Ashdown Forest SAC

Air Quality Monitoring and Modelling

Volume 1

August 2018



Experts in air quality management & assessment

Document Control

Client	Wealden District Council	**Principal Contact**	[redacted]

Job Number	J2008

Report Prepared By:	[redacted]

Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J2008/9/F1	2 August 2018	Final	[redacted]

This report has been prepared by Air Quality Consultants Ltd on behalf of the Client, taking into account the agreed scope of works. Unless otherwise agreed, this document and all other Intellectual Property Rights remain the property of Air Quality Consultants Ltd.

In preparing this report, Air Quality Consultants Ltd has exercised all reasonable skill and care, taking into account the objectives and the agreed scope of works. Air Quality Consultants Ltd does not accept any liability in negligence for any matters arising outside of the agreed scope of works. The Company operates a formal Quality Management System, which is certified to ISO 9001:2008, and a formal Environmental Management System, certified to ISO 14001:2015. QMF 08.

When issued in electronic format, Air Quality Consultants Ltd does not accept any responsibility for any unauthorised changes made by others.

When printed by Air Quality Consultants Ltd, this report will be on Evolve Office, 100% Recycled paper.

Executive Summary

This report identifies the existing air quality conditions across the Ashdown Forest Special Area of Conservation (SAC). It also predicts the effects that changes in traffic flows, in particular those changes associated with the Wealden Local Plan on roads within and close to the SAC, will have on air quality conditions within the SAC. Matters related to ecological effects are not considered within this current report. The outcomes of this work will assist Wealden District Council in meeting its Habitats Regulations duty as relevant to plan making.

A number of different pollutants have been measured as part of this study. These measurements have been used to quantify levels of the following pollutants; which are those for which critical levels (for airborne concentrations) and critical loads (for rates of deposition to the ground) have been set, internationally, to protect habitats such as those believed to be present within the SAC:

- nitrogen oxides (NOx) (assessed both annual mean and maximum 24-hour mean concentrations);
- ammonia (NH_3) (assessed as an annual mean concentration); and
- nutrient nitrogen deposition (assessed as an annual mean deposition flux).

The study has used an extensive network of air quality monitors located across the Ashdown Forest SAC. The results from these monitors show that the critical levels for annual mean NOx and NH_3 concentrations are currently being exceeded close to roads, but being achieved at locations set well away from the roads. Maximum 24-hour mean NOx concentrations have only been measured at one monitoring site, and the results show that this critical level has not been exceeded at this location.

Nitrogen deposition fluxes have not been measured directly, and so it was necessary to accompany the measurements with numerical modelling to calculate nitrogen deposition to the SAC. Numerical modelling of concentrations was also carried out. It was not possible to rely solely on the air quality monitoring because concentrations can vary appreciably over relatively short distances (i.e. between one monitoring site and another). The model has been calibrated using the measurements.

The model results show that the annual mean critical levels for both NH_3 and NOx are being exceeded close to most of the roads across the SAC. The model results also show that the critical level for 24-hour mean NOx concentrations is being exceeded across much of the SAC. Furthermore, the critical load for nitrogen deposition is predicted to be exceeded across almost the entire SAC; with exceedences predicted to all areas which currently contain heath.

An important requirement of this study has been to predict the effects that traffic generated by the Wealden Local Plan on roads within and close to Ashdown Forest, will have on air quality within the SAC. Traffic growth assumptions have been taken from the Ashdown Forest

Transport Model. These cover changes associated with the Local Plan, and also the changes caused by other anticipated traffic growth which is not caused by the Local Plan.

Over the Local Plan period (i.e. to 2028), the UK Government predicts that the adoption of a range of new technologies, as well as national and international policies and plans, will cause emissions per vehicle, as well as total emissions from many other sectors, to change. It is very difficult to predict, with any certainty, the effect that these changes will have, and so three alternative emissions models have been considered: emissions models 'A', 'B', and 'C'. Emissions model 'A' represents the existing situation with respect to both emissions per vehicle and emissions released outside of the study area (such that, when applied to the future, emissions model A assumes that there will be no improvements over time). Emissions models 'B' and 'C' represent the effects of partial and full reductions of vehicle (and other sector) emissions as predicted by Defra.

The nitrogen deposition model is particularly sensitive to diurnal variations in the rate at which nitrogen dioxide is absorbed through the stomata of plants. In order to account of uncertainty in these diurnal patterns, results are presented for two separate deposition models (the Environment Agency 'EA' method, and the 'AQC' method).

The results are summarised, very briefly, in Tables Ex.1, Ex.2, and Ex.3, for the emissions models A, B, and C respectively. The columns describing 'Existing Traffic Volumes' in Table Ex.1 (emissions model A) describe the existing situation, while the other columns in Table Ex.1 describe the situation if traffic volumes increase, but there is no concurrent change in emissions from new technology and policies. Tables Ex.2 and Ex.3 show the picture if these changes in emissions from new technology and polices do happen (but to varying extents).

Tables Ex.1, Ex.2, and Ex.3 show that all of the critical levels, and the critical load, will be exceeded within the SAC in all emissions models and all traffic growth scenarios. The scale of these exceedences – in terms of both the amount by which the critical level or critical load is breeched, and also the area predicted to experience an exceedence – does, however, change. Traffic growth which is not caused by the Local Plan is predicted to increase the maximum concentrations and fluxes and to increase the area of the SAC exceeding the critical levels and critical loads. Traffic growth caused by the Local Plan will then increase concentrations, and the affected areas, further.

It is also possible to compare the predictions across Table Ex.1, Ex.2, and Ex.3. This shows the changes that could be expected if traffic volumes increase, while emissions from road traffic (and other sectors) fall. In this case, air quality conditions in 2028 with the plan will be better than they are at present[1]; albeit not sufficiently improved to allow the critical levels and loads to be achieved, and less improved than would be the case without the Local Plan.

[1] i.e. comparing the results in Table Ex.2 or Ex.3 for '2028 With Plan' against those in Table Ex.1 for 'Existing Traffic Volumes'.

This report does not seek to determine whether these predicted changes in concentrations and fluxes might give rise to a significant effect on the habitats that make up the SAC. A Habitats Regulations Assessment for the Local Plan is being prepared separately.

Table Ex.1 Maximum Predicted Concentrations and Fluxes Across the SAC Under Emissions Scenario A. Also Shown, in Parentheses, are the Total Areas Predicted to Exceed the Critical Level (CL) or Critical Load (CL)

Pollutant	Habitat	Existing Traffic Volumes	2028 No WDC-growth	2028 With Plan	Critical Level / Load
Annual Mean NOx – µg/m^3 (ha >CL)	**Whole SAC**	89.6 (4.6)	104.2 (6.8)	112.4 (8.2)	**30**
	Heath [a]	63.4 (0.4)	75.6 (0.9)	83.6 (1.3)	
24-hour Mean NOx– µg/m^3 (ha >CL)	**Whole SAC**	426 (all)	473 (all)	498 (all)	**75**
	Heath [a]	334 (all)	378 (all)	406 (all)	
Annual Mean NH_3– µg/m^3 (ha >CL)	**Whole SAC**	2.2 (3.1)	2.5 (4.3)	2.7 (4.9)	**1**
	Heath [a]	1.7 (0.1)	1.9 (0.3)	2.1 (0.4)	
Nitrogen Deposition (EA Method) kg-N/ha/yr (ha > CL)	**Whole SAC**	66.5 (2,658)	73.4 (2,658)	77.5 (2,658)	**10**
	Heath [a]	31.7 (all)	35.8 (all)	38.6 (all)	
Nitrogen Deposition (AQC Method) kg-N/ha/yr (ha > CL)	**Whole SAC**	55.9 (2,666)	60.4 (2,667)	63.1 (2,667)	**10**
	Heath [a]	22.7 (all)	24.5 (all)	25.7 (all)	

[a] i.e. those areas of the SAC which are currently heath.

Table Ex.2 Maximum Predicted Concentrations and Fluxes Across the SAC Under Emissions Scenario B. Also Showing, in Parentheses, the Total Areas Predicted to Exceed the Critical Level or Critical Load (CL)

Pollutant	Habitat	Existing Traffic Volumes	2028 No WDC-growth	2028 With Plan	Critical Level / Load
Annual Mean NOx – µg/m^3 (ha >CL)	**Whole SAC**	43.7 (0.1)	50.8 (0.6)	54.4 (1.1)	**30**
	Heath [a]	30.6 (0.0004)	37.5 (0.0004)	42.7 (0.004)	
24-hour Mean NOx– µg/m^3 (ha >CL)	**Whole SAC**	254 (80)	284 (114)	299 (132)	**75**
	Heath [a]	193 (16)	226 (24)	249 (30)	
Annual Mean NH_3– µg/m^3 (ha >CL)	**Whole SAC**	na [b]	na [b]	na [b]	**1**
	Heath [a]	na [b]	na [b]	na [b]	
Nitrogen Deposition (EA Method) kg-N/ha/yr (ha > CL)	**Whole SAC**	50.6 (2,594)	55.5 (2,594)	58.7 (2,594)	**10**
	Heath [a]	23.4 (all)	25.8 (all)	27.7 (all)	
Nitrogen Deposition (AQC Method) kg-N/ha/yr (ha > CL)	**Whole SAC**	46.7 (2,594)	50.6 (2,595)	53 (2,595)	**10**
	Heath [a]	19.3 (all)	20.8 (all)	21.8 (all)	

[a] i.e. those areas of the SAC which are currently heath.

[b] it has not been possible to predict traffic-related NH_3 emissions using alternative emissions models, and so the results for 'model A' (in Table Ex.1) should be used.

Table Ex.2 Maximum Predicted Concentrations and Fluxes Across the SAC Under Emissions Scenario C. Also Showing, in Parentheses, the Total Areas Predicted to Exceed the Critical Level or Critical Load (CL)

Pollutant	Habitat	Existing Traffic Volumes	2028 No WDC-growth	2028 With Plan	Critical Level / Load
Annual Mean NOx – µg/m^3 (ha >CL)	**Whole SAC**	32.2 (0.005)	37.4 (0.02)	40.8 (0.1)	**30**
	Heath [a]	23.5 (0)	28.2 (0)	31.7 (0.0004)	
24-hour Mean NOx– µg/m^3 (ha >CL)	**Whole SAC**	201 (36)	225 (55)	241 (65)	**75**
	Heath [a]	156 (7)	180 (11)	198 (13)	
Annual Mean NH_3– µg/m^3 (ha >CL)	**Whole SAC**	na [b]	na [b]	na [b]	**1**
	Heath [a]	na [b]	na [b]	na [b]	
Nitrogen Deposition (EA Method) kg-N/ha/yr (ha > CL)	**Whole SAC**	47.3 (2,594)	51.4 (2,594)	54 (2,594)	**10**
	Heath [a]	21.5 (all)	23.5 (all)	24.9 (all)	
Nitrogen Deposition (AQC Method) kg-N/ha/yr (ha > CL)	**Whole SAC**	44.4 (2,594)	48.1 (2,594)	50.2 (2,594)	**10**
	Heath [a]	18.4 (all)	19.8 (all)	20.7 (all)	

[a] i.e. those areas of the SAC which are currently heath.

[b] it has not been possible to predict traffic-related NH_3 emissions using alternative emissions models, and so the results for 'model A' (in Table Ex.1) should be used.

Contents

1 Introduction 45
2 Published Critical Levels and Critical Loads Relevant to Ashdown Forest ... 48
3 Historic Information on Air Pollution around Ashdown Forest 50
4 Monitoring Methodology 60
5 Modelling Methodology 74
6 Scenario Definition 156
7 Limitations and Uncertainty 162
8 Measured Concentrations and Traffic Volumes 170
9 Existing Baseline Model Results 185
10 2028 No-Growth Model Results 258
11 2028 No WDC-Growth Model Results 287
12 2028 With Plan Model Results 331
13 Changes Caused by Local Plan Alone 375
14 Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth 442
15 Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth and National and International Emissions Projections 509
16 Summary and Conclusions 539
17 References 553

List of Tables and Figures

Table 2.1: Vegetation and Ecosystem Critical Levels [a] 48
Table 2.2: Vegetation and Ecosystem Critical Loads 49
Figure 3.1: Measured Annual Mean NO_2 Concentrations at Lullington Heath over 27 Years ($\mu g/m^3$) 51
Figure 3.2: Measured Annual Mean NH_3 Concentrations at Lullington Heath over 21 Years ($\mu g/m^3$) 52
Figure 3.3: NH_4^+ in Precipitation Measured at Barcombe Mills over 30 Years (blue line) and 24-month rolling average (black line) (mg-N/litre) 53

Figure 3.4: NO_3^- in Precipitation Measured at Barcombe Mills from 1986-2016 (blue line) and 24-month rolling average (black line) (mg-N/litre)..... 54

Figure 3.5: Gaseous Nitric Acid Measured at Barcombe Mills from 2000-2016 (blue line) and 24-month rolling average (black line) (µg/m^3)..... 55

Figure 3.6: UK Total NH_3 Emissions: 1980 – 2016 (Defra, 2018b) 56

Figure 3.7: UK Total NOx Emissions: 1970 – 2016 (Defra, 2018b) 58

Figure 3.8: Predicted Historic Nitrogen Deposition to the UK during the 20th Century (After Fowler *et al*. (2004)) Blue line shows oxidised nitrogen, red line shows reduced nitrogen, and green line shows total deposition..... 59

Figure 4.1: Automatic Monitor Enclosure at Kingstanding 61

Figure 4.2: Diffusion Tube Monitor (Site T43)..... 63

Table 4.1: Summary of Diffusion Tube Data Capture 64

Figure 4.3: DELTA Sampler, Wind Generator, Gas Meter, and Solar Panel (Site T71)66

Table 4.2: Percentage Data Capture for Gases by the Delta Samplers over the 19 Month Period between November 14 and June 2016 67

Figure 4.4: Diagram of an ALPHA sampler..... 68

Figure 4.5: Example of an ALPHA Site..... 69

Table 4.3: Percentage Data Capture by the Alpha Samplers over 19 Month Period between November 14 and June 2016..... 70

Figure 4.6: Transect Locations used for Ecological Surveys 71

Table 4.4: Colocation of Ecological and Air Quality Monitoring Sites..... 71

Figure 4.7: ATC Control Box and Loop..... 72

Table 4.5: Percentage Data Capture for the ATCs 73

Figure 5.1: Roads Included in the Ashdown Forest Transport Model (figure prepared by gta civils Ltd. Those roads with boxed numbers – with the exception of link 47 – are those included in the Transport Model)..... 75

Figure 5.2: Local Background NOx to NO_2 Relationship..... 78

Table 5.1: Annual Mean Modelled Background Concentrations of NO_2, NOx, NH_3, HNO_3, NH_4^+, NO_3^- and NO_2^- as Used in the Modelling [a]..... 79

Table 5.2: Assumed Reduction in Non-Traffic Background NOx and NO_2 Concentrations from Model A to Models B and C 80

Table 5.3: Assumed Reduction in HNO_3 and particulate NO_3^- and NO_2^- from Model A to Models B and C 81

Table 5.4: Ratio of Period Average to Annual Average Concentrations at Four AURN Sites 83

Table 5.5: Assumed Ratios of Period Average to Annual Average Concentrations NH_3 Concentrations..... 85

Figure 5.3: Modelled Roads within the SAC 86

Table 5.6: Existing Baseline Flows used in the Model for Roads Inside SAC 86

Table 5.7: Additional Predicted Traffic for 2028 (Change in Vehicles from Existing Baseline in Vehicles per Day) 89

Figure 5.4: Measured NH_3 vs Predicted Road-NOx..... 95

Figure 5.5: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 1100

Figure 5.6: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 1100

Figure 5.7: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 1101

Table 5.8: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 1 101

Figure 5.8: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 2102

Figure 5.9: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 2102

Figure 5.10: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 2103

Table 5.9: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 2 103

Figure 5.11: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 3104

Figure 5.12: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 3104

Figure 5.13: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 3105

Table 5.10: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 3 105

Figure 5.14: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 4106

Figure 5.15: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 4106

Figure 5.16: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 4107

Table 5.11: Modelled vs Measured Road-NOx, Link Sets 4, 5, and 6, Iteration 4 ...107

Figure 5.17: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 5108

Figure 5.18: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 5108

Figure 5.19: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 5109

Table 5.12: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 5 109

Figure 5.20: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 6110

Figure 5.21: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 6110

Figure 5.22: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 6111

Table 5.13: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 6 111

Figure 5.23: Modelled vs Measured Total Annual Mean NOx Concentrations following All Adjustments 112

Table 5.14 Summary of Model Performance for Annual Mean NOx Concentrations112

Figure 5.24: Modelled vs Measured Total Annual Mean NO_2 Concentrations following All Adjustments 114

Table 5.15 Summary of Model Performance for Annual Mean NO_2 Concentrations114

Figure 5.25: Measured vs Predicted Annual Mean NH_3.....115

Table 5.16 Summary of Model Performance for Annual Mean NH_3 Concentrations115

Figure 5.26: Lines of Best-fit for Period-specific NOx to NO_2 Relationships at Eight Automatic Monitoring Sites (four periods) as a Function of the Total NOx Concentration117

Figure 5.27: Lines of Best-fit for Period-specific NOx to NO_2 Relationships at Eight Automatic Monitoring Sites (ten periods) as a Function of the Total NOx Concentration118

Figure 5.28: Period-specific Uplifts Applied to NO_2 Concentrations Calculated using Defra's NOx to NO_2 Calculator (four periods) 119

Figure 5.29: Period-specific Uplifts Applied to NO_2 Concentrations Calculated using Defra's NOx to NO_2 Calculator (ten periods) 120

Table 5.17: Fitted Adjustment Factors Applied to Modelled NO_2 Concentrations at the Ecological Transects.....122

Figure 5.30: Measured vs Predicted 2-Year Average NO_2 Concentrations along Transect 1: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models. 123

Figure 5.31: Natural Log of Measured vs Predicted 2-Year Average NO_2 Concentrations along Transect 2: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models124

Figure 5.32: Measured vs Predicted 2-Year Average NO_2 Concentrations along Transect 3: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models. 125

Table 5.18: Fitted Adjustment Factors Applied to Modelled NH_3 Concentrations at the Ecological Transects.....127

Figure 5.33: Measured vs Predicted 2-Year Average NH_3 Concentrations along Transect 1: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models. 128

Figure 5.34: Measured vs Predicted 2-Year Average NH_3 Concentrations along Transect 2: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models. 129

Figure 5.35: Measured vs Predicted 2-Year Average NH_3 Concentrations along Transect 3 130

Table 5.19: AURN Sites used to Determine 24-hour Mean to Annual Mean NOx Relationship 131

Figure 5.36: Natural Logarithm of Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years.....133

Figure 5.37: Natural Logarithm of Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years, by Site Type – Also Showing the Period Mean at the Kingstanding Site.....134

Figure 5.38: Natural Logarithm of Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years, Excluding Industrial Sites 135

Figure 5.39: Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years, also Showing Kingstanding Site and Best-fit Curve. The Best-fit Curve is that shown in Figure 5.37, which is on a logarithmic scale. It can be described as: $Exp(2.7924 \times Ln(X)^{0.5149})$.....136

Table 5.20: Values of Stomatal Resistance ($r_{stomata}$) (s/m) Taken from the Environment Agency (2008) 140

Table 5.21: Values of Surface Resistance and Soil Resistance ($r_{suface} + r_{soil}$) Taken from the Environment Agency (2008).....141

Table 5.22: Assumed Canopy Heights and Categories from Table 5.20 and Table 5.21 142

Table 5.23: Particle Deposition Velocities (after Marner and Harrison (2004)) (cm/s)143

Figure 5.40: Mean Particle Size Distribution (after Marner and Harrison (2004)) 143

Table 5.24: Constants used to Calculate $r_c(NO_2)$, taken from Smith *et al* (2000) 147

Table 5.25: Assumed Equivalence of Land Use Categories 147

Table 5.26: Values of Rocs and GPP taken from Wehr *et al* (2017) 149

Figure 5.41: Frequency of Summer Daytime Hourly Values of Vd NO_2 to Heath 151

Figure 5.42: Hourly Values of V_d (NO_2) to Heath During Summer Daytime, separated into Five Subsets.....151

Figure 5.43: Hourly Values of V_d (NO_2) to Heath During Winter Daytime, separated into Three Subsets.....152

Figure 5.44: Hourly Values of V_d (NO_2) to Other Land Cover Types During Summer Daytime separated into the Five Subsets defined for Heath.....153

Table 5.27: Number of Hours in Each Meteorological Dataset used in the AQC Deposition Method 154

Table 6.1: Summary of Dispersion and Deposition Model Scenarios.....158

Table 6.2: Formulation of Comparisons which Show the Changes Caused by the Local Plan Alone 159

Table 6.3: Formulation of Comparisons which Show the Changes Caused by the Local Plan In Combination with Other Predicted Traffic Growth.....159

Table 6.4: Formulation of Comparisons which Show the Changes Caused by the Local Plan In Combination with Other Predicted Traffic Growth and International Emissions Projections.....160

Figure 8.1: 1-hour Mean Nitrogen Oxides Concentrations at Kingstanding between October 2014 and August 2016.....171

Figure 8.2: 1-hour Mean Nitrogen Dioxide Concentrations at Kingstanding between October 2014 and August 2016.....171

Figure 8.3: 1-hour Mean NHx Concentrations at Kingstanding between October 2014 and August 2016 172

Figure 8.4: Hourly-mean NOx / Average Daily-mean NO_2 between October 2014 and August 2016 (GMT) 172

Figure 8.5: Hourly-mean NO_2 / Average Daily-mean NO_2 between October 2014 and August 2016 (GMT) 173

Figure 8.6: Ammonia Hourly-mean NH_3 / Average Daily-mean NH_3 between October 2014 and August 2016 (GMT) 173

Table 8.1: Average Measured Concentrations at the Automatic Monitor between 29th October 2014 and 1st August 2016 ($\mu g/m^3$).....173

Table 8.2: Two-year Average NO_2 Concentrations at the Diffusion Tube Sites ($\mu g/m^3$) as well as Distance (D) from the Nearest Road (m) [a] 175

Table 8.3: Two-year Average NO_x Concentrations at the Diffusion Tube Sites ($\mu g/m^3$) as well as Distance (D) from the Nearest Road (m)[a].....176

Figure 8.7: Two-year Mean Measured NO_2 Concentration vs Distance from Roads along the Four Transects 177

Figure 8.8: Two-year Mean Road-NO_2 (total minus assumed background) vs Distance from Roads along the Four Transects on Logarithmic Scales 177

Figure 8.9: Two-year Mean NOx Concentration vs Distance from Roads along the Four Transects.....178

Figure 8.10: Two-year Mean NOx Concentration vs Distance from Roads along the Four Transects on Logarithmic Scales 178

Table 8.4: Two-year Average DELTA Monitoring Results (µg/m^3) [a].....179

Figure 8.11: Two-year Mean Measured NH_3 vs Distance from Roads along the Three Transects.....181

Figure 8.12: Two-year Mean Road-NH_3 (total minus assumed background) vs Distance from Roads along the Three Transects on Logarithmic Scales 181

Table 8.6: Measured Traffic Flows used Fleet Compositions.....183

Figure 8.13: Average Measured Diurnal Traffic Profiles (total traffic).....184

Figure 9.1: Annual Mean NOx Concentrations Along Transects A, B, and C. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.....186

Figure 9.2: Annual Mean NOx Concentrations Along Transects D, E, and F. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.....187

Figure 9.3: Annual Mean NOx Concentrations Along Transects G, H, and I. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.....188

Figure 9.4: Annual Mean NOx Concentrations Along Transects J, K, and L. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH. The value for Quadrat K.QA is 75.1 µg/m^3. 189

Figure 9.5: Annual Mean NOx Concentrations Along Transects M, N, and O. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.....190

Figure 9.6: Maximum 24-hour Mean NOx Concentrations Along Transects A, B, and C. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 μg/m^3 critical level. 191

Figure 9.7: Maximum 24-hour Mean NOx Concentrations Along Transects D, E, and F. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 μg/m^3 critical level. 192

Figure 9.8: Maximum 24-hour Mean NOx Concentrations Along Transects G, H, and I. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 μg/m^3 critical level. 193

Figure 9.9: Maximum 24-hour Mean NOx Concentrations Along Transects J, K, and L. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 μg/m^3 critical level. The value for Quadrat K.QA is 377 μg/m^3. 194

Figure 9.10: Maximum 24-hour Mean NOx Concentrations Along Transects M,N and O. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 μg/m^3 critical level. 195

Figure 9.11: Annual Mean NH_3 Concentrations Along Transects A, B, and C. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 μg/m^3 critical level and the +/-20% critical level range suggested by CEH. 196

Figure 9.12: Annual Mean NH_3 Concentrations Along Transects D, E, and F. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 μg/m^3 critical level and the +/-20% critical level range suggested by CEH. 197

Figure 9.13: Annual Mean NH_3 Concentrations Along Transects G, H, and I. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 μg/m^3 critical level and the +/-20% critical level range suggested by CEH. 198

Figure 9.14: Annual Mean NH_3 Concentrations Along Transects J, K, and L. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 μg/m^3 critical level and the +/-20% critical level range suggested by CEH. 199

Figure 9.15: Annual Mean NH_3 Concentrations Along Transects M, N, and O. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 μg/m^3 critical level and the +/-20% critical level range suggested by CEH. 200

Table 9.1: Range in Predicted Deposition Fluxes to Each Ecological Survey Transect Assuming that all of the Habitat is Heath 203

Table 9.2: Range in Predicted Deposition Fluxes to Each Ecological Survey Transect Using Observed Habitat Structure.....204

Figure 9.16: Deposition to Ecological Transect A – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 205

Figure 9.17: Deposition to Ecological Transect B – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 206

Figure 9.18: Deposition to Ecological Transect C – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 207

Figure 9.19: Deposition to Ecological Transect D – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 208

Figure 9.20: Deposition to Ecological Transect E – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 209

Figure 9.21: Deposition to Ecological Transect F – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 210

Figure 9.22: Deposition to Ecological Transect G – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 211

Figure 9.23: Deposition to Ecological Transect H – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 212

Figure 9.24: Deposition to Ecological Transect I – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 213

Figure 9.25: Deposition to Ecological Transect J – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 214

Figure 9.26: Deposition to Ecological Transect K – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 215

Figure 9.27: Deposition to Ecological Transect L – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 216

Figure 9.28: Deposition to Ecological Transect M – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 217

Figure 9.29: Deposition to Ecological Transect N – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 218

Figure 9.30: Deposition to Ecological Transect O – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 219

Figure 9.31: Deposition to Ecological Transect A – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 220

Figure 9.32: Deposition to Ecological Transect B – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 221

Figure 9.33: Deposition to Ecological Transect C – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 222

Figure 9.34: Deposition to Ecological Transect D – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 223

Figure 9.35: Deposition to Ecological Transect E – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 224

Figure 9.36: Deposition to Ecological Transect F – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 225

Figure 9.37: Deposition to Ecological Transect G – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 226

Figure 9.38: Deposition to Ecological Transect H – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 227

Figure 9.39: Deposition to Ecological Transect I – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 228

Figure 9.40: Deposition to Ecological Transect J – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 229

Figure 9.41: Deposition to Ecological Transect K – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 230

Figure 9.42: Deposition to Ecological Transect L – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 231

Figure 9.43: Deposition to Ecological Transect M – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 232

Figure 9.44: Deposition to Ecological Transect N – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 233

Figure 9.45: Deposition to Ecological Transect O – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) 234

Figure 9.46: Predicted Annual Mean NOx Concentrations across the SAC – Existing Baseline ($\mu g/m^3$).....236

Table 9.3: Annual Mean NOx across the Ashdown Forest SAC – Existing Baseline ($\mu g/m^3$) 236

Table 9.4: Summary of Annual Mean NOx across the Ashdown Forest SAC – Existing Baseline [a] 237

Table 9.5: Area of Ashdown Forest SAC in Exceedence of the 30 $\mu g/m^3$ Critical Level for Annual Mean NOx – Existing Baseline [a] 238

Figure 9.47: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC - Existing Baseline ($\mu g/m^3$).....239

Table 9.6: 24-hour NOx across the Ashdown Forest SAC - Existing Baseline ($\mu g/m^3$)239

Table 9.7: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – Existing Baseline [a] 240

Figure 9.48: Predicted Annual Mean NH_3 Concentrations across the SAC– Existing Baseline ($\mu g/m^3$).....241

Table 9.8: Annual Mean NH_3 across the Ashdown Forest SAC – Existing Baseline ($\mu g/m^3$) 242

Table 9.9: Summary of Annual Mean NH_3 across the Ashdown Forest SAC – Existing Baseline [a] 243

Table 9.10: Area of Ashdown Forest SAC in Exceedence of the 1 $\mu g/m^3$ Critical Level for Annual Mean NH_3 – Existing Baseline [a] 243

Figure 9.49: Nitrogen Deposition to SAC – Existing Baseline (EA Method) (kg-N/ha/yr) 245

Table 9.11: Average Nitrogen Deposition to the Ashdown Forest SAC – Existing Baseline (EA Method) (kg-N/ha/yr).....245

Table 9.12: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (EA Method) (kg-N/ha/yr).....246

Table 9.13: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (EA Method) (kg-N/ha/yr).....246

Table 9.14: Summary of Nitrogen Deposition To Ashdown Forest SAC – Existing Baseline (EA Method) [a] 247

Table 9.15: Area of Ashdown Forest SAC in Exceedence of the 10 kg-N/ha/yr Critical Load for Nitrogen Deposition – Existing Baseline (EA Method) [a] 248

Figure 9.50: Average Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (EA Method) – Relative Flux per Ha.....249

Figure 9.51: Total Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (i.e. taking account of relative cover of each land use) (EA Method).....249

Figure 9.52: Total Nitrogen Deposition to the Ashdown Forest SAC by Pollutant (taking account of relative cover of each land use) (EA Method) 250

Figure 9.53: Nitrogen Deposition to SAC – Existing Baseline (AQC Method) (kg-N/ha/yr) 251

Table 9.16: Average Nitrogen Deposition to the Ashdown Forest SAC – Existing Baseline (AQC Method) (kg-N/ha/yr) 251

Table 9.17: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (AQC Method) (kg-N/ha/yr).....252

Table 9.18: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (AQC Method) (kg-N/ha/yr).....252

Table 9.19: Summary of Nitrogen Deposition To Ashdown Forest SAC – Existing Baseline (AQC Method) [a] 253

Table 9.20: Area of Ashdown Forest SAC in Exceedence of the 10 kg-N/ha/yr Critical Load for Nitrogen Deposition – Existing Baseline (AQC Method) [a] 254

Figure 9.54: Average Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (AQC Method) – Relative Flux per Ha.....255

Figure 9.55: Total Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (i.e. taking account of relative cover of each land use) (AQC Method).....255

Figure 9.56: Total Nitrogen Deposition to the Ashdown Forest SAC by Pollutant (taking account of relative cover of each land use) (AQC Method) 256

Figure 10.1: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No-Growth - B (μg/m^3) 259

Table 10.1: Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth – B (μg/m^3).....260

Table 10.2: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - B [a] 260

Figure 10.2: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No-Growth - B (μg/m^3) 262

Table 10.3: 24-hour NOx across the Ashdown Forest SAC – 2028 No-Growth - B (μg/m^3) 262

Table 10.4: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - B [a].....263

Figure 10.3: Nitrogen Deposition to SAC – 2028 No-Growth - B (EA Method) (kg-N/ha/yr) 264

Table 10.5: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - B (EA Method) (kg-N/ha/yr).....265

Table 10.6: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – B (EA Method) (kg-N/ha/yr) 265

Table 10.7: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - B (EA Method) (kg-N/ha/yr) 266

Table 10.8: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - B (EA Method) [a] 267

Figure 10.4: Nitrogen Deposition to SAC – 2028 No-Growth - B (AQC Method) (kg-N/ha/yr) 269

Table 10.9: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - B (AQC Method) (kg-N/ha/yr) 269

Table 10.10: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – B (AQC Method) (kg-N/ha/yr).....270

Table 10.11: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - B (AQC Method) (kg-N/ha/yr) 270

Table 10.12: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - B (AQC Method) [a] 271

Figure 10.5: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No-Growth - C (μg/m^3) 272

Table 10.13: Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth – C (μg/m^3).....273

Table 10.14: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - C [a] 273

Figure 10.6: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No-Growth - C (μg/m^3) 275

Table 10.15: 24-hour NOx across the Ashdown Forest SAC – 2028 No-Growth - C (μg/m^3) 275

Table 10.16: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - C [a] 276

Figure 10.7: Nitrogen Deposition to SAC – 2028 No-Growth - C (EA Method) (kg-N/ha/yr) 277

Table 10.17: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - C (EA Method) (kg-N/ha/yr) 278

Table 10.18: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – C (EA Method) (kg-N/ha/yr) 278

Table 10.19: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - C (EA Method) (kg-N/ha/yr) 279

Table 10.20: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - C (EA Method) [a] 280

Figure 10.8: Nitrogen Deposition to SAC – 2028 No-Growth - C (AQC Method) (kg-N/ha/yr) 282

Table 10.21: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - C (AQC Method) (kg-N/ha/yr) 282

Table 10.22: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – C (AQC Method) (kg-N/ha/yr) 283

Table 10.23: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - C (AQC Method) (kg-N/ha/yr) 283

Table 10.24: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - C (AQC Method) [a] 284

Figure 11.1: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No WDC-Growth - A (μg/m^3) 288

Table 11.1: Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – A (μg/m^3) 288

Table 11.2: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - A [a] 289

Figure 11.2: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No WDC-Growth - A (μg/m^3) 290

Table 11.3: 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – A (μg/m^3) 291

Table 11.4: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - A [a] 291

Figure 11.3: Predicted Annual Mean NH_3 Concentrations across the SAC– 2028 No WDC-Growth (μg/m^3) 293

Table 11.5: Annual Mean NH_3 across the Ashdown Forest SAC – 2028 No WDC-Growth (μg/m^3) 293

Table 11.6: Summary of Annual Mean NH_3 across the Ashdown Forest SAC – 2028 No WDC-Growth [a] 294

Figure 11.4: Nitrogen Deposition to SAC – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr) 295

Table 11.7: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr) 296

Table 11.8: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr) 296

Table 11.9: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr) 297

Table 11.10: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No WDC-Growth - A (EA Method) [a] 298

Figure 11.5: Nitrogen Deposition to SAC – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr).....300

Table 11.11: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr).....300

Table 11.12: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr).....301

Table 11.13: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr).....301

Table 11.14: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 No WDC-Growth - A (AQC Method) [a].....302

Figure 11.6: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No WDC-Growth - B (μg/m^3).....304

Table 11.15: Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – B (μg/m^3).....304

Table 11.16: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - B [a].....305

Figure 11.7: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No WDC-Growth - B (μg/m^3).....306

Table 11.17: 24-hour NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – B (μg/m^3).....307

Table 11.18: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - B [a].....307

Figure 11.8: Nitrogen Deposition to SAC – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr).....309

Table 11.19: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr).....309

Table 11.20: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr).....310

Table 11.21: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr).....310

Table 11.22: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No WDC-Growth - B (EA Method) [a].....311

Figure 11.9: Nitrogen Deposition to SAC – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr).....313

Table 11.23: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr) 313

Table 11.24: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr) 314

Table 11.25: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr) 314

Table 11.26: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 No WDC-Growth - B (AQC Method) [a] 315

Figure 11.10: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No WDC-Growth - C (μg/m^3).....317

Table 11.27: Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – C (μg/m^3) 317

Table 11.28: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - C [a] 318

Figure 11.11: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No WDC-Growth - C (μg/m^3).....319

Table 11.29: 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – C (μg/m^3) 320

Table 11.30: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - C [a] 320

Figure 11.12: Nitrogen Deposition to SAC – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr).....322

Table 11.31: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr).....322

Table 11.32: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr).....323

Table 11.33: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr).....323

Table 11.34: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No WDC-Growth - C (EA Method) [a] 324

Figure 11.13: Nitrogen Deposition to SAC – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr).....326

Table 11.35: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr).....326

Table 11.36: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr).....327

Table 11.37: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr).....327

Table 11.38: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 No WDC-Growth - C (AQC Method) [a] 328

Figure 12.1: Predicted Annual Mean NOx Concentrations across the SAC– 2028 With Plan - A (μg/m^3) 332

Table 12.1: Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan – A (μg/m^3) 333

Table 12.2: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan - A [a] 333

Figure 12.2: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC– 2028 With Plan - A (μg/m^3) 335

Table 12.3: 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan – A (μg/m^3).....335

Table 12.4: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan - A [a] 336

Figure 12.3: Predicted Annual Mean NH_3 Concentrations across the SAC– 2028 With Plan (μg/m^3).....337

Table 12.5: Annual Mean NH_3 across the Ashdown Forest SAC – 2028 With Plan – A (μg/m^3) 338

Table 12.6: Summary of Annual Mean NH_3 across the Ashdown Forest SAC – 2028 With Plan [a] 338

Figure 12.4: Nitrogen Deposition to SAC – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 340

Table 12.7: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 340

Table 12.8: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 341

Table 12.9: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 341

Table 12.10: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 With Plan - A (EA Method) [a] 342

Figure 12.5: Nitrogen Deposition to SAC – 2028 With Plan - A (AQC Method) (kg-N/ha/yr) 344

Table 12.11: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 344

Table 12.12: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 345

Table 12.13: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr) 345

Table 12.14: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 With Plan - A (AQC Method) [a] 346

Figure 12.6: Predicted Annual Mean NOx Concentrations across the SAC– 2028 With Plan - B (μg/m^3) 348

Table 12.15: Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan – B (μg/m^3).....348

Table 12.16: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan - B [a] 349

Figure 12.7: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC– 2028 With Plan - B (μg/m^3) 350

Table 12.17: 24-hour NOx across the Ashdown Forest SAC – 2028 With Plan – B (μg/m^3) 351

Table 12.18: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan - B [a] 351

Figure 12.8: Nitrogen Deposition to SAC – 2028 With Plan - B (EA Method) (kg-N/ha/yr) 353

Table 12.19: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - B (EA Method) (kg-N/ha/yr) 353

Table 12.20: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (EA Method) (kg-N/ha/yr) 354

Table 12.21: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (EA Method) (kg-N/ha/yr) 354

Table 12.22: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 With Plan - B (EA Method) [a] 355

Figure 12.9: Nitrogen Deposition to SAC – 2028 With Plan - B (AQC Method) (kg-N/ha/yr) 357

Table 12.23: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - B (AQC Method) (kg-N/ha/yr) 357

Table 12.24: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (AQC Method) (kg-N/ha/yr) 358

Table 12.25: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (AQC Method) (kg-N/ha/yr) 358

Table 12.26: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 With Plan - B (AQC Method) [a] 359

Figure 12.10: Predicted Annual Mean NOx Concentrations across the SAC– 2028 With Plan - C (μg/m^3) 361

Table 12.27: Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan – C (μg/m^3).....361

Table 12.28: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan - C [a] 362

Figure 12.11: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC– 2028 With Plan - C (μg/m^3).....363

Table 12.29: 24-hour NOx across the Ashdown Forest SAC – 2028 With Plan – C (μg/m^3) 364

Table 12.30: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan - C [a].....364

Figure 12.12: Nitrogen Deposition to SAC – 2028 With Plan – C (EA Method) (kg-N/ha/yr) 366

Table 12.31: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - C (EA Method) (kg-N/ha/yr).....366

Table 12.32: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (EA Method) (kg-N/ha/yr).....367

Table 12.33: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (EA Method) (kg-N/ha/yr).....367

Table 12.34: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 With Plan - C (EA Method) [a] 368

Figure 12.13: Nitrogen Deposition to SAC – 2028 With Plan - C (AQC Method) (kg-N/ha/yr) 370

Table 12.35: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - C (AQC Method) (kg-N/ha/yr).....370

Table 12.36: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (AQC Method) (kg-N/ha/yr).....371

Table 12.37: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (AQC Method) (kg-N/ha/yr).....371

Table 12.38: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 With Plan - C (AQC Method) [a] 372

Figure 13.1: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No WDC-Growth' Under Emissions Scenario A (μg/m^3).....378

Figure 13.2: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A 378

Table 13.1: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (hectares) 379

Table 13.2: Impacts of Plan on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A 379

Table 13.3: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a] 380

Table 13.4: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a,b] 381

Figure 13.3: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario A (μg/m^3).....383

Figure 13.4: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A 383

Table 13.5: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (hectares) 384

Table 13.6: Impacts of Plan on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A....384

Table 13.7: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a].....385

Table 13.8: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a] 385

Figure 13.5: Change in Predicted Annual Mean NH_3 Comparing 'With Plan' to 'No WDC-Growth' ($\mu g/m^3$).....387

Figure 13.6: Areas in SAC Predicted to Experience an Increase in Annual Mean NH_3 Concentrations Greater than 1% of the 1 $\mu g/m^3$ Critical Level where the Critical Level would also be Exceeded (Comparing 'With Plan' to 'No WDC-Growth' Scenarios) 388

Table 13.9: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NH_3 Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios (hectares)388

Table 13.10: Impacts of Plan on Annual Mean NH_3 across the Ashdown Forest SAC (Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios) 389

Table 13.11: Change in Hectares within Different Annual Mean NH_3 Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios [a].....389

Table 13.12: Hectares Predicted to Experience Different Levels of Change in Annual Mean NH_3 Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios [a,b] 390

Figure 13.7: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' Under Emission Scenario A (EA Method) (kg-N/ha/yr) 392

Figure 13.8: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (EA Method) 392

Table 13.13: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (EA Method) (hectares) 393

Table 13.14: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (EA Method) 393

Table 13.15: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (EA Method) [a] 394

Table 13.16: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (EA Method) [a,b] 395

Figure 13.9: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario A (AQC Method) (kg-N/ha/yr) 397

Figure 13.10: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (AQC Method) 397

Table 13.17: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (AQC Method) (hectares) 398

Table 13.18: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (AQC Method) 398

Table 13.19: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (AQC Method) [a] 399

Table 13.20: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (AQC Method) [a,b] 400

Figure 13.11: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No WDC-Growth' Under Emissions Scenario B ($\mu g/m^3$) 402

Figure 13.12: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 $\mu g/m^3$ Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B 402

Table 13.21: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (hectares) 403

Table 13.22: Impacts of Plan on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B....403

Table 13.23: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a] 404

Table 13.24: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a,b] 405

Figure 13.13: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario B (μg/m^3) 407

Figure 13.14: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B 407

Table 13.25: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (hectares) 408

Table 13.26: Impacts of Plan on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B....408

Table 13.27: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a] 409

Table 13.28: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a] 409

Figure 13.15: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' Under Emission Scenario B (EA Method) (kg-N/ha/yr) 411

Figure 13.16: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (EA Method) 411

Table 13.29: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (EA Method) (hectares) 412

Table 13.30: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (EA Method) 412

Table 13.31: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (EA Method) [a] 413

Table 13.32: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (EA Method) [a,b] 414

Figure 13.17: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario B (AQC Method) (kg-N/ha/yr).....416

Figure 13.18: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (AQC Method) 416

Table 13.33: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (AQC Method) (hectares) 417

Table 13.34: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing With Plan to No WDC-Growth Scenarios under Emissions Scenario B (AQC Method) 417

Table 13.35: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (AQC Method) [a] 418

Table 13.36: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (AQC Method) [a,b] 419

Figure 13.19: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No WDC-Growth' Under Emissions Scenario C ($\mu g/m^3$).....421

Figure 13.20: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 $\mu g/m^3$ Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C.....421

Table 13.37: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be

Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (hectares) 422

Table 13.38: Impacts of Plan on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C....422

Table 13.39: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a] 423

Table 13.40: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a,b].....424

Figure 13.21: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario C (μg/m^3) 426

Figure 13.22: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C 426

Table 13.41: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (hectares).....427

Table 13.42: Impacts of Plan on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C....427

Table 13.43: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a].....428

Table 13.44: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a] 428

Figure 13.23: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' Under Emission Scenario C (EA Method) (kg-N/ha/yr).....430

Figure 13.24: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (EA Method).....431

Table 13.45: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (EA Method) (hectares) 431

Table 13.46: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (EA Method) 432

Table 13.47: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (EA Method) [a] 433

Table 13.48: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (EA Method) [a,b] 434

Figure 13.25: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario C (AQC Method) (kg-N/ha/yr).....436

Figure 13.26: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (AQC Method) 436

Table 13.49: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (AQC Method) (hectares) 437

Table 13.50: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (AQC Method) 437

Table 13.51: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (AQC Method) [a] 438

Table 13.52: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (AQC Method) [a,b] 439

Figure 14.1: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No Growth' Under Emissions Scenario A ($\mu g/m^3$).....444

Figure 14.2: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 $\mu g/m^3$ Critical Level where the Critical Level

would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A 444

Table 14.1: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (hectares) 445

Table 14.2: In Combination (Traffic) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A445

Table 14.3: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A [a] 446

Table 14.4: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A [a,b] 447

Figure 14.3: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No Growth' under Emissions Scenario A (μg/m^3) 449

Figure 14.4: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A 449

Table 14.5: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (hectares) 450

Table 14.6: In Combination (Traffic) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A450

Table 14.7: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenario Under Emissions Scenario A [a] 451

Table 14.8: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A [a] 451

Figure 14.5: Change in Predicted Annual Mean NH_3 Comparing 'With Plan' to 'No Growth' Scenarios (μg/m^3) 453

Figure 14.6: Areas in SAC Predicted to Experience an Increase in Annual Mean NH_3 Concentrations Greater than 1% of the 1 μg/m^3 Critical Level where the Critical Level would also be Exceeded (Comparing 'With Plan' to 'No Growth Scenarios)454

Table 14.9: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NH_3 Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' and 'No Growth' Scenarios (hectares)..454

Table 14.10: In Combination (Traffic) Impacts on Annual Mean NH_3 across the Ashdown Forest SAC (Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' and 'No Growth' Scenarios) 455

Table 14.11: Change in Hectares within Different Annual Mean NH_3 Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios [a] 455

Table 14.12: Hectares Predicted to Experience Different Levels of Change in Annual Mean NH_3 Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios [a,b] ..456

Figure 14.7: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios Under Emission Scenario A (EA Method) (kg-N/ha/yr) ..458

Figure 14.8: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (EA Method) 458

Table 14.13: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (EA Method) (hectares) 459

Table 14.14 In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (EA Method) 459

Table 14.15: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (EA Method) [a] 460

Table 14.16: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (EA Method) [a,b] 461

Figure 14.9: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method) (kg-N/ha/yr)463

Figure 14.10: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also

be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method) 463

Table 14.17: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method) (hectares) 464

Table 14.18: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method) 464

Table 14.19: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (AQC Method) [a] 465

Table 14.20: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (AQC Method) [a,b] 466

Figure 14.11: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No Growth' Under Emissions Scenario B (μg/m^3) 468

Figure 14.12: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B 469

Table 14.21: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (hectares) 469

Table 14.22: In Combination (Traffic) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B470

Table 14.23: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B [a] 470

Table 14.24: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B [a,b] 471

Figure 14.13: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No Growth' under Emissions Scenario B (μg/m^3) 473

Figure 14.14: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B 474

Table 14.25: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (hectares) 474

Table 14.26: In Combination (Traffic) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B475

Table 14.27: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenario Under Emissions Scenario B [a] 475

Table 14.28: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B [a] 476

Figure 14.15: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios Under Emission Scenario B (EA Method) (kg-N/ha/yr) ..478

Figure 14.16: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (EA Method) 478

Table 14.29: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (EA Method) (hectares) 479

Table 14.30: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (EA Method) 479

Table 14.31: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (EA Method) [a] 480

Table 14.32: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (EA Method) [a,b] 481

Figure 14.17: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method) (kg-N/ha/yr)483

Figure 14.18: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method) 483

Table 14.33: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method) (hectares) 484

Table 14.34: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method) 484

Table 14.35: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (AQC Method) [a] 485

Table 14.36: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (AQC Method) [a,b] 486

Figure 14.19: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No Growth' Under Emissions Scenario C (μg/m^3).....488

Figure 14.20: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C.....489

Table 14.37: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (hectares).....489

Table 14.38: In Combination (Traffic) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C490

Table 14.39: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C [a] 490

Table 14.40: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C [a,b] 491

Figure 14.21: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No Growth' under Emissions Scenario C (μg/m^3) 493

Figure 14.22: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C 493

Table 14.41: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (hectares) 494

Table 14.42: In Combination (Traffic) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C494

Table 14.43: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenario Under Emissions Scenario C [a] 495

Table 14.44: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C [a] 495

Figure 14.23: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios Under Emission Scenario C (EA Method) (kg-N/ha/yr) ..497

Figure 14.24: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (EA Method) 498

Table 14.45: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (EA Method) (hectares) 498

Table 14.46: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (EA Method) 499

Table 14.47: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (EA Method) [a] 500

Table 14.48: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (EA Method) [a,b] 501

Figure 14.25: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method) (kg-N/ha/yr)503

Figure 14.26: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method) 503

Table 14.49: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method) (hectares) 504

Table 14.50: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method) 504

Table 14.51: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (AQC Method) [a] 505

Table 14.52: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (AQC Method) [a,b] 506

Figure 15.1: Change in Predicted Annual Mean NOx Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (μg/m^3) 511

Table 15.1: In Combination (Traffic + Emissions Projections) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A 511

Table 15.2: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a] 512

Table 15.3: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a,b] 513

Figure 15.2: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (μg/m^3).....514

Table 15.4: In Combination (Traffic + Emissions Projections) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A.....515

Table 15.5: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a].....515

Table 15.6: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a].....516

Figure 15.3: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emission Scenario A (EA Method) (kg-N/ha/yr) 517

Table 15.7: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (EA Method).....517

Table 15.8: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (EA Method) [a] 518

Table 15.9: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (EA Method) [a,b].....519

Figure 15.4: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method) (kg-N/ha/yr).....520

Table 15.10: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method).....521

Table 15.11: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method) [a] 522

Table 15.12: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method) [a,b] 523

Figure 15.5: Change in Predicted Annual Mean NOx Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (μg/m^3).....525

Table 15.13: In Combination (Traffic + Emissions Projections) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A 525

Table 15.14: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a] 526

Table 15.15: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a,b].....527

Figure 15.6: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (μg/m^3).....528

Table 15.16: In Combination (Traffic + Emissions Projections) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A 529

Table 15.17: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a].....529

Table 15.18: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a].....530

Figure 15.7: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emission Scenario A (EA Method) (kg-N/ha/yr) 531

Table 15.19: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (EA Method) 531

Table 15.20: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (EA Method) [a] 532

Table 15.21: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (EA Method) [a,b] 533

Figure 15.8: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) (kg-N/ha/yr).....534

Table 15.22: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) 535

Table 15.23: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) [a] 536

Table 15.24: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) [a,b] 537

1 Introduction

1.1 Wealden District Council (WDC) has commissioned Ecus Ltd. to investigate the impacts of traffic-related air quality on the Ashdown Forest Special Area of Conservation (SAC). The outcomes of this work will assist WDC in meeting its Habitats Regulations duty as relevant to plan making. Ecus Ltd. has, in turn, commissioned Air Quality Consultants Ltd (AQC). to identify the air quality conditions across, and nitrogen deposition fluxes to, the SAC. This report describes the air quality component of the study. Matters related to ecological effects are not considered within this current report. The monitoring study is ongoing and the measurements presented here relate to the sampling carried out up to summer 2016.

Pollutants Considered

1.2 The pollutants considered in this report are:

- nitric oxide (NO);
- nitrogen dioxide (NO_2);
- nitrogen oxides (NOx)[2];
- nitric acid (HNO_3);
- ammonia (NH_3);
- particulate ammonium (NH_4^+);
- airborne reduced nitrogen (NHx)[3]
- particulate nitrate (NO_3^-)[4];
- nitrogen deposition; and
- acid deposition.

Report Structure

1.3 The report is structured over a number of chapters. Chapter 2 describes the concentrations (critical levels) and deposition fluxes (critical loads) above which there is thought to be the potential for harm to the key features Ashdown Forest. These represent criteria which are published on a national level and do not take any account of the results from the ecological surveys being carried out by Ecus Ltd.

[2] NOx = NO_2 + NO.

[3] NHx = NH_3 + particulate NH_4^+.

[4] Small amounts of particulate nitrite (NO_2^-) were also recorded.

1.4 Chapter 3 briefly considers how air quality and nitrogen deposition to Ashdown Forest is likely to have changed over the last 100 years. The relevance of this section is to provide context to any historical information that might be collected regarding land cover within the SAC.

1.5 Chapter 4 describes the air quality monitoring methodology used for the study. It describes the instruments used, their locations, and how the data have been manipulated.

1.6 Ambient concentrations of traffic-related air pollutants can change rapidly over relatively short distances, but the monitoring survey only provides information on air quality at those sites where the monitors are located. Concentrations elsewhere within the study area have been predicted using numerical dispersion modelling, calibrated against the measurements. The measured and predicted ambient concentrations have then been used to predict deposition fluxes using numerical deposition modelling. Both dispersion modelling and deposition modelling have also been used to predict concentrations and deposition fluxes in the year 2028. This future-year modelling has been carried out in order to inform WDC in its plan making and thus covers scenarios both with and without the WDC Local Plan. Chapter 5 describes the modelling methodology.

1.7 The predictions for 2028 include a number of different scenarios, which account for different assumptions regarding how the world will change over the intervening period. Chapter 6 describes the different scenarios and how they interrelate.

1.8 All of the results presented in this report are uncertain, but some of the values (e.g. the measurements) can be considered as much more certain than others (e.g. the predicted deposition fluxes). Chapter 7 considers the main sources of uncertainty and outlines the approach that has been taken regarding dealing with uncertainty.

1.9 The measured concentrations are set out in Chapter 8, while the base-year model predictions are presented in Chapter 9. This information shows the current air quality conditions and deposition fluxes within the Ashdown Forest SAC. Results are presented for the monitoring sites themselves, for the locations used by Ecus Ltd. in its ecological surveys, and for the SAC as a whole.

1.10 Chapters 10 to 12 set out the predicted concentrations and deposition fluxes in 2028 for a range of different scenarios; with these scenarios covering different assumptions regarding traffic growth and different assumptions regarding how emissions from road traffic and other sectors will change in the future. They also cover conditions both without and with the Wealden Local Plan. Chapters 13 to 15 then compare the model results for the different scenarios as reported in Chapters 10 to 12, and thus describe the changes in concentrations and deposition fluxes associated with the Local Plan, and with the Local Plan in combination with other plans and projects.

1.11 Chapter 16 briefly outlines the conclusions of this study, but it should be recognised that this report focuses only on the air quality conditions and deposition fluxes, and on the changes to

these metrics. The report does not seek to address the resulting effects on the habitats which make up Ashdown Forest SAC. This current report does not, therefore, seek to determine whether the predicted changes in concentrations and fluxes might give rise to significant effects. A Habitats Regulations Assessment for the Local Plan is being prepared separately.

2 Published Critical Levels and Critical Loads Relevant to Ashdown Forest

2.1 Critical levels and critical loads are the ambient concentrations and deposition fluxes (respectively) below which significant harmful effects to sensitive ecosystems are considered unlikely to occur according to current knowledge. They are set nationally and do not take specific account of measurements made within Ashdown Forest.

2.2 The critical levels relevant to this assessment are set out in Table 2.1, while the critical loads are provided in Table 2.2. Where a range is given, the Air Pollution Information System (APIS) website suggests that the lower-bound value (in this case 10 kg-N/ha/yr) is used. A critical level of 1 μg/m^3 has been used for NH_3 following advice from, and a site visit by, Prof. Mark Sutton of the Centre for Ecology and Hydrology (CEH).

2.3 Objectives for the protection of vegetation and ecosystems have been set by the UK Government and have the same numerical values as the critical levels that have been used in this assessment. The objectives, however, 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[5].

Table 2.1: Vegetation and Ecosystem Critical Levels [a]

Pollutant	Time Period	Critical Level
NOx (expressed as NO_2)	Annual Mean [a, b]	30 μg/m^3
	24-Hour Mean [a]	75 μg/m^3
NH_3	Annual Mean	1 μg/m^3

[a] The critical levels are defined by the World Health Organisation (WHO, 2000). Ammonia critical level is defined by the Convention on Long-Range Transboundary Air Pollution (CLRTAP)

[b] Away from major sources (see Paragraph 2.3), this critical level is set as an objective by the UK Government (Defra, 2007) and a limit value by the European Union (Directive 2008/50/EC of the European Parliament and of the Council, 2008).

2.4 As explained in Appendix 1, the critical loads for nutrient nitrogen deposition to the Ashdown Forest SAC are at least as stringent as those for acid nitrogen deposition (i.e. the critical load for acid nitrogen deposition could not be exceeded unless the critical load for nutrient nitrogen deposition was also exceeded). This study has, therefore, focused on nutrient nitrogen deposition and not presented results for acid deposition.

[5] The same concentrations, with the same constraints, have also been set as Limit Values by the European Commission.

Table 2.2: Vegetation and Ecosystem Critical Loads

Habitat Type [a]	Nutrient Nitrogen (kg-N/ha/yr) [a]	Acid Nitrogen Deposition 'N_{max}' (keq/ha/yr) [a]
Northern Wet Heath	10-20	0.925
European Dry Heath	10-20	0.952

[a] Critical loads taken from the APIS website (APIS, 2017). The value of N_{max} given here is the most stringent across the entire SAC.

Descriptors for Air Quality Impacts and Assessment of Significance

2.5 The Environment Agency's Air Emissions Risk Assessment guidance (Environment Agency, 2018) discounts as insignificant any impact on an SAC, from an individual permit[6] application, if the change in annual mean concentration or deposition flux is less than 1% of a long-term (e.g. annual mean) or 10% of a short-term (e.g. 24-hour mean) environmental standard. This is the case regardless of the existing or predicted future baseline level (i.e. whether or not the critical level or critical load is currently exceeded). The Environment Agency does not suggest that impacts will necessarily be significant above these criteria, merely that there is a potential for significant impacts to occur that should be considered using alternative means. When issuing permits to operate, the Environment Agency also suggests that there is no need for additional assessment if it can be demonstrated that the predicted concentration or flux (with the proposed operation is in place) is less than the critical level or critical load.

2.6 Despite their origin, these criteria are commonly used as screening criteria when assessing all manner of development schemes, including those that generate road traffic. Because many interested parties are familiar with these screening criteria, they have been included in this study as one of the ways to present the results. It is not within the scope of this study to appraise whether or not the Environment Agency screening criteria provide an appropriate level of assessment, or protection, with respect to traffic-related impacts from a Local Plan.

[6] The Environment Agency issues permits to operate industrial processes in England and Wales and its guidance was developed for this purpose.

3 Historic Information on Air Pollution around Ashdown Forest

3.1 Whilst there have been no historic measurements of air quality within Ashdown Forest, it is possible to make some reasonable estimates regarding how air quality and nitrogen deposition rates are likely to have changed since 1900. This chapter is intended to give a very brief overview of general trends in the historical concentrations, and deposition, of nitrogenous pollutants. It is not intended to be a thorough and detailed examination of national or regional trends and their causes, since this is not within the scope of the study.

Local Measurements

3.2 Defra operates one Automatic Urban and Rural Network (AURN), National Ammonia Monitoring Network (NAMN), and Acid Gases and Aerosols Network (AGANet) site in the region. This is at Lullington Heath (ca. 30 km south of the SAC). NO_2 measurements at this site go back as far as 1991, while those for NH_3 go back to 1997. Measured annual mean concentrations of both pollutants have been provided by Defra (Defra, 2018a) and are set out in Figure 3.1 and Figure 3.2.

3.3 For NO_2, there has been a trend of falling concentrations since 1991, which plateaued between 2004 and 2010 but have since begun to fall slightly again, although concentrations in 2017 were roughly the same as those in 2011. This pattern has been well documented at a great many monitoring sites across the UK. For NH_3, there was an overall increase in concentrations between 1997 and 2016, although this increase was not reflected in the single measurement for 2017, which showed the lowest annual mean concentration since 2009.

3.4 NO_2 concentrations have also, historically, been measured using diffusion tubes at a large number of sites across the UK and, in general, trends in measured concentrations have followed those measured by the AURN network.

3.5 Defra also operates a monitoring site at Barcombe Mills (ca. 10 km south of the SAC) which has measured NH_4^+ and NO_3^- in precipitation since 1986 and HNO_3 concentrations since 2000. Measured concentrations have been provided by Defra (Defra, 2018a) and are set out in Figure 3.3 to Figure 3.5. In order to overcome issues with poor data capture in the historic data, a 2-year rolling average of the measured data is shown for both datasets. The data collected prior to 1990 showed some high concentrations but there does not appear to be any obvious downward trend in concentrations of NO_3^- or NH_4^+ in precipitation over the last 15 years. There does, however, appear to be a downward trend in HNO_3 concentrations.

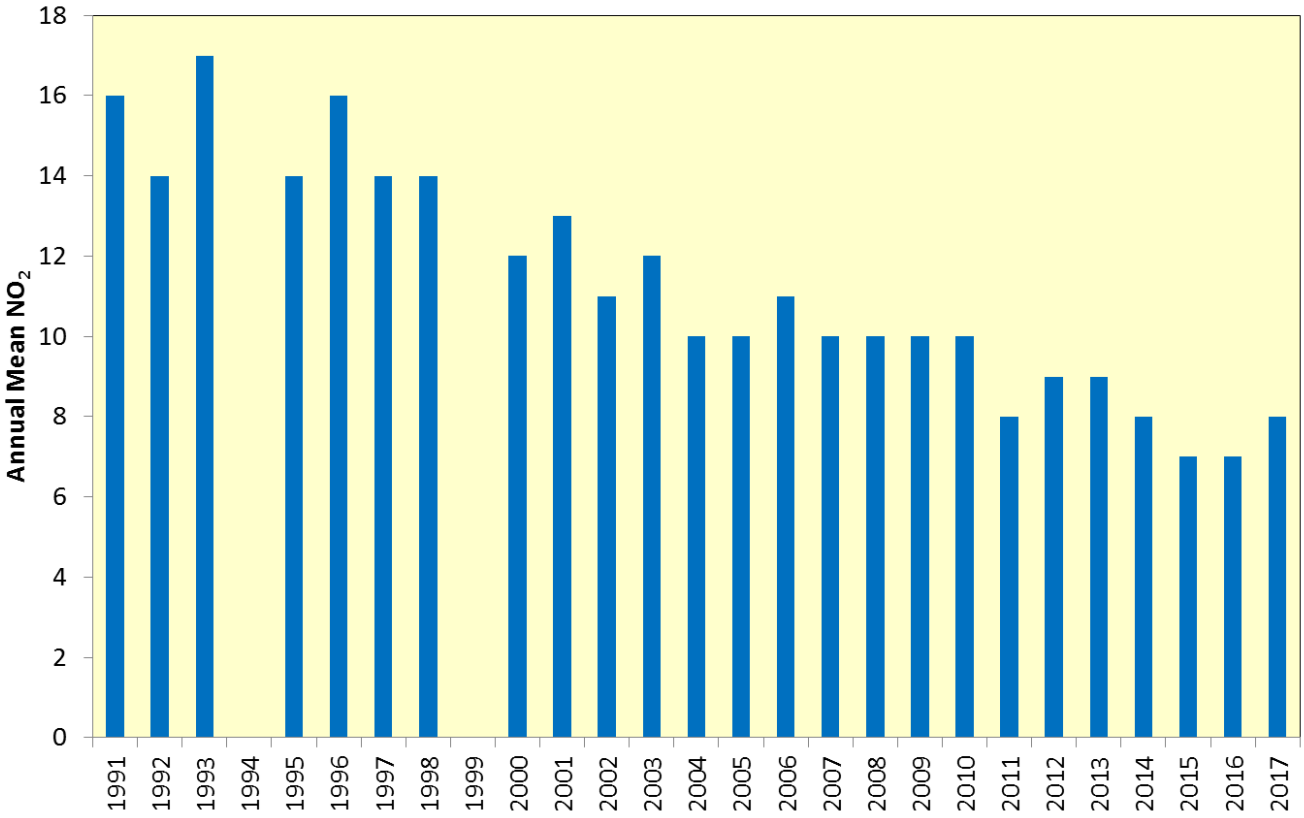


Figure 3.1: Measured Annual Mean NO_2 Concentrations at Lullington Heath over 27 Years ($\mu g/m^3$)

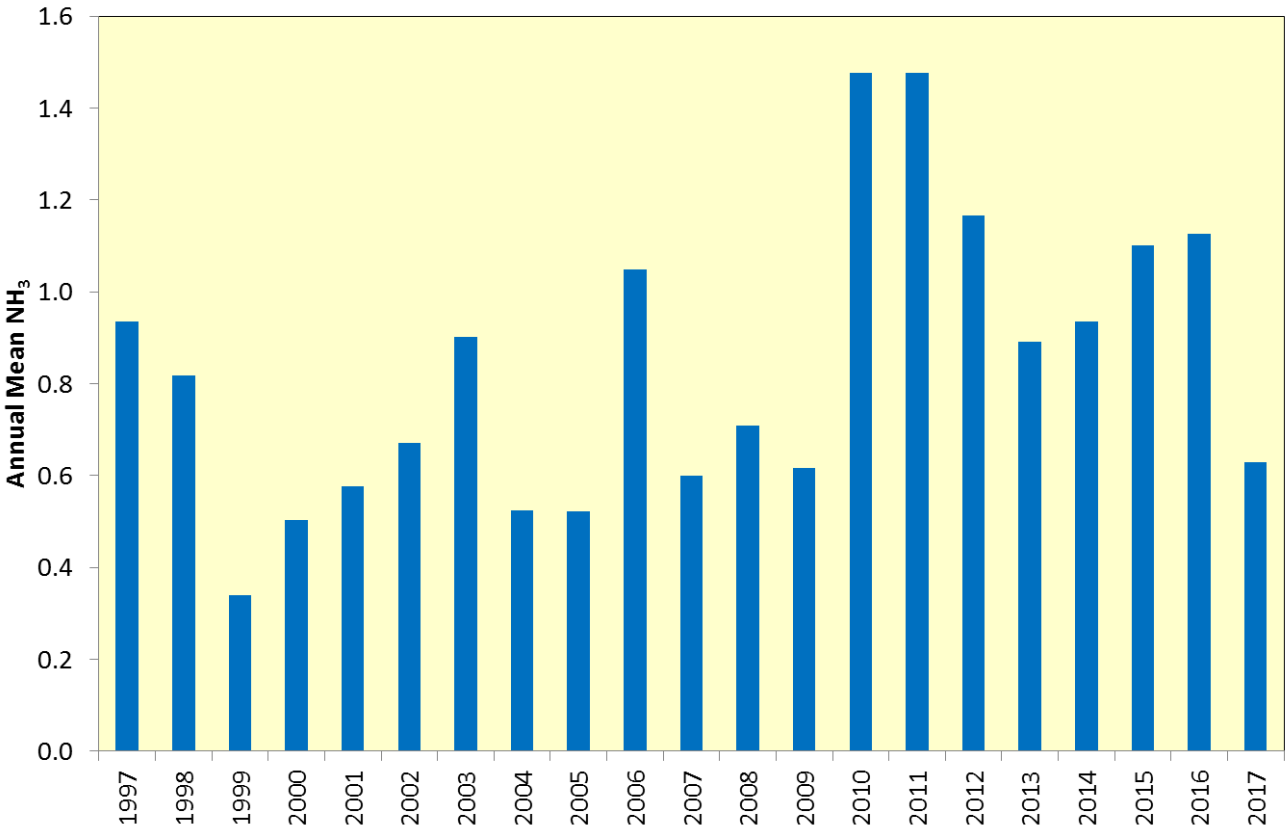


Figure 3.2: Measured Annual Mean NH_3 Concentrations at Lullington Heath over 21 Years ($\mu g/m^3$)

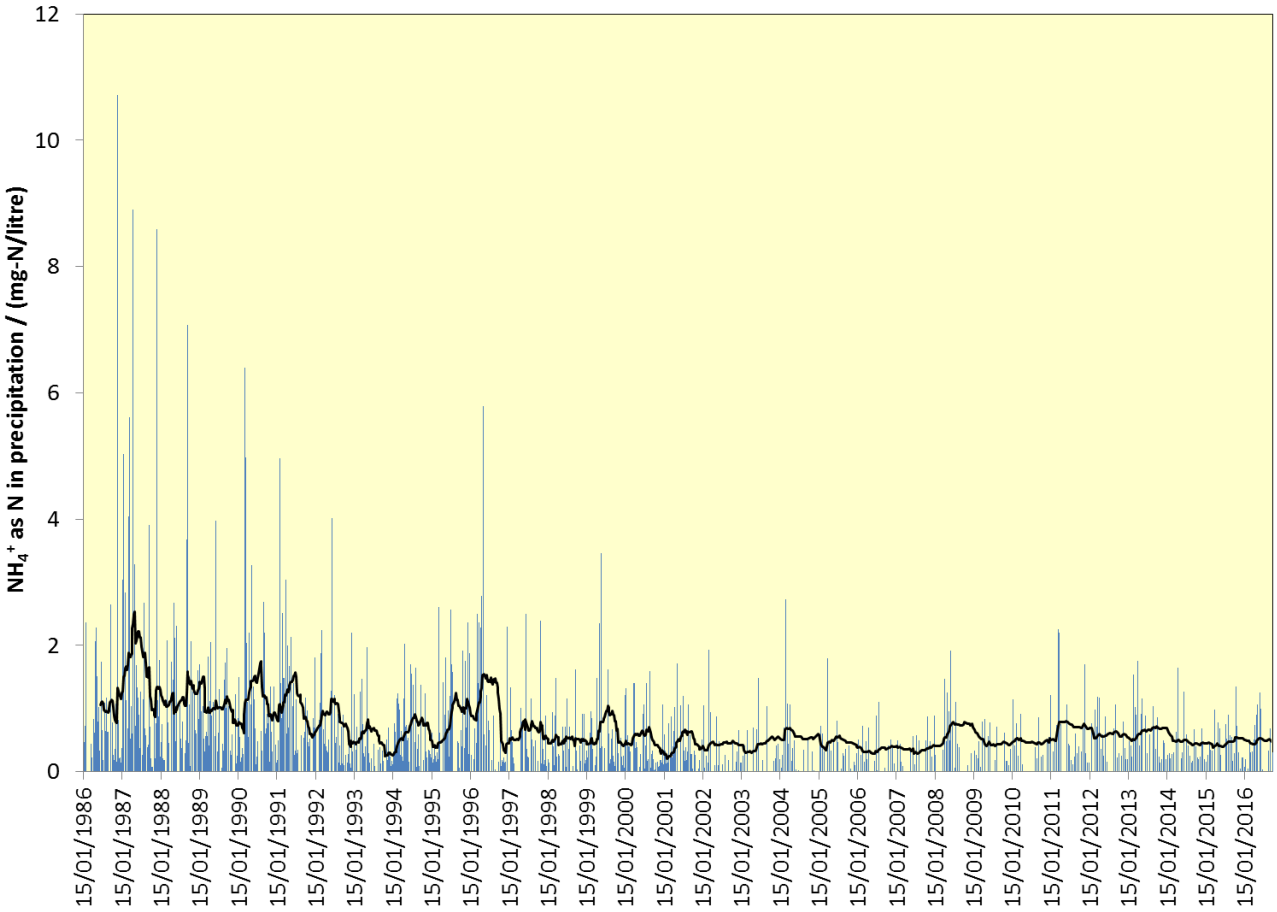


Figure 3.3: NH_4^+ in Precipitation Measured at Barcombe Mills over 30 Years (blue line) and 24-month rolling average (black line) (mg-N/litre)

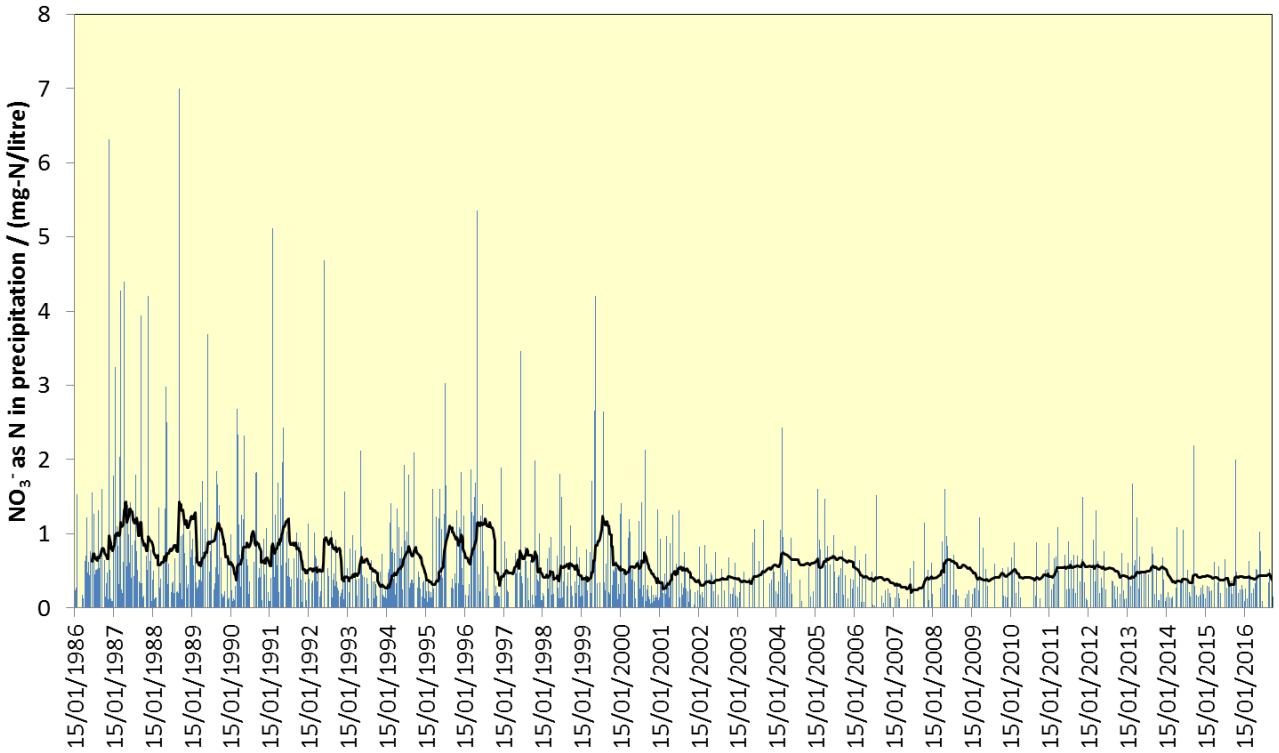


Figure 3.4: NO_3^- in Precipitation Measured at Barcombe Mills from 1986-2016 (blue line) and 24-month rolling average (black line) (mg-N/litre)

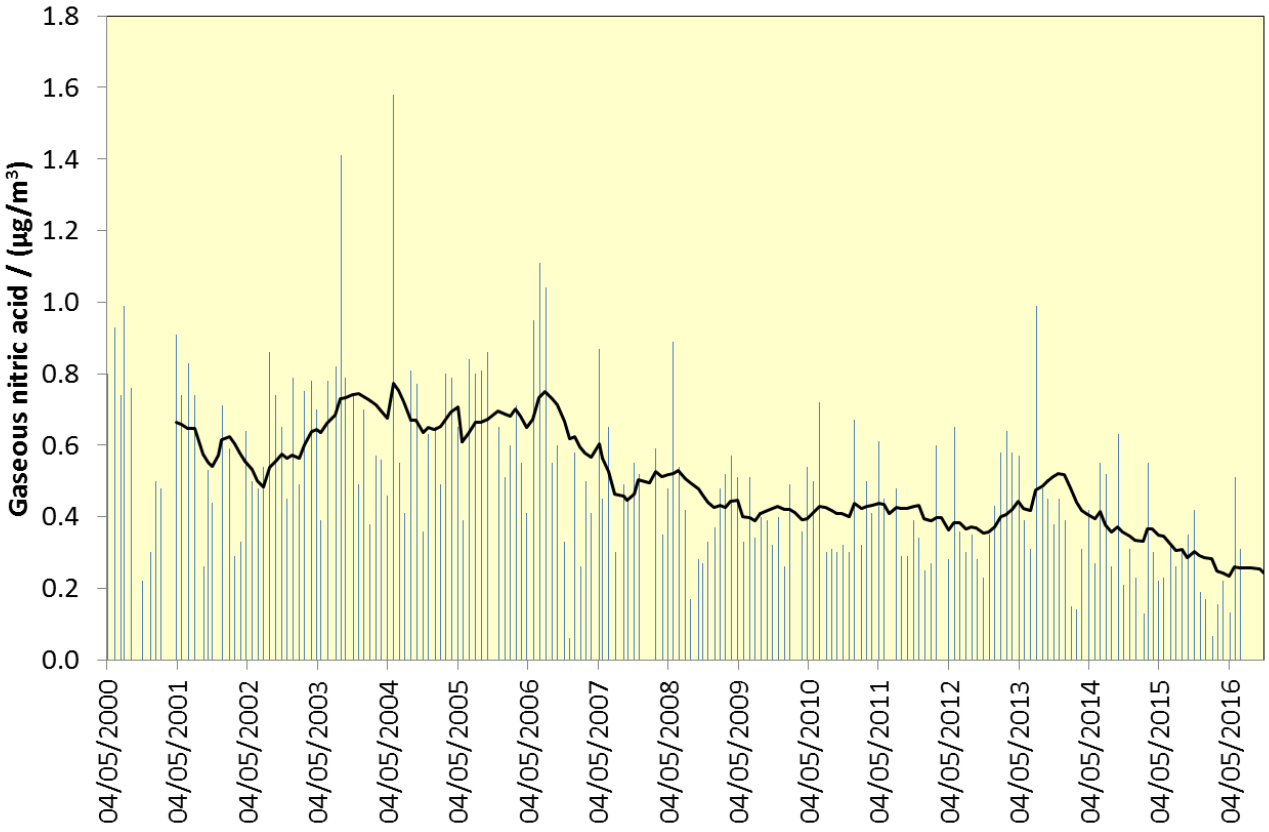


Figure 3.5: Gaseous Nitric Acid Measured at Barcombe Mills from 2000-2016 (blue line) and 24-month rolling average (black line) (µg/m^3)

National Emissions Trends

3.6 In order to characterise the likely trends prior to the 1990s, it is necessary to consider UK-wide data. There is no reason to expect local trends to have been very different from those nationally. National-level emissions estimates are based on multiplying national-level 'activity' estimates with national-level 'emissions factors'. Both of these values are subject to considerable uncertainty and so these emissions estimates should not be confused with direct measurements.

3.7 Agricultural and industrial revolutions throughout the 19th Century led to rapid increases in the emissions of nitrogen containing compounds. However, records relating to this period are poorly documented and are scarce until the turn of the 20th Century.

Trends in UK Total Emissions of NH_3

3.8 Prior to 1950, a substantial source of NH_3 emissions was domestic coal combustion. Subsequently, concentrations of NH_3 arising from domestic coal sources began to decrease, while agricultural sources rose significantly (Fowler et al., 2004); agricultural sources made up around 88% of total national emissions estimates in 2016 (Defra, 2018b). Emissions of ammonia are predicted to have fallen by 10% between 1980 and 2016 (Defra, 2018b), with this trend driven largely by decreasing cattle numbers and a decline in fertiliser use. However, an increased usage of urea-based fertilisers, which are associated with higher NH_3 emission factors, has had the opposite effect in recent years;

emissions since 2013 have been increasing, with a 3.2% increase between 2015 and 2016 (NAEI, 2017), (Defra, 2018b). Recent national-level NH_3 emissions estimates are shown in Figure 3.6.

3.9 In terms of NH_3 emissions from road traffic, the principal issue is 'ammonia slip' which is a by-product of sub-optimal dosing in catalytic control units (designed to reduce NOx emissions). Three-way catalysts manufactured in the early 1990s performed more poorly in this regard than later models, but there is increasing evidence that selective catalytic reduction (SCR) technology, which is fitted to modern diesel vehicles, is a growing source of NH_3. This is an active area of research and is not currently reflected in Defra's national inventory (i.e. in Figure 3.6).

3.10 In general, measured NH_3 concentrations have not shown the decline predicted in the national emissions inventory. One reason for this is that the effective lifetime of NH_3 has increased over time. This is because, as sulphur dioxide emissions have declined, less NH_3 is effectively 'locked away' by reaction with sulphur dioxide.

