adjacent to the A1307.

In-Combination Projects

3.3 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 committed developments within Greater Cambridge, with growth associated with the areas outside Greater Cambridge informed by a mixture of National Trip End Model and adopted local plans.

Assessment Scenarios

3.4 NOx and NH_3 concentrations, and nitrogen and acid deposition fluxes, have been predicted for the following scenarios:

A) base year 2023;

B) 2046 without any increase in traffic from 2023 (including future-year emissions factors and future-year background concentrations and fluxes but base-year traffic within the dispersion model). This scenario is termed '2046 Zero Growth';

C) 2046 without the Local Plan but with the forecast background increase in traffic from 2023 and in-combination projects (also including future-year emissions factors and background concentrations and fluxes). This scenario is termed '2046 Base'; and

D) 2046 with the Local Plan (including proposed mitigation measures) and background traffic growth (also including future-year emissions factors and background concentrations and fluxes). This scenario is termed '2046 With Local Plan'.

3.5 The three 2046 scenarios have been compared to derive the impacts of the Local Plan alone and in-combination with other projects and plans:

- the difference between scenarios C and D represents the change (that is, 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.

3.6 It should be noted that the growth in traffic predicted between 2023 and 2046 is not all caused by projects and plans as relevant to the HRA[1], and so this approach will over-predict the in-combination changes. This makes the assessment worst-case.

Monitoring

3.7 Information on existing NOx and nitrogen dioxide concentrations has been obtained by collating the results of monitoring carried out close to the European Habitat 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.

3.8 Information on existing background NH_3 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

[1] Some of the predicted growth in traffic will be attributed to macro-economic and demographic trends such as rising car ownership rates.

consists of 95 sites across the UK, four of which are close to the study area. Annual mean results for the baseline year of 2023 are summarised in Table 3 and the monitoring locations are shown in Figure 2. All of the measured concentrations are below the CLe of 3 micrograms per cubic metre, but above the CLe of 1 micrograms per cubic metre.

Table 3: Summary of Annual Mean NH_3 Monitoring in 2023 (micrograms per cubic metre)

Site	Annual Mean
Stoke Ferry	2.3
Woodwalton Fen	1.2
Monks Wood	1.5
Chippenham Fen	1.3



Figure 2: Monitoring Locations

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

Alt Text: a map depicting the four NH_3 monitoring locations in relation to the boundaries of the European Habitat Sites Ouse Washes, Portholme, and Devil's Dyke.

Modelling Methodology

Background Concentrations and Fluxes

3.9 Background concentrations of NOx and NH_3, and nitrogen and acid nitrogen deposition fluxes, have been taken from APIS (2026). The concentrations and deposition fluxes represent 1 kilometre x 1 kilometre 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.

3.10 Concentrations of NH_3 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 JJNCC's Nitrogen Futures project

(JNCC, 2020)[2]. Nitrogen Futures only predicted changes to 2030, so the rate of change predicted by JNCC between 2023 and 2030 has been used to predict concentrations and deposition in 2046 (that is, 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 NOx and NH_3, this approach is most likely to over-predict in 2046 and therefore provide a conservative assessment. Concentrations of NOx in 2046 have been predicted by multiplying the 2023 concentration taken from APIS by the relative change to concentrations (between 2023 and 2040[3]) for each location predicted in Defra's latest (2021-based) national NO_2 maps published for Local Air Quality Management (Defra, 2026a). Background concentrations of nitrogen dioxide (NO_2) are only needed to inform the conversion of NOx to NO_2. These have been taken directly from Defra's maps for each relevant year.

Influence of Local Road Traffic

3.11 Concentrations have been predicted using the ADMS-Roads dispersion model, with emissions of NOx derived using Defra's Emissions Factors Toolkit (EFT) (v14.1) (Defra, 2026a), and emissions of NH_3 derived using AQC's Calculator for Road Emissions of Ammonia (CREAM) (v2A) (AQC, 2025). Traffic flows have been derived from the Cambridgeshire and Peterborough Combined Authority Transport Model (CaPCAM). The road network represented within the assessment includes strategic roads in the vicinity of the European Habitat Sites (and also local non-strategic roads where suitable traffic data for this were available). The model results for NOx and nitrogen dioxide 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 nitrogen dioxide and NH_3. Details of the method for calculating deposition are provided in Appendix A2.

[2] 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.
[3] The furthest year for which predictions can currently be reliably made.

Receptors

3.12 Impacts have been predicted at receptors arranged along transects running perpendicular to affected roads. The transects begin at the closest part of the European Habitat Sites to the road[4]. Within European Habitat Sites, receptors have been placed at the following distances from the roads: 2 metres, 3 metres, 5 metres, 9 metres, 17 metres, 33 metres, 65 metres, 129 metres and 200 metres[5]. Where the European Habitat Sites site is set back more than 2 metres from the road, an additional receptor has been placed at the point closest to the road. These roadside transects are shown in Figure 3 to Figure 5. For Ouse Washes and Portholme, additional receptors have been placed at various points in and around each SAC, using source-oriented grids, and underlying Cartesian grids with spacing of 100 metre. These additional receptors have been used to generate isopleths. For Devil's Dyke, additional receptors have been placed using source-oriented grids.

3.13 All receptors have been modelled at a height of 0 metres.

[4] Following guidance from the IAQM (Holman et al, 2020), impacts have not been predicted within 2 meters of roads.
[5] These distances are used because they broadly reflect the expected rate at which concentrations of NOx and ammonia reduce with distance from roads. This provides an efficient way to more precisely show the predicted changes.

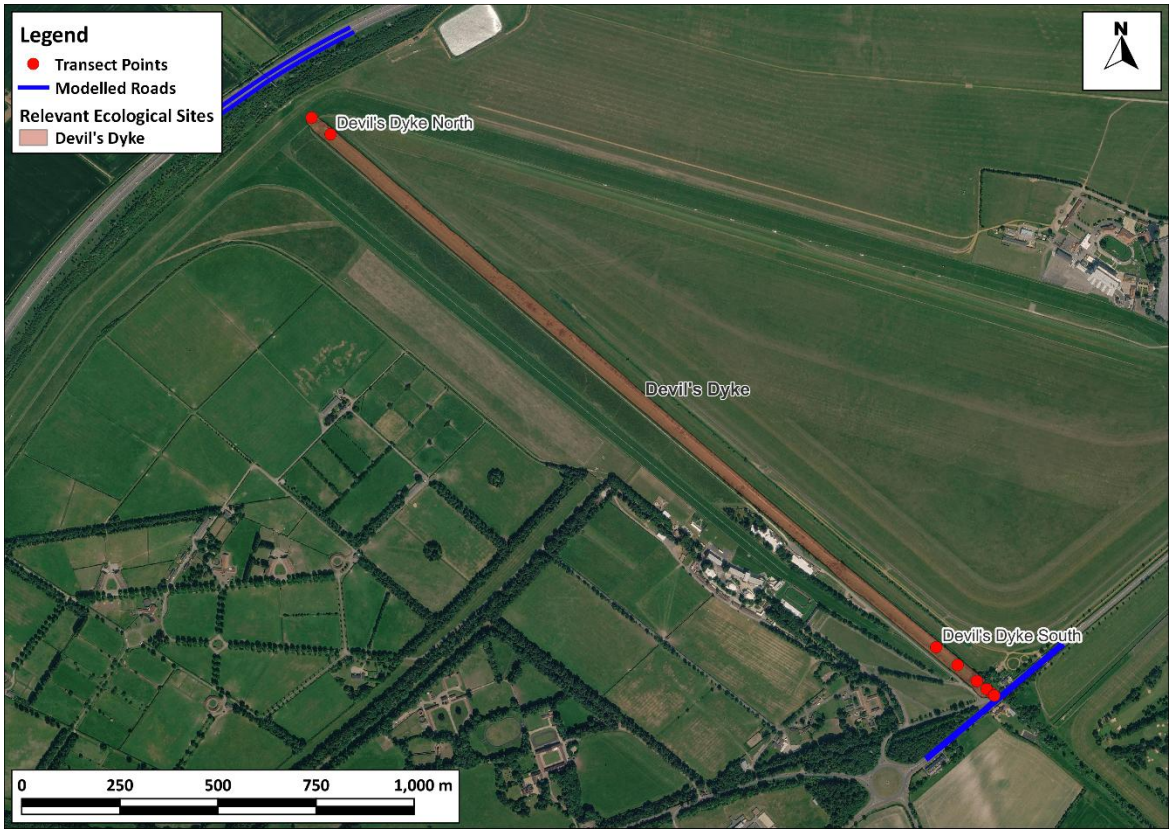


Figure 3: Receptor Transect Locations – Devil's Dyke

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

Alt Text: a map of transect points plotted on top of the Devil's Dyke SAC, located at both the southeast end of Devil's Dyke and the northwest end of Devil's Dyke, labelled Devil's Dyke South and Devil's Dyke North respectively. The modelled roads are also shown adjacent to the ecological site.

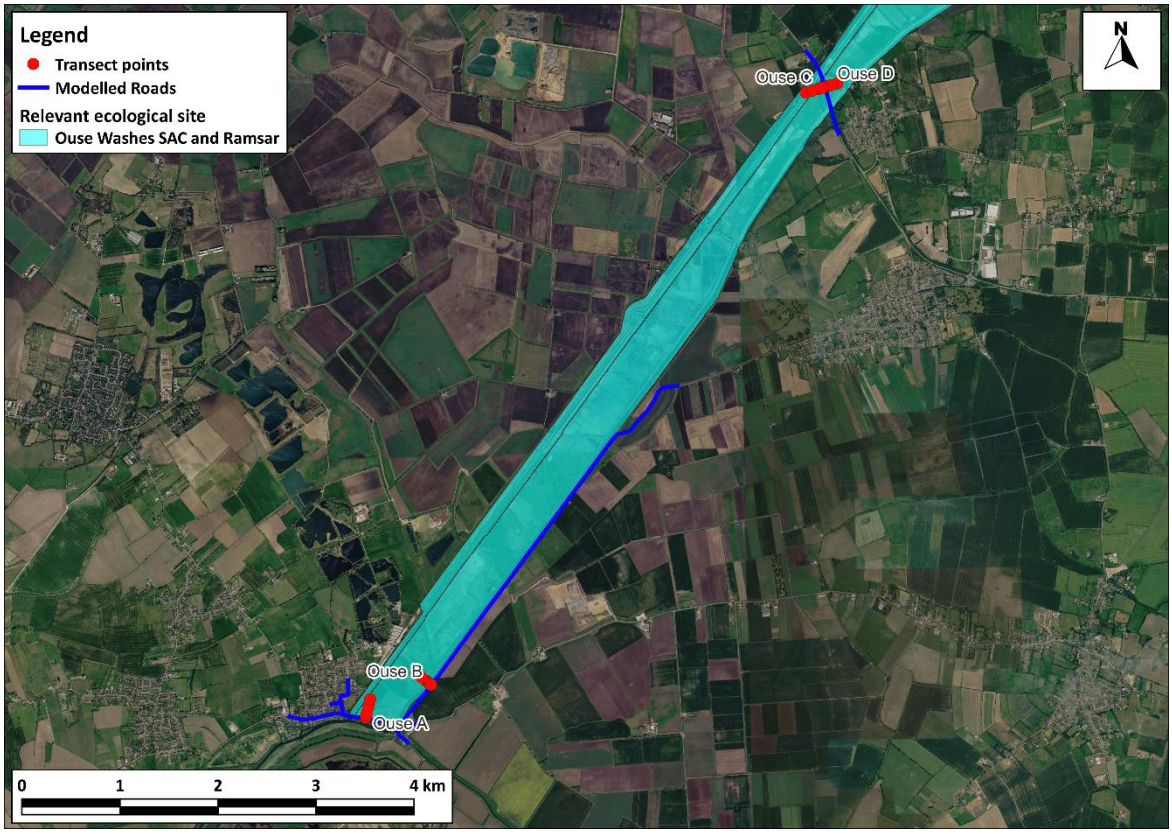


Figure 4: Receptor Transect Locations – Ouse Washes South

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

Alt Text: a map of transect points plotted on top of the Ouse Washes SAC and Ramsar, labelled Ouse A to Ouse D. The modelled roads are also shown adjacent to the ecological site.

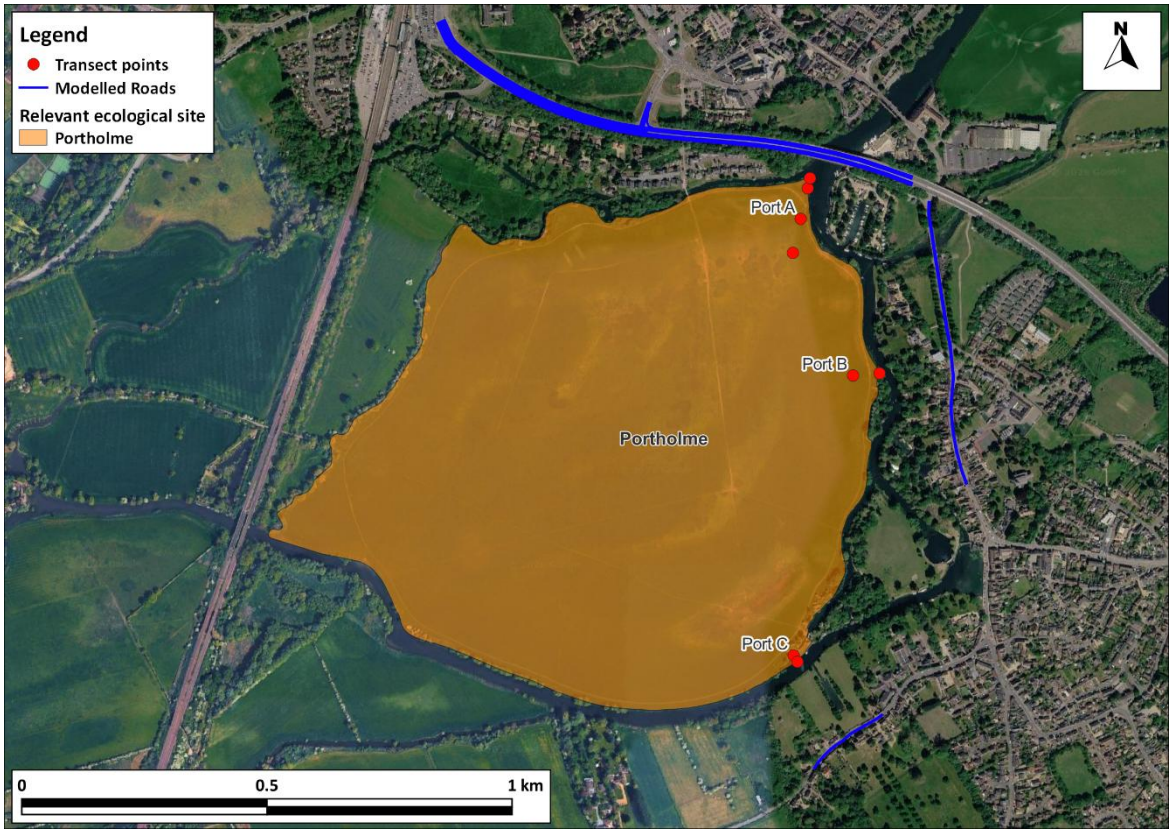


Figure 5: Receptor Transect Locations – Portholme SAC

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

Alt Text: a map of transect points plotted on top of the Portholme SAC, labelled Port A to Port C. The modelled roads are also shown adjacent to the ecological site.

Uncertainty

3.14 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.

3.15 An important stage in the process of modelling road traffic emissions of is model verification, which involves comparing the model output with measured concentrations (see Appendix A2). 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 possible

for the Ouse Washes and Portholme sites, but modelling at Devil's Dyke has not been verified against local measurements because of an absence of suitable monitoring sites in this area.

3.16 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_3 monitoring network in Europe (AQC, 2025). The modelling has thus been verified as far as is possible.

3.17 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.

3.18 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc. In early 2020, activity in the UK was disrupted by the COVID-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably (Defra Air Quality Expert Group, 2020). At the same time, concentrations of NH_3 seemed to increase, which is likely related to disruption of agricultural and land management activities across Europe. A reduction in NOx and concurrent increase in NH_3 may have disrupted the formation of ammonium nitrate, which is another important component of nitrogen deposition. Data used in this assessment are based on post-pandemic years and are therefore considered to be representative of the future.

3.19 The stretch of the A14 alongside Devil's Dyke SAC is within a cutting. Dispersion processes within cuttings can be complex. The sides of the cutting present a barrier to pollutant dispersal. In many wind conditions, the topography may increase mixing and therefore pollutant dilution. In other wind conditions, the direction of flow may be diverted along the cutting. Cuttings cannot be included explicitly within the dispersion model. Because the barrier is not present in the dispersion model, the model assumes a straight-line distance from source to receptor which is shorter than reality. This will most likely lead to average concentrations being over-predicted beyond the cutting edge.

3.20 This issue was also identified in the Appropriate Assessment for the South Oxfordshire and Vale of White Horse Joint Local Plan, which explained that a:

"stretch of the M40 is in cutting leading the air quality model to over-predict average concentrations" (UE Associates, 2025).

3.21 This conclusion has since been endorsed by Natural England (South and Vale Councils and Natural England, 2026).

3.22 There are also areas of woodland separating the qualifying SAC features from both the A14 and A1304. Trees create barriers to pollutant dispersal which cannot be accurately accounted for in dispersion models. This issue was considered in the HRA Addendum for the now adopted Greater Manchester Local Plan (GMEU, 2022). This assessed a "*tree barrier scenario*" which sought to account for some of the effects. While unable to fully account for all the expected benefits, this showed that the barriers reduced concentrations and deposition beyond the trees.

3.23 The benefits of tree shelter belts for ammonia mitigation have also been investigated extensively in the context of agricultural emissions sources (e.g. (Bealey et al., 2016)). This has shown substantial benefits from trees close to the emissions sources. While there are differences between how emissions are released from traffic and agriculture, the subsequent behaviour of ammonia in the atmosphere, including how it interacts with trees, is the same.

3.24 Taking account of both the A14 cutting, and the screening effect of woodland along both roads, the dispersion modelling presented here is likely to be worst-case. Impacts are therefore likely to not occur as far into the SAC as has been predicted by the model.

Assumptions

3.25 It is necessary to make a number of assumptions when carrying out an air quality assessment. In order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. A key assumption made in carrying out this assessment is the assumption that the Monks Wood meteorological monitoring station, located at C.E.H. Monks Wood, approximately 7 kilometres to the northwest of Huntingdon, appropriately represents conditions in the study area (this is discussed further in Appendix A2). It is the

nearest monitoring station representative of meteorological conditions at the European Habitat Sites.

4 Dispersion Model Results

Results Along Transects

4.1 Table 4 to Table 15 set out the concentrations and deposition fluxes along the transects, as well as the changes relative to the CLes and CLos. As explained in Paragraph 3.12, the transects begin at the edge of the European Habitat Sites closest to the road (for example the North Transect at Devil's Dyke, shown in Table 4, represents a part of the European Habitat Sites which is 135 metres from the A14).

4.2 Natural England also sometimes requests that the degree of 'retardation' to ongoing reductions in nitrogen deposition should also be calculated. This calculation is provided in Appendix A3.