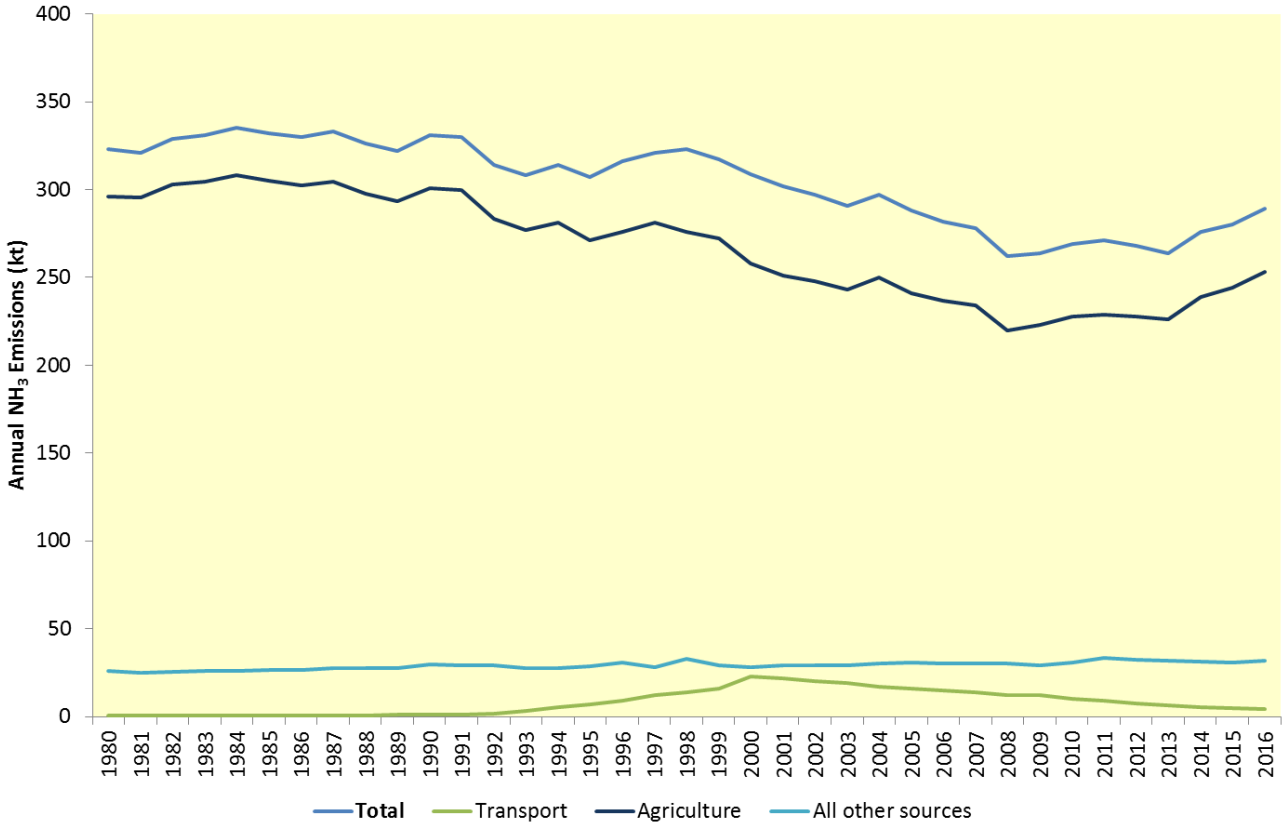


Figure 3.6: UK Total NH_3 Emissions: 1980 – 2016 (Defra, 2018b)

Trends in UK Total Emissions of NOx

3.11 Combustion sources (predominantly traffic and energy generation) account for the vast majority of UK emissions of NOx. While NOx emissions remained stable until the 1940s, the rising use of motor vehicles in the latter half of the 20th century led to a subsequent notable increase that continued until the 1990s.

3.12 UK total emissions of NOx are predicted by Defra to have declined by 72% between 1970 and 2016 (Figure 3.7). This decline is thought to have been driven, in part, by the successive introduction of tighter emission standards for petrol and diesel vehicles. Since 2008, emissions from passenger cars have further decreased, which is mainly driven by improvements in catalyst repair rates after the introduction of Regulations Controlling Sale and Installation of Replacement Catalytic Converters and Particle Filters for Light Vehicles for Euro 3 (or above) light duty vehicles. However, the increasing number of diesel cars partly offset these emissions reductions because diesel cars emit higher NOx relative to their petrol counterparts (84% of 2015 passenger car emissions is due to diesel cars). Emission reductions since 1970 from the energy sector are primarily due to shifts in the electricity generation fuel mix in the early 1990s from coal to natural gas, along with the installation of NOx abatement at coal-fired power stations. Since 2008, the installation of Boosted Over Fire Air systems across coal power stations to reduce NOx formation has led to a further decline in estimated emissions (NAEI, 2017).

3.13 Figure 3.7 shows the predicted NOx emissions in the UK between 1970 and 2016. The decline in predicted emissions since 2010 has not been reflected in the concentrations measured at many monitoring sites. While a similar observation was made for the NH_3 inventory, the causes are thought to be different, and this issue is discussed further in Chapter 7.

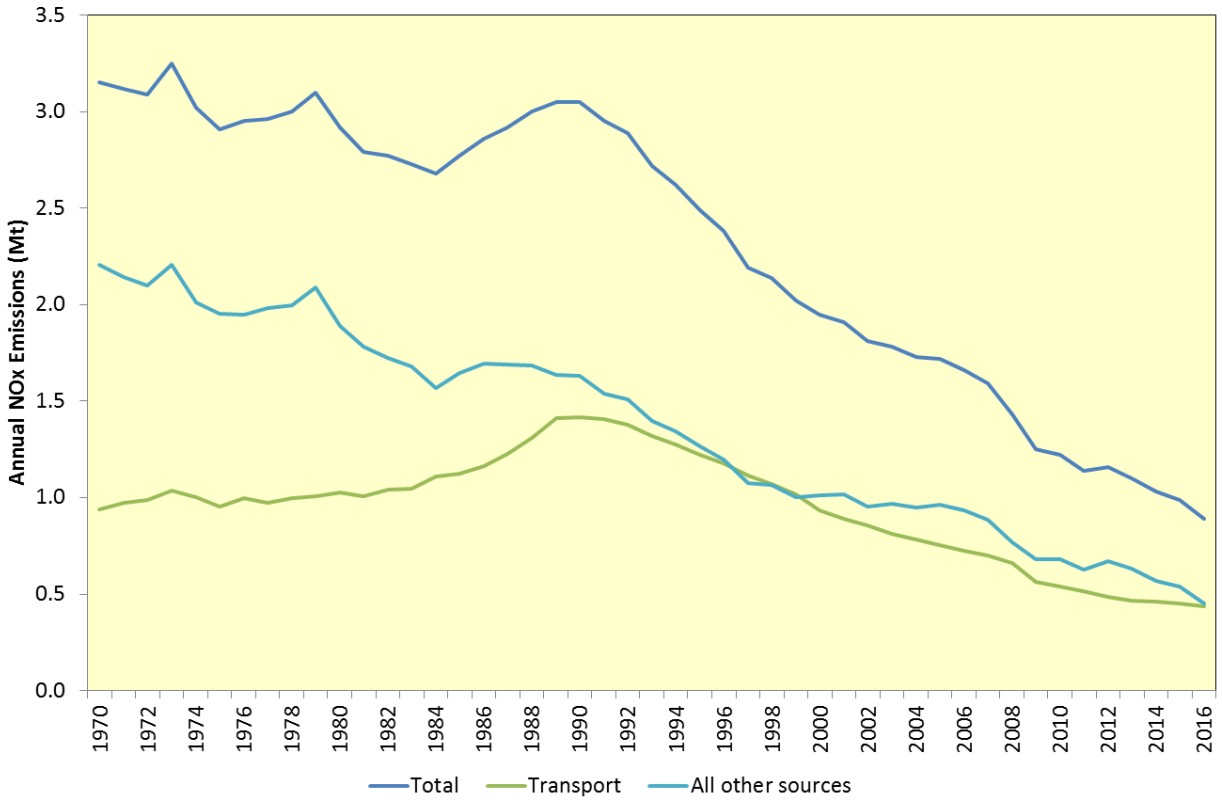


Figure 3.7: UK Total NOx Emissions: 1970 – 2016 (Defra, 2018b)

National Trends in Nitrogen Deposition

3.14 Accurate deposition measurements are not available prior to 1986, but Fowler *et al*. (2004) have constructed a chronology of nitrogen deposition in the UK for the 20th Century (see Figure 3.8). They extrapolated deposition rates to before the introduction of measured deposition fields under the assumption that the relationships between emission and deposition remain constant with time. This chronology suggests that UK deposition fluxes almost doubled in the period between 1940 and 1990, before reducing between 1990 and 2000.

3.15 Subsequently, total nitrogen deposition in the UK is thought to have declined by approximately a further 15% since 2000, with this driven by reductions in oxidised nitrogen. Reduced nitrogen deposition is not predicted to have changed appreciably since 2000.

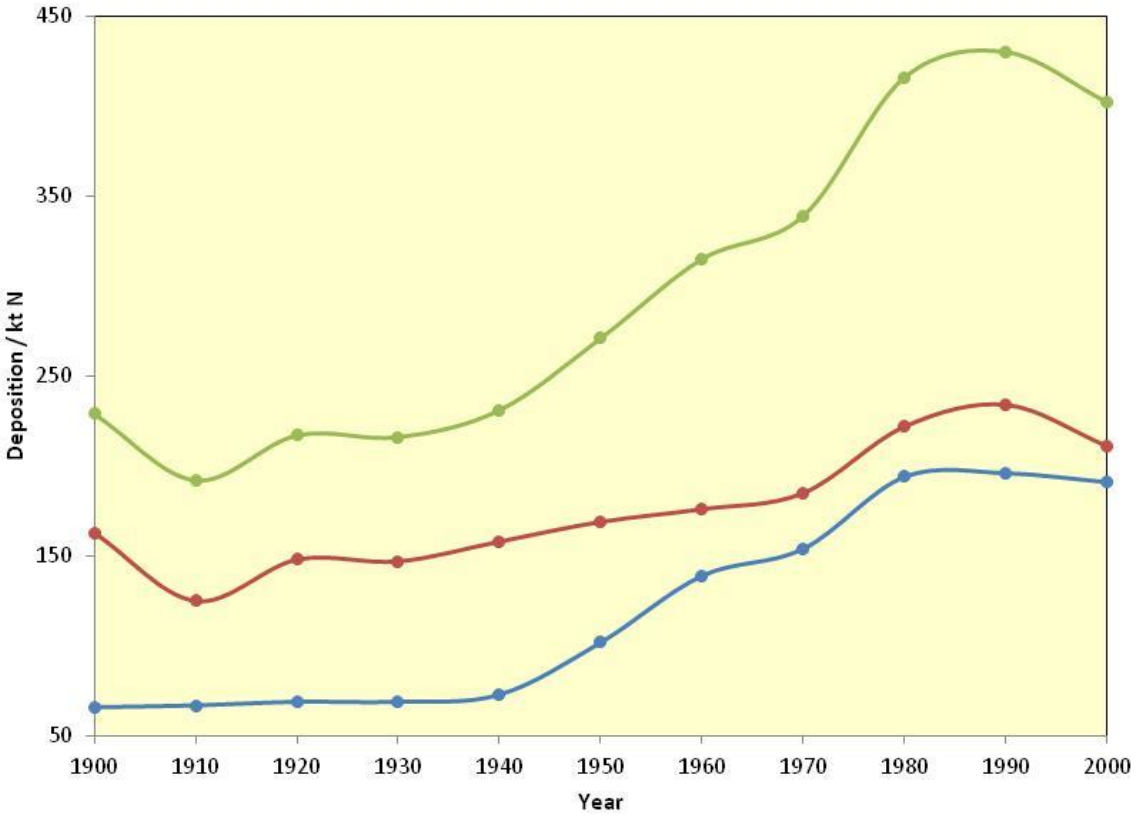


Figure 3.8: Predicted Historic Nitrogen Deposition to the UK during the 20th Century (After Fowler *et al*. (2004)) Blue line shows oxidised nitrogen, red line shows reduced nitrogen, and green line shows total deposition

Long-term Historic Trends in Nitrogen Deposition to Ashdown Forest

3.16 There is no reason to expect that the pattern of change for Ashdown Forest was appreciably different from that described above for the UK as a whole. It is thus likely that nitrogen deposition fluxes to Ashdown Forest are currently lower than they were in the early 1990's, but substantially higher than they were in the 1950's.

4 Monitoring Methodology

4.1 The approach taken to the air quality monitoring has been very detailed. A large number of monitoring sites have been used in order to improve the resolution of the available information. Furthermore, the methods used have been selected to provide a robust measured dataset. The approach taken thus goes well beyond what would be expected for a typical air quality assessment and the quality and value of the dataset is much greater as a result.

4.2 Ambient pollution concentrations have been measured using the following methods:

- 1 x continuous analyser measuring hourly-mean concentrations of NO_2, NO, and NHx;
- 102 x passive NO_2 diffusion tube sites, measuring monthly-mean concentrations of NO_2;
- 6 x DEnuder for Long-Term Atmospheric ('DELTA') II systems, measuring monthly-mean concentrations of NH_3, HNO_3, NH_4^+ and NO_3^- [7]; and
- 87 x Adapted Low-cost Passive High Absorption ('ALPHA') samplers, collocated in triplicate across 29 sites, measuring monthly-mean concentrations of NH_3.

4.3 In addition, traffic flows have been measured at eight sites across the SAC using Automatic Traffic Counters (ATCs). These counters accompany five sites which are operated by East Sussex County Council (ESCC).

Details of the NOX/NHx Continuous Analyser

4.4 The monitor is located beside the western kerb of the B2026 between New Road and High Road, as shown in Figure A3.1 in Appendix 1. The site is located within the grounds of Kingstanding police training grounds, which provides both a secure site and a fixed electrical power supply. The continuous analyser is shown in Figure 4.1, below.

4.5 The instrument is a Teledyne API T201 Chemiluminescent NH_x/NO_x combined analyser (NOx is the sum of NO_2 and NO). This measures NH_x, NO, NOx and NO_2. The instrument is housed in an air-conditioned enclosure to ensure correct operation. This is a pumped instrument, with air drawn in from an inlet at the roadside edge of the enclosure, 1.7 m from the kerb.

4.6 The instrument houses a fixed IP address modem, allowing data to be downloaded automatically to a remote server. The data were checked twice daily by trained staff in order to identify any data quality issues.

4.7 This type of monitoring method for NOx was used because it is the methodology used by Defra in its AURN network and it represents the 'reference' method for NOx and NO_2. A version of this

[7] The DELTA samplers also measure other components which are not of direct interest to this study, namely sulphur dioxide, hydrogen chloride, and particulate sulphate, chloride, sodium, calcium, and magnesium. These components are not mentioned further in this report.

monitor that can also measure NH_3 was chosen to provide more information on NH_3 concentrations.

4.8 Routine on-site calibrations were carried out each month. Scheduled services were carried out in April 2015, February 2016, and September 2016. In addition, external quality control audits were carried out by Ricardo Energy and Environment in November 2014, July 2015, January 2016, and August 2016. For NOx, the audits are carried out following the same procedures that Ricardo Energy and Environment applies when it audits the national network on behalf of Defra. These audits were carried out in order to improve the reliability of the data collected.



Figure 4.1: Automatic Monitor Enclosure at Kingstanding

4.9 The automatic monitor was commissioned on 29th October 2014 and the monitoring described in this report runs up to 1st August 2016. Ratification of the data has been based on calibration factors determined from the monthly calibrations and external audits, along with visual examination of the data and comparison with monitoring data from the nearby AURN monitor at Lullington Heath (Defra, 2018a). Any erroneous data have been flagged and removed from subsequent analysis. 1-hour and period means have then been calculated.

4.10 The automatic monitor achieved more than 95% data capture between 29th October 2014 and 1st August 2016. Some data were subsequently removed during the ratification process, but the ratified data capture remained above 90% for all pollutants.

Details of the NO_2 Diffusion Tubes

4.11 The NO_2 diffusion tubes are termed 'passive' samplers in that they do not pump air and thus require no power supply. They are 7.1 cm long plastic tubes with an absorbent grid at one end. Gas diffuses up the tube and is collected on the absorbent. After exposure, the entire tube is returned to the laboratory for analysis. All diffusion tubes were supplied and analysed by Gradko Environmental using the 20% TEA in water method. Gradko Environmental holds United Kingdom Accreditation Service (UKAS) accreditation to ISO 17025:2005 for this service.

4.12 NO_2 diffusion tubes have been used for this project since they provide reasonable information on long-term NO_2 concentrations for a relatively low cost and with minimal infrastructure requirements. This means that it has been possible to sample NO_2 concentrations at a large number of sites and thus improve knowledge of concentrations across the SAC.

4.13 The site locations are shown in Figure A3.2 to Figure A3.11 in Appendix 1. Single tubes are exposed at each site, with the exception of triplicate tubes co-located with the automatic monitor. Tubes are either attached to street furniture (lamp posts etc.) or to wooden posts. Figure 4.2, below, shows one of the NO_2 diffusion tube sites. The sites comprise kerbside[8], roadside and background locations, as well as four transects. Each transect is made up of 8 sites located at increasing distances from the kerb. The first site is as close as possible to the kerb, the next site is 2.5 m from the kerb, and then the next five sites are 5 m, 10 m, 22 m, 50 m, 100 m, and 200 m from the kerb[9]. The four transects were:

- running west of the A22 between Nutley and Wych Cross (Transect 1 = Sites R1.1 to R1.8);
- running east of the A22 between Nutley and Wych Cross (Transect 2 = Sites R2.1 to R2.8);
- running east of the B2026 between New Road and High Road (Transect 3 Sites R3.1 to R3.8); and
- running north of the A26 at Poundgate (Transect 4 = Sites R4.1 to R4.7 and Site T18[10]).

[8] Kerbside sites are within 1 m of the kerb.

[9] Transects 1, 2 and 3 were initially installed (in October 2014) with a monitor 1 m from the kerb. The following month, as a result of concerns raised by the Conservators of Ashdown Forest regarding ease of access for mowing equipment, these monitors were moved back 70 cm, to be 1.7 m from the kerb. In other respects, the positions of the monitors have not altered since they were first installed.

[10] The gorse 200 m along Transect 4 was impenetrable and thus site T18 has been used to represent conditions 200 m from this road.



Figure 4.2: Diffusion Tube Monitor (Site T43)

4.14 The first NO_2 diffusion tube monitors were exposed on 7th August 2014 and the monitoring described in this report runs up to 9th August 2016. Each exposure has been for approximately 4 weeks.

4.15 The initial exposures of NO_2 diffusion tubes were staggered over a number of months. This was principally because it was not possible to define all of the site locations at the outset of the study. In addition, the practicalities of setting up such a large number of sites, and the requirement for certain sites to be co-located with other monitors and the vegetation survey transects, meant that all of the monitoring could not begin concurrently. There have been some issues with vandalism, with the resulting loss of some of the monitors. With the exception of losses due to vandalism, there has been complete data capture at each site over each site's monitoring period. Table 4.1 summarises the data capture at the diffusion tube sites. Owing to repeated vandalism, which involved repeated removal not only of the monitoring equipment but also of the post to which it was attached, one site only achieved 15 month's data (Site R1.8). Because the monitoring periods were then quite different, the period-average measurements at this site appear to be significantly different from those at other nearby sites (for example, the period mean at this site, which is 200 m from the road, was higher than that at the sites at 100, 50, 22, 10, and 5 m from the same road). Because of this, this site has been excluded from subsequent analysis.

Table 4.1: Summary of Diffusion Tube Data Capture

Months of Data	Number of Diffusion Tube Sites
24	25
23	18
22	22
21	7
20	12
19	8
18	7
17	2
16	2
15	1

4.16 For each site, a period average NO_2 concentration has been calculated, taking account of the precise number of hours in each individual monitoring period. The average monthly profile at those roadside or kerbside sites with a full 24 months of data has then been determined. This profile has been used to predict the concentration during each missing month at the remaining roadside or kerbside sites. The same procedure was then repeated for the background sites. As an example of this, Site T2 was missing data for Month 2. At the 23 roadside and kerbside sites with a full 24 months of data, inclusion of Month 2 raised the overall average concentration by 1.1% (when compared with an average excluding Month 2). The 23-month mean concentration at Site T2 has thus been increased by 1.1%. This process has been termed 'annualisation', even though it brings about parity with two-years of sampling rather than with one year.

4.17 The annualised data have finally been adjusted for bias. The 2015 annual mean factor taken from the spreadsheet (V06/16) available from Defra (Defra, 2018a) has been used. Thus, all concentrations have been multiplied by a factor of 0.88. Analysis carried out by the authors of this report determined that the principal causes of diffusion tube bias relate to issues within the laboratory (AEA Energy and Environment, 2008). Since the national colocation factor was based on 30 studies, compared to the single local study, it was considered to be more robust. Furthermore, Box 7.11 of Defra's technical guidance on local air quality management (Defra, 2016a) explains that the national co-location factor will be more appropriate than a local factor when "*the survey consists of tubes exposed over a range of settings, which differ from the co-location site*". This is considered to apply to this study, which includes diffusion tube sites which range from busy kerbside sites to background sites.

Details of the DELTA Samplers

4.18 Each DELTA system consists of an extended denuder-filter pack sampling train through which ambient air is drawn by a pump, with air volume captured by a high sensitivity dry gas meter

(Connolly et al, (2016)). The walls of the denuders (borosilicate glass tubes) are coated with acid and alkaline solutions which capture basic (NH_3) and acidic (HNO_3) gases respectively. Particles are then collected on filters. Each set of tubes and filters is exposed for one month before the samples are returned to the laboratory for analysis. By comparing the amount of material deposited on the sampler with the volume of air drawn through the system, as recorded by a gas flow meter, the average ambient concentration during the monitoring period is derived. The DELTA samplers are provided and analysed by CEH.

4.19 DELTA samplers were used for this project as they form the basis of Defra's NAMN and AGANet networks and thus form the 'reference' method for measuring NH_3 and HNO_3 in the UK.

4.20 The locations of the six DELTA monitors are shown in Figure A3.12 in Appendix 1. One of the sites (A1) is co-located with the automatic monitor and takes electricity from the same fixed power source. The remaining five sites are equipped with their own solar panels and wind generators, along with deep cycle batteries to generate and store electricity.

4.21 Two of the DELTA sites represent background conditions. The remaining three are all roadside sites. The roadside sites are:

- 5 m from the A26 at Poundgate (Site R4.3);
- 5 m from the A22 between Nutley and Wych Cross (Site R1.3); and
- 5 m from New Road, between the B2026 and the A26 (Site T71).

4.22 Figure 4.3 shows one of the DELTA samplers, together with its wind generator.



Figure 4.3: DELTA Sampler, Wind Generator, Gas Meter, and Solar Panel (Site T71)

4.23 All six DELTA denuder sites were installed on the 12th November 2014 and the monitoring described in this report runs up to the 3rd June 2016[11].

4.24 In December 2014, a combination of atypically low sunlight levels combined with low wind speeds caused four of the sites to generate insufficient electricity to function. The affected sites were R1.3, T71, T41, and R4.3. At two of the sites, this problem corrected itself[12] the following month. The other two sites did not produce usable data until additional equipment was installed in March 2015. The sites were subsequently equipped with additional solar panels and batteries and, while low light levels did reduce flow rates during the subsequent winter, this was insufficient to invalidate the data collected.

4.25 Two further issues have also affected data capture. In February 2015, site R1.3 was targeted by thieves. Replacement equipment was installed in early March 2015, together with better security. In April 2015, a wildfire engulfed Site T41, destroying the equipment. The site was brought online again in August 2015. Data capture at each site for acid and basic gases over the 19 month monitoring period is set out in Table 4.2. Capture rates for some of the particulate species was marginally lower since some of the concentrations were below the limit of sample detection and some of the samples were flagged as contaminated. Checking and screening of DELTA measurement data follows the protocols in the quality management system applied to the UK air monitoring networks (Tang and Sutton (2003), Conolly et al. (2016)). This includes screening the

11 This date reflected the availability of data from CEH and was agreed in advance with WDC.

12 To the extent that data could be salvaged.

whole dataset for sampling anomalies and outliers, e.g. due to contamination or other issues.

4.26 Only Site T46 has achieved 100% data capture. The data from the remaining sites have thus been 'annualised' to the period mean from the T46 analyser following the same method described for nitrogen dioxide in Paragraph 4.16. Because concentrations vary by season, if the data had not been 'annualised' in this way then the results would be biased, in that the seasonal factors affecting those months with better data capture would be afforded a disproportionate weight in the overall average concentrations. This annualisation will have magnified the effect of any uncertainties associated with data which have been used to 'gap fill', but this is considered vastly preferable to the alternative of accepting that seasonal factors have been misrepresented. The annualised data are considered to be the most robust dataset to use for this study. Even after this annualisation, there remained some seasonal bias, because of the fact that the monitoring study did not cover two complete years. In order to remove this residual seasonal bias, the data have finally been adjusted to double-count the June to October 2015 measurements (i.e. to make a full 24-month monitoring period, which was then averaged)[13]. As with the annualisation, the benefit of this approach is that it removes seasonal bias, which would result in misreporting annual mean concentrations. The risk is that it places more emphasis on the results from some months than those from others. Overall, the approach taken is considered to be the most robust.

Table 4.2: Percentage Data Capture for Gases by the Delta Samplers over the 19 Month Period between November 14 and June 2016

Site	Data Capture
R1.3 (D1)	91%
T46 (D2)	100%
A1 (D3)	96%
T71 (D4)	91%
T41 (D5)	53%[a]
R4.3 (D6)	95%

[a] Equipment destroyed by fire.

Details of the ALPHA Samplers

4.27 Like the NO_2 diffusion tubes, the ALPHA samplers are passive samplers. Each ALPHA sampler is a short, flat tube with an absorbent filter paper at the top and a PTFE membrane across the inlet at the bottom (Figure 4.4) (Tang et al., (2001)). Air passes through the PTFE membrane and NH_3 is collected by the filter paper. After exposure, the samplers are returned to the laboratory for analysis. The ALPHA samplers are supplied and analysed by CEH.

4.28 ALPHA samplers were used for this project as they are cheaper than DELTA samplers and require less infrastructure. They can thus be used in greater numbers than DELTA samplers and can be deployed in locations where the siting of DELTA samplers would be impractical. ALPHA

[13] The June to October data were counted twice since it was these months which were missing from a complete consecutive 24-month period.

samplers are used as part of the NAMN and have been shown to be reasonably accurate.

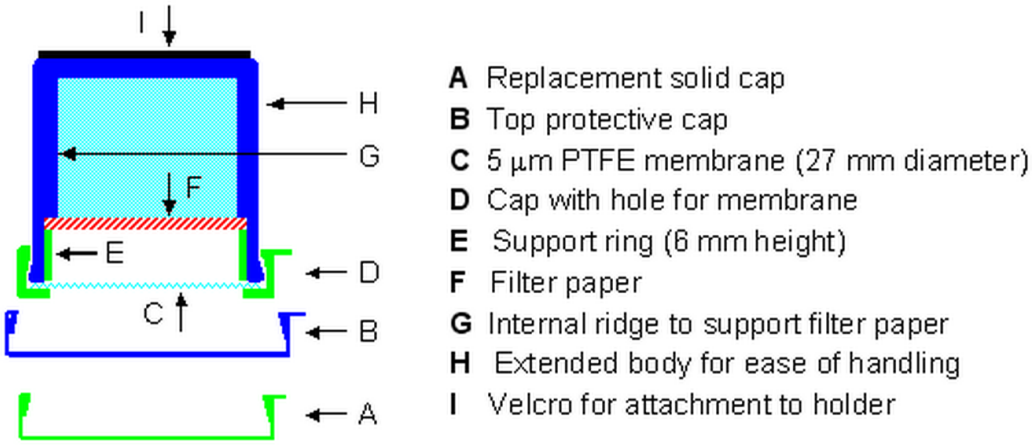


Figure 4.4: Diagram of an ALPHA sampler[14]

4.29 Each month, 87 ALPHA samplers are exposed in triplicate across 29 monitoring sites as shown in Figure A3.13. Triplicate samplers are used in order to provide more reliable measurements and to replicate the operation of the NAMN.

4.30 One of these 29 sites is co-located with the automatic monitor and DELTA sampler at Kingstanding police station (A1) and one is co-located with the DELTA site beside the A26 at Poundgate (site R4.3).

4.31 Eighteen of the sites are arranged over three transects. Each transect is made up of 6 sites located at increasing distances from the kerb. The first site is located as close as possible to the kerb, the next site is 2.5 m from the kerb, and then the next four sites are 5 m, 10 m, 22 m, and 100 m from the kerb. The three transects are:

- running west of the A22 between Nutley and Wych Cross (Transect 1 = Sites R1.1, R1.2, R1.3, R1.4, R1.5, and R1.7);
- running east of the A22 between Nutley and Wych Cross (Transect 2 = Sites R2.1, R2.2, R2.3, R2.4, R2.5, and R2.7); and
- running east of the B2026 between New Road and High Road (Transect 3 = Sites R3.1, R3.2, R3.3, R3.4, R3.5, and R3.7).

4.32 The remaining sites are located close to locations that are being used for ecological surveys.

4.33 All of the ALPHA samplers are affixed to wooden posts at heights of approximately 2 m above the ground. Each set of three samplers is attached to an aerodynamically shaped support. Figure 4.5 shows one of the ALPHA sites.

[14] pollutantdeposition.defra.gov.uk

4.34 Twenty-five of the ALPHA sites were commissioned between the 12th and 13th of November 2014. Four additional sites were commissioned between the 9th and 11th of December 2014. The monitoring described in this report runs up to the 3rd June 2016. There were issues with vandalism which affected Sites R2.4, R2.5, R2.7, T59, T61, and T67. Table 4.3 summarises the data capture at each of the ALPHA monitoring sites.

4.35 Following the same method described for nitrogen dioxide in Paragraph 4.16, data were 'annualised' against the results from those sites which achieved 100% data capture. In order to remove seasonal bias, the data have finally been adjusted to double-count the June to October 2015 measurements (i.e. to make a full 24-month monitoring period, which was then averaged)[13].



Figure 4.5: Example of an ALPHA Site

Table 4.3: Percentage Data Capture by the Alpha Samplers over 19 Month Period between November 14 and June 2016

Site	Data Capture	Site	Data Capture
R1.1	100%	R3.4	100%
R1.2	100%[a]	R3.5	100%[a]
R1.3	100%	R3.7	100%[a]
R1.4	100%	T59	79%[b]
R1.5	100%	T61	84%[b]
R1.7	100%	T62	100%
R2.1	100%	T65	100%
R2.2	100%[a]	A1	100%
R2.3	100%	T67	89%[b]
R2.4	84%[b]	T14	100%
R2.5	74%[b]	T69	100%
R2.7	84%[b]	T68	100%
R3.1	100%	T70	100%
R3.2	100%	R4.3	100%
R3.3	100%	-	-

[a] Over the 18 month period starting December 2014

[b] Issues with vandalism which affected Sites R2.4, R2.5, R2.7, T59, T61, and T67

Combined sites

4.36 Where appropriate, sites are equipped with more than one type of monitor. For example Transects 1, 2, and 3 were used for both NO_2 diffusion tubes and ALPHA samplers. Table A2.1 (Appendix 1) provides details of all of the sites.

Colocations with Ecological Survey Transects

4.37 Figure 4.6 shows the indicative locations of the ecological survey transects. Each ecological transect was made up of a number of quadrats, within which samples were taken, as indicated by the black dots in Figure 4.6. The air quality monitoring transects are not precisely co-located with the ecological survey locations. This was to avoid any disturbance that might have been caused by the routine servicing of the air quality monitoring sites altering the vegetation being surveyed. Three of the air quality monitoring transects are, however, very close to the ecological transects. Air quality monitoring Transect 2 runs parallel to ecological monitoring Transect J, air quality Transect 1 runs parallel with ecology Transect J, and air quality Transect 3 runs parallel with ecology Transect N. Furthermore, roadside and background NO_2 diffusion tube monitoring sites have been positioned close to each of the other ecological monitoring transects, as indicated in Table 4.4.

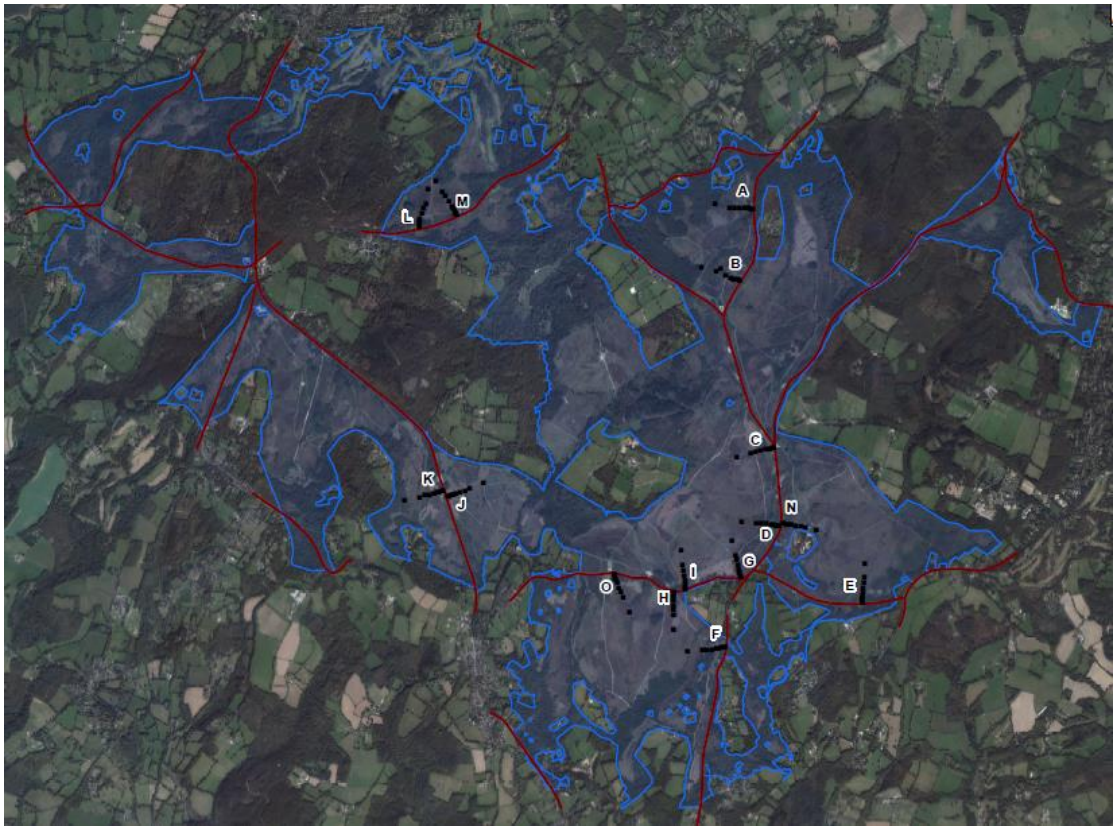


Figure 4.6: Transect Locations used for Ecological Surveys

Image courtesy of Ecus Ltd. Base mapping source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Table 4.4: Colocation of Ecological and Air Quality Monitoring Sites

Ecological Monitoring Transect	Representative Air Quality Monitoring Sites (Roadside and Background, or Full Transect)
A	T13,T69
B	T14,T69
C	T67,T7
D	T66,T60
E	T65,T64
F	T62,T63
G	T61,T60
H	T40,T39
I	T40,T41
J	Air Quality Monitoring Transect 2
K	Air Quality Monitoring Transect 1
L	T5,T57,T70
M	T68,T57,T70
N	Air Quality Monitoring Transect 3
O	T59,T39

Details of the Automatic Traffic Counters

4.38 The ATCs consist of pneumatic loops buried in the surfaces of the roads. Vehicles travelling along the roads depress the loops, causing pneumatic pulses to be sent to the counter units. The counter units stand at the roadsides and are powered by solar panels and batteries. They are fitted with modems to allow the data to be polled remotely. The ATCs were installed, and are maintained, by Q-Free TDC and use Hi-TRAC UTC-L systems. Figure 4.7 shows one of the ATC units. ATCs were used for this project following the advice of Sussex County Council.

4.39 The sites were located so as to complement the existing ATC sites in the area which are operated by ESCC. The ATC site locations are shown in Figure A3.14 in Appendix 1.



Figure 4.7: ATC Control Box and Loop

4.40 The ATCs were installed between 30th August and 13th September 2015. The data presented and used in this report run up to the 3rd September 2016 (i.e. roughly 12 months). On 6th March 2016 Site 1206 was vandalised and was not recommissioned until 9th August 2016. The long delay in recommissioning related to delays in agreeing the costs to replace the equipment and the subsequent lead time in ordering the equipment. Some isolated data were also removed during the quality assurance process. Table 4.5 summarises the resultant data capture for the ATC sites.

4.41 In order to derive annual average flows on the road represented by Site 1206, the ratio of the annual average flows at ESCC Sites 129 and 16 (see Figure A3.14) were calculated and compared with the average flows over the period for which data at Site 1206 were available. The measurements from Site 1206 were then multiplied by the average ratio for each vehicle type

from these two sites (i.e. following the same approach used to 'annualise' the air quality monitoring data). As with the air quality monitoring data, if this had not been done, then the data would have been seasonally biased. Because Sites 129 and 16 are both also on the A22, these are considered to ideally represent the likely seasonal patterns along this section of the A22. Using the data in this way removes the potential for seasonal bias.

Table 4.5: Percentage Data Capture for the ATCs

Site	Data Capture
1201[a]	98%
1202[a]	100%
1203[a]	100%
1204[a]	97%
1205[b]	95%
1206[b]	56%[c]
1207[b]	100%
1208[b]	100%

[a] Period 30/08/15 to 03/09/16
[b] Period 19/09/15 to 03/09/16
[c] Affected by vandalism

5 Modelling Methodology

5.1 The purpose of the modelling is to provide part of the evidence base that Wealden District Council can use to assess the impacts that additional road traffic generated by the Wealden Local Plan, on roads contained within the Ashdown Forest Transport Model (see Figure 5.1), will have on the Ashdown Forest SAC. The modelling does not consider any effects of the Local Plan on non-traffic emissions, or on emissions from traffic on roads which are not included in the Ashdown Forest Transport Model. The main focus of the modelling is to determine ambient concentrations and deposition fluxes over the entire SAC in a number of different scenarios, but attention has also been given to predicting existing concentrations and fluxes at the quadrats used for the ecological surveys.

5.2 As with the air quality monitoring method, the approach taken to air quality modelling goes well beyond the level of detail that would typically be used for an air quality assessment. It covers pollutants that would very frequently be ignored, and provides a very detailed investigation into local patterns of dispersion and deposition, going further than would be the case, for example, for an assessment to accompany a planning application. In many respects, the approach follows tried and tested methods which are recommended in relevant guidance documents. In some instances, no appropriate methodologies exist in guidance and it has been necessary to devise bespoke approaches developed by suitably qualified air quality professionals. In all cases, the approaches taken have been selected to be realistic and representative.

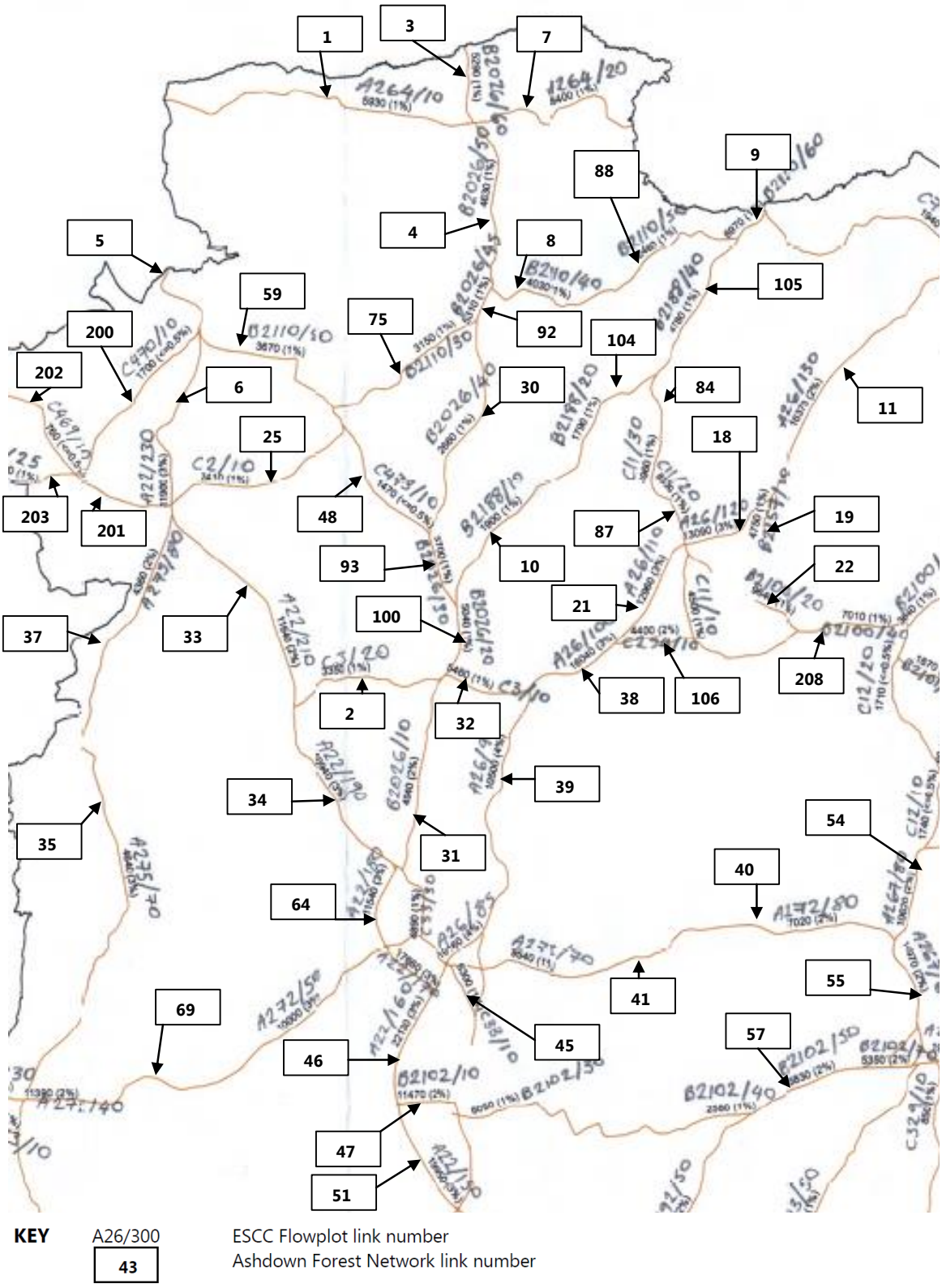


Figure 5.1: Roads Included in the Ashdown Forest Transport Model (figure prepared by gta civils Ltd. Those roads with boxed numbers – with the exception of link 47 – are those included in the Transport Model)

Modelling Scenarios

5.3 Modelling has been carried out for several alternative scenarios. These are described in Chapter 6 of this report, but for ease of reading can broadly be described as follows.

5.4 Three different emissions models have been considered:

- emissions model A – in which emissions per vehicle are the same as those in 2015 (for which the model has been verified against local measurements) and emissions from non-traffic sources are matched as closely as possible to this rule;
- emissions model B – in which emissions per vehicle fall between 2015 and 2028 in line with the CURED 3A emissions model (AQC, 2017) and emissions from non-traffic sources are, again, matched as closely as possible to this rule; and
- emissions model C – in which emissions per vehicle fall between 2015 and 2028 as predicted in Defra's emissions factors toolkit V8.0.1 (Defra, 2018a) and emissions from non-traffic sources are matched as closely as possible to this rule.

5.5 Three different traffic datasets are considered:

- existing traffic;
- existing traffic + background growth to 2028; and
- existing traffic + background growth to 2028 + the Wealden Local Plan.

5.6 Finally, two different deposition models have been used:

- the "EA method" - which follows an approach described by the Environment Agency; and
- the "AQC method" - which has been developed for this study to mimic the approach used in the national-scale deposition modelling carried out by CEH for Defra.

5.7 Specific details of these methods are set out in subsequent sections of this chapter. How these scenarios have been used to consider the impacts of the Wealden Local Plan is described in Chapter 6, along with a summary of what is, and what is not, included in each scenario.

Calculating Annual Mean NOx from Measured Annual Mean NO_2 Concentrations

5.8 Defra has provided predictions of background NO_2 and NOx concentrations on a 1 km x 1 km grid basis across the UK using its 2016-based emissions inventory (Defra, 2018a). These predictions for 2015 have been extracted for an area extending 10 km in each direction from the approximate centre of the SAC. The NO_2 and NOx concentrations are plotted against each other in Figure 5.2. It has been assumed that the relationship shown in Figure 5.2 accurately describes the NO_2 quotient in NOx at background sites in Ashdown Forest. This relationship has been used to calculate annual mean NOx concentrations at those NO_2 diffusion tube monitoring sites which are

considered to provide a good representation of background conditions (i.e. T7, T9, T26, T27, T30, T39, T41, T43, T45, T46, T50, T55, and T57). This method has been used since it reflects the approach advised by Defra for Local Air Quality Management (LAQM) purposes and because Defra's maps are considered to provide a reasonable indication of NO_2 to NOx ratios.

5.9 In order to predict annual mean NOx concentrations at the non-background sites, i.e. those sites affected by emissions from local roads, Defra's NO_2 from NOx calculator (Version 6.1) (Defra, 2018a) has been used. The traffic mix has been set to 'all non-urban UK traffic', the year has been set to 2015[15], and the background NO_2 concentration has been taken to be the average of the measurements at the background sites listed above. The proportion of primary NO_2 (fNO_2) at each site has been predicted at each site individually (i.e. a different value of fNO_2 has been used at each monitoring site) following the method described later (at Paragraph 5.35). At each site, the NO concentration has been calculated as the difference between NOx and NO_2. This method has been used since it reflects the approach advised by Defra for Local Air Quality Management (LAQM) purposes. Validation of Version 1 of Defra's NO_2 from NOx calculator, carried out by AQC on behalf of Defra, showed good agreement against measured concentrations.

[15] 2015 has been used since it represents the only full calendar year of the monitoring period, and also covers half of the monitoring period. Within the NO_2 from NOx calculator, the choice of year determines the proportion of primary NO_2 emissions and also the ozone concentration. Neither of these factors experience significant year-on-year step changes and so using 2015 to represent the entire monitoring period is considered to be appropriate.

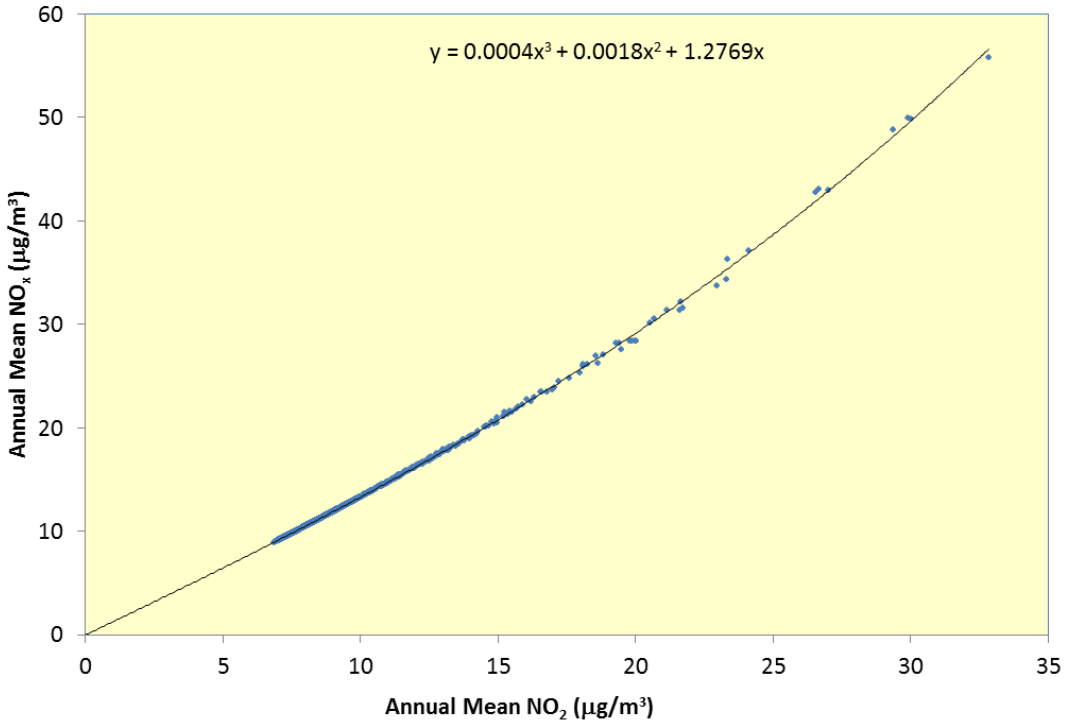


Figure 5.2: Local Background NOx to NO_2 Relationship

Background Concentrations

5.10 The term 'background concentration' is used in this chapter to denote the concentrations that would occur without any emissions from those sources which have been modelled explicitly (i.e. the roads within the Ashdown Forest Transport Model). The contribution from these, explicitly-modelled, sources is then added on to this 'background' to give the 'total' concentration. In practice, it is very difficult to accurately determine the background as defined in this way, since the concentration without any local roads cannot be measured. In practice, given the level of accuracy of the measurements, those concentrations which are measured at 'background sites' (see Chapter 4) (i.e. those sites located well away from any roads) will be very similar to those which exclude all of the local modelled roads. This does not mean that changes to traffic emissions from the modelled roads will not affect concentrations at background monitoring sites; just that the measurements at these sites give the best available representation of what the 'background concentrations' as used in this chapter will be.

5.11 Adding the contribution from the explicitly-modelled roads onto the concentrations measured at the background monitoring sites will inevitably introduce an element of double counting, but within the context of other sources of uncertainties (see Chapter 7), this error will be small and the approach is considered to be acceptable.

5.12 The approach has thus been to define the existing background concentration field using results from the measurements, and to define total concentrations by adding onto this background the contribution from the explicitly-modelled roads. It has also been necessary to adjust the background concentration field to reflect the likely situation in 2028 in the different alternative

emissions scenarios.

Annual Mean Background Concentrations for Emissions Model A

5.13 Measurements made at the background monitoring sites are set out in detail in Chapter 8, and these have been used for all modelling carried out under emissions model A. The diffusion tube monitoring sites which are considered to provide a good representation of background conditions are T7, T9, T26, T27, T30, T39, T41, T43, T45, T46, T50, T55, and T57. No obvious spatial patterns were evident in the annual mean concentrations measured at these sites, and so the annual mean background NO_2 concentration used in the modelling is taken to be the average of the concentrations measured at these sites. The background NOx concentration has been calculated from this value using the relationship described in Paragraph 5.8. For NH_3, fewer background monitoring sites were available and so the approach has been to supplement the measurements from the background monitoring sites with the results from the transects in order to infer an appropriate background concentration. Further details of this approach are set out in Paragraph 5.61. The annual mean background NO_2, NOx, and NH_3 concentrations used in the model are set out in Table 5.1.

5.14 No significant relationships have been identified between NOx or NO_2 and either HNO_3, or any of the relevant particulate species. This is to be expected since the formation time of these species is very different to that of NO_2. As shown in Chapter 8, all of the measured concentrations of HNO_3 and the relevant particulate species fall within a relatively small range and so the modelling has assumed a uniform concentration field of these pollutants across the entire study area, with the concentration taken as the average of the measurements. In the case of these pollutants, there is then also assumed to be no increment from explicitly-modelled roads (i.e. local traffic, including that associated with the Wealden Local Plan, is assumed not to affect concentrations of these pollutants). The annual mean background concentrations of HNO_3, and particulate NH_4^+, NO_3^- and NO_2^- used in the model are set out in Table 5.1.

Table 5.1: Annual Mean Modelled Background Concentrations of NO_2, NOx, NH_3, HNO_3, NH_4^+, NO_3^- and NO_2^- as Used in the Modelling [a]

Pollutant	Emissions Model A	Emissions Model B	Emissions Model C
NO_2	7.9	5.7	
NOx	10.4	7.4	
NH_3	0.58	0.62	
HNO_3	0.97	0.68	0.63
NH_4^+	0.75	0.81	
NO_3^-	1.56	1.12	1.04
NO_2^-	0.03	0.02	0.02

[a] rounded values are presented here, but unrounded numbers were used for modelling

Annual Mean Background Concentrations for Emissions Models B and C

NOx and NO_2

5.15 Defra's (2016-based) national maps of background NOx and NO_2 concentrations (Defra, 2018a) have been used to predict the rate of reduction in non-traffic background concentrations between 2015 and 2028. This method was used since it follows the approach that Defra advises for LAQM purposes. Each of the 69 1 x 1 km grid squares that the SAC falls within were first selected from the national maps. Next, all road traffic sources were removed following the approach provided by Defra (Defra, 2018a). The ratio of non-traffic background concentrations in 2028 to that in 2015 was then calculated for each grid square. The average ratio was then calculated for NO_2 and NOx separately. These ratios are given in Table 5.2 and suggest that the non-traffic components of NOx and NO_2 concentrations in 2028 will be about 70% of those in 2015. Because the road traffic components of the background maps have been subtracted, emissions Models B and C are identical for this component.

Table 5.2: Assumed Reduction in Non-Traffic Background NOx and NO_2 Concentrations from Model A to Models B and C

	Future-year Concentration as % of 2015 Concentration	
	NOx	**NO_2**
Maximum	72.7%	74.1%
Mean	71.0%	72.2%
Minimum	69.8%	71.1%

HNO_3 and particulate NO_3^- and NO_2^-

5.16 Trends in concentrations of HNO_3 and particulate NO_3^- and NO_2^- are likely to follow those in NOx. Predicting background concentrations of these pollutants thus follows a similar approach to that for NOx, but because these species form over greater distances, the model domain has been expanded, and traffic emissions have not been removed. First, Defra's maps of ambient background NOx concentrations in 2015 and 2028 (Defra, 2018a) for the 24,000 1 km x 1 km grid squares that make up the southeast of England have been obtained. For emissions model B, the road-traffic components of NOx have been uplifted in line with the CURED model (AQC, 2017). For emissions model C, the background maps have been used directly.

5.17 The ratios of the 2028 prediction to the 2015 prediction at each square have then been calculated. On average, the predictions for models B and C are 70% and 65% respectively of those for model A. The measured concentrations of HNO_3 and particulate NO_3^- and NO_2^- have thus been multiplied by 0.701 and 0.653 to estimate future-year values.

Table 5.3: Assumed Reduction in HNO_3 and particulate NO_3^- and NO_2^- from Model A to Models B and C

	Future-year Concentration as % of 2015 Concentration	
	Model B	**Model C**
Maximum[a]	105.2%	104.9%
Mean	70.1%	65.3%
Minimum	48.9%	42.8%

[a] the maxima in this table reflect an assumption in Defra's maps that background NOx concentrations close to the Port of Dover will increase between 2015 and 2028.

NH_3 and Particulate NH_4^+

5.18 For the reasons explained in Paragraph 5.62, there are no emissions models B or C for NH_3 from local traffic, but in order to provide robust estimates of total nitrogen deposition under models B and C, background NH_3 and particulate NH_4^+ in the future have been scaled using national-level projections.

5.19 Whilst it would be preferable to calculate source-specific emissions in 2015 and use detailed process information to model year-by-year changes in emissions from each source individually, such an approach would require resources well beyond the scope of this study. A best estimate has been calculated by multiplying existing annual mean background concentrations by the expected change in national ammonia emissions between 2015 and 2028. Given other sources of uncertainty, this approach is considered to be appropriate; although, in particular, it is noted that the published projections do not take account of recent commitments and proposals at both European and UK levels to reduce NH_3 emissions and so future-year background projections may prove to be precautionary. Defra has calculated the UK total NH_3 emissions in 2015 to be 272.11 kt, and predicted that the emissions in the future will be 283.82 kt in 2020, 288.93 kt in 2025, and 294.33 kt in 2030 (Defra, 2012). Interpolating between the 2025 and 2030 values gives an estimate for 2028 of 292.17 kt. The existing (model A) background NH_3 and particulate NH_4^+ concentrations have thus been multiplied by 292.17 / 272.11. This clearly over-simplifies what is likely to happen (for example, changes in the emissions of acidic gases over this period will change the behaviour of NH_3) but it nevertheless provides a useful estimate.

5.20 All of the annual mean background concentrations used in the model are set out in Table 5.1.

Time-variance of Background Concentrations

5.21 For the deposition modelling (see Paragraph 5.109 onward), it is necessary to calculate the background NO_2, NO, and NH_3 concentrations during each of the following time periods: winter night, winter day, summer night, and summer day[16], with the winter day and summer day periods

[16] In this context, summer is defined as starting on 1st April and winter is defined as starting on 1st October. Daytime and night time have been calculated for each day of the year separately based on the day-specific hours of sunrise and sunset. The subdivisions (Winter Day 1-3 and Summer Day 1-5) are described in in the section on deposition modelling beginning in Paragraph 5.109.

then subdivided into 3 and 5 sub-periods respectively. The reason why these periods have been modelled separately is explained in the section on deposition modelling (Paragraph 5.109 onward). The model does not require period-specific background concentrations of HNO_3, or particulate NO_3, NO_2^-, or NH_4^+.

NOx and NO_2

5.22 Hour-by-hour NO_2, NOx and NO concentrations for the period 7th August 2014 to 9th August 2016 have been taken from Defra's AURN sites at Brighton Preston Park, Canterbury, Rochester Stoke, and Eastbourne (Defra, 2018a). These are the background sites nearest to the study area that had more than 80% data capture during each time period between these dates. The ratios of the average concentrations in each period to the annual average concentrations have then been calculated. These are shown in Table 5.4. The ratios are very consistent across the four sites and it is thus considered that the averages shown in Table 5.4 are likely to provide a good representation of background conditions in the SAC. The average measured background concentrations within the SAC have thus been multiplied by the average factors shown in Table 5.4. These backgrounds have been used in the dispersion modelling and deposition calculations. This approach has been chosen since it is considered to give the most reliable indication of the temporal variation in background NOx and NO_2 concentrations over the course of a day. There is no reliable way to predict how diurnal variation in background concentrations might change in the future, so these factors have been assumed to remain constant across all emissions models.

Table 5.4: Ratio of Period Average to Annual Average Concentrations at Four AURN Sites

Period	Brighton Preston Park	Canterbury	Rochester Stoke	Eastbourne	Average
			NO_2		
Winter Night	1.19	1.24	1.24	1.18	1.21
Winter Day 1	1.59	1.70	1.63	1.60	1.63
Winter Day 2	0.95	1.05	1.03	0.89	0.98
Winter Day 3	0.79	0.84	0.85	0.76	0.81
Winter Day All	1.07	1.16	1.14	1.03	1.10
Summer Night	0.94	0.87	0.86	0.73	0.85
Summer Day 1	0.91	0.92	0.87	0.83	0.88
Summer Day 2	0.78	0.73	0.71	0.76	0.74
Summer Day 3	0.67	0.63	0.64	0.60	0.63
Summer Day 4	0.56	0.61	0.62	0.43	0.55
Summer Day 5	0.39	0.50	0.49	0.35	0.43
Summer Day All	0.70	0.70	0.69	0.63	0.68
			NOx		
Winter Night	1.28	1.24	1.21	1.22	1.24
Winter Day 1	2.11	2.25	2.00	1.94	2.08
Winter Day 2	0.88	1.10	1.12	0.93	1.01
Winter Day 3	0.71	0.87	0.91	0.78	0.82
Winter Day All	1.14	1.32	1.29	1.14	1.22
Summer Night	0.80	0.70	0.73	0.58	0.70
Summer Day 1	0.91	0.99	0.88	0.81	0.90
Summer Day 2	0.71	0.73	0.77	0.74	0.74
Summer Day 3	0.62	0.64	0.69	0.59	0.64
Summer Day 4	0.52	0.63	0.65	0.43	0.56
Summer Day 5	0.38	0.54	0.51	0.37	0.45
Summer Day All	0.66	0.73	0.72	0.62	0.68
			NO		
Winter Night	1.48	1.24	1.11	1.36	1.30
Winter Day 1	3.24	3.29	3.24	2.95	3.18
Winter Day 2	0.72	1.19	1.42	1.07	1.10

Period	Brighton Preston Park	Canterbury	Rochester Stoke	Eastbourne	Average
Winter Day 3	0.54	0.93	1.09	0.83	0.85
Winter Day All	1.29	1.64	1.79	1.47	1.55
Summer Night	0.48	0.36	0.31	0.15	0.33
Summer Day 1	0.91	1.13	0.89	0.77	0.92
Summer Day 2	0.55	0.73	0.97	0.68	0.73
Summer Day 3	0.52	0.67	0.85	0.58	0.65
Summer Day 4	0.44	0.67	0.75	0.43	0.57
Summer Day 5	0.35	0.61	0.56	0.43	0.49
Summer Day All	0.58	0.78	0.84	0.59	0.70

NH_3

5.23 It has also been necessary to determine background NH_3 concentrations for these periods. There are no background monitors in the vicinity which measure concentrations on an hour-by-hour basis and so the following approach has been taken. First, the assumed 2-year mean background NH_3 concentration has been factored to represent summer-mean and winter-mean concentrations based on the ratio of summer to winter concentrations at the NAMN sites at Barcombe Mills and Lullington Heath. Each of these values has then been further apportioned to represent day/night based on the average measured diurnal profile of NHx measured at Site A1 (see Chapter 8). While this site clearly experiences a contribution from road traffic, and there are issues as to the proportion of particulate NH_4^+ that it samples, it provides the best available means of predicting the diurnal profiles in background concentrations in the SAC and this method is thus considered to be suitable. Given the uncertainty associated with these data, as well as the relative lack of diurnal profiles in NH_3 deposition velocities, it is not considered appropriate to further subdivide each of the daytime periods (e.g. into Winter Day 1, Winter Day 2 etc.). The annual average background NH_3 concentrations have been multiplied by the factors set out in Table 5.5 in order to derive period-average background concentrations.

Table 5.5: Assumed Ratios of Period Average to Annual Average Concentrations NH_3 Concentrations

Period	Ratio
Winter Night	0.55
Winter Day 1	1.11
Winter Day 2	1.11
Winter Day 3	1.11
Winter Day All	1.11
Summer Night	0.79
Summer Day 1	1.57
Summer Day 2	1.57
Summer Day 3	1.57
Summer Day 4	1.57
Summer Day 5	1.57
Summer Day All	1.57

Traffic Flows

Existing Baseline Traffic Flows

Roads within 200 m of the SAC

5.24 The September 2015 to September 2016 traffic flows measured at the ATC sites commissioned as part of this project were used to represent existing conditions. These flows were supplemented with flows collected by the ATCs operated by East Sussex County Council (ESCC) for the 2015 calendar year[17]. These flows are described further in Chapter 8. For each of these traffic counters, the diurnal and monthly flow profile was calculated (see Chapter 8 for measured diurnal profiles).

5.25 ATC data were not available for all of the roads in the study area since this would have meant setting up ATC sites on a large number of minor roads; resulting in significant expense that would have added relatively little in terms of the study objectives. Alternative means of predicting emissions from these roads were thus used, as described below. These methods are considered to be appropriate.

5.26 For all of the roads shown in black in Figure 5.3, flows were supplemented with those for 2014 from the East Sussex County Council's (ESCC) Flowplot model, provided by gta civils ltd. This provides the traffic volume and % Heavy Duty Vehicles (HDVs) only, and so this was further

[17] Data availability from ESCC meant that it was not possible to use periods which matched completely. However, since both datasets provided data for a complete 12-month period, the differences in dates will have no significant effect on the conclusions of the study.

weighted using the average measured fleet composition on the smaller roads with ATCs (i.e. sites 1201, 1202, 1203 1204 1205, 1207, and 1208). Owing to the approach taken to model verification and adjustment (see Paragraph 5.63) inaccuracies in these predicted traffic data will be relatively inconsequential.

5.27 For the roads shown in red in Figure 5.3, no base-year traffic data were available. The approach for these links has been to use a nominal vehicle flow (1,000 AADT at the average fleet composition from the minor-road ATCs listed above) and back-calculate the emissions using road-specific NO_2 measurements (see section starting at Paragraph 5.63).

5.28 Table 5.7 sets out all of the traffic flows for the existing baseline on roads within 200 m of the SAC. It lists the road names, the relevant ATC count points as detailed in Chapter 4, and the model link names which are shown in Figure A4.2.

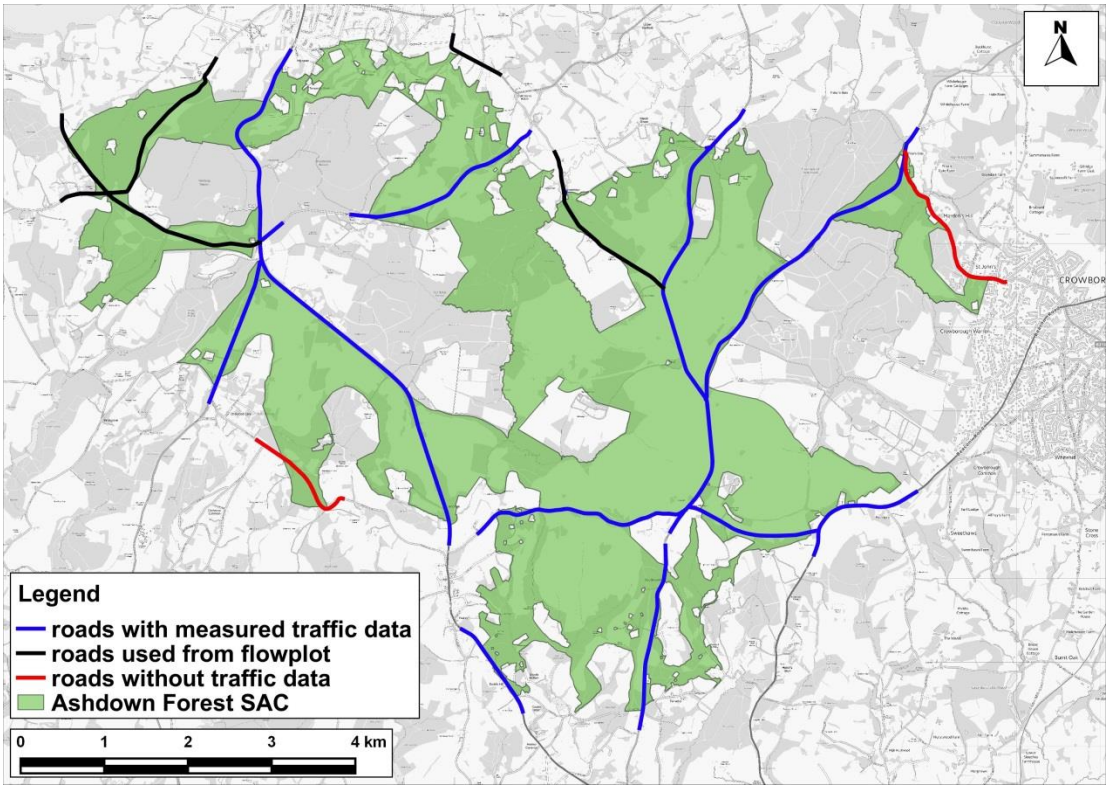


Figure 5.3: Modelled Roads within the SAC

Table 5.6: Existing Baseline Flows used in the Model for Roads Inside SAC

Road	ATC	Model Links [1]	Note	AADT	Vehicle Composition (%)					
					Car	LGV	Rigid HGV	Artic HGV	Bus	M/C
A26	18	33,34,110,123	A	16,398	85	10	2.7	1.5	0.6	0.5
A22	129	8,9,10,11,12,38, 65,87,88,89,90, 91,92,93,94,95, 96,117,118	A	12,042	92	0.4	4.6	1.5	0.6	0.6

Road	ATC	Model Links [1]	Note	AADT	Vehicle Composition (%)					
					Car	LGV	Rigid HGV	Artic HGV	Bus	M/C
	1206	1,2,3,4,5,14,24, 48,68,72,115	B	10,228	92	0.4	4.6	1.5	0.6	0.6
A275	38	6,7,49,69,70,71, 97,98,99	A	4,602	92	0.4	4.6	1.5	0.6	0.6
B2026	41	18,30,50,122	A	5,526	91	7.1	1.4	0.2	0.1	0.5
	1208	26,29,36,37,111 ,112,113,114,12 0,121	B	5,078	96	0.5	2.5	0.1	0.0	0.7
	1205	59,66,105,106	B	1,444	96	0.5	2.8	0.2	0.1	0.9
	1204	58,103	B	3,957	96	0.5	2.1	0.1	0.1	1.3
B2188	1202	51,52,53,54,56, 57,80,107,108,1 09	B	2,104	96	0.4	2.5	0.1	0.0	0.9
Crowborou gh Rd	1203	13,15,16,17,27, 28,100,101,102, 119	B	3,221	94	0.4	3.9	0.1	0.1	1.2
New Rd	1201	19,31,32,81,82	B	5,648	95	0.4	3.6	0.1	0.0	0.4
Coleman's Hatch Rd	1207	22,23,25,64,74	B	1,839	95	0.4	2.3	0.1	0.4	1.4
Kidd's Hill	na	60,62,63,79,104	C	1,520	97	0.5	1.2	0.0	0.0	0.9
Shepherds Hill	na	21	C	2,880	97	0.5	1.9	0.1	0.1	0.9
Priory Rd	na	40,77,46,86,55, 20,61,67,35	C	1,820	98	0.5	0.9	0.0	0.0	0.9
Hindleap Lane	na	43,44,45,47,73, 78,83	C	6,390	97	0.5	2.0	0.1	0.1	0.9
Legsheath Lane	na	46,76,84,85	C	810	49	0.2	47	1.9	1.3	0.5
Plawhatch Lane	na	42,75,116	C	6,640	97	0.5	1.7	0.1	0.0	0.9
Chelwood Gate Road + Marden's Hill	na	124,125,126,12 7,128,129,134	D	1,000	95	0.4	3.1	0.3	0.2	1.0

A = ESCC ATC data for 2015 calendar year
B = Project-specific ATC data for September 2015 to September 2016
C = Flowplot modelled flow for 2014 calendar year
D = Nominal flow
[1] see Figure A4.2

Roads More than 200 m from the SAC

5.29 For the roads which are more than 200 m from the SAC, the existing baseline traffic data were those for 2014 taken from the ESCC Flowplot model (provided by gta civils ltd). gta civils ltd. advised that any differences between annual average traffic flows in 2014 and those that were

measured in 2015/2016 will have been extremely small, particularly when compared with other sources of uncertainty in these traffic data. The 2014 data were thus used directly to represent base year conditions without any adjustment. The traffic flows used for the roads outside of the SAC are set out in Table A2.2 in Appendix 2.

Predicted Traffic Growth to 2028

5.30 Predicted traffic growth to 2028 was taken from the Ashdown Forest Transport Model, produced by gta civils ltd. on behalf of Wealden District Council. Data were provided for two future-year scenarios:

- 2028 amended Tempro 7.2 reference case (WDC no growth). This scenario accounts for traffic growth arising from development sources outside of Wealden to 2028, based on standard TEMPRO7.2 housing and employment input data as amended by advice from adjacent local planning authorities to better reflect their current plans and expectations, but does not include any development growth within Wealden district associated with the Wealden Local Plan; and
- 2028 Scenario 2C – amended Tempro 7.2 (as above) but including development growth within Wealden district associated with the Wealden Local Plan.

5.31 In effect, the first of these scenarios covers the possibility that national- and local-level (outside of Wealden district) development growth plans and predictions to 2028 materialise but that no development growth beyond the study base year takes place within Wealden district, while the second accounts for the additional development, and the traffic associated with it, in the Local Plan (i.e. it includes all of the traffic in the first scenario as well as the additional traffic associated with the Local Plan). Table 5.7 sets out the additional traffic, over and above the existing baseline, predicted in these scenarios for roads within 200 m of the SAC. The traffic flows used for the roads outside of the SAC are set out in Table A2.2 in Appendix 2.

5.32 How these different traffic scenarios have been used to predict the impacts of the Plan alone and in combination is described in Chapter 6 ‘Scenario Definition’.

Table 5.7: Additional Predicted Traffic for 2028 (Change in Vehicles from Existing Baseline in Vehicles per Day)

Road	ATC	Model Links [1]	Amended Tempro Growth to 2028 without Wealden Local Plan		2028 Scenario 2C - with Wealden Local Plan	
			LDV	HDV	LDV	HDV
A26	18	33,34,110,123	2,853	81	4,123	81
A22	129	8,9,10,11,12,38,65,87,88,89,90,91,92,93,94,95,96,117,118	2,135	61	3,774	61
	1206	1,2,3,4,5,14,24,48,68,72,115	2,089	62	3,690	62
A275	38	6,7,49,69,70,71,97,98,99	1,010	6	1,088	6
B2026	41	18,30,50,122	876	16	1,302	16
	1208	26,29,36,37,111,112,113,114,120,121	549	9	838	9
	1205	59,66,105,106	474	7	648	7
	1204	58,103	826	16	1,230	16
B2188	1202	51,52,53,54,56,57,80,107,108,109	50	1	72	1
Crowborough Rd	1203	13,15,16,17,27,28,100,101,102,119	869	16	1,034	16
New Rd	1201	19,31,32,81,82	858	23	1,269	23
Coleman's Hatch Rd	1207	22,23,25,64,74	529	5	560	5
Kidd's Hill	na	60,62,63,79,104	352	4	582	4
Shepherds Hill	na	21	206	3	249	3
Priory Rd	na	40,77,46,86,55,20,61,67,35	38	0.2	39	0.2
Hindleap Lane	na	43,44,45,47,73,78,83	429	16	498	16
Legsheath Lane	na	46,76,84,85	38	0.2	39	0.2
Plawhatch Lane	na	42,75,116	431	14	482	14
Chelwood Gate Road + Marden's Hill	na	124,125,126,127,128,129,134	-	-	-	-

1 see Figure A4.2

Dispersion Modelling Methodology

5.33 For the purposes of this study, it has been assumed that the total ambient concentrations[18] are made up of the background (as described in Paragraph 5.10) and a local road increment (see Equation Eq 1 below.

Eq 1. $$Ct = Cb + Cr$$

[18] The term 'ambient concentrations' denotes the concentrations of pollutants in the air and should not be confused with the deposition of pollutants to the ground; which is described subsequently (from Paragraph 5.109) in this chapter.

Where *Ct* is the total ambient concentration, *Cb* is the background concentration, and *Cr* is the concentration increment from local roads. This approach is standard for studies of this type.

5.34 The monitoring results collected for this study (see Chapter 8 below) show a clear dependence between concentrations of NOx, NO_2, and NH_3 and distance from the road; which shows that there is an appreciable traffic-related concentration increment for these pollutants. For the secondary pollutants HNO_3, and particulate NO_3^-, NO_2^-, and NH_4^+, no such relationships were observed. This reflects the longer formation times for these pollutants when compared with those of NO_2. For the purposes of this study it has thus been assumed that there is no roadside increment to the concentrations of these pollutants over and above the background concentrations described previously (from Paragraph 5.10).

5.35 The contribution of local roads to concentrations of NOx, primary NO_2, and NH_3 has been predicted by simulating the release of pollutants along roads within and close to Ashdown Forest using a dispersion model. The purpose of including primary NO_2 emissions within the dispersion model is to obtain receptor-specific primary NO_2 proportions for use in Defra's NO_2 from NOx calculator (see Paragraph 5.9).

Dispersion Model

5.36 The ADMS-Roads (Version 4.1) dispersion model has been used. This model is widely used for local air quality modelling studies and is considered to be suitable for this purpose. Link-specific emissions of NOx, primary NO_2, and NH_3, in g/km/s, have been entered into the model, and concentrations of NOx, primary NO_2, and NH_3, in $\mu g/m^3$, have been taken from the model.

Depletion

5.37 Deposition has been calculated from the predicted ambient concentration outside of dispersion model. This is because the deposition routine used for this study is more detailed than that which could be simulated by the dispersion model and also because NO_2 concentrations were calculated from modelled NOx concentrations outside of the model. This means that NOx is treated as being chemically inert with no removal either via chemical reaction or deposition. In the case of NOx and NO_2, this is expected to have a negligible effect on the results, but for NH_3, which deposits more rapidly, depletion effects could be noticeable. To account for this, depletion of NH_3 via deposition has been included within the model predictions. This has been done by including deposition within the model using a fixed deposition velocity of 0.02 m/s (AQTAG, 2011), which is an indicative estimate of deposition to grassland. The deposition outputs from the model were not then used in subsequent calculations (the preference was to use the more detailed routine described in Paragraph 5.109 onward) but the model then reduced the predicted ambient NH_3 concentrations to account for this (indicative) deposition flux of NH_3.

5.38 Indicative tests suggested that the effective deposition flux calculated using the detailed routine (as used to calculated deposition fluxes) results in generally lower deposition than the fixed

deposition velocity (as used to calculate depletion). This means that depletion effects may have been over-predicted (and deposition thus under-predicted), but the relatively modest change in concentrations that modelled depletion introduces will not significantly affect the results.

5.39 While it would clearly be preferable to use habitat- and meteorology-specific deposition velocities to account for this depletion (and thus ensure consistency with the deposition calculations), there are no commercially-available dispersion models which allow for this. The approach taken is a pragmatic work-around to account for the relatively small effect of depletion of NH_3 from the emissions plume. Given that this effect is relatively small in any event, the discrepancy between deposition models will not introduce any significant error.

Meteorological Data

5.40 Hour-by-hour meteorological data for the 2-year period 7th August 2014 to 9th August 2016 have been taken from the Meteorological Office site at Gatwick airport. This is the closest meteorological station operated to Meteorological Office standards and is considered to be suitable for the study. The data period is that for which the model has been verified against local monitoring (which commenced on 7th August 2014). This meteorological dataset has been separated into four subsets to represent summer day, summer night, winter day, and winter night, with each of the two daytime sets then further subdivided into winter day 1-3, and summer day 1-5. These subdivisions are to facilitate the deposition modelling, which is described in Paragraph 5.109 onward.

Diurnal and Monthly Profiles

5.41 For roads within 200 m of the SAC, diurnal and monthly flow profiles have been derived from the local traffic counts as explained in Paragraph 5.24 and entered into the model using a .fac file. For those roads more than 200 m from roads, a UK average diurnal and monthly flow profile has been derived from national profiles published by the Department for Transport (2017b).

Source Geometry

Roads within 200m of the SAC

5.42 Each road within the SAC, and any road within 200 m of the SAC, has been entered into ADMS in detail. Where the dispersion around a section of road will be restricted by trees, this has been accounted for using the ADMS Advanced Canyon Module. Vegetation porosity has been estimated using photographs taken around the SAC at different times of the year and site visits to the SAC and has been varied by road and by the time of year (i.e. for deciduous vegetation a higher porosity has been assumed in winter than in summer in order to account for the loss of foliage during winter which will mean that there are fewer restrictions to the free-movement of air during the winter). Had this not been done, the modelling would not have taken account of the effects of trees on dispersion near to roads.

5.43 ADMS-Roads has been run using a detailed terrain file to take account of the effect of local topography on dispersion. The modelled roads within 200m of the SAC are shown in Figure A4.2 in Appendix 1.

Roads More than 200 m from the SAC

5.44 In order to more fully take account of the influence that traffic growth associated with the Local Plan will have on the roads within the Ashdown Forest Transport Model, all of the roads shown in Figure A4.3 in Appendix 1 were also included in the dispersion model. All of these roads were modelled assuming flat terrain and assuming free dispersion around each road. The distance separating each of these roads from the SAC will mean that the assumption of free dispersion will have had no effect on the results. The assumption of flat terrain will have had a very small effect which will not have affected the overall conclusions of the study.

Receptor Grid for Dispersion Model

5.45 Concentrations have been predicted across a grid of receptors covering the study area. This uses source-oriented grids, aligned along the length of each road that falls within the SAC and at distances of 4 m, 6 m, 9 m, 14 m, 26 m, and 54 m from the centre of each road. At distance between 50 m and 200 m from each road within the SAC, a 50 m x 50 m Cartesian grid has been used. Elsewhere within the SAC, a 100 m x 100 m Cartesian grid has been used. Outside of the SAC, a 250 m x 250 m Cartesian grid has been used. This amounts to more than 20,000 receptors. The receptor grid is shown in Figure A4.1 in Appendix 1. The reason for using a fine grid close to the road is so that the spatial pattern in concentrations can be determined with more certainty in those areas where concentrations change appreciably over small distances. The reason for using a coarser grid further away from roads is to save on model processing time, since a fine receptor grid is not necessary in those areas where concentrations do not change appreciably over small distances. The receptor grid used represents a balance between unmanageable model run times and perfect spatial detail. The approach taken is considered to be suitable.

5.46 In addition, the model has been run to predict concentrations at each of the air quality monitoring sites and at each of the quadrats used for the ecological surveys (see Paragraph 4.37).

Calculating Receptor-specific fNO_2 Values

5.47 The proportion of primary NO_2 in NOx has been calculated by dividing each receptor-specific primary NO_2 concentration (in $\mu g/m^3$) by the equivalent NOx concentration (in $\mu g/m^3$).

Calculating period-average and annual average concentrations

5.48 The period-average (i.e. for summer day (1-5), summer night, winter day (1-3), and winter night) results were taken directly from the outputs of the dispersion model. Annual average concentrations, where required, were calculated from these period-average values taking account

of the relative number of valid meteorological hours in each period.

Predicting Emissions from Local Roads

Predicting Traffic Emissions of NOx and Primary NO_2

Emissions Model A

5.49 NOx and primary NO_2 emissions from road traffic under emissions model A have been predicted using Defra's Emissions Inventory Toolkit (EFT) Version 8.0.1. The year has been set to 2015, to reflect the mid-point of the monitoring period against which the model has been verified. The area type and road type (which the EFT uses to estimate the vehicle fleet composition to a finer resolution than is available from the traffic counts or traffic model) have all been set to "England (not London)" and "Rural (not London)" respectively. The same settings (i.e. retaining an emissions year of 2015) have been used for all traffic datasets processed under emissions model A.

5.50 Because the composition of the existing fleet is known with greater resolution than that of the future fleet, the approach has been to calculate emissions for the separate datasets set out in Table 5.6 and Table 5.7 separately (i.e. link-specific emissions from all of the vehicles listed in Table 5.6 were calculated, then the link-specific emissions from all of the vehicles in Table 5.7 were calculated and then the results for the relevant future-year scenarios were added to those from the baseline traffic). The alternatives to this would be either to lose the detail provided by the ATC counts, or to infer an inappropriate level of knowledge of the composition of the additional vehicles which are predicted to be on these roads by 2028.

5.51 The link-specific fNO_2 values (i.e. the proportion of primary NO_2 in NOx) have been multiplied by the link-specific total NOx emissions to give the primary NO_2 emissions in g/km/s and it is these which have been entered into the dispersion model.

5.52 The EFT calculates traffic emissions according to the average traffic speed. For the roads within 200 m of the SAC, average traffic speeds have been estimated based on local speed limits, road conditions, proximity to junctions, and direct observations of slowing traffic near to junctions etc.. For those roads more than 200 m from the SAC, average traffic speeds have been assumed to be equal to the speed limits. This is likely to have resulted in a net under-prediction in emissions near to junctions well away from the SAC; however to some extent this will be accounted for through the model verification and adjustment process and will thus not result in significant residual bias.