NOx

Table 4: Model Results for Annual Mean NOx at Devil's Dyke SAC (microgrammes per cubic metre)

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NOx Concentration	B) 2046 Zero Growth - Total NOx Concentration	C) 2046 Base - Total NOx Concentration	D) 2046 With Local Plan - Total NOx Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
S	7	30	18.5	5.0	5.2	5.2	0.13	0.83
S	9	30	17.6	4.9	5.1	5.2	0.12	0.76
S	17	30	15.2	4.8	5.0	5.0	0.09	0.57
S	33	30	13.0	4.7	4.8	4.8	0.06	0.39
S	65	30	11.1	4.6	4.7	4.7	0.04	0.24
S	129	30	9.7	4.5	4.5	4.6	0.02	0.13
S	200	30	9.1	4.5	4.5	4.5	0.01	0.08
N	135	30	23.7	5.3	5.7	5.7	0.04	1.37

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NOx Concentration	B) 2046 Zero Growth - Total NOx Concentration	C) 2046 Base - Total NOx Concentration	D) 2046 With Local Plan - Total NOx Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
N	200	30	18.0	4.9	5.2	5.2	0.03	0.82

Table 5: Model Results for Annual Mean NOx at Ouse Washes SAC/SPA/Ramsar (microgrammes per cubic metre)

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NOx Concentration	B) 2046 Zero Growth - Total NOx Concentration	C) 2046 Base - Total NOx Concentration	D) 2046 With Local Plan - Total NOx Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
A	2	30	23.0	6.2	6.5	6.6	0.11	1.21
A	3	30	22.1	6.2	6.5	6.5	0.11	1.14
A	5	30	20.8	6.1	6.4	6.4	0.10	1.03
A	9	30	19.1	6.0	6.2	6.3	0.08	0.88
A	17	30	17.1	5.9	6.1	6.1	0.07	0.71
A	33	30	15.1	5.7	5.9	5.9	0.05	0.54
A	65	30	13.3	5.6	5.7	5.7	0.04	0.38
A	129	30	11.9	5.5	5.6	5.6	0.02	0.26
A	200	30	11.0	5.5	5.5	5.6	0.02	0.19
B	2	30	24.0	6.2	6.3	6.3	0.07	0.31
B	3	30	23.0	6.2	6.2	6.3	0.06	0.30

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NOx Concentration	B) 2046 Zero Growth - Total NOx Concentration	C) 2046 Base - Total NOx Concentration	D) 2046 With Local Plan - Total NOx Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
B	5	30	21.3	6.1	6.1	6.2	0.05	0.27
B	9	30	19.3	6.0	6.0	6.0	0.05	0.24
B	17	30	17.1	5.8	5.9	5.9	0.04	0.20
B	33	30	15.0	5.7	5.8	5.8	0.03	0.17
B	65	30	13.2	5.6	5.6	5.7	0.02	0.14
B	129	30	11.7	5.5	5.6	5.6	0.02	0.12
B	200	30	10.8	5.5	5.5	5.5	0.01	0.10
C	2	30	26.4	6.4	6.9	6.9	0.02	1.53
C	3	30	25.2	6.4	6.8	6.8	0.02	1.43
C	5	30	23.5	6.2	6.6	6.6	0.01	1.28
C	9	30	21.2	6.1	6.4	6.4	0.01	1.09
C	17	30	18.6	6.0	6.2	6.2	0.01	0.86
C	33	30	16.0	5.8	6.0	6.0	0.01	0.63
C	65	30	13.7	5.6	5.8	5.8	0.01	0.43
C	129	30	11.7	5.5	5.6	5.6	0.00	0.27
C	200	30	10.6	5.5	5.5	5.5	0.00	0.18
D	2	30	30.8	6.6	7.2	7.2	0.02	1.84
D	3	30	29.5	6.6	7.1	7.1	0.02	1.74
D	5	30	27.4	6.5	6.9	6.9	0.02	1.57
D	9	30	24.5	6.3	6.7	6.7	0.02	1.33
D	17	30	21.2	6.1	6.4	6.4	0.01	1.06

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NOx Concentration	B) 2046 Zero Growth - Total NOx Concentration	C) 2046 Base - Total NOx Concentration	D) 2046 With Local Plan - Total NOx Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
D	33	30	17.8	5.9	6.1	6.1	0.01	0.78
D	65	30	14.9	5.7	5.9	5.9	0.01	0.54
D	129	30	12.5	5.6	5.7	5.7	0.00	0.34

Table 6: Model Results for Annual Mean NOx at Portholme SAC (micrograms per cubic metre)

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NOx Concentration	B) 2046 Zero Growth - Total NOx Concentration	C) 2046 Base - Total NOx Concentration	D) 2046 With Local Plan - Total NOx Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
A	44	30	39.6	9.9	10.6	10.9	1.00	3.39
A	65	30	35.3	9.6	10.2	10.4	0.85	2.84
A	129	30	28.6	9.1	9.6	9.7	0.60	1.98
A	200	30	24.8	8.9	9.2	9.3	0.47	1.51
B	146	30	20.7	8.6	8.8	8.9	0.43	1.05
B	200	30	19.7	8.5	8.7	8.8	0.34	0.90
C	185	30	16.3	8.3	8.4	8.5	0.16	0.48
C	200	30	16.3	8.3	8.4	8.5	0.16	0.47

Ammonia

Table 7: Model Results for Annual Mean NH_3 at Devil's Dyke SAC (microgrammes per cubic metre)

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NH_3 Concentration	B) 2046 Zero Growth - Total NH_3 Concentration	C) 2046 Base - Total NH_3 Concentration	D) 2046 With Local Plan - Total NH_3 Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
S	7	1	2.2	2.2	2.3	2.3	2.70	16.74
S	9	1	2.1	2.1	2.3	2.3	2.41	14.85
S	17	1	2.0	2.0	2.1	2.1	1.61	9.78
S	33	1	1.9	1.9	2.0	2.0	0.92	5.52
S	65	1	1.8	1.9	1.9	1.9	0.42	2.51
S	129	1	1.7	1.8	1.8	1.8	0.14	0.81
S	200	1	1.7	1.8	1.8	1.8	0.05	0.31
N	135	1	1.9	1.9	2.0	2.0	0.22	6.57
N	200	1	1.8	1.9	1.9	1.9	0.09	2.78

Table 8: Model Results for Annual Mean NH_3 at Ouse Washes SAC/SPA/Ramsar (microgrammes per cubic metre)

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NH_3 Concentration	B) 2046 Zero Growth - Total NH_3 Concentration	C) 2046 Base - Total NH_3 Concentration	D) 2046 With Local Plan - Total NH_3 Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
A	2	3	2.8	2.6	2.9	2.9	0.90	9.26
A	3	3	2.7	2.6	2.8	2.8	0.83	8.55
A	5	3	2.6	2.5	2.7	2.7	0.72	7.42

A	9	3	2.4	2.4	2.5	2.6	0.57	5.87
A	17	3	2.3	2.3	2.4	2.4	0.40	4.12
A	33	3	2.1	2.1	2.2	2.2	0.24	2.49
A	65	3	2.0	2.1	2.1	2.1	0.12	1.27
A	129	3	2.0	2.0	2.0	2.0	0.05	0.54
A	200	3	1.9	2.0	2.0	2.0	0.03	0.30
B	2	3	2.6	2.5	2.5	2.6	0.39	1.58
B	3	3	2.5	2.5	2.5	2.5	0.35	1.43
B	5	3	2.4	2.4	2.4	2.4	0.29	1.20
B	9	3	2.3	2.3	2.3	2.3	0.22	0.92
B	17	3	2.2	2.2	2.2	2.2	0.15	0.64
B	33	3	2.1	2.1	2.1	2.1	0.09	0.40
B	65	3	2.0	2.0	2.0	2.0	0.05	0.24
B	129	3	1.9	2.0	2.0	2.0	0.02	0.15
B	200	3	1.9	2.0	2.0	2.0	0.02	0.11
C	2	3	2.8	2.7	3.0	3.0	0.11	10.48
C	3	3	2.7	2.6	2.9	2.9	0.10	9.58
C	5	3	2.6	2.6	2.8	2.8	0.09	8.22
C	9	3	2.4	2.4	2.6	2.6	0.07	6.42
C	17	3	2.3	2.3	2.4	2.4	0.05	4.39
C	33	3	2.1	2.1	2.2	2.2	0.03	2.56
C	65	3	2.0	2.1	2.1	2.1	0.01	1.24
C	129	3	1.9	2.0	2.0	2.0	0.01	0.48
C	200	3	1.9	2.0	2.0	2.0	0.00	0.23
D	2	3	3.1	2.9	3.4	3.4	0.15	13.82
D	3	3	3.0	2.9	3.3	3.3	0.14	12.85
D	5	3	2.9	2.8	3.1	3.1	0.12	11.22
D	9	3	2.7	2.6	2.9	2.9	0.10	8.97

D	17	3	2.4	2.4	2.6	2.6	0.07	6.32
D	33	3	2.2	2.2	2.4	2.4	0.04	3.83
D	65	3	2.1	2.1	2.2	2.2	0.02	1.96
D	129	3	2.0	2.0	2.1	2.1	0.01	0.84

Table 9: Model Results for Annual Mean NH_3 at Portholme SAC (micrommes per cubic metre)

Transect	Distance from Road Edge (metres)	CLe	A) 2023 Base - Total NH_3 Concentration	B) 2046 Zero Growth - Total NH_3 Concentration	C) 2046 Base - Total NH_3 Concentration	D) 2046 With Local Plan - Total NH_3 Concentration	Change as % of CLe for Alone (D-C)	Change as % of CLe for In Combination (D-B)
A	44	3	2.0	2.0	2.0	2.0	0.75	2.95
A	65	3	2.0	1.9	2.0	2.0	0.51	2.00
A	129	3	1.9	1.8	1.9	1.9	0.22	0.84
A	200	3	1.8	1.8	1.8	1.8	0.11	0.44
B	146	3	1.8	1.8	1.8	1.8	0.03	0.18
B	200	3	1.8	1.8	1.8	1.8	0.02	0.14
C	185	3	1.8	1.8	1.8	1.8	0.01	0.08
C	200	3	1.8	1.8	1.8	1.8	0.01	0.07

Nitrogen Deposition

Table 10: Model Results for Nitrogen Deposition at Devil's Dyke SAC (kilograms of nitrogen per hectare per year)

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total N Dep	B) 2046 Zero Growth - Total N Dep	C) 2046 Base - Total N Dep	D) 2046 With Local Plan - Total N Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
S	7	10	17.1	15.6	16.3	16.5	1.43	8.88
S	9	10	16.8	15.4	16.0	16.2	1.27	7.87
S	17	10	15.8	14.8	15.2	15.3	0.85	5.21
S	33	10	15.0	14.2	14.5	14.5	0.49	2.96
S	65	10	14.5	13.9	14.0	14.0	0.23	1.36
S	129	10	14.1	13.7	13.7	13.7	0.07	0.45
S	200	10	14.0	13.6	13.6	13.6	0.03	0.18
N	135	10	16.0	14.4	14.7	14.8	0.13	3.72
N	200	10	15.0	13.9	14.1	14.1	0.05	1.62

Table 11: Model Results for Nitrogen Deposition at Ouse Washes SAC/SPA/Ramsar (kilograms of nitrogen per hectare per year)

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total N Dep	B) 2046 Zero Growth - Total N Dep	C) 2046 Base - Total N Dep	D) 2046 With Local Plan - Total N Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
A	2	10	19.9	17.7	19.0	19.1	1.43	14.69
A	3	10	19.5	17.4	18.6	18.8	1.32	13.56
A	5	10	18.8	17.0	18.0	18.2	1.14	11.78
A	9	10	18.0	16.4	17.3	17.4	0.90	9.34

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total N Dep	B) 2046 Zero Growth - Total N Dep	C) 2046 Base - Total N Dep	D) 2046 With Local Plan - Total N Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
A	17	10	17.0	15.8	16.4	16.4	0.64	6.56
A	33	10	16.1	15.2	15.5	15.6	0.38	4.00
A	65	10	15.4	14.7	14.9	14.9	0.21	2.06
A	129	10	15.0	14.4	14.5	14.5	0.08	0.89
A	200	10	14.8	14.4	14.4	14.4	0.05	0.50
B	2	10	19.0	17.1	17.3	17.4	0.62	2.53
B	3	10	18.6	16.8	17.0	17.1	0.56	2.28
B	5	10	18.0	16.4	16.5	16.6	0.47	1.92
B	9	10	17.2	15.9	16.0	16.0	0.36	1.49
B	17	10	16.4	15.3	15.4	15.4	0.24	1.04
B	33	10	15.7	14.9	14.9	14.9	0.15	0.67
B	65	10	15.2	14.6	14.6	14.6	0.07	0.40
B	129	10	14.8	14.4	14.4	14.4	0.05	0.26
B	200	10	14.7	14.3	14.3	14.3	0.02	0.18
C	2	10	20.2	18.2	19.8	19.8	0.18	16.66
C	3	10	19.7	17.8	19.3	19.4	0.16	15.24
C	5	10	19.0	17.3	18.6	18.6	0.15	13.09
C	9	10	18.1	16.7	17.7	17.7	0.11	10.23
C	17	10	17.1	15.9	16.6	16.6	0.09	7.03
C	33	10	16.1	15.2	15.6	15.6	0.04	4.12
C	65	10	15.4	14.7	14.9	14.9	0.02	2.02
C	129	10	14.9	14.4	14.5	14.5	0.01	0.81
C	200	10	14.7	14.3	14.4	14.4	0.02	0.41

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total N Dep	B) 2046 Zero Growth - Total N Dep	C) 2046 Base - Total N Dep	D) 2046 With Local Plan - Total N Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
D	2	10	22.1	19.4	21.6	21.6	0.25	21.94
D	3	10	21.6	19.0	21.1	21.1	0.23	20.40
D	5	10	20.7	18.4	20.2	20.2	0.19	17.82
D	9	10	19.5	17.6	19.0	19.0	0.15	14.25
D	17	10	18.1	16.6	17.6	17.6	0.12	10.08
D	33	10	16.8	15.7	16.3	16.3	0.08	6.15
D	65	10	15.8	15.0	15.3	15.3	0.03	3.17
D	129	10	15.1	14.6	14.7	14.7	0.01	1.37

Table 12: Model Results for Nitrogen Deposition at Portholme SAC (kilograms of nitrogen per hectare per year)

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total N Dep	B) 2046 Zero Growth - Total N Dep	C) 2046 Base - Total N Dep	D) 2046 With Local Plan - Total N Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
A	44	10	17.1	14.5	14.9	15.0	1.39	5.31
A	65	10	16.5	14.2	14.5	14.6	0.97	3.72
A	129	10	15.6	13.8	14.0	14.0	0.45	1.73
A	200	10	15.2	13.7	13.8	13.8	0.26	1.00
B	146	10	14.9	13.6	13.7	13.7	0.14	0.51
B	200	10	14.7	13.6	13.6	13.6	0.11	0.40
C	185	10	14.5	13.6	13.6	13.6	0.05	0.22
C	200	10	14.5	13.6	13.6	13.6	0.05	0.21

Acid Deposition

Table 13: Model Results for Acid Deposition at Devil's Dyke SAC (kilogram equivalent per hectare per year)

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total Acid Dep	B) 2046 Zero Growth - Total Acid Dep	C) 2046 Base - Total Acid Dep	D) 2046 With Local Plan - Total Acid Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
S	7	4.856	1.2	1.1	1.2	1.2	0.21	1.31
S	9	4.856	1.2	1.1	1.1	1.2	0.19	1.16
S	17	4.856	1.1	1.1	1.1	1.1	0.13	0.77
S	33	4.856	1.1	1.0	1.0	1.0	0.07	0.43
S	65	4.856	1.0	1.0	1.0	1.0	0.03	0.20
S	129	4.856	1.0	1.0	1.0	1.0	0.01	0.07
S	200	4.856	1.0	1.0	1.0	1.0	0.00	0.03
N	135	4.856	1.1	1.0	1.1	1.1	0.02	0.55
N	200	4.856	1.1	1.0	1.0	1.0	0.01	0.24

Table 14: Model Results for Acid Deposition at Ouse Washes SAC/SPA/Ramsar (kilogram equivalent per hectare per year)

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total Acid Dep	B) 2046 Zero Growth - Total Acid Dep	C) 2046 Base - Total Acid Dep	D) 2046 With Local Plan - Total Acid Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
A	2	4.856	1.4	1.3	1.4	1.4	0.21	2.16
A	3	4.856	1.4	1.2	1.3	1.3	0.19	1.99
A	5	4.856	1.3	1.2	1.3	1.3	0.17	1.73
A	9	4.856	1.3	1.2	1.2	1.2	0.13	1.37

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total Acid Dep	B) 2046 Zero Growth - Total Acid Dep	C) 2046 Base - Total Acid Dep	D) 2046 With Local Plan - Total Acid Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
A	17	4.856	1.2	1.1	1.2	1.2	0.09	0.97
A	33	4.856	1.2	1.1	1.1	1.1	0.06	0.59
A	65	4.856	1.1	1.1	1.1	1.1	0.03	0.30
A	129	4.856	1.1	1.0	1.0	1.0	0.01	0.13
A	200	4.856	1.1	1.0	1.0	1.0	0.01	0.07
B	2	4.856	1.4	1.2	1.2	1.2	0.09	0.37
B	3	4.856	1.3	1.2	1.2	1.2	0.08	0.34
B	5	4.856	1.3	1.2	1.2	1.2	0.07	0.28
B	9	4.856	1.2	1.1	1.1	1.1	0.05	0.22
B	17	4.856	1.2	1.1	1.1	1.1	0.04	0.15
B	33	4.856	1.1	1.1	1.1	1.1	0.02	0.10
B	65	4.856	1.1	1.0	1.0	1.0	0.01	0.06
B	129	4.856	1.1	1.0	1.0	1.0	0.01	0.04
B	200	4.856	1.1	1.0	1.0	1.0	0.00	0.03
C	2	4.856	1.4	1.3	1.4	1.4	0.03	2.45
C	3	4.856	1.4	1.3	1.4	1.4	0.02	2.24
C	5	4.856	1.4	1.2	1.3	1.3	0.02	1.93
C	9	4.856	1.3	1.2	1.3	1.3	0.02	1.50
C	17	4.856	1.2	1.1	1.2	1.2	0.01	1.03
C	33	4.856	1.2	1.1	1.1	1.1	0.01	0.61
C	65	4.856	1.1	1.1	1.1	1.1	0.00	0.30
C	129	4.856	1.1	1.0	1.0	1.0	0.00	0.12
C	200	4.856	1.0	1.0	1.0	1.0	0.00	0.06

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total Acid Dep	B) 2046 Zero Growth - Total Acid Dep	C) 2046 Base - Total Acid Dep	D) 2046 With Local Plan - Total Acid Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
D	2	4.856	1.6	1.4	1.5	1.5	0.04	3.23
D	3	4.856	1.5	1.4	1.5	1.5	0.03	3.00
D	5	4.856	1.5	1.3	1.4	1.4	0.03	2.62
D	9	4.856	1.4	1.3	1.4	1.4	0.02	2.10
D	17	4.856	1.3	1.2	1.3	1.3	0.02	1.48
D	33	4.856	1.2	1.1	1.2	1.2	0.01	0.90
D	65	4.856	1.1	1.1	1.1	1.1	0.00	0.47
D	129	4.856	1.1	1.0	1.0	1.0	0.00	0.20

Table 15: Model Results for Acid Deposition at Portholme SAC (kilogram equivalent per hectare per year)

Transect	Distance from Road Edge (metres)	CLo	A) 2023 Base - Total Acid Dep	B) 2046 Zero Growth - Total Acid Dep	C) 2046 Base - Total Acid Dep	D) 2046 With Local Plan - Total Acid Dep	Change as % of CLo for Alone (D-C)	Change as % of CLo for In Combination (D-B)
A	44	4.856	1.2	1.0	1.1	1.1	0.20	0.78
A	65	4.856	1.2	1.0	1.0	1.0	0.14	0.55
A	129	4.856	1.1	1.0	1.0	1.0	0.07	0.25
A	200	4.856	1.1	1.0	1.0	1.0	0.04	0.15
B	146	4.856	1.1	1.0	1.0	1.0	0.02	0.08
B	200	4.856	1.1	1.0	1.0	1.0	0.02	0.06
C	185	4.856	1.0	1.0	1.0	1.0	0.01	0.03
C	200	4.856	1.0	1.0	1.0	1.0	0.01	0.03

Summary

4.3 Table 16 summarises the air quality predictions at the worst-case location within each European Habitat Sites. As explained in Paragraph 2.10, 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 16 nevertheless summarises which impacts can ultimately be disregarded solely on the basis of the air quality predictions.