5.53 Defra (Defra, 2016a) provides guidance on calculating the effects of gradient on emissions. It has since supplemented this guidance with additional details in relation to developing Clean Air Zones; although it has not made this supplementary guidance publically available. Both pieces of guidance have been followed in order to calculate the effects of road gradient on NOx (and by extension primary NO_2) emissions from those roads within 200 m of the SAC. This detail has not

been included for the roads more than 200 m from the SAC, but this is considered unlikely to result in significant additional uncertainty.

5.54 Finally, all of the NOx and primary NO_2 emissions entered into the dispersion model have been adjusted using the calibration factors set out in Paragraphs 5.63 to 5.78.

Emissions Model B

5.55 NOx and primary NO_2 emissions from road traffic under emissions model B have been predicted following the same approach as for emissions model A, but this time setting the year to 2028 and, instead of using the EFT, using the Calculator Using Realistic Emissions from Diesels (CURED) V3A emissions model (AQC, 2017). CURED, which is documented elsewhere (AQC, 2017), is very commonly used for air quality assessments. It assumes higher NOx emission from future-year diesel cars and vans than is the case in the EFT, and thus attempts to account for the historic under-performance of the emissions-controls on these vehicles. It does, however, include the same rate of fleet renewal as the EFT, and thus predicts much lower NOx emissions in 2028 than in 2015. It is also worth noting that CURED and EFT predict identical emissions in 2015 and there is, therefore, no requirement to verify the two models independently against local measurements. The calibration factors set out in Paragraphs 5.63 to 5.78 have thus been applied to all of the NOx and primary NO_2 emissions used in model B.

Emissions Model C

5.56 NOx and primary NO_2 emissions from road traffic under emissions model C have been predicted following the same approach as for emissions model A, but this time setting the year, within EFT 8.0.1, to 2028 instead of 2015. This model thus assumes the full improvements in vehicle emissions that Defra has assumed in its own national-scale modelling. The calibration factors set out in Paragraphs 5.63 to 5.78 have been applied to all of the NOx and primary NO_2 emissions used in model C.

Predicting Traffic Emissions of NH_3

Emissions Model A

5.57 The two most commonly-used sources of NH_3 emissions data in Europe come from the Computer Programme to calculate Emissions from Road Transport (COPERT) (Emisia, 2018) and from the Netherlands Organisation for Applied Scientific Research (TNO). TNO has collated comprehensive evidence (TNO, 2015) which shows that the emissions factors used in COPERT are likely to be incorrect and should not, therefore, be used. Unfortunately, TNO's own testing for NH_3 has recently encountered some instrument problems and their latest data are thus subject to question (Norbert Ligterink, TNO, pers. comm). Since, for this current study, very detailed roadside NH_3 measurements are available, these have been used to calculate traffic-related NH_3 emissions factors which are representative of Ashdown Forest. Given the quality of the NH_3 measurements made in this current study, these emissions factors are considered to be more

robust for Ashdown Forest than any other published data.

5.58 Figure 5.4 shows the total measured NH_3 at all of the ALPHA and DELTA sites, compared against the predicted road-NOx concentrations for the same sites. Data from the automatic monitor have not been included here since the co-located DELTA sampler represents the reference method for NH_3. There is a clear relationship between the two datasets; which is to be expected since both NH_3 and NOx are primary pollutants from road traffic. Cape et al. (2004) identified similar patterns. NH_3 is thought to be released both from 3-way catalytic converters in older vehicles and also, increasingly, from selective catalytic reduction devices fitted to newer diesel cars, vans, lorries, and buses. The NH_3 is thus a bi-product of technology which is intended to reduce emission of NOx, but it is nevertheless reasonable to consider that the factors which drive higher NOx emissions (traffic volume, vehicle type, speed, and gradient) may also give rise to higher NH_3 emissions. The close correlation between predicted NOx and measured NH_3 that is shown in Figure 5.4 is thus not surprising.

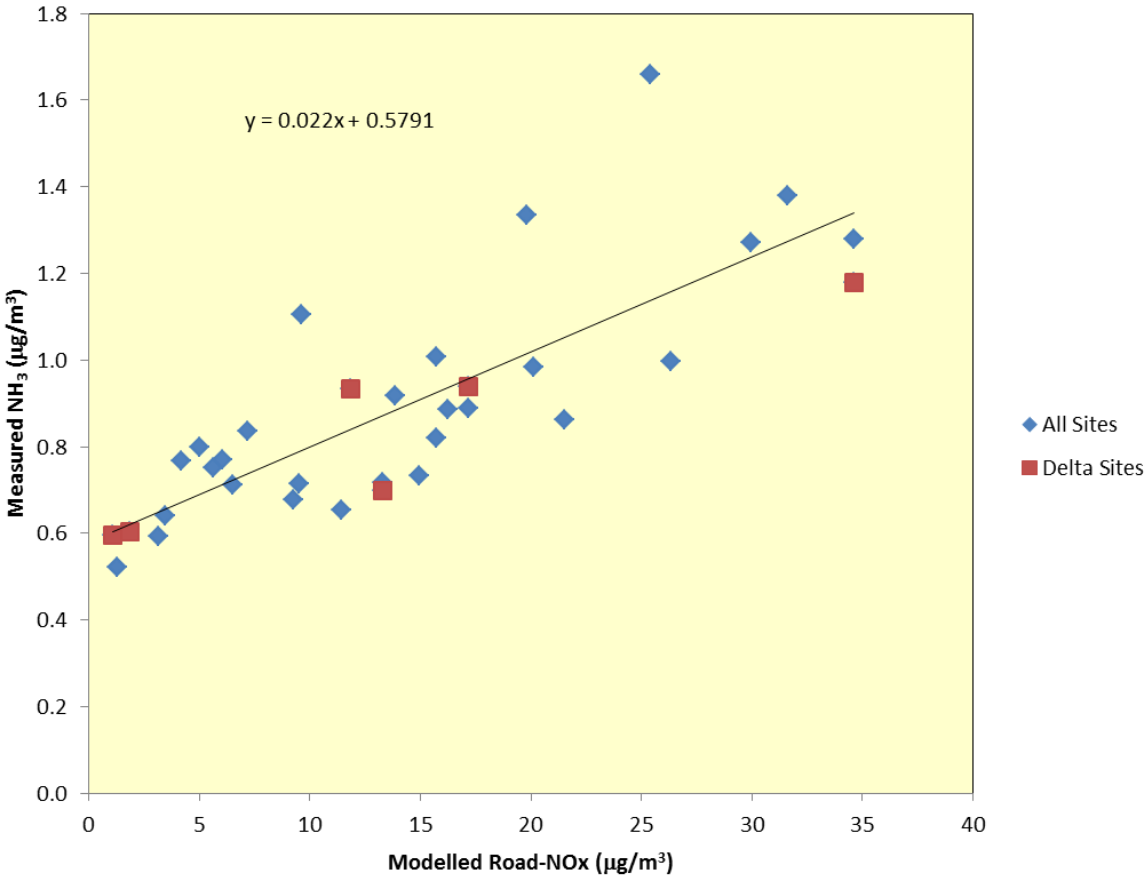


Figure 5.4: Measured NH_3 vs Predicted Road-NOx

5.59 It is also noteworthy that this is not the first study to identify a relationship between proximity from the road and ambient NH_3 concentrations. Cape et al. (2004) identified similar patterns close to a number of roads more than a decade prior to this current study.

5.60 In order to predict traffic-related NH_3 emissions under emissions model A, the predicted NOx

emissions have been multiplied by 0.022 (i.e. the slope of the line in Figure 41). In other words, for each gramme of NOx that is emitted, 0.022 grammes of NH_3 are also assumed to be emitted.

5.61 The trend-line in Figure 5.4 has an intercept of 0.5791. This fits well with the measured concentrations at the background NH_3 monitors (see Chapter 8) and is the assumed background NH_3 for the model as described in Paragraph 5.13.

Emissions Models B and C

5.62 COPERT V5 predicts that traffic-related NH_3 emissions are unlikely to change in the future but, as noted Paragraph 5.57, this model is not considered to be robust for NH_3. Recent issues with TNO's measurements (see Paragraph 5.57) make it very difficult to determine how NH_3 emissions from traffic might change in the future, but it is the opinion of the lead author of this current report (who also led development of the CURED emissions model for NOx which is widely used across the industry), as well as of others in the field (e.g. Norbert Ligterink, TNO, pers. comm) that emissions per vehicle are quite likely to increase in the future. Unfortunately, there is currently no robust way to predict by how much emissions of NH_3 per vehicle might change by 2028 and, because of this, there are no emissions models B or C for NH_3. When predicting nitrogen deposition under emissions models B and C, the model A NH_3 emissions factors have been used.

Model Verification and Adjustment

Model Adjustment for NOx and Primary NO_2

5.63 In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against local measurements. Following the principles set out in Defra's guidance for LAQM (Defra, 2016a), the model output of road-NOx has been compared with the 'measured' road-NOx.

5.64 Those sites which were used to define background concentrations were excluded from the verification of the road increment. Five other sites were also excluded since it was judged that they were influenced by very local phenomena which could not be represented in the dispersion model. These were Sites T2 (near to a bus stop – affecting emissions), T13 (opposite a car park – affecting emissions), T19 and T22 (near to houses – affecting dispersion and potentially driving styles), and T61 (at the opening of a very dense hedge – affecting dispersion).

5.65 It is usual (e.g. (Defra, 2016a)) to adjust the NOx component of model results by comparing measured vs modelled road-NOx and deriving a model uplift factor based on this comparison (using ordinary least squares regression if there is more than one monitoring site, and simply dividing one by the other if there is just one site). The appropriateness of this adjustment factor is then demonstrated by comparing measured and modelled NO_2 concentrations. Such an approach works well when all of the roads have a similar dispersion environment (e.g. it is well known that busy, fast-flowing roads often behave differently from quieter or slower roads) and

when all of the traffic flows come from the same source (and thus have comparable bias and uncertainty to one another).

5.66 Where a study area contains more than one type of road (such as busy, fast-flowing roads on the one hand and congested, urban roads on the other), it is very common to carry out two separate adjustments. This is usually done by simply dividing the receptors into two groups and adjusting each group of receptors separately. This approach is not, however, ideal, where a continuous contour field is required, since it results in step-changes in predicted concentrations.

5.67 The vast majority of roads within Ashdown Forest – and all of the key roads for the study – fall within one of the following two categories:

- busy, fast-flowing 'A' roads for which traffic counts are available; or
- quieter, minor roads for which traffic counts are available.

These are the roads shown in blue in Figure 5.3, above. On examination, and in line with observations made in very many other modelling studies across the UK, ADMS-Roads performed systematically differently for each of these groups, suggesting that two separate model adjustment factors would be most appropriate.

5.68 As explained in Paragraphs 5.25 and 5.26, in addition to these two groups of roads, there were a small number of quieter roads for which there were no measured traffic data. For six of these roads, shown in black in Figure 5.3, data were available from ESCC's Flowplot model. For those roads shown in red in Figure 5.3, no traffic data were available at all. Despite this lack of traffic data, there was a good coverage of air quality monitoring sites. This meant that even where the traffic flow was not known, the NOx emission rates from that traffic could be estimated with some degree of confidence. The first step in doing this was modelling a nominal flow (1,000 AADT was chosen but any value would have resulted in identical predicted concentrations following calibration against the measurements) for the roads with no traffic data, and using the Flowplot flows for the six roads shown in black in Figure 5.3.

5.69 It was observed that one of the links for which Flowplot base data were used (B2210, Shepherd's Hill, which is the northernmost road shown in black in Figure 5.3) did not appear to behave consistently with the others when comparing modelled and measured road-NOx values. This could reflect artefacts in the traffic data or in the measurement, or in the monitor siting (since the monitor is up a steep bank from the road). Because there is only a very short section of this road in close proximity to the SAC, and because there is a monitoring site immediately adjacent to this section of road, it was considered appropriate to treat this link separately from the others and thus calculate a link-specific uplift factor.

5.70 When the model was initially set up, Flowplot data were not available for the links to the west of Wych Cross and thus, for legacy reasons, it was most convenient to derive a separate model adjustment factor for these roads. The remaining Flowplot link (C473, Kidd's Hill) was grouped in

with the quiet minor roads for which traffic counts were available.

5.71 In order to appropriately-treat those links for which a nominal traffic flow of 1,000 AADT had been modelled, it was necessary to treat each road separately and derive road-specific adjustment factors (i.e. it would make no sense to group these roads together since they are likely, in practice, to have very different traffic flows).

5.72 The monitoring sites were thus divided into the following groups:

Groups of links:

- Set 1: all monitors alongside busy, fast-flowing 'A' roads for which measured traffic data are available;
- Set 2: all monitors alongside quieter minor roads for which measured traffic data are available + the C437 Kidd's Hill;
- Set 3: all of the links to the west of Wych Cross for which only Flowplot traffic data are available (these are Hindleap Lane, Priory Road, Plawhatch Lane, and Legsheath Lane);

Individual links:

- Set 4: the single monitoring site alongside B2210 Shepherd's Hill (Flowplot data);
- Set 5: the single monitoring site alongside Chelwood Gate Road (no traffic data); and
- Set 6: the single monitoring site alongside Marden's Hill (no traffic data).

5.73 In contrast to most studies, and in order to ensure that the outcome of the adjusted model was a continuous contour field, the derived model adjustments were applied to the road-specific emissions rather than to the receptor-specific outputs. There is a direct linear relationship between the emissions of primary pollutants and their predicted concentrations and so this achieves the same thing. However, since emissions from every road affect concentrations at every monitoring site, applying these adjustments to one group of roads had an effect on the derived adjustments for each other group of roads (i.e. there is circularity). The approach taken was thus to derive model adjustment factors for each of the monitor groups listed above, apply these adjustments to the model inputs, rerun the model, and repeat the process multiple times (i.e. iteratively).

5.74 Initially, NOx and primary NO_2 emissions for roads within the SAC were uplifted by a factor of approximately 2.5. Professional experience is that an uplift of this order was likely to be required, and this reduced the number of calibration iterations (as described below). Because the subsequent iterations calibrated the predicted road-NOx against measured values, the approximate nature of this first step will not have introduced any appreciable error.

5.75 As outlined in Paragraph 5.9, measured road-NOx has been calculated from the measured NO_2 concentrations and the calculated background NO_2 concentration using Defra's NOx from NO_2

calculator. However, as explained in Paragraph 5.35, primary NO_2, which is a key input to this calculator, is also an output of the dispersion model. Each time NOx emissions were adjusted, the primary NO_2 emissions (which originate as a proportion of NOx) were also adjusted by the same factor. This means that there was further a circularity to this process, such that when the model outputs were adjusted to match the 'measured' NOx concentrations, the 'measured' concentrations used for the calibration changed. For this reason, each of the iterations below involved revisiting the calculation described in Paragraph 5.9 (i.e. calculating NOx from measured NO_2) and generating fresh outputs. The 'measured' NOx concentrations presented elsewhere in this report are then those calculated using the final-adjusted modelled primary NO_2 concentrations.

5.76 Each iteration of the verification process is described below. It should be recognised that most of the monitoring sites fall within either Set 1, Set 2, or Set 3, and that the monitoring sites included in the other sets have necessarily been separated out since there is no reason to expect the relative error in their assumed traffic flows to be equal (i.e. for three of the four links, the traffic flows have simply been made up). The large differences in the derived adjustment factors for these links should thus be viewed as showing differences in traffic flows rather than differences in the performance of the emissions model or dispersion model.

5.77 After 6 iterations in this way, the derived adjustments stopped changing appreciably. The combined adjustment factors from iterations 1 to 5 (iteration 6 was just to test whether further iterations would have an appreciable effect), were then used to adjust all model inputs for subsequent scenarios. These adjustment factors are shown as the slope (e.g. y = ??? x) in Figure 5.5 to Figure 5.22 and as the site-specific scaling values in Table 5.8 to Table 5.13. Most of the significant roads more than 200 m from the SAC are 'A' roads, and so the model adjustments for Set 1 have been applied to these roads.

5.78 While the various iterations are set out in detail below, it should be noted that the most important feature of the verification process is how the final model compares against measurements, rather than the specific way in which individual adjustment factors were derived. This comparison of the ultimate model performance is given in Paragraphs 5.79 to 5.84, below.

Iteration 1

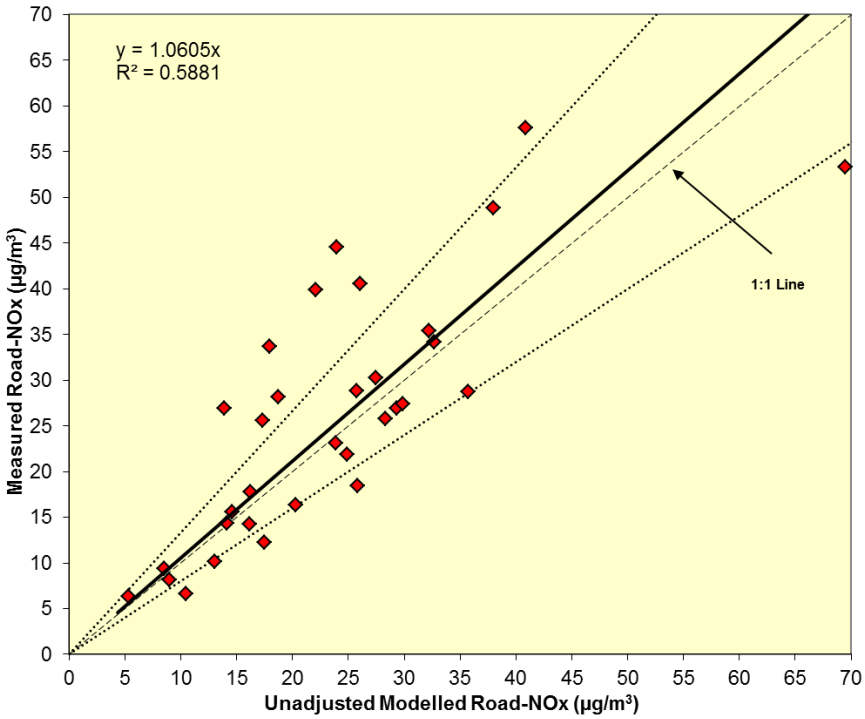


Figure 5.5: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 1

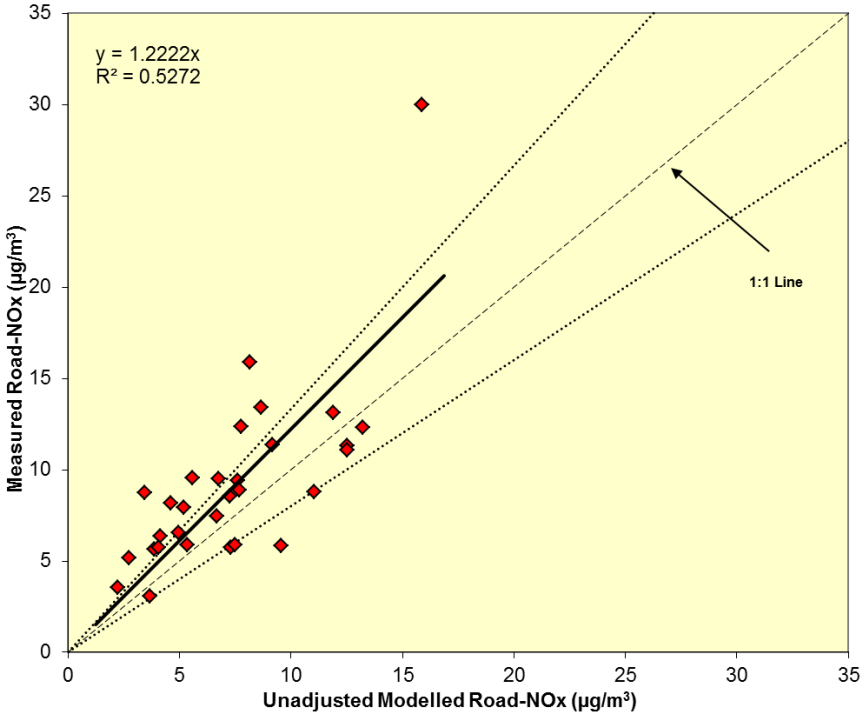


Figure 5.6: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 1

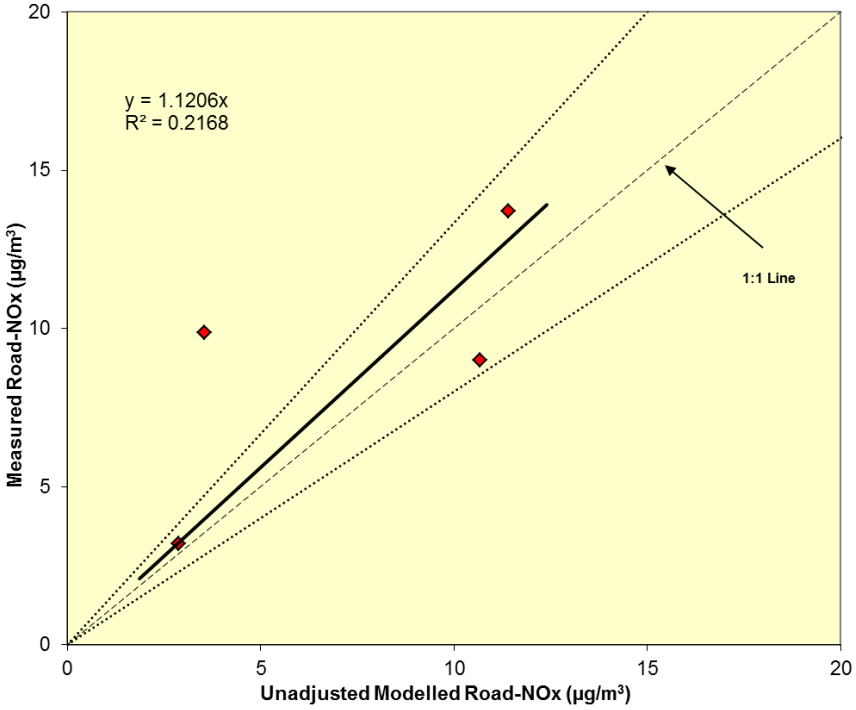


Figure 5.7: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 1

Table 5.8: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 1

Period	Measured Road-NOx (µg/m^3) A	Modelled Road-NOx (µg/m^3) B	Site-specific scaling (A/B)
Set 4	27.9	4.0	6.898
Set 5	3.2	3.4	0.941
Set 6	5.7	2.9	1.935

Iteration 2

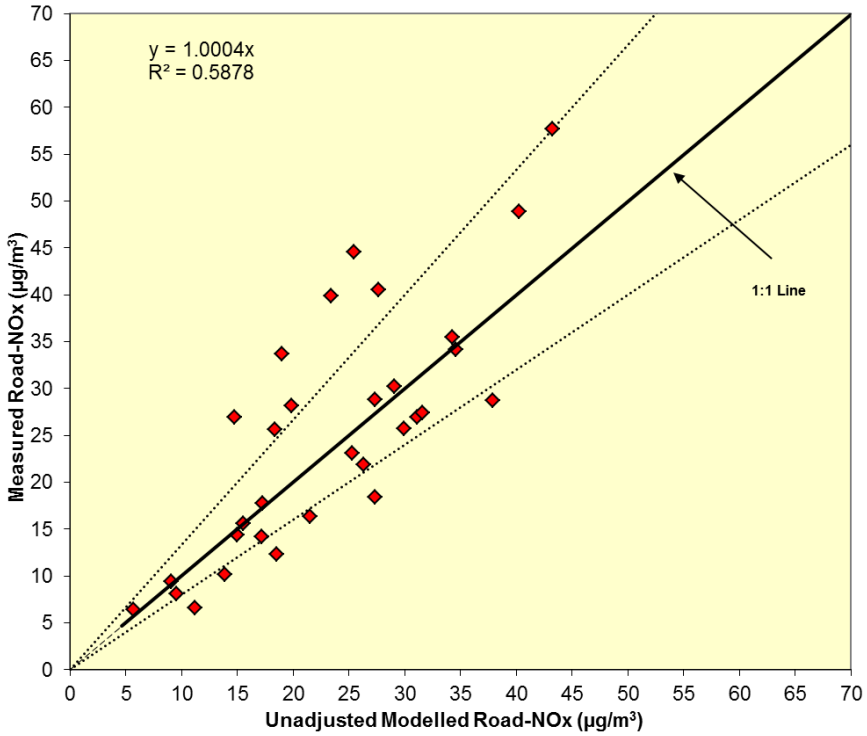


Figure 5.8: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 2

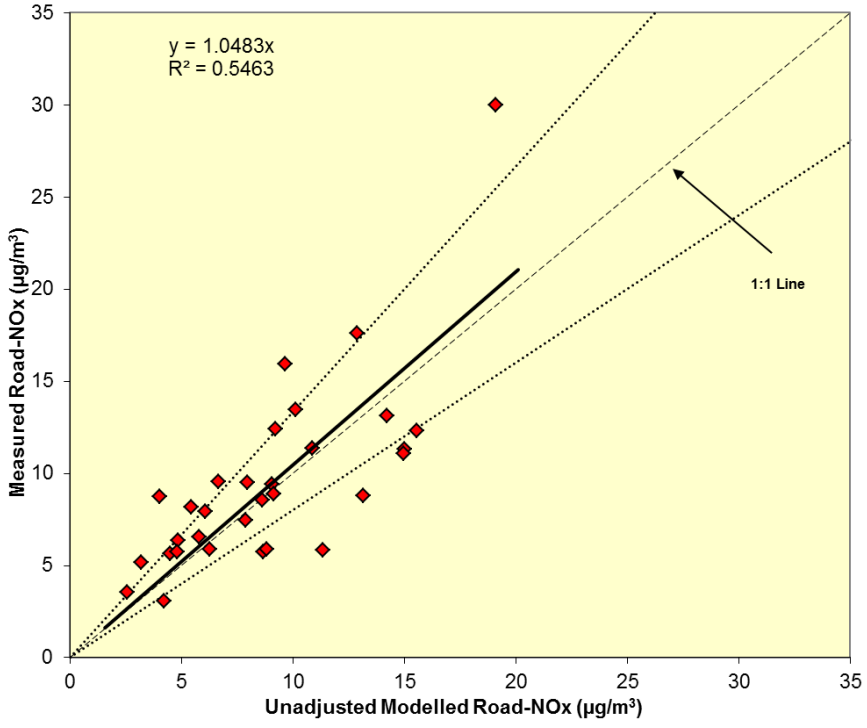


Figure 5.9: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 2

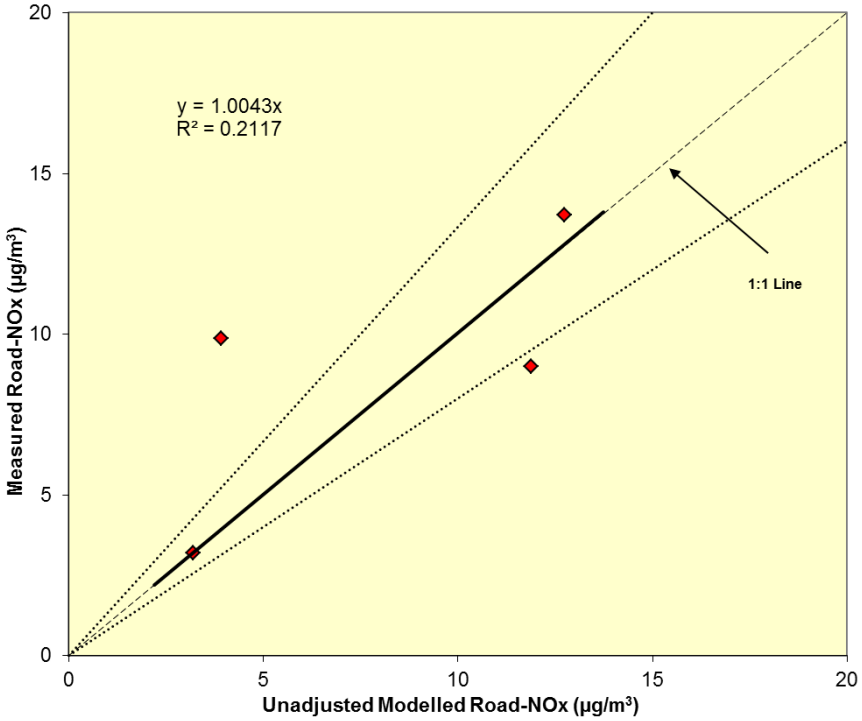


Figure 5.10: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 2

Table 5.9: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 2

Period	Measured Road-NOx (µg/m^3) A	Modelled Road-NOx (µg/m^3) B	Site-specific scaling (A/B)
Set 4	27.8	20.0	1.393
Set 5	3.2	3.3	0.957
Set 6	5.7	3.9	1.460

Iteration 3

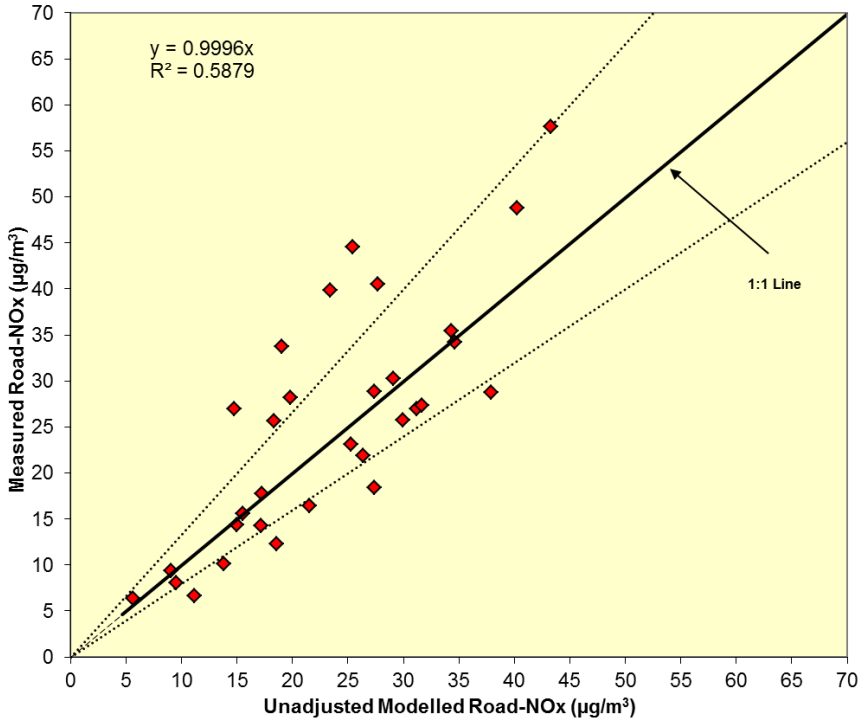


Figure 5.11: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 3

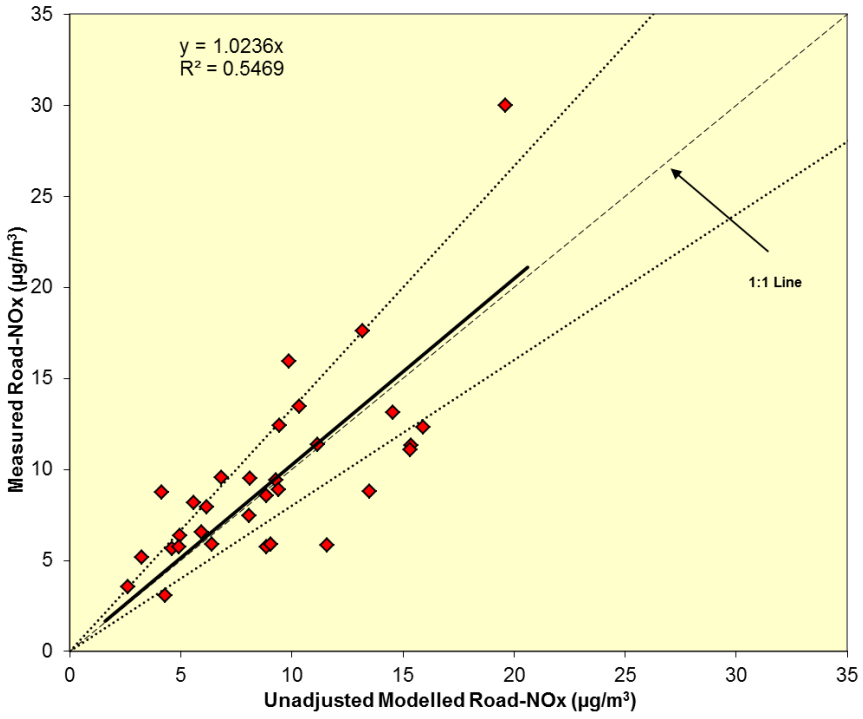


Figure 5.12: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 3

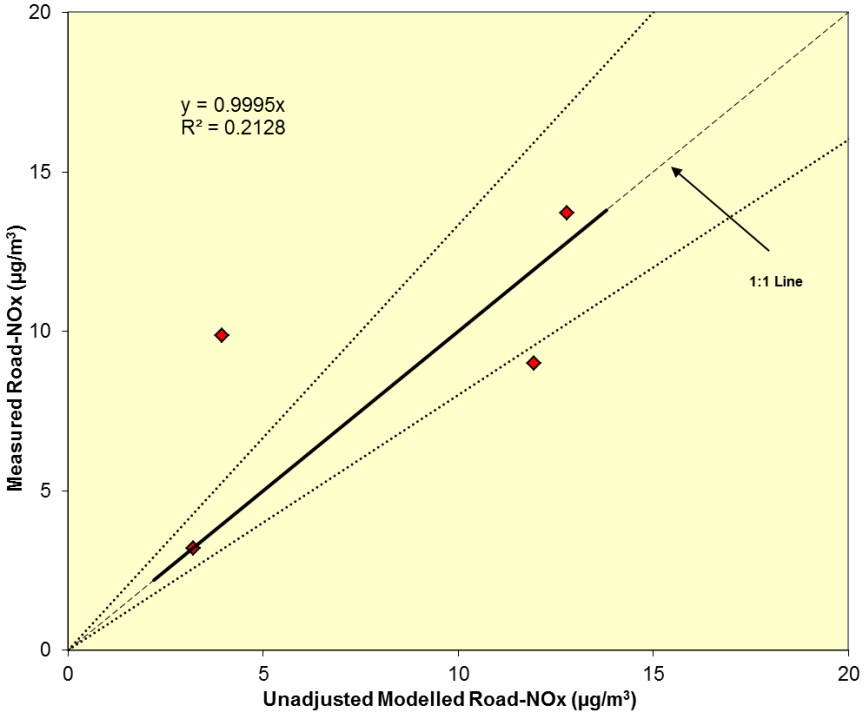


Figure 5.13: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 3

Table 5.10: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 3

Period	Measured Road-NOx (µg/m^3) A	Modelled Road-NOx (µg/m^3) B	Site-specific scaling (A/B)
Set 4	27.8	27.0	1.030
Set 5	3.2	3.2	0.983
Set 6	5.7	4.7	1.218

Iteration 4

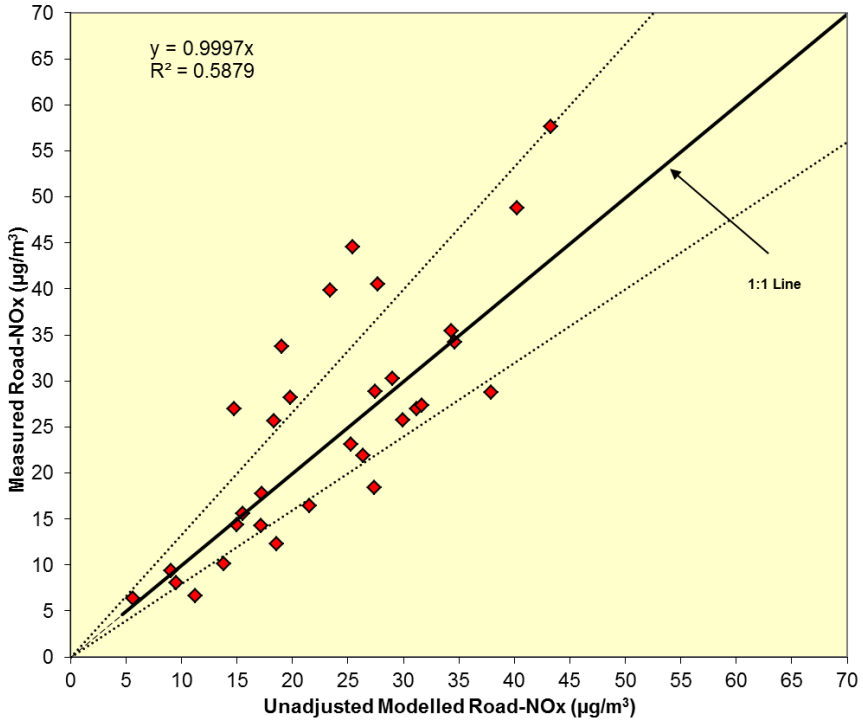


Figure 5.14: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 4

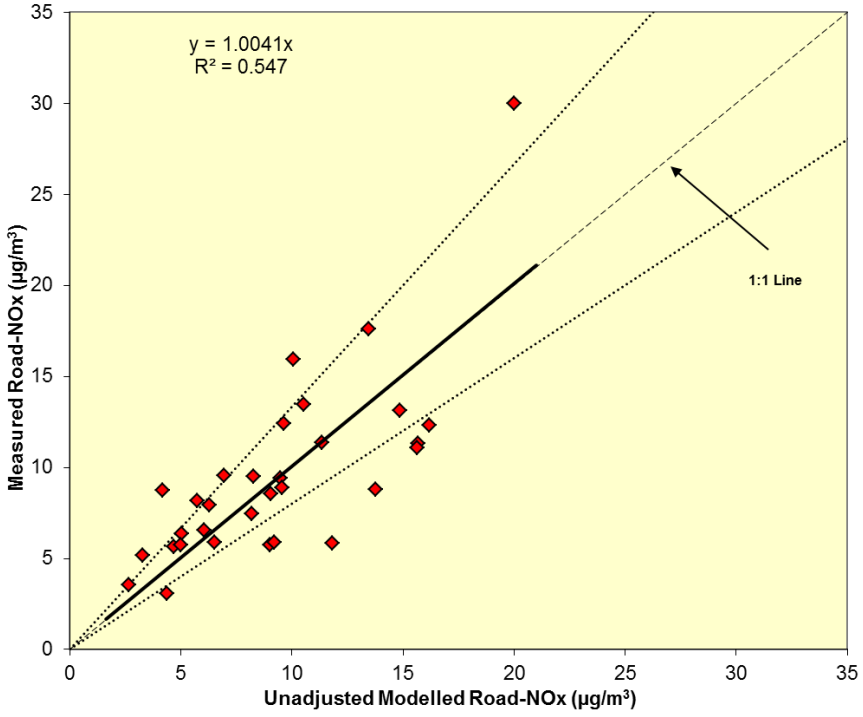


Figure 5.15: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 4

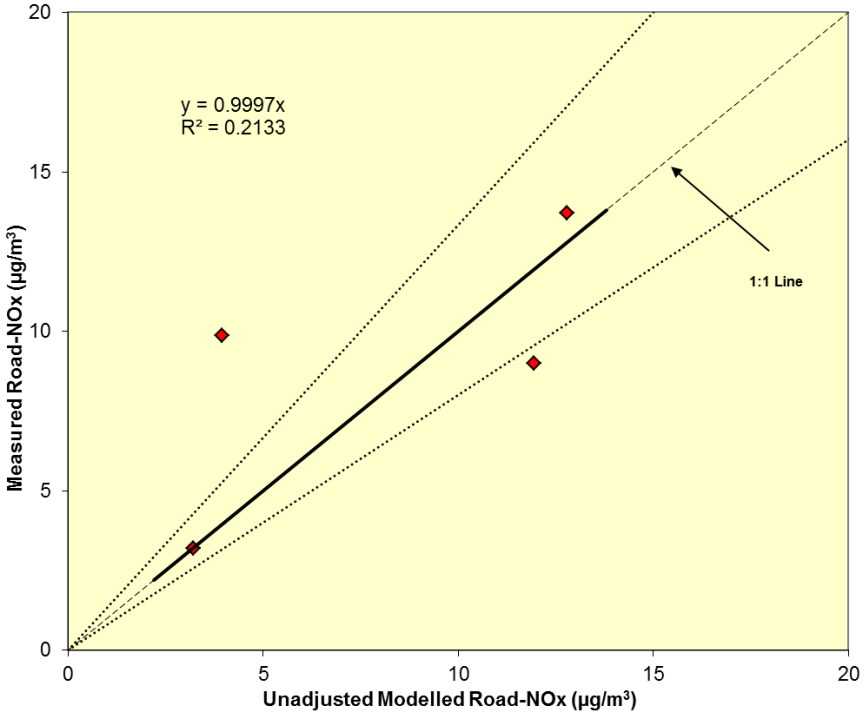


Figure 5.16: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 4

Table 5.11: Modelled vs Measured Road-NOx, Link Sets 4, 5, and 6, Iteration 4

Period	Measured Road-NOx (µg/m^3) A	Modelled Road-NOx (µg/m^3) B	Site-specific scaling (A/B)
Set 4	27.8	27.7	1.002
Set 5	3.2	3.2	0.993
Set 6	5.7	5.2	1.092

Iteration 5

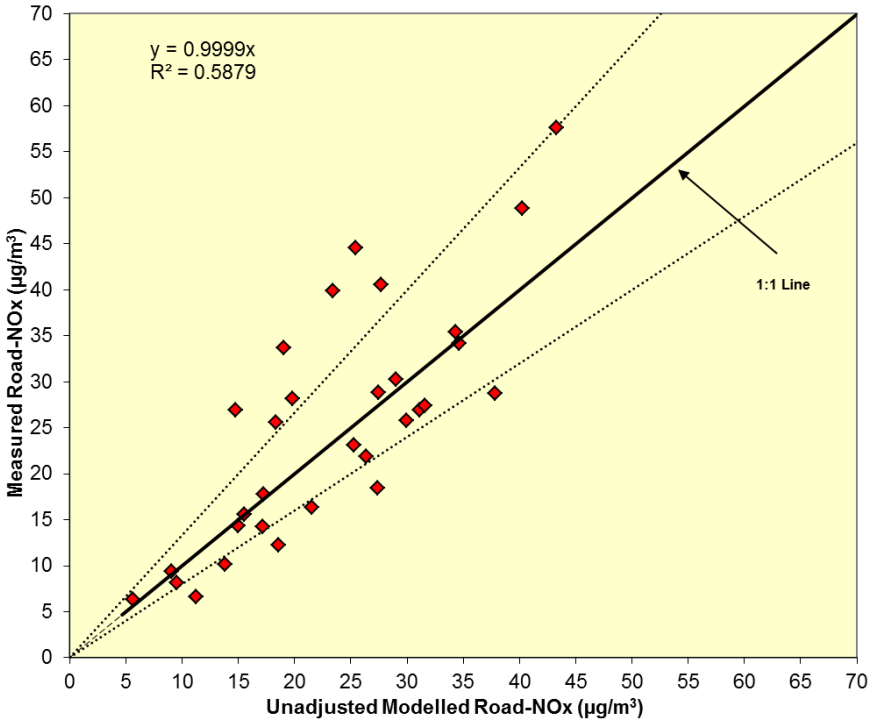


Figure 5.17: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 5

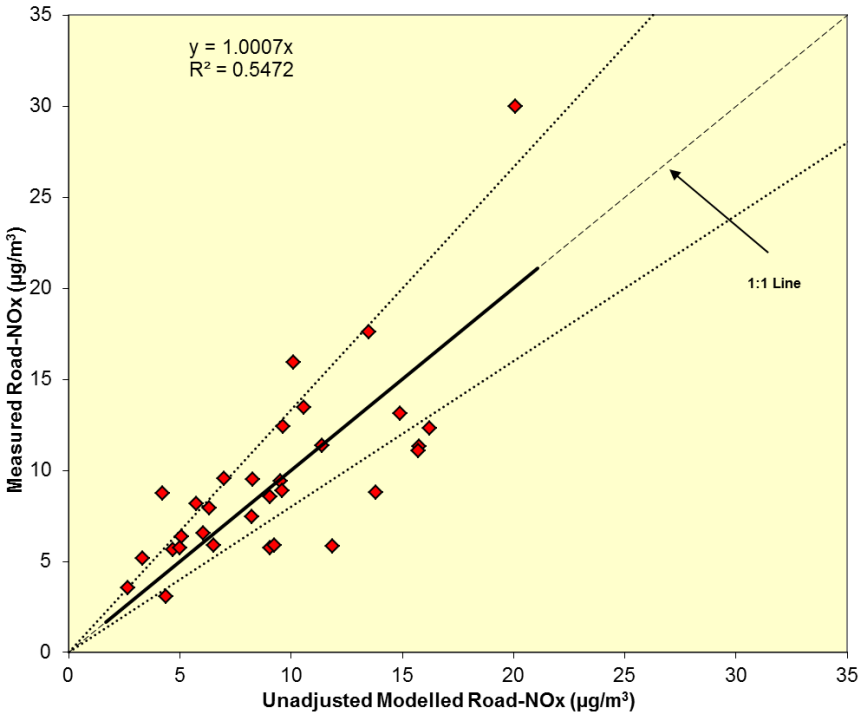


Figure 5.18: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 5

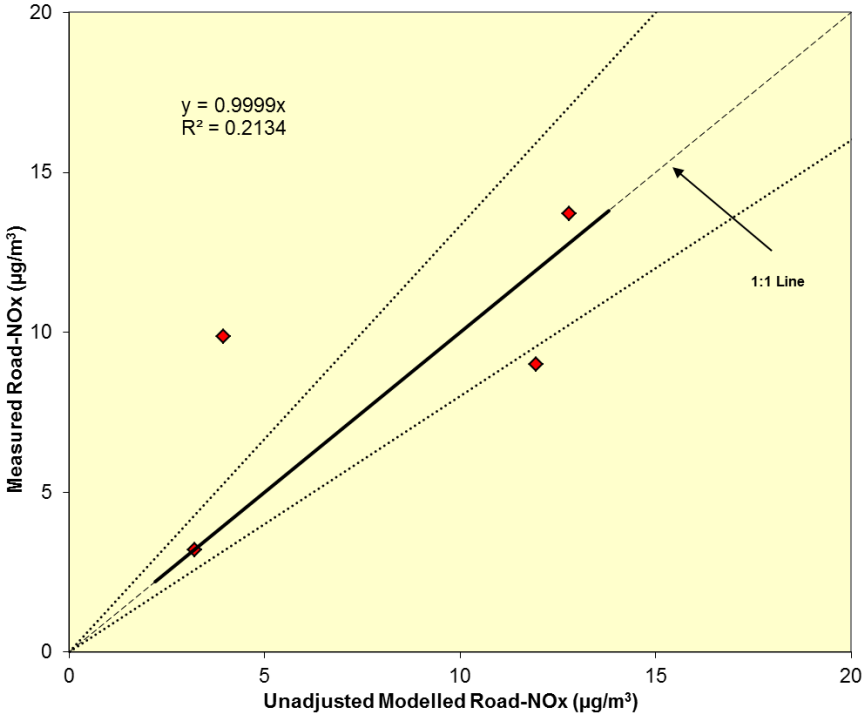


Figure 5.19: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 5

Table 5.12: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 5

Period	Measured Road-NOx (µg/m^3) A	Modelled Road-NOx (µg/m^3) B	Site-specific scaling (A/B)
Set 4	27.8	27.8	1.000
Set 5	3.2	3.2	0.997
Set 6	5.7	5.5	1.037

Iteration 6 (adjustment factors not applied)

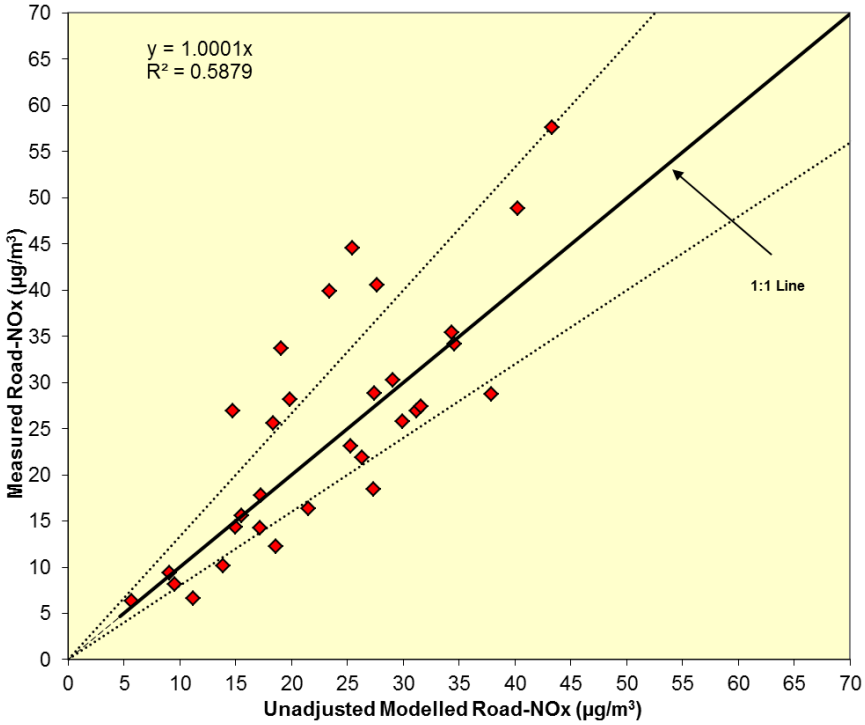


Figure 5.20: Modelled vs Measured Annual Mean Road-NOx, Link Set 1, Iteration 6

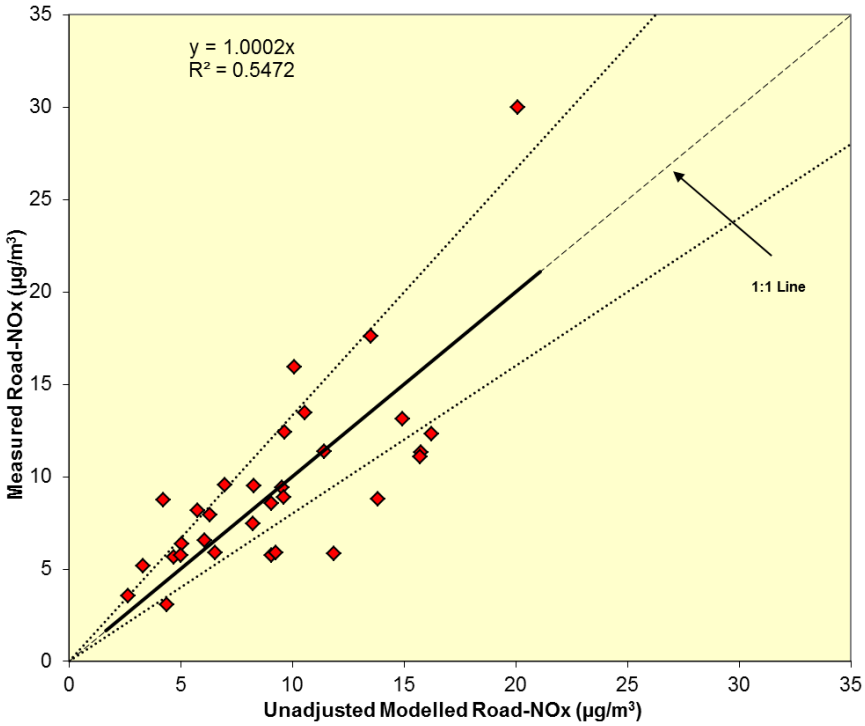


Figure 5.21: Modelled vs Measured Annual Mean Road-NOx, Link Set 2, Iteration 6

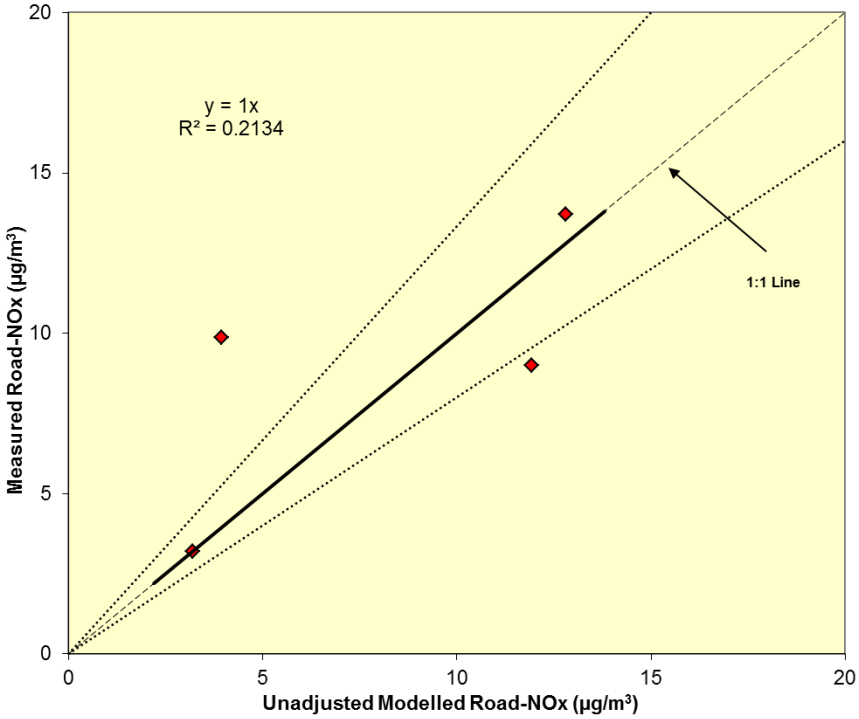


Figure 5.22: Modelled vs Measured Annual Mean Road-NOx, Link Set 3, Iteration 6

Table 5.13: Modelled vs Measured Annual Mean Road-NOx, Link Sets 4, 5, and 6, Iteration 6

Period	Measured Road-NOx (µg/m^3) A	Modelled Road-NOx (µg/m^3) B	Site-specific scaling (A/B)
Set 4	27.8	27.8	1.000
Set 5	3.2	3.2	0.999
Set 6	5.7	5.6	1.015

Final Verification for annual mean NOx

5.79 Total NOx annual mean concentrations have been calculated by summing the annual mean outputs from the calibrated model with the assumed annual mean background NOx concentration. Figure 5.23 shows how the measured and predicted total annual mean NOx concentrations compare. The horizontal axis shows the predicted NOx while the vertical axis shows the measurement-derived NOx. Each red dot represents a monitoring site. If all of the predictions matched the measurements perfectly, then all of the red dots would lie on the 1:1 line, shown by the dashed line. Such a situation would never be expected in reality since emissions models and dispersion models are not perfect, and since monitors themselves are subject to error. A model is generally considered to perform well if the majority of predictions are within +/- 25% of the measurement. Those dots which lie higher than the 1:1 line are those where the model has under-predicted while those below the 1:1 line are over-predicted. The dotted lines show the point at which predictions would be 25% above, and 25% below the measurements. Figure 5.23 shows that almost all of the dots are within this range.

5.80 Table 5.14 provides summary statistics on the model performance. It confirms that the model

predicts NOx concentrations within +/-25% at the vast majority of sites. The model is thus considered to perform well on average for annual mean NOx.

5.81 It is not usual to verify the performance of local-scale dispersion models against individual monthly measurements, and such an approach would not be appropriate given that the bias in the measurements themselves will vary from month to month (only cancelling out when reported as annual mean concentrations). Furthermore, it is the annual model results, rather than the monthly results, which are used in this study. The model has thus not been verified for each month separately.

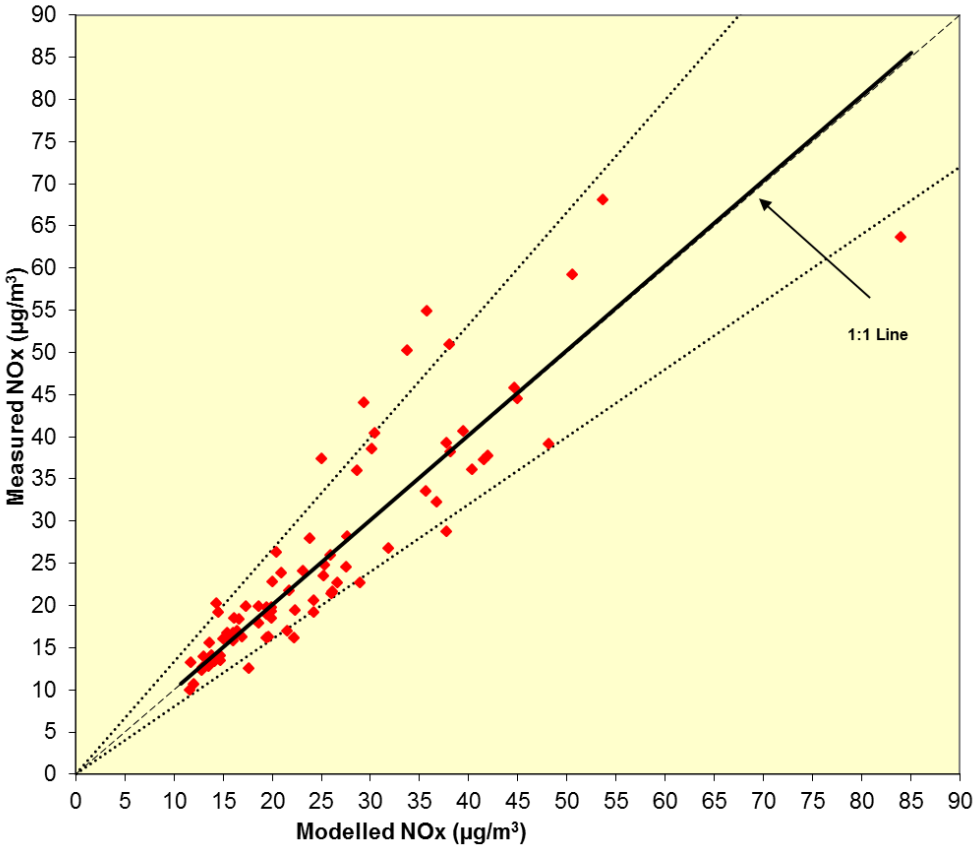


Figure 5.23: Modelled vs Measured Total Annual Mean NOx Concentrations following All Adjustments

Table 5.14 Summary of Model Performance for Annual Mean NOx Concentrations

Statistic	Value
Correlation Coefficient	0.89
Root Mean Square Error (µg/m^3)	5.83
Fractional Bias	0.02
number sites >25%	7
number sites <25%	6
number sites within 25%	69
% sites within 25%	84%

Final Verification for Total Annual Mean NO_2

5.82 The NOx and primary NO_2 outputs from the calibrated model have been combined with the assumed background concentrations within Defra's NO_2 from NOx calculator (Version 6.1) (Defra, 2018a). Following the approach described in Paragraph 5.9, the traffic mix has been set to 'all non-urban UK traffic', the year has been set to 2015.

5.83 Figure 5.24 shows how the measured and predicted total NO_2 concentrations compare (these values should not be confused with the primary NO_2 predictions). The horizontal axis shows the predicted NO_2 while the vertical axis shows the measured NO_2. As for NOx, each red dot represents a monitoring site. If all of the predictions matched the measurements perfectly, then all of the red dots would lie on the 1:1 line, shown by the dashed line. Such a situation would never be expected in reality since emissions models and dispersion models are not perfect, and since monitors themselves are subject to error. A model is generally considered to be performing well if the majority of predictions are within +/-25% of the measurement. Those dots which lie higher than the 1:1 line are those where the model has under-predicted while those below the 1:1 line are over-predicted. The dotted lines show the point at which predictions would be 25% above, and 25% below the measurements. Figure 5.24 shows that almost all of the dots are within this range.

5.84 Table 5.15 provides summary statistics on the model performance. It confirms that the model predicts NO_2 concentrations within +/-25% at the vast majority of sites. Furthermore, there is virtually no bias and the Root Mean Square Error is well within the value of 4 that is usually considered acceptable for NO_2 predictions (Defra, 2016a). The model is thus considered to perform well on average for NO_2.

5.85 It is not usual to verify the performance of local-scale dispersion models against individual monthly measurements, and such an approach would not be appropriate given that the bias in the measurements themselves will vary from month to month (only cancelling out when reported as annual mean concentrations). Furthermore, it is the annual model results, rather than the monthly results, which are used in this study. The model has thus not been verified for each month separately.

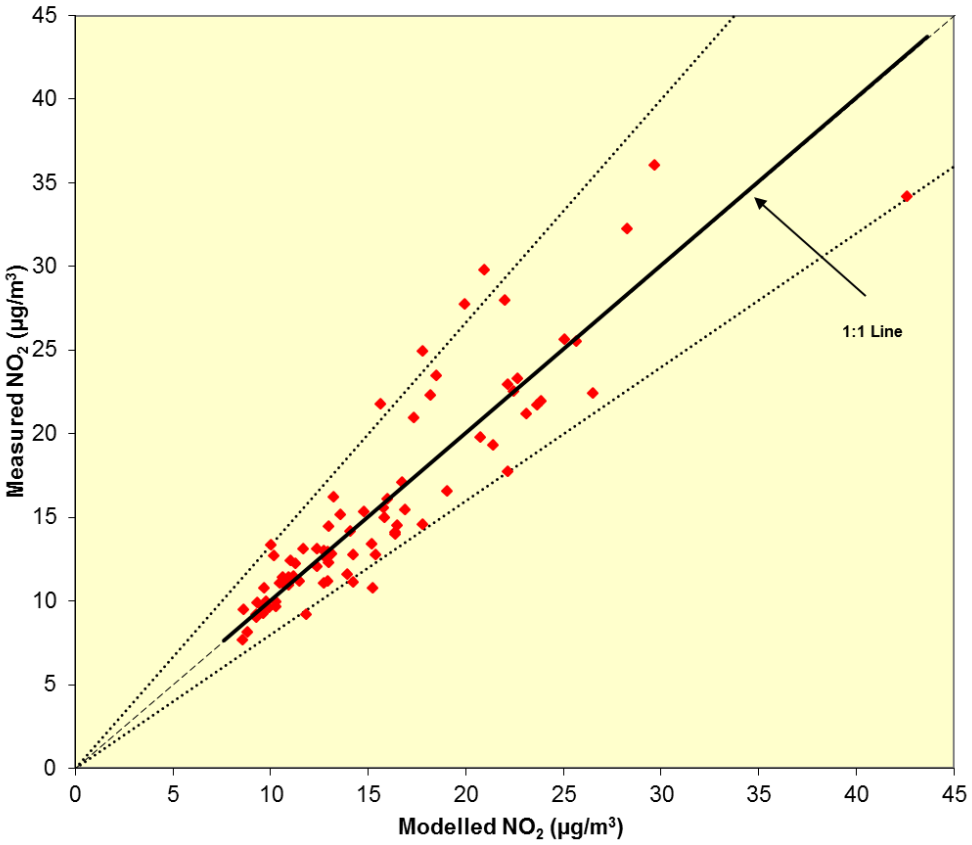


Figure 5.24: Modelled vs Measured Total Annual Mean NO_2 Concentrations following All Adjustments

Table 5.15 Summary of Model Performance for Annual Mean NO_2 Concentrations

Statistic	Value
Correlation Coefficient	0.90
Root Mean Square Error (µg/m^3)	2.78
Fractional Bias	0.01
number sites >25%	4
number sites <25%	4
number sites within 25%	74
% sites within 25%	90%

Model Verification for Annual Mean NH_3

5.86 Because the NH_3 emissions factors have been derived directly from the local measurements, it is to be expected that there will be no bias when compared with those measurements. Figure 5.25 shows how the model compares with the NH_3 measurements. Most of the predictions are within 25% of the measurements, indicating reasonable model performance. In particular, the model predicts well at all of the DELTA sites, where concentrations are known with most certainty.

5.87 Table 5.16 provides summary statistics on the model performance. It shows that the model predicts NH_3 concentrations within +/-25% of the measured value at 91% of sites. Furthermore,

there is virtually no bias and the Root Mean Square Error is just 0.15. The model is thus considered to perform well on average for NH_3. As with NOx and NO_2, the model has not been verified for each month separately. The results presented elsewhere in this report are annual mean results and not monthly-mean results.

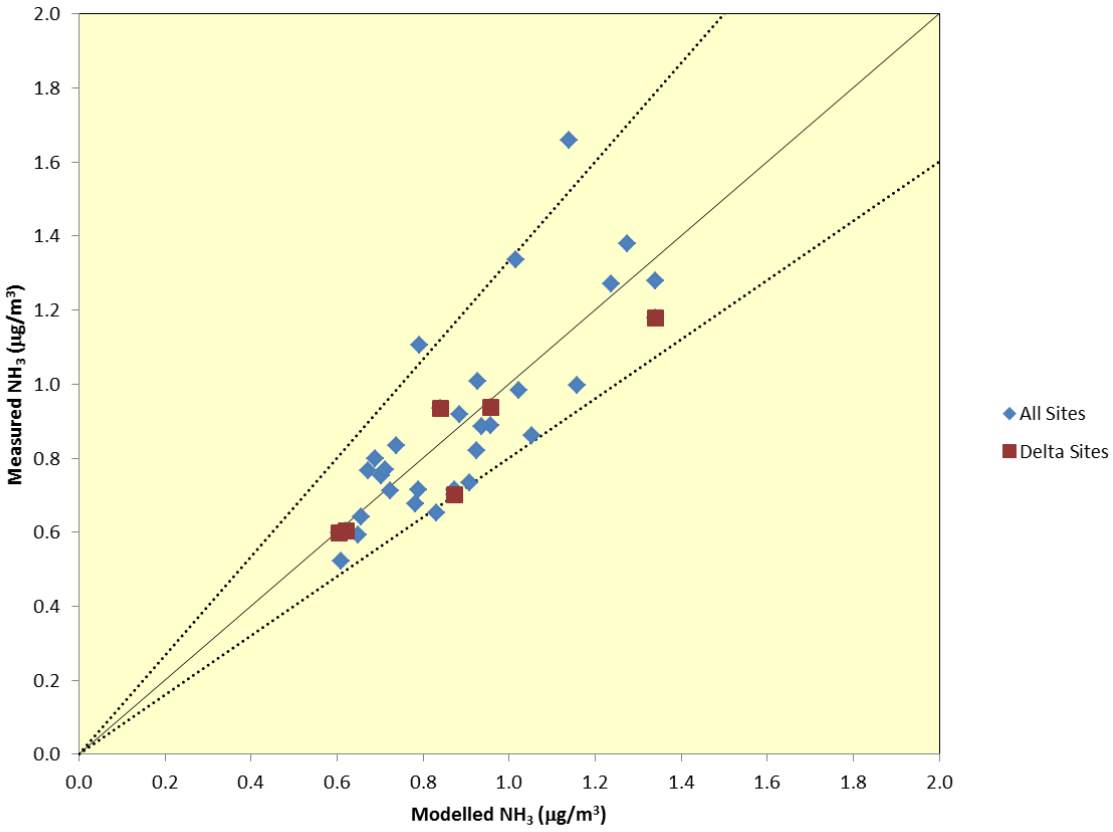


Figure 5.25: Measured vs Predicted Annual Mean NH_3

Table 5.16 Summary of Model Performance for Annual Mean NH_3 Concentrations

Statistic	Value
Correlation Coefficient	0.81
Root Mean Square Error (µg/m^3)	0.15
Fractional Bias	0.00
number sites >25%	1
number sites <25%	2
number sites within 25%	31
% sites within 25%	91%

NO_2 from NOx Relationships

5.88 As outlined previously (see Paragraphs 5.9, 5.35, and 5.82). Modelled annual mean NO_2 concentrations have been predicted from modelled annual mean NOx concentrations using Defra's NO_2 from NOx calculator (Version 6.1) (Defra, 2018a), the assumed annual average

background NO_2 concentrations, and modelled, receptor-specific, primary NO_2 proportions. The setting used within Defra's calculator was 'all non-urban UK traffic'. For predictions made under emissions model A, the year was set to 2015. For predictions made under emissions models B and C, the year was set to 2028. This change in year has the effect of including Defra's predictions regarding how background ozone concentrations will change between 2015 and 2028.

Period-specific Adjustment of the NOx to NO_2 Relationships

5.89 While the calculation of NO_2 from NOx on an annual average basis is relatively straightforward, there is also a requirement to predict NO_2 from NOx for each of the individual model periods (summer day (1-5), summer night, winter day (1-3), and winter night). Because sunlight and ozone concentrations vary over the course of a day, and over the course of a year, different relationships are expected to apply to each period.

5.90 The initial calculation of period-specific NO_2 from period-specific NOx uses Defra's NO_2 from NOx calculator (Version 6.1) as described above. In order to take account of the diurnal and annual variation in the NOx to NO_2 relationship, a secondary factor has then been applied and this has been calculated as set out below.

5.91 The hour-by-hour measurements from eight roadside and background automatic monitoring sites in the region (Brighton Preston Park, Canterbury, Eastbourne Devonshire Park, Rochester Stoke, Tunbridge Wells A26, Tonbridge Roadside 2, Eastbourne Holly Place, and Lewes West Street) were obtained for the period 7th August 2014 to 9th August 2016; i.e. a two-year period. These data were then apportioned by period (summer day, summer night etc.). A line of best fit was then plotted between NOx and NO_2 for each aggregated dataset (i.e. all sites grouped together). These best fit lines are shown in Figure 5.26 and Figure 5.27. They show an expected pattern, with more NO to NO_2 conversion during the night time, particularly during summer when ozone concentrations are high, and less conversion during day time.

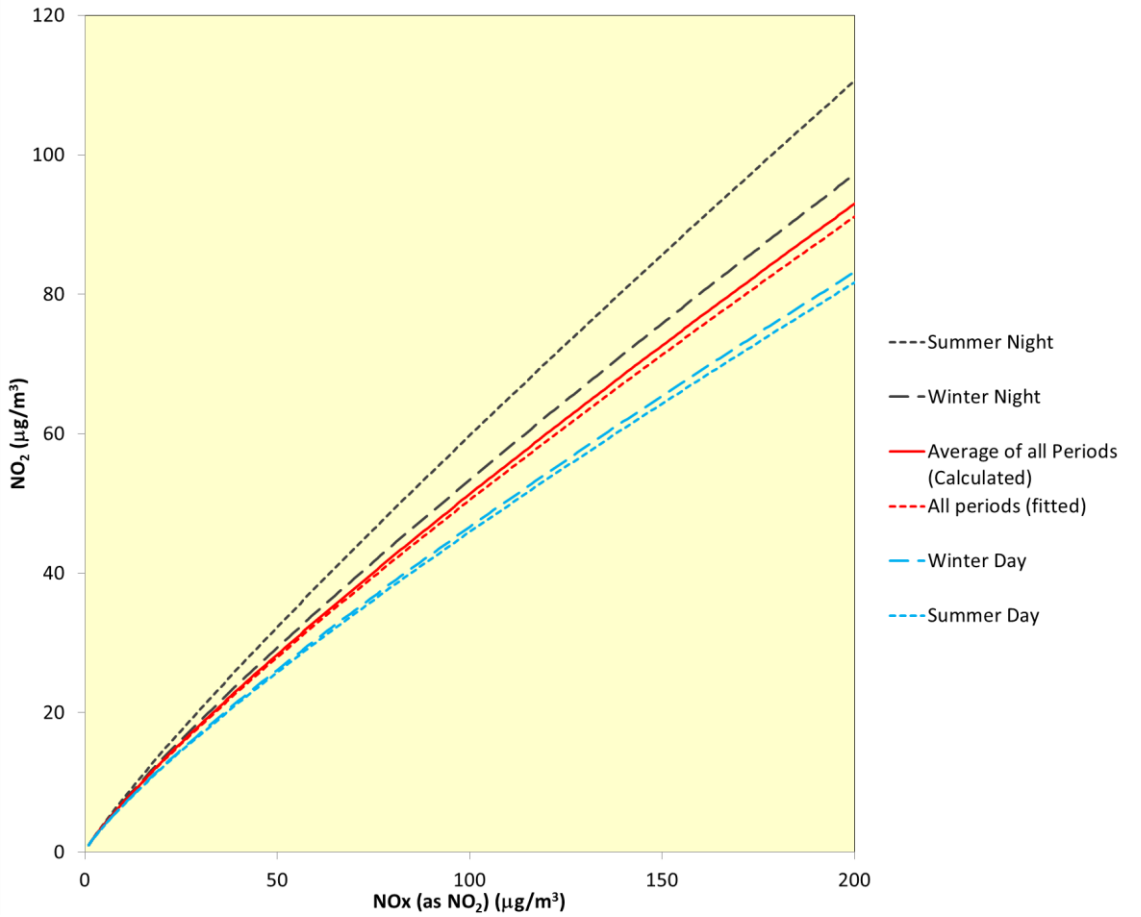


Figure 5.26: Lines of Best-fit for Period-specific NOx to NO_2 Relationships at Eight Automatic Monitoring Sites (four periods) as a Function of the Total NOx Concentration

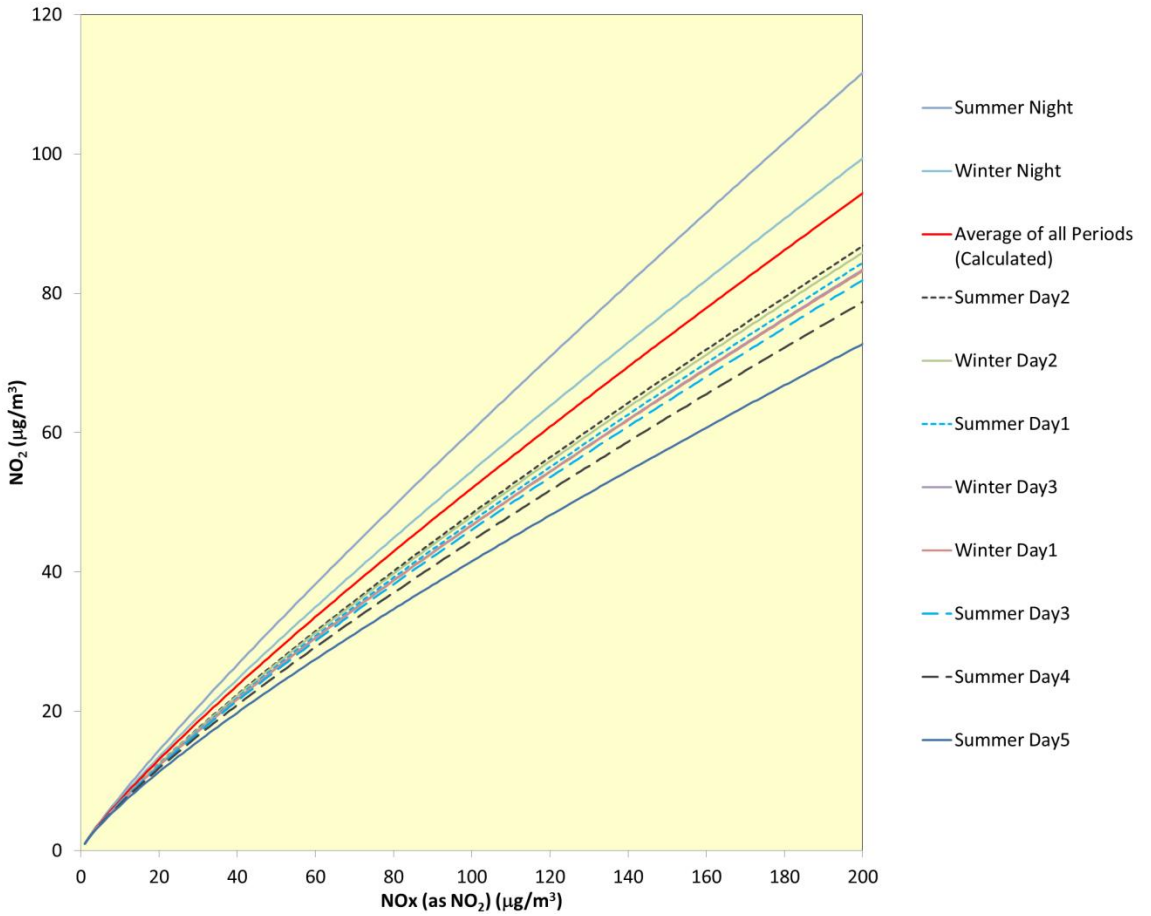


Figure 5.27: Lines of Best-fit for Period-specific NOx to NO_2 Relationships at Eight Automatic Monitoring Sites (ten periods) as a Function of the Total NOx Concentration

5.92 Within the modelled period (as defined by the meteorological and monitoring data used, i.e. 7th August 2014 to 9th August 2016), there are 2,561 hours of summer day, 1,831 hours of summer night, 1,566 hours of winter day, and 2,802 hours of winter night. A weighted average NOx to NO_2 ratio was calculated by combining each of the period-specific lines shown in Figure 5.26 according to these proportions. This average is also shown in Figure 5.26. The degree of divergence of each period-specific line in Figure 5.26 from this weighted average was then calculated. These 'period-specific divergences' are plotted in Figure 5.28. Figure 5.28 thus shows the degree of divergence from the annual average NOx to NO_2 pattern that occurs during each period. Figure 5.29 then shows the same process using the more detailed, ten-period split (i.e. with summer day subdivided into five groups and winter day subdivided into three groups).

5.93 The lines shown in Figure 5.28 and Figure 5.29 have been applied as secondary weightings after the use of Defra's NOx from NO_2 calculator. For example, the predictions of NO_2 during summer night were made by inputting the period-specific modelled road-NOx concentration (i.e. the component of total NOx coming from road traffic) and period-specific background NO_2 concentration into Defra's calculator and deriving a period-specific total concentration. This NO_2 concentration was then multiplied by:

0.0364 x 'A' – 0.0034

Where 'A' is the natural logarithm of the total predicted NOx concentration in μg/m^3 (as NO_2).

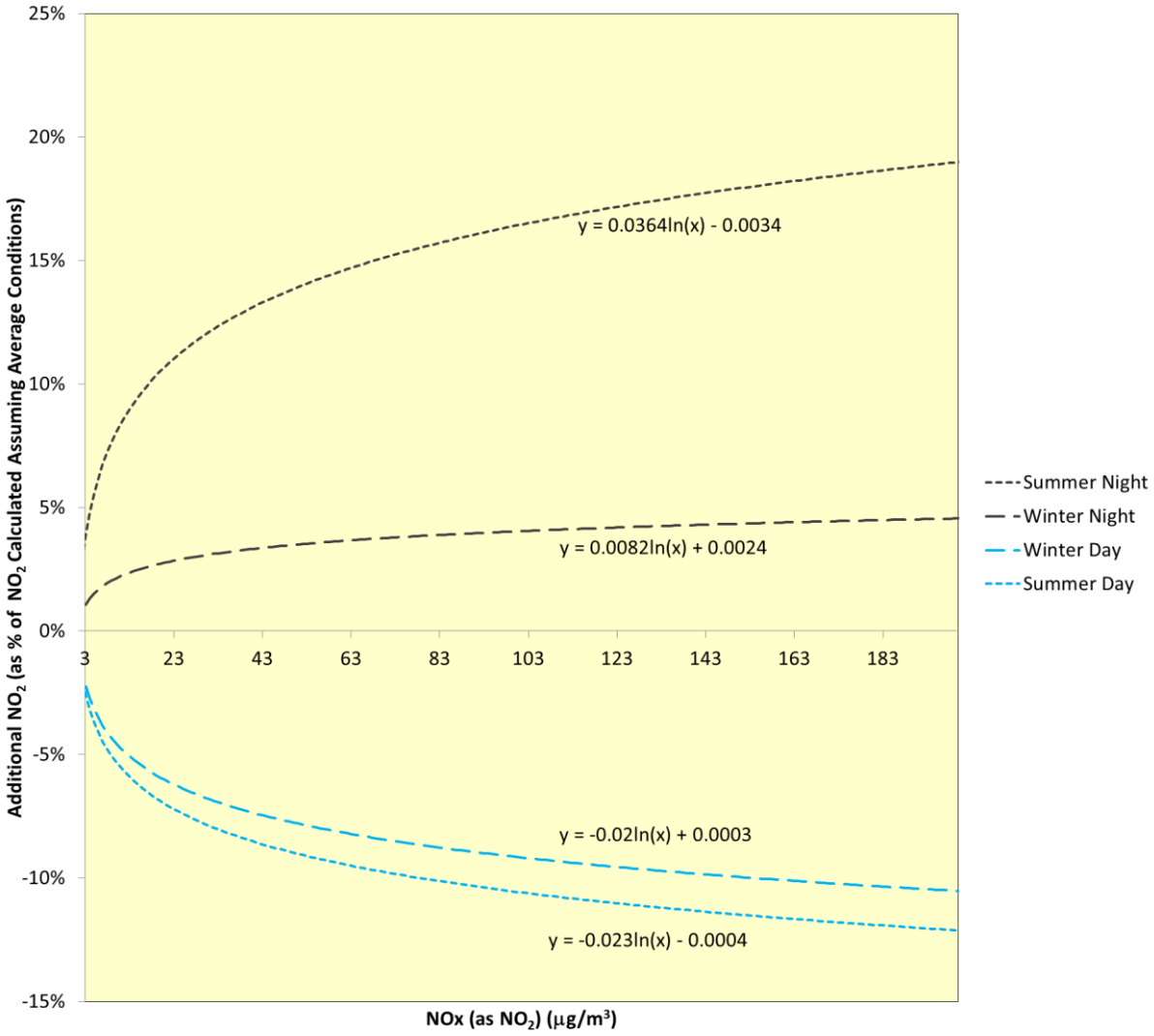


Figure 5.28: Period-specific Uplifts Applied to NO_2 Concentrations Calculated using Defra's NOx to NO_2 Calculator (four periods)

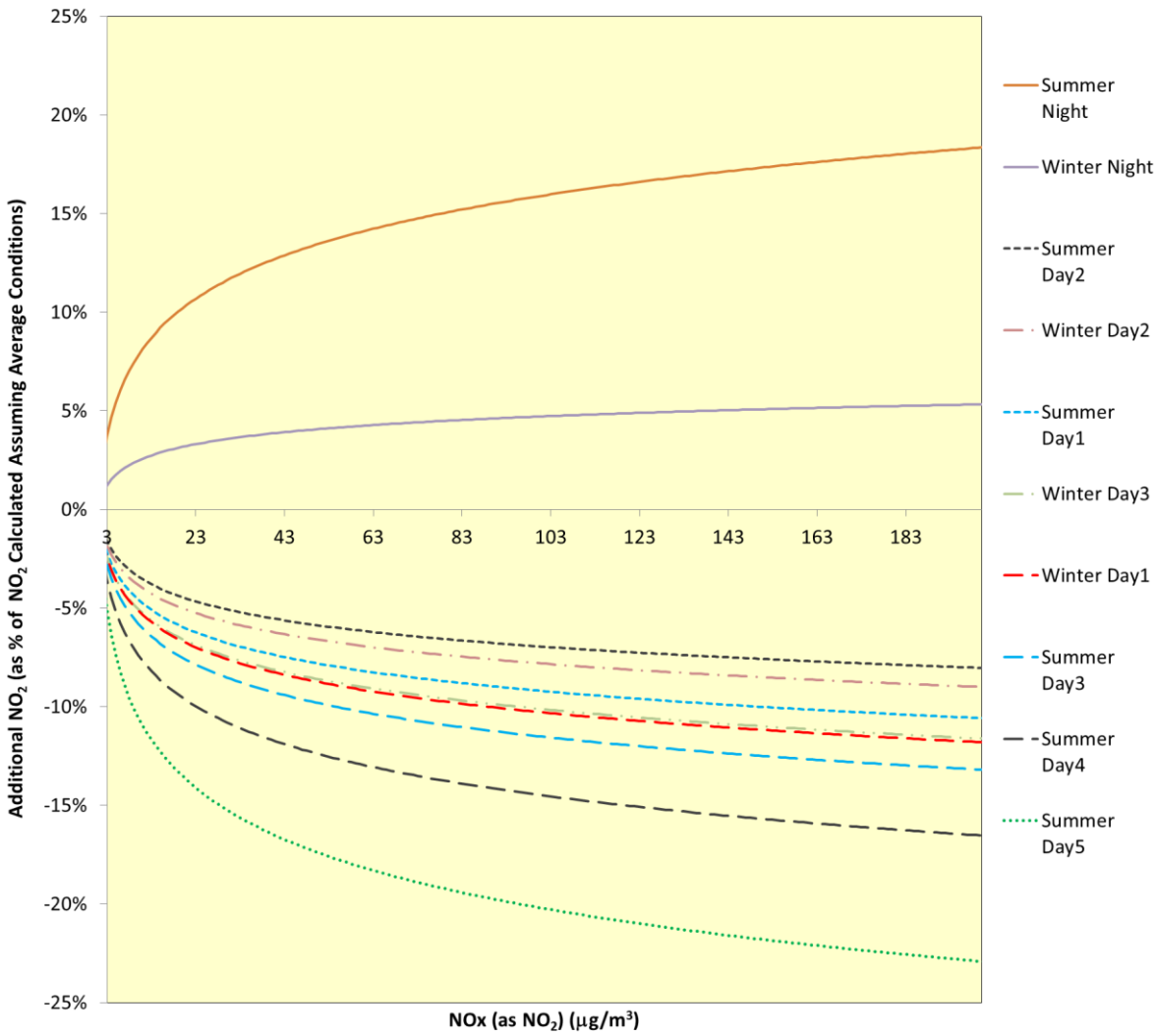


Figure 5.29: Period-specific Uplifts Applied to NO_2 Concentrations Calculated using Defra's NOx to NO_2 Calculator (ten periods)

5.94 In practice, the degree of diurnal and seasonal divergence from the annual average NOx to NO_2 ratio will change if the assumptions in emissions models B and C come to pass. This is because both ozone and primary NO_2 levels are assumed to be different in models B and C than they are at present. It has not, however, been possible to predict how the factors shown in Figure 5.28 and Figure 5.29 might change and so they have been applied to all model scenarios.

Additional Manipulation of fall-off with Distance Relationships

NO_2

5.95 As shown in Table 4.4, all of the ecological monitoring transects are either near to air quality monitoring transects, or near to roadside and background air quality monitoring sites. In order to ensure the closest possible agreement between the measurements and the concentrations used to calculate deposition fluxes to the ecological survey transects, a further manipulation of the predicted concentrations has been carried out when predicting concentrations at the ecological

quadrats only. While it would have been possible to calculate the deposition fluxes directly from the measurements, this would have lost the detail gained by modelling diurnal processes and so this approach was considered preferable.

5.96 Figure 5.30 (top) shows how the measured and modelled fall-off with distance of two-year average NO_2 concentrations compare along air quality monitoring Transect 1[19,20]. A line of best fit has been fitted through each set of data. The difference between each line (i.e. see Table 5.17 Row K) has then been applied as an adjustment to the modelled NO_2 data as shown in Figure 5.30 (middle, with concentrations shown on a log scale, and bottom, with concentrations shown on a linear scale). Applying this adjustment results in a more precise fit to the measurements. This same adjustment has been applied to the 2-year average NO_2 predictions along ecological monitoring Transect K, which runs parallel to air quality Transect 1 (note that the adjustment has only been applied out to 100 m since it is not considered appropriate to extrapolate it).

5.97 Figure 5.31 shows the same approach applied to air quality Transect 2. This adjustment has been applied to the NO_2 predictions along ecological Transect J, which runs parallel to air quality Transect 2.

5.98 Figure 5.32 shows the equivalent data for air quality Transect 3. This adjustment has been applied to predicted NO_2 concentrations along ecological Transect N, which runs parallel to air quality Transect 3.

5.99 For all of the other site pairings shown in Table 4.4, it was not possible to plot curved lines and so both measured and predicted concentrations were assumed to trace a straight line (when viewed using a logarithmic scale on both axes) between the roadside and background monitor. Given the shapes of the curves along the three monitoring transects considered, this is not an unreasonable assumption. For each roadside-background pair, an adjustment was derived as the difference between the measured and predicted lines (i.e. following the same approach as at the transect sites).

5.100 Table 5.17 sets out all of the adjustments applied to predicted NO_2 concentrations along the ecological transects. The same adjustments have also been applied to NO, but in the context of nitrogen deposition, these are relatively inconsequential and so the fact that they are based on NO_2 rather than NO is of little overall concern. While some of these adjustments result in a steeper fall-off with distance than predicted by ADMS, some result in a shallower rate of reduction. On average, there is no indication that ADMS is getting this feature consistently wrong, and so no adjustment has been applied to the SAC-wide predictions as shown in the

[19] The data are shown as the natural logarithm of both distance from road and measured concentrations. Professional experience producing air quality models for UK Government is that this is a convenient way to analyse concentration vs distance from roads transects.

[20] It was considered more appropriate to focus on NO_2 than NOx, since NO_2 is what was measured and is the principal pollutant of concern in relation to nitrogen deposition from NOx. Similarly, the analysis has used total concentrations rather than just the local road component since it is also considered useful to apply a localised calibration to the assumed background concentrations.

various maps and future-year predictions.

Table 5.17: Fitted Adjustment Factors Applied to Modelled NO_2 Concentrations at the Ecological Transects

Ecological Monitoring Transect	Nearby Air Quality Monitors	Adjusted NO_2 Concentration Calculated Using: A=
A	T13,T69	EXP(LN(D)+(((-0.0528*LN(B)+2.5193)-(-0.0222*LN(B)+2.2684))))
B	T14,T69	EXP(LN(D)+(((-0.068*LN(B)+2.5985)-(-0.0393*LN(B)+2.3575))))
C	T67,T7	EXP(LN(D)+(((-0.0463*LN(B)+2.5722)-(-0.0751*LN(B)+2.6198))))
D	T66,T60	EXP(LN(D)+(((-0.0186*LN(B)+2.4924)-(-0.0577*LN(B)+2.5448))))
E	T65,T64	EXP(LN(D)+(((-0.0837*LN(B)+2.7007)-(-0.101*LN(B)+2.8374))))
F	T62,T63	EXP(LN(D)+(((-0.2268*LN(B)+3.351)-(-0.1636*LN(B)+3.0621))))
G	T61,T60	EXP(LN(D)+(((-0.082*LN(B)+2.8657)-(-0.0542*LN(B)+2.5239))))
H	T40,T39	EXP(LN(D)+(((-0.0726*LN(B)+2.4379)-(-0.0621*LN(B)+2.5814))))
I	T40,T41	EXP(LN(D)+(((-0.0447*LN(B)+2.4221)-(-0.0663*LN(B)+2.5838))))
J	Transect 2	EXP(LN(D)+(((-0.0084*LN(D3)^2-0.122*LN(B)+3.161)-(-0.0127*(LN(B)^2)-0.1246*LN(B)+3.2671))))
K	Transect 1	EXP(LN(D)+(((-0.0392*LN(B)^3+0.3734*LN(B)^2-1.251*LN(B)+3.9582)-(-0.0028*(LN(B)^2)-0.1667*LN(B)+3.1014))))
L	T5,T57,T70	EXP(LN(D)+(((-0.0725*LN(B)+2.3718)-(-0.0213*LN(B)+2.2721))))
M	T68,T57,T70	EXP(LN(D)+(((-0.0884*LN(B)+2.4654)-(-0.042*LN(B)+2.3939))))
N	Transect 3	EXP(LN(D)+(((0.0102*LN(B)^3-0.0839*LN(B)^2+0.0767*LN(B)+2.6423)-(0.0083*LN(B)^3-0.0659*LN(B)^2+0.0071*LN(B)+2.8092))))
O	T59,T39	EXP(LN(D)+(((-0.0812*LN(B)+2.4921)-(-0.0399*LN(B)+2.4409))))
Where	A = adjusted NO_2 concentration, B = distance from edge of road, LN = the natural logarithm, and D = NO_2 concentration predicted using ADMS-Roads.	

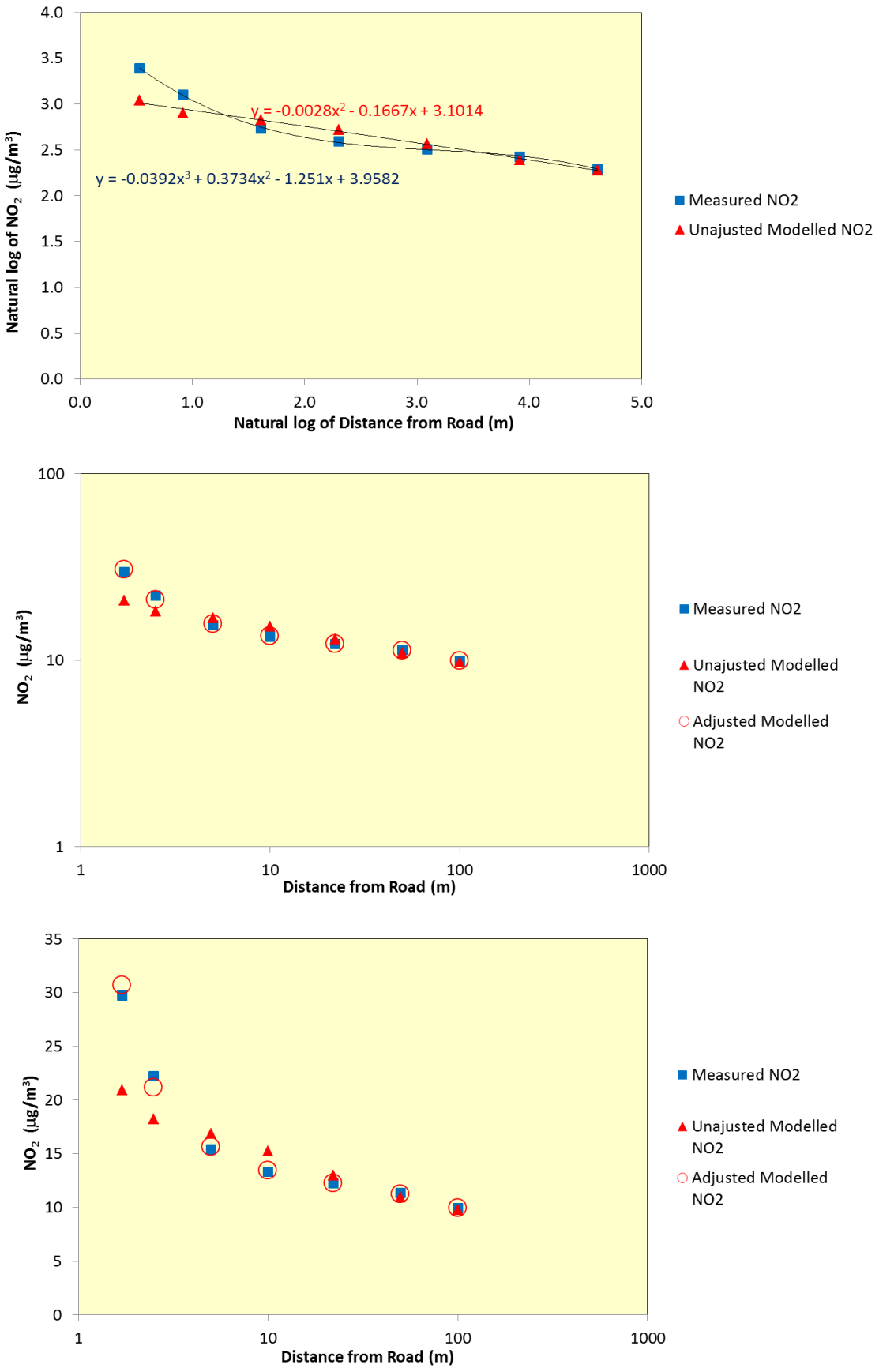


Figure 5.30: Measured vs Predicted 2-Year Average NO_2 Concentrations along Transect 1: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models.

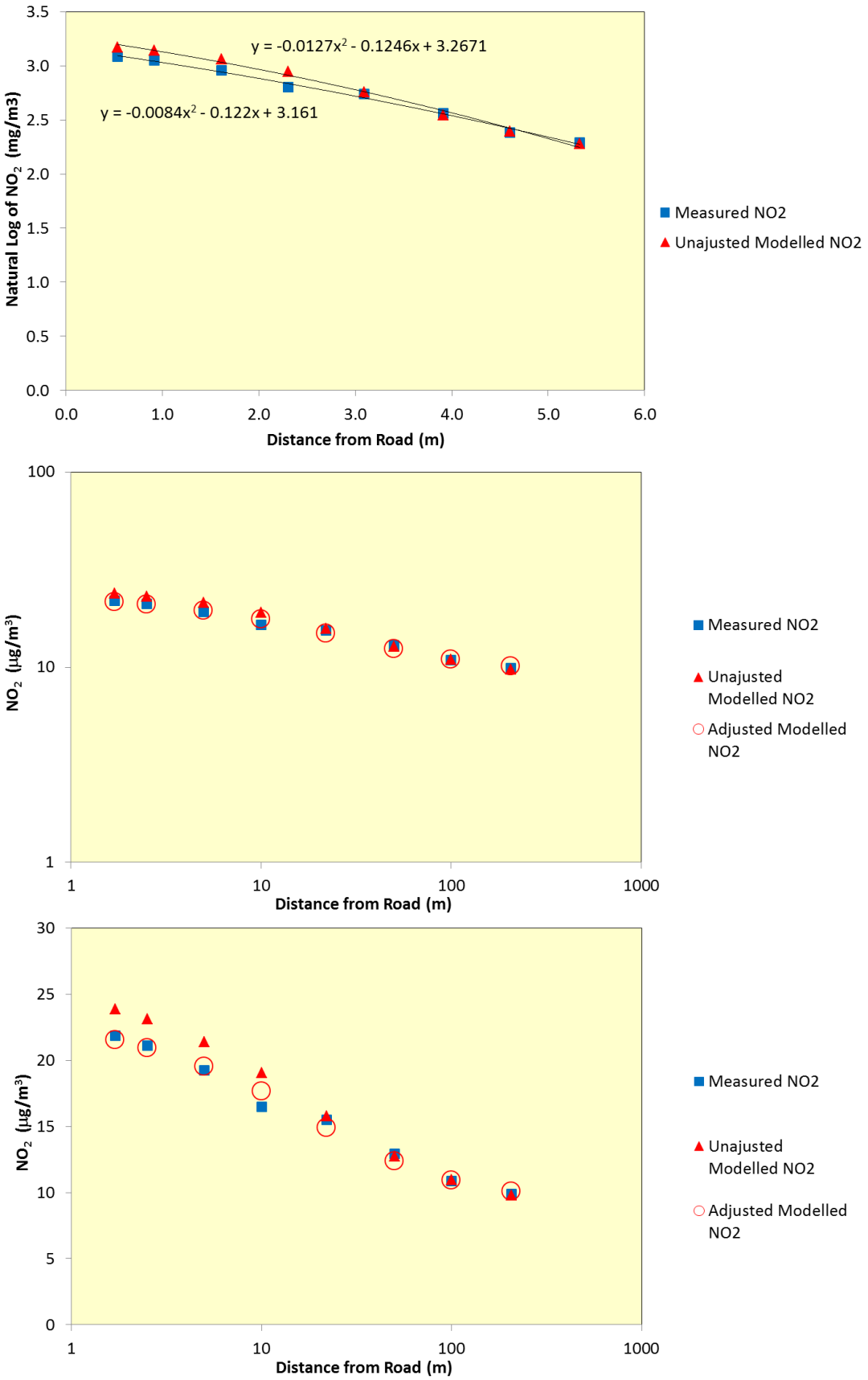


Figure 5.31: Natural Log of Measured vs Predicted 2-Year Average NO_2 Concentrations along Transect 2: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models

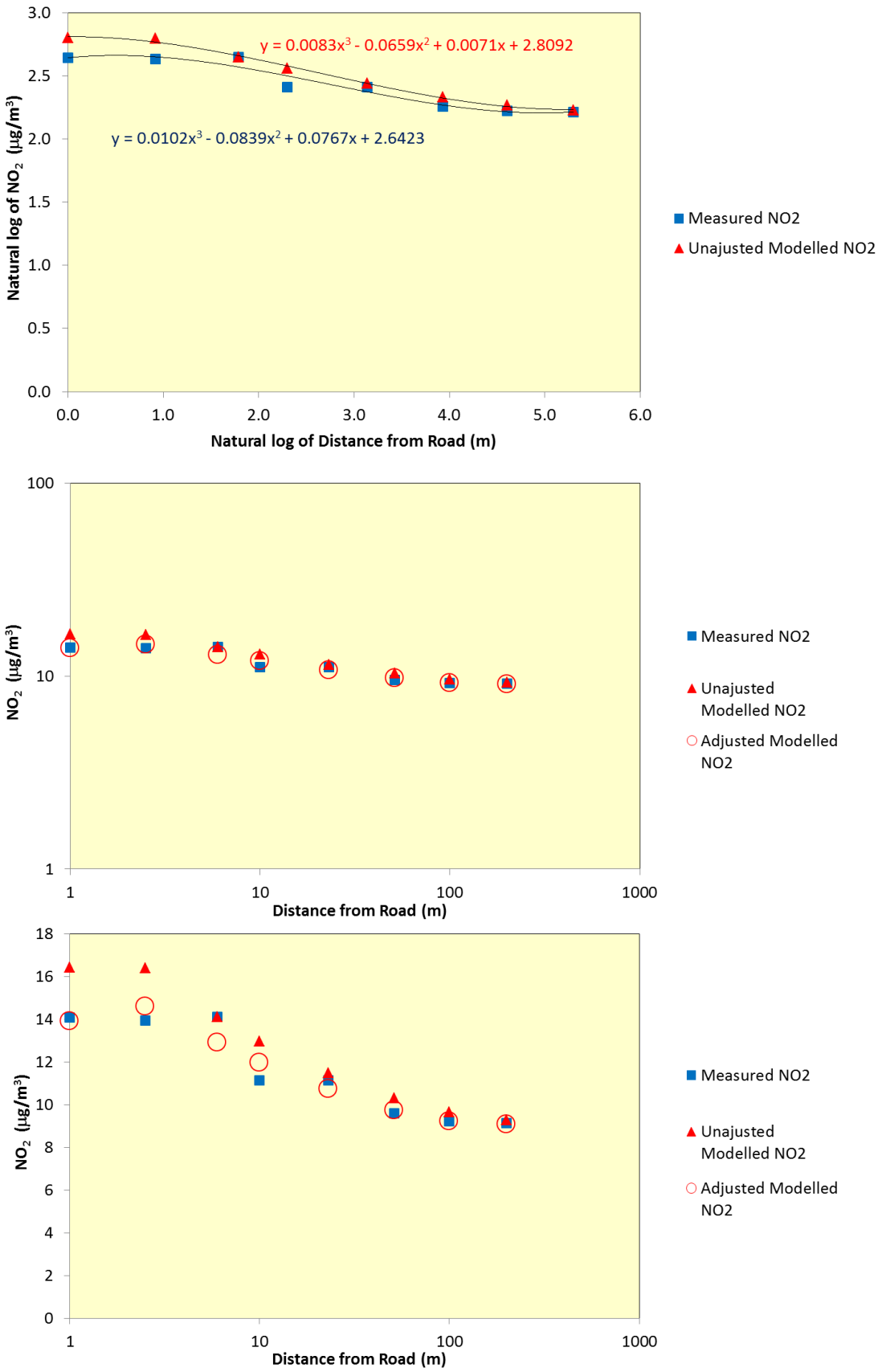


Figure 5.32: Measured vs Predicted 2-Year Average NO_2 Concentrations along Transect 3: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models.

NH_3

5.101 As noted in Chapter 8, the measured NH_3 concentrations show much more scatter around any discernible trend line. This is highlighted in Figure 5.33 (top), which shows the measured and predicted NH_3 concentrations (again using the natural logarithm of both concentration and distance from road) along air quality monitoring Transect 1. Despite the scatter in the measurements, it has been possible to discern the approximate line of best fit shown in Figure 5.33 (top). This is a similar shape to the equivalent region on the NO_2 curve (compare Figure 5.30 and Figure 5.33) but suggests an even steeper rate of reduction for NH_3 than for NO_2. This is perhaps unsurprising given that NH_3 is a primary pollutant while NO_2 is, to a large extent, a secondary pollutant (meaning that it is formed from chemical reactions in the atmosphere). As with NO_2, an adjustment to the modelled concentrations has been calculated as the difference between the two lines shown in Figure 5.33. Figure 5.33 (middle, with concentrations shown on a log scale, and bottom, with concentrations shown on a linear scale) shows the effect of applying this adjustment, which results in a more precise fit to the measurements. This adjustment has been applied to all of the modelled NH_3 concentrations along ecological monitoring Transect K (see Table 5.18).

5.102 Figure 5.34 shows the same approach applied along air quality monitoring Transect 2. This adjustment has thus been applied to all of the modelled NH_3 concentrations along ecological monitoring Transect J (see Table 5.18).

5.103 Figure 5.35 shows the measured and predicted NH_3 along air quality monitoring Transect 3. While there is a clear trend in reducing measured concentrations with increasing distance from the road, there is significant scatter around this trend. In particular, measured concentrations increase with increasing distance at three of the monitoring sites. There is no clear explanation for this and so this trend must be viewed with some scepticism. Those measured concentrations which fit with the expected trend (i.e. reducing concentrations with increased distance from the road) are not dissimilar to the predicted concentrations. The biggest differences between the measured and predicted concentrations are at those sites where the trend in the measurements is questionable. It is thus considered that the model already does a reasonable job of predicting concentrations along this transect and no further adjustment has been applied.

5.104 In terms of all of the other ecological monitoring transects, there are insufficient local NH_3 monitors to apply site-specific model adjustments and so no such adjustments have been applied.

Table 5.18: Fitted Adjustment Factors Applied to Modelled NH_3 Concentrations at the Ecological Transects

Ecological Monitoring Transect	Nearby Air Quality Monitors	Adjusted NH_3 Concentration Calculated Using: A=
J	Transect 2	EXP(LN(B)+(((-0.325*LN(LN(D))+0.1449)-(-0.1485*LN(B3)+0.3577))))
K	Transect 1	EXP(LN(B)+(((-0.449*LN(LN(D))+0.2022)-(-0.1288*LN(B2)+0.166))))
Where	A = adjusted NH_3 concentration, B = distance from edge of road, LN = the natural logarithm, and D = NH_3 concentration predicted using ADMS-Roads.	

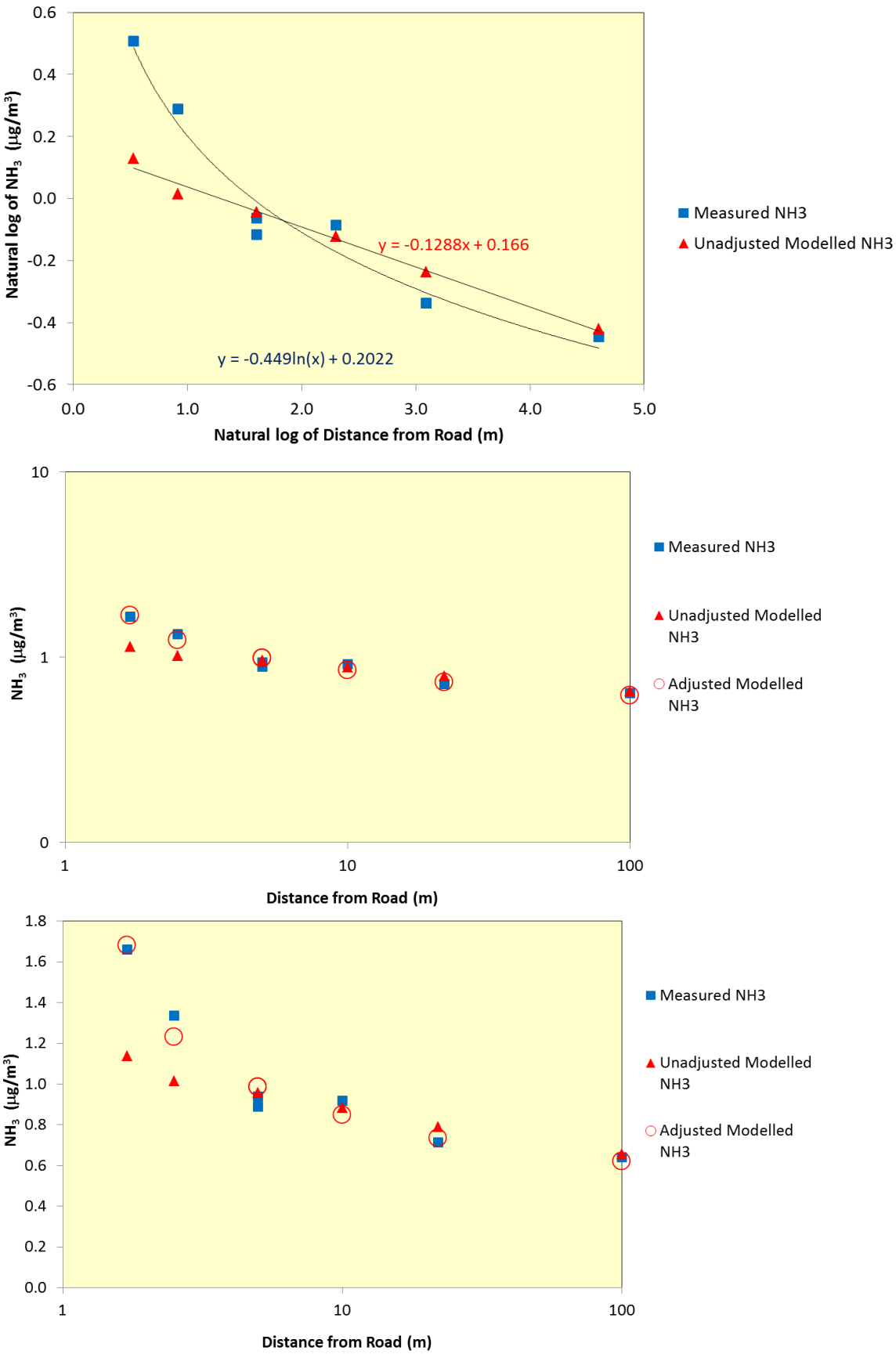


Figure 5.33: Measured vs Predicted 2-Year Average NH_3 Concentrations along Transect 1: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models.

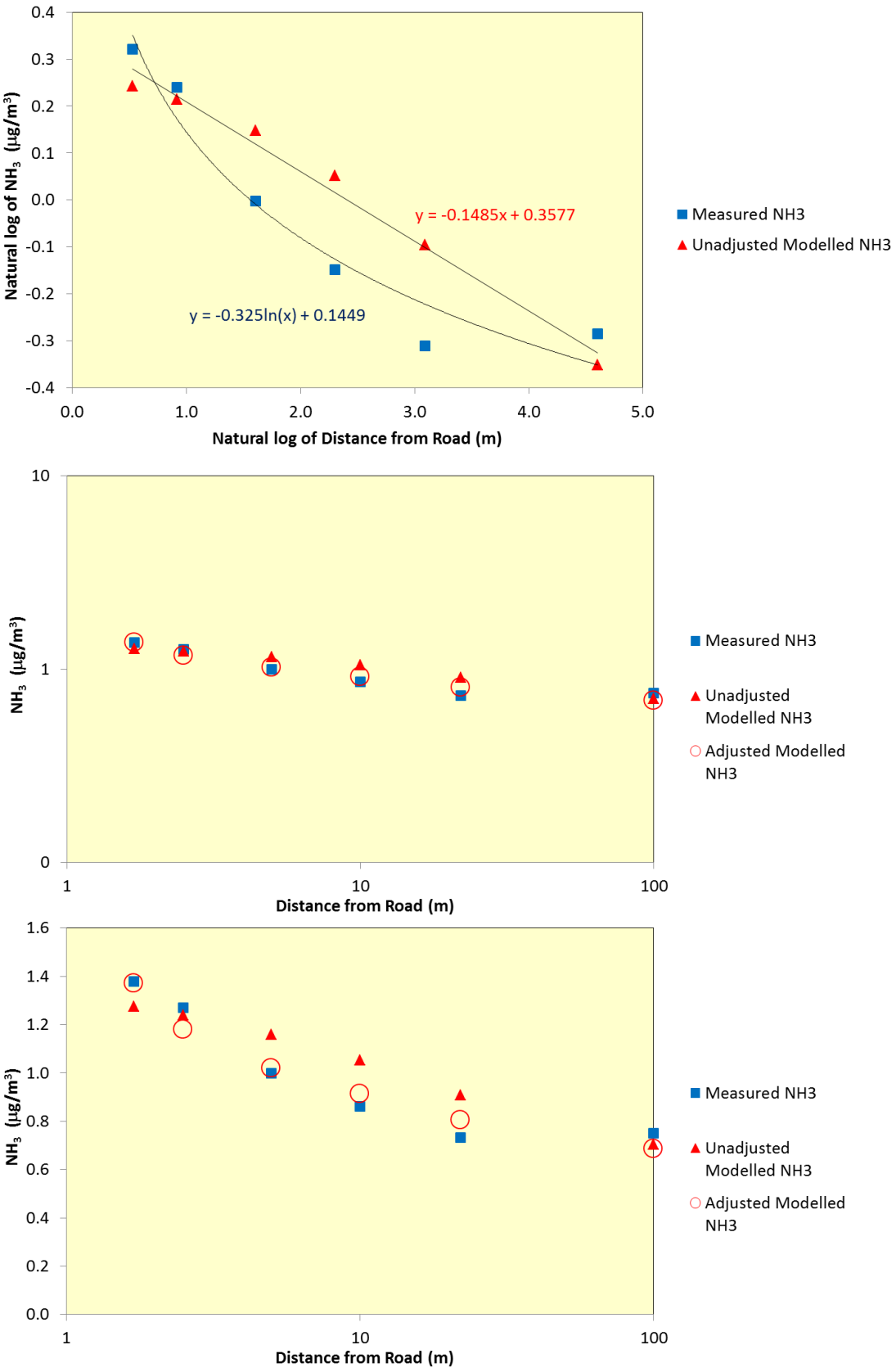


Figure 5.34: Measured vs Predicted 2-Year Average NH_3 Concentrations along Transect 2: top = unadjusted model on log scales, middle = unadjusted and adjusted models on log 'y' scale; bottom = unadjusted and adjusted models.

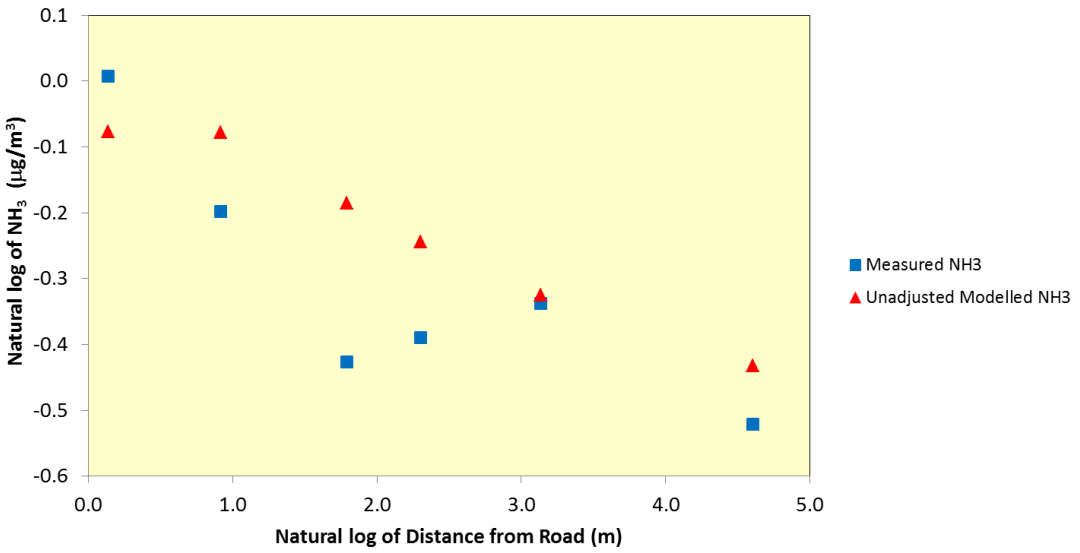


Figure 5.35: Measured vs Predicted 2-Year Average NH_3 Concentrations along Transect 3

Calculating 24-hour Mean NOx from Predicted Annual Mean NOx Concentrations

5.105 As explained previously in this chapter, in order to improve the precision of the deposition calculations, the predictive dispersion model has been configured to treat different time periods separately. This means that, while the dispersion model can be used to predict annual mean concentrations of NOx, it cannot be used to directly determine the maximum 24-hour mean NOx concentration during a year. An additional step is thus required in order to assess against the critical level for 24-hour mean NOx concentrations.

5.106 Since there are no other robust published relationships between annual mean and the maximum 24-hour mean NOx concentrations, one has been derived for this project. Measured annual mean and maximum 24-hour mean NOx concentrations over the three years of 2014, 2015, and 2016, for the 135 AURN monitoring sites shown in Table 5.19, have been obtained from Defra[21]. Only annual mean and maximum 24-hour mean concentrations at sites with more than 75% data capture have been included. These sites include roadside sites, background sites, and those in between. The results have been plotted in Figure 5.36. This shows that there is a clear relationship between these two metrics, albeit with quite considerable scatter. There appears to be some variation in the trend by year, with 2015 having generally lower maximum 24-hour mean NOx concentrations for a given annual mean concentration, and 2016 having generally higher values.

5.107 Figure 5.37 shows the same data, categorised by site type and also showing the measured period-mean concentrations at the Kingstanding monitoring site. Higher concentrations were measured at the roadside sites than at the background sites, but there is no very strong differentiation between the patterns at different sites. The relationship between annual mean and maximum 24-hour mean concentrations at the Kinstanding monitor is within (although on the low

[21] These are all of the AURN sites with adequate data capture during these years.

side) the range from all of the AURN sites. The SAC includes roadside locations, intermediate locations, and background locations. There is thus considered to be no value in removing any of the AURN sites when determining the relationship between maximum 24-hour mean concentrations and annual mean concentrations. The fact that the measured relationship at Kingstanding is below the average at the AURN sites is thus not considered to suggest that this will be the case across all different settings within the SAC. While it could be argued that industrial AURN sites should be excluded, Figure 5.38 which excludes these sites shows that they have no appreciable effect on the overall pattern. The best-fit line shown in Figure 5.37 has thus been used as the basis for predicting the maximum 24-hour mean concentrations from measured and predicted annual mean concentrations.

5.108 Figure 5.39 shows the same relationship as Figure 5.37 on linear scales. While there is clearly scatter around the assumed relationship, it is likely to provide a reasonable basis for predicting 24-hour mean concentrations on average. The maximum 24-hour mean NOx concentrations have thus been predicted as:

Maximum 24-hour Mean NOx = EXP 2.7924 x LN Annual Mean $NOx^{0.5149}$

Table 5.19: AURN Sites used to Determine 24-hour Mean to Annual Mean NOx Relationship

Aberdeen	Leamington Spa	Stoke-on-Trent Centre	Chepstow A48	Norwich Lakenfields
Aberdeen Union Street Roadside	Leamington Spa Rugby Road	Storrington Roadside	Chesterfield Roadside	Nottingham Centre
Aberdeen Wellington Road	Leeds Centre	Sunderland Silksworth	Chilbolton Observatory	Nottingham Western Boulevard
Armagh Roadside	Leeds Headingley Kerbside	Sunderland Wessington Way	Coventry Allesley	Oldbury Birmingham Road
Aston Hill	Leicester A594 Roadside	Swansea Roadside	Cwmbran	Oxford Centre Roadside
Barnsley Gawber	Leicester University	Thurrock	Derry	Oxford St Ebbes
Bath Roadside	Leominster	Tower Hamlets Roadside	Derry Rosemount	Peebles
Belfast Centre	Lincoln Canwick Rd.	Walsall Woodlands	Doncaster A630 Cleveland Street	Plymouth Centre
Belfast Stockman's Lane	Liverpool Queen's Drive Roadside	Wicken Fen	Dumbarton Roadside	Portsmouth
Birmingham Acocks Green	London Bexley	Widnes Milton Road	Dumfries	Preston
Birmingham Tyburn	London Bloomsbury	Wigan Centre	Eastbourne	Reading London Rd.
Birmingham Tyburn Roadside	London Eltham	Wirral Tranmere	Eskdalemuir	Reading New Town
Blackburn Accrington Road	London Haringey Priory Park South	Wrexham	Exeter Roadside	Rochester Stoke
Blackpool Marton	London Hillingdon	Yarner Wood	Fort William	Salford Eccles
Bournemouth	London Marylebone Road	York Fishergate	Glasgow Great Western Road	Sandy Roadside

Bradford Mayo Avenue	London N. Kensington	Billingham	Glasgow High Street	Shaw Crompton Way
Brighton Preston Park	London Teddington	Grangemouth	Glasgow Kerbside	Sheffield Devonshire Green
Bristol St Paul's	London Westminster	Grangemouth Moray	Glasgow Townhead	Sheffield Tinsley
Bury Whitefield Roadside	Lullington Heath	Horley	Glazebury	Southampton A33
Bush Estate	Luton A505 Roadside	Liverpool Speke	Hafod-yr-ynys Roadside	Southampton Centre
Cambridge Roadside	Manchester Piccadilly	London Harlington	Haringey Roadside	Southend-on-Sea
Camden Kerbside	Market Harborough	Manchester Sharston	High Muffles	Southwark A2 Old Kent Road
Canterbury	Narberth	Manchester South	Honiton	St Osyth
Cardiff Centre	Newcastle Centre	Middlesbrough	Hull Freetown	Stanford-le-Hope Roadside
Carlisle Roadside	Newcastle Cradlewell Roadside	Port Talbot Margam	Hull Holderness Road	Stockton-on-Tees A1305 Roadside
Charlton Mackrell	Newport	Scunthorpe Town	Inverness	Stockton-on-Tees Eaglescliffe
Chatham Roadside	Northampton Kingsthorpe	Warrington	Ladybower	Stoke-on-Trent A50 Roadside

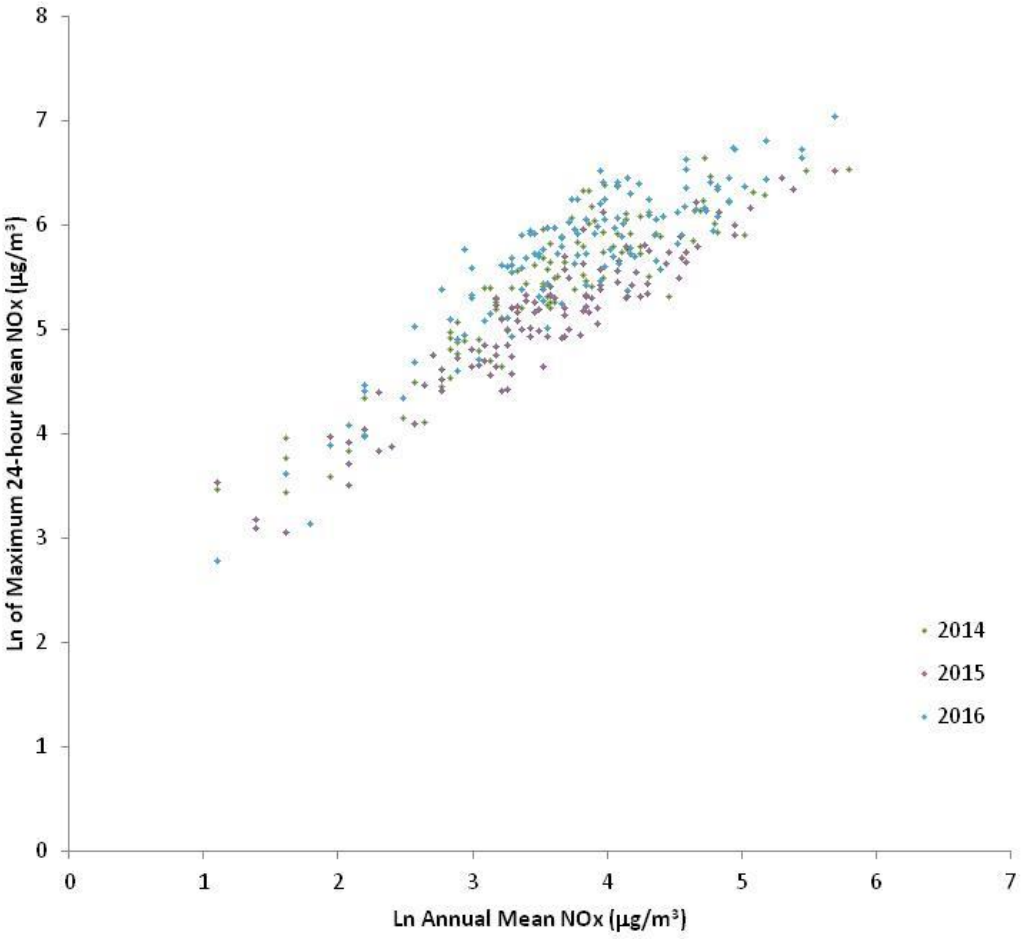


Figure 5.36: Natural Logarithm of Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years

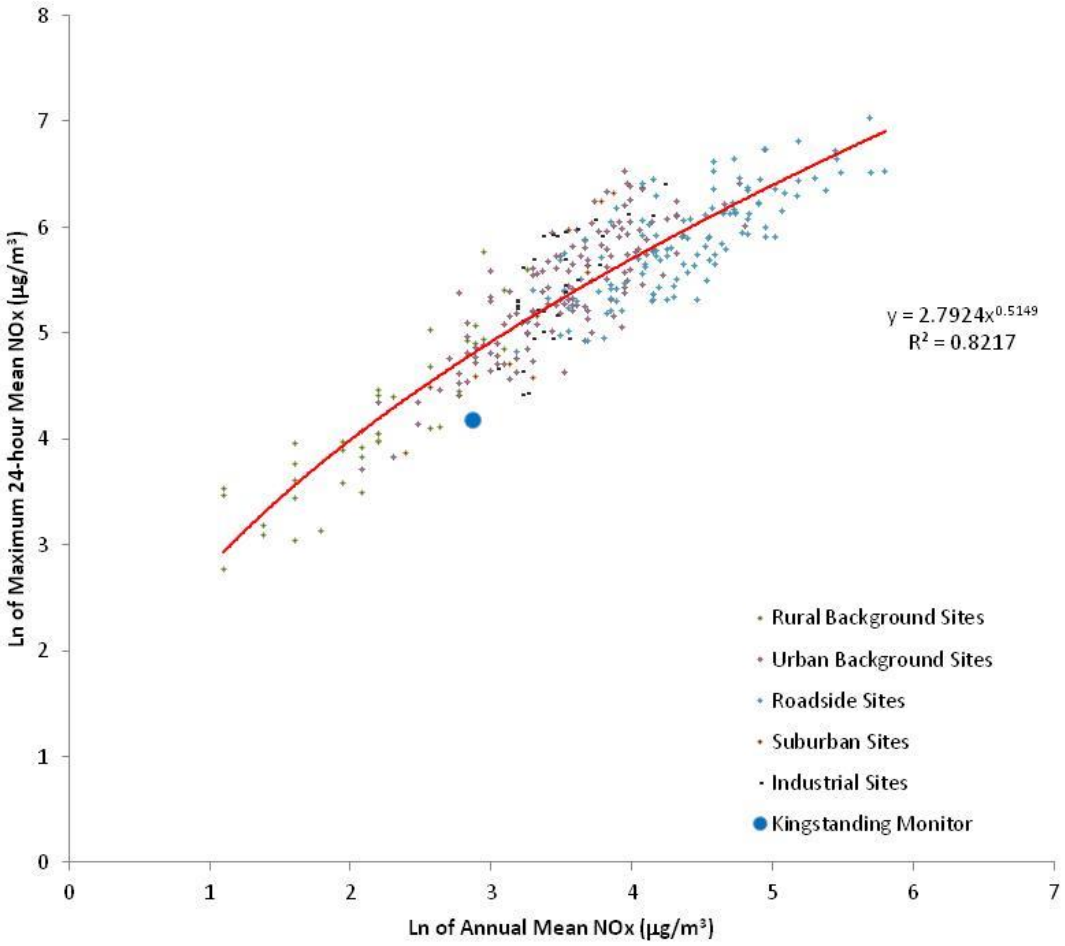


Figure 5.37: Natural Logarithm of Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years, by Site Type – Also Showing the Period Mean at the Kingstanding Site

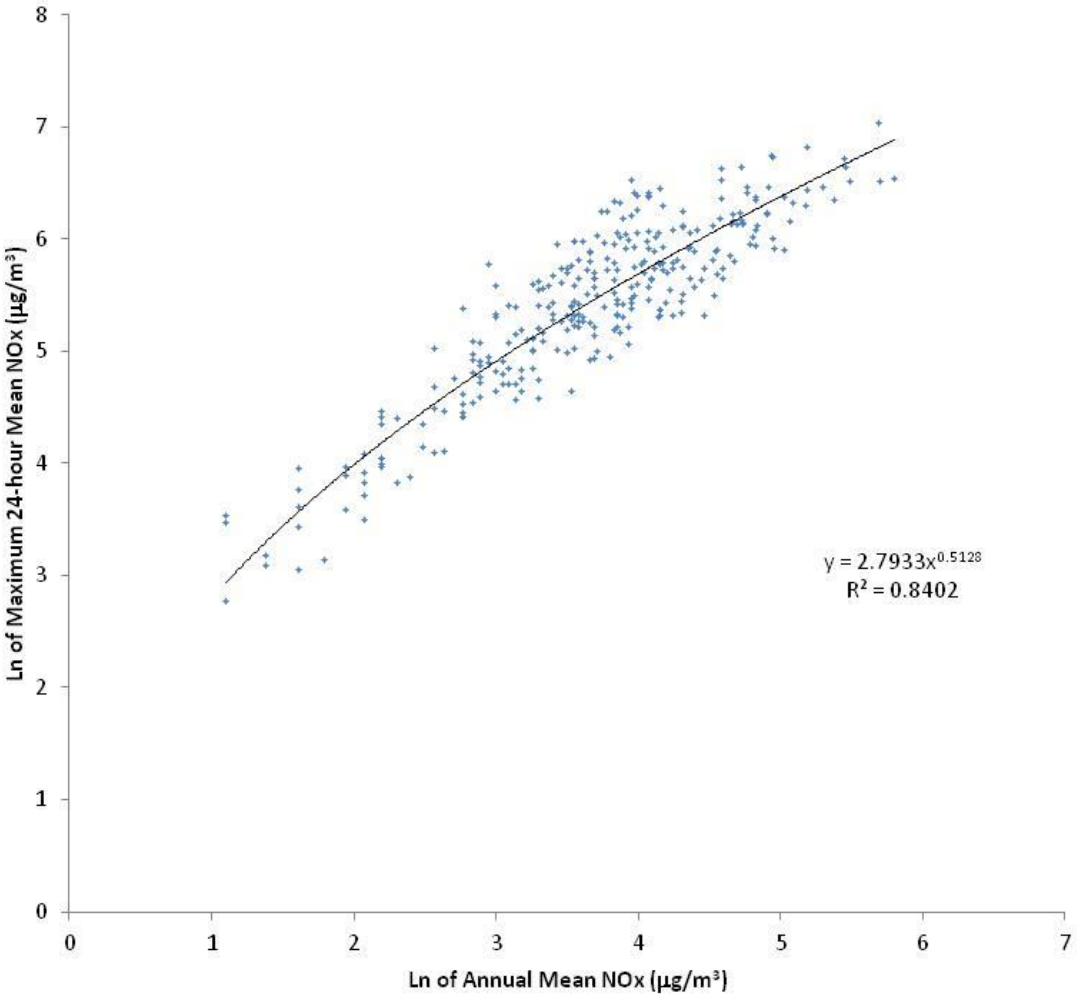


Figure 5.38: Natural Logarithm of Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years, Excluding Industrial Sites

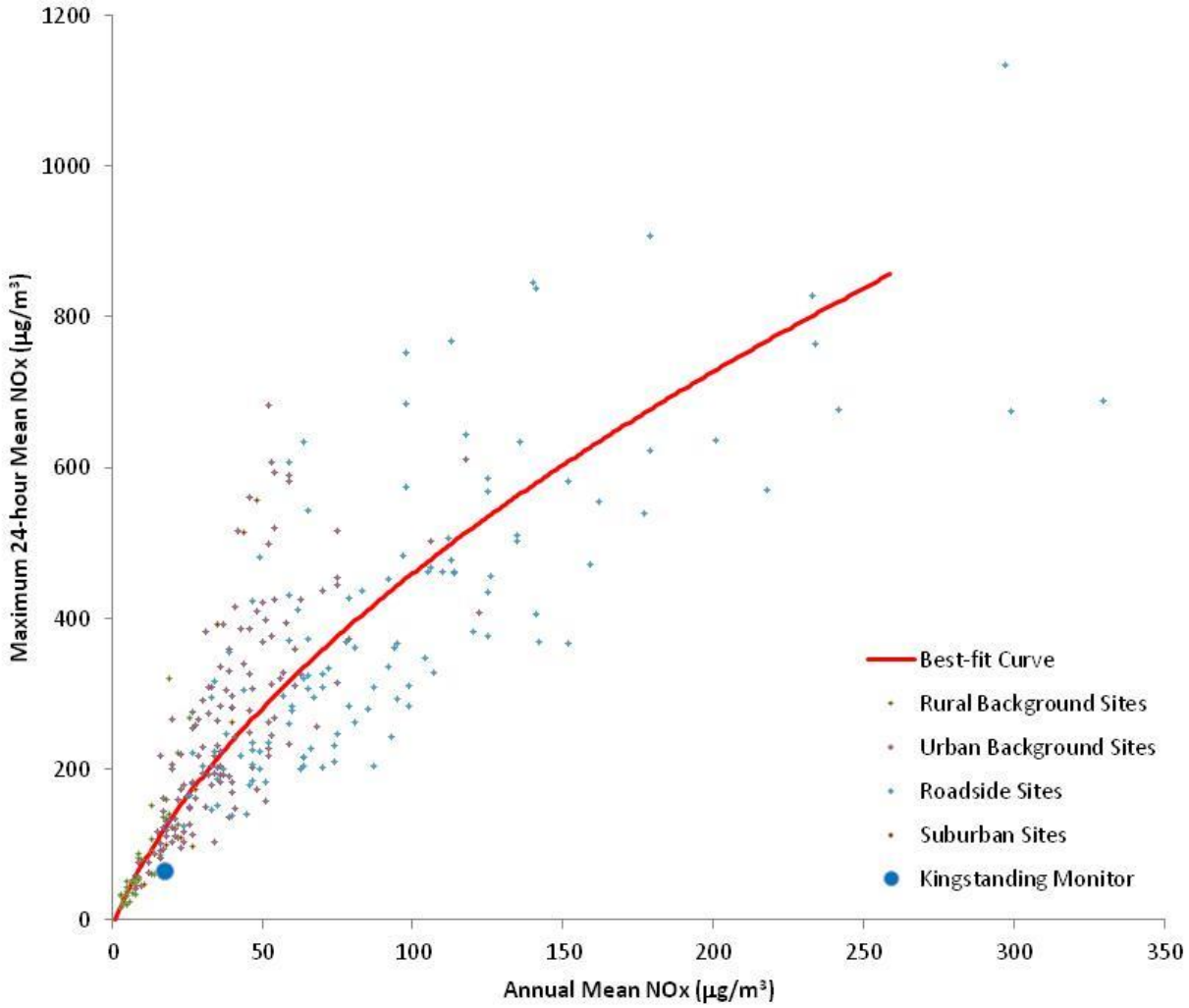


Figure 5.39: Annual Mean NOx vs Maximum 24-hour Mean NOx at all Suitable AURN Sites over 3 Years, also Showing Kingstanding Site and Best-fit Curve. The Best-fit Curve is that shown in Figure 5.37, which is on a logarithmic scale. It can be described as: $Exp(2.7924 \times Ln(X)^{0.5149})$

Modelling of Deposition Fluxes to the Entire SAC

Receptor Grids

5.109 As explained in Paragraph 5.45, concentrations have been predicted across a grid of more than 20,000 receptors, which cover the SAC and the surrounding area. Away from roads, the coverage of these receptors is relatively coarse; relying on the fact that concentrations are quite spatially homogenous at large distances from sources. Deposition fluxes will not, however, be so spatially uniform away from roads. Where one surface type abuts another, there will be a step change in deposition fluxes. It has thus been necessary to use an even finer grid to calculate deposition fluxes. A Cartesian grid of 6.8 million receptor points covering the entire SAC on a 2 m x 2 m basis has thus been defined.

5.110 Concentrations have been interpolated across the 21,000 receptors using triangulation with linear interpolation. The interpolated concentrations have then been assigned to each of the 6.8 million

receptors. The land-cover at each 2 m x 2 m grid point has been assigned from detailed land-cover maps generated by Ecus Ltd. using aerial imagery and ground-truthing. Deposition has then been calculated for each 2 m x 2 m of the SAC.

Deposition Calculations

5.111 Dry deposition is driven by a concentration gradient caused by surface depletion. This is quantified as a deposition velocity (V_d), which is the ratio between deposition flux and atmospheric concentration.

Eq 2. $Vd(z) = -F/C(z)$

and therefore:

Eq 3. $F = VdC$

where F is the deposition flux, and atmospheric concentration ($_C$) and V_d are both referenced to a height (z) above the ground. In principle, these terms refer to instantaneous values, but more commonly, time-averaged data are used.

5.112 As explained in Paragraph 4.1, a very detailed approach has been taken to calculating deposition fluxes, which goes well beyond the level of detail that would typically be used for an air quality assessment. Very often, air quality assessments multiply annual average concentrations by annual average deposition velocities, but it is well-established that there are diurnal and seasonal differences in deposition velocities, as well as diurnal and seasonal differences in concentrations. The highest NO_2 concentrations, for example, often occur after dark in the winter, but these are largely irrelevant for deposition since deposition of NO_2 largely stops at this time (since the principal route of NO_2 deposition is via plant's stomata and these are inactive after dark in the winter). Applying annual average deposition velocities to annual average concentrations smooths over this, and other, details, and while this simplification is probably appropriate for basic assessments, it is associated with potentially significant error. Modelling carried out on behalf of Defra (Smith et al. (2000)) and the Environment Agency (Environment Agency, 2008) has taken a more detailed approach of using temporally-variable concentrations and temporally-variable deposition velocities. Given the attention currently focused on Ashdown Forest, and the degree of effort taken in the monitoring campaign, it was considered appropriate to apply a more detailed approach to the deposition modelling than that of using annual average deposition velocities.

5.113 The approach used is based on an electrical resistance analogy; also known as the 'big-leaf model'. This is the same general approach used by CEH on behalf of Defra in the UK national deposition maps. The approach treats the various forces which resist deposition separately. The first of these forces is termed the 'aerodynamic resistance' (r_a). This is the resistance to transport between the atmosphere and a shallow (ca. 1 mm) layer near to the surface. Transport here is due to turbulent diffusion. r_a is dependent on height, and is therefore given for a reference height (z). Second is laminar boundary layer resistance (r_b). This is the resistance to transport through the quasi-laminar layer to the surface. Transport of gases through this layer is due to molecular

diffusion. Transport of particles may be the result of Brownian motion or sedimentation. Third is surface resistance (r_c). This is the receptiveness of the surface to depositing material and depends on properties of both. Equation Eq 4 shows how the deposition velocity (V_d) is calculated from these three resistances Smith et al. (2000).

Eq 4. $$V_d = \left(\frac{1}{r_a + r_b + r_c} \right)$$

5.114 Two separate deposition models have been run; providing two alternative sets of outputs. The reason for this is uncertainty in the surface resistance (r_c) for NO_2; to which the model is particularly sensitive. One method "the EA method", follows an approach for calculating r_c published by the Environment Agency (2008). The second method has been developed by the authors of this report, but relies very heavily on work by CEH in producing the national UK deposition maps by Smith et al. (2000). Since it was not appropriate to follow CEH's method exactly, this is termed the "AQC method". It should be noted that while the terms "EA method" and "AQC method" are used here, for convenience, to describe the entire deposition calculations, these names are more precisely related to the different descriptions of the parameter $r_c(NO_2)$, between the two methods. In the following section, the approach used for the EA method is set out first, and then the additional features of the AQC method are described.

EA Deposition Method

5.115 A separate value of V_d has been calculated for each surface type and for each hour of the meteorological dataset running from 7th August 2014 to 9th August 2016[22]. These V_d values have then been averaged over each of the following time periods: summer day, summer night, winter day, and winter night[23]. It has not been practical to apply hour-by-hour deposition velocities to hour-by-hour concentrations.

Deposition of Gases (NO_2, NO, NH_3, and HNO_3)

Calculating r_a and r_b

5.116 The approach largely follows that described by Smith et al. (2000), which is used in Defra's national deposition maps. r_a and r_b are calculated as follows:

Eq 5. $$r_a = \frac{u(z)}{u_*^2}$$

Eq 6. $$r_b = \frac{2}{k u_*} \left(\frac{Sc}{\mathrm{Pr}} \right)^{2/3}$$

22 Excluding those hours when the Gatwick meteorological station did not record any data.

23 In the case of NO, ra+rb+rc was averaged, rather than averaging V_d since V_d NO is dependent on the ambient concentration.

where *u(z)* is the wind speed at reference height (*z*), *k* is von Karman's constant, *Sc* is the Schmidt number for the gas, *Pr* is the Prandtl number for air, and u_* is the friction velocity.

5.117 The Prandtl number has been calculated using Sutherland's law, taking account of the average recorded temperature at the Gatwick meteorological office station during each time period. The Schmidt number has been calculated using Equation Eq 7, applying the molecular diffusion coefficients calculated by Massman (1998), adjusted to each period-specific temperature.

Eq 7. $$Sc = \frac{v}{k_c}$$

where *v* is the kinematic viscosity of air, and k_c is the molecular diffusion coefficient of each gas in air.

5.118 In common with the approach given by Smith et al (2000), the following relationship between canopy height (*h*), wind speed (*u*), aerodynamic roughness length (z_0), zero plane displacement (*d*), and friction velocity has been assumed:

Eq 8. $z_0 = 0.1h$

Eq 9. $d = 0.7h$

Eq 10. $$u_* = \frac{u(z)k}{\log_e((z-d)/z_0)}$$

5.119 The Gatwick meteorological office station records wind speed at a height of 10 m above the ground. The calculations set out above require the wind speed above the canopy. This has been calculated using equation Eq 11. Each hourly wind speed has been treated separately (along with the concurrent recorded temperature. The meteorological station records wind speeds <0.25 m/s as 0 m/s. These have been manually set to 0.125 m/s.

Eq 11. $$\frac{u(z)}{u(z_{ref})} = \frac{\ln\left(\frac{z-d}{z_0}\right)}{\ln\left(\frac{z_{ref}-d}{z_0}\right)}$$

where z is the height above the canopy from which deposition is calculated and z_{ref} is the height at which the wind speed has been measured.

5.120 Canopy height has been estimated through discussion with ecologists at Ecus Ltd. who have carried out the ground surveys[24]. Concentrations have been modelled at a height of 1.5 m above ground. The reference height has been set to 1.5 m for those canopies less than 1.5 m and set

[24] These heights have been applied to all vegetation across the entire SAC and so precise site-specific measurements were considered to be less representative than the high-level view of those involved with the ground surveys.

to 0.5 m above the woodland canopy.

Estimating $r_c(NH_3)$

5.121 Defra's national model takes different forms depending on the land use category. NH_3 deposition to moorland and forest uses a fixed r_c of 20 s/m, reflecting the dominance of uptake on cuticular surfaces in these ecosystems[25]. For arable and grassland a bi-directional flux is introduced, but since neither of these habitats is of primary interest to this study, a fixed $r_c(NH_3)$ value of 20 s/m has been used.

Estimating $r_c(HNO_3)$

5.122 In common with Defra's national model, $r_c(HNO_3)$ has been assumed to be zero (i.e. $r_c(HNO_3)$ = 0 s/m).

Estimating $r_c(NO_2)$

5.123 The approach for $r_c(NO_2)$ follows that given by the Environment Agency (2008) as set out in equation Eq 12.

Eq 12. $$\frac{1}{r_c} = \frac{1}{r_{stomata}} + \frac{1}{r_{soil}} + \frac{1}{r_{surface}}$$

The Environment Agency (2008) values of $r_{stomata}$ in Table 5.20, and values of r_{soil} + $r_{surface}$ in Table 5.21 have been used in the model.

Table 5.20: Values of Stomatal Resistance ($r_{stomata}$) (s/m) Taken from the Environment Agency (2008)

Habitat	Summer day	Summer night	Winter day	Winter night
Coniferous forest	150	9,999	400	9,999
Deciduous forest	75	9,999	9,999	9,999
Grassland	50	9,999	9,999	9,999
Heathland	50	9,999	9,999	9,999

[25] Resistances are expressed in s/m, since deposition velocities are expressed in m/s.

Table 5.21: Values of Surface Resistance and Soil Resistance (r_{suface} + r_{soil}) Taken from the Environment Agency (2008)

Habitat	Summer day	Summer night	Winter day	Winter night
Coniferous forest	1,000	2,000	2,000	2,000
Deciduous forest	1,000	2,000	2,000	2,000
Grassland	1,000	2,000	2,000	2,000
Heathland	1,000	2,000	2,000	2,000
Freshwater	2,000	2,000	2,000	2,000

Deposition of NO

5.124 Deposition of NO is slow compared with the other species considered and, in any event, only occurs where NO concentrations are elevated (elsewhere, the soil is a net source of NO). The Environment Agency (2008b), following on from work by Fowler et al. (1998), used the following generalisation to calculate deposition of NO (Eq 13).

Eq 13. $$NOFlux = \frac{C_{air} - C_{soil}}{r_a + r_b + r_{soil}}$$

Where C_{air} is the concentration in the air and C_{soil} is the concentration in the soil. Fixed values of 20 µg/Nm^3 for C_{soil} and 1,000 s/m for r_{soil} have been used, which are those used by both Fowler et al. (1998) and the Environment Agency (2008b).

5.125 Equation Eq 13 shows that at ambient concentrations above C_{soil} (20 µg/Nm^3), NO is deposited, while at ambient concentrations below this, it is emitted. Since period-average values of C_{air} have been used, the instantaneous nature of this process has been lost. Where NO deposition is calculated to be positive, it has been added to the total deposition flux, however, negative fluxes have not been included in the model. While this approach is simplistic, the slow and localised nature of NO deposition will mean that it introduces relatively little error.

Application to Mapped Habitats in the SAC

5.126 Table 5.22 sets out the canopy heights and land-use categories used in the deposition modelling.

Table 5.22: Assumed Canopy Heights and Categories from Table 5.20 and Table 5.21

Surface Type	Summer	Winter	Equivalent Category from Table 5.20 and Table 5.21
Bare Ground	<0.01	<0.01	Freshwater
Bracken	1	0.5	Heathland
Scattered Bracken	1	0.5	Heathland
Grassland	0.5	0.2	Grassland
Open Water	<0.01	<0.01	Freshwater
Semi-natural woodland	10	10	Deciduous forest
Dry Dwarf Shrub Heath	0.5	0.4	Heathland
Wet Dwarf Shrub Heath	0.5	0.4	Heathland

Deposition of Particles

5.127 Marner and Harrison (2004) used equation Eq 14 to calculate mass-weighted particle deposition velocities.

Eq 14. $$V_d = \frac{\sum_{i=1}^{i=6} V_{di} C_i}{\sum_{i=1}^{i=6} C_i}$$

where V_{di} is the V_d of fraction i, and C_i is the mass concentration of analyte in size fraction i. The same authors also measured typical particle size distributions of the species of interest to this study (Figure 5.40) and calculated deposition velocities (Table 5.22). These have been used for this study, assuming arable-based velocities to bracken and heath, grassland-based velocities to grassland and bare ground, and forest and water-based velocities to woodland and water respectively.

Table 5.23: Particle Deposition Velocities (after Marner and Harrison (2004)) (cm/s)

Particle Sizes	Deposition Velocities (V_d) for Different Land Uses			
	Water	Grassland	Arable	Forest
dp 8 - 20 μm	2.00	1.8	3.25	na
dp 4 – 8 μm	0.60	0.35	0.55	na
dp 2 – 4 μm	0.25	0.1	0.15	na
dp 1 – 2 μm	0.15	0.04	0.08	na
dp 0.5 – 1 μm	0.07	0.021	0.045	na
dp < 0.5 μm	0.01	0.018	0.023	na
Overall Aerosol NO_3^-	0.23	0.15	0.26	1.78
Overall Aerosol NH_4^+	0.11	0.06	0.10	1.02

Figure 5.40: Mean Particle Size Distribution (after Marner and Harrison (2004))

Wet Deposition

Emissions Scenario A

5.128 The contribution from wet deposition has been taken from the national deposition maps for 2014, which is the most recent year of available data (CEH, 2018). The 2014 fluxes have been assumed to represent the existing baseline scenario. These are presented on a 5 km x 5 km grid across the UK. Values across the SAC have been derived by interpolating the coarse gridded data using triangulation with linear interpolation (taking all of the values within 35 km of the SAC and assuming each value represents the centre of each grid point).

5.129 It has not been possible to take account of the influence that traffic associated with the Local Plan will have on wet deposition. This is because the contribution to wet deposition of emissions from individual roads cannot be determined. The influence of roads within the Ashdown Forest Transport Model on wet deposition to the SAC is expected to be negligible.

Emissions Scenarios B and C

5.130 As noted in Chapter 3, there is a non-linear relationship between total emissions and total deposition and this makes it extremely difficult to predict baseline deposition fluxes in 2028 taking account of national-scale predicted changes in emissions. In order to provide an estimate of wet deposition under emissions models B and C, a linear relationship between emissions and deposition has been assumed; which will inevitably introduce error.

5.131 In order to estimate wet deposition of reduced nitrogen in 2028 under emissions scenarios B and C, the interpolated 2014-specific fluxes have been multiplied by the ratio of Defra's predicted UK total NH_3 emissions in 2028 (292.17 kt) (see Paragraph 5.18) to those in 2015 (272.11 kt) (Defra, 2012). As explained in Paragraph 5.18, this is an over-simplification but nevertheless provides a useful estimate.

5.132 In order to predict wet deposition of oxidised nitrogen in 2028 under Emissions Scenario B and C, the same approach as described for projecting future-year HNO_3 and particulate NO_3^- concentrations (see Paragraph 5.16) has been used. Defra's maps of ambient background NOx concentrations in 2015 and 2028 (Defra, 2018a) for the 24,000 1 km x 1 km grid squares that make up the southeast of England have been used. For emissions model B, the road-traffic components of NOx have been uplifted in line with the CURED model (AQC, 2017). For emissions model C, the background maps have been used directly. The ratios of the 2028 prediction to the 2015 prediction at each square has then been calculated. As described in Paragraph 5.16, on average, the predictions for models B and C are 70.1% and 65.3% respectively of those for model A. Oxidised wet deposition has thus been multiplied by 0.701 and 0.653 to estimate future-year values for models B and C respectively.

AQC Deposition Method

Estimating r_a and r_b

5.133 The approach used in the AQC method for parameters ra and rb, is identical to that used in the EA deposition method as described above.

Estimating $r_c(NO_2)$

5.134 Values of r_c were calculated using equation Eq 12:

Eq 15. $$\frac{1}{r_c} = \frac{1}{r_{stomata}} + \frac{1}{r_{surface}}.$$

Estimating $r_{stomata}$ (NO_2)

5.135 The calculations followed the method provided by Smith *et al* (2000), but whereas that model calculates deposition velocities for each hour of a single day within each month (i.e. 24 x 12 = 288 separate values of rc for each habitat), the current study began by calculating a separate deposition velocity for each individual hour of a 2-year meteorological file (i.e. 17,597 valid values in total). Smith *et al* (2000) provided ranges for certain parameters used in their model, and the

approach used here has been to interpolate across these ranges using other published measurements as described below.

5.136 The value of $r_{stomata}$ is dependent on the amount of incoming solar radiation, which was estimated for each hour in the dataset as follows. Direct (R_{beam}) and diffuse ($R_{diffuse}$) radiation were determined separately, using the following equations (taken from Smith *et al* (2000)):

Eq 16. $$R_{beam} = 600\ Wm^{-2} * e^{-0.185(P/P_0)/\cos(\theta)} \cos(\theta)$$

and

Eq 17. $$R_{diffuse} = 0.4(600\ Wm^{-2} - R_{beam}) \cos(\theta)$$

where θ is the zenith angle of the sun and

Eq 18. $$\frac{P}{P_0} = \left(1 - \frac{0.0065a}{288.16}\right)^{5.25611}$$

is the ratio of actual to sea level pressure. Here *a* is the altitude. The value of 600 Wm^{-2} is the irradiance of visible light at the top of the atmosphere, assumed to be 45% of the 1320 Wm^{-2} solar radiation Smith *et al* (2000).

5.137 These parameters were then adjusted to give a maximum value for clear skies and a minimum value for overcast skies. As noted above, the model of Smith *et al* (2000) focused on a single day within each month, and differentiated between clear and overcast skies based on a 1985 analysis of solar radiation measurements. For the current study, whether the sky was clear or overcast was determined for each separate hour of the meteorological dataset using cloud cover measurements made at Gatwick Airport. It was assumed that cloud cover readings of 0-4 oktas indicated clear sky, while readings of 5-8 oktas indicated overcast sky. Following the approach of Smith *et al* (2000), the actual visible direct and diffuse radiation S_{beam} and $S_{diffuse}$ was set to a maximum as:

Eq 19. $$S_{beam} = 0.9R_{beam}$$

and

Eq 20. $$S_{diffuse} = 0.9R_{diffuse}$$

for clear skies; and was set to a minimum as

Eq 21. $$S_{beam} = 0$$

and

Eq 22. $$S_{diffuse} = 0.2\left(R_{beam} + R_{diffuse}\right)$$

for overcast skies.

5.138 The average values for direct and diffuse visible radiation falling on a leaf surface, assuming a spherical leaf angle distribution, were calculated by:

Eq 23. $$S_{beam}(leaf) = \frac{S_{beam}}{2\cos(\theta)}$$

and

Eq 24. $$S_{diffuse}(leaf) = \frac{S_{diffuse}}{2}$$

with the appropriate values of S_{beam} and $S_{diffuse}$ used depending on cloud cover.

5.139 The stomatal resistance for NO_2 was then calculated for sunlit leaves as:

Eq 25. $$r_{sunlit} = \frac{r_{stomata(min)}}{f_T}\left(1 + \frac{b}{S_{beam}(leaf)+S_{diffuse}(leaf)}\right) DVR_{NO2}$$

and for shaded leaves as:

Eq 26. $$r_{shaded} = \frac{r_{stomata(min)}}{f_T}\left(1 + \frac{b}{S_{diffuse}(leaf)}\right) DVR_{NO2}$$

where $r_{stomata(min)}$ is the minimum stomatal resistance for water vapour (see Paragraph 0 below), b is the light response coefficient (see Table 5.24), DVR_{NO2} is the molecular diffusion correction and f_T is the temperature correction. DVR_{NO2} is given by:

Eq 27. $$DVR_{NO2} = \frac{dv(H_2O)}{dv(NO_2)}$$

where $dv(X)$ is the molecular diffusivity of gas X. The temperature correction f_T takes in account that the rate stomatal exchange is highest at an optimum temperature T_{opt} = 15°C and falls to zero above a maximum temperature T_{max} = 25°C and below a minimum temperature T_{min} that is dependent on the land use (see Table 5.24), and is defined as

Eq 28. $$f_T = \frac{T-T_{min}}{T_{opt}-T_{min}} \frac{T_{max}-T}{T_{max}-T_{opt}}^{\frac{T_{max}-T_{opt}}{T_{opt}-T_{min}}}$$

where T is the temperature during a given hour. For temperatures outside the range for which stomatal exchange would occur, f_T was set to 0.0001 as an arbitrarily low number to avoid dividing by zero later in the model. This was sufficient to make the stomatal pathway for deposition negligible.

5.140 The area indices of leaves which are exposed to radiation, LAI_{lit}, were calculated from the Leaf Area Index (LAI) (see paragraph 5.144 below) using the equation:

Eq 29. $$LAI_{lit} = 1.95(1 - e^{-0.7LAI})$$

which for clear skies were then split into indices for direct and diffuse radiation, approximated by:

Eq 30. $$LAI_{sunlit} = 2\left(1 - e^{-\frac{LAI}{2\cos(\theta)}}\right)\cos(\theta)$$

and

Eq 31. $$LAI_{shaded} = LAI_{lit} - LAI_{sunlit}$$

respectively. The stomatal resistance was then calculated, for each individual hour of the meteorological dataset, as:

Eq 32. $$r_{stomata}(clear) = \frac{1}{LAI_{sunlit}/r_{sunlit} + LAI_{shaded}/r_{shaded}}$$

for clear skies and

Eq 33. $$r_{stomata}(overcast) = \frac{r_{shaded}}{LAI_{lit}}$$

for overcast skies. These were calculated for each hour in the dataset using hourly temperature and cloud data.

5.141 Table 5.25 shows how the values presented in Table 5.24 have been applied to the habitat types used in this current study.

Table 5.24: Constants used to Calculate $r_c(NO_2)$, taken from Smith *et al* (2000)

Land Use Category	Min $r_{stomata(min)}$	Max $r_{stomata(min)}$	Min LAI	Max LAI	*b* (W/m^2)	Tmin (°C)
Arable	80	500	0.01	4.5	60	4
Grassland	80	300	2	4	40	4
Moorland	140	300	1.5	3	40	2
Forest	140	350	6	6	25	0
Urban	140	350	2	2	40	4

Table 5.25: Assumed Equivalence of Land Use Categories

Surface Type	Equivalent Category from Table 5.24
Bare Ground	Urban
Bracken	Arable
Scattered Bracken	Arable
Grassland	Grassland
Open Water	Urban
Semi-natural woodland	Forest
Dry Dwarf Shrub Heath	Moorland
Wet Dwarf Shrub Heath	Moorland

5.142 Except for the difference that values were calculated for each hour of the 2-year dataset, rather than for one day per month, the calculations set out above follow those presented by Smith *et al* (2000). Where it was necessary to develop a bespoke method was in order to estimate temporal variation in values of $r_{stomata(min)}$ and LAI. In both cases, Smith *et al* (2000) provided the ranges of their values for each land use category (see Table 5.24) and it was necessary to interpolate between these values in order to generate a profile across the year, and across the growing season.

Interpolating $r_{somata(min)}$

5.143 In order to interpolate hour-specific values of $r_{stomata(min)}$, recent work by Wehr *et al* (2017) was used. While this work is not specific to the UK, within the context in which it has been used here, it is considered to be appropriate. Wehr *et al* (2017) measured carbonyl sulphide (OCS) uptake in plants over the growing season, which they found to be a good indicator of stomatal conductance. In order to interpolate between the values in Table 5.24, it was assumed that, over the course of a year $r_{stomata(min)}$ would be proportional to the inverse of the rate of carbonyl sulphide (OCS) uptake (R_{OCS}) and that the maximum value of R_{OCS} would correspond to the minimum value of $r_{stomata(min)}$ and vice versa. The measured values of R_{OCS} are shown in Table 5.26. The values of $r_{stomata(min)}$ corresponding to values of R_{OCS} between the minimum and maximum were calculated using Equation Eq 34:

Eq 34. $$r_{stomata(min)} = \frac{A}{R_{OCS}} + C$$

where A and C are constants calculated for each land use category. For days between those for which R_{OCS} was given, the value corresponding to the most recent day for which there was a measurement was used. For days outside the period of measurement the maximum value of $r_{stomata(min)}$ was used.

Interpolating Leaf Area Index

5.144 Maximum and minimum values of Leaf Area Index (LAI) were, again, taken from the values reported by Smith *et al* (2000) (see Table 5.24), and this time it was assumed that LAI is proportional to the gross primary production (GPP) measured by Wehr *et al* (2017) (Table 5.26). LAI was then calculated similarly to $r_{stomata(min)}$, with the differences that: it was assumed the maximum and minimum values of LAI corresponded with the maximum and minimum values of GPP; that values of LAI corresponding to values of GPP between the maximum and minimum were calculated using an Equation Eq 35; and that the minimum value of LAI was used for days outside the period of measurement.

Eq 35. $$r_{stomata(min)} = AR_{OCS} + C$$

Table 5.26: Values of Rocs and GPP taken from Wehr *et al* (2017)

Julian Day	R_{OCS} (pmol m^{-2} s^{-1})	GPP (µmol m^{-2} s^{-1})
141	29	14
155	30	17
169	37	25
183	42	23
197	38	20
211	34	22
225	26	22
239	32	20
253	29	14
267	30	15
281	25	14
295	9	6

Estimating rsurface (NO_2)

5.145 Smith *et al* (2000) did not include r_{suface} (NO_2) within their model, since this route of uptake is considered to be so slow when compared with stomatal uptake that it can be safely ignored. However, given that this route of uptake was included by the Environment Agency (2008), and thus in the EA method, it was considered that, for the sake of completeness, it should also be included here. Erisman and Draaijers (1995) (Table 4.5) estimated values of r_c to wet and dry soil surfaces, with this resistance being either 2,000 s/m to wet soil or 1,000 s/m to dry soil.

5.146 Values of $r_{surface}$ were thus assigned to each hour of the meteorological file as follows:

- if rain fell in the current hour $r_{surface}$ = 2,000 s/m;
- in winter, if rain fell in the previous two hours $r_{surface}$ = 2,000 s/m;
- for hours between midnight (GMT) and sunrise $r_{surface}$ = 2,000 s/m; and
- for all other hours, $r_{surface}$ = 1,000 s/m.

These rules were based on the judgement of the authors of this current report, but are unlikely to introduce significant error.

Averaging Vd NO_2

5.147 As with the EA method, the deposition velocity (V_d) of NO_2 was calculated for each hour of the 2-year meteorological dataset, using hour-specific values of r_a, r_b, and r_c. The values of *Vd* were then averaged over representative periods. These averaging periods are those for which ambient concentrations were predicted by the dispersion model, and thus deposition fluxes were calculated for each individual averaging period (e.g. winter night etc.), rather than for each individual hour. While it would have been preferable to apply hour-specific deposition velocities

to hour-specific predicted concentrations, this was not possible given the size of the dataset.

5.148 For the EA method, defining the averaging periods was relatively straightforward, since NO_2 deposition is known to vary most significantly between day and night and between summer and winter. The added level of detail used in the AQC method resulted in significant variance in Vd over the daytime periods and it did not, therefore, seem appropriate to average across these values. More refined and representative daytime averaging periods were thus identified.

5.149 It is noted that there is no requirement for the averaging periods to be chronologically-contiguous (i.e. leading on from one another). In practice, those hours which the AQC deposition model predicts were associated with the highest rates of deposition occurred at many different times of the day. Furthermore, since dry, sunny, conditions are usually associated with higher deposition velocities, but very high temperatures are associated with some of the lowest velocities (i.e. where T_{max} is exceeded), this means that deposition can, within the model, turn from very high to very low from one hour to the next.

5.150 In order to account for these patterns, the AQC method has thus grouped the daylight meteorological hours according to their calculated deposition velocities. Figure 5.41 shows all of the hourly values of Vd NO_2 to heath during summer daytime hours, as well as a series of 'break points'. These 'break points' were defined subjectively and are simply intended to separate the range of deposition velocities into workable groups for averaging. Figure 5.42 shows these groupings in a different way, and shows how the deposition velocities have then been averaged. For example, all hours that gave rise to one of the deposition velocities in Set 5 in Figure 5.42 were modelled using the average value for that set. In this way, the daytime meteorological hours were grouped according to their deposition velocities and not according to their chronological order.

5.151 Because the dispersion model was run to predict the average concentration within each of these meteorological groups, the effect of this approach is that the correct meteorological conditions are paired with the correct deposition velocities and, while detail will still be lost by using average values, this effect will be much smaller than would be the case if the daytime period not been split up.