Table 16: Summary of Air Quality Predictions

Habitat Site	Pollutant	CLe/ CLo	PC Alone <1% of CLe/CLo	PC In Combination <1% of CLe/CLo	PEC < CLe/ CLo	Screens Out
Devil's Dyke	Annual Mean NOx	30	Y	N	Y	Y
Devil's Dyke	Annual Mean NH_3	1	N	N	N	N
Devil's Dyke	N Dep short vegetation	10	N	N	N	N
Devil's Dyke	Acid Deposition to short vegetation	4.856	Y	N	Y	Y
Ouse Washes	NOx	30	Y	N	Y	Y
Ouse Washes	NH_3	3	Y	N	N	N
Ouse Washes	N Dep to short vegetation	10	N	N	N	N
Ouse Washes	Acid Deposition to short vegetation	4.856	Y	N	Y	Y

Habitat Site	Pollutant	CLe/ CLo	PC Alone <1% of CLe/CLo	PC In Combination <1% of CLe/CLo	PEC < CLe/ CLo	Screens Out
Portholme	NOx	30	N	N	Y	Y
Portholme	NH_3	3	Y	N	Y	Y
Portholme	N Dep to short vegetation	10	N	N	N	N
Portholme	Acid Deposition to short vegetation	4.856	Y	Y	Y	Y

4.4 On the basis of the observations in Table 16, it is possible to discount all impacts except:

- Devil's Dyke SAC - NH_3 concentrations and nitrogen deposition to short vegetation;
- Ouse Washes SAC/SPA/Ramsar - NH_3 concentrations and nitrogen deposition to short vegetation; and
- Portholme SAC – nitrogen deposition to short vegetation.

4.5 For these sites/pollutants, further assessment is needed through the HRA.

5 Isopleths

5.1 As the assessment has been unable to classify all of the impacts as insignificant (as shown in Table 16), isopleths have been plotted to show the areas over which the 1% of CLe/CLo screening criterion is exceeded. In the isopleth plots, the area of exceedance of 1% is the area between the adjacent modelled road and the plotted 1% isoline (the line in red). These are presented in Figure 6 to Figure 28, 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. 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 can be discounted to all areas outside the lines shown in Figure 6 to Figure 28. Assessment of effects within the lines shown Figure 6 to Figure 28 is provided by LUC.

5.2 It should be noted that these plots are intended to show impacts within the European Habitat Sites; outside of the European Habitat Sites, the isopleths will be less accurate.

NOx

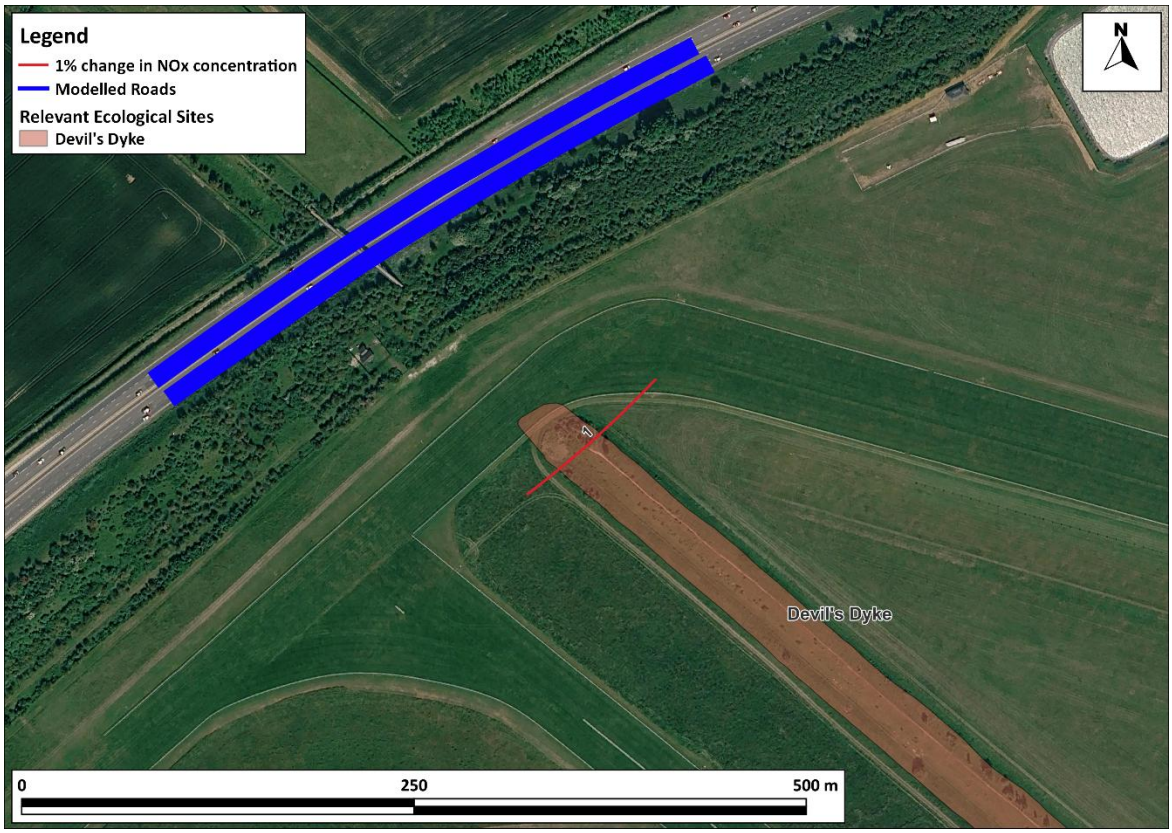


Figure 6: Areas Exceeding 1% of CLe In-Combination in Devil's Dyke

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

Alt text: a map displaying the modelled road layout, with the northwestern end of Devil's Dyke shown adjacent to this. The 1% NOx concentration change is shown by a red isoline indicating where the 1% NOx concentration change (or greater) occurs up to within the ecological site.

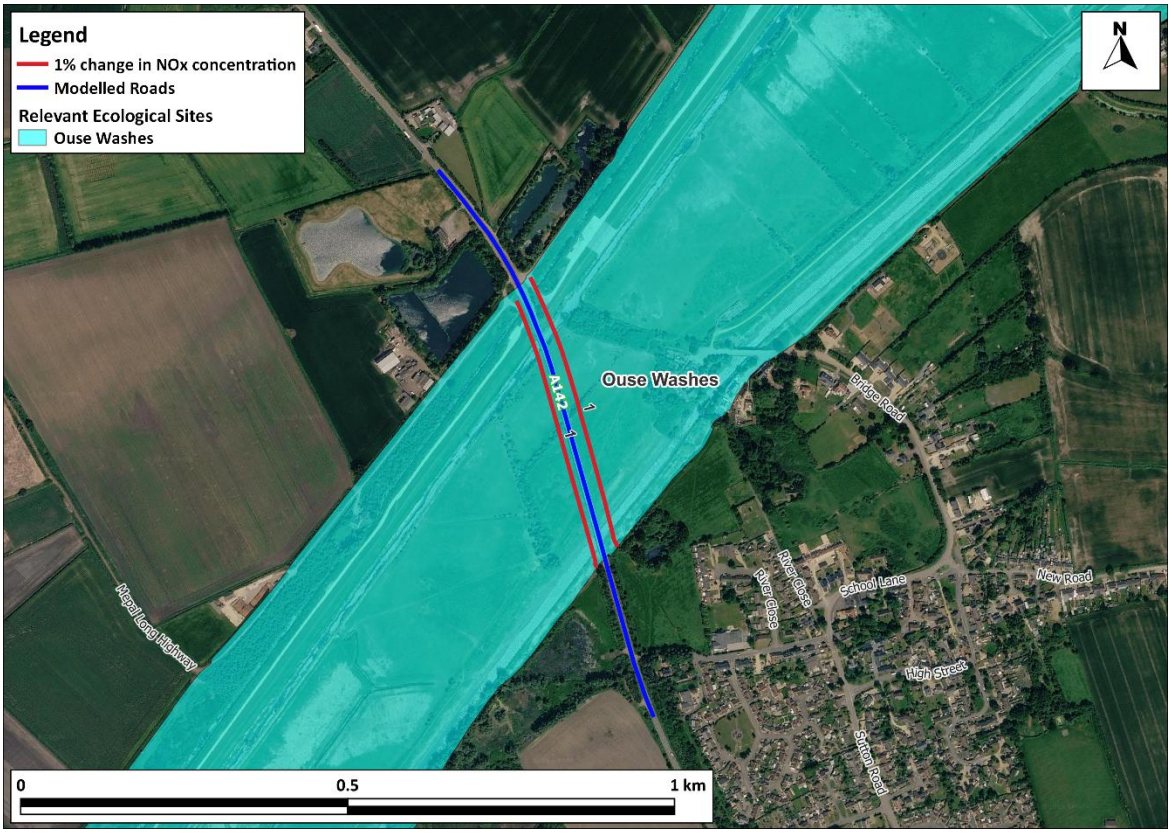


Figure 7: Areas Exceeding 1% of CLe In-Combination in Ouse Washes (North Extent)

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

Alt text: a map displaying the modelled road layout which cuts through the middle of Ouse Washes at this location (the northern section of the Ouse Washes that has been modelled). The 1% NOx concentration change is shown by a red isoline either side of the modelled road, indicating where 1% change NOx concentration (or greater) occurs up to within the ecological site.

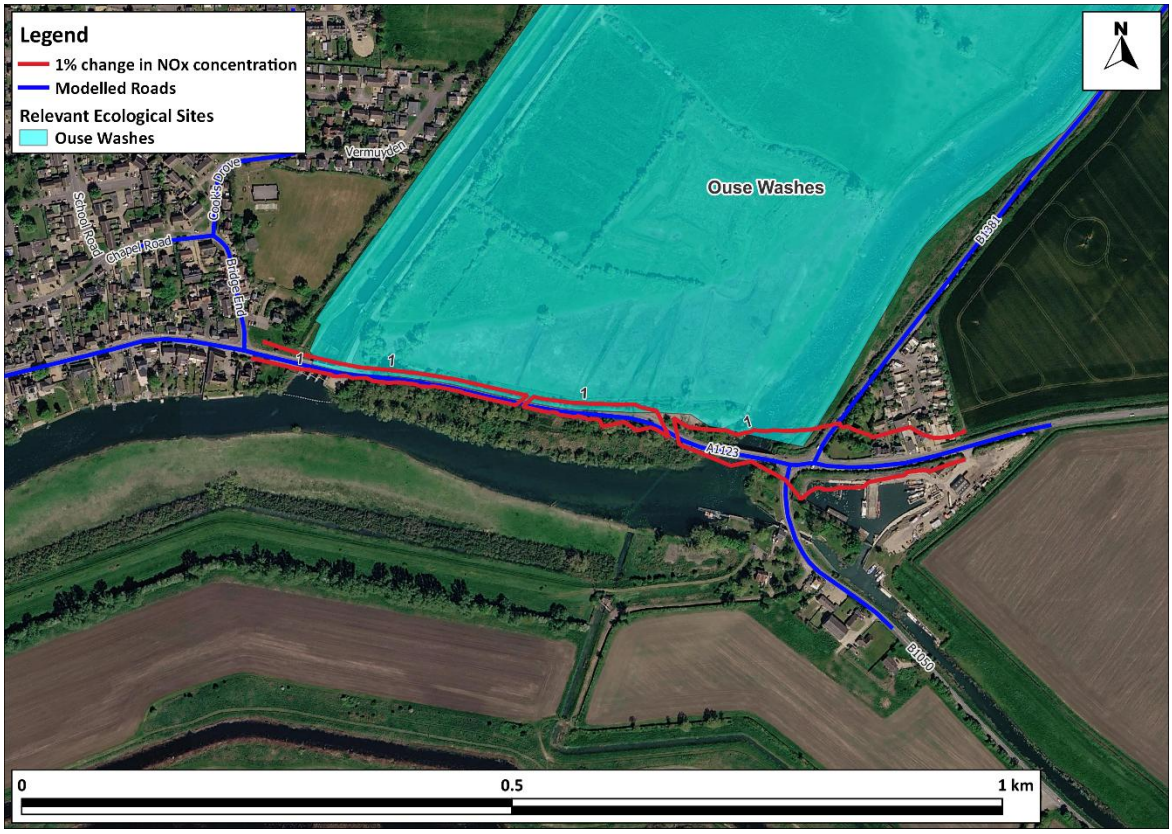


Figure 8: Areas Exceeding 1% of CLe In-Combination in Ouse Washes (South Extent)

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

Alt text: a map displaying the modelled road layout surrounding the southern end of the Ouse Washes. The 1% NOx concentration change is shown by a red isoline either side of part of the modelled road network, indicating where 1% change NOx concentration (or greater) occurs up to within the ecological site.

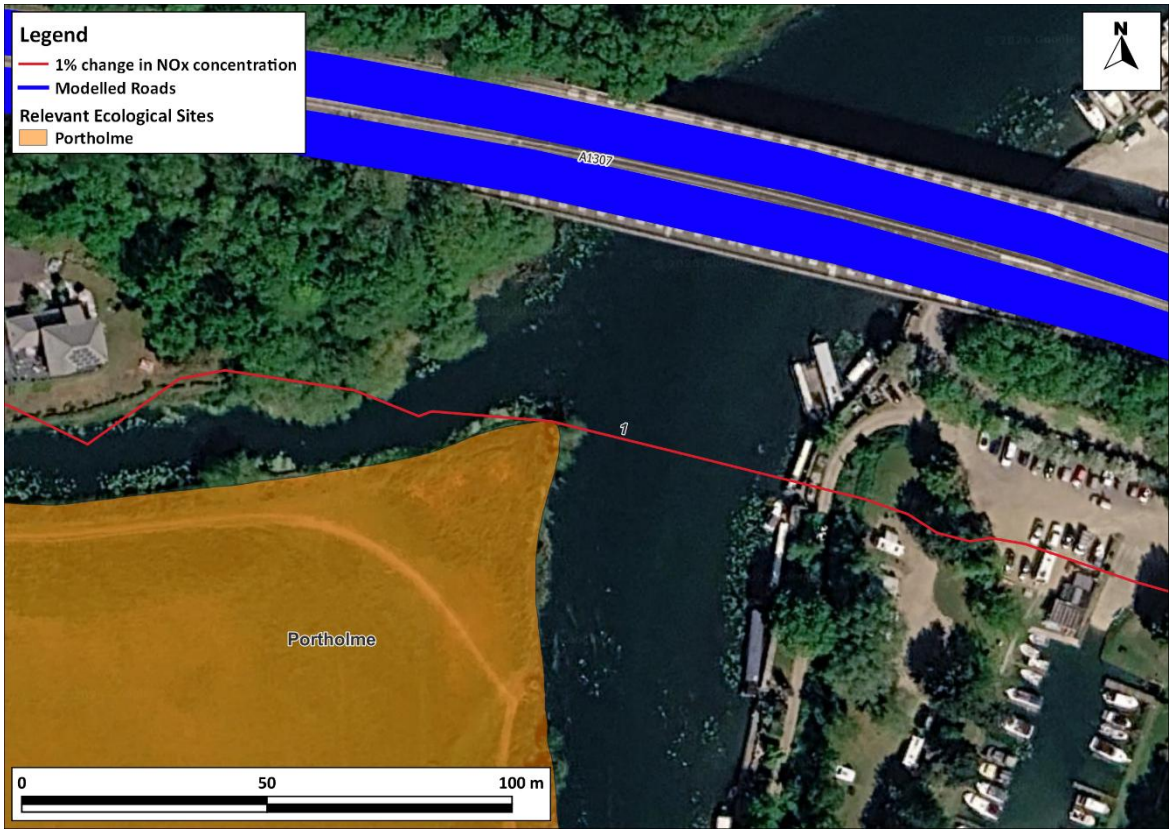


Figure 9: Areas Exceeding 1% of CLe In-Isolation in Portholme SAC

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

Alt text: a map displaying the modelled road layout adjacent to Portholme SAC. The 1% NOx concentration change is shown by a red isoline, indicating where 1% change NOx concentration (or greater) occurs up to within the ecological site. The red isoline just overlaps with the SAC.

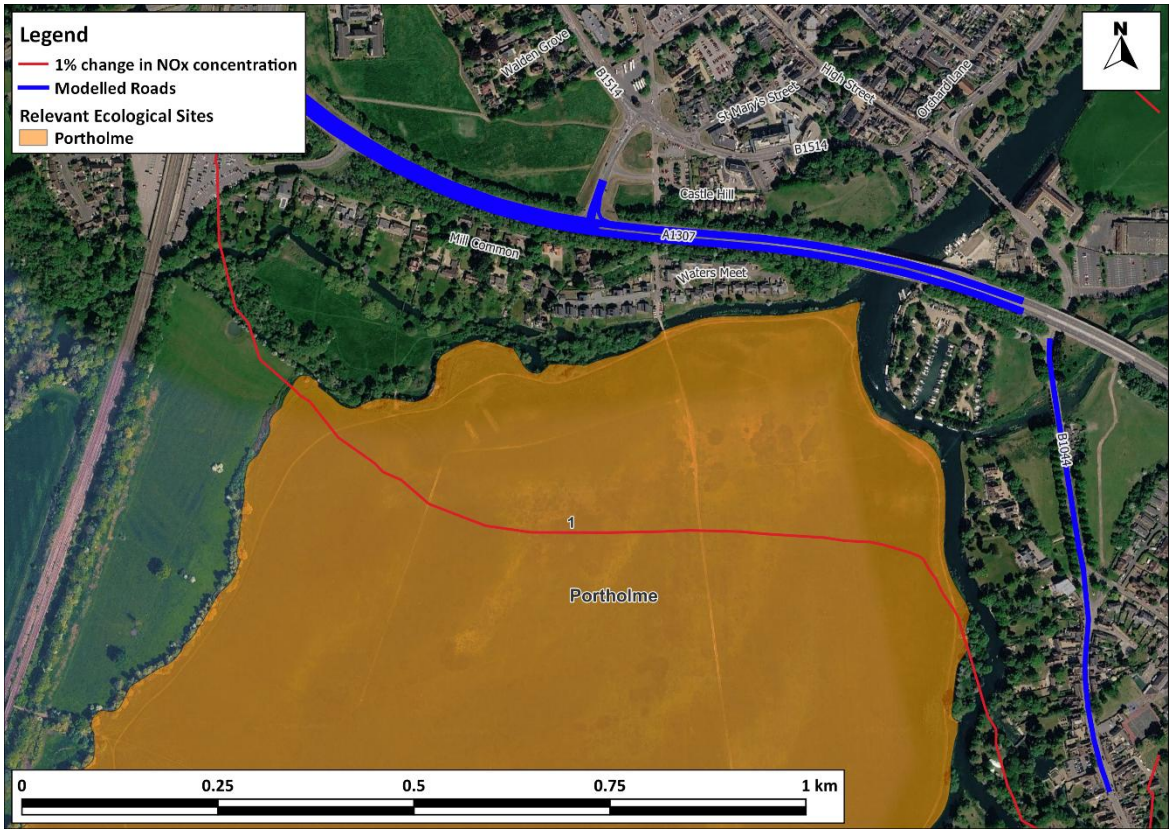


Figure 10: Areas Exceeding 1% of CLe In-Combination in Portholme SAC

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

Alt text: a map displaying the modelled road layout adjacent to Portholme SAC. The 1% NOx concentration change is shown by a red isoline, indicating where 1% change NOx concentration (or greater) occurs up to within the ecological site.

Ammonia

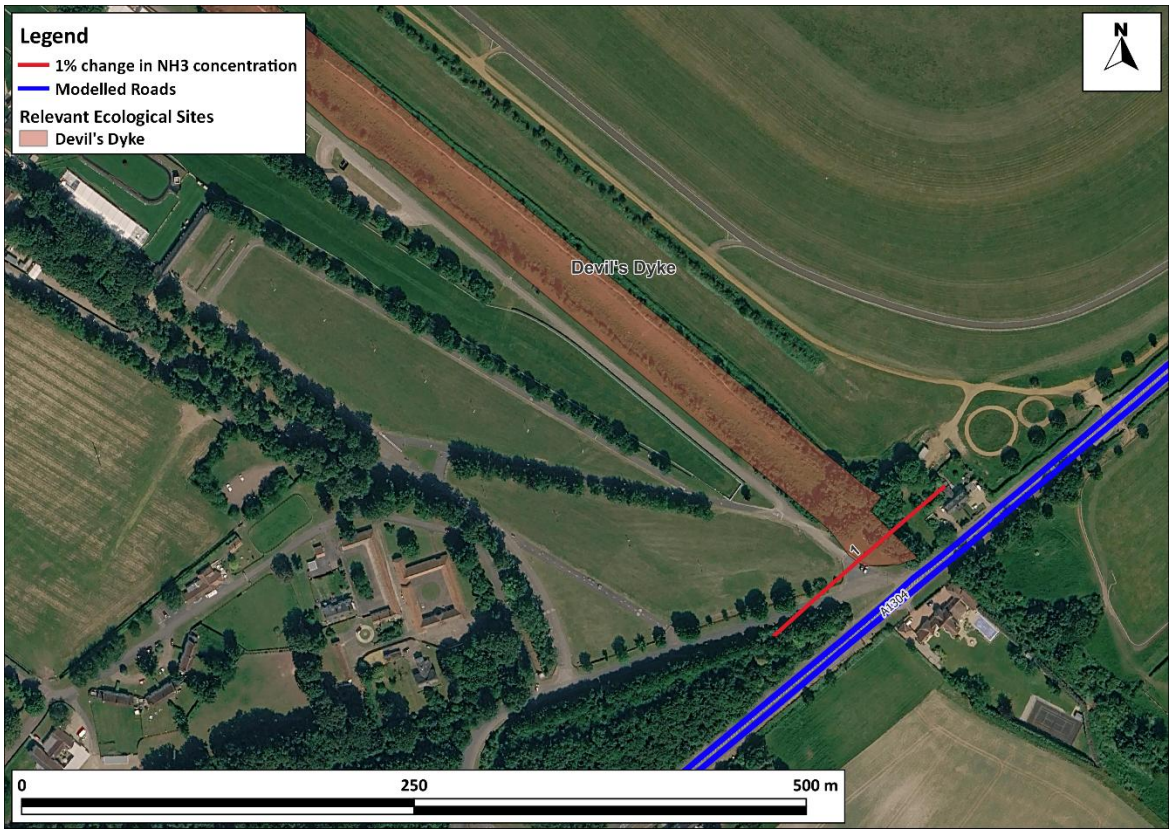


Figure 11: Areas Exceeding 1% of CLe In-Isolation in Devil's Dyke

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

Alt text: a map displaying the modelled road layout, with the southeastern end of Devil's Dyke shown adjacent to this. The 1% NH_3 concentration change is shown by a red isoline indicating where the 1% NH_3 concentration change (or greater) occurs up to within the ecological site.

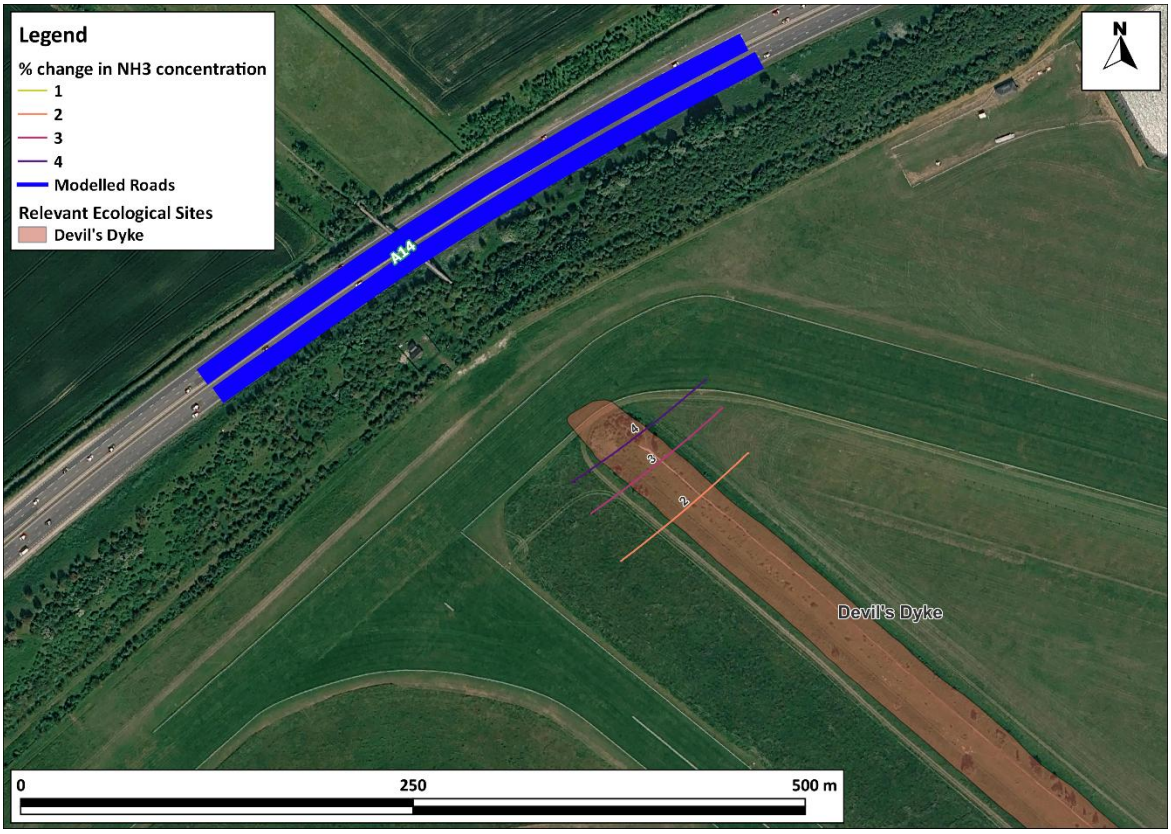


Figure 12: Areas Exceeding 1% of CLe In-Combination in Devil's Dyke (North Extent)

The 1% contour extends beyond 200 metres, and so additional contours are shown for this site.

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

Alt text: a map displaying the modelled road layout, with the northwestern end of Devil's Dyke shown adjacent to this. The 2%, 3% and 4% NH_3 concentration changes are shown by isolines indicating where the relative percentage changes in NH_3 concentration changes occur up to within the ecological site. The order of the isolines, from closest to the road to furthest away from the road, is 4%, 3%, and then 2%.

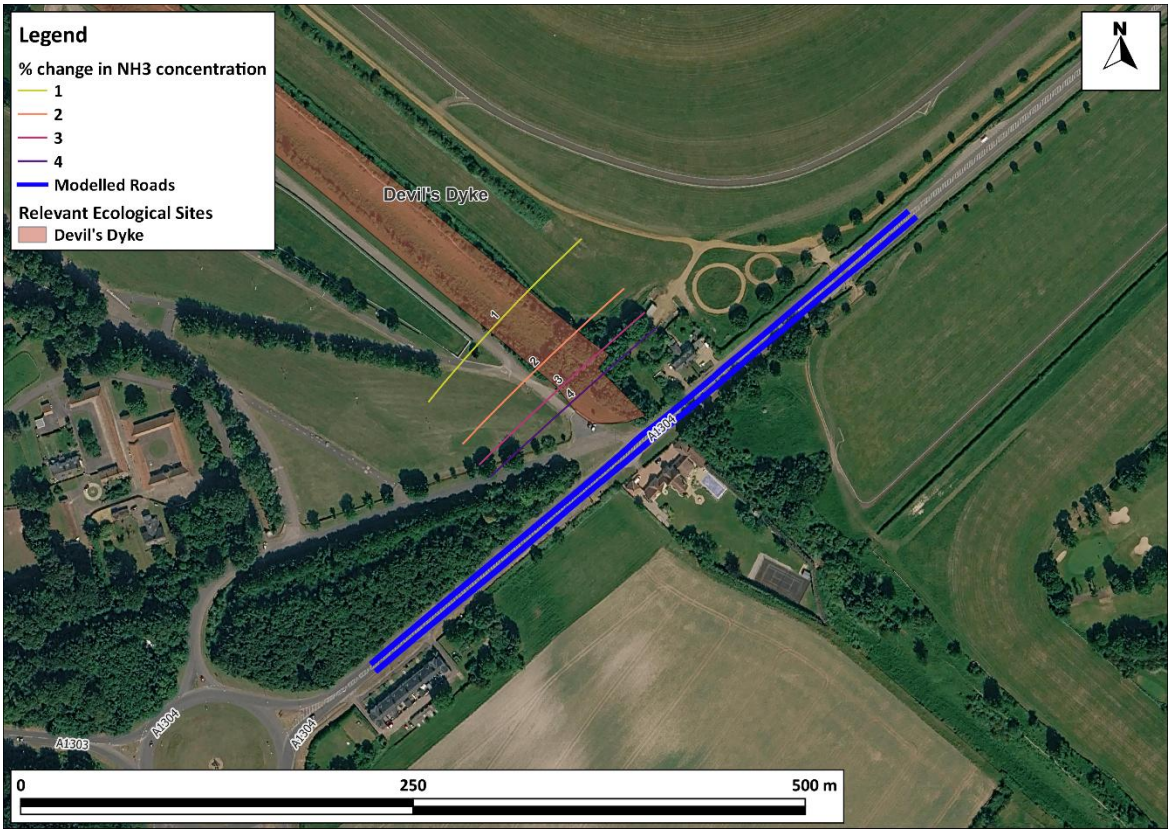


Figure 13: Areas Exceeding 1% of CLe In-Combination in Devil's Dyke (South Extent)

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

Alt text: a map displaying the modelled road layout, with the southeastern end of Devil's Dyke shown adjacent to this. The 1%, 2%, 3% and 4% NH_3 concentration changes are shown by isolines indicating where the relative percentage changes in NH_3 concentration changes occur up to within the ecological site. The order of the isolines, from closest to the road to furthest away from the road, is 4%, 3%, 2% and then 1%.

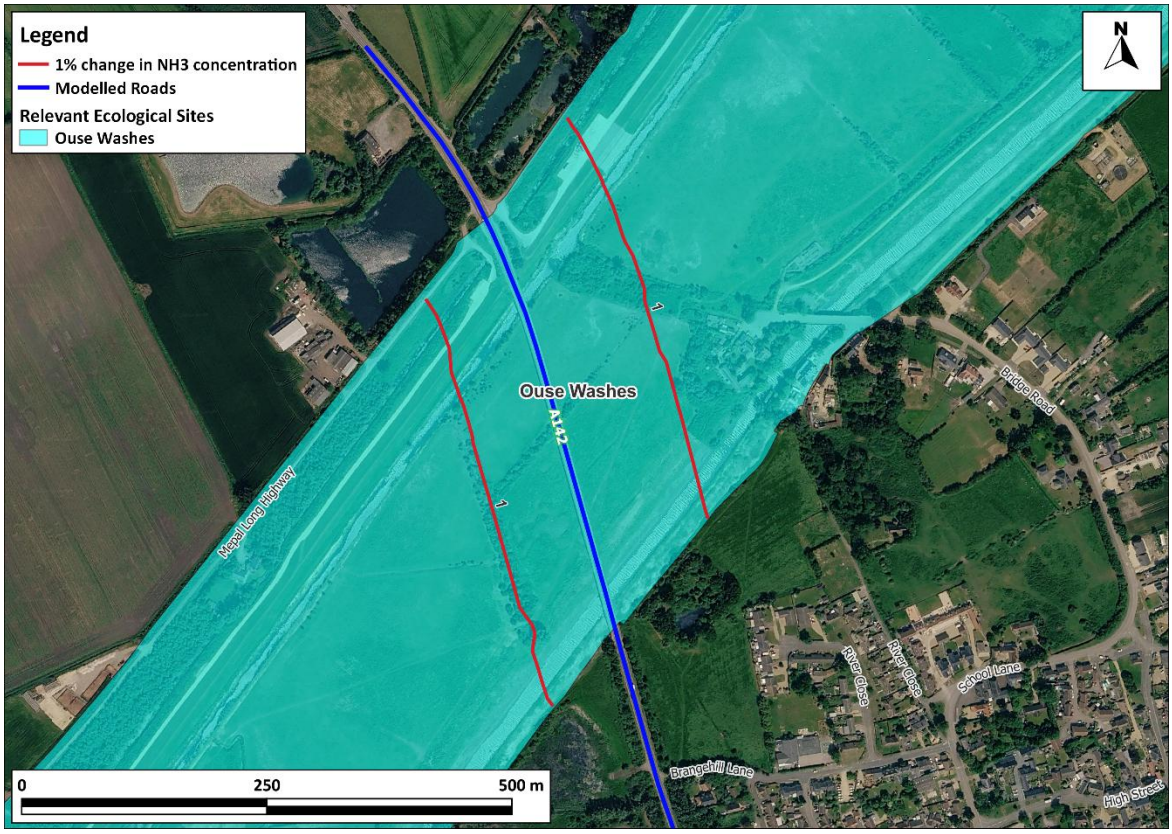


Figure 14: Areas Exceeding 1% of CLe In-Combination in Ouse Washes (North Extent)

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

Alt Text: a map displaying the modelled road layout which cuts through the middle of Ouse Washes at this location. The 1% NH_3 concentration change is shown by a red isoline either side of the modelled road, indicating where 1% change NH_3 concentration (or greater) occurs up to within the ecological site.

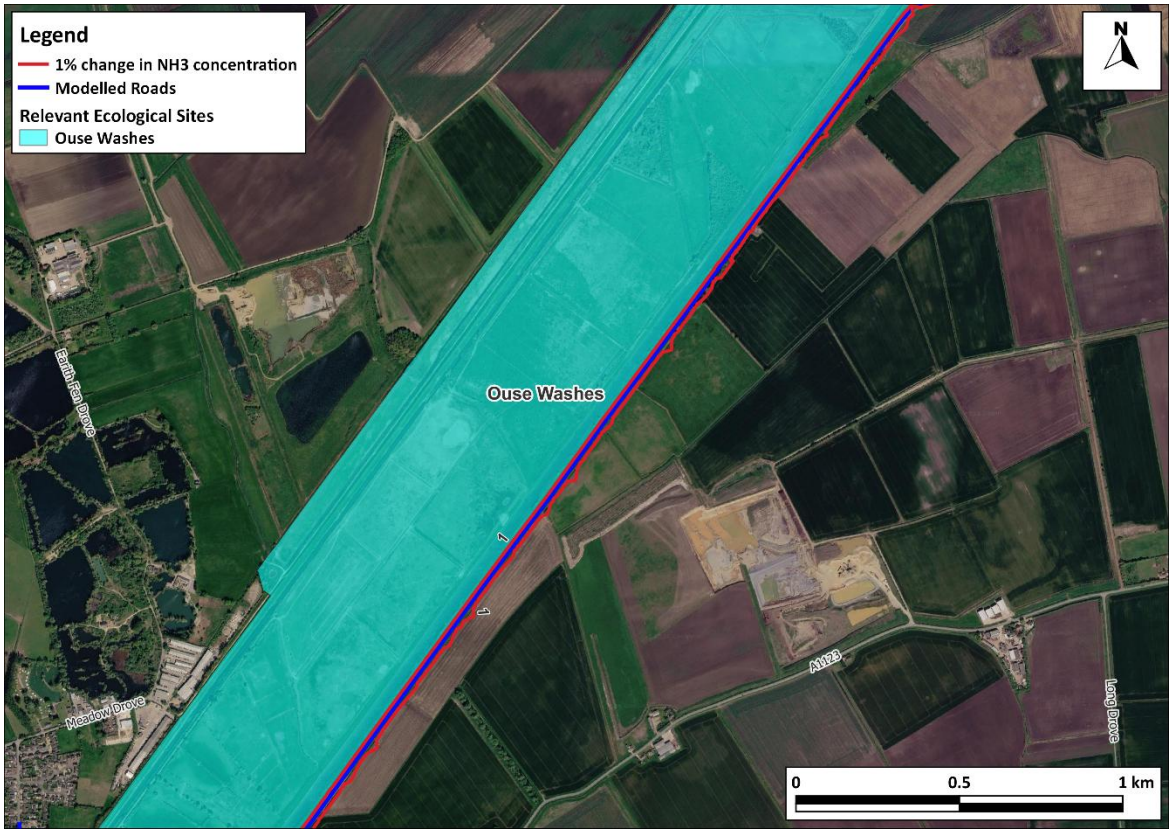


Figure 15: Areas Exceeding 1% of CLe In-Combination in Ouse Washes (Middle Extent)

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

Alt text: a map showing the modelled road network adjacent to the middle section of the Ouse Washes, with the modelled roads to the east of the site. A red isoline depicts the 1% change in NH_3 indicating where 1% change NH_3 concentration (or greater) occurs up to within the ecological site.

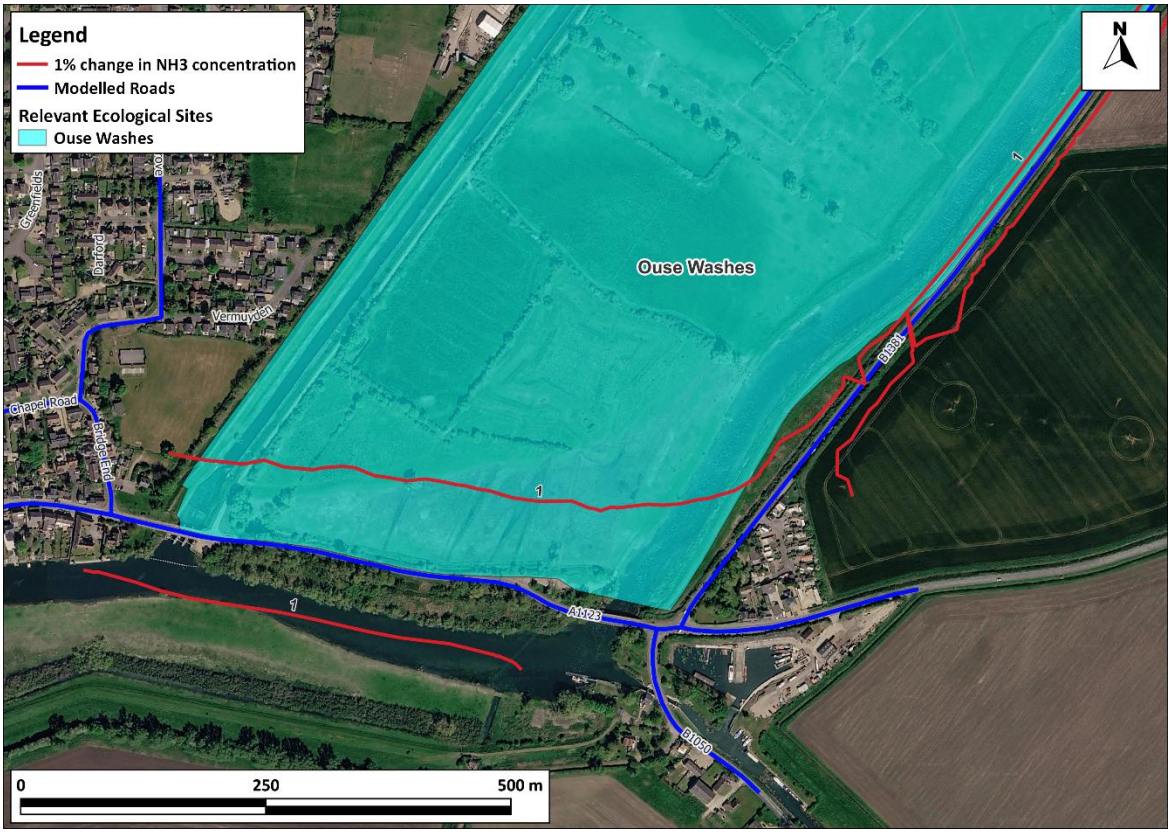


Figure 16: Areas Exceeding 1% of CLe In-Combination in Ouse Washes (South Extent)

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

Alt text: a map displaying the modelled road layout surrounding the southern end of the Ouse Washes. The 1% NH_3 concentration change is shown by a red isoline either side of part of the modelled road network, indicating where 1% change NH_3 concentration (or greater) occurs up to within the ecological site.