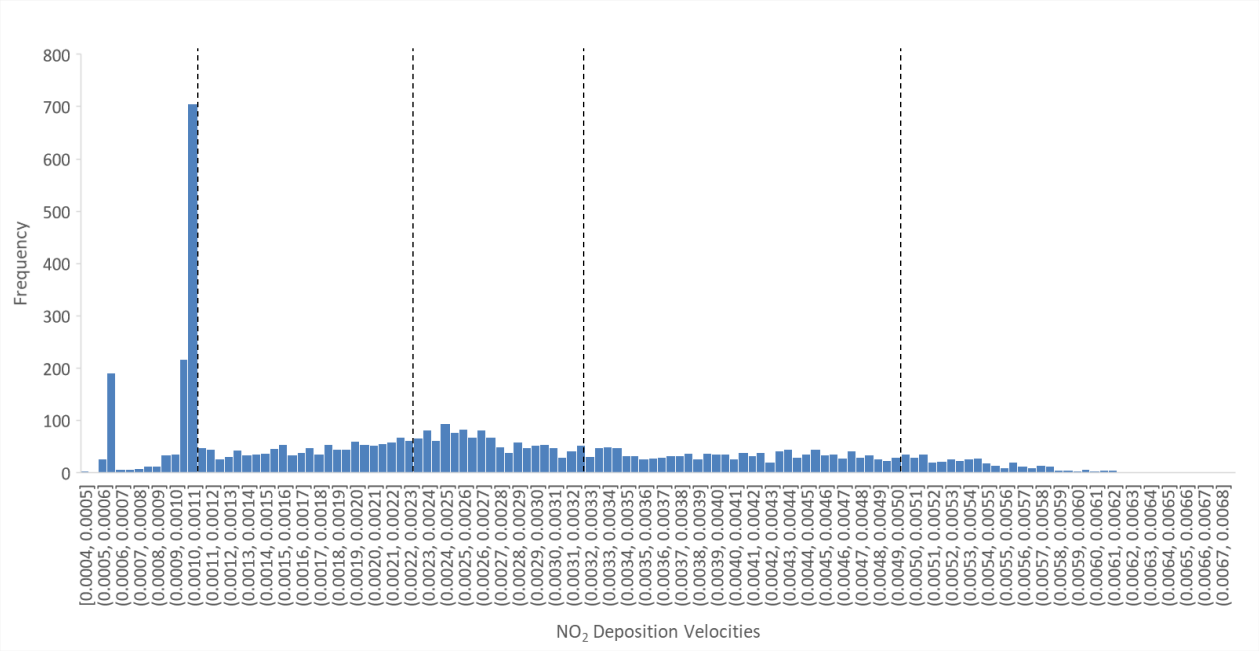


Figure 5.41: Frequency of Summer Daytime Hourly Values of Vd NO_2 to Heath

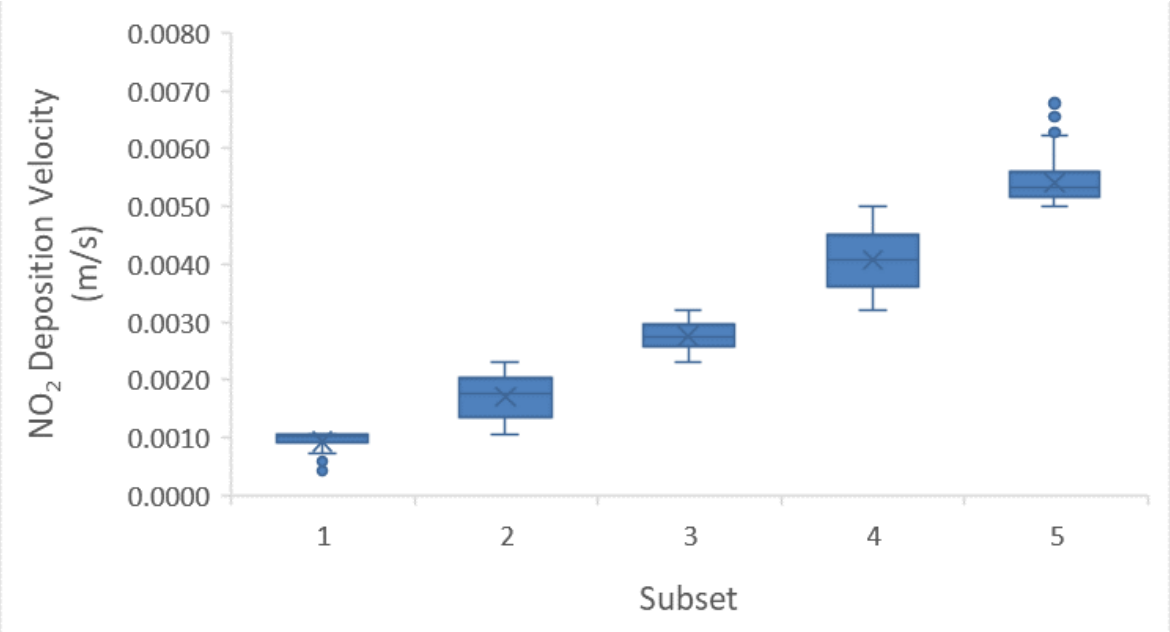


Figure 5.42: Hourly Values of V_d (NO_2) to Heath During Summer Daytime, separated into Five Subsets

5.152 The degree of variability in the winter daytime deposition velocities was less significant than that for summer daytime and thus a smaller number of groups was judged to be required. Winter daytime meteorological hours were thus separated into three sets as shown in Figure 5.43. It was not considered necessary to further subdivide the night-time datasets for the AQC method, and these periods are thus the same for both the AQC and EA methods.

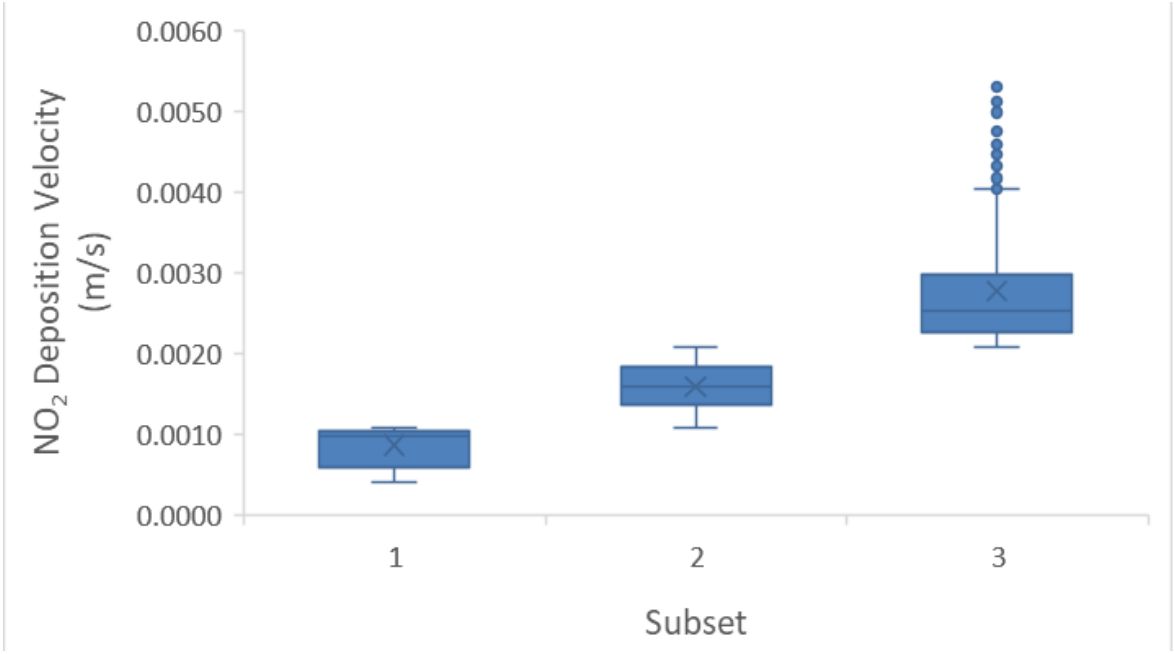


Figure 5.43: Hourly Values of V_d (NO_2) to Heath During Winter Daytime, separated into Three Subsets

5.153 The meteorological datasets have been defined according to deposition to heath, but have then been used with other land cover types (see Figure 5.44). The values for other land cover types in Figure 5.44 overlap across the different averaging periods, whereas those in Figure 5.42 for heath do not. These overlaps mean that the meteorological groupings defined for heath are imperfect for the other habitat types, but overall the overlaps are relatively small and these meteorological subsets are thus considered to be appropriate. The meteorological datasets used for the AQC method are summarised in Table 5.27.

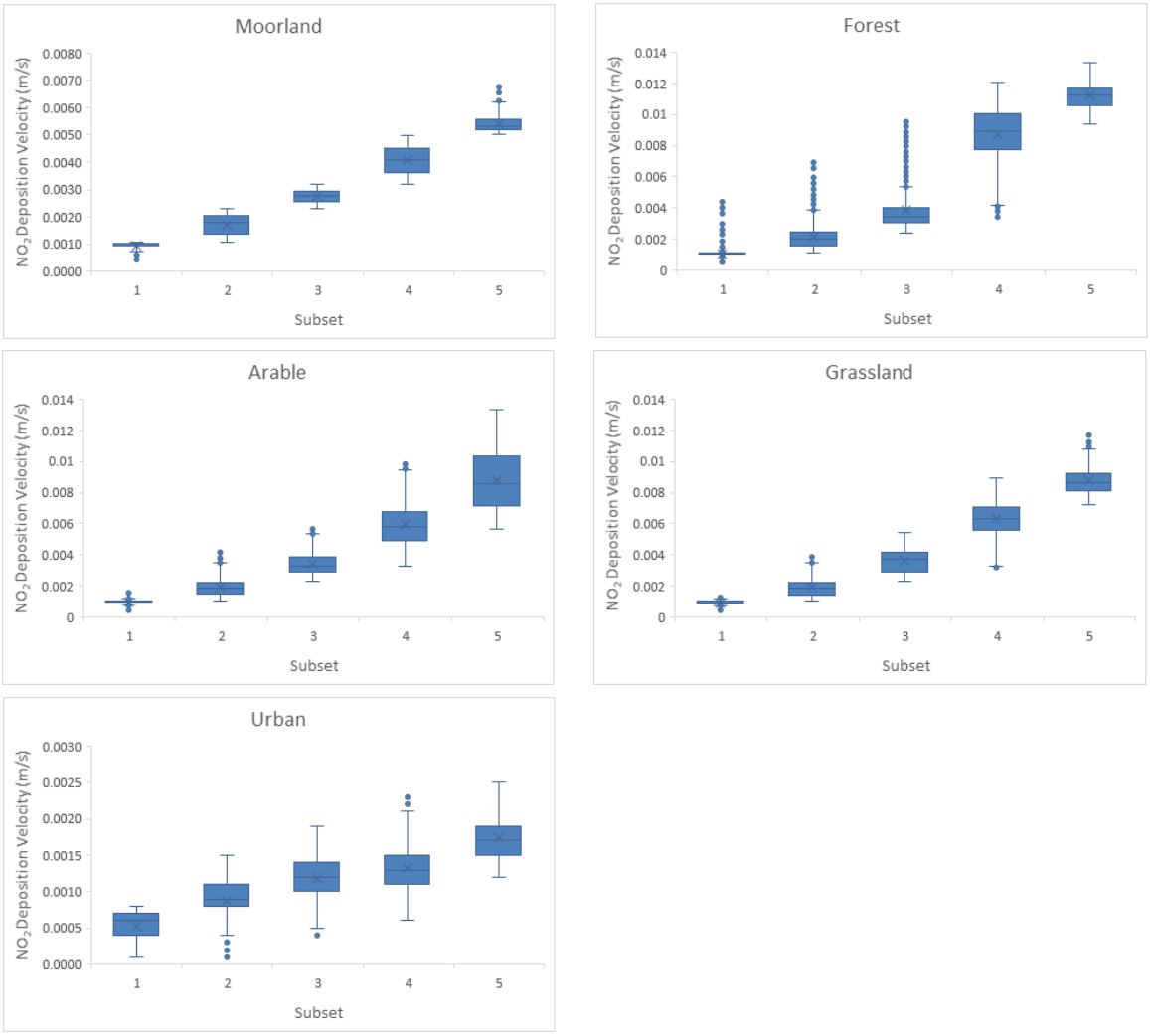


Figure 5.44: Hourly Values of V_d (NO_2) to Other Land Cover Types During Summer Daytime separated into the Five Subsets defined for Heath

Table 5.27: Number of Hours in Each Meteorological Dataset used in the AQC Deposition Method

Period	Number of Meteorological Hours
Winter Night	5,602
Winter Day 1	764
Winter Day 2	1,632
Winter Day 3	738
Summer Night	3,753
Summer Day 1	1,117
Summer Day 2	1,016
Summer Day 3	1,456
Summer Day 4	1,185
Summer Day 5	334

AQC method for Vd NO

5.154 In the AQC method, deposition of NO, was assumed to be zero. While the EA method assumed that, at very high (>20 $\mu g/m^3$) ambient NO concentrations, NO will deposit, it is considered that this relationship should take account of the duration of the exposure; and the effect of this on soil nitrogen concentrations. Thus, while a brand new emission source (e.g. a new road) which caused NO concentrations to exceed 20 $\mu g/m^3$ would probably cause net deposition, this may not be the case for an existing road, where the environment will have experienced elevated nitrogenous inputs for some considerable time (and thus may have higher soil nitrogen concentrations). For this reason, and to provide a sensitivity test to the assumptions in the EA method, deposition of NO has been excluded from the AQC method. In practice, even within the EA method, deposition of NO only makes up an extremely small fraction of the total flux (see Chapter 9) and so this methodological difference has little effect.

AQC Deposition Method for other Pollutants

5.155 As noted above, the AQC method uses identical parameters for r_a and r_b as the EA method. It also uses the same values of r_c for HNO_3 and NH_3 and the same particle deposition velocities and wet deposition fluxes. This means that all of the fluxes of HNO_3, particle deposition and wet deposition predicted using the two methods are the same. For NH_3, however, the use of different averaging periods introduces some small differences. Even though these averaging periods were defined for NO_2 deposition, it is considered appropriate to retain them for the NH_3 deposition calculations (i.e. they simply add a finer degree of temporal resolution and cannot introduce additional error). The NH_3 deposition fluxes are thus marginally different between the EA and AQC methods.

Modelling Deposition Fluxes to the Ecological Survey Quadrats

5.156 The methodology used to calculate deposition to the ecological survey quadrats is essentially the same as for the SAC as a whole, with the following differences:

- ambient concentrations of NO, NO_2, and NH_3 have been predicted using the methodology described in Table 5.17 and Table 5.18 which takes explicit account of concentrations measured at the adjacent air quality monitoring sites;
- vegetation type has been based on the results of the habitat surveys carried out by Ecus Ltd., rather than on the SAC-wide land-cover maps; and
- vegetation height has been based on the sward heights observed during the ecological sampling and thus varies from quadrat to quadrat.

6 Scenario Definition

Treatment of Traffic on Explicitly-modelled Roads

Traffic Datasets

6.1 To summarise some of the information presented in Chapter 5 (Methodology), air quality modelling has been carried out using three different traffic datasets:

1) existing traffic;

2) existing traffic + amended Tempro growth to 2028 but without any growth within Wealden caused by the Wealden Local Plan; and

3) existing traffic + amended Tempro growth to 2028 + the Wealden Local Plan.

6.2 These three sets of traffic data have been used to predict conditions in the following scenarios:

- 'Existing Baseline' (traffic dataset 1);
- '2028 No Growth' (traffic dataset 1);
- '2028 No WDC-Growth' (traffic dataset 2); and
- '2028 With Plan' (traffic dataset 3).

The existing traffic dataset has thus been used to represent both the existing baseline, and the situation in 2028 assuming no change in traffic flows between 2015 and 2028.

Emissions Models

6.3 As explained in Chapter 7, it is very difficult to predict with certainty how traffic emissions will change between 2015 and 2028, and all projections are uncertain. In order to account for some of the uncertainty regarding emissions of NOx from road traffic, three separate emissions models have been used:

A) emissions per vehicle are the same as those in 2015 (for which the model has been verified against local measurements);

B) emissions per vehicle fall between 2015 and 2028 in line with the CURED 3A model (AQC, 2017); and

C) emissions per vehicle fall between 2015 and 2028 as predicted in Defra's EFT V8.0.1 (Defra, 2018a).

6.4 It is considered that the outlook for NH_3 emissions per vehicle is even more uncertain than for NOx. NH_3 emissions per vehicle may increase between 2015 and 2028, but no suitable models are available with which to predict these patterns. NH_3 emissions per vehicle have thus only

been modelled using one emissions dataset ('A'), which represents emissions per vehicle in 2015 (for which the model has been verified against local measurements).

6.5 The emissions models (models A, B, and C) are defined around the approach used to predict NOx emissions from the roads within the Ashdown Forest Transport Model. However, as explained in Chapter 5, the predictions also include contributions from other sources (both traffic-related and non-traffic) by way of the 'background' concentrations and fluxes. It is necessary to include the effect that changes in national and international emissions projections – which include changes to a range of sectors, from road transport to power generation - will have on these background components. As explained in Chapter 5, this has been done by referring to Defra's published projections. It has not, however, been possible (or arguably desirable) to disaggregate the national-level projections in emissions per unit activity (e.g. NOx in grammes per vehicle per kilometre) from the national-level activity projections (e.g. total vehicle-kilometres travelled in the UK in 2028), this means that the activity assumptions which feed into the background fields differ between emissions model A and emissions models B and C. This point is expanded on in Paragraph 6.12 below.

Deposition Models

6.6 As explained in Chapter 5, deposition fluxes have been calculated using two alternative deposition models. This is principally to take account of uncertainty regarding the stomatal resistance to NO_2, to which the models are particularly sensitive. One method follows an approach to calculating the stomatal resistance published by the Environment Agency ('EA method'), while the other follows an approach which was developed for this study ('AQC method').

Scenario Summary

6.7 Table 6.1 summarises the various models which have been run. For example, for the existing baseline, one NOx dataset, one NH_3 dataset, and two deposition datasets have been produced. For 2028 With Plan, three NOx datasets, one NH_3 dataset, and six deposition datasets[26] have been produced.

[26] i.e. both the EA and AQC methods have been used for each of the NOx emissions datasets in turn, with each alternative NOx emissions dataset combined with the same 'A' NH_3 emissions dataset.

Table 6.1: Summary of Dispersion and Deposition Model Scenarios

Feature	Existing Baseline		2028 No Growth						2028 No WDC-Growth						2028 With Plan					
2015 Traffic	Y		Y						Y						Y					
Additional Traffic from Growth Outside Wealden	-		-						Y						Y					
Additional Traffic Caused by Local Plan	-		-						-						Y					
NOx Emissions Scenarios	A		A[a]		B		C		A		B		C		A		B		C	
NH_3 Emissions Scenarios	A		A[a,b]						A[a,b]						A[a,b]					
Deposition Scenarios	EA	AQC	EA	AQC	EA	AQC	EA	AQC	EA	AQC	EA	AQC	EA	AQC	EA	AQC	EA	AQC	EA	AQC

[a] The 2028 No Growth results under emissions model A are the same as those for the existing baseline and are not presented twice.

[b] Ambient NH_3 concentrations are only predicted for scenario A, but the NH_3 component of deposition in scenarios B and C also take account of projected changes in background NH_3 concentrations.

Scenario Comparisons

6.8 The results from these model scenarios have been compared against one-another to show the changes in concentrations and deposition fluxes that the Local Plan will cause, both on its own and in combination with other anticipated changes.

Changes Caused by Local Plan Alone

6.9 The changes caused by the Local Plan alone have been calculated by subtracting the results for '2028 No WDC-Growth' from those for '2028 With Plan'. In each case this has been done using equivalent emissions and deposition models. This means that the changes caused by the Local Plan alone are presented for three different NOx emissions scenarios, one NH_3 emissions scenario, and six deposition scenarios as outlined in Table 6.2. The changes being considered are those caused by the increase in traffic caused by the Local Plan on explicitly-modelled roads (i.e. those within the Ashdown Forest Transport Model).

Table 6.2: Formulation of Comparisons which Show the Changes Caused by the Local Plan Alone

Feature	Dataset					
Start-point for Traffic	2028 No WDC-Growth					
End-point for traffic	2028 With Plan					
NOx Emissions Scenarios	A		B		C	
NH_3 Emissions Scenarios	A[a]					
Deposition Scenarios	EA	AQC	EA	AQC	EA	AQC

[a] Ambient NH_3 concentrations are only predicted for scenario A, but the NH_3 component of deposition in scenarios B and C also take account of projected changes in background NH_3 concentrations.

Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth

6.10 The changes caused by the Local Plan in combination with other predicted traffic growth have been calculated by subtracting the results for '2028 No Growth' from those for '2028 With Plan'. As above, in each case this has been done using equivalent emissions and deposition models. This means that these changes are also presented for three different NOx emissions scenarios, one NH_3 emissions scenario, and six deposition scenarios as outlined in Table 6.2. The changes being considered are thus those caused by the Local Plan and also by growth in traffic on explicitly-modelled roads (i.e. those within the Ashdown Forest Transport Model).

Table 6.3: Formulation of Comparisons which Show the Changes Caused by the Local Plan In Combination with Other Predicted Traffic Growth

Feature	Dataset					
Start-point for Traffic	2028 No Growth					
End-point for traffic	2028 With Plan					
NOx Emissions Scenarios	A		B		C	
NH_3 Emissions Scenarios	A[a]					
Deposition Scenarios	EA	AQC	EA	AQC	EA	AQC

[a] Ambient NH_3 concentrations are only predicted for scenario A, but the NH_3 component of deposition in scenarios B and C also take account of projected changes in background NH_3 concentrations.

Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth and International Emissions Projections

6.11 The changes caused by the Local Plan in combination with other predicted traffic growth and

International Emissions Projections have also been calculated by subtracting the results for '2028 No Growth' from those for '2028 With Plan', but this time, alternative NOx emissions have been compared as shown in Table 6.4. In effect, this comparison is of the existing situation against the future (With Plan) if emissions (from traffic and other sectors) change in line with national-level projections.

Table 6.4: Formulation of Comparisons which Show the Changes Caused by the Local Plan In Combination with Other Predicted Traffic Growth and International Emissions Projections

Feature	Dataset			
Start-point for Traffic	2028 No Growth			
End-point for traffic	2028 With Plan			
Start-point for NOx Emissions	A			
End-Point for NOx Emissions	B		C	
Start-point for NH_3 Emissions	A[a]			
End-point for NH_3 Emissions	A[a]			
Deposition Scenarios	EA	AQC	EA	AQC

[a] Ambient NH_3 concentrations are only predicted for scenario A, but the NH_3 component of deposition in scenarios B and C also take account of projected changes in background NH_3 concentrations.

Treatment of Other Sources (i.e. other than Traffic on Explicitly-modelled Roads)

6.12 As explained in Chapter 7, the study presented here is of the effects of additional traffic on those roads within the Ashdown Forest Transport Model. It is not possible, within this study, to quantify the effect of traffic growth associated with the Local Plan on roads which are not included in this transport model. Furthermore, it has not been possible to consider any changes in non-traffic emissions which will be caused by the Local Plan. The approach to determining future-year background concentrations has, however, resulted in certain changes in activity being included within some emissions models which is not included in others.

6.13 This is because the scaling of the measured background concentrations, and of the predicted current-year wet deposition fluxes (and the assumed background ozone concentration used for NOx to NO_2 conversion), to reflect future-year conditions under emissions models B and C, relies on projections from Defra which combine activity changes (e.g. traffic growth driven by, amongst other things, new developments across the UK) with estimates of how emissions per unit activity (e.g. emissions per vehicle-kilometre) will change over time. In order to include these latter

(emissions per unit activity) estimates, it has also been necessary to include the former (activity) data. The two cannot be disentangled.

6.14 The result of this is that all of the results reported under emissions models B and C effectively include all of the changes in activity that Defra predicts, at a national-level, will occur between 2015 and 2028 (as well as the associated changes in emissions). The results for emissions model A do not include these changes.

6.15 There is no practical alternative to this situation without using a national-scale model rather than the local-scale modelling that is presented here. While these limitations should be borne in mind when viewing the results of the assessment, it should be noted that, for a local-scale assessment such as this one, the approach taken is routine and standard and also considered to be reasonable and appropriate.

7 Limitations and Uncertainty

7.1 There is uncertainty associated with all aspects of the study. While there is no practical way to quantify this uncertainty, the following sections discuss the main sources of uncertainty, and where there is a risk of bias.

Uncertainty in Air Quality Monitoring

7.2 All measurements have an associated uncertainty. The passive samplers (NO_2 diffusion tubes and ALPHA samplers) are considered to be the most uncertain. The data that have been used from the pumped samplers (automatic monitor and DELTA instruments) are considered to be more reliable than those from the passive samplers, but also have an inherent level of uncertainty.

7.3 It is not expected that any of the measurements are biased in terms of their annual averages, and the large numbers of monitoring sites used adds significantly to the reliability of the dataset as a whole, which has been used to verify the model.

Uncertainty in Predicting Existing Concentrations

7.4 There are many components that contribute to the uncertainty of modelling predictions. The model is required to simplify real-world conditions into a series of algorithms and this cannot be done perfectly.

7.5 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Figure 5.23, Figure 5.24 and Figure 5.25). The level of confidence in the verification process is necessarily enhanced when such a large number of monitors are used in the verification as has been the case for this assessment. Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of existing baseline concentrations.

Uncertainty in Predicting Future-year Concentrations

7.6 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.

Trends NOx Emissions from Road Traffic

7.7 Historically, large reductions in NOx emissions have been projected, which has led to significant reductions in NO_2 concentrations from one year to the next being predicted. Over time, it was found that trends in measured concentrations did not reflect the rapid reductions that Defra and DfT had predicted (Carslaw, Beevers, Westmoreland, & Williams, 2011). This was evident

across the UK, although the effect appeared to be greatest in inner London; there was also considerable inter-site variation. Emission projections over the 6 to 8 years prior to 2009 suggested that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25%, whereas monitoring data showed that concentrations remained relatively stable, or even showed a slight increase. An analysis for 23 roadside sites in London covering the period 2003 to 2012 showed a weak downward trend of around 5% over the ten years (Carslaw & Rhys-Tyler, 2013), but this still falls short of the improvements that had been predicted at the start of this period. Analysis of more recent data (AQC, 2018) showed an average downward trend for NO_2 and NOx of around 1.5% per year with marked regional variations.

7.8 The reason for the historic disparity between the predicted changes in concentrations and those measured, related to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have had to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the nitrogen oxides emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles has often been no better than that of earlier models. This was compounded by an increasing proportion of nitrogen dioxide in the nitrogen oxides emissions, i.e. primary nitrogen dioxide, which has a significant effect on roadside concentrations (Carslaw, Beevers, Westmoreland, & Williams, 2011) (Carslaw & Rhys-Tyler, 2013).

7.9 Recognition of these discrepancies has led to changes to the type approval process. Vehicles are now tested using a more complex laboratory drive cycle and also through 'Real Driving Emissions' (RDE) testing, which involves driving on real roads while measuring exhaust emissions. For Heavy Duty Vehicles (HDVs), the new testing regime has worked very well and on-road NOx emissions from the latest vehicles (Euro VI[27]) are now very low when compared with those from older models (ICCT, 2017).

7.10 For Light Duty Vehicles (LDVs), while the latest (Euro 6) emission standard has been in place since 2015, the new type-approval testing regime only came into force in 2017. Despite this delay, work by AQC (2016) showed that Euro 6 diesel cars manufactured prior to 2017 tended to emit significantly less NOx than previous (Euro 5 and earlier) models. Given the changes to the testing regime, it is reasonable to expect that diesel cars and vans registered for type approval since 2017 will, on average, generate even lower NOx emissions.

7.11 As well as reviewing information on the emissions from modern diesel vehicles in the real world (AQC, 2016), AQC has also reviewed the assumptions contained within EFT V8.0.1 (AQC, 2018). One point of note is that the EFT makes a range of assumptions, which appear to be very conservative, regarding the continued use of diesel cars into the future and the relatively slow uptake of non-conventional (e.g. electric) vehicles (AQC, 2018). Thus, despite previous versions of Defra's EFT being over-optimistic regarding future-year predictions, it is not unreasonable to

[27] Euro VI refers to HDVs while Euro 6 refers to LDVs.

consider that EFT v8.0.1 might under-state the scale of reductions over coming years (i.e. over-predict future-year traffic emissions).

7.12 There are, however, assumptions within EFT v8.0.1 regarding the expected performance of diesel cars and vans registered for type approval beyond 2016 that have not been tested, and it is thus sensible to consider the possibility that this future-year technology might be less effective than has been assumed. Modelling using emissions model B assumes that the post-2020 technology fitted to Euro 6 diesel cars and vans does not deliver any benefits. There are also assumptions, within both EFT v8.0.1 and CURED V3A regarding the rate of removal of older vehicles from the fleet which cannot, at this time, be guaranteed. Emissions model A accounts for this uncertainty by assuming that there will be no improvements at all from 2015.

Trends in NH_3 Emissions from Road Traffic

7.13 Much less research has been carried out into NH_3 emissions from vehicles than into NOx emissions and so all projections are more tenuous. The data collected as part of this study provide reasonable confidence in current year emissions, but there is little robust information on which to base future-year projections. A large part of the problem is that, while NOx emissions from all new road vehicle models are regulated by European legislation, NH_3 emissions from light duty vehicles are not. Furthermore, Selective Catalytic Reduction (SCR) technology, which is often used to help achieve the NOx emissions standards, has the potential to be a major source of NH_3. The way in which the NOx emissions standards are implemented for light-duty diesel vehicles is set to become more stringent by 2020 and it is not unreasonable to assume that vehicle manufacturers will meet this challenge with more emphasis on SCR technology and, potentially, with higher dosing rates of the reagents which can give rise to NH_3 emissions. While this is, largely, speculation, it does not seem unreasonable to conclude that NH_3 emissions per vehicle may increase in the future. This affect is not taken into account within COPERT, which predicts that while NOx emissions from newly-manufactured diesel cars will fall between 2016 and 2020, there will be no associated change in NH_3 emissions. Defra's predictions go further, and suggest that NH_3 emissions from road traffic will reduce into the future (Defra, 2012).

7.14 While it is likely that NH_3 emissions per vehicle will increase in the future, there is currently no robust way to quantify this effect. The model is thus considered likely to under-predict traffic-related NH_3 emissions in the future, but there currently is no robust way to address this.

Trends in NOx and NH_3 Emissions from Other Sectors

7.15 There is also uncertainty in the predictions of how emissions from non-traffic sectors will change by 2028. For this, it has been necessary to rely on Defra's projections. For oxidised nitrogen, it is considered that the projections based on Defra's data represent reasonable estimates; albeit that they may over-predict the benefits of newer vehicle technologies. These projections reflect expected activity changes and the effect of policies which have already been agreed.

7.16 In terms of reduced nitrogen, the estimates are considered to be more tenuous. They rely on Defra's national-level projections, which will themselves have considerable error. These projections have then been assumed to be spatially-homogenous, which they will not be. There is also the issue that changes in NOx emissions over the period will affect the speciation of NH_3 within the atmosphere, but it has not been possible to take this into account. Defra's current projections were generated prior to recent commitments and proposals at both European and UK levels to reduce NH_3 emissions. Attention on NH_3 emissions, particularly from agriculture, has grown over recent years and it is not unreasonable to expect additional management of NH_3 emissions from agricultural sources, over and above that assumed in Defra's current projections, over the Local Plan period. For these reasons, it is considered that the future-year projections of reduced nitrogen from non-traffic sources, while best current estimates, have considerable uncertainty associated with them.

Uncertainty in Predicting Existing Deposition Fluxes

7.17 There is also uncertainty associated with predicting deposition fluxes from the measured concentrations. The complex processes by which the pollutants are deposited have been simplified into a series of algorithms which are only intended to be an approximation of the real world (as described more fully in Chapter 5).

7.18 Deposition is highly dependent on land use; with the same ambient concentration giving rise to much more rapid deposition to tall vegetation than to short vegetation. Put simply, this is because taller vegetation types are more efficient at scavenging pollutants out of the air. The deposition calculations are thus highly dependent upon the land-use mapping which was prepared as part of this study.

7.19 The calculated deposition fluxes are also highly dependent on meteorology. The meteorological data have been taken from a site at Gatwick airport which is operated to Meteorological Office standards. This is considered to be the most robust dataset to use, but there will be differences between meteorological conditions at Gatwick and those at the SAC.

7.20 In order to account for some of the uncertainty in modelling dry deposition, two alternative models have been used; although the principal difference between these relates to the treatment of stomatal resistance and, in particular, how it varies over time of day and time of year.

7.21 While both the deposition models used are relatively detailed, they cannot explicitly take account of all processes affecting deposition. So called 'edge effects', where the rate of deposition to the edge of an area of woodland (as air blows up against it) is greater than that to the centre of the woodland (as air blows over the top) is not, for example, accounted for. Similarly, the potential for NH_3 to deposit more rapidly in the presence of acid gases such as sulphur dioxide (so called 'co-deposition') is not included. There are also processes which are less well known, such as the evaporation of ammonium nitrate particles close to the surface of vegetation, forming gaseous NH_3 and HNO_3 which deposit rapidly, leading to a higher deposition flux than can be accounted

for in models such as those used for this study. Thus, while a detailed and careful attempt has been made to quantify local dry deposition, it must be recognised that the results will still have an uncertainty associated with them.

7.22 Wet deposition has been counted by referring to the results from the national UKEAP precip-net network. Most of the gauges in this network are bulk gauges (meaning that they remain open all the time) rather than wet-only gauges (meaning that they close when it is not raining). The effect of this is that the gauges will collect some dry deposition, meaning that this component is double-counted in both this study and Defra's national model. The degree of double-counting is currently unknown, but it could be potentially up to +/-40% (Dammgen et. al (2005)).

Comparisons with Other Common Approaches

7.23 The approach that has been taken to calculating deposition is significantly more detailed than is used in most air quality assessments. Highways England's Design Manual for Roads and Bridges (DMRB), for example, suggests that, instead of the detailed calculations that are presented in Chapter 5, total traffic-related nitrogen deposition to all vegetation types is calculated simply by multiplying the predicted annual mean NO_2 concentration by 0.1 (which is broadly equivalent to applying a deposition velocity of 1 cm/s [28]). Deposition of traffic-related NH_3 is ignored. The Environment Agency takes different approaches in different contexts. In its AQTAG guidance, the Environment Agency (2011) provides fixed (constant) approximate dry deposition velocities. Separately, the Environment Agency (2008) has published an approach which formed the basis of one of the detailed methodologies used here (the 'EA method'). It is interesting to note that the Environment Agency (2008) showed that fluxes calculated using its detailed routine were up to four times higher than those calculated using its more simplistic (AQTAG) values. It noted that:

"The dry deposition calculations used here have followed the present state-of-the-art in deposition modelling. The assumed values of the surface and aerodynamic resistances may be subject to discussion, but given the assumptions it is unlikely that any plausible alternatives would depart greatly from the nominal values used here, which are within the usually quoted ranges. The consequence of the calculations is that, with the exception of deposition of NO_2 on to water, predicted dry deposition rates are significantly greater than previous estimates using an assumed constant deposition velocity." (Environment Agency, 2008).

7.24 The 'AQC' deposition method (Chapter 5) predicts generally smaller NO_2 deposition fluxes than the 'EA method' (i.e. as described in Chapter 5). The surfaces to which the AQC method predicts higher fluxes than the EA method are water and bare ground, which is potentially interesting given the conclusions of the EA as quoted in Paragraph 7.23. It is not within the scope of this assessment to validate either the DMRB or AQTAG deposition velocities by comparing them against the more detailed method used here.

[28] As explained in Paragraph 5.111, the deposition flux calculated as the ambient concentration multiplied by the deposition velocity.

7.25 In order to provide a robust and realistic assessment, the current study has used detailed, temporally-variable, deposition routines. The effect of this is that, rather than having a single deposition velocity with its own inherent (and undefined) uncertainty, the current deposition models have used a large number of different input parameters, all of which have their own inherent (and undefined) uncertainty levels. Despite this, there is no reason to consider that the more detailed models used here will have a greater level of uncertainty than would be provided either by using the DMRB or AQTAG deposition velocities; in fact the opposite should be true since the approach used here accounts for many of the uncertainties in these approaches.

7.26 Two members of the team responsible for the national-scale modelling carried out on behalf of Defra (Smith, Fowler, Sutton, Fletchard, & Coyle, 2000) have reviewed the 'EA-method' modelling approach as taken here (their review predates the addition of the 'AQC method'). In particular, Prof. Mark Sutton has noted that:

"Detailed calculations of N deposition have been described … which combine measurements with modelling estimates. While such calculations necessarily include uncertainties, I consider that a careful approach has been taken, and that there is no obvious overall bias in the estimates according to established methodologies. Nevertheless, it should be recognized that the absolute magnitude of the estimates may be considered as at least +/-20% uncertain, which has implications when comparing the estimates with critical loads and taking a precautionary approach. For example, the volatility of ammonium nitrate particulate matter is not considered in the methodology, which may have the effect of increasing N particle deposition rates compared with standard methodologies. This mechanism remains a topic of active research, but illustrates how actual deposition could be larger than the estimates reported by ECUS. Nevertheless, the methodology and the values as calculated … can be considered as appropriate and fully sufficient for the present purpose.".

7.27 Prof. Sutton has not reviewed the AQC deposition method, which it is noted predicts a generally lower rate of deposition than the EA method. The AQC method is, however, considered by the authors of this report to be more detailed than the EA method and thus probably more accurate.

Uncertainty in Prediction of Deposition Fluxes in the Future

7.28 Predicting deposition fluxes in the future is even more difficult than predicting existing fluxes. All of the uncertainty described above is combined, in the future-year scenarios, with several additional sources of potential error.

7.29 One additional source of uncertainty is that the relationship between total emissions of NOx and NH_3 and total nitrogen deposition is not linear. For example, as explained in Chapter 3, a 41% reduction in total UK emissions of oxidised nitrogen between 1988 and 2010 only gave rise to a 14% reduction in oxidised nitrogen deposition. Accurately quantifying the effect of this non-linearity on future-year projections is extremely challenging and it is thus common practice (e.g. (Fowler et al., 2004)) to assume a direct linear relationship, as has been done here. This

assumption is, however, known to be incorrect and will thus introduce error. It justifies the use of sensitivity testing as has been applied through the use of different future-year scenarios.

7.30 There is also the issue that any changes in land use, between 2014 (when the land cover maps were produced) and 2028 will affect deposition. This introduces circularity, since elevated levels of nitrogen deposition can lead to changes in vegetation composition which can, in turn, speed up the rate at which pollutants deposit. It is not possible to predict how the land cover of the SAC might change by 2028 and so the deposition calculations assume that it will not change.

7.31 As noted in Paragraph 7.19, deposition is highly dependent on meteorology. It has been assumed that the same meteorological conditions which were measured between September 2014 and September 2016 will also represent conditions in 2028. In practice, there are many anthropogenic and natural reasons why this may not be the case.

7.32 Overall, the future-year deposition projections will have a relatively high level of uncertainty associated with them, but they are nevertheless considered to be reasonable estimates.

Comparing Predictions across Different Scenarios

7.33 Comparisons of the predicted concentrations and deposition fluxes across different scenarios (as is done in Chapter 15 of this report) should be treated with care. Where the scenarios contain like-for-like parameters (i.e. when considering the impacts Plan in isolation, or in combination with other traffic growth only – as in Chapters 13 and 14) then the level of uncertainty associated with each scenario is quite similar and the degree of change can be viewed as reasonably reliable. When comparing the results from scenarios which contain different assumptions (i.e. when considering the impacts of the Plan in combination with national and international emissions projections in Chapter 15) it must be recognised that the uncertainty associated with the two scenarios may be very different, and the calculated change might thus be more a function of this uncertainty than of anything else. In practice, uncertainty regarding future-year emissions projections dominates the predicted changes to a much greater extent than issues related to the Local Plan, although the former is outside the control of WDC, while the latter is not.

Uncertainty in Assessment Criteria

7.34 The study has assessed concentrations and deposition against published critical levels and critical loads, but it should be recognised that these are also uncertain. Advice from CEH is that the critical level for annual mean NOx concentrations is quite uncertain, having not been substantively reviewed for nearly 20 years. CEH has suggested that the critical level range for annual mean NOx concentrations may be in the range 15 $\mu g/m^3$ to 45 $\mu g/m^3$ (the current critical level is 30 $\mu g/m^3$). On the other hand, CEH has suggested that the critical level for annual mean NH_3 concentrations is more certain, with a possible error of around +/-20% (i.e. a critical level range of 0.8 $\mu g/m^3$ to 1.2 $\mu g/m^3$) (Prof Mark Sutton, CEH, pers. comm.). It is also to be expected that the 24-hour mean critical level and the annual mean critical loads are uncertain. In terms of

the critical loads, this uncertainty is, to an extent, more explicit since the critical loads are presented as ranges.

Overall Comment on Uncertainty

7.35 Despite all of the sources of uncertainty, it is considered highly unlikely that the critical levels and critical loads are currently being achieved across the entire SAC (as shown later in this report). It should also be recognised that, in many cases, changes can be predicted with more confidence than total concentrations or fluxes. As an example of this, while it is not possible to say for certain whether total NH_3 concentrations in 2028 will be higher or lower than they were in 2015, it is possible to be certain that the addition, onto a road, of more vehicles which emit NH_3, will increase roadside NH_3 concentrations.

8 Measured Concentrations and Traffic Volumes

Results from the Automatic Monitor

8.1 The ratified measurements of NOx, NO_2, and NHx are set out in Figure 8.1, Figure 8.2, and Figure 8.3 respectively. In the case of NOx and NO_2, the pattern is largely as would be expected for site of this nature, with variations over the course of a day and over the course of a year. The time-series for NHx shows more 'noise' at the start of the monitoring period owing to the magnitude of span factors used in the data ratification process. The monitoring results are also summarised in Figure 8.4, Figure 8.5, and Figure 8.6, which show the average measured diurnal concentration profiles. The diurnal profiles for NOx and NO_2 shown in Figure 8.4 and Figure 8.5 follow the expected pattern for a roadside site, with two clear peaks denoting the morning and evening peak hours for traffic.

8.2 Figure 8.5, which shows the diurnal profile of NHx concentrations, is also interesting. There is a pronounced diurnal trend, as would be expected due to natural NH_3 emissions, but also apparent is evidence of morning and evening peaks, corresponding with those in NOx. This highlights the importance of traffic NH_3 emissions and concurs with the findings of Cape et al. (2004).

8.3 Table 8.1 sets out the average measured concentrations of NOx and NO_2 over this reporting period. The average measured NOx concentration was less than the critical level of 30 $\mu g/m^3$. The maximum 24-hour mean concentration[29] was 64.9 $\mu g/m^3$, which is below the 24-hour-mean critical level. The automatic monitor uses the national 'reference method' for NOx and NO_2 and the results can be considered relatively definitive. For NHx, the method is more experimental and the 'reference method' is provided by the DELTA sampler which is co-located with the automatic monitor. For this reason, the measured period average NHx concentration is not presented since this would be misleading as it has not been used directly in the modelling[30].

[29] Over 24-hour periods containing at least 18-hours of data.

[30] In other words, because long-term NH_3 concentrations at the same location have been measured using two different methods, the values used – and presented - are those which come from the more reliable of the two instruments (i.e. the DELTA sampler). The NHx data from the automatic analyser remain useful in that they provide information on diurnal patterns in concentrations.

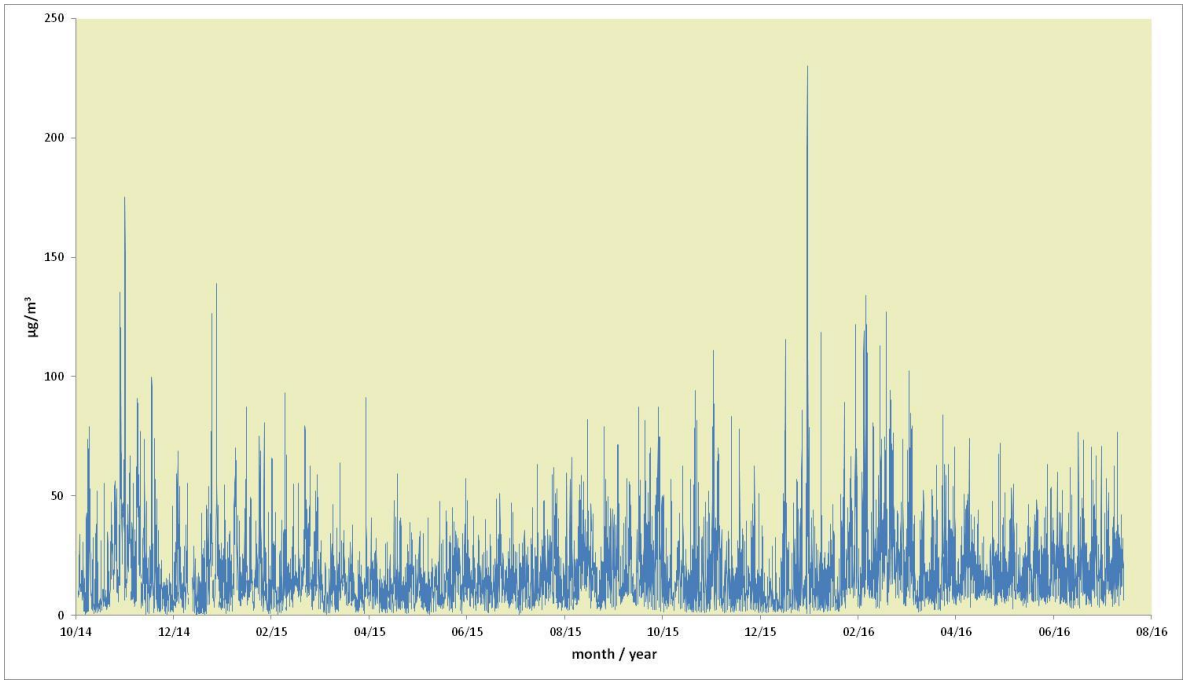


Figure 8.1: 1-hour Mean Nitrogen Oxides Concentrations at Kingstanding between October 2014 and August 2016

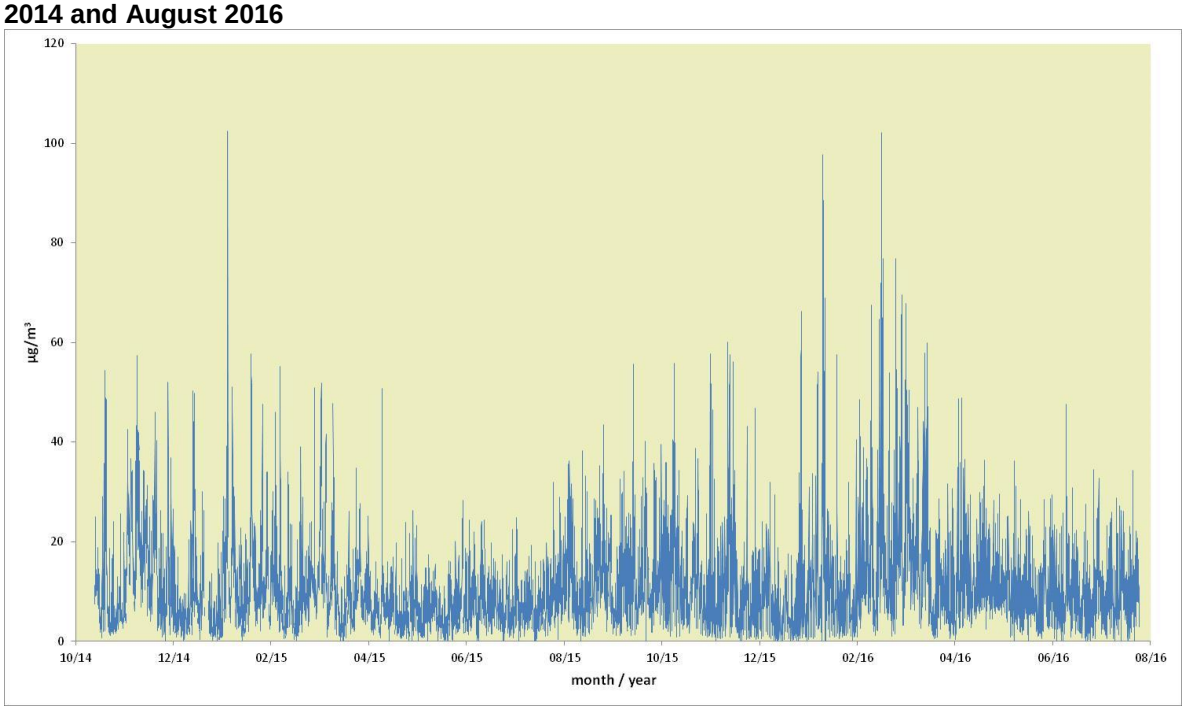


Figure 8.2: 1-hour Mean Nitrogen Dioxide Concentrations at Kingstanding between October 2014 and August 2016

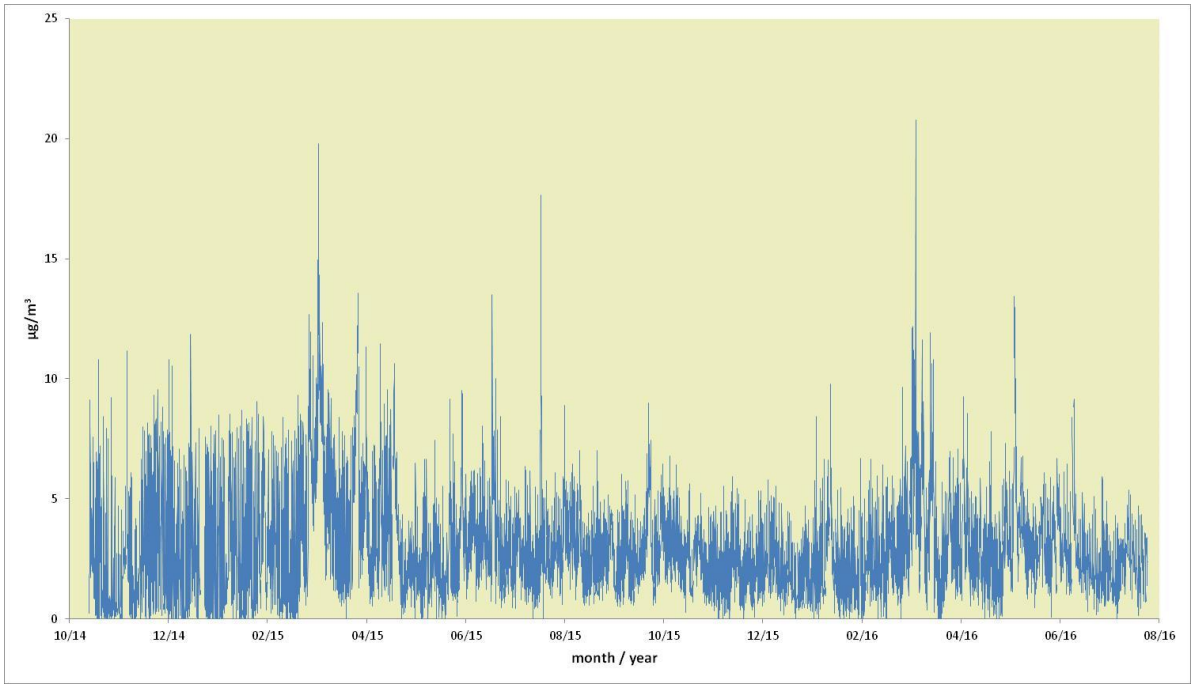


Figure 8.3: 1-hour Mean NHx Concentrations at Kingstanding between October 2014 and August 2016

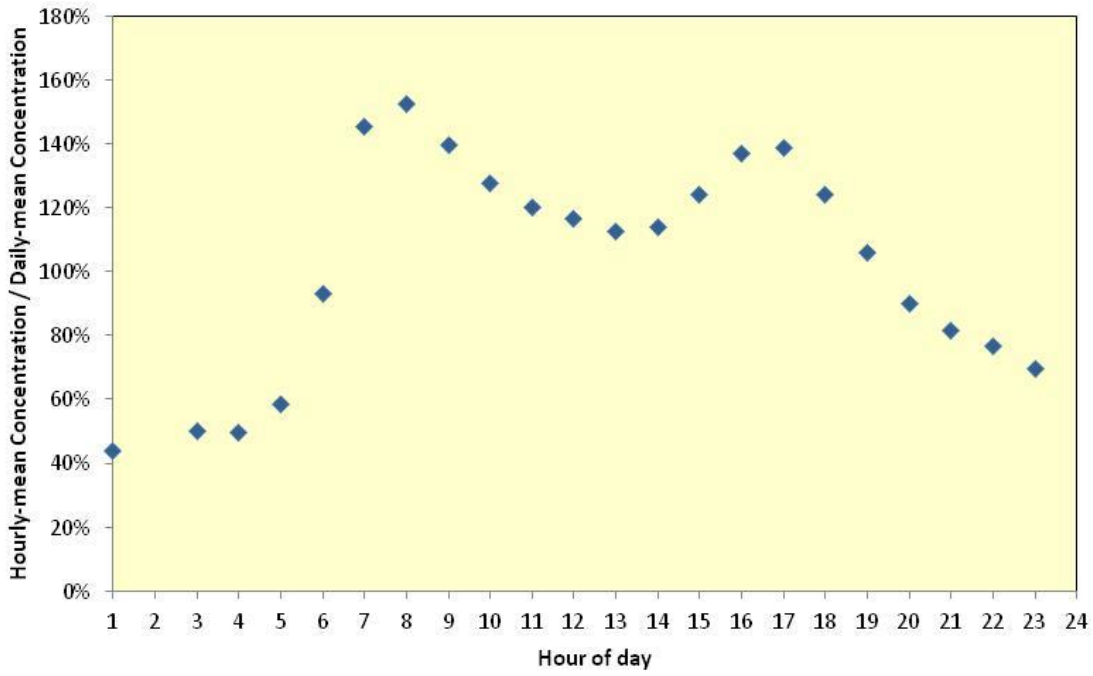


Figure 8.4: Hourly-mean NOx / Average Daily-mean NO_2 between October 2014 and August 2016 (GMT)[31]

[31] Data for 2 AM not shown since regular routine calibrations at this time limits data capture for this hour.

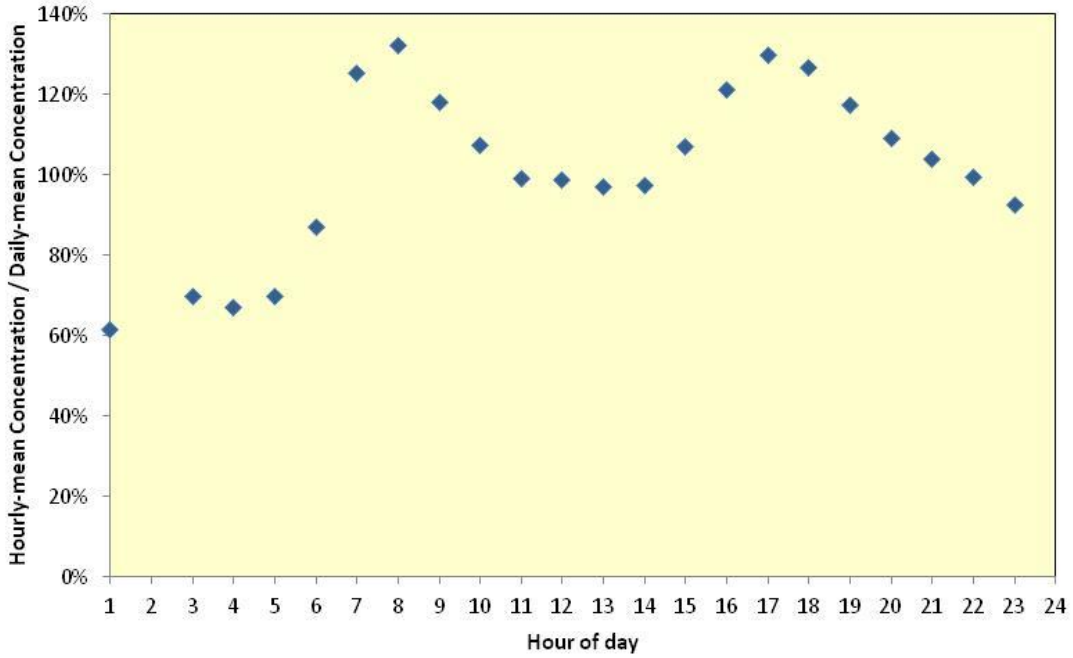


Figure 8.5: Hourly-mean NO_2 / Average Daily-mean NO_2 between October 2014 and August 2016 (GMT)[31]

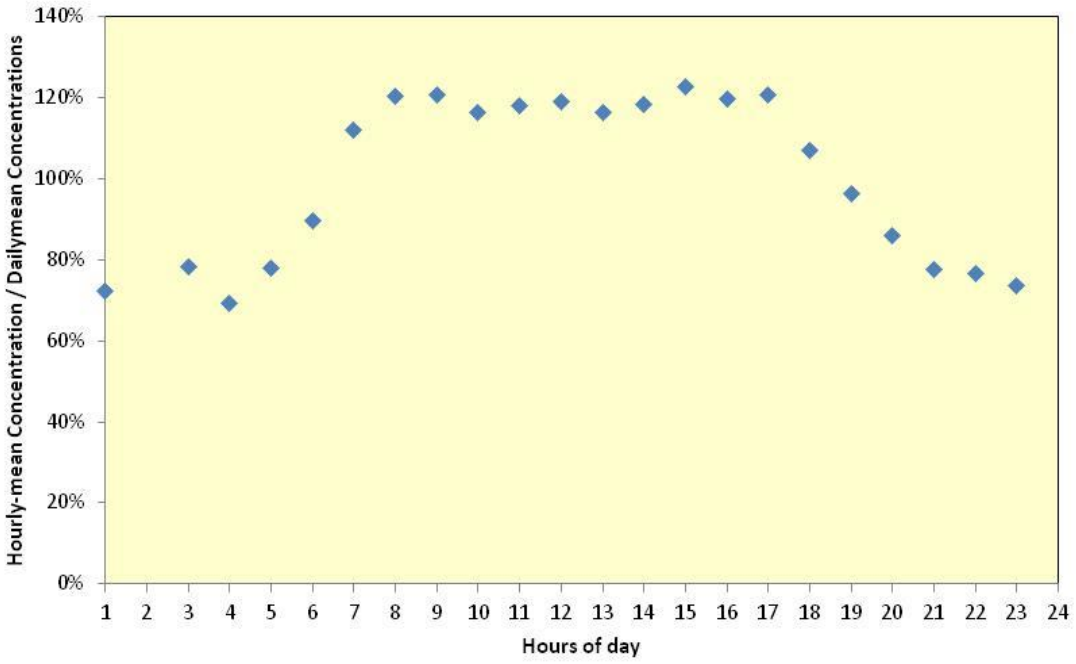


Figure 8.6: Ammonia Hourly-mean NH_3 / Average Daily-mean NH_3 between October 2014 and August 2016 (GMT)[31]

Table 8.1: Average Measured Concentrations at the Automatic Monitor between 29th October 2014 and 1st August 2016 (µg/m³)

	NOx	NO_2
Period-Mean Measured Concentration	17.6	10.7
Critical Level	30	na

Results from the Diffusion Tubes

8.4 The two-year average measured NO_2 concentrations are set out in Table 8.2 and also shown in Figure A5.1 to Figure A5.4 in Appendix 1. The highest average measured concentration of 36 $\mu g/m^3$ was at Site R4.1, which is adjacent to the A26. All of the sites which are more than 250 m from roads measured concentrations between 6 $\mu g/m^3$ and 11 $\mu g/m^3$ as a two-year average.

8.5 Table 8.3 shows the calculated NOx concentrations at each of the sites, together with distance from the nearest road. Where the average measured concentration is greater than the 30 $\mu g/m^3$ critical level for annual mean NOx concentrations, the concentration is shown in bold. Exceedences of the critical level have been measured up to 5 m from the edges of roads. No exceedences of the critical level have been measured beyond this distance.

8.6 NO_2 concentrations along each of the transects are shown in Figure 8.7 and Figure 8.8. All four transects show the expected pattern of much higher concentrations close to roads, with lower concentrations further away. Figure 8.8, which presents the measurements on a logarithmic scale, shows how the different transects compare. The pattern of fall-off is much steeper for Transect 1 (running west of the A22) than for Transect 2 (running east of the A22), which may reflect the influence of prevailing wind direction on roadside concentrations. The highest measured concentrations were at Transect 4 (beside the A26). It should be noted that the monitor at 100 m from the road along Transect 4 is within a dense bank of trees, which may explain the low measured concentrations. The fall off is less clear for Transect 3 (beside the B2026) which may reflect the fact that this road carries relatively lower traffic volumes than the roads beside the other transects.

8.7 Using the calculated NOx concentrations from Table 8.3, Figure 8.9 and Figure 8.10 show the total NOx concentration at each of the transect monitoring sites in relation to the critical level. As well as the critical level itself, Figure 8.9 and Figure 8.10 also show the indicative uncertainty range in the critical level as suggested by CEH (see Paragraph 7.34). On Transect 4, the critical level is breached up to 10 m from the road. On Transect 2, the critical level is breached out to somewhere between 5 m and 10 m from the road. On Transect 1, the critical level is breached out to somewhere between 5 m and 10 m from the road. The critical level is achieved along the entire length of Transect 3. The lower bound of the critical level range is exceeded within 100 m of the road along Transect 2, and the upper bound is exceeded very close to the road along Transects 1 and 4.

Table 8.2: Two-year Average NO_2 Concentrations at the Diffusion Tube Sites (µg/m^3) as well as Distance (D) from the Nearest Road (m) [a]

Site	NO_2	D	Site	NO_2	D	Site	NO_2	D	Site	NO_2	D
T1	21.7	1.5	T28	20.9	2.3	T55	7.0	215	R2.4	16.5	10.0
T2	13.9	2.1	T29	17.0	1.5	T56	22.5	1.2	R2.5	15.5	22.0
T3	27.9	1.6	T30	7.8	460	T57	7.0	356	R2.6	12.9	50.0
T4	25.6	1.7	T31	23.2	2.7	T58	13.0	1.5	R2.7	10.9	100
T5	10.7	1.0	T32	24.9	1.2	T59	11.4	2.0	R2.8	9.9	206
T6	12.5	3.7	T33	27.7	1.3	T60	10.8	360	R3.1	14.1	1.0
T7	9.9	417	T34	16.0	1.7	T61	16.1	2.8	R3.2	13.9	2.5
T8	8.1	240	T35	19.7	2.9	T62	23.4	2.4	R3.3	14.1	6.0
T9	7.0	313	T36	22.4	2.0	T63	8.9	166	R3.4	11.1	10.0
T10	9.8	0.8	T37	21.7	1.2	T64	9.5	211	R3.5	11.1	23.0
T11	11.0	0.7	T38	12.2	1.0	T65	14.5	1.4	R3.6	9.6	51.0
T12	7.6	1.3	T39	7.2	560	T66	12.0	1.6	R3.7	9.2	100
T13	12.4	1.0	T40	11.0	1.8	T67	12.7	1.8	R3.8	9.1	200
T14	12.6	2.5	T41	8.6	390	T68	11.0	2.1	R4.1	36.0	2.0
T15	11.4	1.3	T42	12.7	1.4	T69	9.4	181	R4.2	32.2	3.0
T16	12.3	1.6	T43	11.1	453	T71	11.1	5.5	R4.3	25.5	5.0
T17	11.0	1.4	T44	9.6	1.4	R1.1	29.7	1.7	R4.4	17.7	10.0
T18	9.9	233	T45	6.7	264	R1.2	22.2	2.5	R4.5	14.5	22.0
T19	27.3	2.6	T46	8.2	660	R1.3	15.4	5.0	R4.6	11.5	50.0
T20	22.9	1.2	T47	16.2	0.9	R1.4	13.3	10.0	R4.7	9.1	96.0
T21	34.1	1.3	T48	14.4	1.4	R1.5	12.2	22.0	-	-	-
T22	27.6	2.6	T49	12.9	2.3	R1.6	11.3	50.0	-	-	-
T23	15.1	3.5	T50	8.8	328	R1.7	9.9	100	-	-	-
T24	13.0	4.8	T51	15.3	1.0	R1.8	-	200	-	-	-
T25	14.9	1.4	T52	12.7	1.3	R2.1	21.9	1.7	-	-	-
T26	7.2	258	T53	13.3	1.5	R2.2	21.1	2.5	-	-	-
T27	5.9	560	T54	9.6	0.9	R2.3	19.2	5.0	-	-	-

[a] bias adjusted and 'annualised' as described in Chapter 4.

Table 8.3: Two-year Average NO_x Concentrations at the Diffusion Tube Sites (µg/m^3) as well as Distance (D) from the Nearest Road (m)[a]

Site	NO_x	D	Site	NO_x	D	Site	NO_x	D	Site	NO_x	D
T1	**37.3**	1.5	T28	**36.0**	2.3	T55	8.7	215	R2.4	26.8	10.0
T2	21.6	2.1	T29	28.1	1.5	T56	**38.2**	1.2	R2.5	24.7	22.0
T3	**50.9**	1.6	T30	10.3	460	T57	8.8	356	R2.6	19.8	50.0
T4	**45.8**	1.7	T31	**40.6**	2.7	T58	19.9	1.5	R2.7	15.9	100
T5	15.6	1.0	T32	**44.1**	1.2	T59	16.9	2.0	R2.8	14.1	206
T6	18.9	3.7	T33	**50.3**	1.3	T60	15.7	360	R3.1	21.7	1.0
T7	14.0	417	T34	26.0	1.7	T61	25.9	2.8	R3.2	21.4	2.5
T8	10.7	240	T35	**33.5**	2.9	T62	**40.4**	2.4	R3.3	21.7	6.0
T9	13.9	313	T36	**39.1**	2.0	T63	12.3	166	R3.4	16.3	10.0
T10	16.0	0.8	T37	**37.3**	1.2	T64	13.3	211	R3.5	16.3	23.0
T11	9.9	0.7	T38	18.3	1.0	T65	22.7	1.4	R3.6	13.4	51.0
T12	18.8	1.3	T39	9.5	560	T66	17.8	1.6	R3.7	12.8	100
T13	19.1	1.0	T40	16.1	1.8	T67	19.2	1.8	R3.8	12.6	200
T14	16.8	2.5	T41	11.7	390	T68	16.1	2.1	R4.1	**68.0**	2.0
T15	18.5	1.3	T42	19.2	1.4	T69	13.2	181	R4.2	**59.2**	3.0
T16	16.1	1.6	T43	16.3	453	T71	16.2	5.5	R4.3	**44.6**	5.0
T17	8.7	1.4	T44	13.5	1.4	R1.1	**54.9**	1.7	R4.4	28.8	10.0
T18	14.0	233	T45	8.3	264	R1.2	**38.5**	2.5	R4.5	22.7	22.0
T19	**48.5**	2.6	T46	11.0	660	R1.3	24.6	5.0	R4.6	17.0	50.0
T20	**39.2**	1.2	T47	26.3	0.9	R1.4	20.5	10.0	R4.7	12.6	96.0
T21	**63.6**	1.3	T48	22.8	1.4	R1.5	18.5	22.0	-	-	
T22	**49.1**	2.6	T49	19.8	2.3	R1.6	16.7	50.0	-	-	
T23	23.8	3.5	T50	12.0	328	R1.7	14.1	100	-	-	
T24	19.9	4.8	T51	24.1	1.0	R1.8	23.9	200	-	-	
T25	23.5	1.4	T52	19.4	1.3	R2.1	**37.7**	1.7	-	-	
T26	9.5	258	T53	20.3	1.5	R2.2	**36.1**	2.5	-	-	
T27	7.4	560	T54	13.6	0.9	R2.3	**32.3**	5.0	-	-	

[a] calculated from the values in Table 8.2 following the approach set out in Chapter 5.

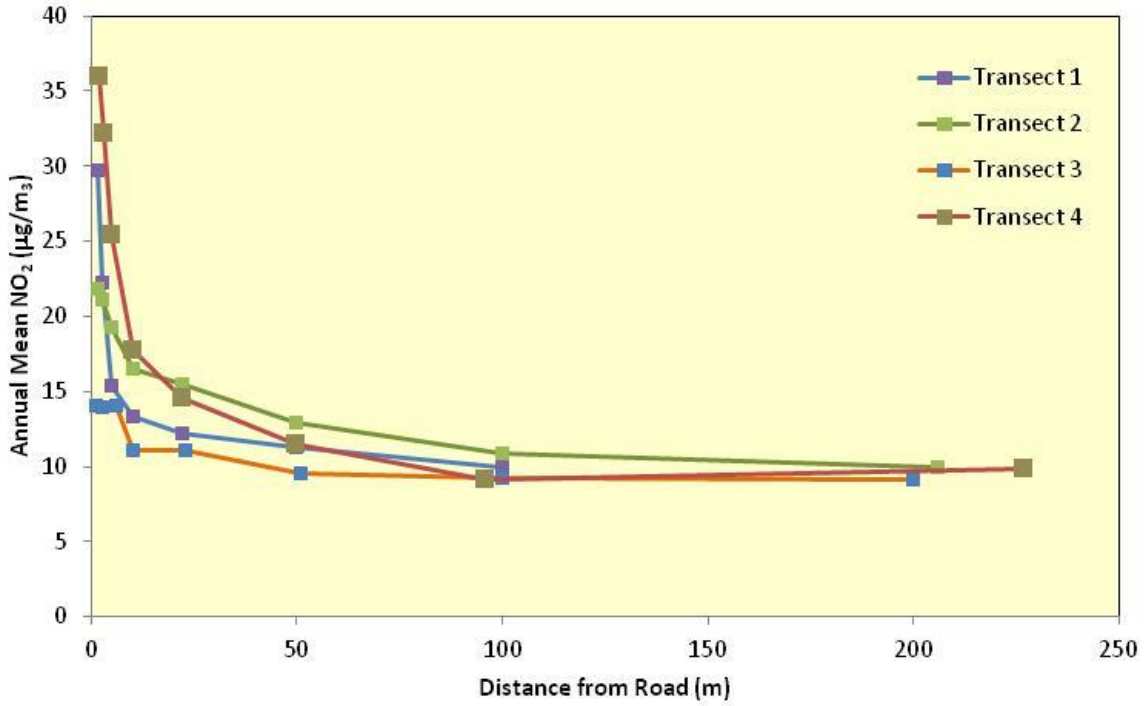


Figure 8.7: Two-year Mean Measured NO_2 Concentration vs Distance from Roads along the Four Transects [32]

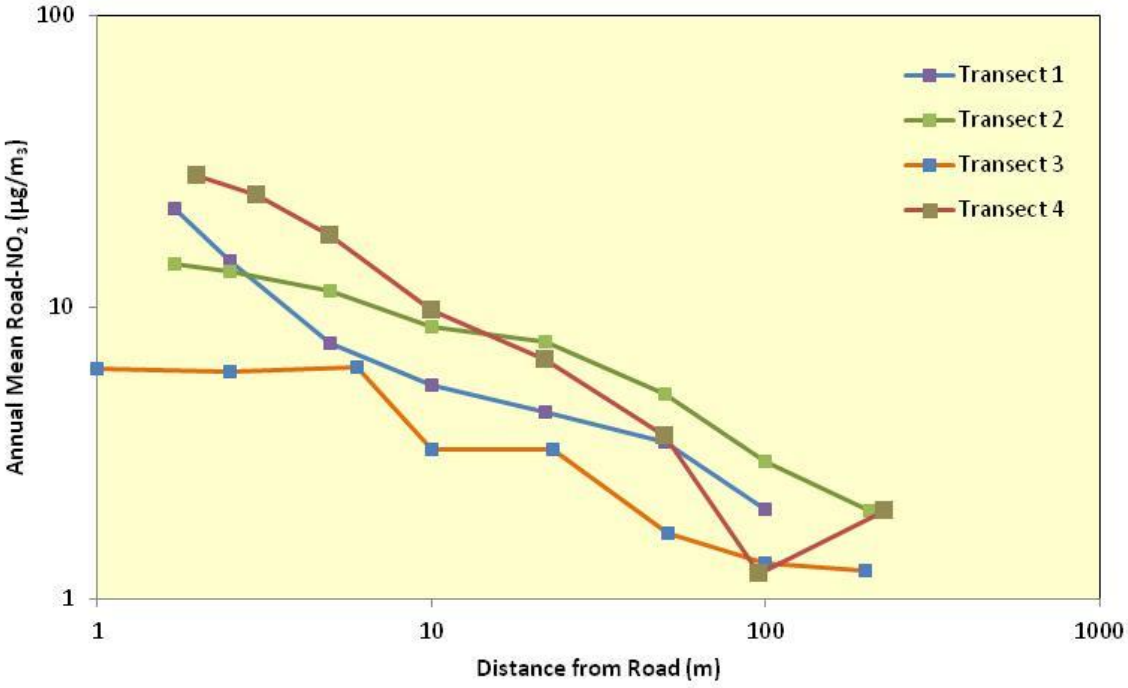


Figure 8.8: Two-year Mean Road-NO_2 (total minus assumed background) vs Distance from Roads along the Four Transects on Logarithmic Scales

[32] See Paragraph 4.13 for description of transects.

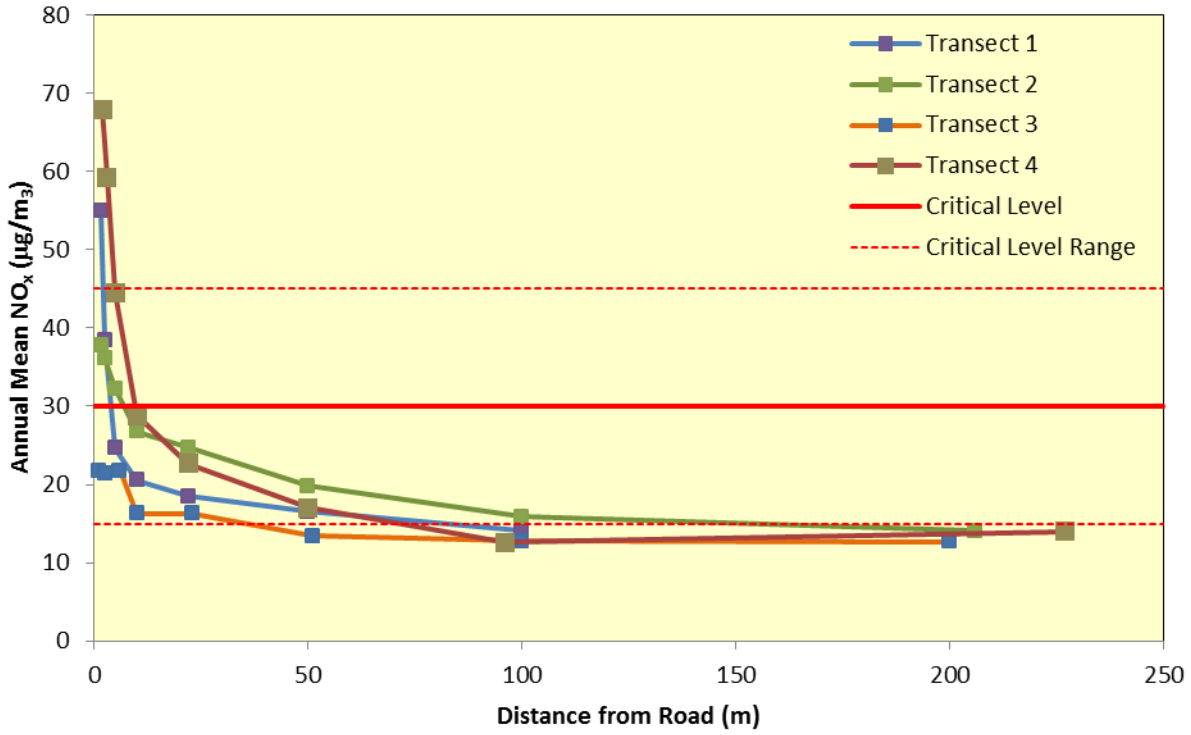


Figure 8.9: Two-year Mean NOx Concentration vs Distance from Roads along the Four Transects

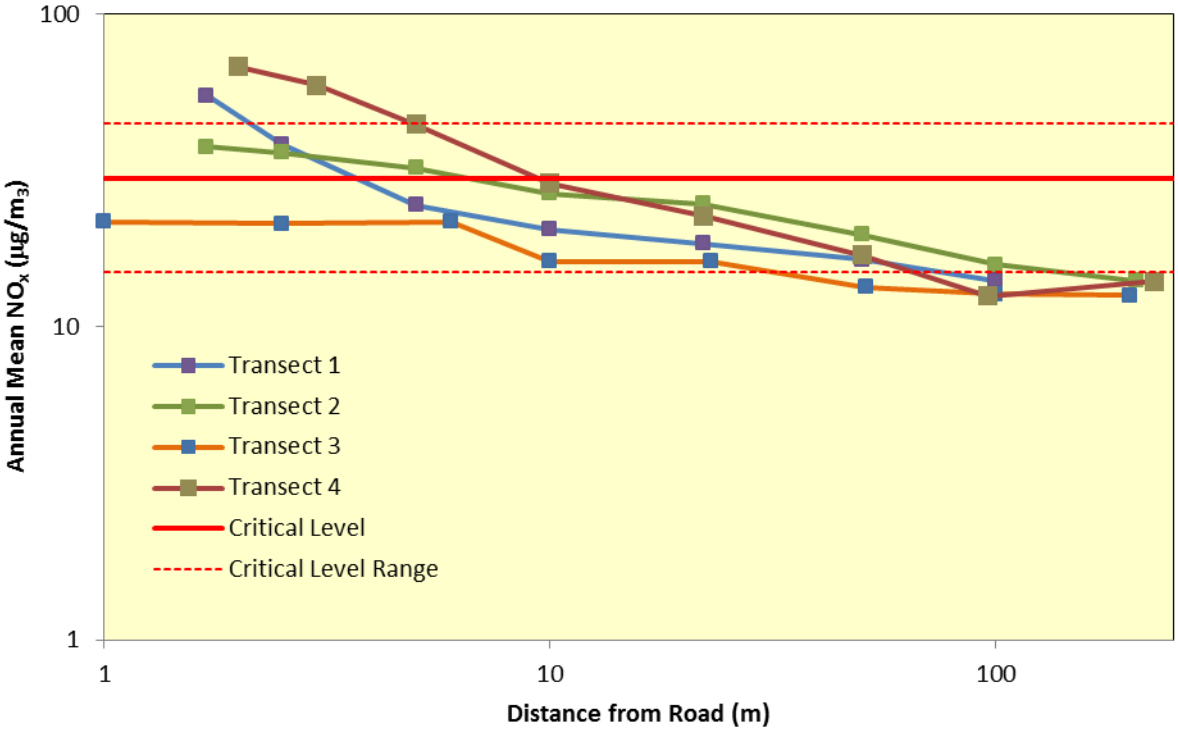


Figure 8.10: Two-year Mean NOx Concentration vs Distance from Roads along the Four Transects on Logarithmic Scales

Results from the DELTA Samplers

8.8 The two-year average results from the DELTA monitors are summarised in Table 8.4. The highest average NH_3 concentration (1.2 µg/m^3) was measured at site R4.3, which is beside to the A26. This exceeds the critical level of 1 µg/m^3. The two background DELTA sites (T46 and T41) both measured the same average NH_3 concentration (0.6 µg/m^3). HNO_3 and particulate concentrations were relatively stable across all six DELTA sites. This is to be expected since these are secondary pollutants which form relatively slowly in the atmosphere.

Table 8.4: Two-year Average DELTA Monitoring Results (µg/m^3) [a]

	R1.3 (D1)	T46 (D2)	A1 (D3)	T71 (D4)	T41 (D5)	R4.3 (D6)
NH_3	0.94	0.60	0.70	0.93	0.60	1.18
HNO_3	1.05	0.98	0.89	0.95	0.93	0.98
Ammonium (NH_4^+)	1.07	0.63	0.60	0.62	0.86	0.73
Nitrate (NO_3^-)	1.70	1.43	1.62	1.25	1.83	1.73
Nitrite (NO_2^-)	0.01	0.02	0.01	0.01	0.01	0.14

[a] 'annualised' as described in Chapter 4. Critical level exceedence shown in bold.

Results from the ALPHA Monitors

8.9 The two-year average NH_3 results from the ALPHA samplers are set out in Table 8.5. The highest measured NH_3 concentration (1.66 µg/m^3) was at Site R1.1, which is beside the A22. The lowest measured concentration (0.52 µg/m^3) was at Site T69, which is well away from any roads, to the west of the B2026 north of Kidd's Hill. Exceedences of the 1 µg/m^3 critical level were measured at Sites R1.1, R1.2, R2.1, R2.2, R3.1, T67, and R4.3. The concentration measured at Sites R2.3 and T62 were close to, but below, the critical level.

8.10 Concentrations along the transects are also shown in Figure 8.11 and Figure 8.12. The pattern of reducing concentrations shows much more variability for NH_3 than that for NO_2, which is most likely to reflect the influence of other, natural, emission sources (such as decaying organic matter) along, or close to, the transects. Despite this, there is still a clear trend at all three sites of higher concentrations beside the roads and lower concentrations further away. It is considered that the 'bunching' of concentrations at 22 m along all three transects is purely coincidence, since there no mechanism that would cause the concentrations along different transects to be the same at this distance when they are different at all other distances from the roads. Figure 8.11 shows that the critical level was exceeded at distances within 5 m of the road along Transects 1 and 2, as well as the kerbside on Transect 3. Figure 8.11 also shows the indicative error ranges on the critical level as suggested by CEH. These show that the upper bound was breached very close to the road along Transects 1 and 2, with the lower bound of the critical level range exceeded beyond 10 m from the road.