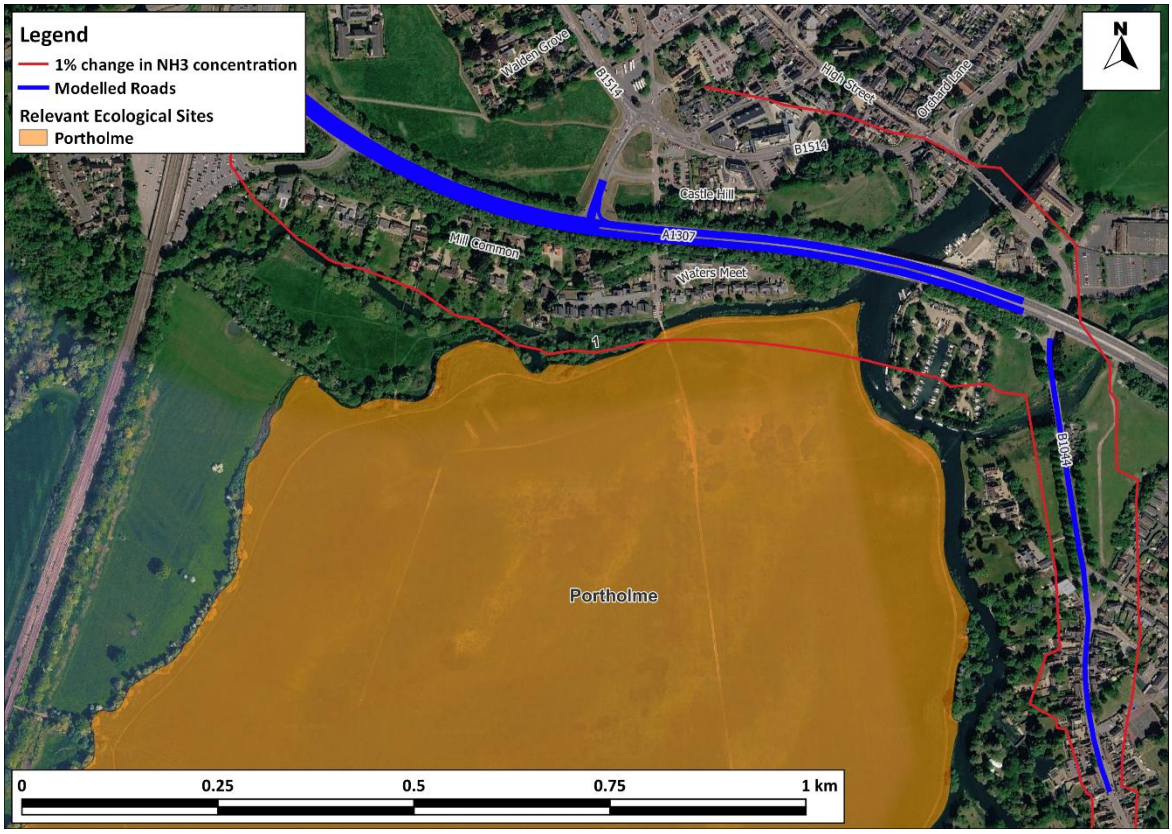


Figure 17: Areas Exceeding 1% of CLe In-Combination in Portholme SAC

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

Alt text: a map displaying the modelled road layout adjacent to Portholme SAC. The 1% NH_3 concentration change is shown by a red isoline, indicating where 1% change NH_3 concentration (or greater) occurs up to within the ecological site.

Nitrogen Deposition

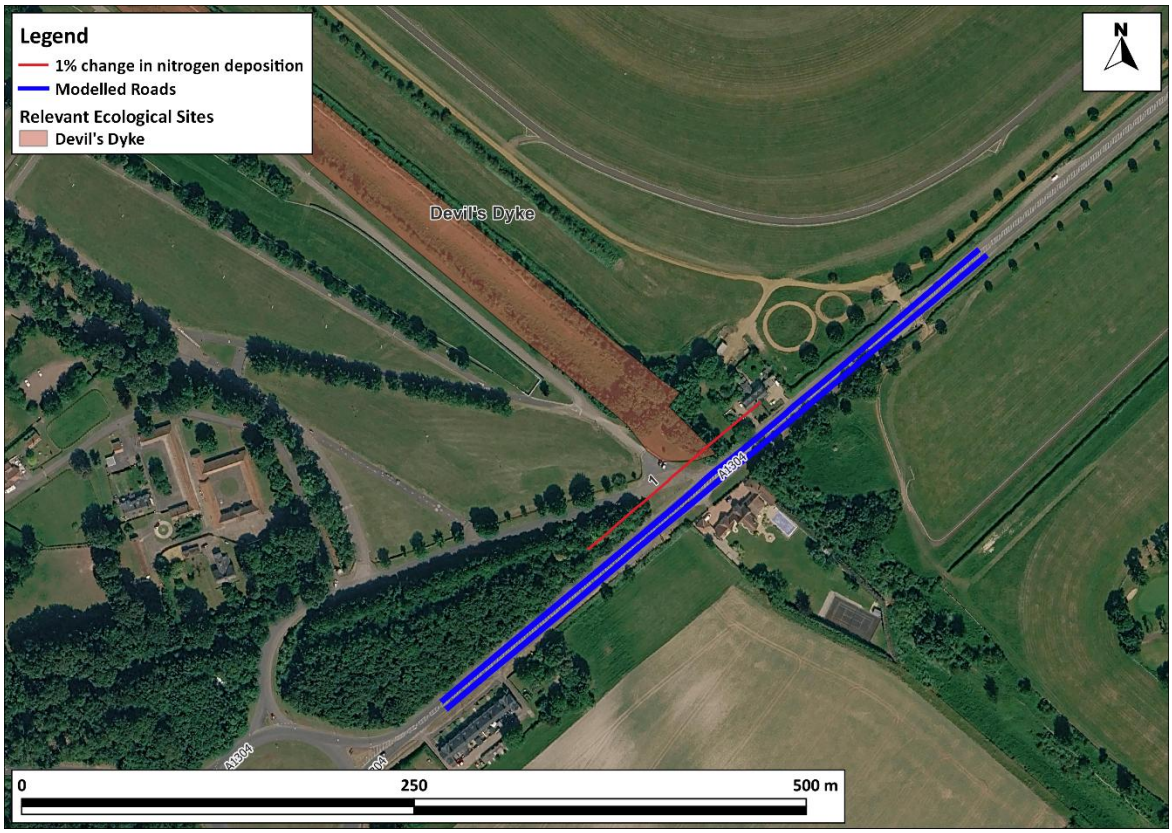


Figure 18: Areas Exceeding 1% of CLo In-Isolation in Devil's Dyke

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

Alt text: a map displaying the modelled road layout, with the southeastern end of Devil's Dyke shown adjacent to this. The 1% nitrogen deposition change is shown by a red isoline indicating where the 1% nitrogen deposition change (or greater) occurs up to within the ecological site.

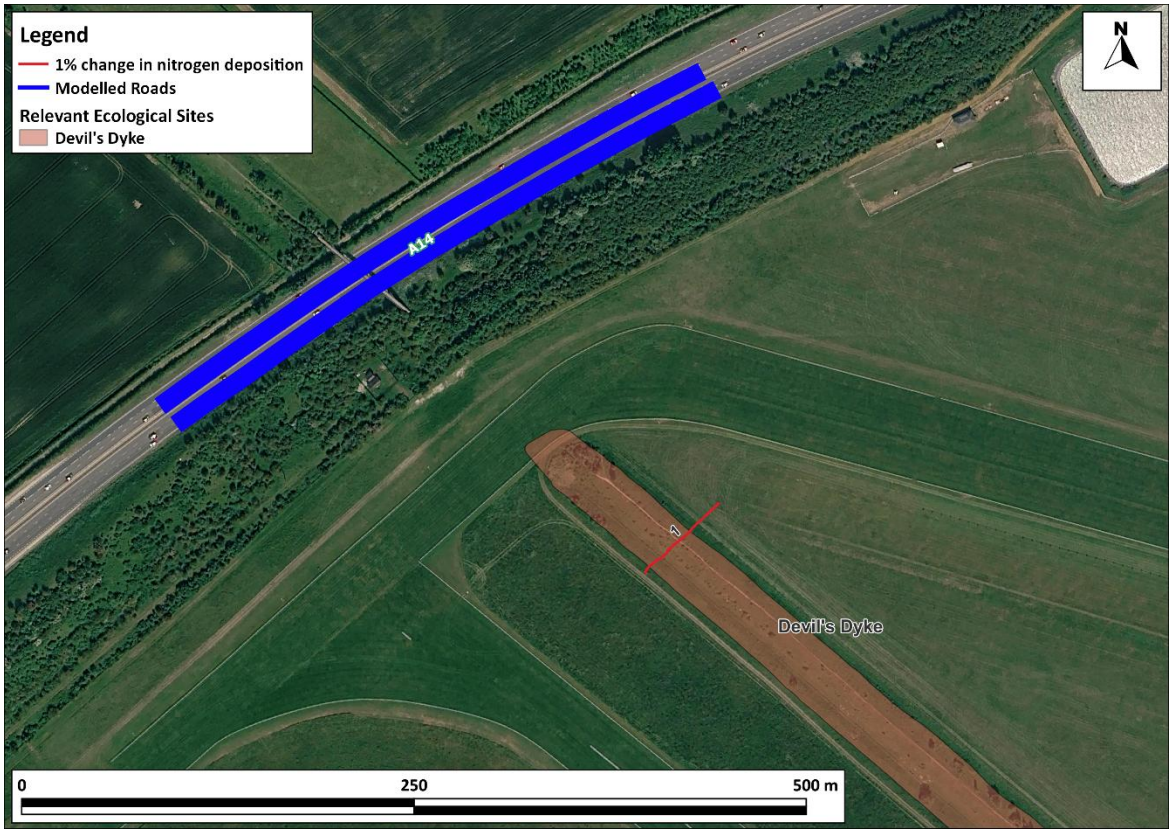


Figure 19: Areas Exceeding 1% of CLe In-Combination in Devil's Dyke (North Extent)

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

Alt text: a map displaying a modelled road layout, with the northwestern end of Devil's Dyke shown adjacent to this. The 1% nitrogen deposition change is shown by a red isoline indicating where the 1% nitrogen deposition change (or greater) occurs up to within the ecological site.

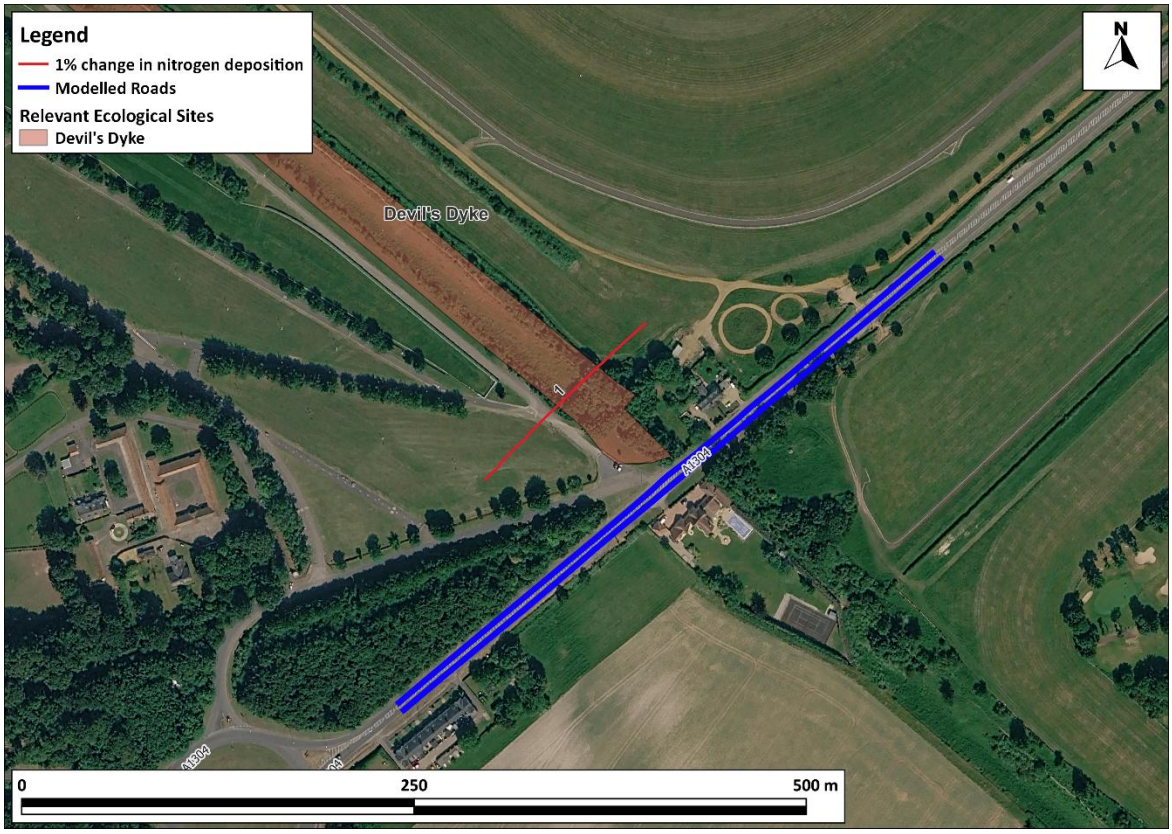


Figure 20: Areas Exceeding 1% of CLe In-Combination in Devil's Dyke (South Extent)

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

Alt text: a map displaying the modelled road layout, with the southeastern end of Devil's Dyke shown adjacent to this. The 1% nitrogen deposition change is shown by a red isoline indicating where the 1% nitrogen deposition change (or greater) occurs up to within the ecological site.

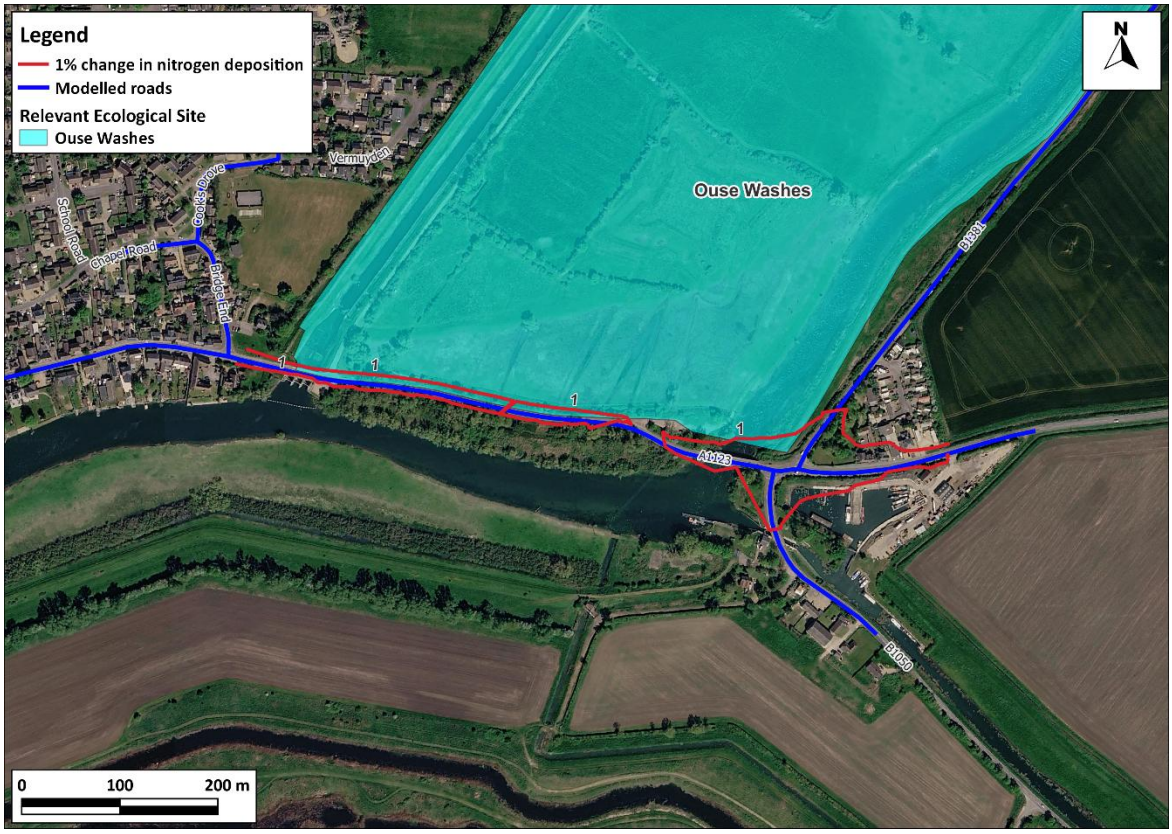


Figure 21: Areas Exceeding 1% of CLo Alone in Ouse Washes

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

Alt text: a map displaying the modelled road layout surrounding the southern end of the Ouse Washes. The 1% nitrogen deposition change is shown by a red isoline either side of part of the modelled road network, indicating where 1% change nitrogen deposition (or greater) occurs up to within the ecological site.

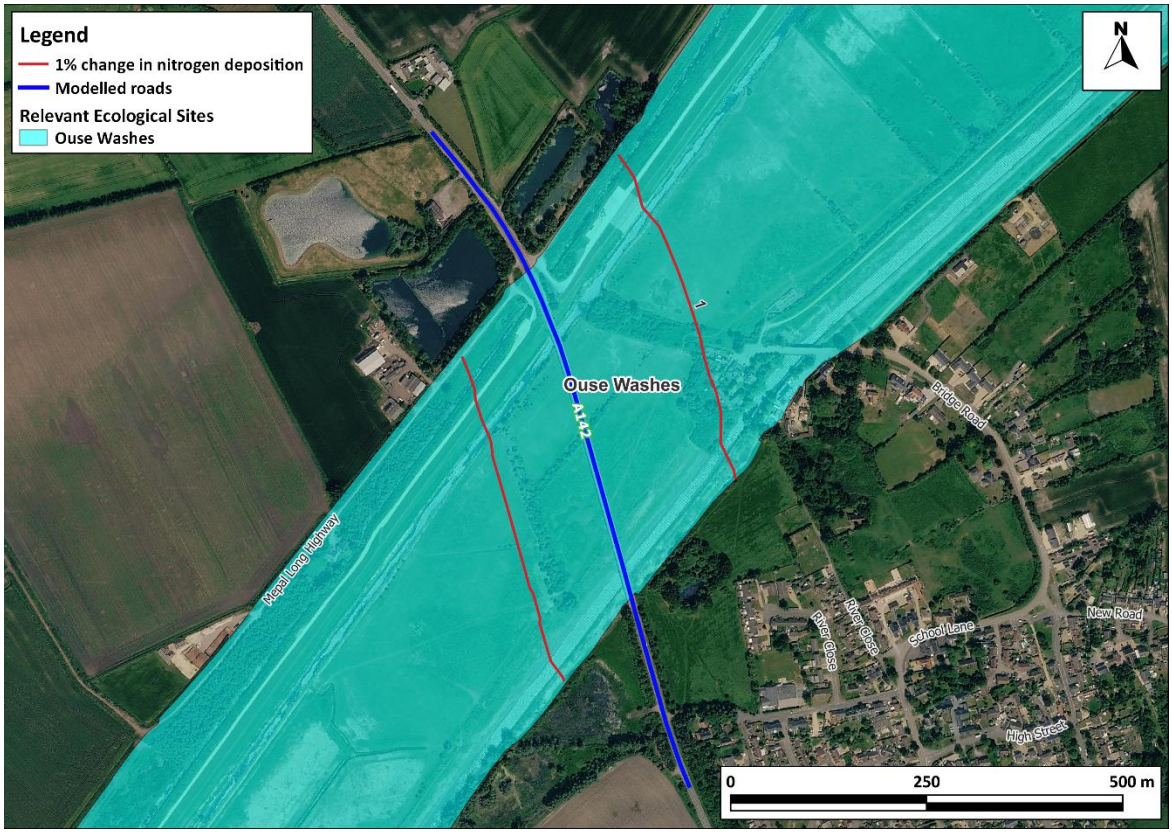


Figure 22: Areas Exceeding 1% of CLo In-Combination in Ouse Washes (North Extent)

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

Alt text: a map displaying the modelled road layout which cuts through the middle of Ouse Washes at this location. The 1% nitrogen deposition change is shown by a red isoline either side of the modelled road, indicating where 1% change nitrogen deposition (or greater) occurs up to within the ecological site.