Table 8.5: ALPHA Monitoring Results (µg/m^3 of NH_3) as well as Distance (D) from the Nearest Road (m) [a]

Site	NH_3	D	Site	NH_3	D
R1.1	1.66	1.7	R3.4	0.68	10.0
R1.2	1.34	2.5	R3.5	0.71	23.0
R1.3	0.89	5.0	R3.7	0.59	100
R1.4	0.92	10.0	T59	0.77	2.0
R1.5	0.71	22.0	T61	0.83	2.8
R1.7	0.64	100	T62	0.98	2.4
R2.1	1.38	1.7	T65	0.89	1.4
R2.2	1.27	2.5	A1	0.72	1.7
R2.3	1.00	5.0	T67	1.11	1.8
R2.4	0.86	10.0	T14	0.77	2.5
R2.5	0.73	22.0	T69	0.52	181
R2.7	0.75	100	T68	0.80	2.1
R3.1	1.01	1.0	T70	0.59	226
R3.2	0.82	2.5	R4.3	1.28	5.0
R3.3	0.65	6.0	-	-	-

[a] 'annualised' as described in Chapter 4. Exceedences of the critical level shown in bold.

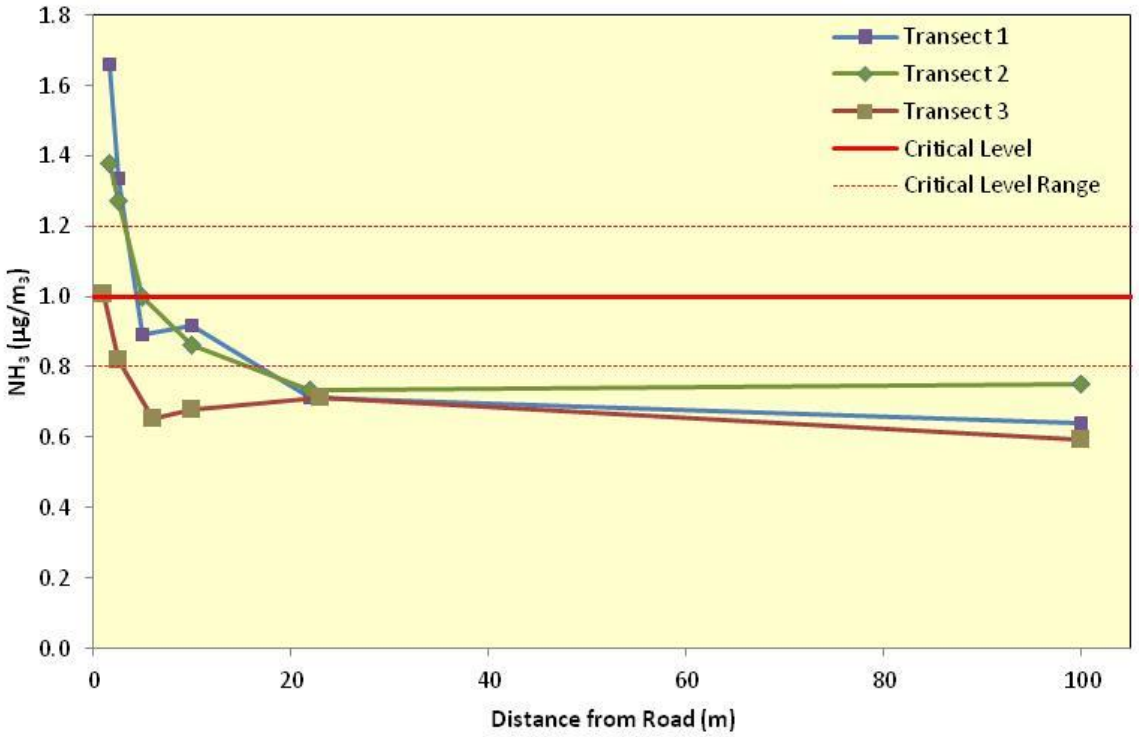


Figure 8.11: Two-year Mean Measured NH_3 vs Distance from Roads along the Three Transects

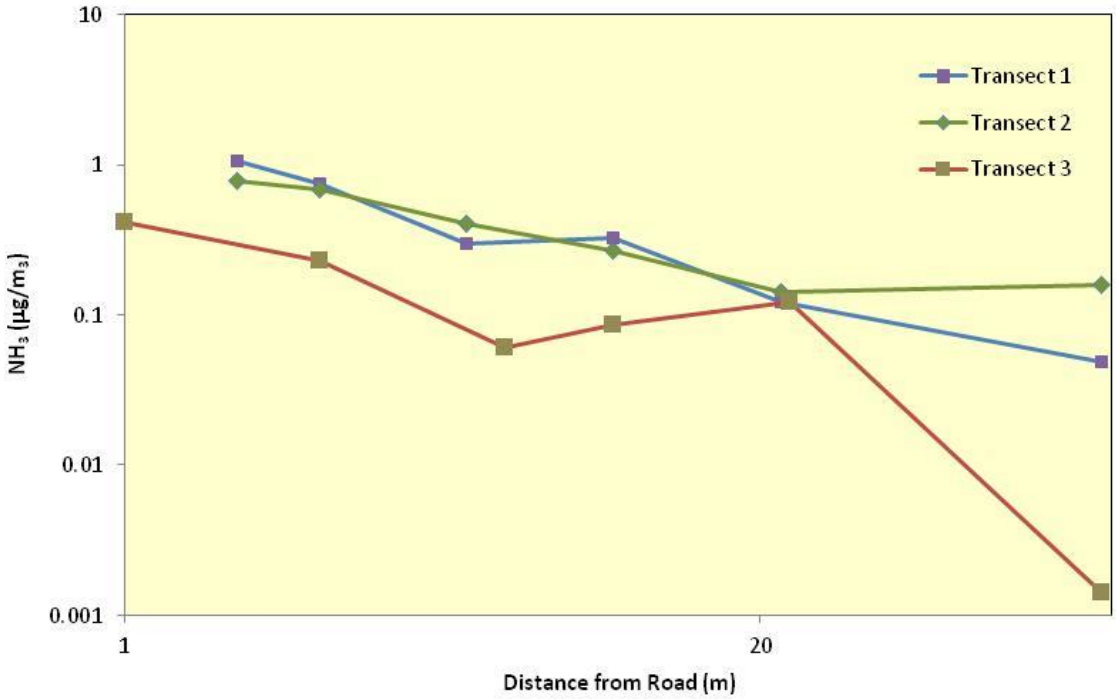


Figure 8.12: Two-year Mean Road-NH_3 (total minus assumed background) vs Distance from Roads along the Three Transects on Logarithmic Scales

Results from the Automatic Traffic Counters

8.11 Table 8.6 summarises the traffic flows measured at each of the automatic traffic counters (see Figure A3.14 in Appendix 1 for monitor locations). The highest flows were recorded at the ESCC site on the A26, where an annual average flow of 16,000 vehicles per day was recorded. The next busiest road was the A22, where flows of 12,000 vehicles per day and 10,000 vehicles per day were recorded to the south and north of Wych Cross respectively. The ESCC automatic counter on the A275 recorded fewer than 5,000 vehicles per day as an annual average. Flows along the B2026 varied from around 1,000 vehicles per day near Wrens Warren, to more than 1,400 to more than 5,000 vehicles per day near to Pylons car park.

8.12 The diurnal profiles in the measured traffic flows are summarised in Figure 8.13. All of the counters showed a very typical weekday pattern, with a clear, sharp peak during the morning 'rush-hour' and a more prolonged peak associated with the early evening. The weekend profiles show slightly more variability, with relatively higher weekend flows along the A22 north of Wych Cross, and a much more pronounced peak on Sunday evenings at some sites than at others, with the B2026 at Wrens Warren having a clear diurnal profile on Sundays. In terms of the atypical Sunday profile on the A22 north of Wych Cross, this may be influenced by the poor data capture at this monitor (see Chapter 4).

Table 8.6: Measured Traffic Flows used Fleet Compositions

Identifier		Vehicle Composition (%)						AADT
		M/C	Car	LGV	Rigid HGV	Artic HGV	Bus	
1201	New Road west of Poundgate carpark	0.4	95.4	0.4	3.6	0.1	0.02	5,648
1202	B2188 south of Lye Green	0.9	96.1	0.4	2.5	0.1	0.02	2,104
1203	Crowborough Road near Ellison's Pond	1.2	94.3	0.4	3.9	0.1	0.1	3,221
1204	B2026 near Four Counties carpark	1.3	96.0	0.5	2.1	0.1	0.1	3,957
1205	B2026 near Wrens Warren carpark	0.9	95.5	0.5	2.8	0.2	0.1	1,444
1206	A22 between Broadstone Warren and Forest Row	0.6	92.2	0.4	4.6	1.5	0.6	10,228
1207	Colemans Hatch Road between Lintons and Townsends carparks	1.4	95.3	0.4	2.3	0.1	0.4	1,839
1208	B2026 near Putland's Farm	0.7	96.1	0.5	2.5	0.1	0.05	5,078
18	A26 at Poundgate	0.5	84.6	10.1	2.7	1.5	0.6	16,398
38	A275 at Wych Cross	0.6	92.2	0.4	4.6	1.5	0.6	4,602
41	B2026 near Pylons carpark	0.5	90.7	7.1	1.4	0.2	0.1	5,526
129	A22 at between A275 and the llama park	0.6	92.2	0.4	4.6	1.5	0.6	12,042

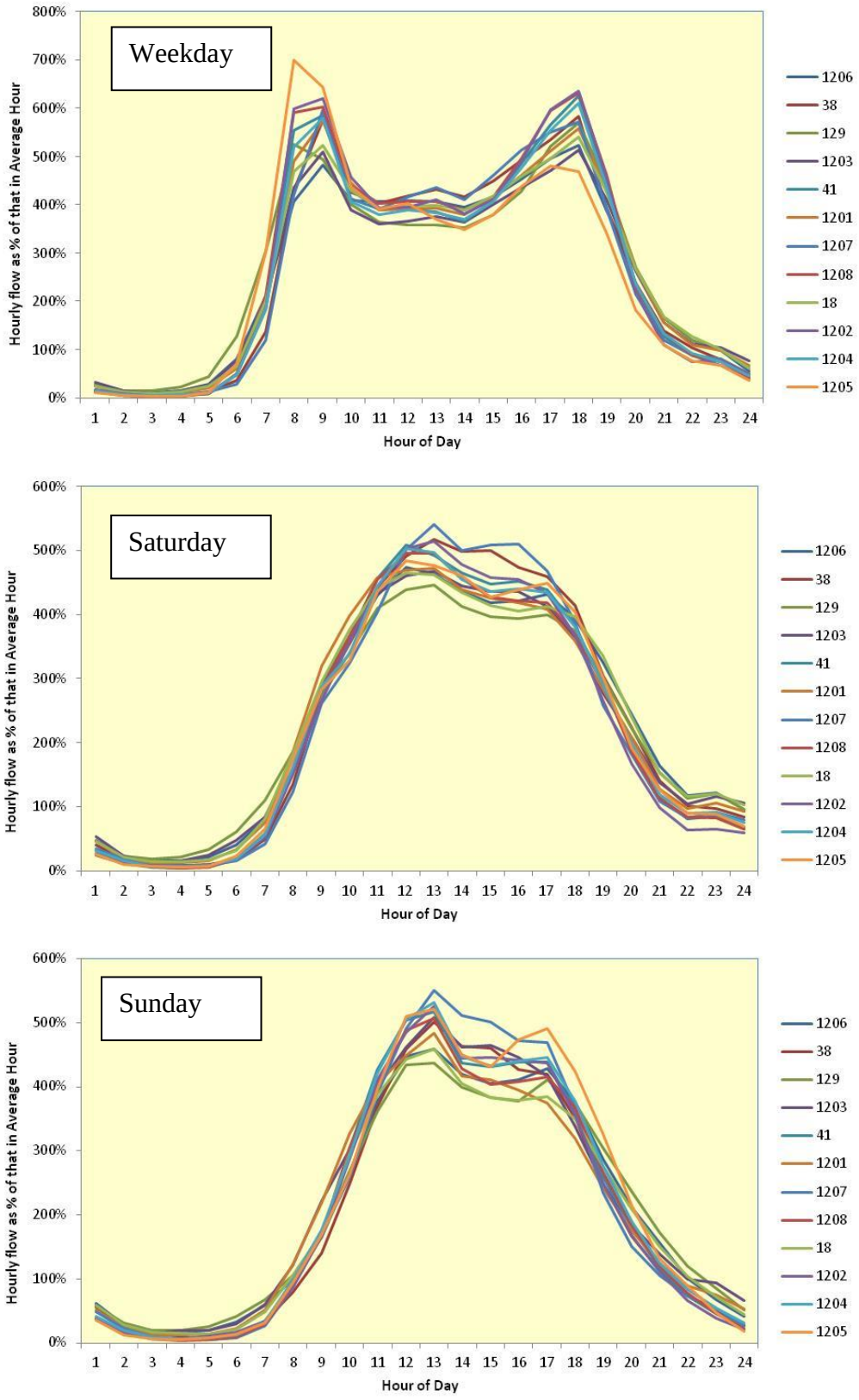


Figure 8.13: Average Measured Diurnal Traffic Profiles (total traffic)

9 Existing Baseline Model Results

Predicted Concentrations at the Ecological Quadrats

Annual Mean NOx Concentrations

9.1 Annual mean concentrations of NOx have been predicted at a height of 1.5 m above ground level at each of the ecological quadrats described in Paragraph 4.37. The results are shown in Figure 9.1 to Figure 9.5. As explained in Paragraphs 5.95 to 5.104, these predictions take direct account of nearby measured concentration and thus provide location-specific patterns in the rate at which concentrations reduce on moving away from roads.

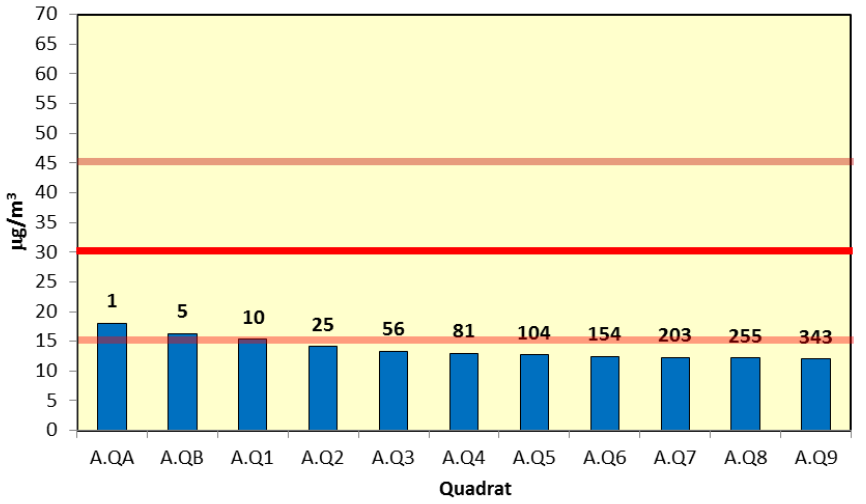
9.2 The 30 $\mu g/m^3$ critical level is only exceeded along Transects F, G, J, and K, and then only at the quadrats which are 1 m or 5 m from the kerb. The 15 $\mu g/m^3$ lower bound of the critical level range, as indicated by CEH in Paragraph 7.34, is exceeded at some point along all of the transects. The highest predicted NOx concentration along any of the transects is a concentration of 75 $\mu g/m^3$ at Quadrat A in Transect K. This is more than double the 30 $\mu g/m^3$ critical level.

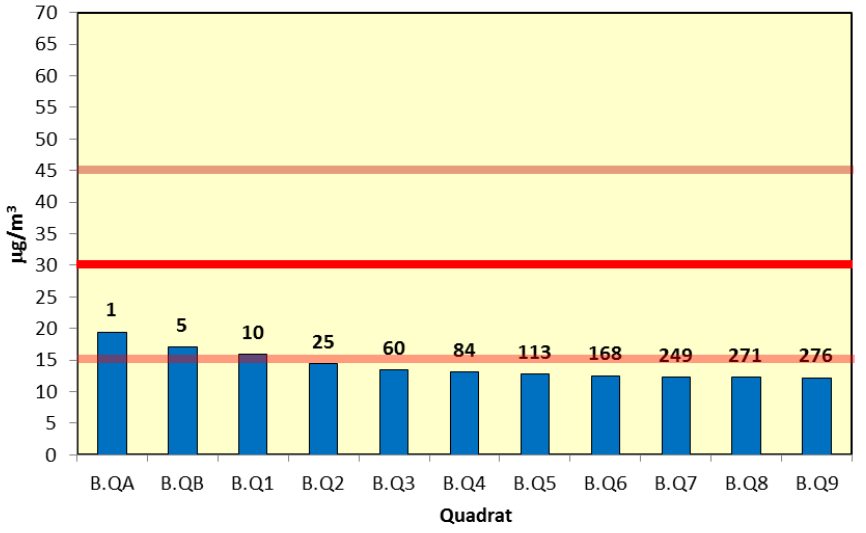
Maximum 24-hour Mean NOx Concentrations

9.3 The maximum 24-hour mean NOx concentrations at each quadrat have been predicted as described in Chapter 5. The results are shown in Figure 9.6 to Figure 9.10. The 75 $\mu g/m^3$ critical level is predicted to have been exceeded over most of the SAC, with concentrations dropping marginally below the critical level on Transects H, L, M, and O, with no predicted concentrations achieving the critical level closer than 50 m from a road. The maximum predicted 24-hour mean NOx concentration within a quadrat was more than 375 $\mu g/m^3$ (i.e. five times the critical level), with this predicted 1 m from the road along Transect K.

NH_3 Concentrations

9.4 Annual mean concentrations of NH_3 have been predicted at a height of 1.5 m above ground level at each of the ecological quadrats. These results are shown in Figure 9.11 to Figure 9.15. The critical level for NH_3 is exceeded at the roadside quadrats in Transects F, G, J, and K. The lower bound of the critical level range (see Paragraph 7.34) is exceeded in Transects E, F, G, J, K, and N. The upper bound of this range is exceeded in Transects J, and K.





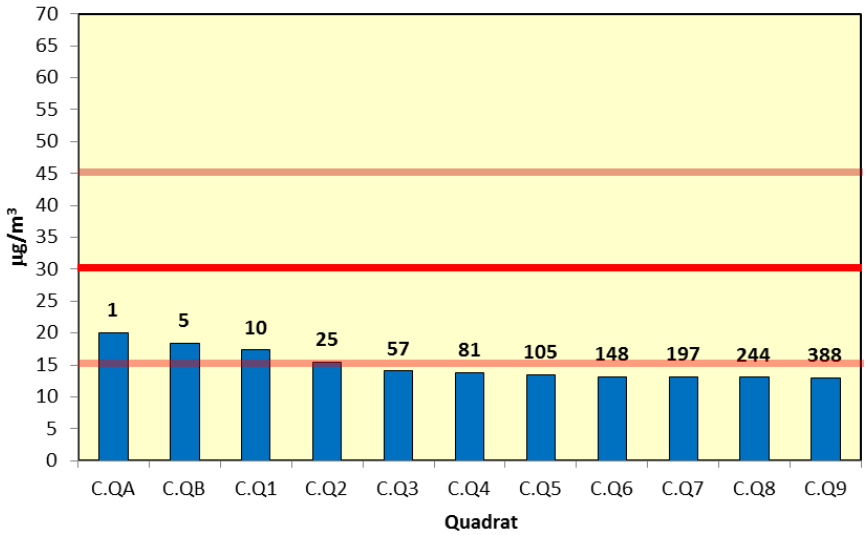


Figure 9.1: Annual Mean NOx Concentrations Along Transects A, B, and C. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.

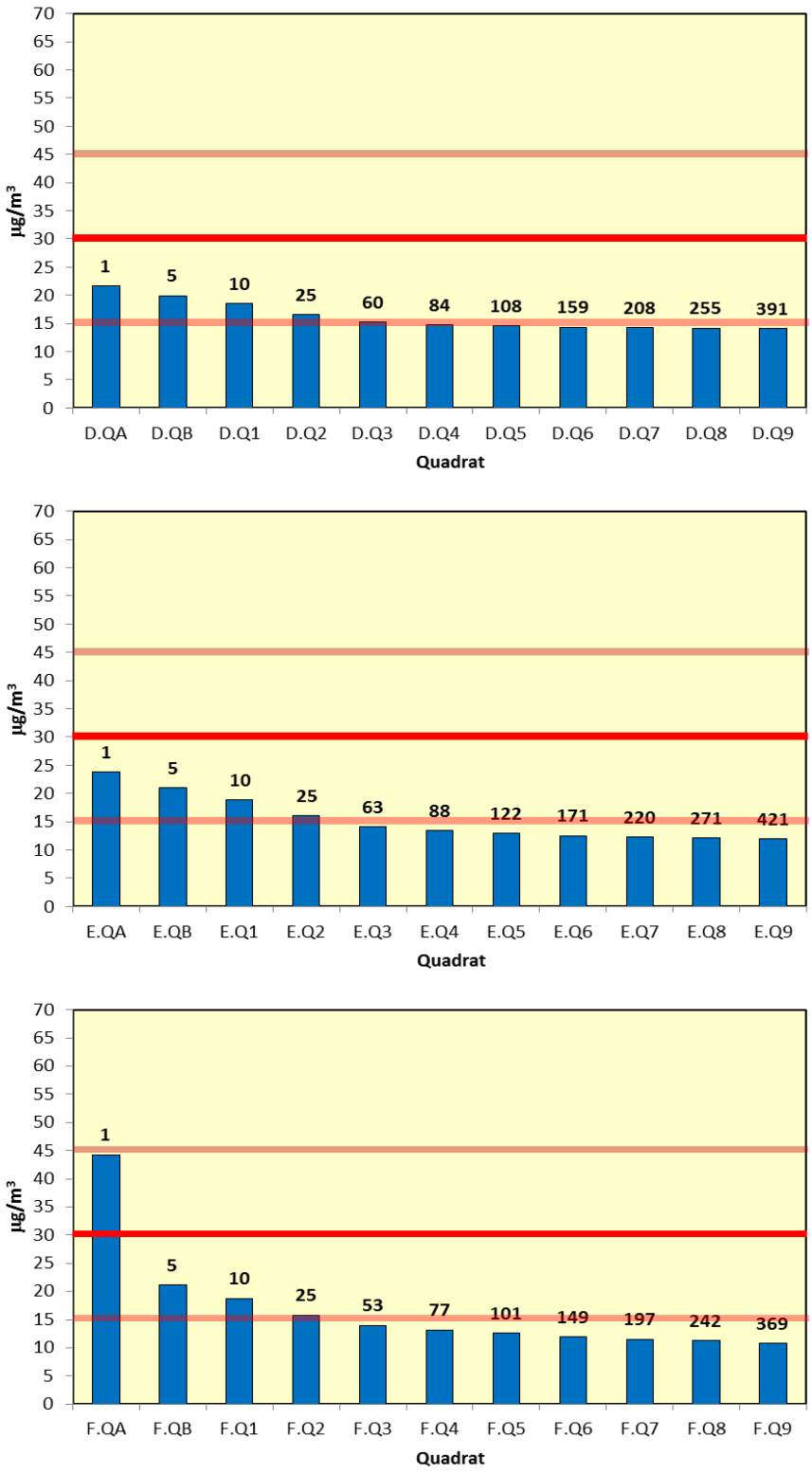


Figure 9.2: Annual Mean NOx Concentrations Along Transects D, E, and F. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.

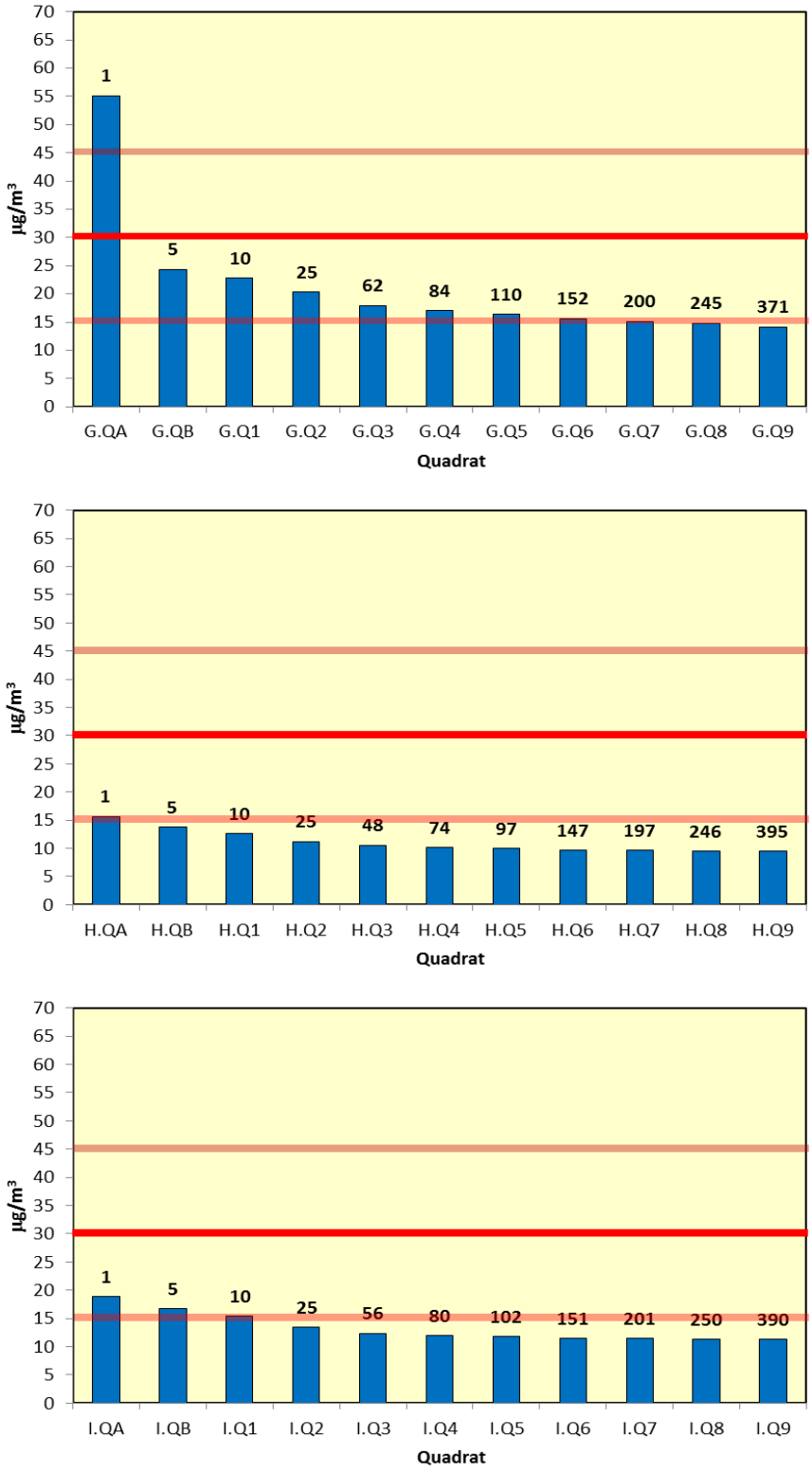


Figure 9.3: Annual Mean NOx Concentrations Along Transects G, H, and I. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.

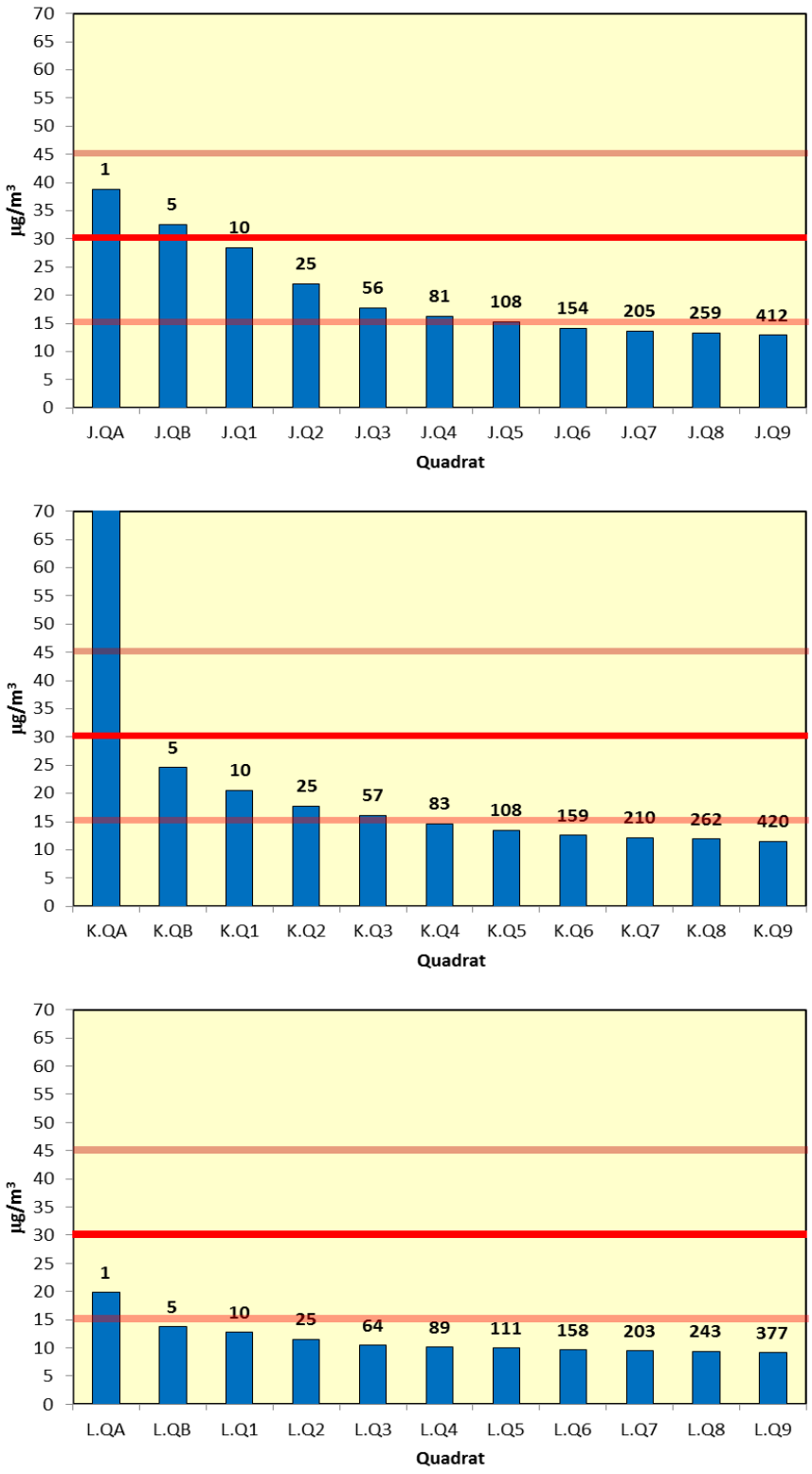


Figure 9.4: Annual Mean NOx Concentrations Along Transects J, K, and L. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH. The value for Quadrat K.QA is 75.1 µg/m^3.

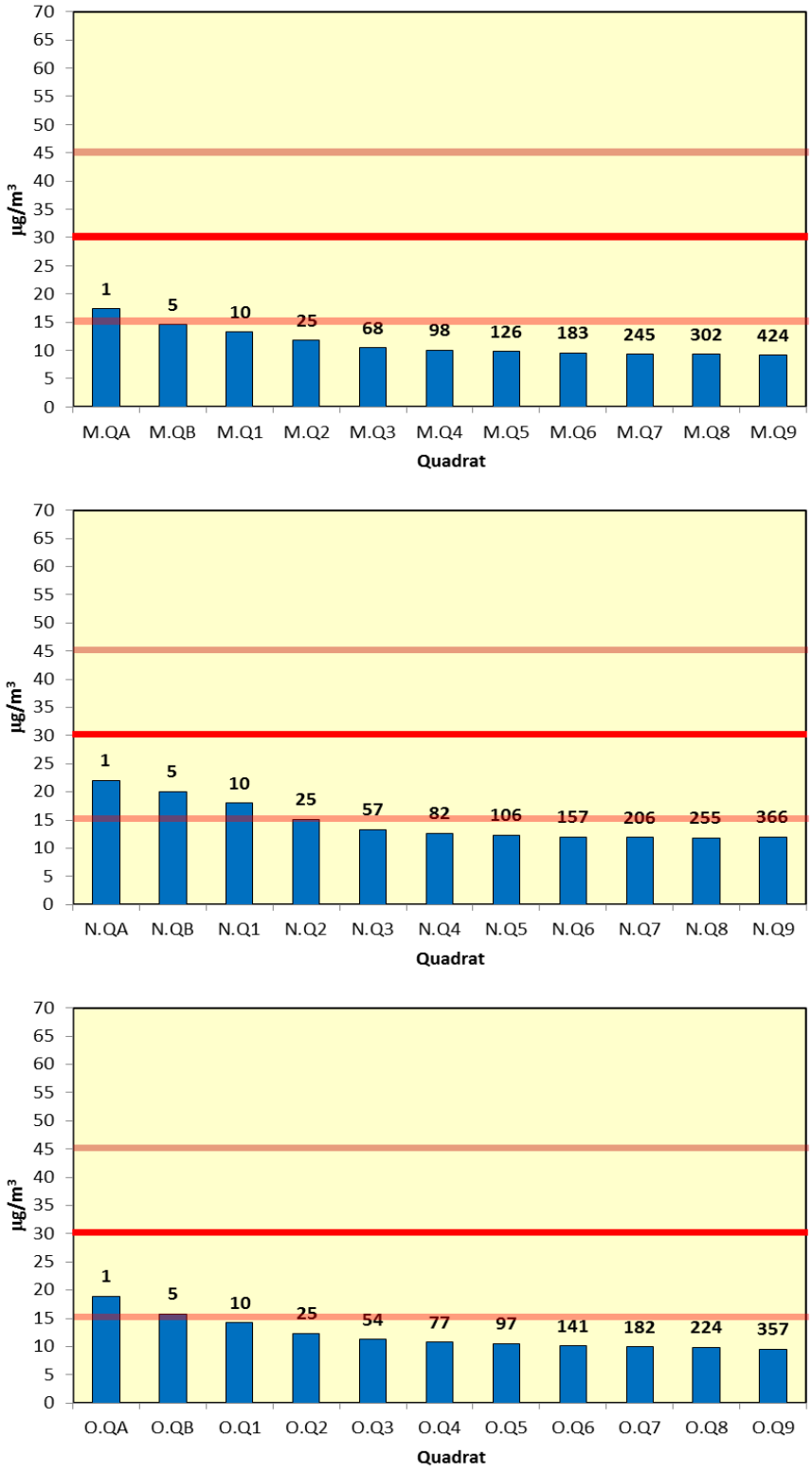
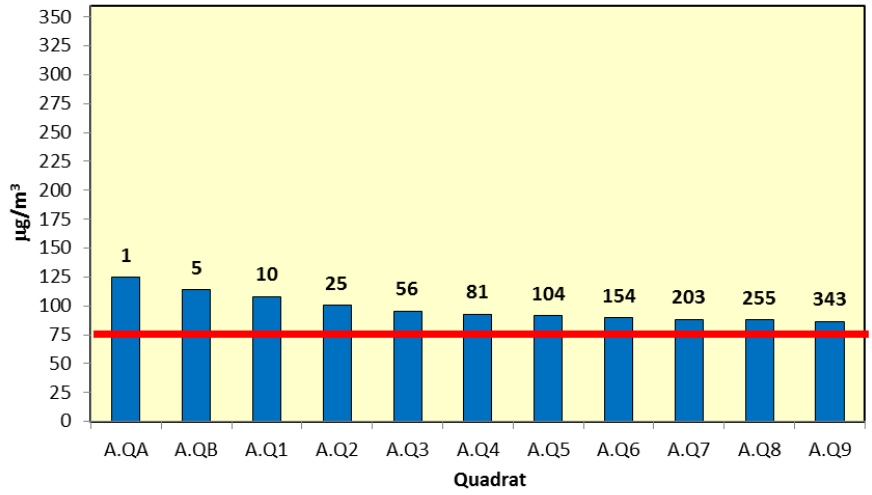
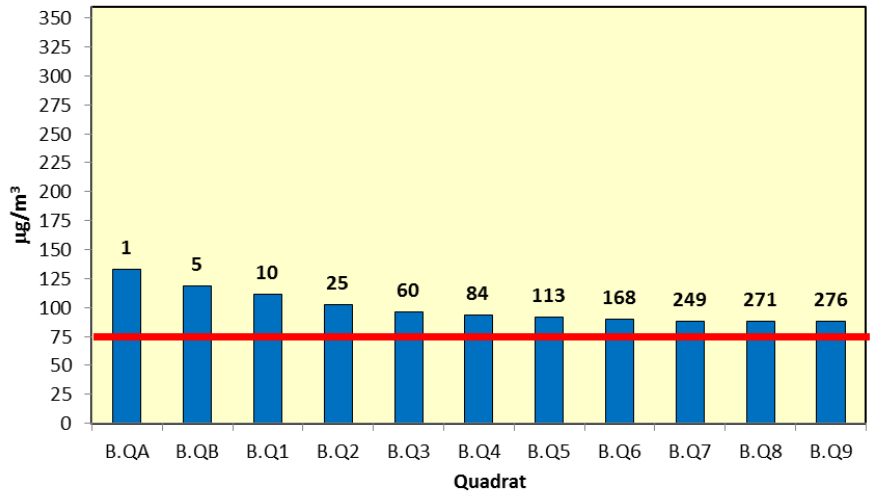


Figure 9.5: Annual Mean NOx Concentrations Along Transects M, N, and O. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 30 µg/m^3 critical level and the 15 µg/m^3 and 45 µg/m^3 critical level range suggested by CEH.





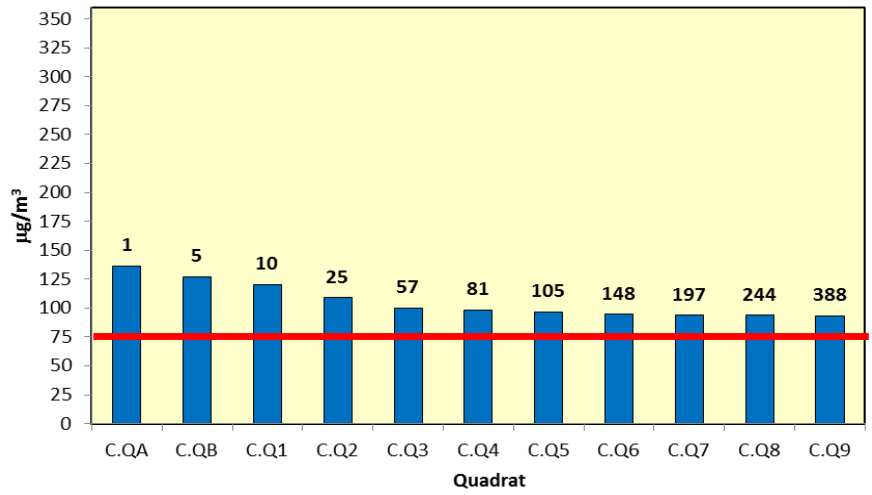


Figure 9.6: Maximum 24-hour Mean NOx Concentrations Along Transects A, B, and C. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 µg/m^3 critical level.

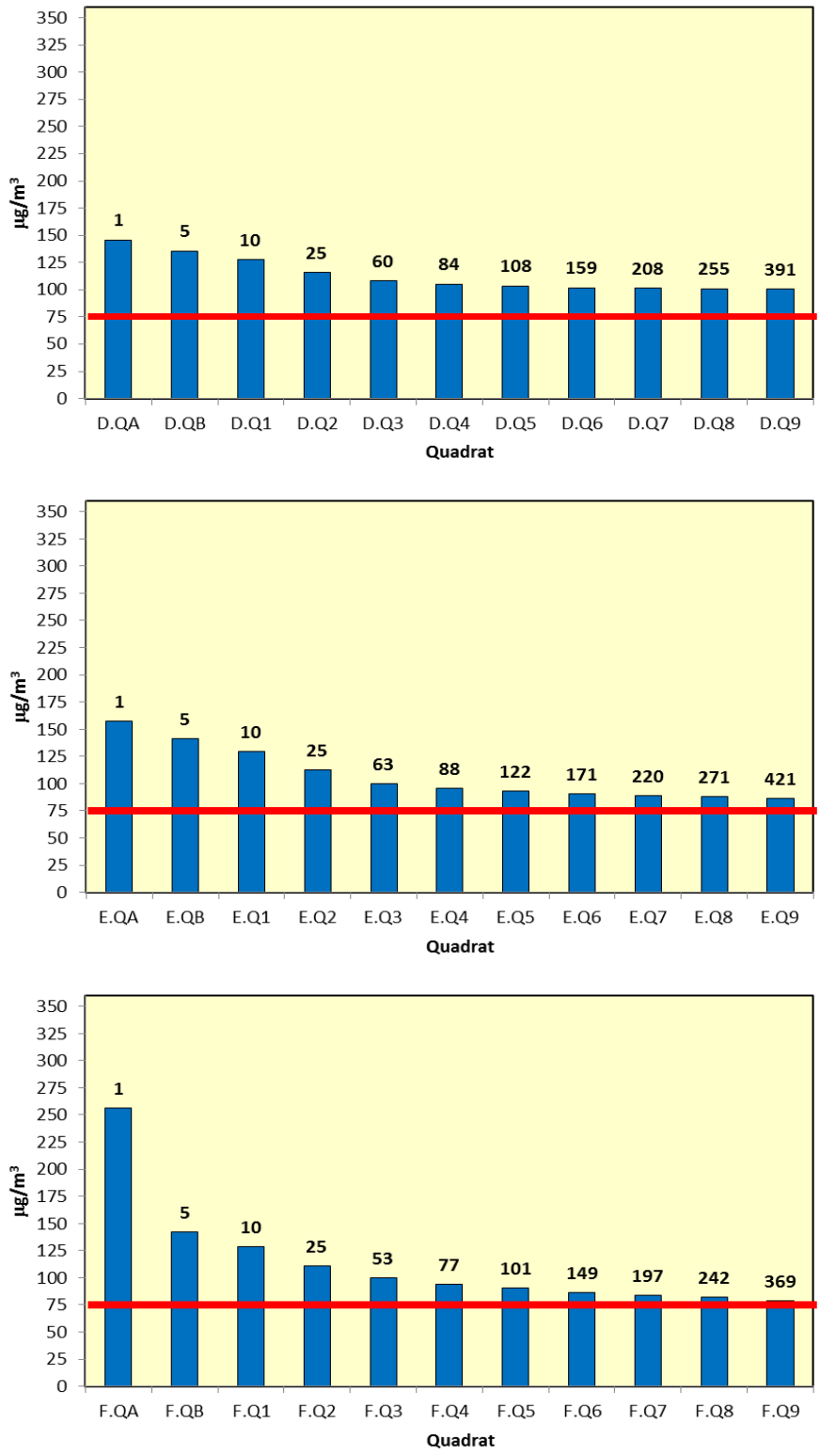


Figure 9.7: Maximum 24-hour Mean NOx Concentrations Along Transects D, E, and F. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 µg/m^3 critical level.

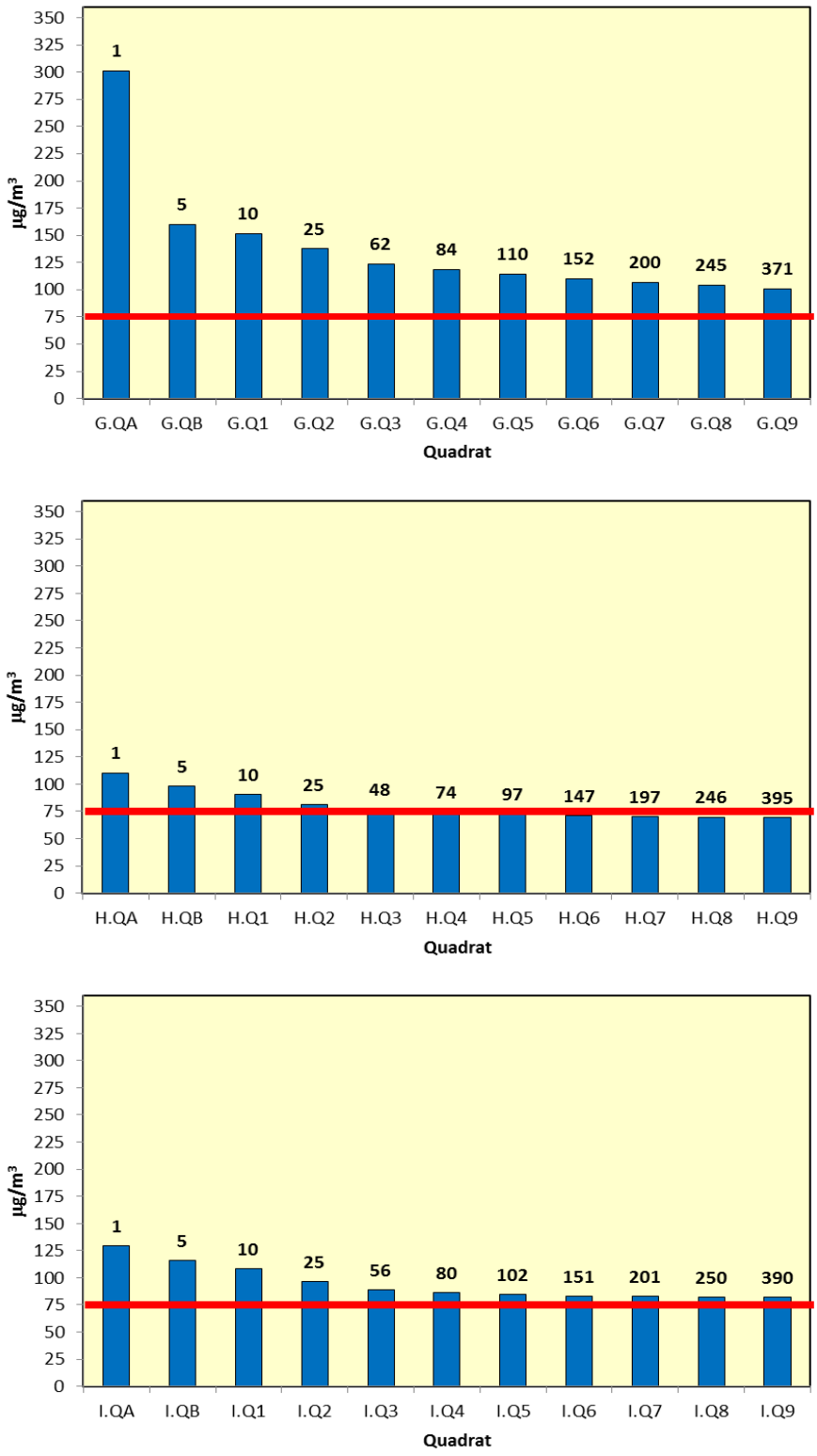


Figure 9.8: Maximum 24-hour Mean NOx Concentrations Along Transects G, H, and I. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 µg/m^3 critical level.

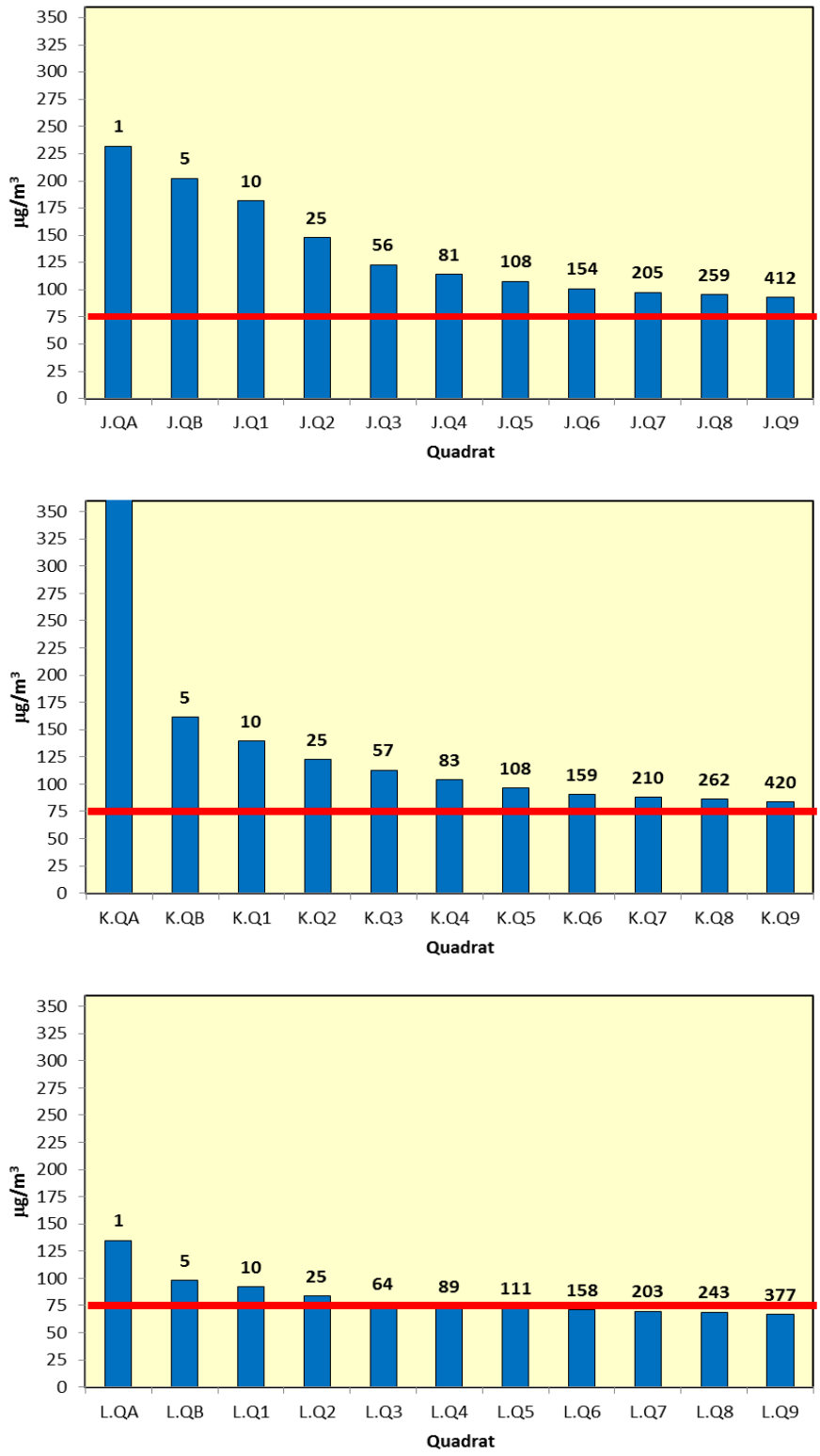


Figure 9.9: Maximum 24-hour Mean NOx Concentrations Along Transects J, K, and L. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 µg/m^3 critical level. The value for Quadrat K.QA is 377 µg/m^3.

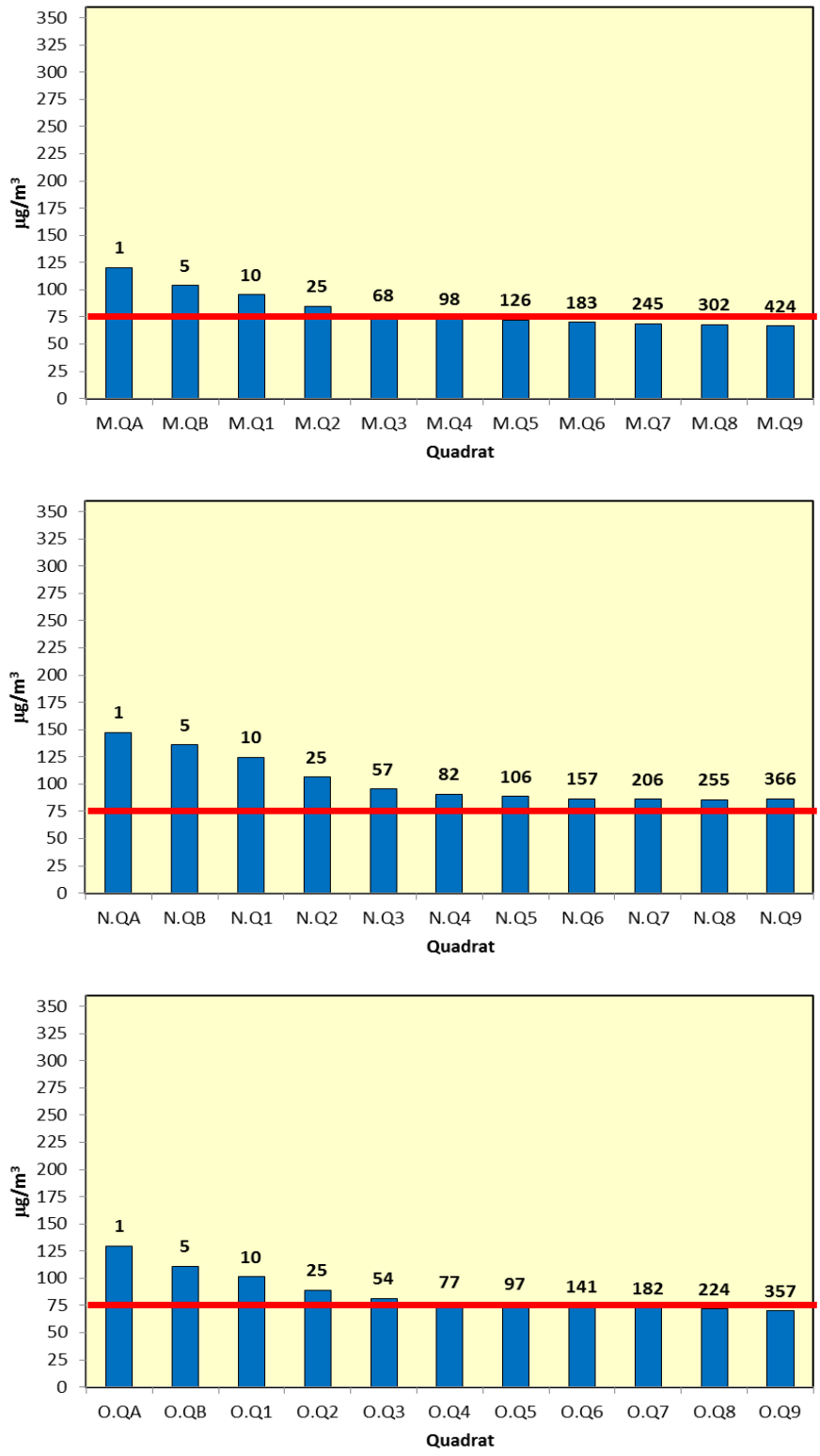


Figure 9.10: Maximum 24-hour Mean NOx Concentrations Along Transects M,N and O. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Horizontal line shows the 75 µg/m^3 critical level.

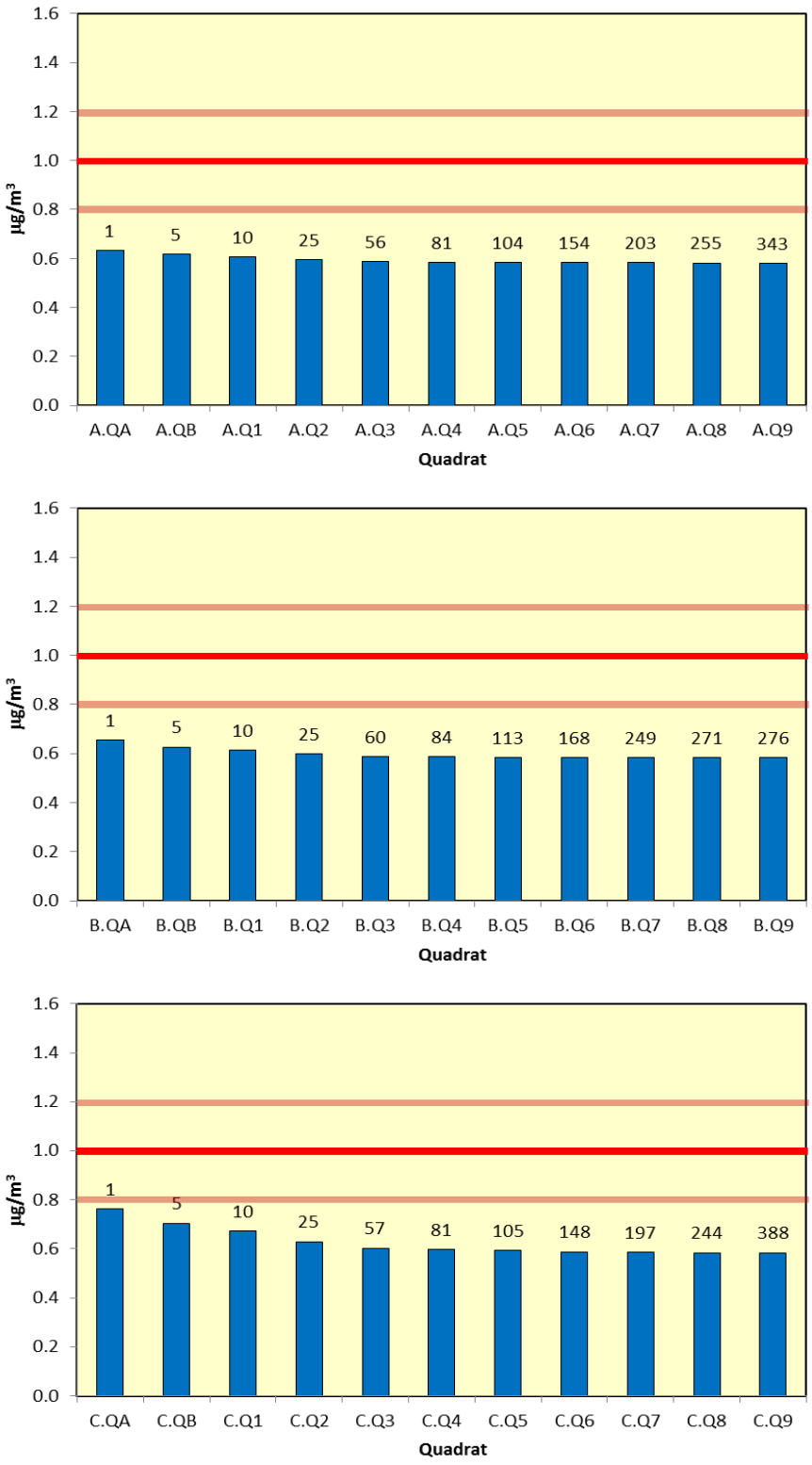


Figure 9.11: Annual Mean NH_3 Concentrations Along Transects A, B, and C. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 µg/m^3 critical level and the +/-20% critical level range suggested by CEH.

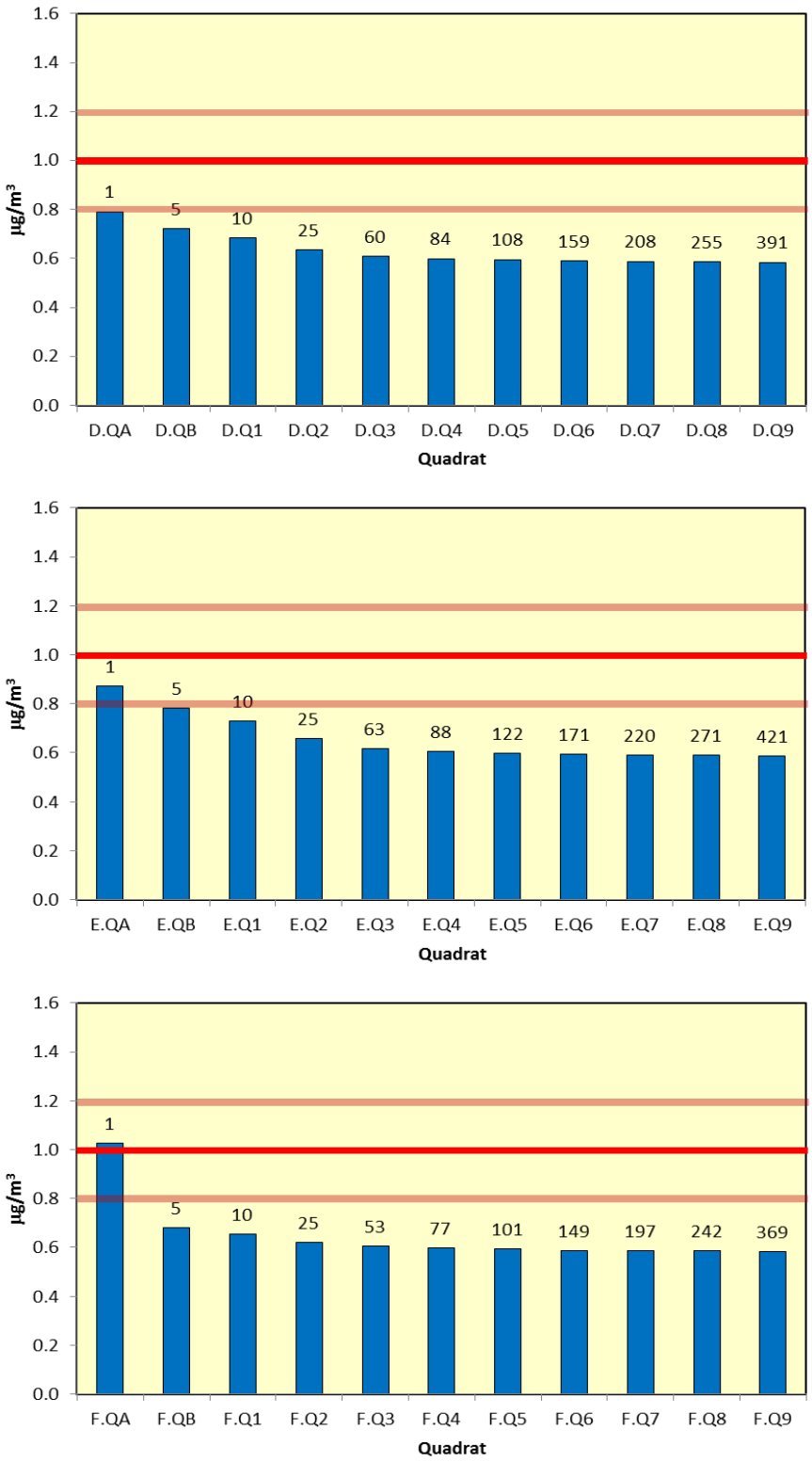


Figure 9.12: Annual Mean NH_3 Concentrations Along Transects D, E, and F. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 µg/m^3 critical level and the +/-20% critical level range suggested by CEH.

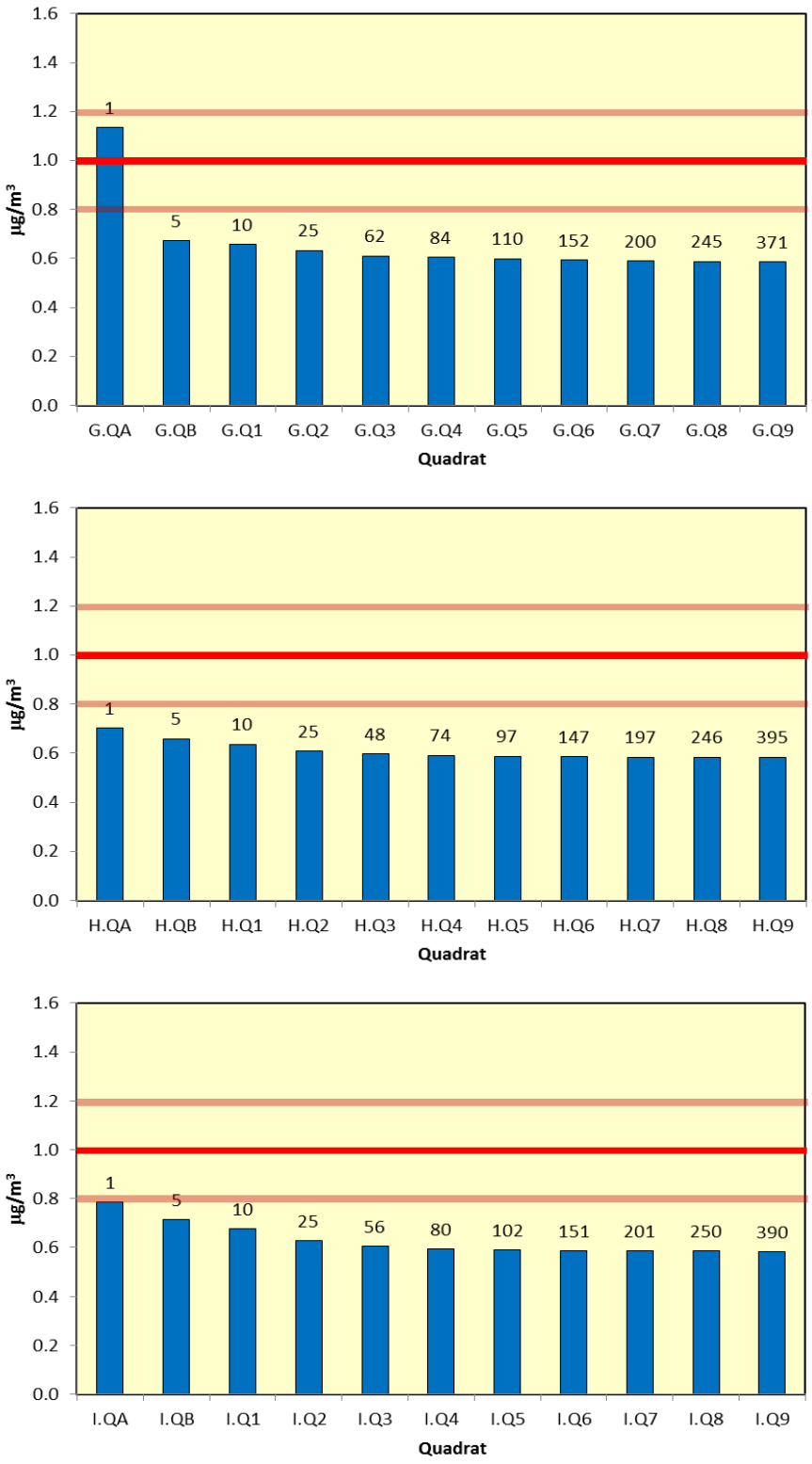


Figure 9.13: Annual Mean NH_3 Concentrations Along Transects G, H, and I. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 µg/m^3 critical level and the +/-20% critical level range suggested by CEH.

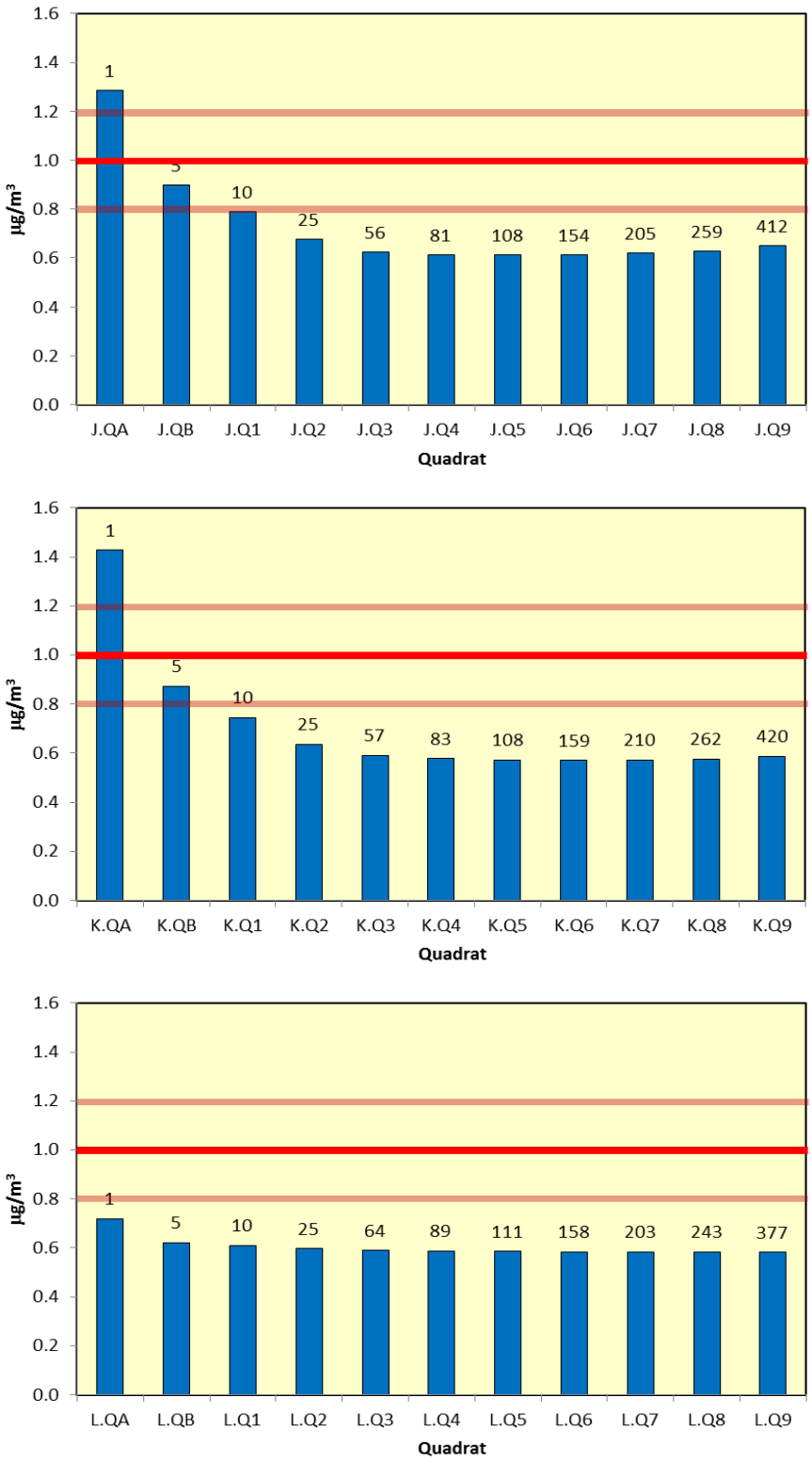


Figure 9.14: Annual Mean NH_3 Concentrations Along Transects J, K, and L. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 µg/m^3 critical level and the +/-20% critical level range suggested by CEH.

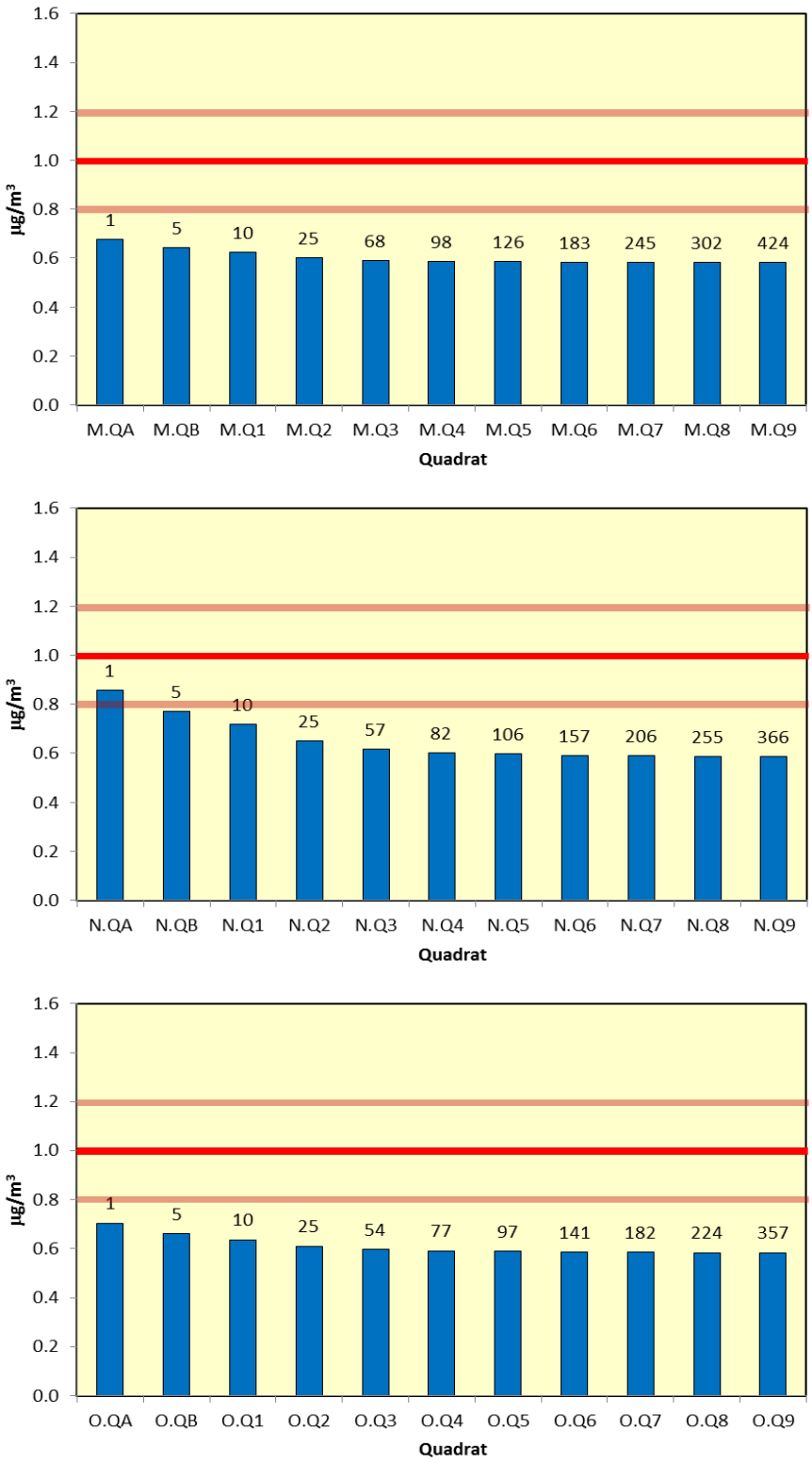


Figure 9.15: Annual Mean NH_3 Concentrations Along Transects M, N, and O. Approximate distance from the nearest main road to each quadrant to shown numerically above each column. Lines show the 1 µg/m^3 critical level and the +/-20% critical level range suggested by CEH.

Predicted Deposition to the Ecological Quadrats

9.5 For the reasons outlined in Chapter 5, deposition fluxes vary in response to ambient concentrations, and also in response to the characteristics of the land surface. Ambient concentrations of NO_2 and NH_3 change markedly with distance from roads, but regardless of the ambient concentrations, deposition tends to be much more rapid to tall surfaces such as woodland, than to shorter surfaces such as heath. This means that the same ambient concentration will give rise to much higher levels of nitrogen deposition to woodland than it will to heath. Deposition is also much more rapid to vegetated surfaces than to bare ground.

9.6 The predicted deposition fluxes to Quadrats A to O are shown in Figure 9.16 to Figure 9.30 for the EA method, and in Figure 9.31 to Figure 9.45 for the AQC method. For each quadrat, the deposition flux has been calculated twice, once assuming deposition to a uniform sward of wet dwarf heath, and once assuming deposition to the dominant habitat type (and average sward height) recorded during the ecological surveys. The purpose of the former set of calculations is to isolate the influence of vegetation structure on deposition flux, in order to better determine the extent to which deposition is affecting habitat structure (rather than habitat structure affecting deposition). As explained in Chapter 5, these deposition calculations take direct account of nearby measured concentration and thus provide location-specific patterns in the rate at which concentrations reduce on moving away from roads.

Deposition to an Idealised, Uniform Habitat Type

9.7 The pattern of deposition can most easily be understood by first focusing on the bottom panels (Panels B) within each of the figures (Figure 9.16 to Figure 9.45), which show what the deposition would be if the entire SAC was comprised of heath (and thus normalising for the confounding effect of habitat structure).

9.8 Most of the transects are alongside relatively quiet roads (for example Transects A, B, C, D, F, and N are beside the B2026, Transects G, H, I, and O are beside Crowborough Road, Transect E is beside New Road, and Transects L and M are beside Colemans Hatch Road. Because these roads carry relatively low volumes of traffic, ambient concentrations (see Figure 9.1 to Figure 9.15) at those Quadrats close to roads are relatively similar to those further away from the roads (i.e. the roadside increment is relatively small). The exceptions to this are Transects F and G, where the kerbside quadrat is enclosed by trees, which restrict dispersion and thus cause concentrations to be elevated in the immediate vicinity of the roads[33]. Transects J and K are adjacent to the A22, where traffic volumes are higher, and thus the local road increment to ambient concentrations (see Figure 9.1 to Figure 9.15) is greater than that alongside the quieter roads.

9.9 The spatial patterns in ambient concentrations of NH_3 and NOx (see Figure 9.1 to Figure 9.15) are

[33] This section considers the effect of *deposition* to a uniform sward height, but the modelled effects of vegetation height on *dispersion* are still included in the results.

similar to the spatial patterns in predicted deposition of these species[34], as shown in the bottom panels of Figure 9.16 to Figure 9.45; with higher fluxes close to roads and lower fluxes further away. Deposition of the remaining components (HNO_3, particulates, and wet deposition) does not vary with distance from roads, and so does not change across each transect. Because the particulate, HNO_3, and wet deposition components make up such a large proportion of the total, total deposition is much less spatially variable than the ambient concentrations of NOx and NH_3 (compare Figure 9.16 to Figure 9.45 with Figure 9.1 to Figure 9.15).

9.10 Predicted deposition fluxes of NOx are generally smaller using the AQC method (Figure 9.31 to Figure 9.45) than they are using the EA method (Figure 9.16 to Figure 9.30). For example, the NOx component of deposition in Figure 9.16 (EA method) at quadrat A.QA is 3.1 kg-N/ha/yr, while for the AQC method (Figure 9.31) it is 1.5 kg-N/ha/yr. This reflects changes to the assumed stomatal resistance, differences to the way in which daytime periods are averaged, and to a small degree, the omission of NO deposition from the AQC method (although NO deposition to this quadrat is predicted by the EA method to be zero in any event). There are also differences between the NH_3 deposition flux predicted using the two different methods; although these are generally too small to see in the figures, for example the value for NH_3 to heath at quadrat A.QA in Figure 9.16 (EA method) is 2.46 kg-N/ha/yr, while in Figure 9.31 (AQC method) it is 2.45 kg-N/ha/yr. Deposition of the other components (labelled as 'Wet', HNO_3, and 'Particulates') are identical in both methods (e.g. the contribution of these components in Figure 9.16 is no different than in Figure 9.31).

9.11 The calculated deposition fluxes to each transect, assuming that all the habitat is heath are also summarised in Table 9.1. This shows, for example, that the calculated deposition fluxes along Transect K range from 15.3 kg-N/ha/yr to 30.4 kg-N/ha/yr using the EA method and from 14.3 kg-N/ha/yr to 22.2 kg-N/ha/yr using the AQC method; while those along Transect H range from 14.6 kg-N/ha/yr to 16.3 kg-N/ha/yr using the EA method and from 13.8 kg-N/ha/yr to 14.8 kg-N/ha/yr using the AQC method.

[34] Albeit that there is a curve-linear relationship between NOx and NO_2.

Table 9.1: Range in Predicted Deposition Fluxes to Each Ecological Survey Transect Assuming that all of the Habitat is Heath[33,35]

Ecological Transect	EA Method		AQC Method	
	Min	Max	Min	Max
A	15.6	16.8	14.5	15.2
B	15.6	17.1	14.5	15.3
C	15.4	17.5	14.3	15.5
D	15.5	17.7	14.2	15.6
E	14.9	18.2	13.9	15.9
F	14.8	24.4	13.8	18.4
G	15.5	24.9	14.2	19.2
H	14.6	16.3	13.8	14.8
I	15.0	17.1	14.0	15.3
J	15.8	22.7	14.6	18.9
K	15.3	30.4	14.3	22.2
L	15.3	18.2	14.5	15.9
M	15.3	17.1	14.4	15.5
N	15.1	18.4	14.0	16.0
O	14.7	17.0	13.8	15.1

Deposition to Observed Habitat Types

9.12 The top panels (Panels A) within Figure 9.16 to Figure 9.45 show the calculated deposition fluxes to the observed habitat structures. These are calculated using the same ambient concentrations as the bottom panels (Panels B) but also take account of changes in habitat between, and within, each transect. The habitat type is given at the bottom of each chart.

9.13 Within this study area, habitat structure exerts a greater influence on deposition than the variations in ambient concentrations do. This means that deposition fluxes to tall structures, such as woodland, are greater than deposition to short vegetation, even if the former occurs several hundred metres from the road while the latter occurs at the kerb. An example of this is Transect A (B2029 at Wrens Warren) as shown in Figure 9.16 and Figure 9.31 (for the EA and AQC methods respectively). Here, the highest rate of predicted deposition is 343 m from the road (Quadrat A.Q9), while the lowest rate of deposition is much closer to the road (Quadrat A.Q3 at 56 m). The reason for this is that Quadrat A.Q9 contains woodland, while Quadrat A.Q3 contains grassland. As well as these more obvious effects, vegetation structure also exerts more subtle effects on deposition. For example, the calculated deposition flux to Quadrat A.Q7 is higher than that to

[35] The same sward characteristics have been assumed for both wet and dry heath and so there is no need to differentiate between the two here (i.e. the numbers are equally representative of both).

Quadrat A.Q6 because, even though both surfaces have been classified as being predominantly bracken, the average sward height recorded in Quadrat A.Q7 is taller than the average sward height recorded in Quadrat A.Q6.

9.14 Taking account of observed habitat structures, the ranges of calculated deposition fluxes to each transect are summarised in Table 9.2. This shows, for example, that the calculated deposition fluxes along Transect K range from 15.1 kg-N/ha/yr to 31.8 kg-N/ha/yr using the EA method and from 14.0 kg-N/ha/yr to 29.7 kg-N/ha/yr using the AQC method; while those along Transect H range from 13.8 kg-N/ha/yr to 18.1 kg-N/ha/yr using the EA method and from 13.1 kg-N/ha/yr to 16.5 kg-N/ha/yr using the AQC method.