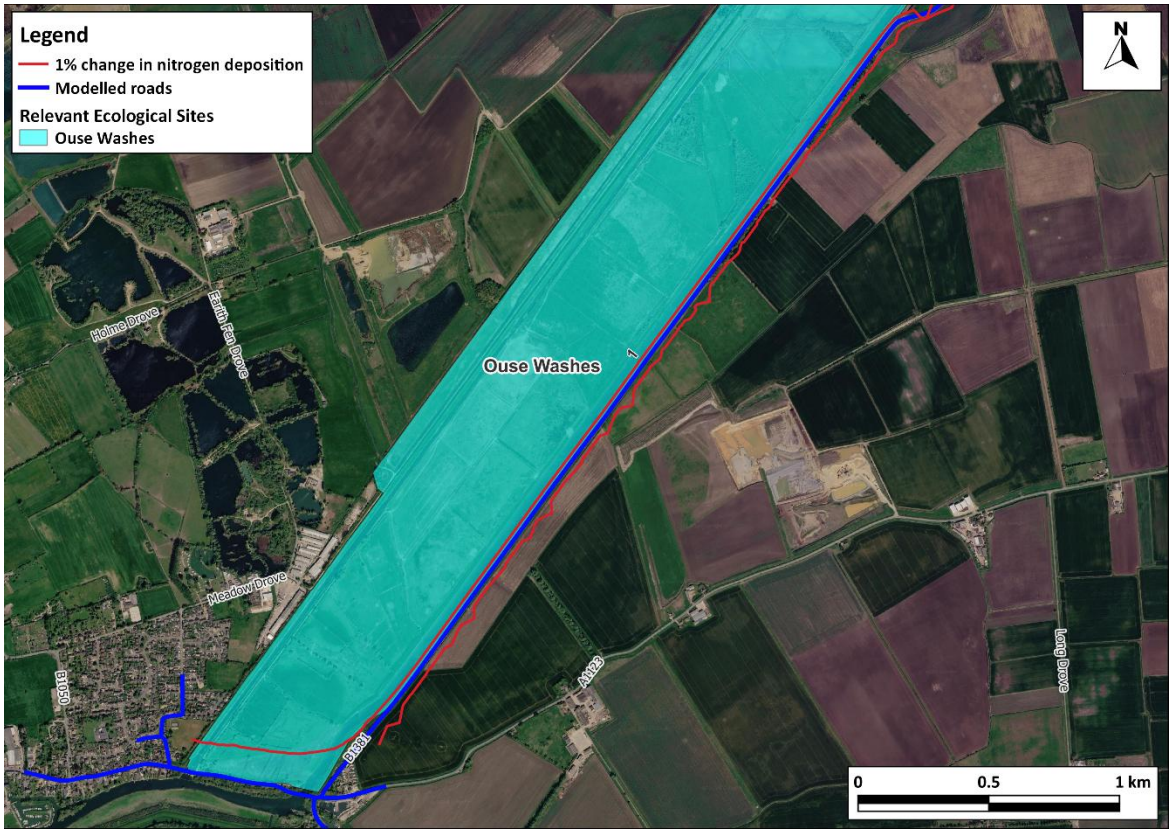


Figure 23: Areas Exceeding 1% of CLo In-Combination in Ouse Washes (South Extent)

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

Alt text: a map showing the modelled road network adjacent to the middle and southern sections of the Ouse Washes, with the modelled roads to the east of the site. A red isoline depicts the 1% change in nitrogen deposition indicating where 1% change nitrogen deposition (or greater) occurs up to within the ecological site.

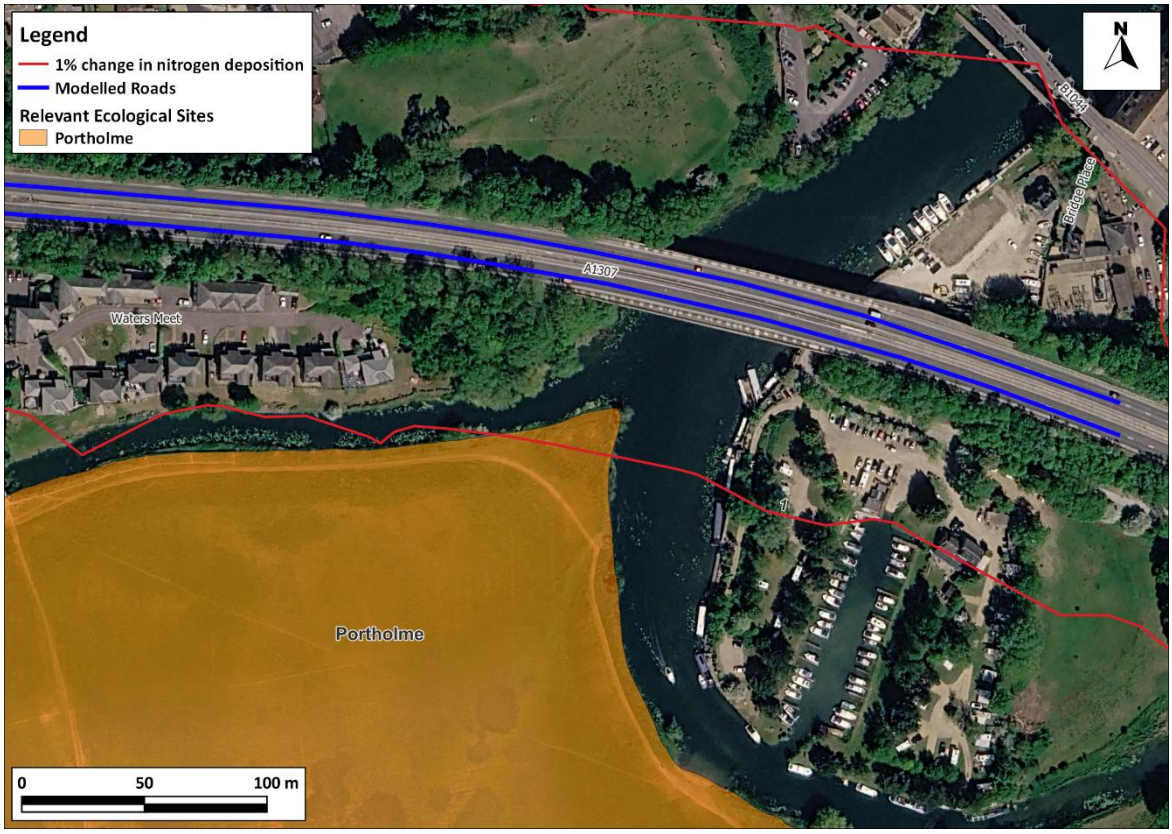


Figure 24: Areas Exceeding 1% of CLo In-Isolation in Portholme SAC

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

Alt text: a map displaying a modelled road layout adjacent to Portholme SAC. The 1% nitrogen deposition change is shown by a red isoline, indicating where 1% change nitrogen deposition (or greater) occurs up to within the ecological site.

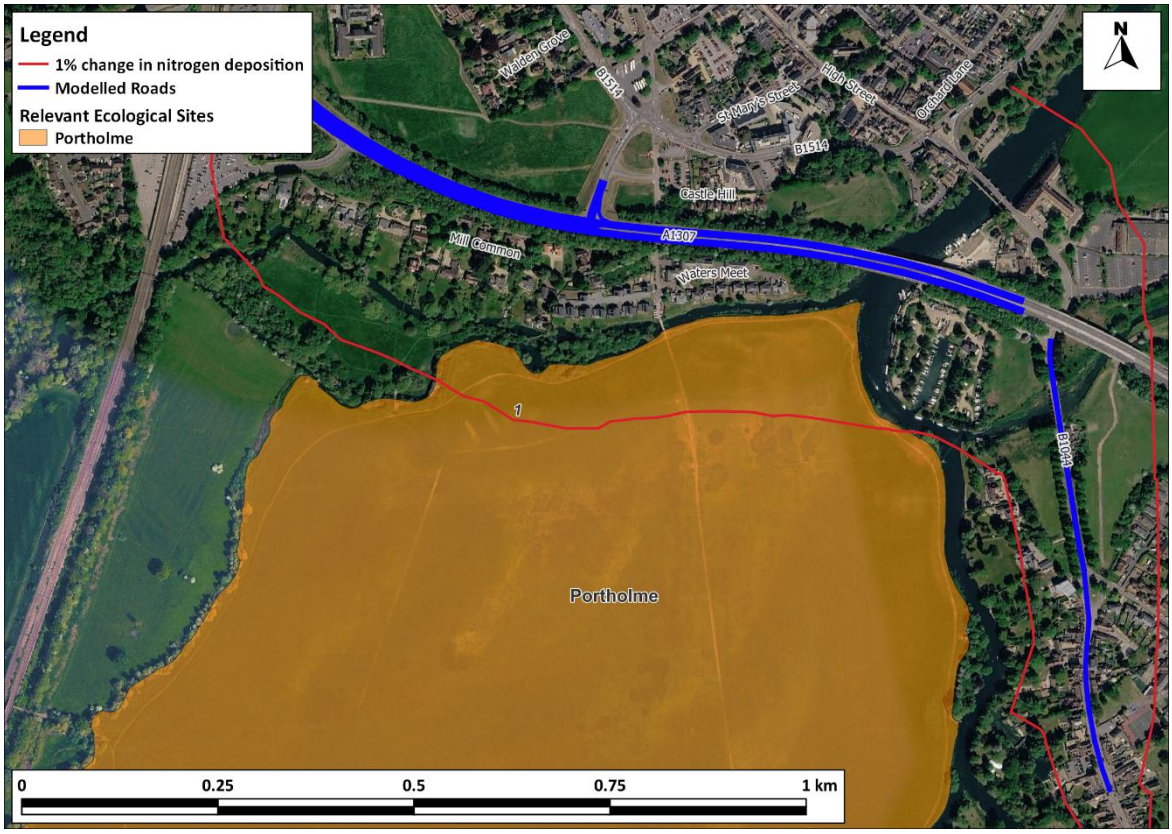


Figure 25: Areas Exceeding 1% of CLo In-Combination in Portholme SAC

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

Alt text: a map displaying a modelled road layout adjacent to Portholme SAC. The 1% nitrogen deposition change is shown by a red isoline, indicating where 1% change nitrogen deposition (or greater) occurs up to within the ecological site.

Acid Deposition

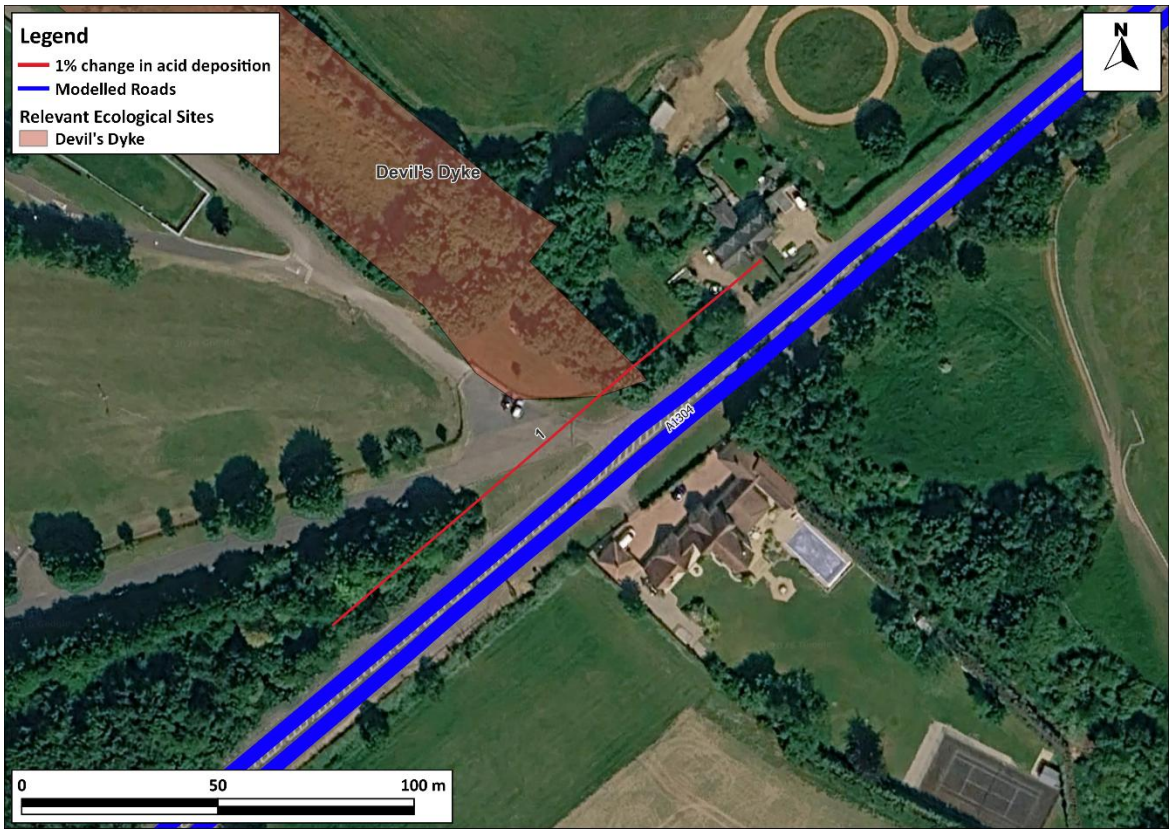


Figure 26: Areas Exceeding 1% of CLo In-Combination in Devil's Dyke

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

Alt text: a map displaying the modelled road layout, with the southeastern end of Devil's Dyke shown adjacent to this. The 1% acid deposition change is shown by a red isoline indicating where the 1% acid deposition change (or greater) occurs up to within the ecological site.

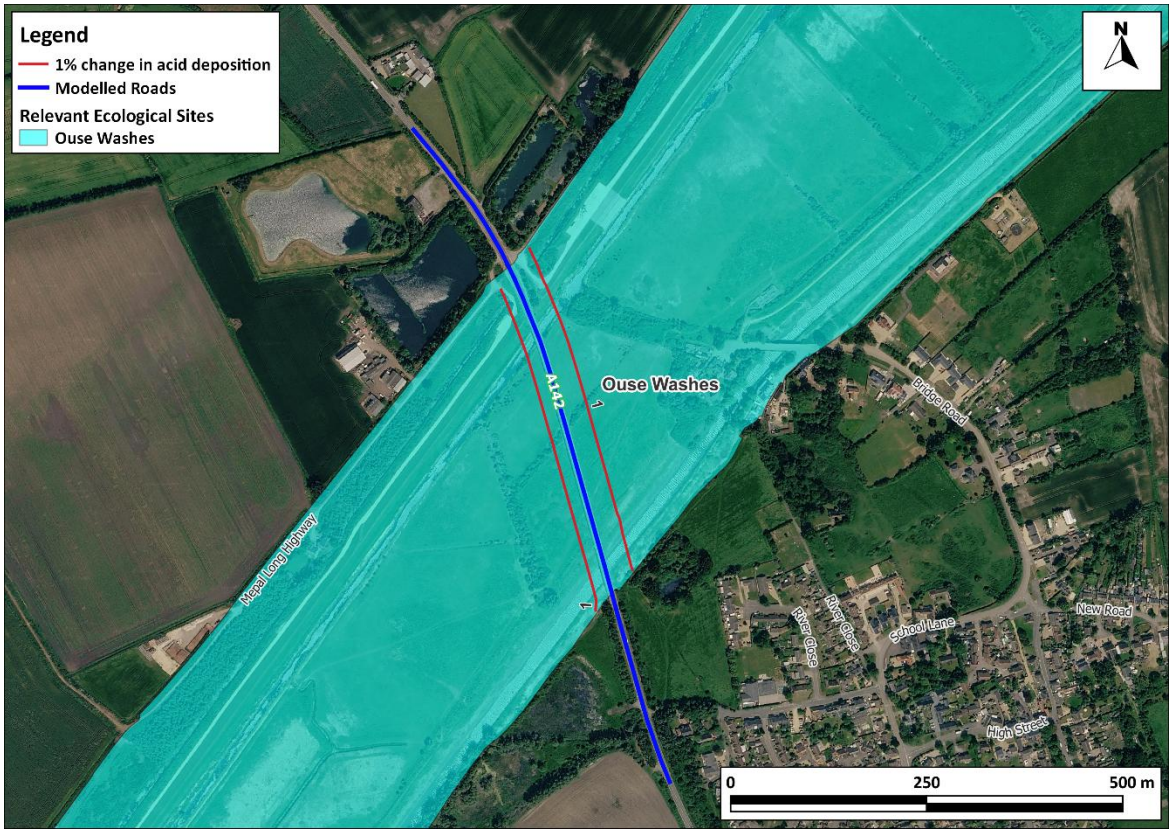


Figure 27: Areas Exceeding 1% of CLo In-Combination in Ouse Washes (North Extent)

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

Alt text: a map displaying a modelled road layout which cuts through the middle of Ouse Washes at this location. The 1% acid deposition change is shown by a red isoline either side of the modelled road, indicating where 1% change acid deposition (or greater) occurs up to within the ecological site.

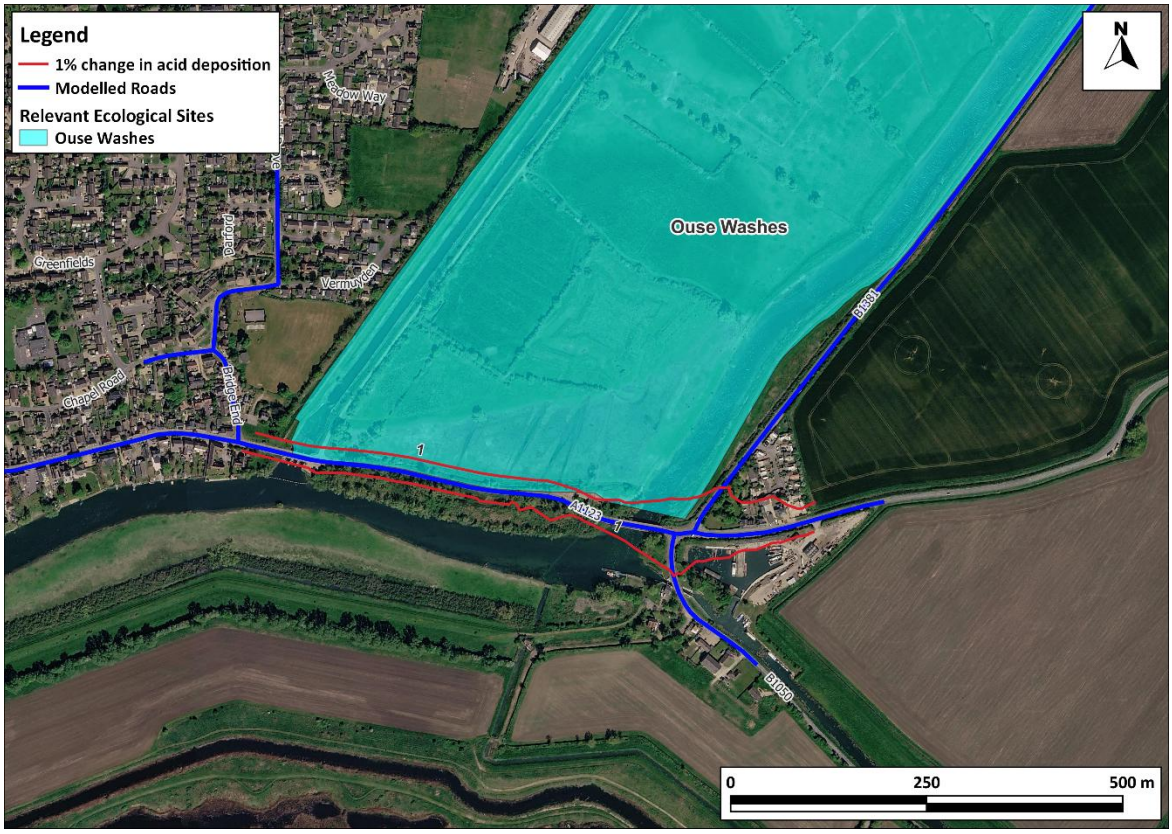


Figure 28: Areas Exceeding 1% of CLo In-Combination in Ouse Washes (South Extent)

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

Alt text: a map displaying the modelled road layout surrounding the southern end of the Ouse Washes. The 1% acid deposition change is shown by a red isoline either side of part of the modelled road network, indicating where 1% change acid deposition (or greater) occurs up to within the ecological site.