Table 9.2: Range in Predicted Deposition Fluxes to Each Ecological Survey Transect Using Observed Habitat Structure

Ecological Transect	EA Method		AQC Method	
	Min	Max	Min	Max
A	13.2	30.6	12.7	30.0
B	15.1	18.7	14.1	17.0
C	12.9	18.1	12.4	16.3
D	13.2	16.6	12.6	14.9
E	14.1	20.8	13.2	17.8
F	11.6	43.6	12.1	39.3
G	12.9	19.2	12.3	16.7
H	13.8	18.1	13.1	16.5
I	12.3	32.3	12.3	31.3
J	13.4	28.2	12.8	22.4
K	15.1	31.8	14.0	29.7
L	12.8	30.7	12.7	30.2
M	14.8	31.4	14.1	30.7
N	13.0	17.8	12.3	15.8
O	12.6	15.3	12.1	14.3

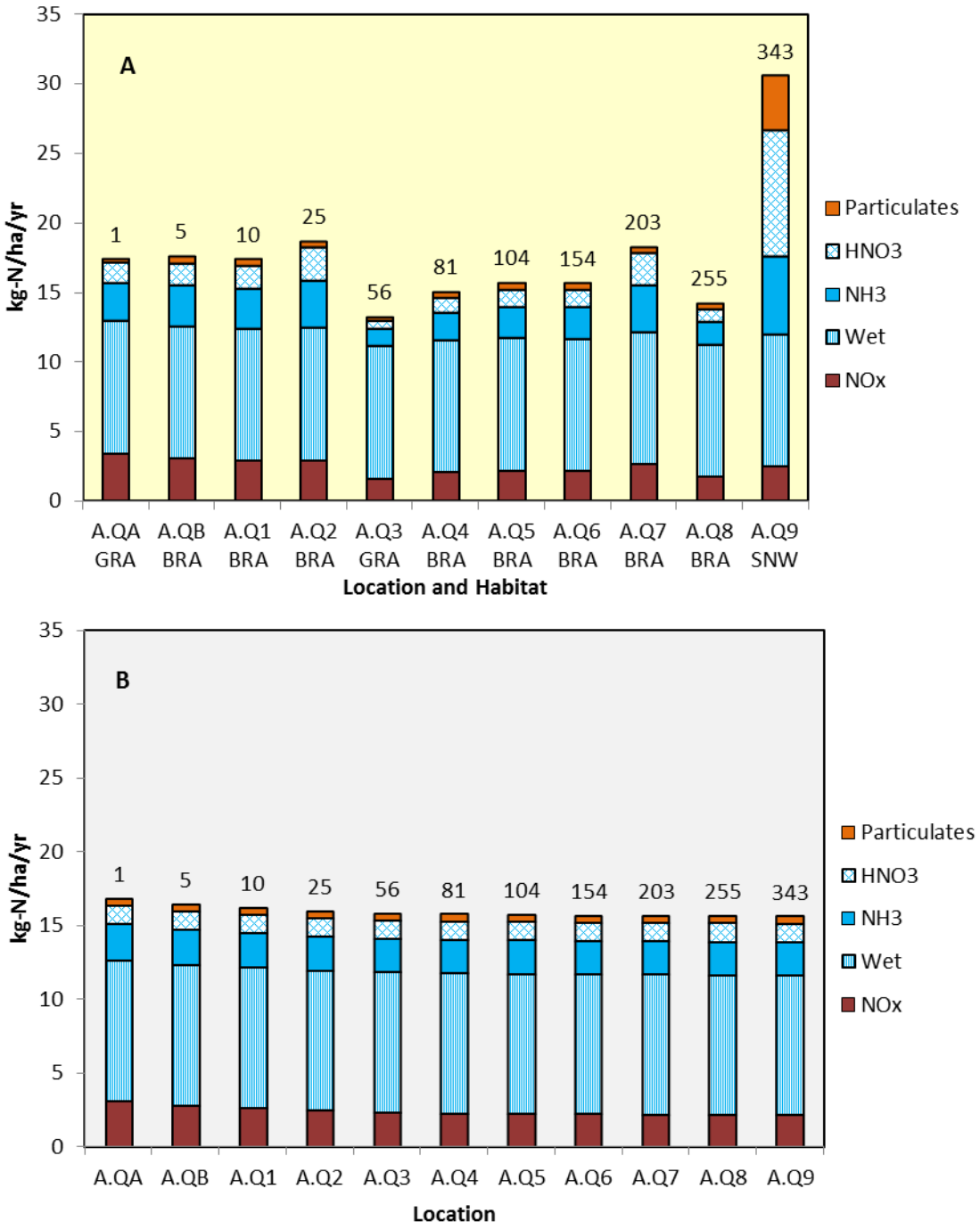


Figure 9.16: Deposition to Ecological Transect A – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column)[36]

[36] Habitat types listed as: GRA = grassland, BRA = bracken, SNW = semi natural woodland, DDH = dry dwarf heath, WDH = wet dwarf heath, BGR = bare ground, GRS = gorse.

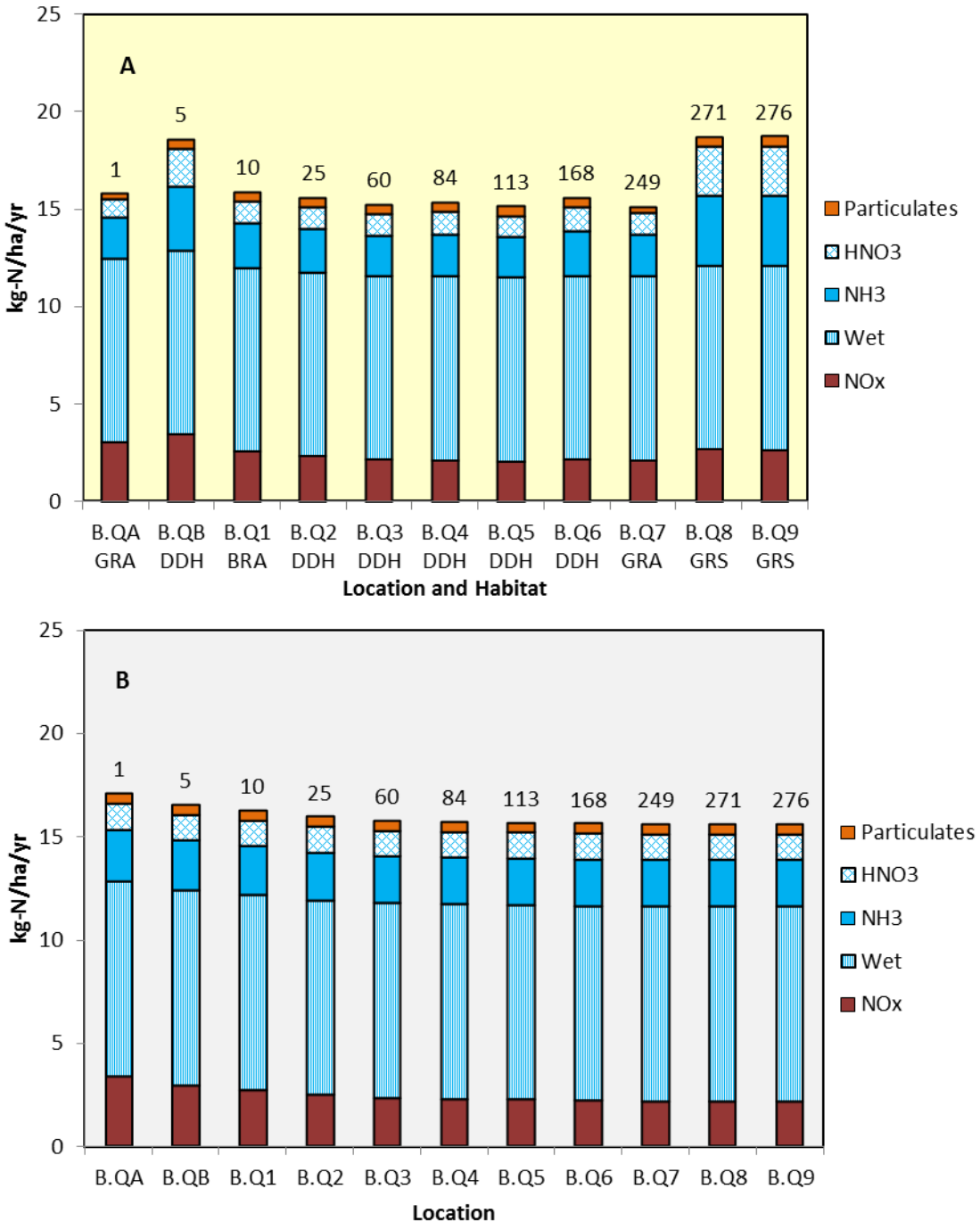


Figure 9.17: Deposition to Ecological Transect B – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column)[36]

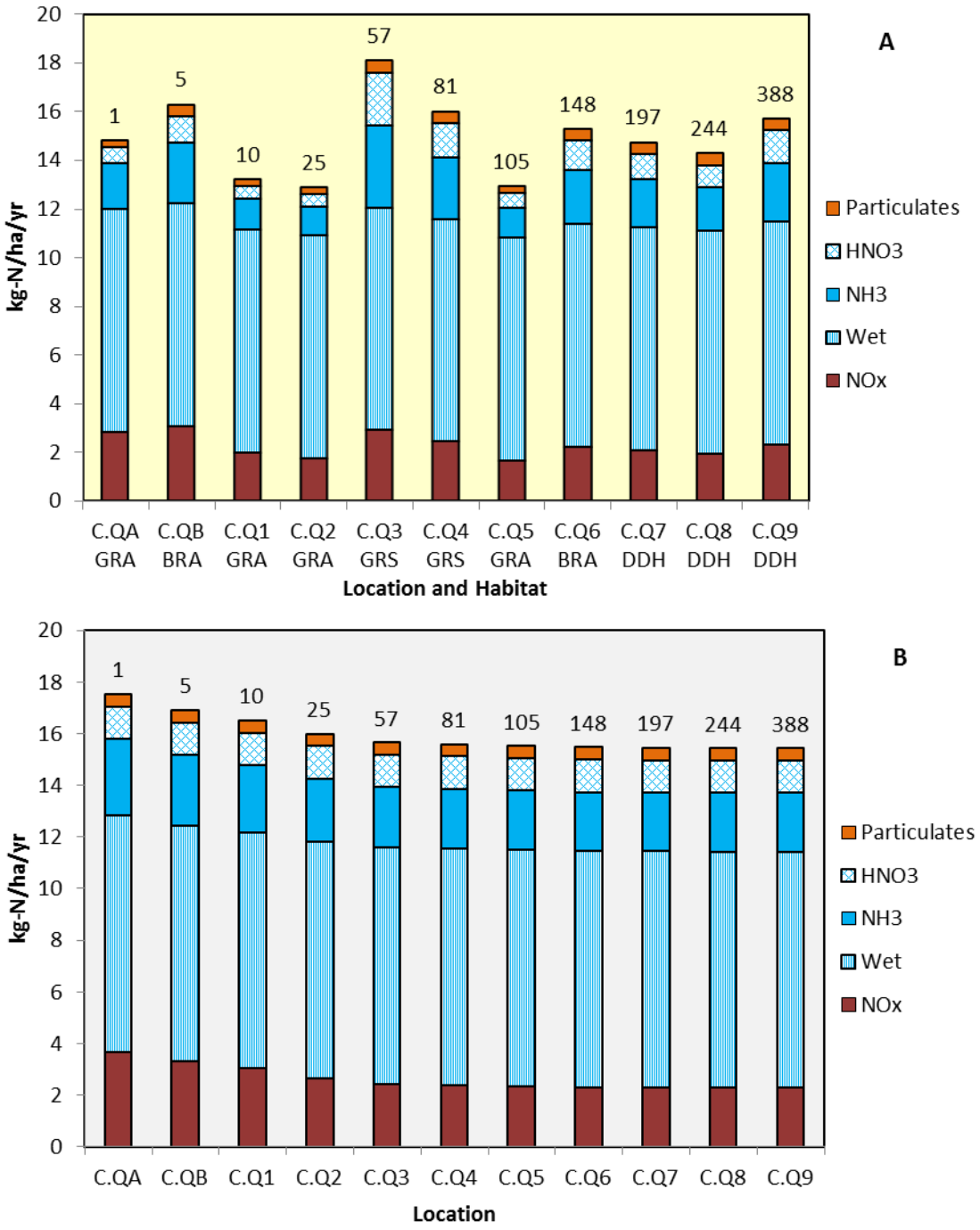


Figure 9.18: Deposition to Ecological Transect C – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

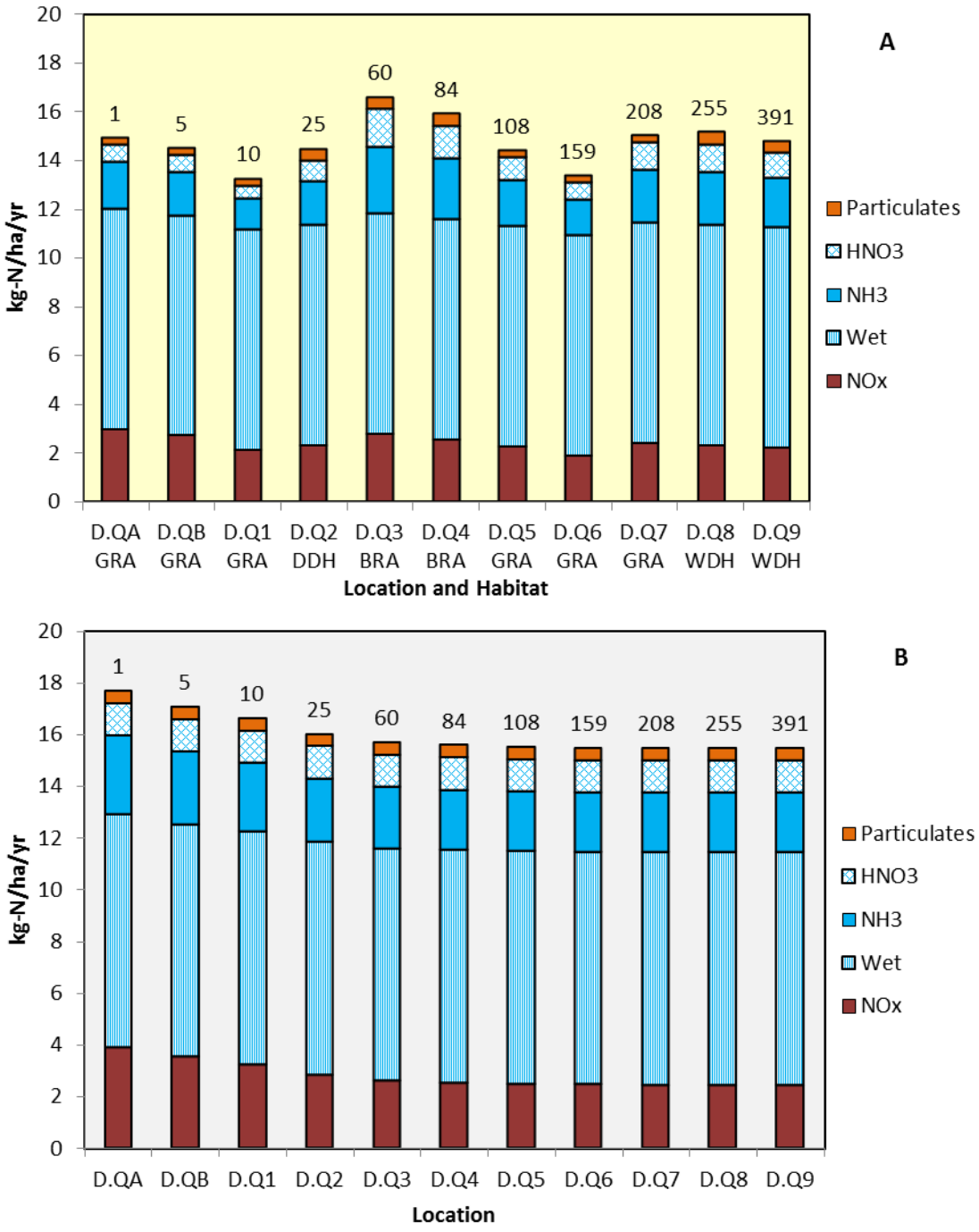


Figure 9.19: Deposition to Ecological Transect D – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

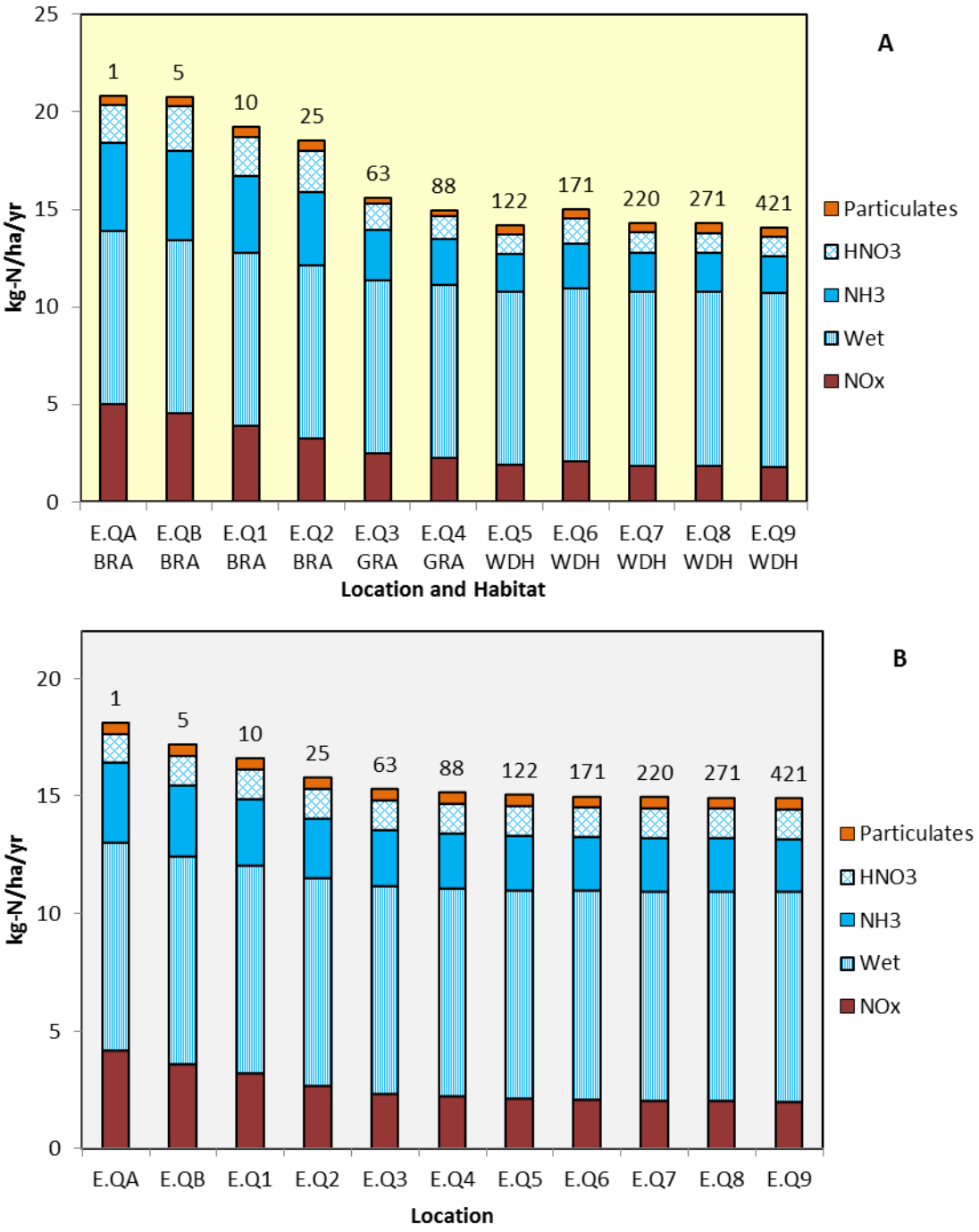


Figure 9.20: Deposition to Ecological Transect E – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

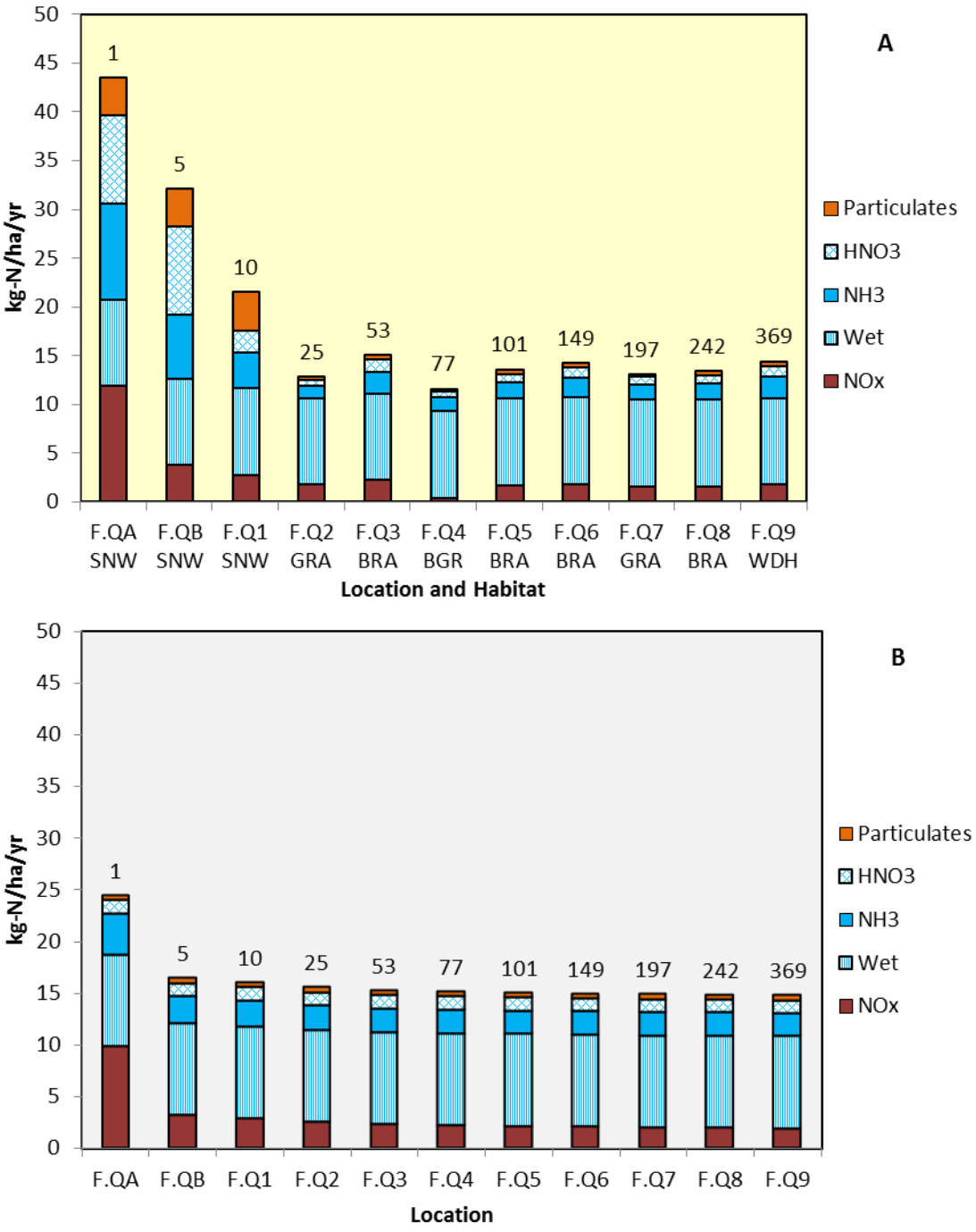


Figure 9.21: Deposition to Ecological Transect F – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36,37]

[37] Deposition of NO and NO_2 to the quadrat 1m from the road is enhanced by the elevated NO_2 and NH_3 concentrations in this area, which are themselves related to the shielding effect of trees. Thus, this figure does not entirely show the pattern that would occur without the influence of trees.

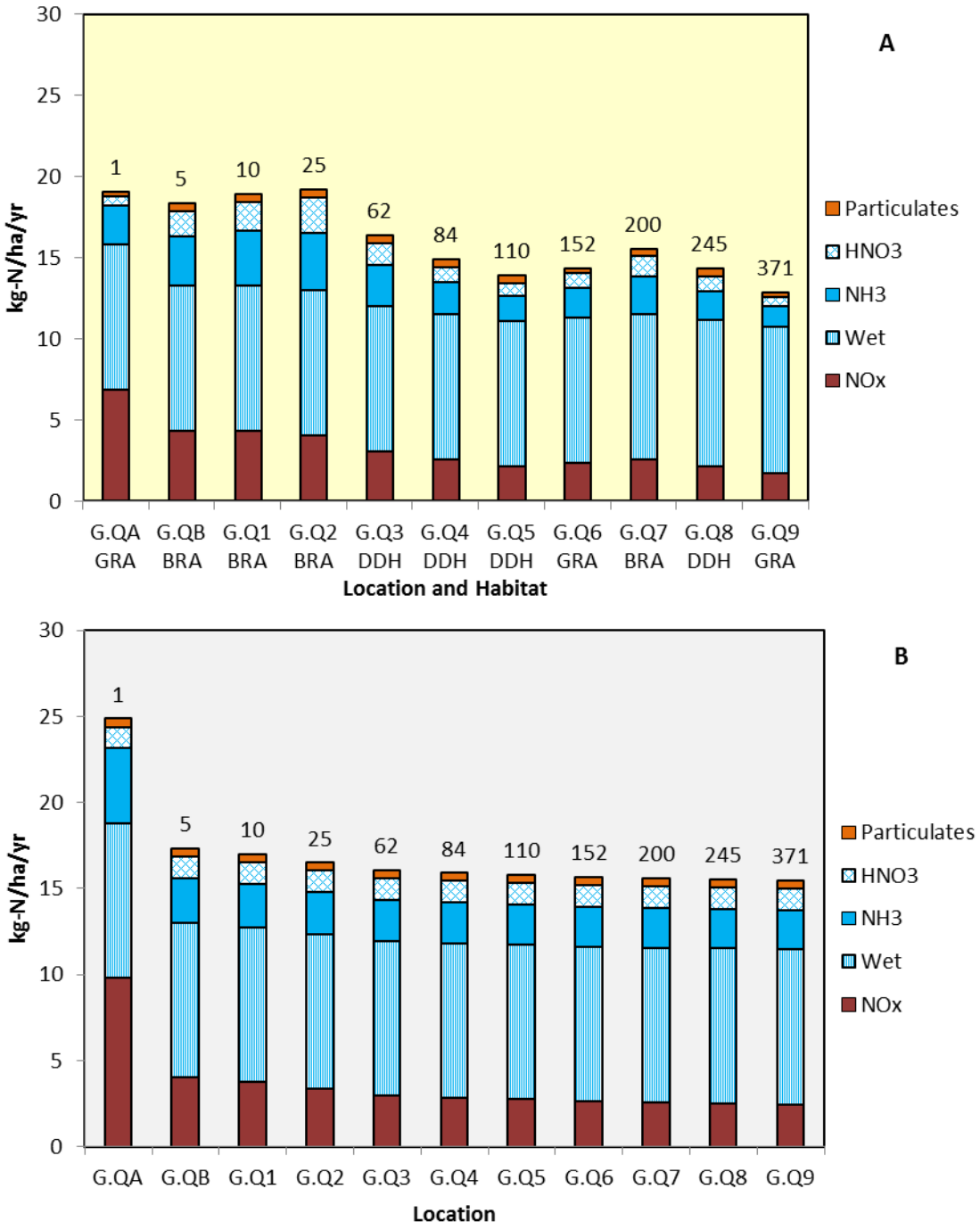


Figure 9.22: Deposition to Ecological Transect G – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

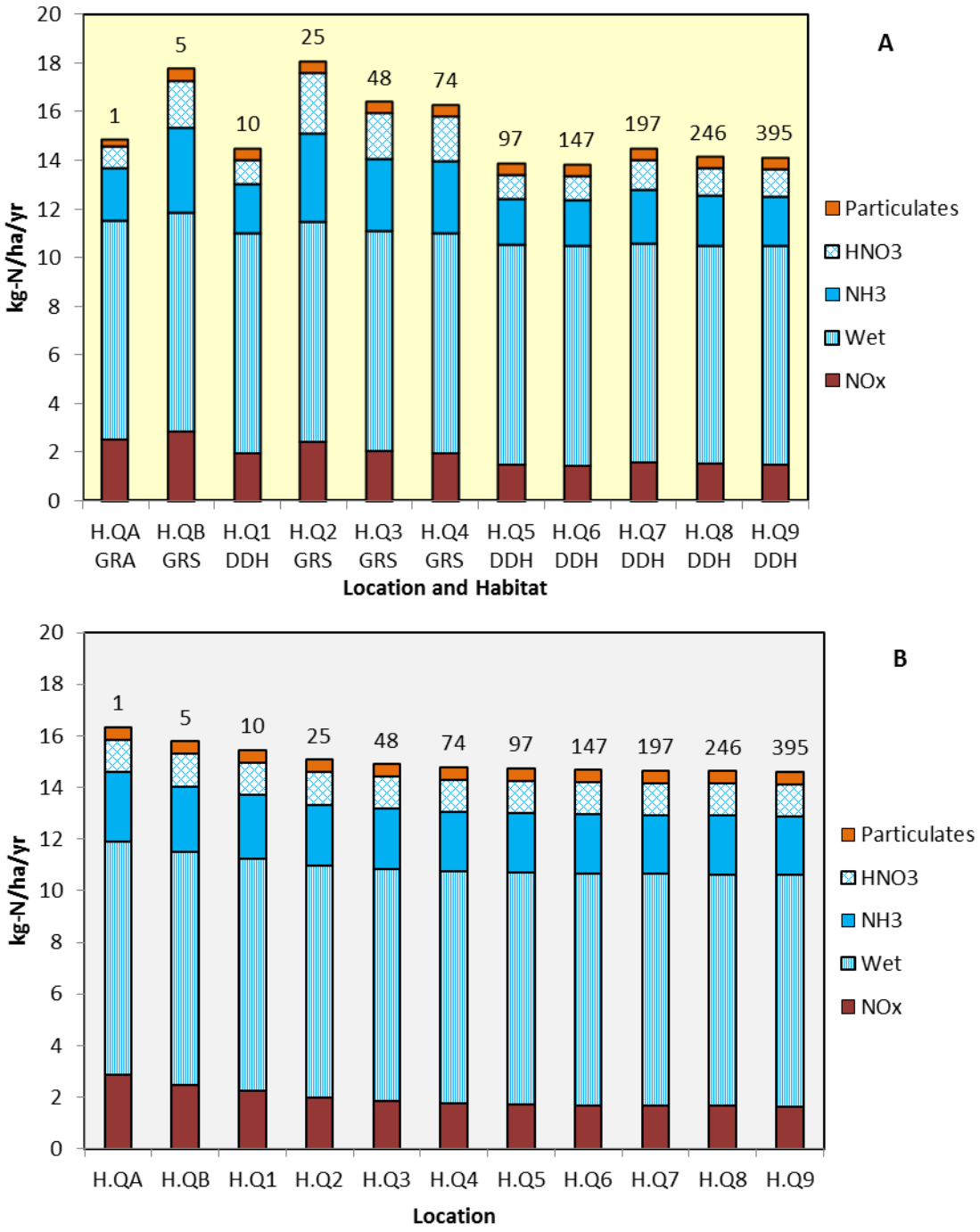


Figure 9.23: Deposition to Ecological Transect H – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

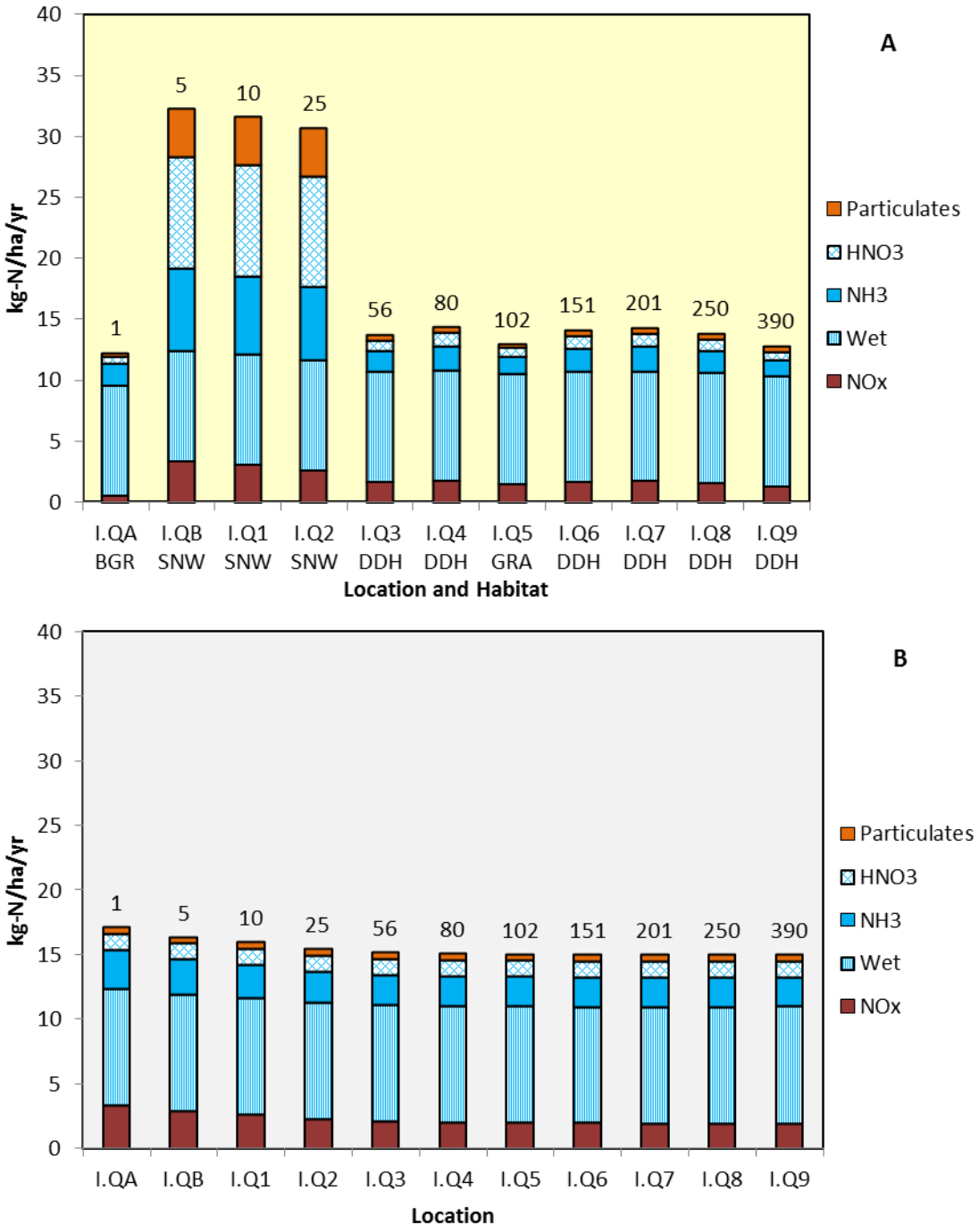


Figure 9.24: Deposition to Ecological Transect I – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

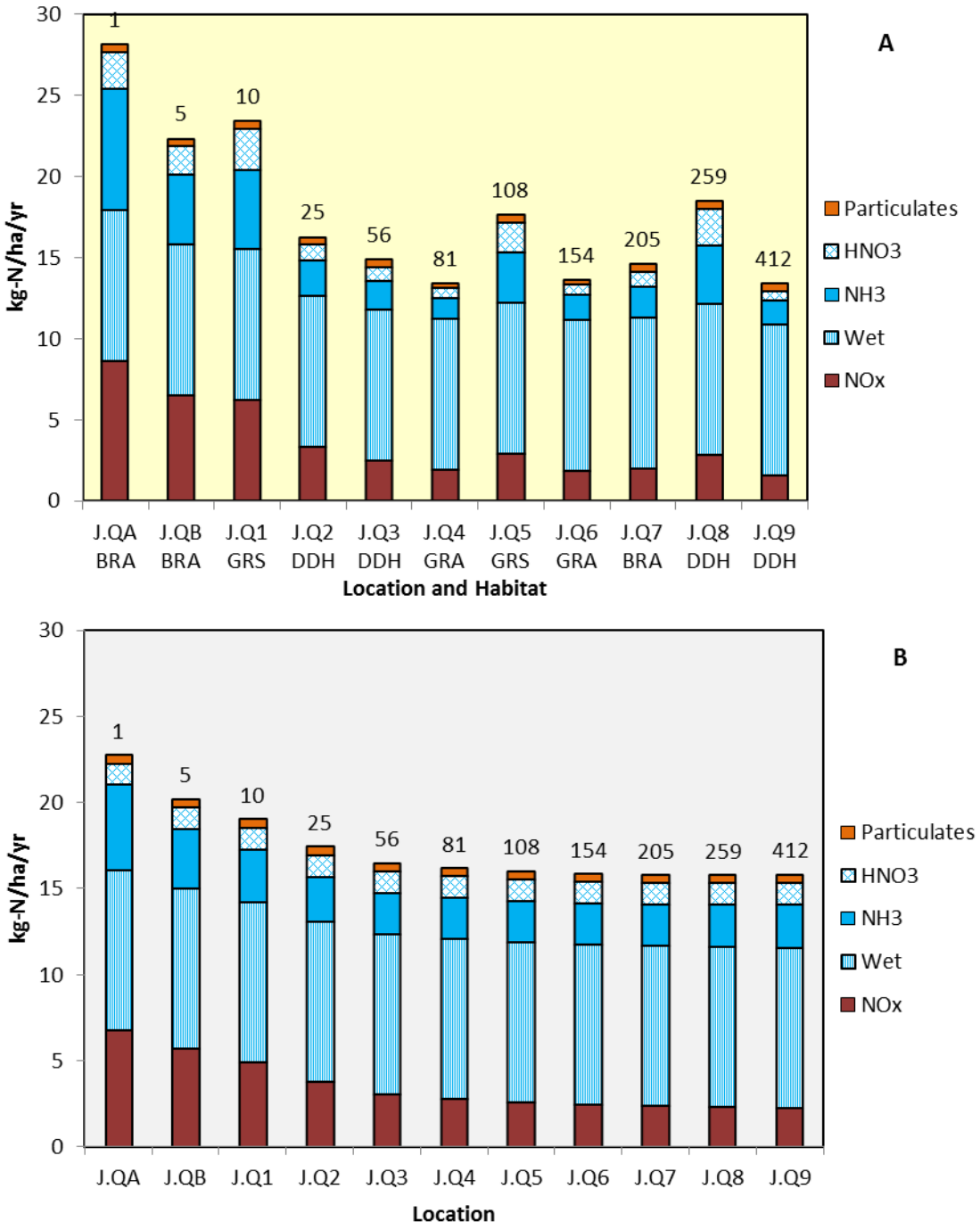


Figure 9.25: Deposition to Ecological Transect J – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column)[36]

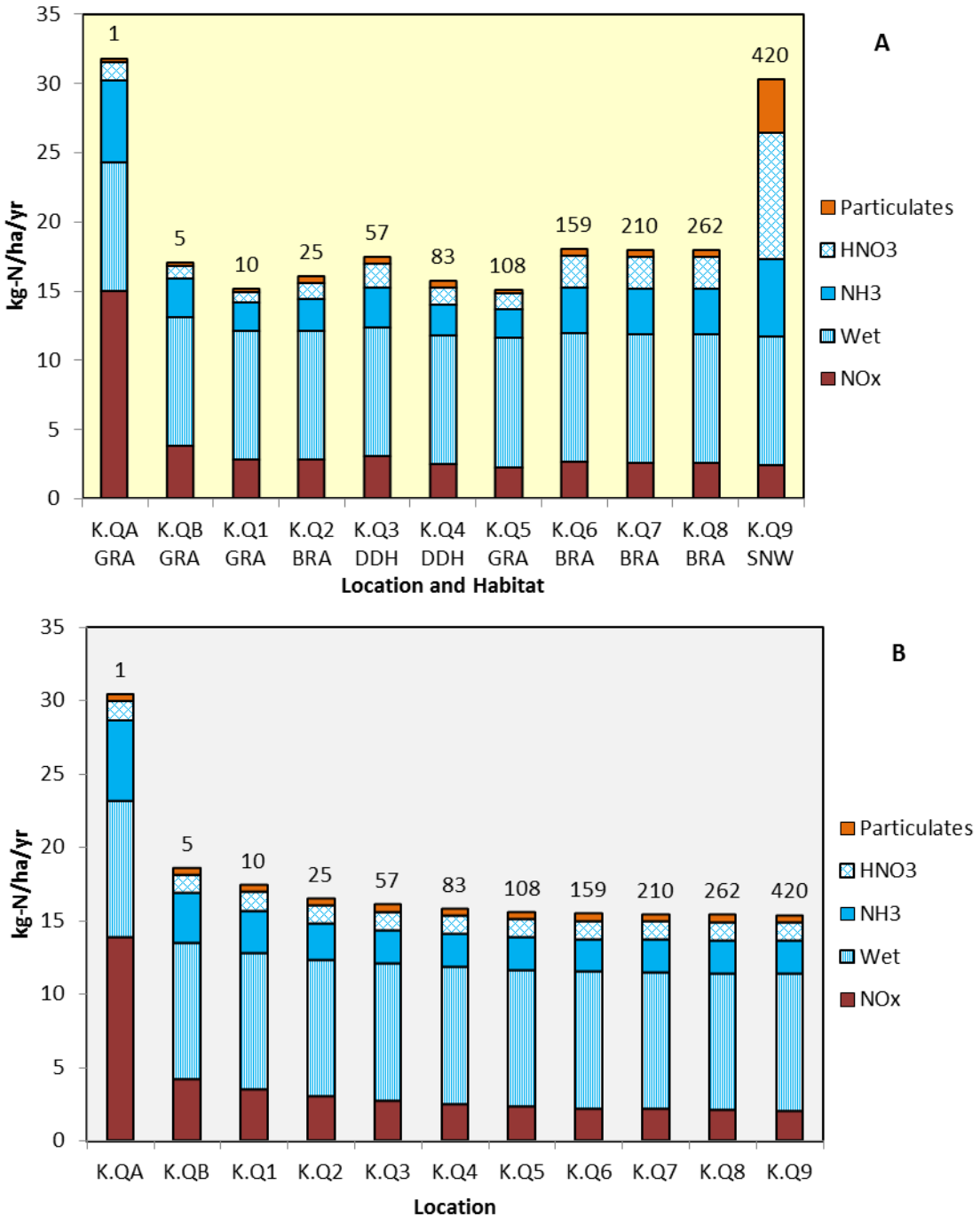


Figure 9.26: Deposition to Ecological Transect K – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

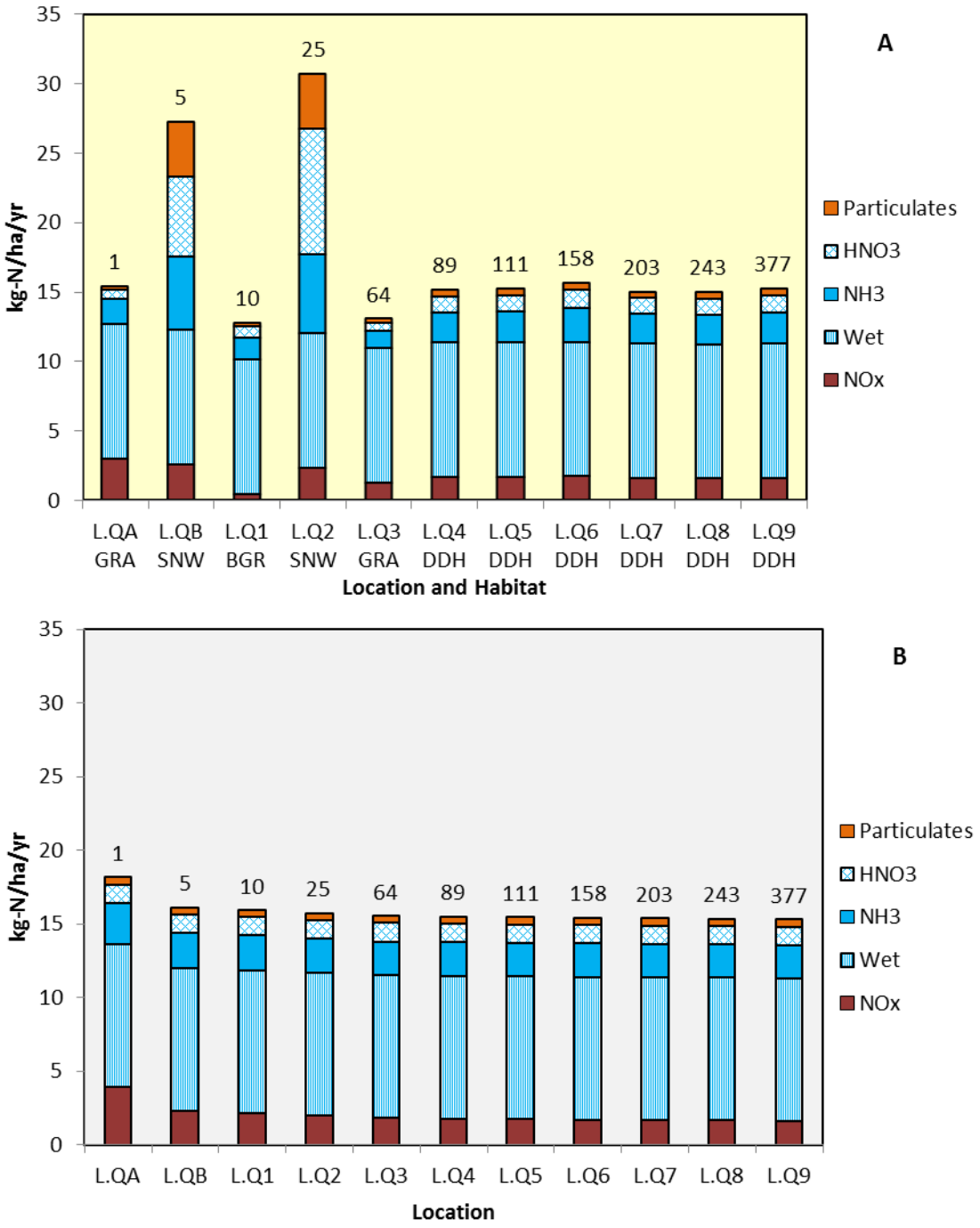


Figure 9.27: Deposition to Ecological Transect L – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

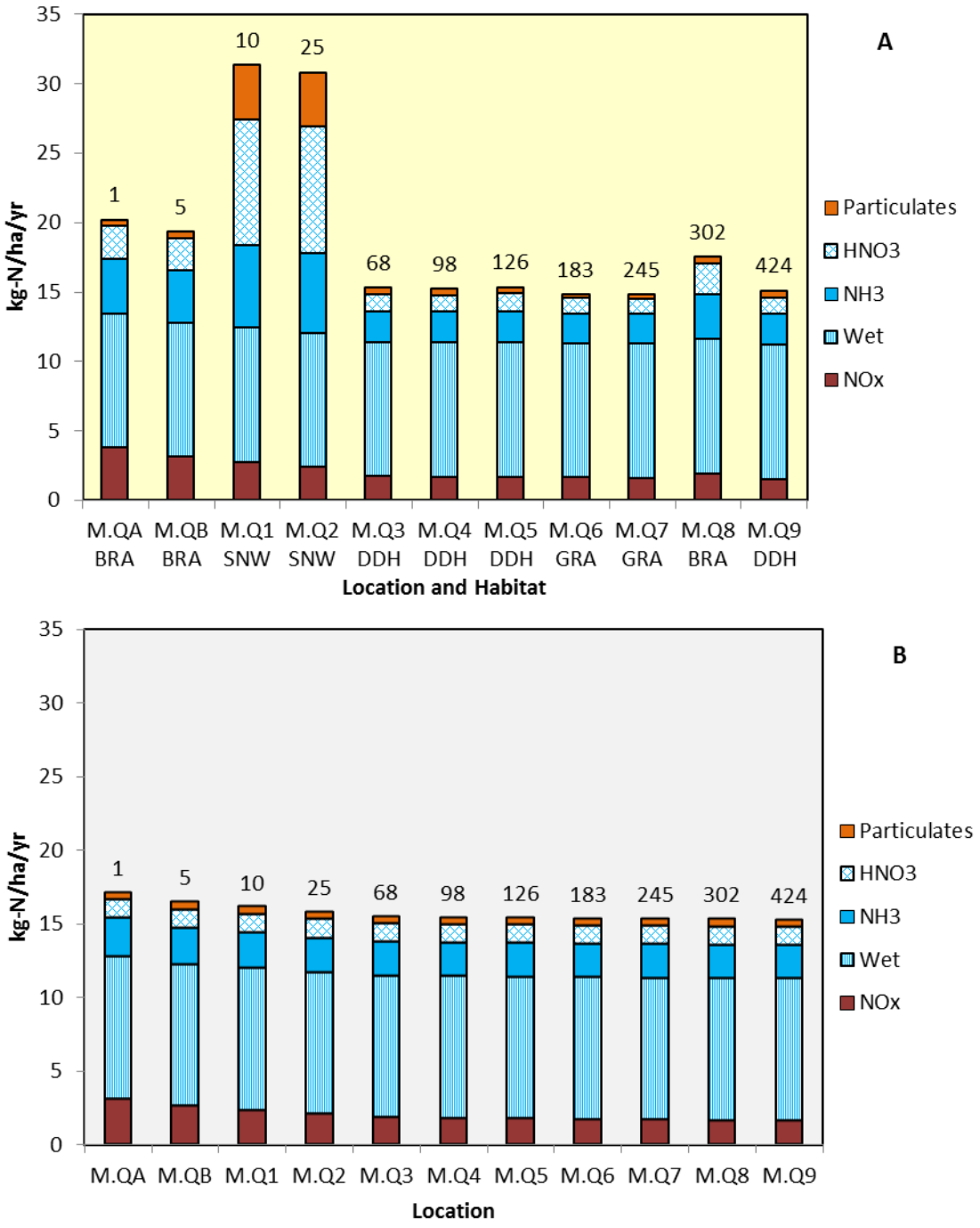


Figure 9.28: Deposition to Ecological Transect M – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

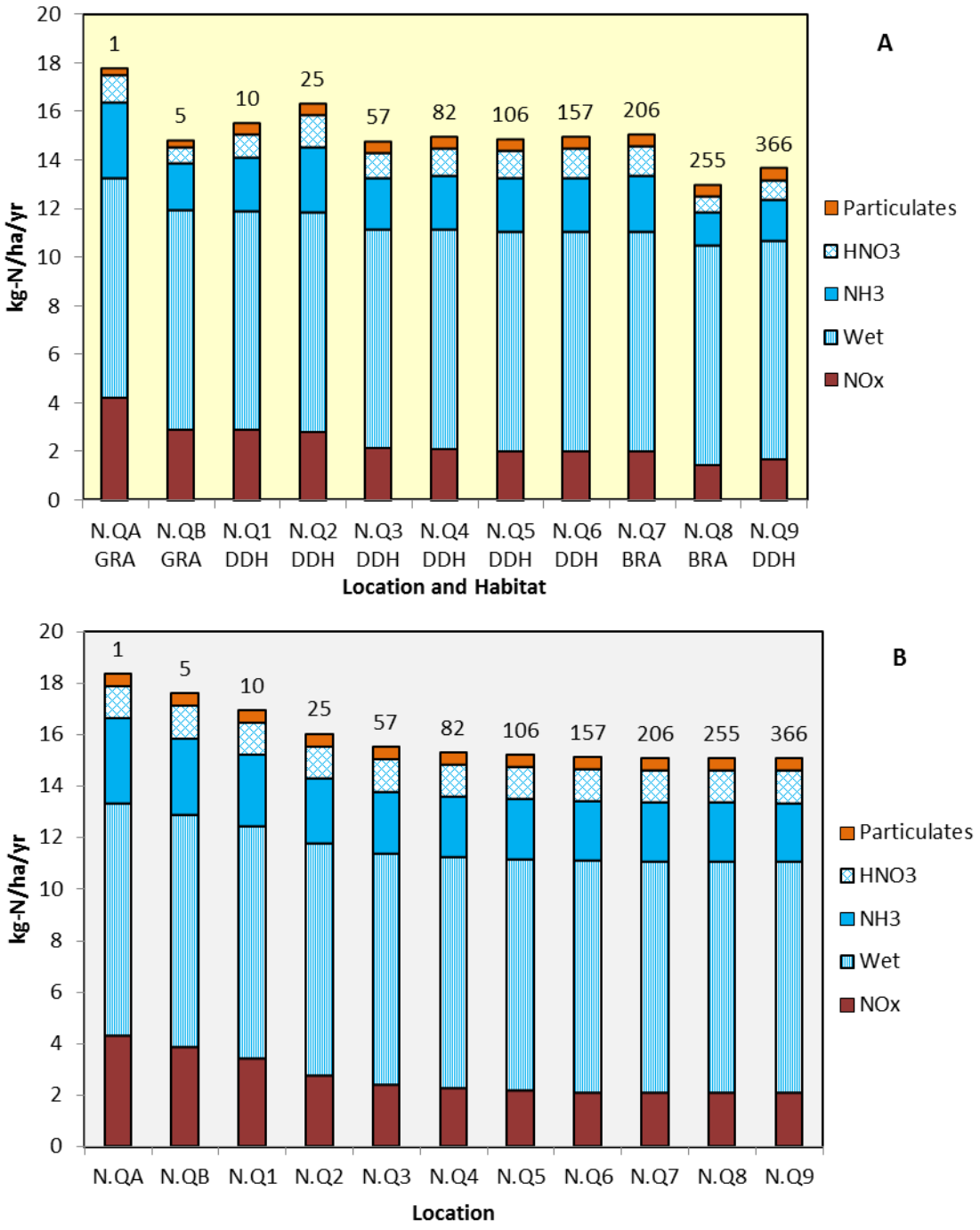


Figure 9.29: Deposition to Ecological Transect N – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

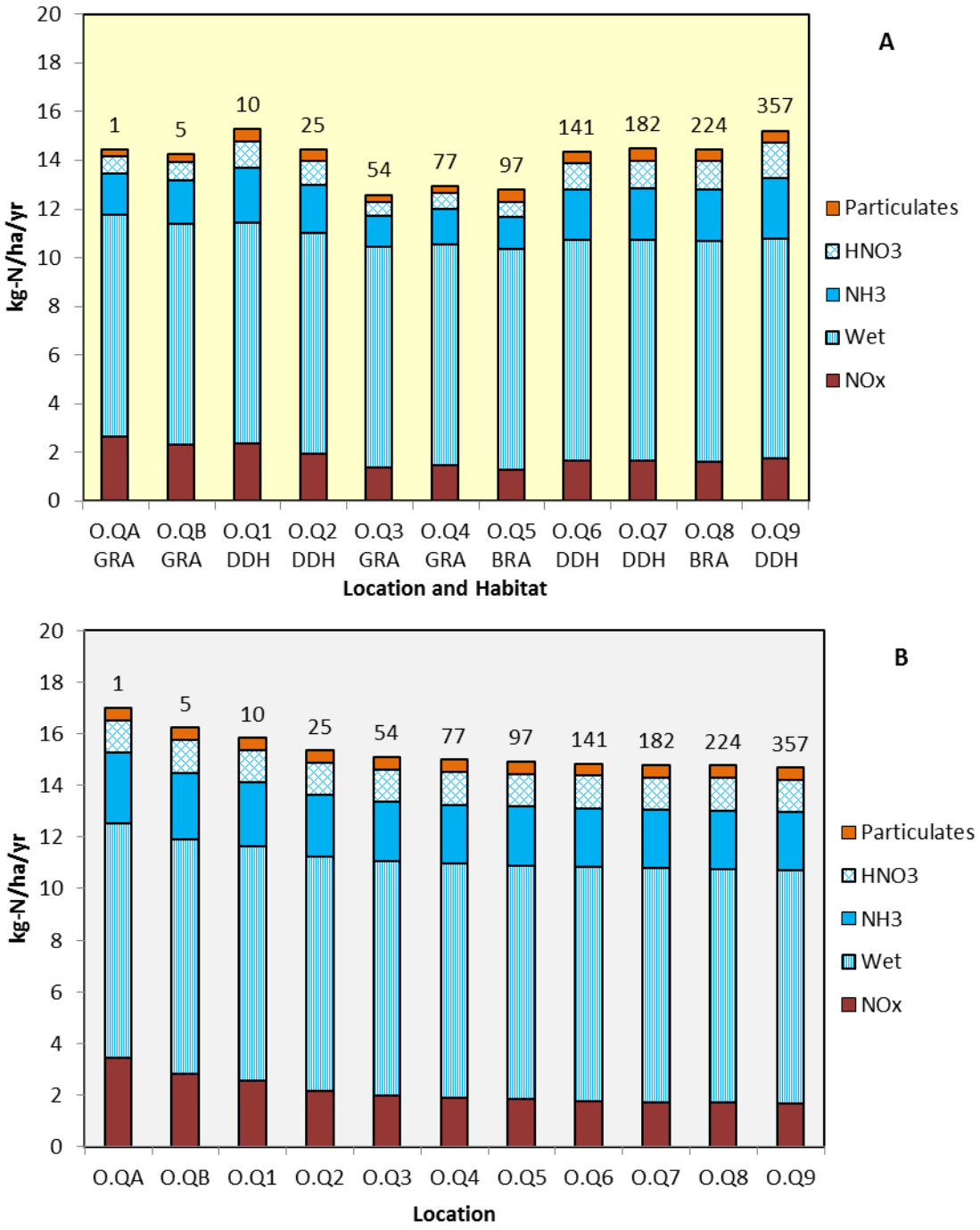


Figure 9.30: Deposition to Ecological Transect O – EA Method – A Using Current Habitat Types and B If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

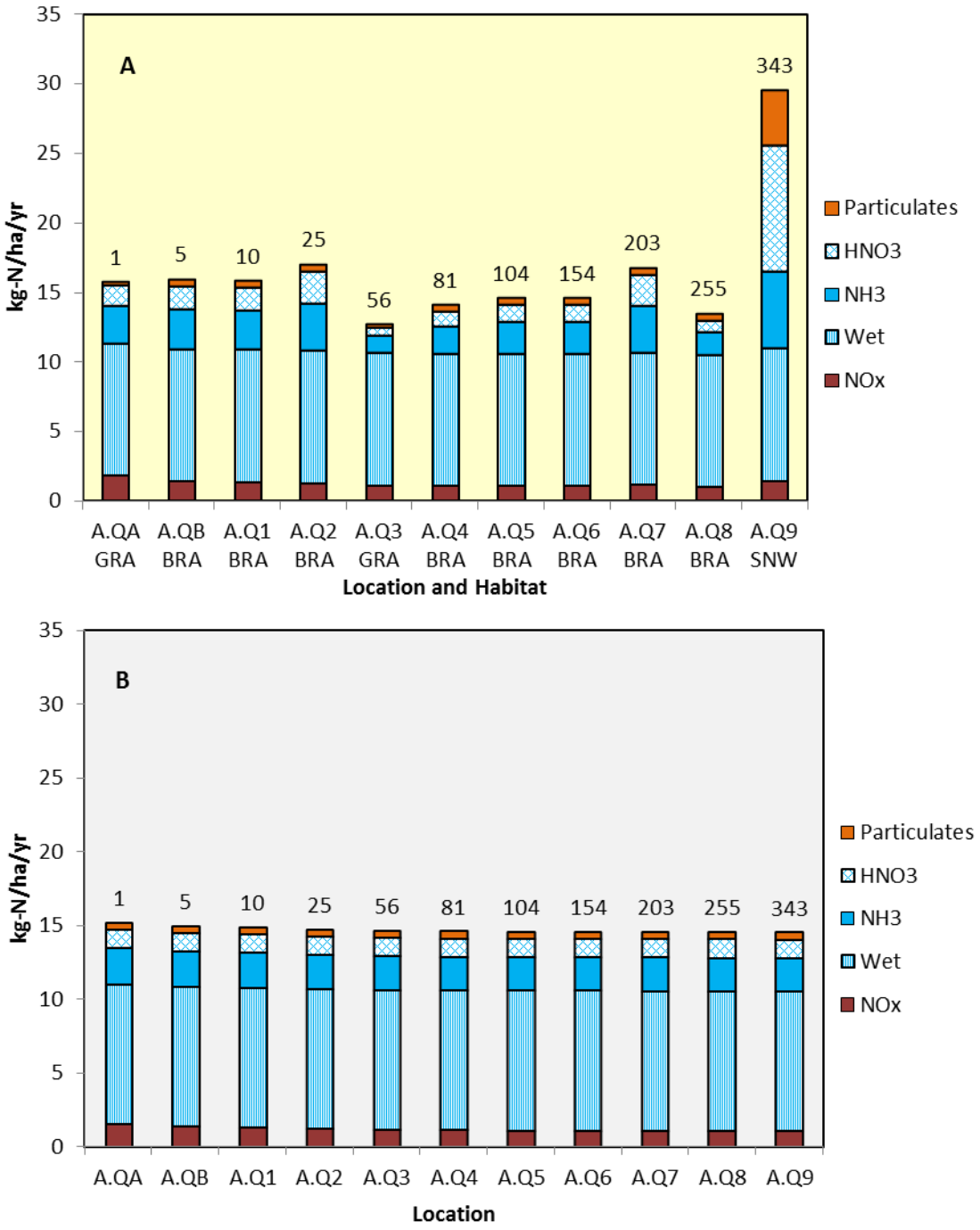


Figure 9.31: Deposition to Ecological Transect A – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column)[36]

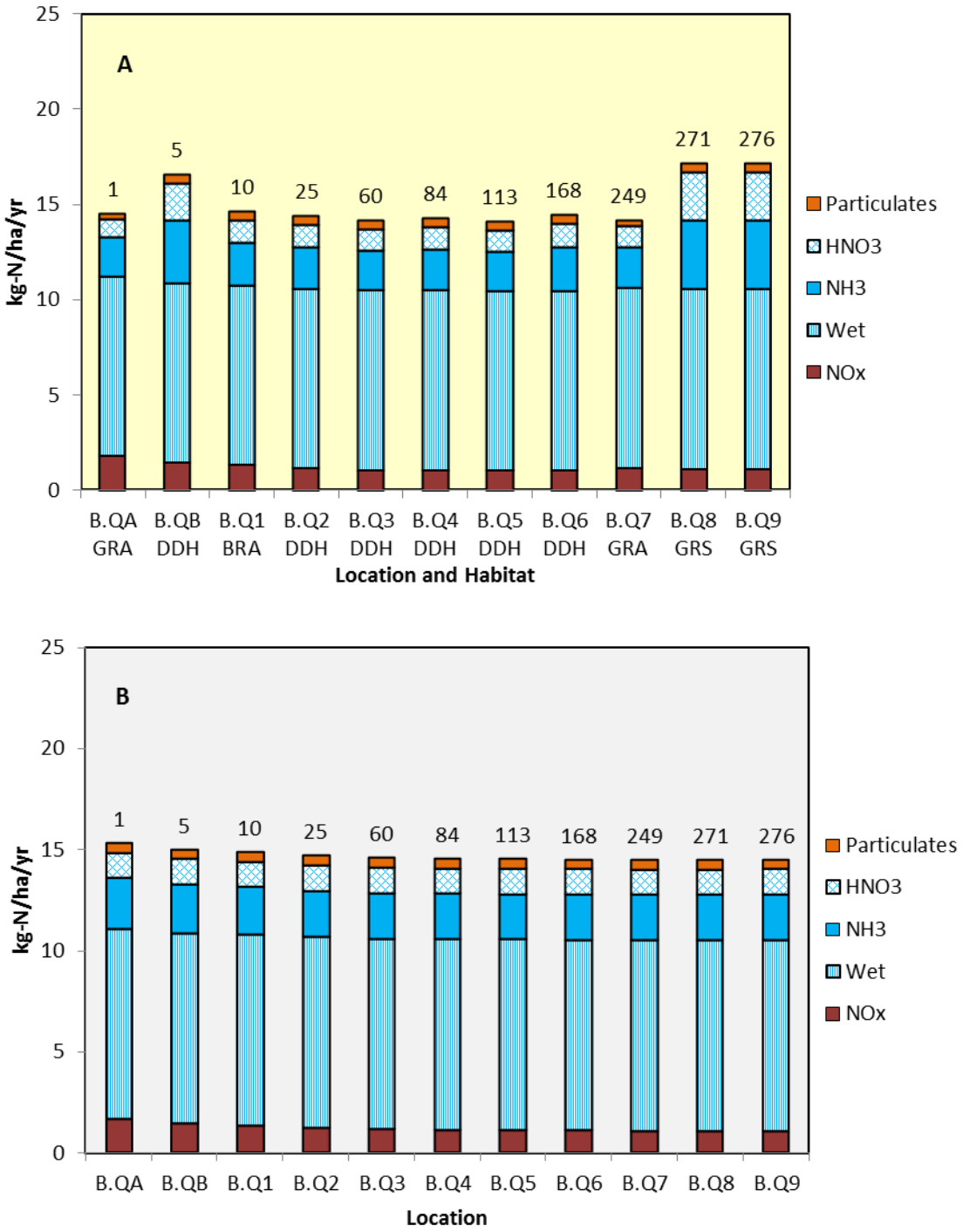


Figure 9.32: Deposition to Ecological Transect B – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column)[36]

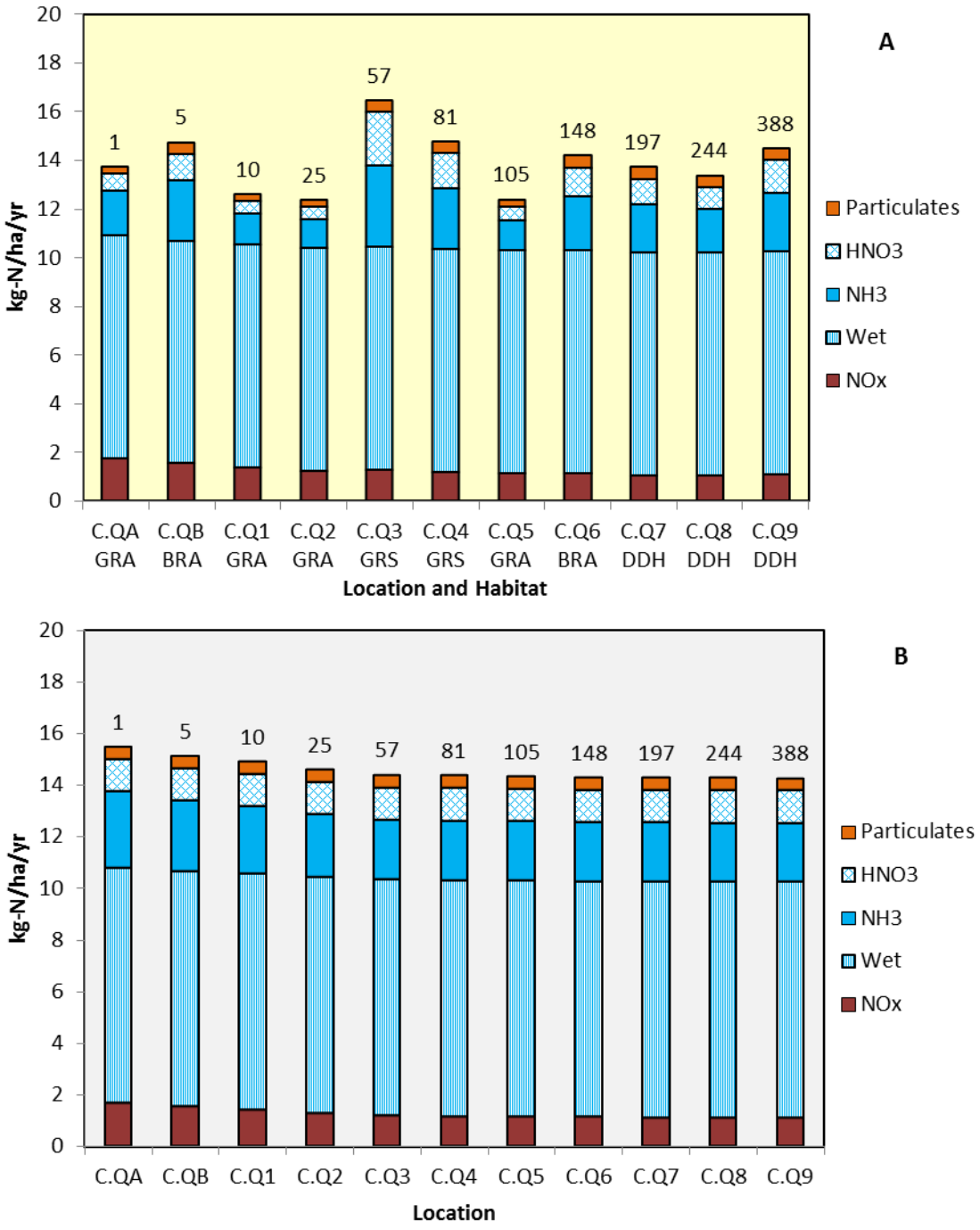


Figure 9.33: Deposition to Ecological Transect C – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

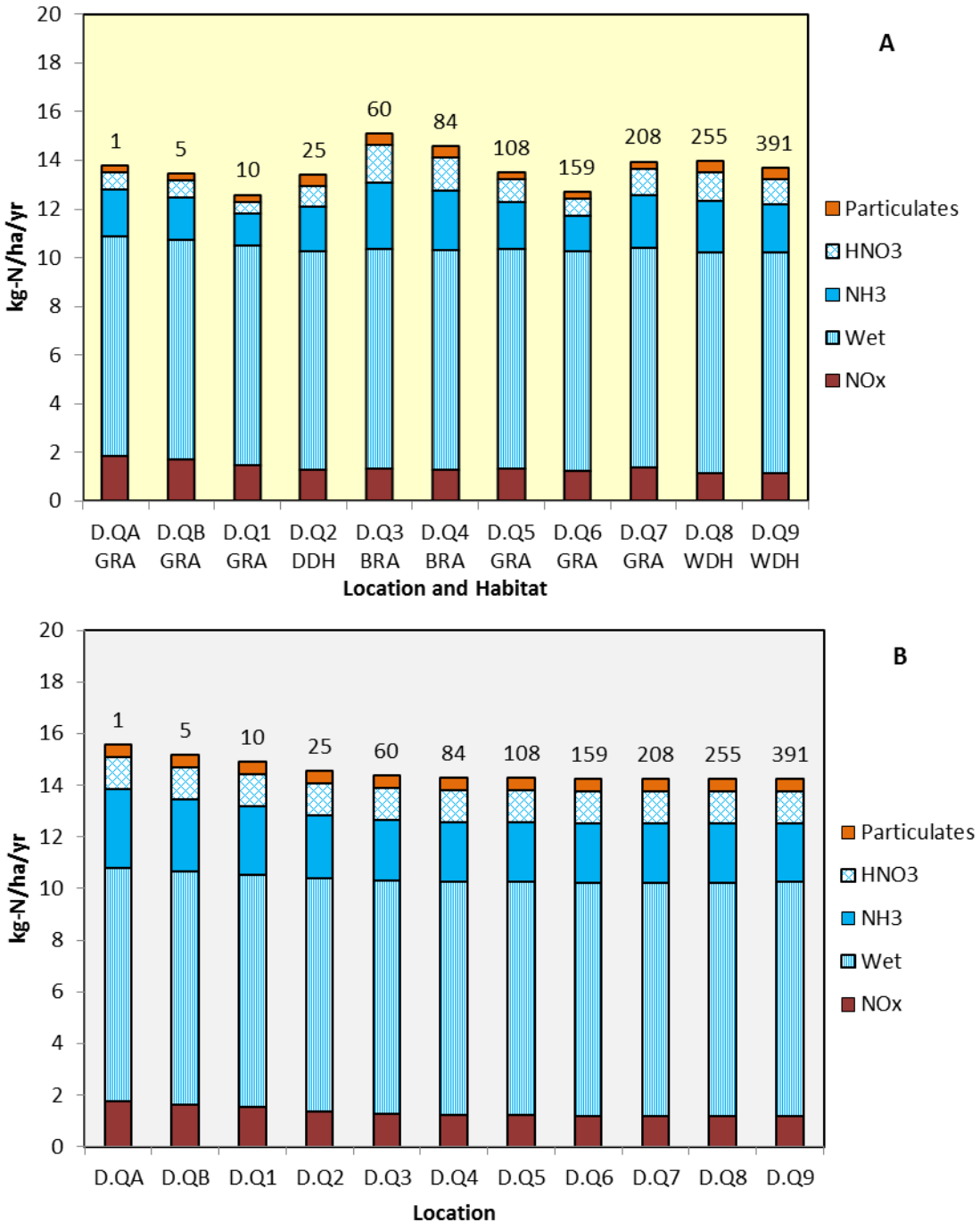


Figure 9.34: Deposition to Ecological Transect D – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

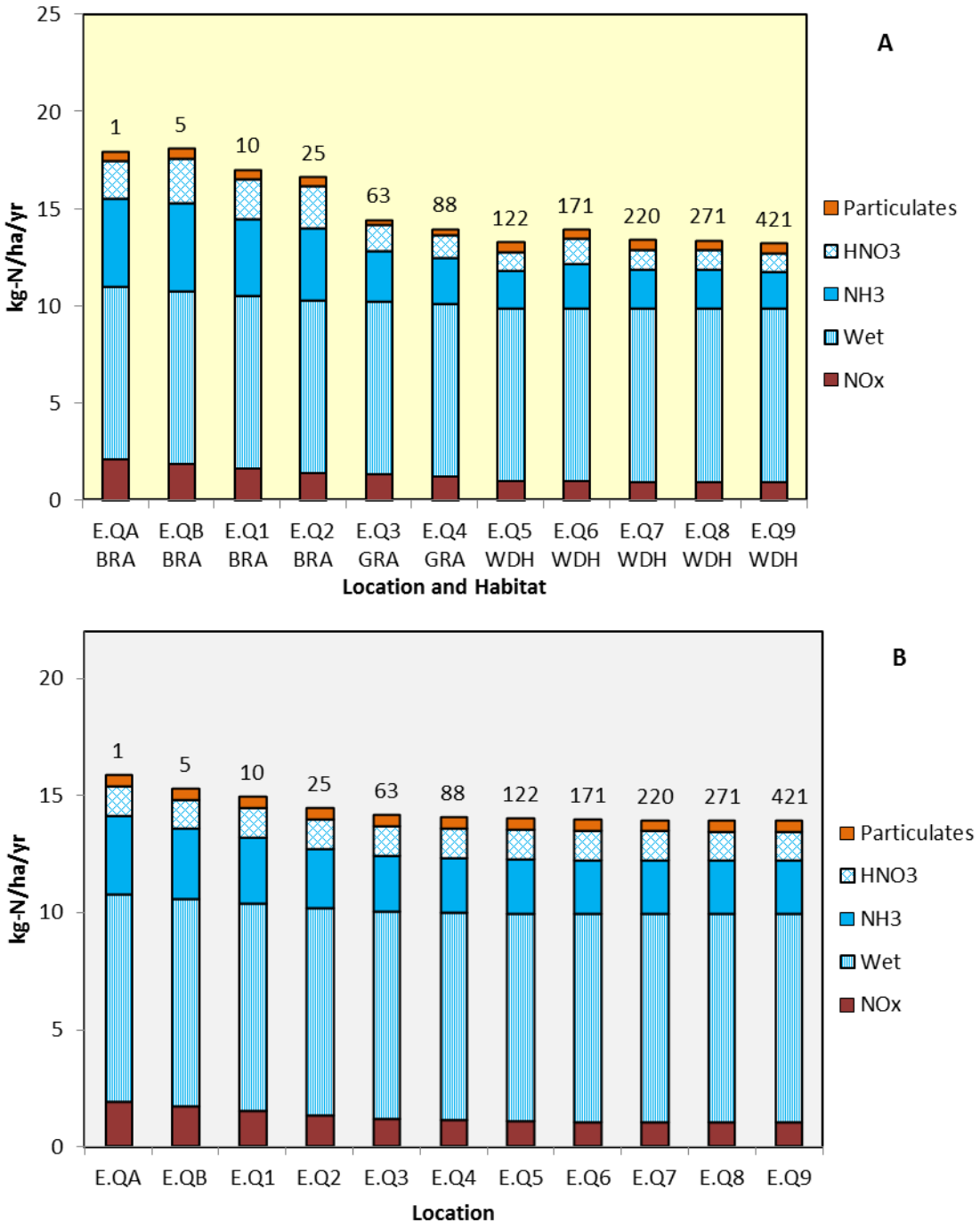


Figure 9.35: Deposition to Ecological Transect E – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

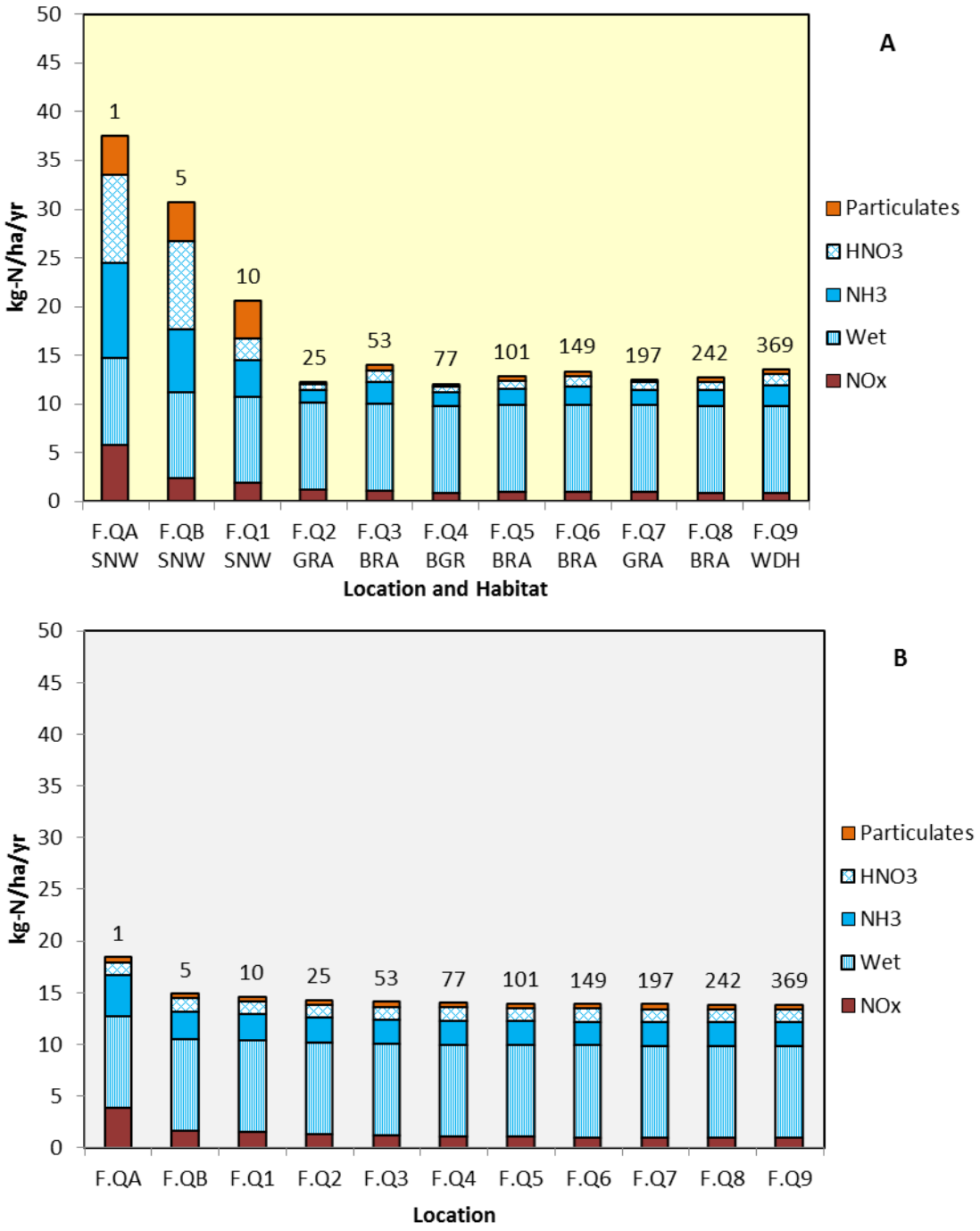


Figure 9.36: Deposition to Ecological Transect F – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36,38]

[38] Deposition of NO and NO_2 to the quadrat 1m from the road is enhanced by the elevated NO_2 and NH_3 concentrations in this area, which are themselves related to the shielding effect of trees. Thus, this figure does not entirely show the pattern that would occur without the influence of trees.