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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)

NAMN	National Ammonia Monitoring Network
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + 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 MIEnvSc 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 AMIEnvSc

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 14.1) 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?	No
Variable Surface Roughness File Used?	Yes – 12 kilometres x 12 kilometres Cartesian grid at 50 metres resolution
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Monks Wood
Meteorological Data Year	2023
Dispersion Site Surface Roughness Length (metres)	N/A (variable surface roughness file used)
Dispersion Site Minimum MO Length (metres)	1
Met Site Surface Roughness Length (metres)	0.3
Met Site Minimum MO Length (metres)	1
Gradients?	No

A2.2 AADT flows, diurnal flow profiles, speeds, and vehicle fleet composition data have been provided by Greater Cambridge Shared Planning Service. Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits 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 AADT	2023 %HDV	2046 Base AADT	2046 Base %HDV	2046 With Local Plan AADT	2046 With Local Plan %HDV
213	23,556	1.43	33,164	1.41	36,422	1.53
212	23,556	1.43	33,164	1.41	36,422	1.53
211	23,556	1.43	33,164	1.41	36,422	1.53
210	23,556	1.43	33,164	1.41	36,422	1.53
110	6,787	0.77	8,344	0.73	9,146	1.43
109	6,425	2.83	7,641	3.47	8,744	3.23
108	35,044	16.89	53,880	12.74	54,376	12.68
107	35,384	17.23	55,056	12.94	55,675	12.99
106	5,576	5.08	7,639	4.35	8,274	4.01
105	5,757	3.61	8,106	2.84	8,440	2.67
104	14,870	6.41	21,880	4.90	21,894	5.01
103	14,870	6.41	21,880	4.90	21,894	5.01
102	8,901	4.44	9,529	4.07	9,736	4.00
101	8,901	4.44	9,529	4.07	9,736	4.00
100	8,901	4.44	9,529	4.07	9,736	4.00
99	8,901	4.44	9,529	4.07	9,736	4.00
98	8,901	4.44	9,529	4.07	9,736	4.00
97	8,901	4.44	9,529	4.07	9,736	4.00

Road Link	2023 AADT	2023 %HDV	2046 Base AADT	2046 Base %HDV	2046 With Local Plan AADT	2046 With Local Plan %HDV
96	8,901	4.44	9,529	4.07	9,736	4.00
95	8,901	4.44	9,529	4.07	9,736	4.00
94	8,901	4.44	9,529	4.07	9,736	4.00
93	8,901	4.44	9,529	4.07	9,736	4.00
92	8,901	4.44	9,529	4.07	9,736	4.00
91	8,901	4.44	9,529	4.07	9,736	4.00
90	8,901	4.44	9,529	4.07	9,736	4.00
89	8,901	4.44	9,529	4.07	9,736	4.00
88	8,901	4.44	9,529	4.07	9,736	4.00
87	8,901	4.44	9,529	4.07	9,736	4.00
86	8,901	4.44	9,529	4.07	9,736	4.00
85	12,030	3.87	16,747	3.82	17,296	3.72
84	12,030	3.87	16,747	3.82	17,296	3.72
83	12,030	3.87	16,747	3.82	17,296	3.72
82	12,030	3.87	16,747	3.82	17,296	3.72
81	12,030	3.87	16,747	3.82	17,296	3.72
80	12,030	3.87	16,747	3.82	17,296	3.72
79	12,030	3.87	16,747	3.82	17,296	3.72
78	12,030	3.87	16,747	3.82	17,296	3.72
77	12,030	3.87	16,747	3.82	17,296	3.72
76	8,901	4.44	9,529	4.07	9,736	4.00
75	12,030	3.87	16,747	3.82	17,296	3.72
74	8,901	4.44	9,529	4.07	9,736	4.00
73	12,030	3.87	16,747	3.82	17,296	3.72

Road Link	2023 AADT	2023 %HDV	2046 Base AADT	2046 Base %HDV	2046 With Local Plan AADT	2046 With Local Plan %HDV
72	8,901	4.44	9,529	4.07	9,736	4.00
71	12,030	3.87	16,747	3.82	17,296	3.72
70	2,020	1.09	2,190	3.06	2,247	2.98
69	12,030	3.87	16,747	3.82	17,296	3.72
66	12,800	1.17	18,696	1.35	20,538	1.33
65	23,556	1.43	33,164	1.41	36,422	1.53
28	12,030	3.87	16,747	3.82	17,296	3.72
27	10,250	0.53	13,259	0.90	12,871	2.77
26	10,250	0.53	13,259	0.90	12,871	2.77
24	10,756	1.74	14,468	1.47	15,884	1.78
23	10,756	1.74	14,468	1.47	15,884	1.78
21	23,556	1.43	33,164	1.41	36,422	1.53
20	2,020	1.09	2,190	3.06	2,247	2.98
19	2,020	1.09	2,190	3.06	2,247	2.98
18	2,007	0.95	2,190	3.06	2,247	2.98
17	10,039	4.11	13,676	3.85	14,219	3.71
16	12,800	1.17	18,696	1.35	20,538	1.33
15	12,800	1.17	18,696	1.35	20,538	1.33
14	10,756	1.74	14,468	1.47	15,884	1.78
12	4,350	1.56	8,743	0.94	9,558	1.00
11	10,250	0.53	13,259	0.90	12,871	2.77
10	10,250	0.53	13,259	0.90	12,871	2.77
7	14,870	6.41	21,880	4.90	21,894	5.01
6	8,901	4.44	9,529	4.07	9,736	4.00

Road Link	2023 AADT	2023 %HDV	2046 Base AADT	2046 Base %HDV	2046 With Local Plan AADT	2046 With Local Plan %HDV
5	12,030	3.87	16,747	3.82	17,296	3.72
4	14,870	6.41	21,880	4.90	21,894	5.01
3	12,030	3.87	16,747	3.82	17,296	3.72
0	8,901	4.44	9,529	4.07	9,736	4.00

A2.3 Figure A2-1 to Figure A2-4 show the road network included within the model, along with the speed at which each link was modelled.



Figure A2-1: Modelled Road Network & Speed – Devil's Dyke

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

Alt text: a map showing the roads (which are labelled with the road link IDs) that have been modelled adjacent to the boundary of the Devil's Dyke SAC. The roads are adjacent to the northwestern end and the southeastern end of the SAC. The modelled roads are coloured by the speeds that they

have been modelled at. Indicating that the roads adjacent to the southeast of the SAC have been modelled at 97 kilometres per hour, and the roads adjacent to the northwest of the SAC have been modelled at 113 kilometres per hour.

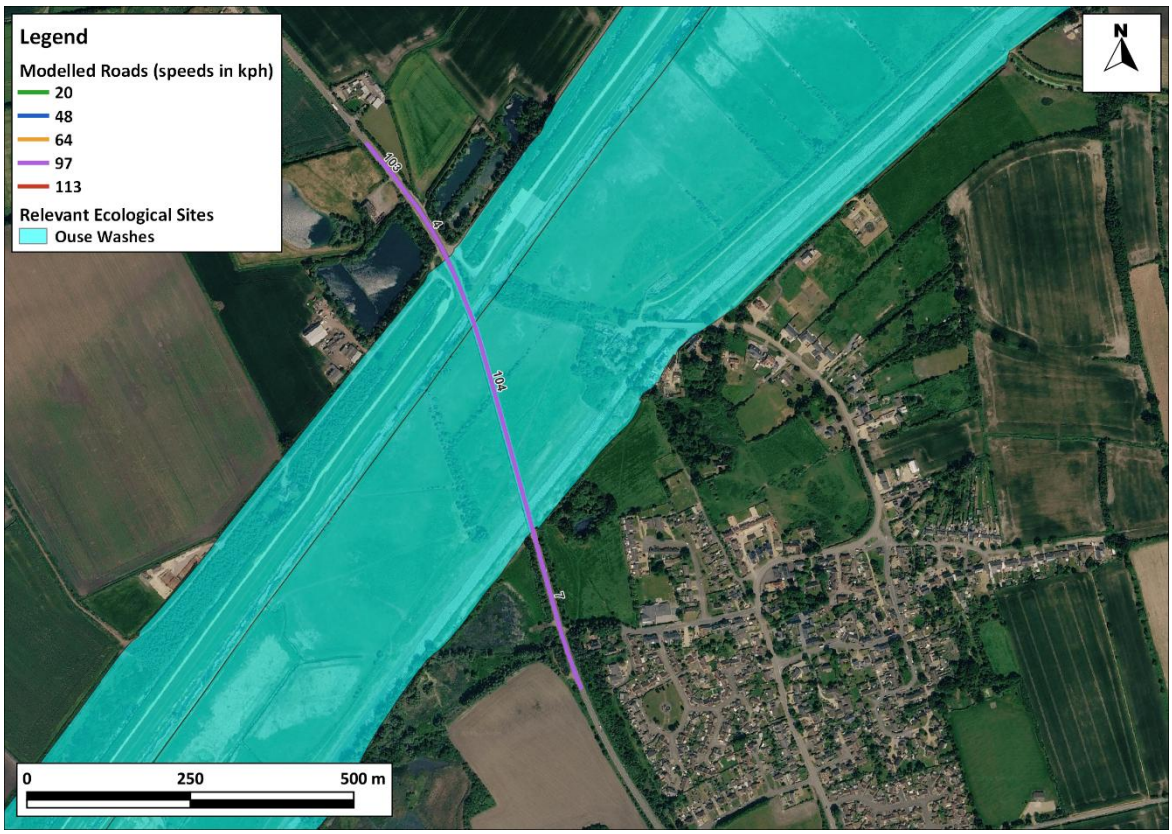


Figure A2-2: Modelled Road Network & Speed – Ouse Washes (North Extent)

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

Alt text: a map showing the roads (which are labelled with the road link IDs) that have been modelled at the Ouse Washes SAC (for the northern area of the SAC that has been modelled). The roads cut through the middle of the SAC at this location. The modelled roads are coloured by the speeds that they have been modelled at, indicating that the roads have all been modelled at 97 kilometres per hour in this location.

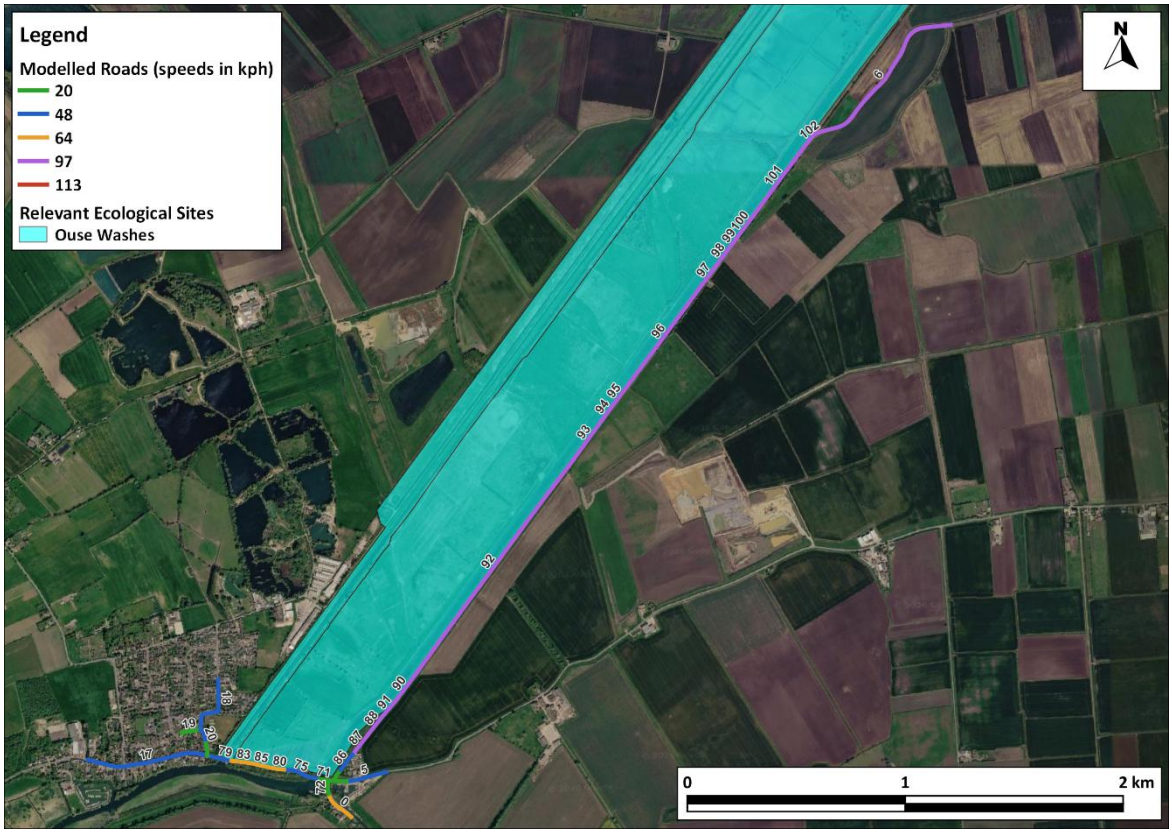


Figure A2-3: Modelled Road Network & Speed – Ouse Washes (South Extent)

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

Alt text: a map showing the roads (which are labelled with the road link IDs) that have been modelled at the Ouse Washes SAC (for the middle and southern areas of the SAC that has been modelled). A single road has been modelled adjacent to the eastern edge of the SAC, with several roads and two junctions modelled adjacent to the southern end of the SAC. The modelled roads are coloured by the speeds that they have been modelled at, indicating that the roads have all been modelled at a range of speeds, including 97 kilometres per hour for the road to the east of the SAC, 20 kilometres per hour for the roads leading into the modelled junctions, and 48 and 64 kilometres per hours for other roads.

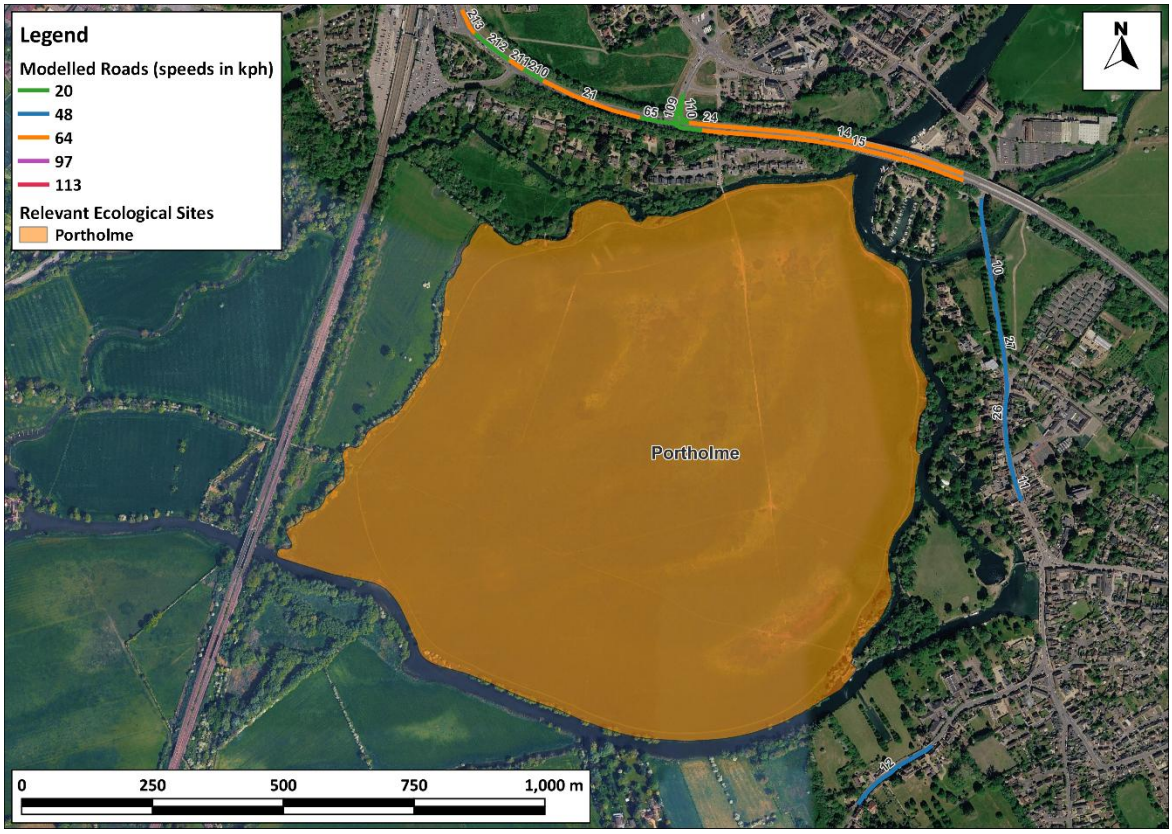


Figure A2-4: Modelled Road Network & Speed – Portholme SAC

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

Alt text: a map showing the roads (which are labelled with the road link IDs) that have been modelled at the Portholme SAC. A single road has been modelled adjacent to the eastern edge of the SAC, with the dual carriageway and one junction modelled adjacent to the northern end of the SAC. The modelled roads are coloured by the speeds that they have been modelled at, indicating that the road to the east has been modelled at 48 kilometres per hour, and the dual carriageway the north at 64 kilometres per hour (bar the roads leading into the junctions here which are modelled at 20- kilometres per hour).

A2.4 Hourly sequential meteorological data in sectors of 10 degrees from Monks Wood for 2023 have been used in the model. The Monks Wood meteorological monitoring station is located at C.E.H. Monks Wood, approximately 7 kilometres to the northwest of Huntingdon. It is the nearest monitoring station representative of meteorological conditions at the European Habitat Sites. Both the European Habitat Sites and the Monks Wood meteorological monitoring station will be influenced by the effects of inland meteorology over flat-lying topography. A wind rose for the site for

2023 is provided in Figure A2-5. 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.

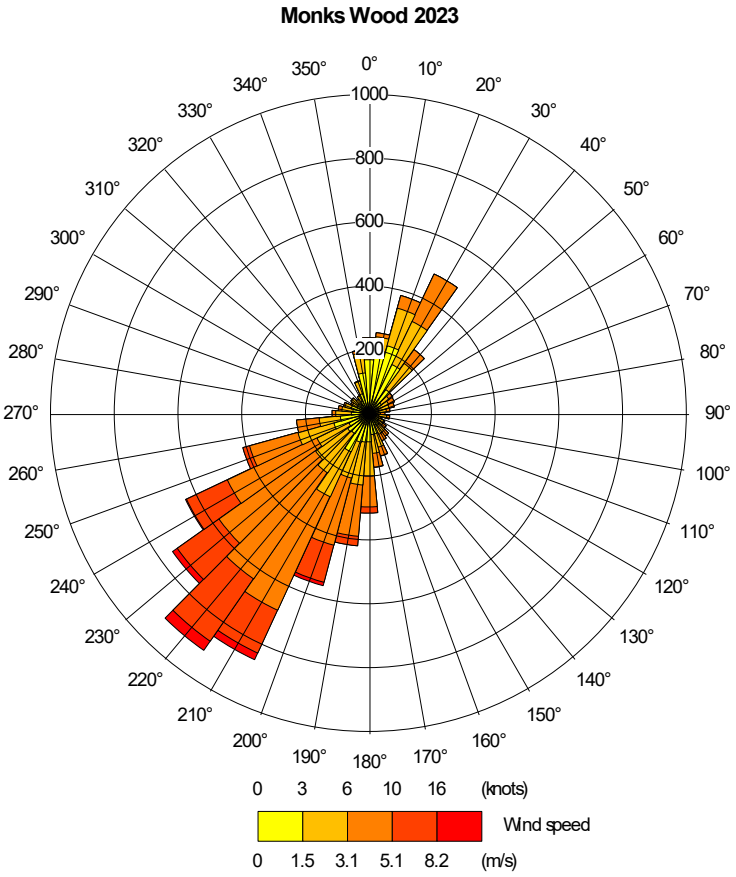


Figure A2-5: Wind Rose

Alt text: A radial bar plot showing the frequency, direction, and speeds of winds measures at the monks wood meteorological station in 2023. The direction of the wind is depicted by the direction of the bars on the plot which align to the degrees from which the wind blew. The speed of the recorded wind is depicted by a colour scale. The frequency of the recorded direction and speed is depicted by the length of the plotted bars. The wind rose depicts a main collection of bars plotted around the 170 degrees to 260 degrees, with the length (or frequency) peaking at 220 degrees. A secondary and smaller collection of bars, centred around the 30 degree mark, is also present.

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 nitrogen dioxide concentrations. To account for this, it is preferable to adjust the model against local measurements. The model verification study was completed as part of work AQC has previously delivered in the area. The model was run to predict annual mean nitrogen dioxide concentrations during 2023 at the Earith 1 (Huntingdonshire District), and PFH (Huntingdonshire District) monitoring sites. These sites were selected because they are very close to the Portholme and Ouse Washes sites. Concentrations were modelled at the heights of the monitors.

Nitrogen Dioxide

A2.6 Most nitrogen dioxide (NO_2) 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 (NOx = NO + NO_2). The model output of road-NOx (that is, the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentration and the predicted background NO_2 concentration using the NOx from NO_2 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-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations. The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator (Defra, 2026a).

Ouse Washes SAC/SPA/Ramsar Site

A2.8 The road network and verification site for the Ouse Washes verification are shown in Figure A2-6.

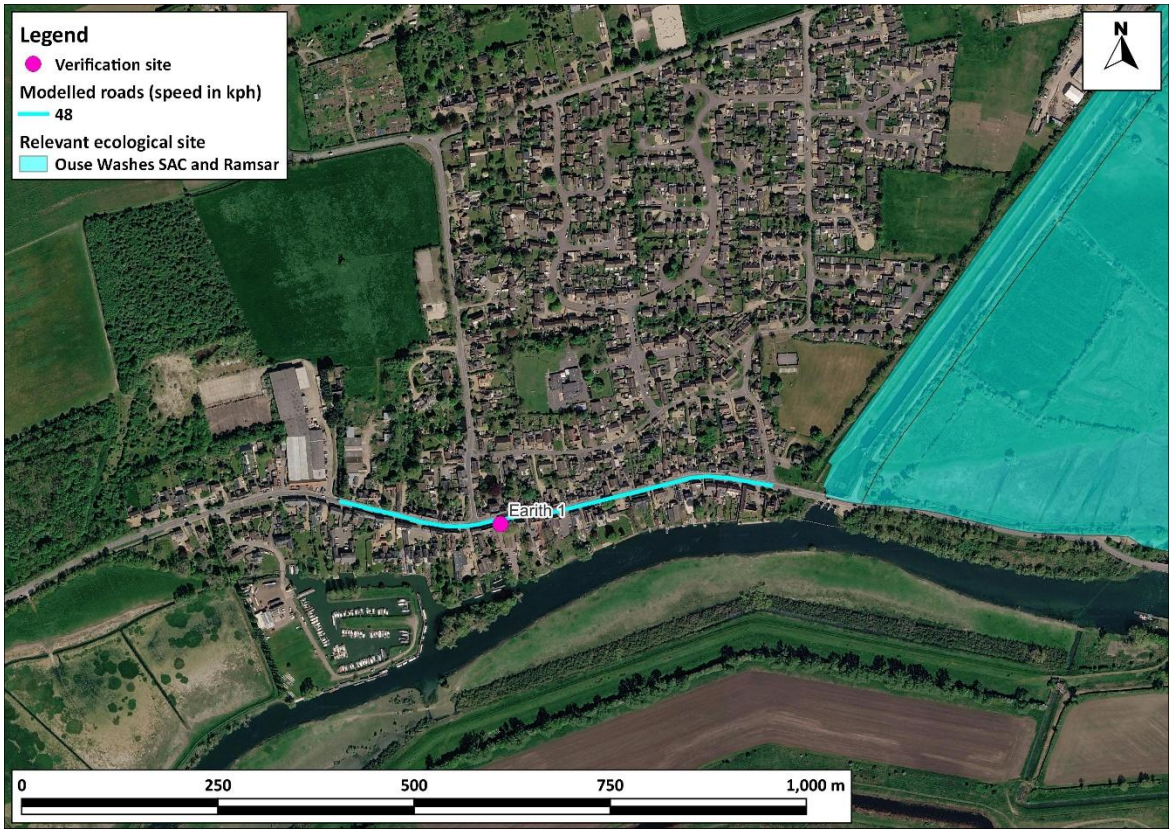


Figure A2-6: Modelled Road Network & Speed - Ouse Washes Verification

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

Alt text: a map showing the modelled road network adjacent to the Earith 1 air quality monitor, with a single road modelled to the north of the monitor. The modelled road is coloured to indicate it has been modelled at a speed of 48 kilometres per hour. The Ouse Washes is also depicted to the east.

A2.9 The data used to calculate the adjustment factor are provided below:

- Measured NO_2 : 10.2 microgrammes per cubic metre
- Background NO_2 : 6.72 microgrammes per cubic metre
- 'Measured' road-NOx (using NOx from NO_2 calculator): 7.14 microgrammes per cubic metre
- Modelled road-NOx = 7.64 microgrammes per cubic metre
- Road-NOx adjustment factor: 7.14/7.64 = **0.934**[6]

[6] Based on un-rounded values.

A2.10 As the factor is less than one, no adjustment has been applied to the model. This will provide a worst-case assessment.

Portholme SAC

A2.11 The road network and verification site for the Portholme SAC are shown in Figure A2-7.

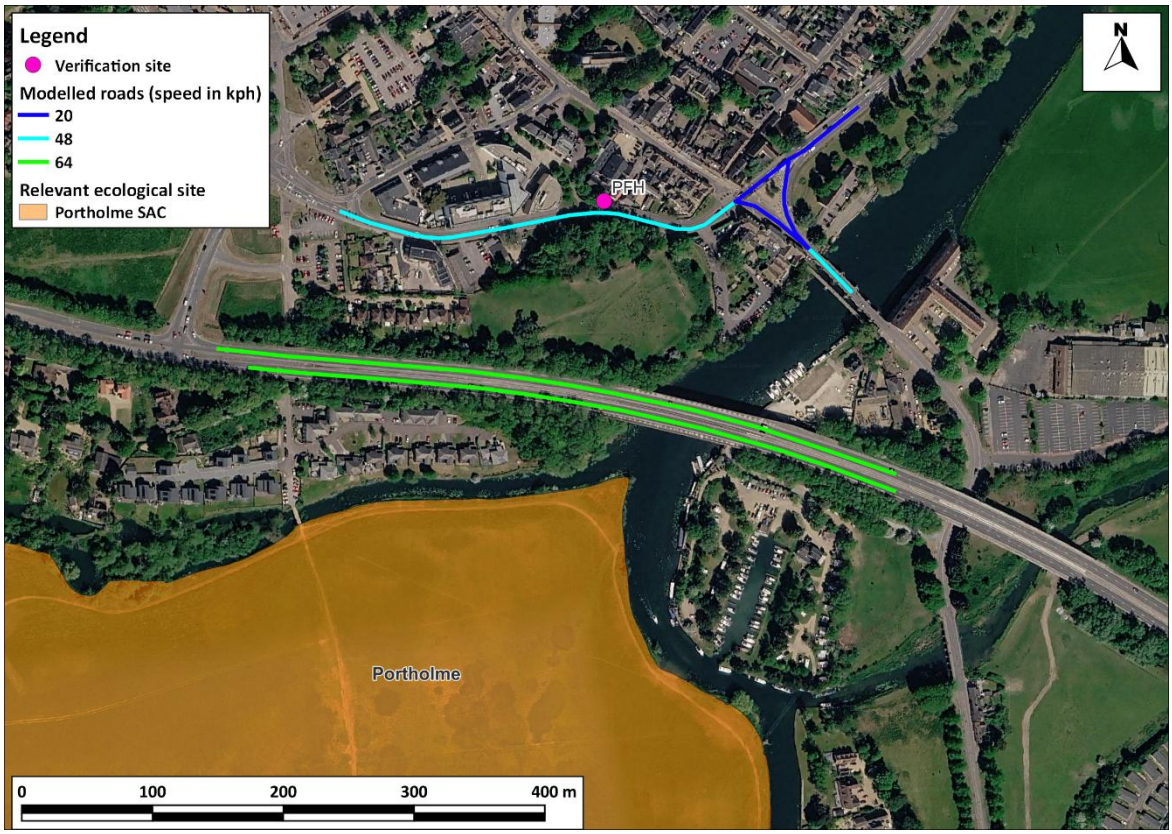


Figure A2-7: Modelled Road Network & Speed – Portholme SAC Verification

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

Alt text: a map showing the modelled road network adjacent to the PFH air quality monitor, with a modelled road network and junction located to the south and east of the monitor. The modelled road is coloured to indicate it has been modelled at a speed of 20, 48, and 64 kilometres per hour. The Portholme SAC is also depicted to the south past the modelled roads.

A2.12 The data used to calculate the adjustment factor are provided below:

- Measured NO_2 : 25.0 micrograms per cubic metre
- Background NO_2 : 10.3 micrograms per cubic metre

- 'Measured' road-NOx (using NOx from NO_2 calculator): 33.9 microgrammes per cubic metre
- Modelled road-NOx = 8.54 microgrammes per cubic metre
- Road-NOx adjustment factor: 33.9/8.54 = **3.970**[7]

A2.13 The factor implies that the unadjusted model is under-predicting the road-NOx contribution. Experience elsewhere has shown that this type of modelling is much more likely to under-predict road-NOx alongside slow-flowing 'urban' roads (such as Castle Moat Road, which runs alongside monitor PFH) than beside more open roads (such as the A1307, which runs past the SAC). An adjustment factor of 3.970 has been applied to emissions from all the roads around Portholme SAC, and this is expected to have over-predicted the impacts, making the assessment worst-case. In practice, because the A1307 is a wide and open road, it is most likely that not adjusting the results (as has been done for Ouse Washes) would provide the most accurate results. However, given the presence of the PFH monitoring site, an uplift has been applied.

Devil's Dyke SAC

A2.14 There are no existing air quality monitors close to Devil's Dyke; the closest monitors are in Newmaket, along relatively enclosed sections of road which do not represent the A14 and A1304 which pass alongside the SAC. On the basis that both of these 'A' roads are relatively wide open, and based on professional experience of modelling similar types of roads elsewhere, the same approach has been taken as for Ouse Washes; that is, the model results have not been adjusted.

NH_3

A2.15 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.

[7] Based on un-rounded values.

Post-processing

A2.16 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO_2, has been processed through the NOx to NO_2 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_2 based on the adjusted road-NOx and the background NO_2.

Deposition Rates

A2.17 Deposition of NO_2 has not been included within the dispersion model because this is calculated from NOx outside of the model. Instead, deposition has been calculated from the predicted ambient concentrations using the deposition velocities set out in Table A2-3. Deposition velocities refer to a height above ground, typically 1 or 2 metres, although in practice the precise height makes little difference and here they have been applied to concentrations predicted at a height of 0 metres above ground. The velocities are applied simply by multiplying a concentration (microgrammes per cubic metre) by the velocity (metres per second) to predict a deposition flux (microgramme per square metre per second) and then scaling by time and area to represent kilogram per hectare per year of the nitrogen component of the molecule. The deposition velocity for NH_3 has been included within the dispersion model to allow for the calculation of depletion. NH_3 deposits much more rapidly than NO_2, meaning that while it is important to include depletion for NH_3, it is relatively trivial for NO_2.

Table A2-3: Deposition Velocities Used in This Assessment

Pollutant	Deposition Velocity (metres per second)	Reference
Nitrogen Dioxide	0.0015 (Grassland); 0.003 (Forest)	AQTAG06 (AQTAG, 2011)
NH_3	0.02 (Grassland); 0.03 (Forest)	AQTAG06 (AQTAG, 2011)

A2.18 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, nitrogen dioxide and NH_3 is not significant within a short range. It has thus not been included.

A2.19 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_3 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 grammes) of the deposited element, taking account of both its atomic mass and its valency. For example, the acidifying potential (in terms of hydrogen ion equivalent) of both ammonium (NH_4^+) and nitrate (NO_3^-) is 1/14 times the deposited mass in grammes (with 14 being the atomic mass of nitrogen), while for sulphate (SO_4^{2-}) it is 2/32 (with 32 being the atomic mass of sulphur). 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 (kilogram deposition to kilogram equivalent)
N (from deposited NO_2, NH_3)	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 2046) which also continues at the same rate afterwards[8]. This calculation has focused on the transect within each site with the highest PC in-combination with other projects and plans.

A3.2 As explained in Paragraph 3.10, background deposition has been assumed to change between 2023 and 2046 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 2046 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 Base and the 2046 Zero Growth scenario, and between 2023 Base and the 2046 With Local Plan scenario. These improvements are shown in Table A3-1 to Table A3-3, expressed both as the 23-year total and as the change per year. For example, deposition at 7 metres from the road along the South Transect in the Devil's Dyke SAC site is expected to be 1.52 kilograms of nitrogen per hectare per year lower in 2046 than in 2023 if there is no increase in traffic over this 23-year period. With the Local Plan and all other traffic growth, deposition will be 0.63 kilograms of nitrogen per hectare per year lower than in 2023.

[8] 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.

Table A3-1: Reduction in Nitrogen Deposition between 2023 and 2046 at Devil's Dyke (South Transect), in kilograms of nitrogen per hectare per year[a]

Dist from Road (metres)	Change from 2023 Base to '2046 Zero Growth' - over 23 years	Change from 2023 Base to '2046 Zero Growth' - per year	Change from 2023 to '2046 With Local Plan' - over 23 years	Change from 2023 to '2046 With Local Plan' - per year
7	-1.52	-0.07	-0.63	-0.03
9	-1.40	-0.06	-0.61	-0.03
17	-1.08	-0.05	-0.56	-0.02
33	-0.79	-0.03	-0.50	-0.02
65	-0.57	-0.02	-0.43	-0.02
129	-0.41	-0.02	-0.37	-0.02
200	-0.35	-0.02	-0.33	-0.01

[a] The majority of values are shown as negatives since they are reductions over time.

Table A3-2: Reduction in Nitrogen Deposition between 2023 and 2046 at Ouse Washes SAC/SPA/Ramsar (Transect D), in kilograms of nitrogen per hectare per year[a]

Dist from Road (metres)	Change from 2023 Base to '2046 Zero Growth' - over 23 years	Change from 2023 Base to '2046 Zero Growth' - per year	Change from 2023 to '2046 With Local Plan' - over 23 years	Change from 2023 to '2046 With Local Plan' - per year
2	-2.68	-0.12	-0.48	-0.02
3	-2.52	-0.11	-0.48	-0.02
5	-2.27	-0.10	-0.49	-0.02
9	-1.92	-0.08	-0.50	-0.02
17	-1.52	-0.07	-0.51	-0.02
33	-1.14	-0.05	-0.52	-0.02
65	-0.81	-0.04	-0.49	-0.02
129	-0.55	-0.02	-0.41	-0.02

[a] The majority of values are shown as negatives since they are reductions over time.

Table A3-3: Reduction in Nitrogen Deposition between 2023 and 2046 at Portholme SAC (Transect A), in kilograms of nitrogen per hectare per year[a]

Dist from Road (metres)	Change from 2023 Base to '2046 Zero Growth' - over 23 years	Change from 2023 Base to '2046 Zero Growth' - per year	Change from 2023 to '2046 With Local Plan' - over 23 years	Change from 2023 to '2046 With Local Plan' - per year
44	-2.67	-0.12	-2.13	-0.09
65	-2.31	-0.10	-1.94	-0.08
129	-1.77	-0.08	-1.59	-0.07
200	-1.49	-0.06	-1.39	-0.06

[a] 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 2046 Zero Growth scenario. These results are shown in Table A3-4 to Table A3-6. At the South Transect in the Devil's Dyke SAC site, the Local Plan alone will retard the improvements by between 0.02 and 0.89 years, while the Local Plan in-combination, will retard the improvements by between 1.16 and 13.46 years. At Transect D in the Ouse Washes SAC/SPA/Ramsar site, the Local Plan alone will retard the improvements by between 0.14 and 2.19 years, while the Local Plan in-combination, will retard the improvements by between 5.75 and 18.86 years. At Transect A in the Portholme SAC, the Local Plan alone will retard the improvements by between 0.10 and 0.53 years, while the Local Plan in-combination, will retard the improvements by between 1.54 and 4.58 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 2046, 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 NOx or NH_3. This means that the years of delay statistics are likely to have been significantly overpredicted.

Table A3-4: Years Delay to Reductions in Nitrogen Deposition at Devil's Dyke (South Transect), in kilograms of nitrogen per hectare per year

Dist from Road (metres)	Local Plan Alone - PC (kilograms of nitrogen per hectare per year)	Local Plan Alone - Years Delay[a]	Local Plan In Combination - PC (kilograms of nitrogen per hectare per year)	Local Plan In Combination - Years Delay[a]
7	0.14	2.17	0.89	13.46
9	0.13	2.08	0.79	12.93
17	0.09	1.82	0.52	11.11
33	0.05	1.43	0.30	8.57
65	0.02	0.94	0.14	5.49
129	0.01	0.40	0.05	2.52
200	0.00	0.18	0.02	1.16

[a] that is, the PC divided by the 'per year' reductions to the Future Zero Growth scenario.

Table A3-5: Years Delay to Reductions in Nitrogen Deposition at Ouse Washes SAC/SPA/Ramsar (Transect D), in kilograms of nitrogen per hectare per year

Dist from Road (metres)	Local Plan Alone - PC (kilograms of nitrogen per hectare per year)	Local Plan Alone - Years Delay[a]	Local Plan In Combination - PC (kilograms of nitrogen per hectare per year)	Local Plan In Combination - Years Delay[a]
2	0.03	0.22	2.19	18.86
3	0.02	0.21	2.04	18.60
5	0.02	0.19	1.78	18.05
9	0.02	0.18	1.42	17.04
17	0.01	0.19	1.01	15.24
33	0.01	0.16	0.61	12.45
65	0.00	0.10	0.32	9.04

Dist from Road (metres)	Local Plan Alone - PC (kilograms of nitrogen per hectare per year)	Local Plan Alone - Years Delay[a]	Local Plan In Combination - PC (kilograms of nitrogen per hectare per year)	Local Plan In Combination - Years Delay[a]
129	0.00	0.06	0.14	5.75

[a] that is, the PC divided by the 'per year' reductions to the Future Zero Growth scenario.

Table A3-6: Years Delay to Reductions in Nitrogen Deposition at Portholme SAC (Transect A), in kilograms of nitrogen per hectare per year

Dist from Road (metres)	Local Plan Alone - PC (kilograms of nitrogen per hectare per year)	Local Plan Alone - Years Delay[a]	Local Plan In Combination - PC (kilograms of nitrogen per hectare per year)	Local Plan In Combination - Years Delay[a]
44	0.14	1.20	0.53	4.58
65	0.10	0.97	0.37	3.70
129	0.05	0.59	0.17	2.25
200	0.03	0.40	0.10	1.54

[a] that is, the PC divided by the 'per year' reductions to the Future Zero Growth scenario.



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