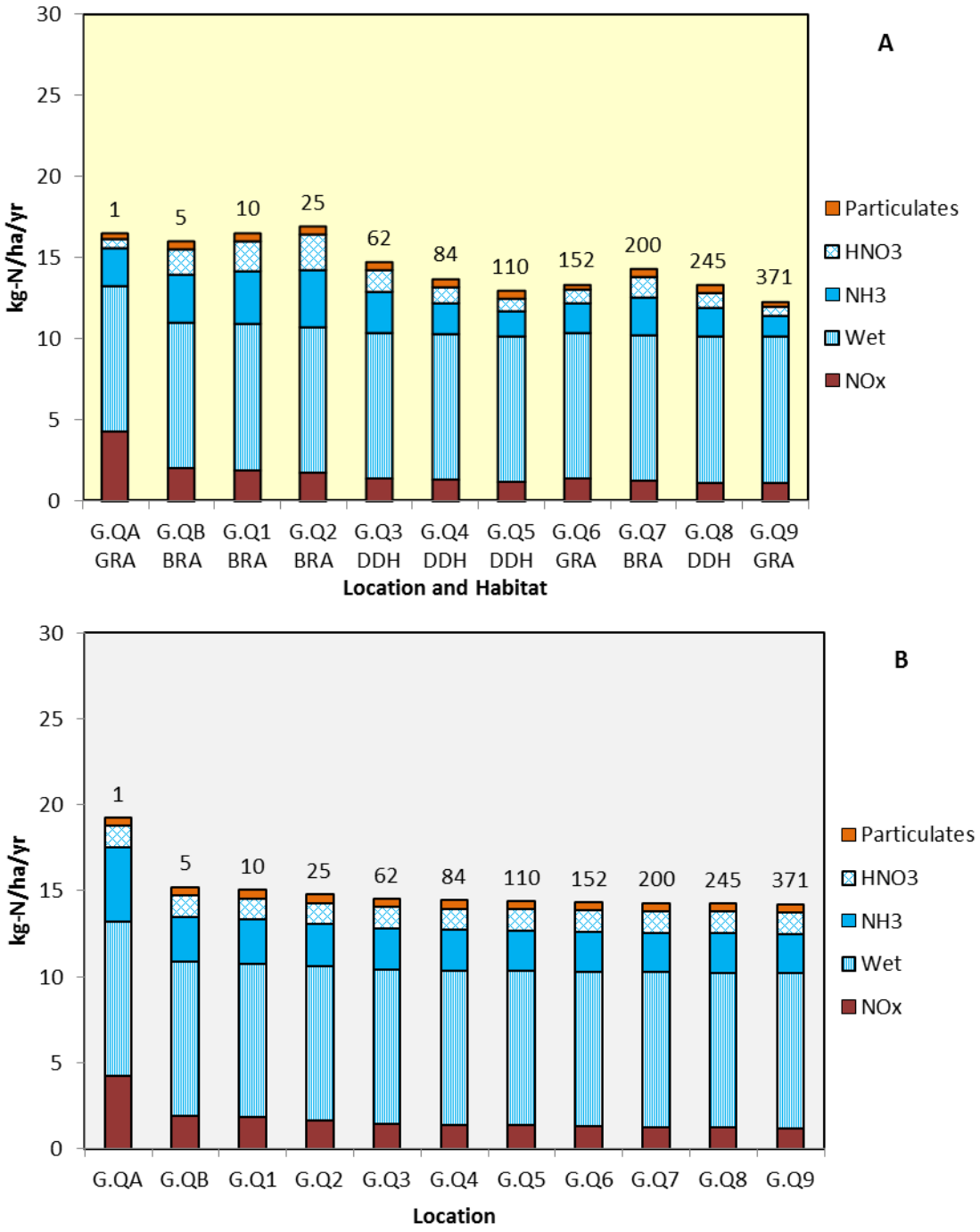


Figure 9.37: Deposition to Ecological Transect G – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

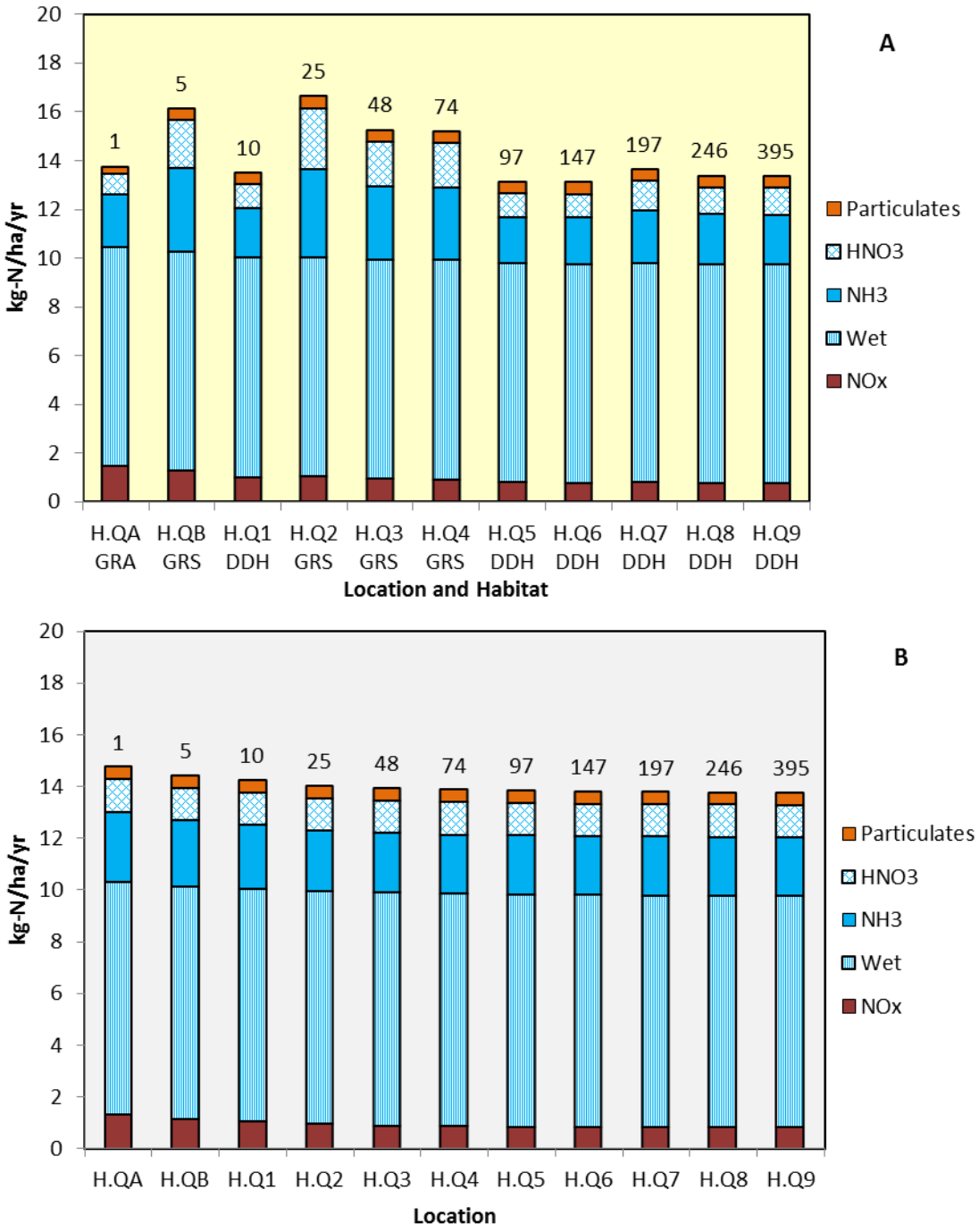


Figure 9.38: Deposition to Ecological Transect H – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

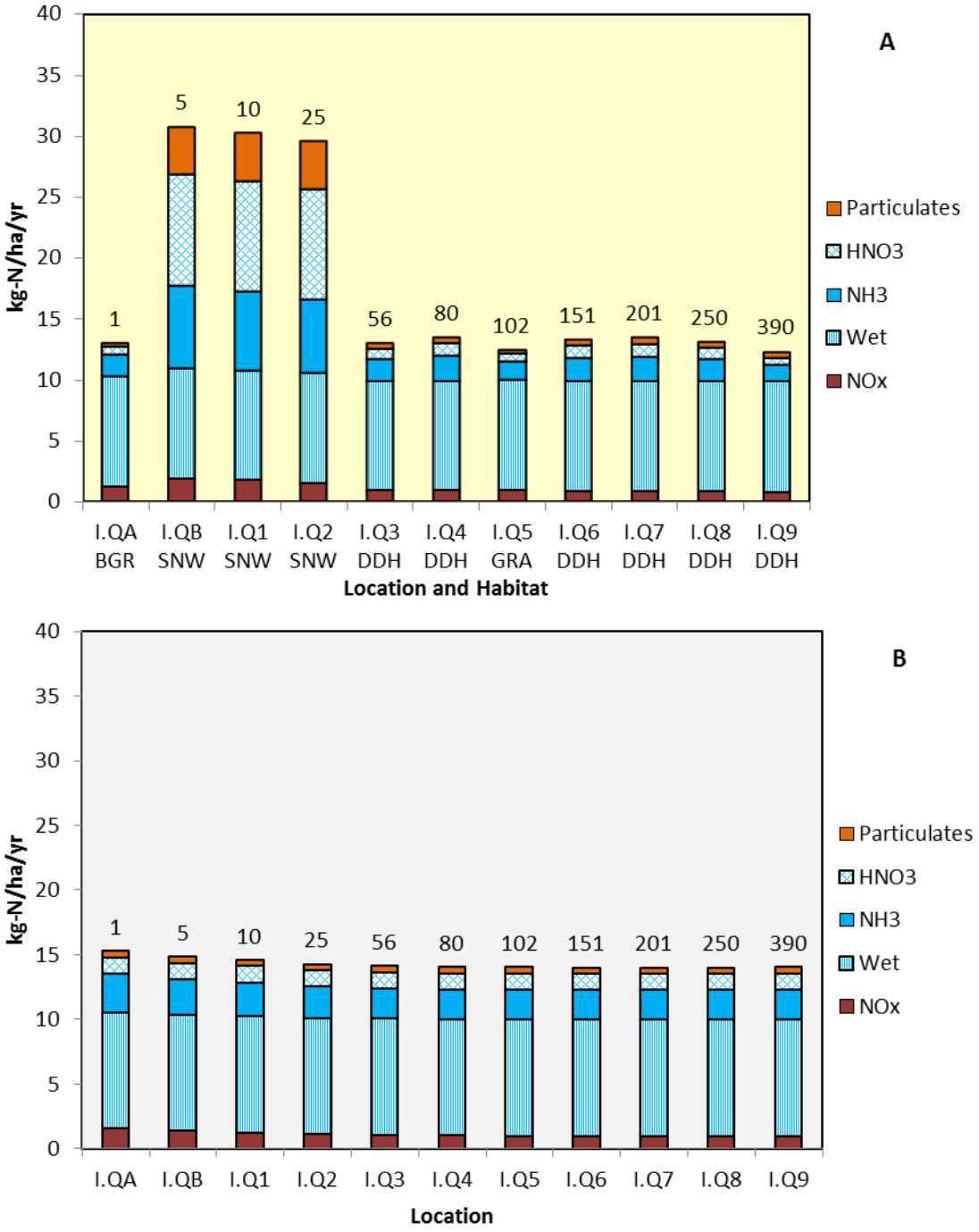


Figure 9.39: Deposition to Ecological Transect I – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

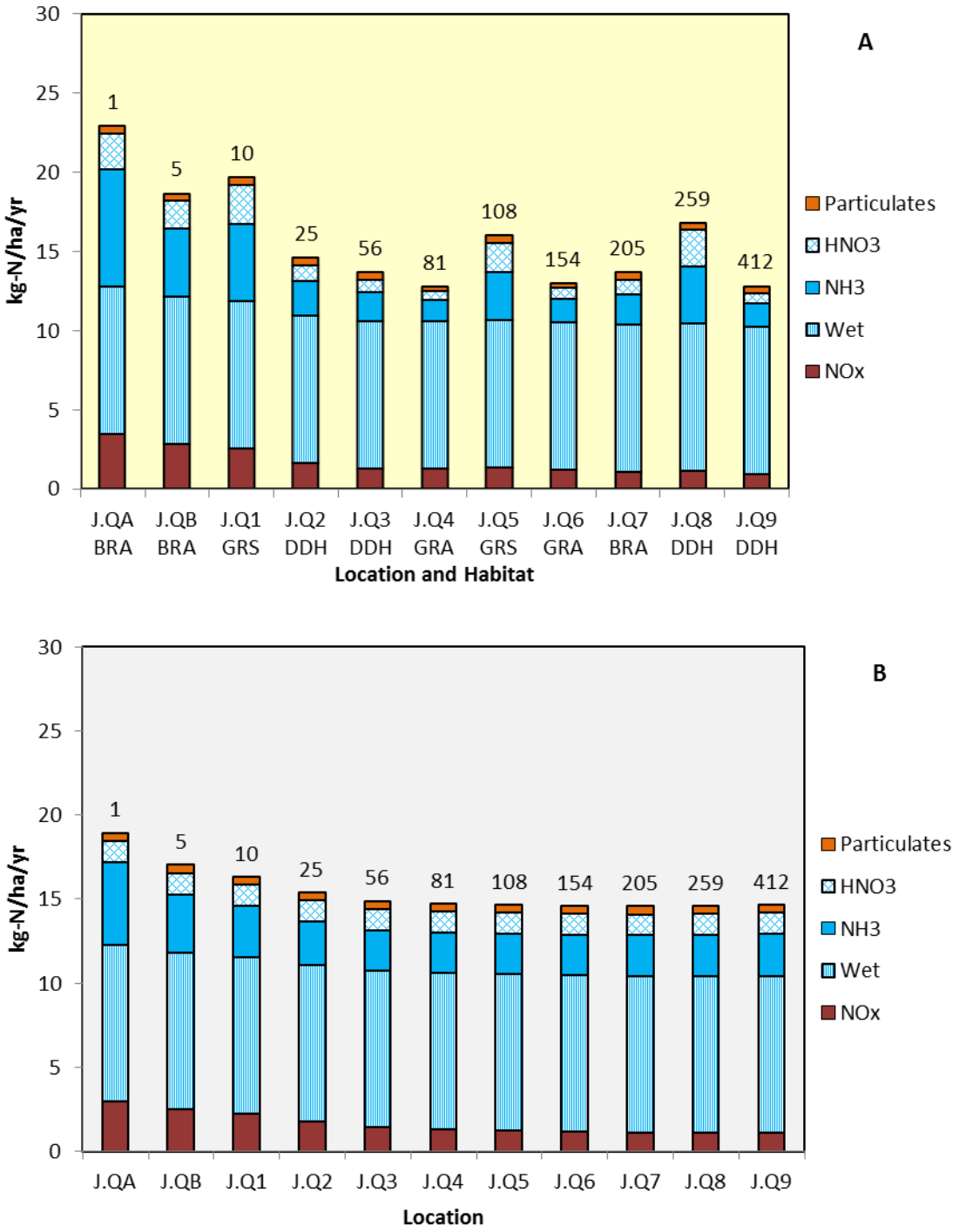


Figure 9.40: Deposition to Ecological Transect J – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column)[36]

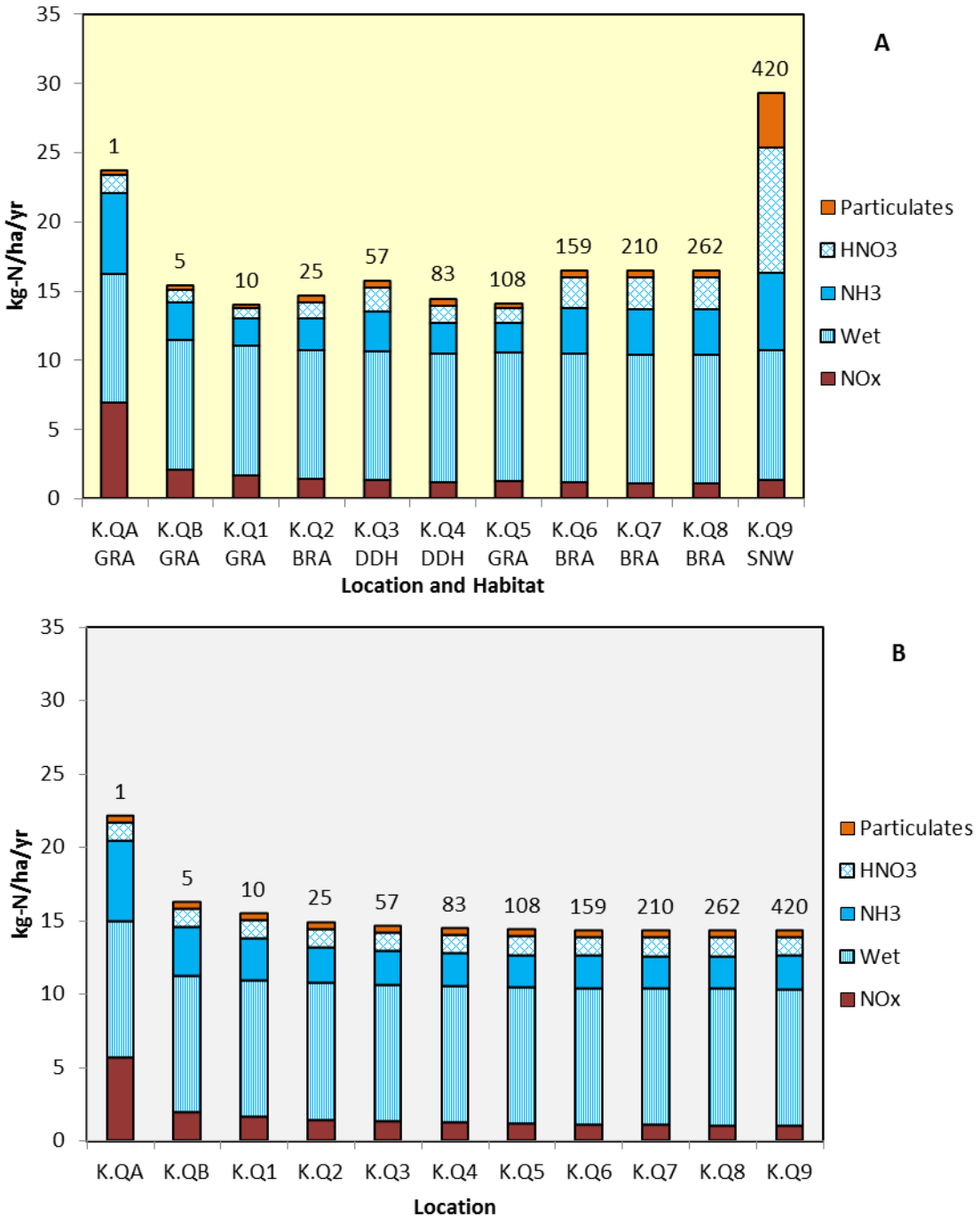


Figure 9.41: Deposition to Ecological Transect K – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

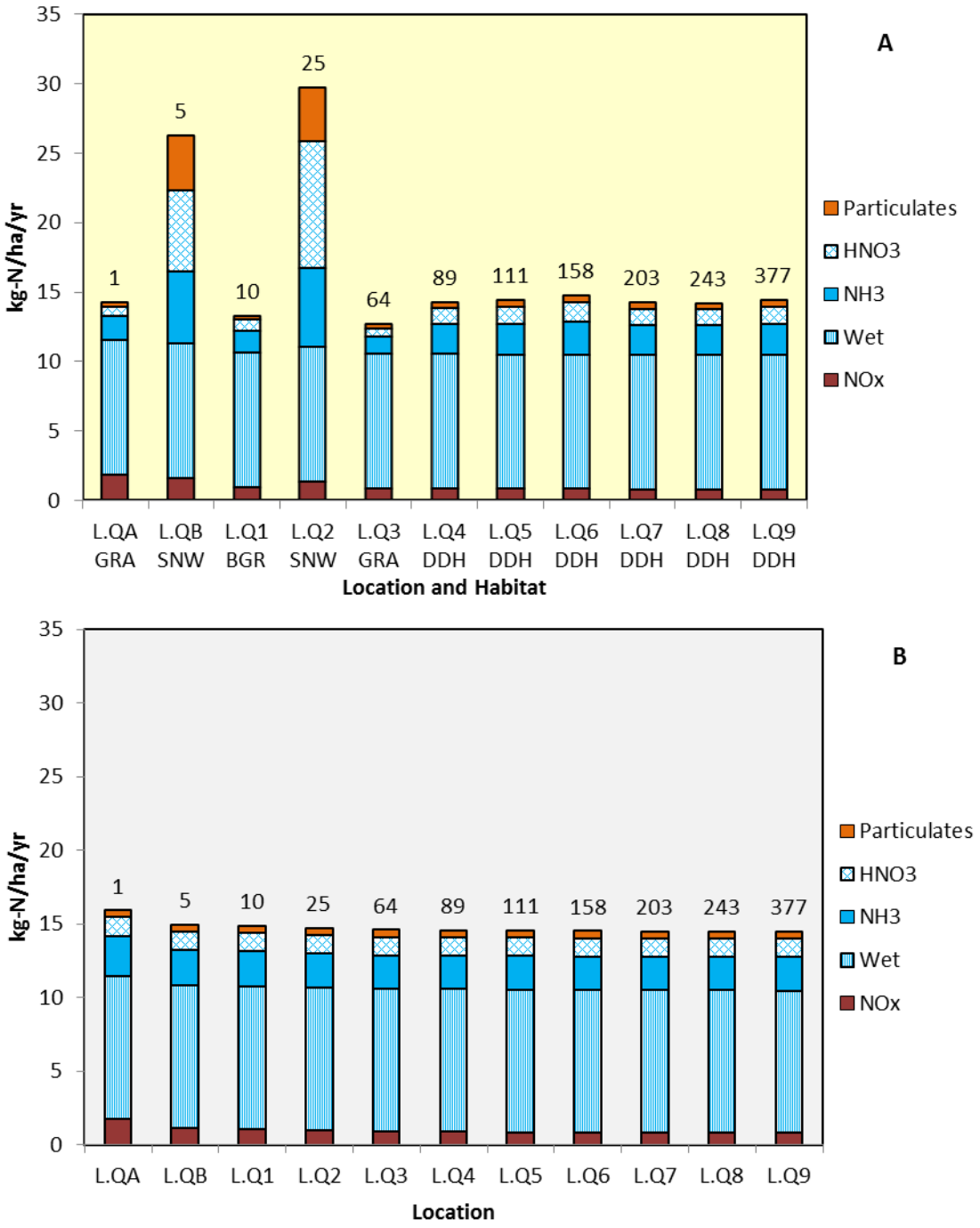


Figure 9.42: Deposition to Ecological Transect L – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

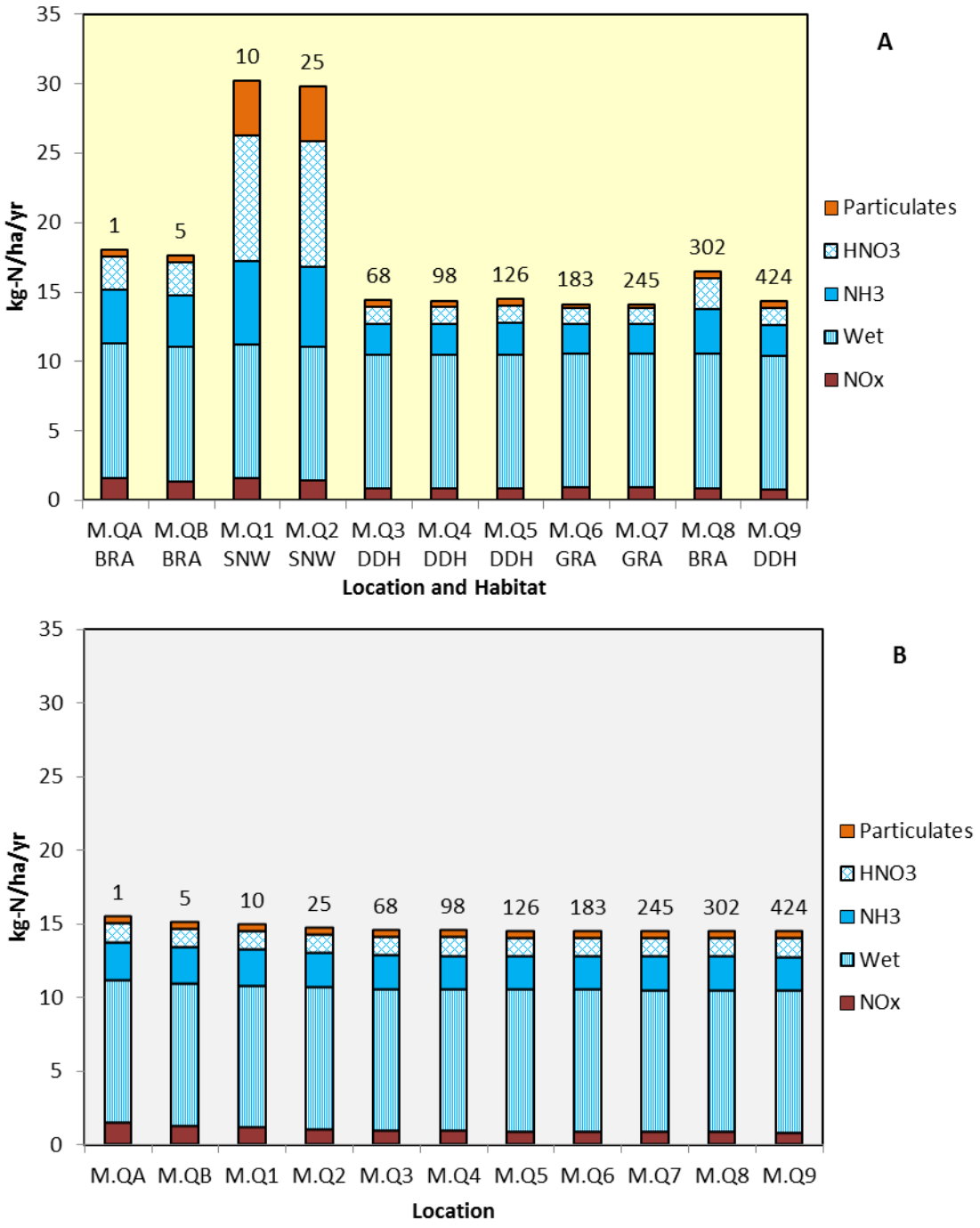


Figure 9.43: Deposition to Ecological Transect M – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

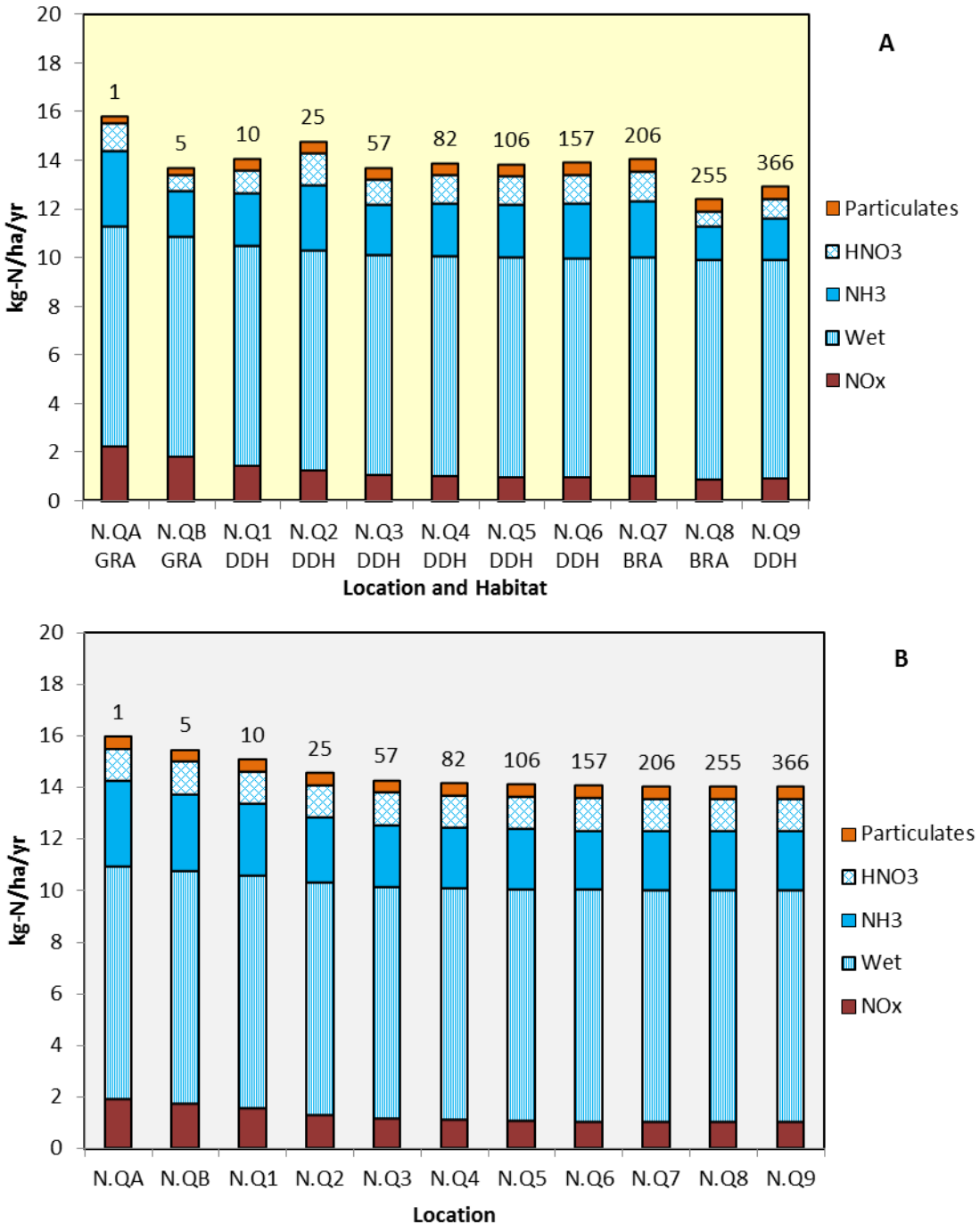


Figure 9.44: Deposition to Ecological Transect N – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

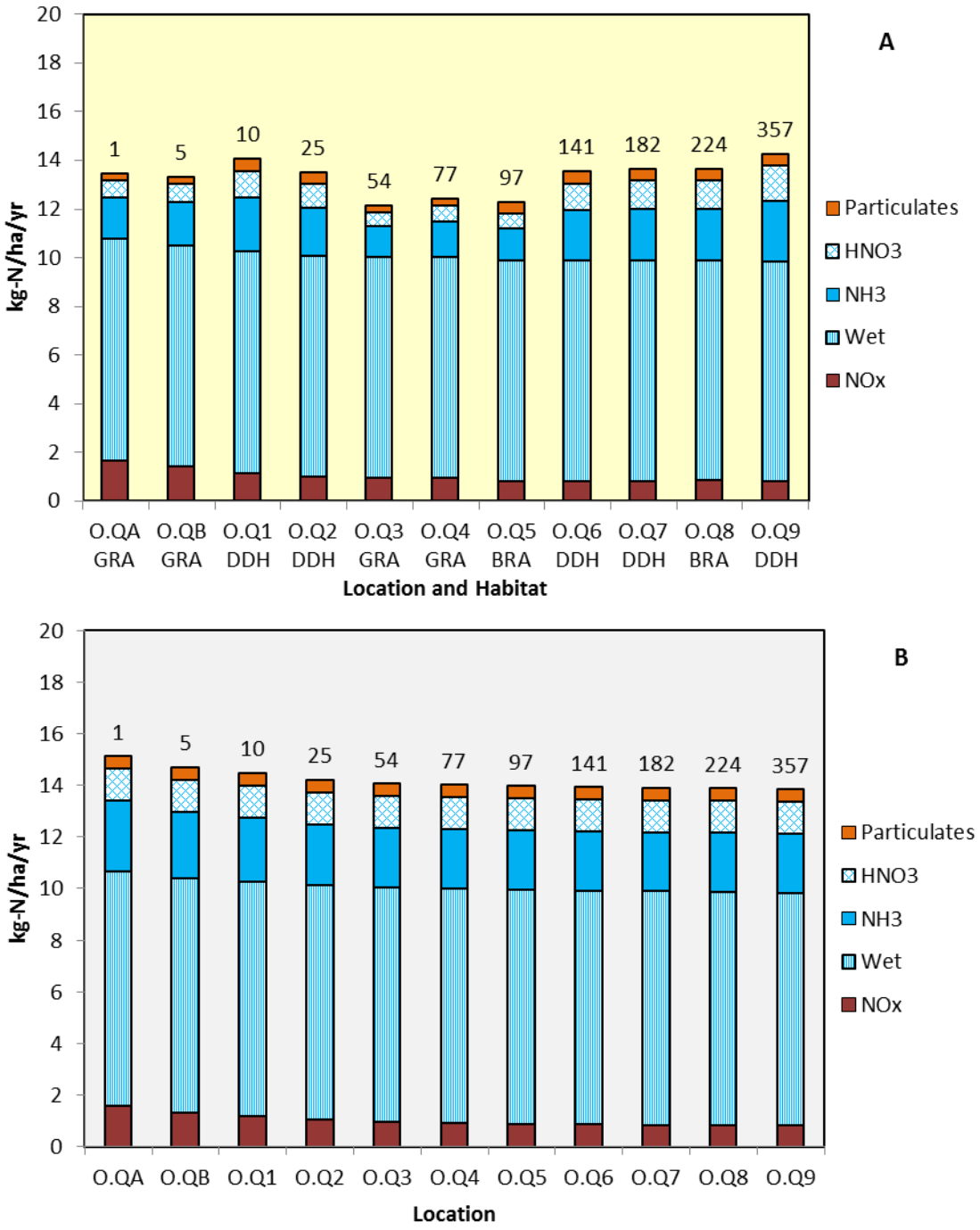


Figure 9.45: Deposition to Ecological Transect O – AQC Method – (A) Using Current Habitat Types and (B) If all Habitat were Heath (approximate distance from the nearest main road to each quadrant to shown numerically above each column) [36]

Area-wide Model Predictions

9.15 This section of the report sets out the predicted concentrations and deposition fluxes over the entire SAC. As explained in Chapter 5, some aspects of the methodology used for the area-wide predictions are slightly different from those used for predictions to the ecological quadrats, since for the area-wide predictions it has not been possible to take account of location-specific fall-off with distance patterns or location-specific vegetation heights. In other respects, however, the methods

are the same.

Annual Mean NOx

9.16 Figure 9.46 shows the predicted existing annual mean NOx concentrations across the SAC. Figure 9.46 also identifies four boxes, and these are used in Figure A6.1 to Figure A6.4 in Appendix 6, which repeat the information from Figure 9.46 in more detail for each box separately. The colour scale used shows the 30 μg/m^3 critical level as a red line, but also shows the 15 μg/m^3 and 45 μg/m^3 error bounds to the critical level identified by CEH as orange and pink lines respectively.

9.17 The 30 μg/m^3 critical level is currently being exceeded alongside the A22 and A26[39]. The 15 μg/m^3 value is being exceeded alongside most of the roads. Over most of the SAC, predicted concentrations are less than 12 μg/m^3, but these levels are only predicted to occur well away from roads.

9.18 Table 9.3 sets out the average, maximum, and minimum annual mean NOx concentrations across the SAC. The average concentration over the entire area is 12.1 μg/m^3, while the maximum concentration predicted at any one location (which is an area of woodland beside the A22 immediately north of Hindleap Lane) is 89.6 μg/m^3. Because most of the SAC is not alongside roads, the minimum concentration is quite close to the average, at 10.8 μg/m^3. The average concentration over dry heath is 11.70 μg/m^3, while over wet heath it is 12.6 μg/m^3. These values are well below the 30 μg/m^3 critical level and also below the 15 μg/m^3 lower-bound uncertainty range to the critical level identified by CEH. The maximum predicted concentrations over dry and wet heath are 63.4 μg/m^3 and 49.4 μg/m^3 respectively. Both of these values are predicted close to the A22, with the highest concentration over dry heath predicted north of Wych Cross, and the highest concentration over wet heath predicted near to the bottom of Millbrook Hill.

9.19 Table 9.4 shows how much of Ashdown Forest SAC is currently expected to experience different ranges of concentrations. It shows, for example, that the concentration over more than half (73%) of the SAC is between 10 μg/m^3 and 12 μg/m^3 and that none of the concentrations are less than 10 μg/m^3. Concentrations greater than 40 μg/m^3 are predicted over an area of 1.81 ha (or 18,100 m^2).

9.20 Table 9.5 sums the rows from Table 9.4 which represent exceedences of the 30 μg/m^3 critical level. The critical level is predicted to be exceeded over 4.61 ha of the SAC in total, of which 0.42 ha (4,200 m^2) is heath, 0.36 ha bracken, 0.04 ha grassland, and 0.39 ha bare ground.

[39] The area over which this exceedence extends is described in Paragraph 9.20.

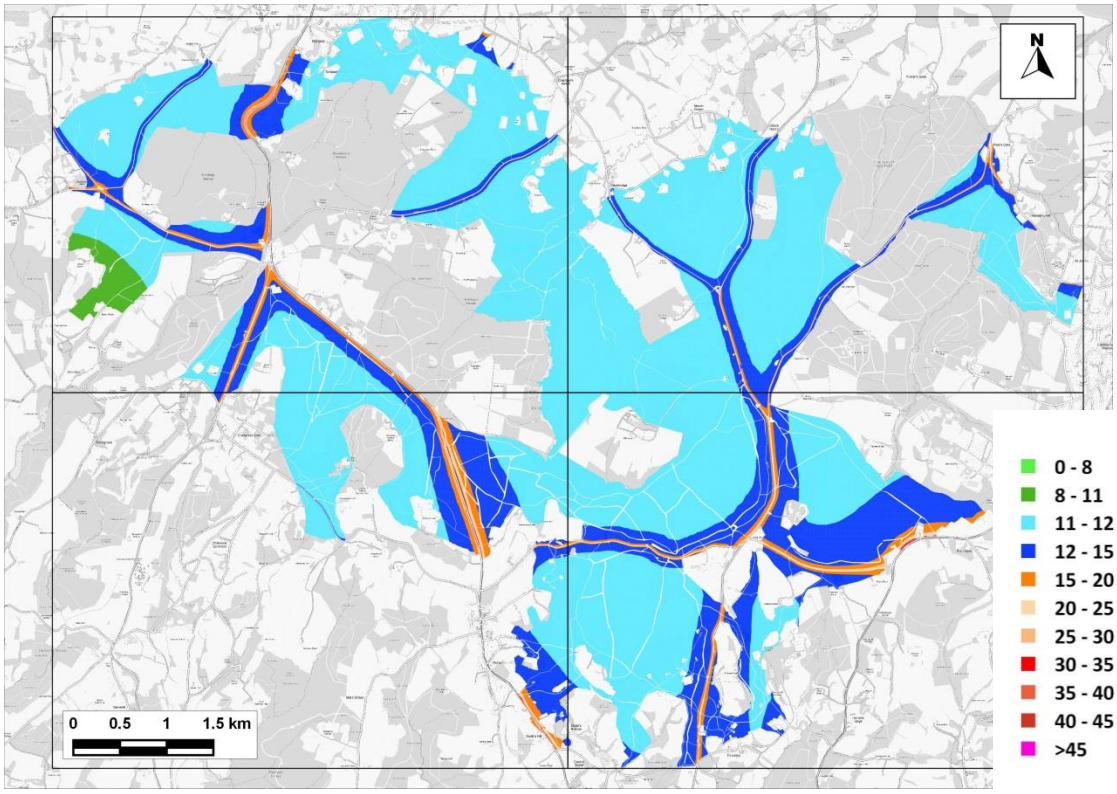


Figure 9.46: Predicted Annual Mean NOx Concentrations across the SAC – Existing Baseline (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 9.3: Annual Mean NOx across the Ashdown Forest SAC – Existing Baseline (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	12.1	89.6	10.8
Bracken	12.1	61.4	11.0
Scattered Bracken	12.0	48.5	10.9
Dry Heath	11.7	63.4	11.0
Wet Heath	12.6	49.4	11.1
Grassland	11.9	53.2	10.9
Water	11.6	28.6	10.9
Bare Ground	12.8	60.8	10.9
Whole SAC	12.1	89.6	10.8

Table 9.4: Summary of Annual Mean NOx across the Ashdown Forest SAC – Existing Baseline [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	12	533.63	884.91	128.27	166.81	132.21	66.19	41.60	5.36	1958.99
12	14	82.52	218.19	99.31	52.71	36.50	16.29	16.00	0.53	522.06
14	18	9.68	72.85	25.57	13.91	10.35	3.73	5.89	0.13	142.11
18	20	0.67	10.31	2.79	1.34	1.11	0.24	1.30	0.01	17.78
20	25	0.37	9.36	3.36	0.98	0.57	0.24	1.66	0.01	16.55
25	30	0.02	3.03	1.05	0.26	0.15	0.04	0.40	0.00	4.95
30	35	0.00	1.22	0.32	0.09	0.06	0.02	0.13	0.00	1.85
35	40	0.00	0.71	0.07	0.05	0.04	0.01	0.07	0.00	0.95
40	-	0.00	1.47	0.03	0.06	0.06	0.01	0.19	0.00	1.81
% of Total Area in SAC										
0	8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
8	10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10	12	85.12%	73.62%	49.19%	70.62%	73.02%	76.28%	61.87%	88.70%	73.45%
12	14	13.16%	18.15%	38.08%	22.32%	20.16%	18.77%	23.79%	8.83%	19.57%
14	18	1.54%	6.06%	9.81%	5.89%	5.72%	4.30%	8.76%	2.14%	5.33%
18	20	0.11%	0.86%	1.07%	0.57%	0.61%	0.28%	1.93%	0.13%	0.67%
20	25	0.06%	0.78%	1.29%	0.42%	0.31%	0.28%	2.47%	0.16%	0.62%
25	30	0.00%	0.25%	0.40%	0.11%	0.08%	0.05%	0.59%	0.03%	0.19%
30	35	0.00%	0.10%	0.12%	0.04%	0.04%	0.02%	0.20%	0.00%	0.07%
35	40	0.00%	0.06%	0.03%	0.02%	0.02%	0.01%	0.11%	0.00%	0.04%
40	-	0.00%	0.12%	0.01%	0.02%	0.03%	0.02%	0.28%	0.00%	0.07%

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 9.5: Area of Ashdown Forest SAC in Exceedence of the 30 μg/m^3 Critical Level for Annual Mean NOx – Existing Baseline [a]

Concentration (μg/m^3)	Habitat Type								
	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
>30	0.00	3.40	0.42	0.19	0.17	0.04	0.39	0.00	4.61

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx - Existing Baseline

9.21 Figure 9.47 shows the predicted maximum 24-hour mean NOx concentrations across the SAC, with a finer level of detail given in Figure A6.5 to Figure A6.8 in Appendix 6. These figures show that the 75 μg/m^3 critical level is predicted to have been exceeded across the entire SAC. Concentrations greater than 85 μg/m^3 are predicted alongside all roads, as well as over much of the southeastern part of the SAC.

9.22 The SAC-wide model results thus suggest that the 75 μg/m^3 critical level was exceeded across the entire SAC. It should, however, be recognised that the monitoring site at Kingstanding did not measure an exceedence of the critical level over the monitoring period. Furthermore, the monitoring-derived transect data presented in Figure 9.6 to Figure 9.10 showed that the critical level was achieved at some locations far from roads. This highlights the uncertainty in the SAC-wide predictions of maximum 24-hour mean NOx concentrations. Despite this uncertainty, the predictions still provide the most robust available estimate of SAC-wide 24-hour mean NOx concentrations.

9.23 Table 9.6 summarises the average, maximum and minimum concentrations predicted at any part of the SAC. The maximum concentration anywhere in the SAC (426.1 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (333.7 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (278.1 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 86.9 μg/m^3, with the averages over dry and wet heath being 84.5 μg/m^3 and 90.6 μg/m^3 respectively. The minimum concentration over the SAC is 78.8 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

9.24 Table 9.7 presents the areas predicted to experience different ranges of concentrations, and highlights that the entire SAC is predicted to exceed the 75 μg/m^3 critical level. It also shows, for example, that 137 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 28 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 11 ha are predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 4 ha are predicted to experience concentrations above 200 μg/m^3.

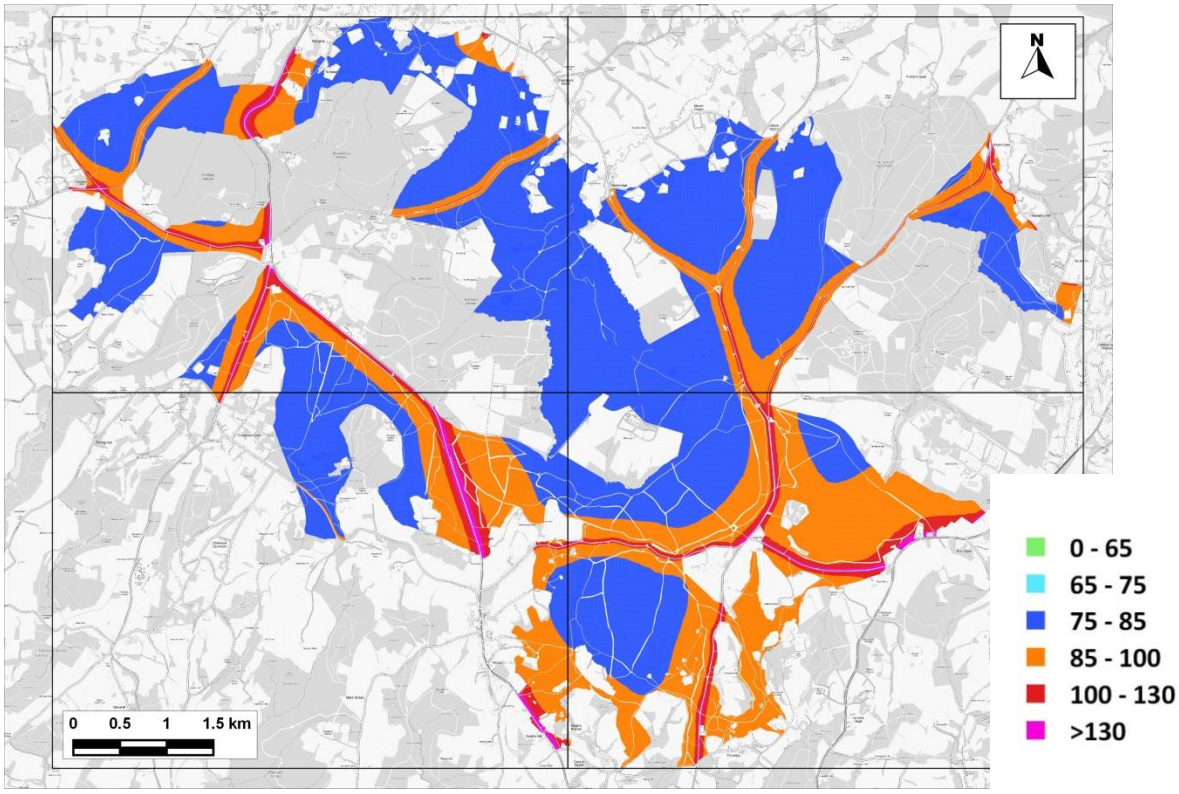


Figure 9.47: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC - Existing Baseline (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 9.6: 24-hour NOx across the Ashdown Forest SAC - Existing Baseline (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	87.2	426.1	78.8
Bracken	87.0	326.2	79.8
Scattered Bracken	86.5	274.2	79.5
Dry Heath	84.5	333.7	79.6
Wet Heath	90.6	278.1	80.4
Grassland	86.1	293.5	78.9
Water	83.7	182.6	79.2
Bare Ground	91.2	323.7	79.2
Whole SAC	86.9	426.1	78.8

Table 9.7: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – Existing Baseline [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	85	445.86	758.60	97.29	141.12	113.06	49.37	32.73	4.91	1642.94
85	100	171.03	347.52	131.62	79.26	56.11	33.29	25.04	1.00	844.87
100	125	9.01	70.60	24.42	13.16	9.99	3.56	5.82	0.12	136.69
125	150	0.91	16.24	4.71	1.92	1.40	0.43	2.26	0.02	27.88
150	200	0.09	6.37	2.52	0.60	0.37	0.08	1.06	0.00	11.10
200	-	0.00	2.72	0.20	0.16	0.13	0.03	0.32	0.00	3.56
% of Total Area in SAC										
0	60	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
60	65	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
65	75	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
75	85	71.1%	63.1%	37.3%	59.7%	62.4%	56.9%	48.7%	81.3%	61.6%
85	100	27.3%	28.9%	50.5%	33.6%	31.0%	38.4%	37.2%	16.5%	31.7%
100	125	1.4%	5.9%	9.4%	5.6%	5.5%	4.1%	8.7%	2.0%	5.1%
125	150	0.1%	1.4%	1.8%	0.8%	0.8%	0.5%	3.4%	0.3%	1.0%
150	200	0.0%	0.5%	1.0%	0.3%	0.2%	0.1%	1.6%	0.1%	0.4%
200	-	0.0%	0.2%	0.1%	0.1%	0.1%	0.0%	0.5%	0.0%	0.1%

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Annual Mean NH_3 – Existing Baseline

9.25 Figure 9.48 shows the predicted annual mean NH_3 concentrations across the SAC, with a finer degree of resolution given in Figure A6.9 to Figure A6.12 in Appendix 6. The colour scale indicates the 1 µg/m^3 critical level in red, with the 0.8 µg/m^3 and 1.2 µg/m^3 critical level error ranges as indicated by CEH shown by the orange and pink lines respectively. The 1 µg/m^3 critical level is predicted to be exceeded alongside the A22 and A26, as well as at the junction of Crowborough

Road with the B2026[40]. Over most of the study area, concentrations are predicted to be below 0.6 μg/m^3.

9.26 Table 9.8 summarises the average, maximum, and minimum concentrations across all gridded receptor points. The maximum concentration anywhere in the SAC (2.2 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (1.7 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (1.3 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 0.59 μg/m^3, with the averages for dry and wet heath being 0.59 μg/m^3 and 0.60 μg/m^3 respectively. The minimum concentration over the SAC is 0.58 μg/m^3, with this predicted for several areas which are well away from roads.

9.27 Table 9.9 shows the area of each habitat which falls within different concentration bands. This information is then further summarised in Table 9.10, which shows the total area which is predicted to exceed the 1 μg/m^3 critical level. Most of the SAC (2,083 ha) would experience concentrations of less than 0.59 μg/m^3. 3.05 ha are predicted experience concentrations above the 1 μg/m^3 critical level, with 2.42 ha of this being woodland, 0.11 ha heath, 0.21 ha bracken, 0.03 ha grassland, and 0.28 ha bare ground.

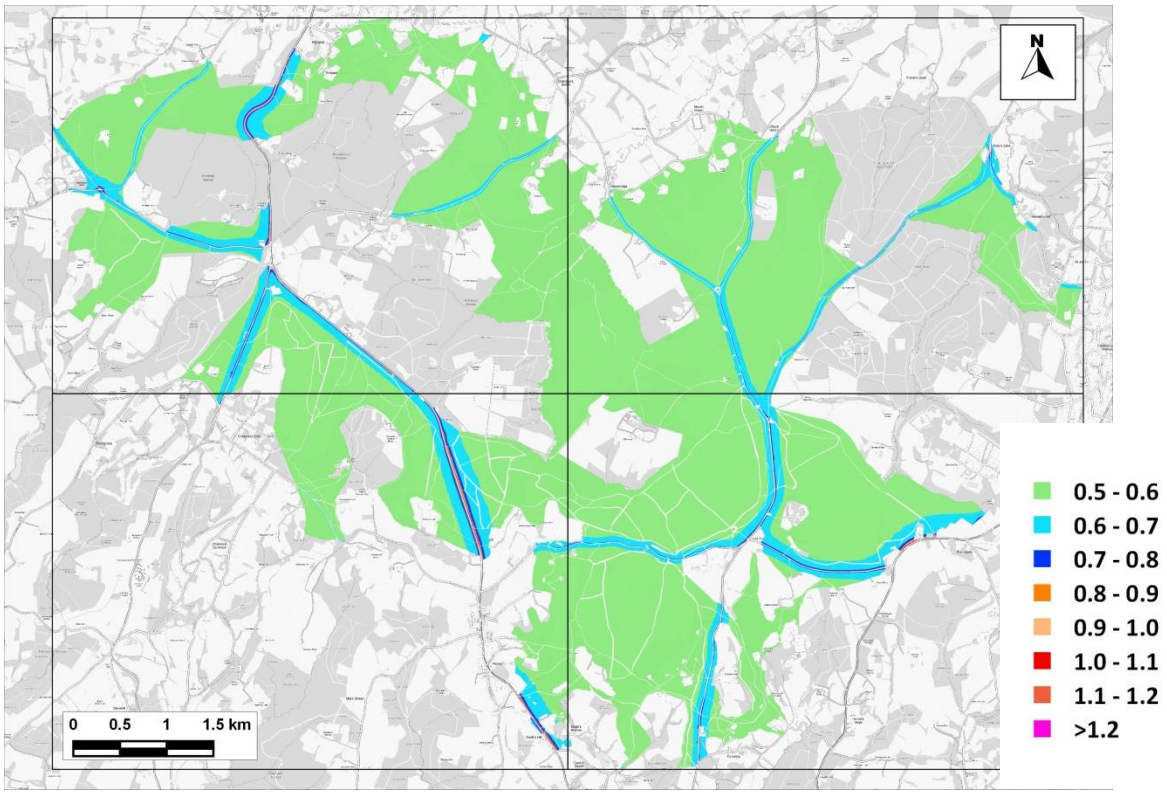


Figure 9.48: Predicted Annual Mean NH_3 Concentrations across the SAC– Existing Baseline (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

[40] The area of exceedence of the 1 μg/m^3 critical level is described in Paragraph 9.27.

Table 9.8: Annual Mean NH_3 across the Ashdown Forest SAC – Existing Baseline ($\mu g/m^3$)

Land Use	Average	Maximum	Minimum
Woodland	0.59	2.2	0.58
Bracken	0.59	1.5	0.58
Scattered Bracken	0.59	1.3	0.58
Dry Heath	0.59	1.7	0.58
Wet Heath	0.60	1.3	0.58
Grassland	0.59	1.4	0.58
Water	0.59	0.9	0.58
Bare Ground	0.60	1.5	0.58
Whole SAC	0.59	2.2	0.58

Table 9.9: Summary of Annual Mean NH_3 across the Ashdown Forest SAC – Existing Baseline [a]

Concentration ($\mu g/m^3$)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0.58	0.59	567.84	921.19	149.93	182.76	141.32	70.04	44.51	5.35	2082.93
0.59	0.6	36.29	112.46	52.54	27.28	18.82	8.76	8.83	0.39	265.37
0.6	0.7	22.08	147.27	52.47	24.20	19.26	7.55	10.55	0.30	283.67
0.7	0.8	0.65	14.11	4.23	1.45	1.26	0.34	2.29	0.01	24.33
0.8	0.9	0.04	3.02	1.17	0.35	0.20	0.04	0.63	0.00	5.46
0.9	1	0.00	1.58	0.31	0.09	0.08	0.02	0.15	0.00	2.23
1	1.1	0.00	0.71	0.08	0.05	0.04	0.01	0.07	0.00	0.97
1.1	1.2	0.00	0.52	0.02	0.02	0.03	0.01	0.07	0.00	0.68
1.2	-	0.00	1.19	0.01	0.02	0.05	0.01	0.13	0.00	1.41
% of Total Area in SAC										
0.58	0.59	90.58%	76.63%	57.50%	77.37%	78.05%	80.72%	66.19%	88.47%	78.10%
0.59	0.6	5.79%	9.36%	20.15%	11.55%	10.39%	10.09%	13.13%	6.42%	9.95%
0.6	0.7	3.52%	12.25%	20.12%	10.24%	10.64%	8.70%	15.69%	4.90%	10.64%
0.7	0.8	0.10%	1.17%	1.62%	0.61%	0.69%	0.39%	3.40%	0.18%	0.91%
0.8	0.9	0.01%	0.25%	0.45%	0.15%	0.11%	0.05%	0.94%	0.03%	0.20%
0.9	1	0.00%	0.13%	0.12%	0.04%	0.04%	0.02%	0.23%	0.00%	0.08%
1	1.1	0.00%	0.06%	0.03%	0.02%	0.02%	0.01%	0.11%	0.00%	0.04%
1.1	1.2	0.00%	0.04%	0.01%	0.01%	0.02%	0.01%	0.11%	0.00%	0.03%
1.2	-	0.00%	0.10%	0.00%	0.01%	0.03%	0.01%	0.20%	0.00%	0.05%

Table 9.10: Area of Ashdown Forest SAC in Exceedence of the 1 $\mu g/m^3$ Critical Level for Annual Mean NH_3 – Existing Baseline [a]

Concentration ($\mu g/m^3$)	Habitat Type								
	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
>1	0.00	2.42	0.11	0.09	0.12	0.03	0.28	0.00	3.05

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition – Existing Baseline (EA Method)

9.28 Figure 9.49 shows the existing nitrogen deposition to each 2 m x 2 m grid across the SAC, with Figure A6.13 to Figure A6.16 in Appendix 6 providing finer detail. Existing deposition fluxes to the SAC are also summarised in Table 9.11, Table 9.12, and Table 9.13.

9.29 The colours shown in Figure 9.49 do not follow smooth gradations like those used to describe concentrations. This is because deposition is heavily influenced by land cover type and so Figure 9.49 contains step-changes in predicted deposition where the land cover changes from one habitat type to another. The highest predicted deposition fluxes occur to woodland, with deposition fluxes greater than 30 kg-N/ha/yr to many areas of woodland. even well away from roads. Conversely, deposition fluxes less than 24 kg-N/ha/yr are predicted in many areas even close to roads where the land cover type is shorter vegetation (i.e. not woodland).

9.30 The maximum deposition flux anywhere in the SAC is some 66.5 kg-N/ha/yr. This flux is predicted immediately adjacent to the A22 at Wych Cross. It occurs at the very edge of the road, and is not representative of a large area. Figure 9.49 (and Figure A6.13 to Figure A6.16) shows deposition fluxes above 34 kg-N/ha/yr adjacent to large stretches of the A22, and beside the A26, as well as in small pockets beside other roads such as Hindleap Lane, New Road, and the B2026.

9.31 Figure 9.49 shows the lowest rates of nitrogen deposition (< 12 kg-N/ha/yr) to areas which have been mapped as bare ground or open water, with the lowest deposition at greater distances from roads. The minimum rate of deposition anywhere within the SAC is 9.3 kg-N/ha/yr.

9.32 Table 9.11 shows that the average rate of deposition to all woodland in the SAC is 30.6 kg-N/ha/yr, while to grassland it is 15.0 kg-N/ha/yr. The average deposition to bare ground is just 10.3 kg-N/ha/yr. Over the entire SAC, average deposition is 22.2 kg-N/ha/yr.

9.33 Table 9.14 shows the distribution of nitrogen deposition across the SAC. It shows, for example, that 9.14 ha experience deposition fluxes below the 10 kg-N/ha/yr critical load and that all of this is either bare ground or open water (the value for open water is too small to show when rounded). The critical load is exceeded over the remaining 2,658 ha of the SAC (see Table 9.15). Deposition fluxes are between 14 and 18 kg-N/ha/yr over a total of 52% of the SAC, and between 30 and 32 kg-N/ha/yr over 39% of the SAC.

9.34 The maximum calculated deposition to dry heath is 31.7 kg-N/ha/yr. This has been predicted alongside the A22 between Wych Cross and Forest Row. This maximum represents the deposition to a very small fragment of heath which has been mapped as being immediately adjacent to the edge of the road.

9.35 The maximum calculated deposition to wet heath is lower, at 26.2 kg-N/ha/yr. This value has been predicted immediately adjacent to the A22 at Millbrook. This represents a larger area of heath; although this very high deposition flux is only predicted for a very narrow strip along the edge of the road.

9.36 Average deposition to wet heath is 15.5 kg-N/ha/yr, while to dry heath it is 15.3 kg-N/ha/yr.

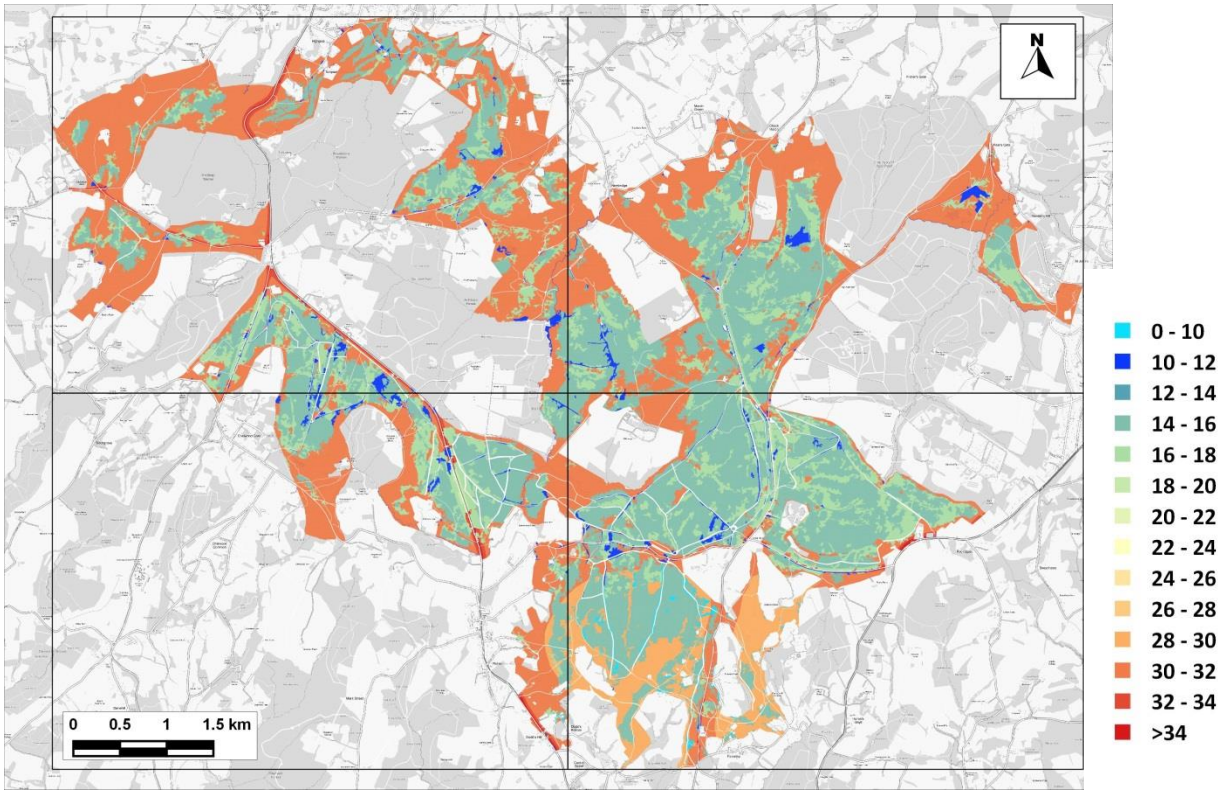


Figure 9.49: Nitrogen Deposition to SAC – Existing Baseline (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 9.11: Average Nitrogen Deposition to the Ashdown Forest SAC – Existing Baseline (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	2.5	5.7	9.1	1.9	2.1	9.4	30.6	45%
Bracken	<0.1	2.4	2.7	1.6	0.2	0.3	9.3	16.4	9%
Scattered Bracken	<0.1	2.4	2.7	1.6	0.2	0.3	9.4	16.5	7%
Dry Heath	<0.1	2.0	2.3	1.3	0.2	0.3	9.3	15.3	24%
Wet Heath	<0.1	2.2	2.3	1.3	0.2	0.3	9.3	15.5	10%
Grassland	<0.1	2.1	2.2	1.1	0.1	0.2	9.4	15.0	3%
Water	<0.1	0.3	0.3	0.1	0.2	0.3	9.4	10.6	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.2	9.3	10.3	3%
Whole SAC	<0.1	2.3	3.8	4.8	0.9	1.1	9.3	22.2	-

Table 9.12: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	3.8	19.1	20.9	9.1	1.9	2.1	9.8	66.5
Bracken	0.8	11.4	6.9	1.6	0.2	0.3	9.8	30.1
Scattered Bracken	0.3	11.4	6.1	1.6	0.2	0.3	9.8	29.0
Dry Heath	1.1	12.7	6.4	1.3	0.2	0.3	9.8	31.7
Wet Heath	0.2	9.8	5.2	1.3	0.2	0.3	9.8	26.2
Grassland	0.4	9.4	5.1	1.1	0.1	0.2	9.8	25.3
Water	<0.1	0.7	0.4	0.1	0.2	0.3	9.7	10.9
Bare Ground	0.5	1.3	0.7	0.1	0.1	0.2	9.8	12.2
Whole SAC	3.8	19.1	20.9	9.1	1.9	2.1	9.8	66.5

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 9.13: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	2.3	5.5	9.1	1.9	2.1	8.7	29.8
Bracken	<0.1	2.2	2.7	1.6	0.2	0.3	8.7	15.8
Scattered Bracken	<0.1	2.2	2.7	1.6	0.2	0.3	8.8	15.9
Dry Heath	<0.1	1.9	2.3	1.3	0.2	0.3	8.7	14.8
Wet Heath	<0.1	2.0	2.3	1.3	0.2	0.3	8.7	14.8
Grassland	<0.1	1.9	2.1	1.1	0.1	0.2	8.7	14.3
Water	<0.1	0.3	0.3	0.1	0.2	0.3	8.8	10.0
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.2	8.7	9.7
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.2	8.7	9.7

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 9.14: Summary of Nitrogen Deposition To Ashdown Forest SAC – Existing Baseline (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	9.13	0.00	9.14
10	12	0.00	0.00	0.00	0.00	0.00	0.00	58.09	6.04	64.13
12	14	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
14	16	620.21	0.00	238.75	17.40	8.23	86.06	0.00	0.00	970.65
16	18	6.62	0.00	19.79	216.65	170.33	0.66	0.00	0.00	414.05
18	20	0.07	0.00	1.93	1.78	2.14	0.03	0.00	0.00	5.95
20	22	0.00	0.00	0.25	0.28	0.20	0.01	0.00	0.00	0.74
22	24	0.00	0.00	0.03	0.07	0.07	0.01	0.00	0.00	0.18
24	26	0.00	0.00	0.01	0.02	0.04	0.01	0.00	0.00	0.07
26	28	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.04
28	30	0.00	122.64	0.00	0.00	0.02	0.00	0.00	0.00	122.66
30	32	0.00	1041.04	0.00	0.00	0.00	0.00	0.00	0.00	1041.04
32	34	0.00	28.40	0.00	0.00	0.00	0.00	0.00	0.00	28.40
34	36	0.00	5.08	0.00	0.00	0.00	0.00	0.00	0.00	5.08
36	38	0.00	1.57	0.00	0.00	0.00	0.00	0.00	0.00	1.57
38	40	0.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00	1.10
40	-	0.00	2.22	0.00	0.00	0.00	0.00	0.00	0.00	2.22
% of Total Area in SAC										
0	10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	13.58%	0.04%	0.34%
10	12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	86.39%	99.96%	2.40%
12	14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%
14	16	98.93%	0.00%	91.56%	7.37%	4.55%	99.17%	0.00%	0.00%	36.39%
16	18	1.06%	0.00%	7.59%	91.72%	94.08%	0.76%	0.00%	0.00%	15.52%
18	20	0.01%	0.00%	0.74%	0.75%	1.18%	0.04%	0.00%	0.00%	0.22%
20	22	0.00%	0.00%	0.10%	0.12%	0.11%	0.01%	0.00%	0.00%	0.03%
22	24	0.00%	0.00%	0.01%	0.03%	0.04%	0.01%	0.00%	0.00%	0.01%

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
24	26	0.00%	0.00%	0.00%	0.01%	0.02%	0.01%	0.00%	0.00%	0.00%
26	28	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
28	30	0.00%	10.20%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	4.60%
30	32	0.00%	86.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	39.03%
32	34	0.00%	2.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.06%
34	36	0.00%	0.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.19%
36	38	0.00%	0.13%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%
38	40	0.00%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%
40	-	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 9.15: Area of Ashdown Forest SAC in Exceedence of the 10 kg-N/ha/yr Critical Load for Nitrogen Deposition – Existing Baseline (EA Method) [a]

Deposition (kg-N/ha/yr)	Habitat Type								
	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
>10	626.90	1202.05	260.76	236.22	181.06	86.77	58.10	6.04	2657.91

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

9.37 Figure 9.50 shows the average flux over the whole of the SAC by surface area per hectare of the different land covers. It shows that, if the land cover for each habitat was equal, woodland would dominate the total deposition flux, with bracken being the next most important habitat in terms of receiving nitrogen deposition.

9.38 The importance of woodland, in terms of total deposition to the SAC, is exacerbated by the amount of woodland relative to other habitats. Woodland makes up around 45% of the SAC, and as shown in Figure 9.51, receives around 62% of the SAC's total nitrogen deposition. Wet and dry heath together make up around 33% of the area and receive about 23% of the nitrogen input (Figure 9.51).

9.39 Figure 9.52 shows how the total nitrogen flux to the SAC is made up in terms of pollutant species. Wet deposition makes up about 42% of the total flux. Deposition of the gases NO, NO_2, HNO_3 and NH_3 makes up 49%. Nitrogen-containing particulate matter makes up the remaining 9%.

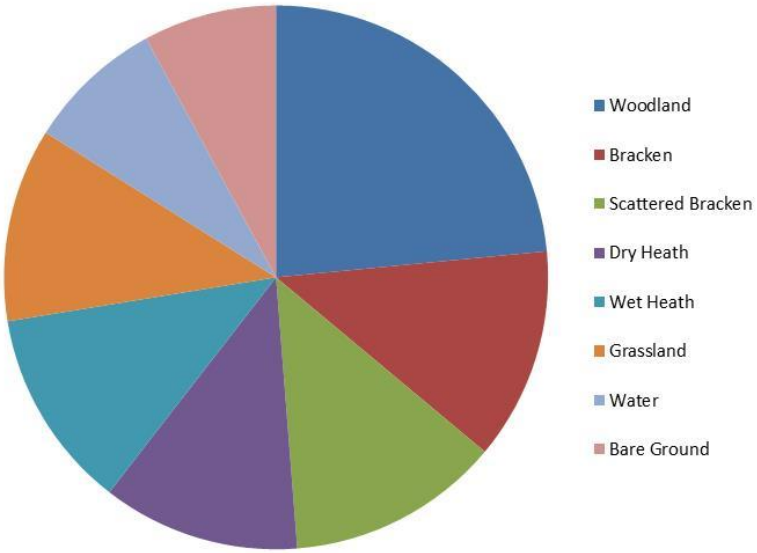


Figure 9.50: Average Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (EA Method) – Relative Flux per Ha

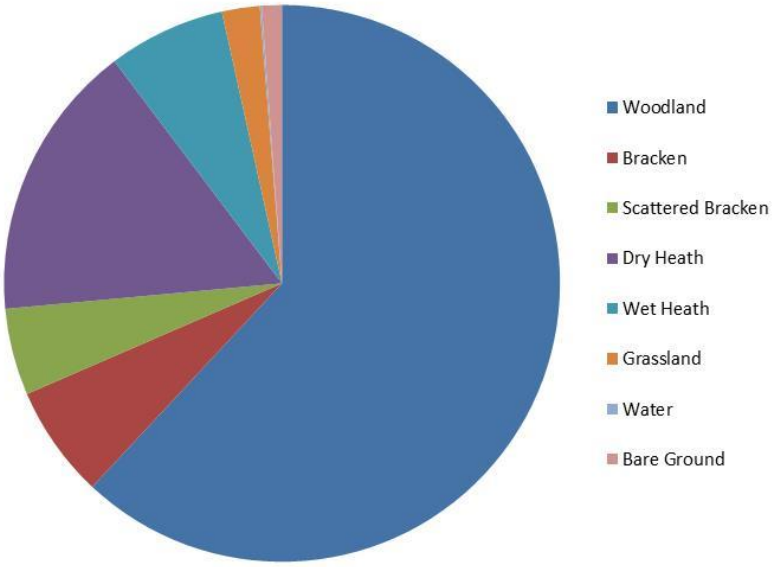


Figure 9.51: Total Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (i.e. taking account of relative cover of each land use) (EA Method)

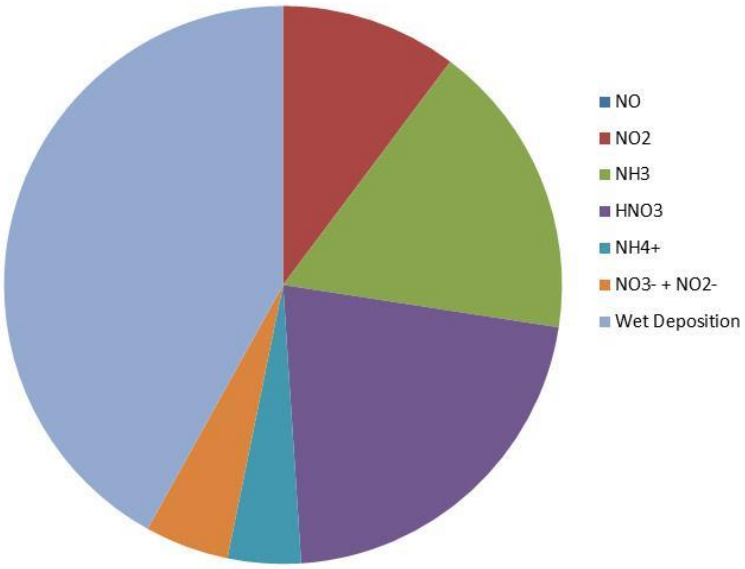


Figure 9.52: Total Nitrogen Deposition to the Ashdown Forest SAC by Pollutant (taking account of relative cover of each land use) (EA Method)

Nitrogen Deposition - Existing Baseline (AQC Method)

9.40 Figure 9.53 shows the existing nitrogen deposition to each 2 m x 2 m grid across the SAC using the AQC deposition method. Figure A6.17 to Figure A6.20 in Appendix 6 provide finer detail. Existing deposition fluxes to the SAC are also summarised in Table 9.16, Table 9.17, and Table 9.18. The distribution of nitrogen deposition across the SAC, and area exceeding the critical load, are shown in Table 9.19 and Table 9.20 respectively.

9.41 The predicted deposition fluxes using the AQC method are mostly lower than those using the EA method, with large parts of the SAC moving from the 32-34 kg-N/ha/yr deposition band (with the EA method) to the 30-32 kg-N/ha/yr band (with the AQC method), while smaller areas have moved from the 16-18 to the 14-16 kg-N/ha/yr band. The maximum predicted flux anywhere in the SAC is 55.9 kg-N/ha/yr, which is lower than the 66.5 kg-N/ha/yr predicted using the EA method, but still well above the 10 kg-N/ha/yr critical load.

9.42 The average deposition to the SAC calculated using the AQC method is 21.3 kg-N/ha/yr, which compares with 22.2 kg-N/ha/yr using the EA method. Conversely, the minimum predicted fluxes to water and bare ground are slightly higher using the AQC method. Because these surfaces make up the only areas of the SAC which are not currently predicted to exceed the 10 kg-N/ha/yr critical load, this means that the total area predicted to exceed the critical load is higher using the AQC method than it is using the EA method. 47% of the SAC is predicted to experience deposition fluxes between 14 and 16 kg-N/ha/yr, while 44% receive between 28 and 32 kg-N/ha/yr.

9.43 The maximum calculated deposition to dry heath, using the AQC method, is 22.7 kg-N/ha/yr, while the maximum deposition to wet heath is 19.9 kg-N/ha/yr. Average deposition to wet heath is 14.4 kg-N/ha/yr, while to dry heath it is 14.2 kg-N/ha/yr.

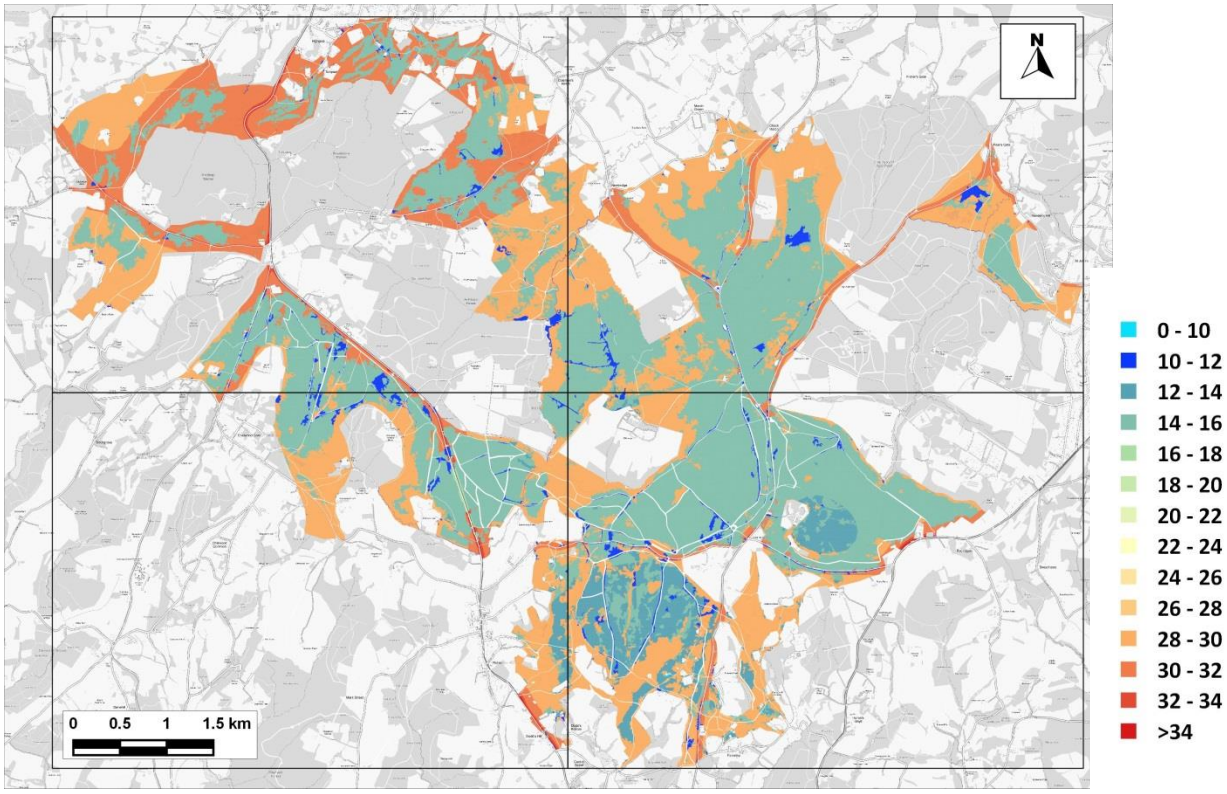


Figure 9.53: Nitrogen Deposition to SAC – Existing Baseline (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 9.16: Average Nitrogen Deposition to the Ashdown Forest SAC – Existing Baseline (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.9	5.7	9.1	1.9	2.1	9.4	30.0	45%
Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	9.3	15.0	9%
Scattered Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	9.4	15.1	7%
Dry Heath	<0.1	1.0	2.3	1.3	0.2	0.3	9.3	14.2	24%
Wet Heath	<0.1	1.1	2.3	1.3	0.2	0.3	9.3	14.4	10%
Grassland	<0.1	1.2	2.1	1.1	0.1	0.2	9.4	14.1	3%
Water	<0.1	0.5	0.3	0.1	0.2	0.3	9.4	10.8	0.2%
Bare Ground	<0.1	0.5	0.3	0.1	0.1	0.2	9.3	10.5	3%
Whole SAC	<0.1	1.4	3.8	4.8	0.9	1.1	9.3	21.3	-

Table 9.17: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	12.3	20.8	9.1	1.9	2.1	9.8	55.9
Bracken	<0.1	4.1	6.8	1.6	0.2	0.3	9.8	22.0
Scattered Bracken	<0.1	3.7	6.1	1.6	0.2	0.3	9.8	21.1
Dry Heath	<0.1	4.9	6.4	1.3	0.2	0.3	9.8	22.7
Wet Heath	<0.1	3.8	5.1	1.3	0.2	0.3	9.8	19.9
Grassland	<0.1	4.7	5.1	1.1	0.1	0.2	9.8	20.1
Water	<0.1	1.1	0.4	0.1	0.2	0.3	9.7	11.2
Bare Ground	<0.1	2.2	0.7	0.1	0.1	0.2	9.8	12.5
Whole SAC	<0.1	12.3	20.8	9.1	1.9	2.1	9.8	55.9

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 9.18: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – Existing Baseline (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.8	5.5	9.1	1.9	2.1	8.7	29.2
Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	8.7	14.4
Scattered Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	8.8	14.5
Dry Heath	<0.1	0.9	2.3	1.3	0.2	0.3	8.7	13.7
Wet Heath	<0.1	0.9	2.3	1.3	0.2	0.3	8.7	13.8
Grassland	<0.1	1.1	2.1	1.1	0.1	0.2	8.7	13.4
Water	<0.1	0.5	0.3	0.1	0.2	0.3	8.8	10.2
Bare Ground	<0.1	0.5	0.3	0.1	0.1	0.2	8.7	9.9
Whole SAC	<0.1	0.5	0.3	0.1	0.1	0.2	8.7	9.9

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 9.19: Summary of Nitrogen Deposition To Ashdown Forest SAC – Existing Baseline (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.66
10	12	0.00	0.00	0.00	0.00	0.00	0.00	66.50	6.05	72.55
12	14	92.75	0.00	23.69	0.00	0.00	27.75	0.08	0.00	144.27
14	16	534.10	0.00	235.52	235.00	179.18	58.97	0.00	0.00	1242.76
16	18	0.05	0.00	1.51	1.13	1.73	0.04	0.00	0.00	4.46
18	20	0.00	0.00	0.04	0.08	0.11	0.02	0.00	0.00	0.25
20	22	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.05
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	30	0.00	841.06	0.00	0.00	0.00	0.00	0.00	0.00	841.06
30	32	0.00	341.62	0.00	0.00	0.00	0.00	0.00	0.00	341.62
32	34	0.00	13.48	0.00	0.00	0.00	0.00	0.00	0.00	13.48
34	36	0.00	2.59	0.00	0.00	0.00	0.00	0.00	0.00	2.59
36	38	0.00	1.35	0.00	0.00	0.00	0.00	0.00	0.00	1.35
38	40	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.67
40	-	0.00	1.28	0.00	0.00	0.00	0.00	0.00	0.00	1.28
% of Total Area in SAC										
0	10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.98%	0.00%	0.02%
10	12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	98.90%	100.0%	2.72%
12	14	14.79%	0.00%	9.09%	0.00%	0.00%	31.98%	0.11%	0.00%	5.41%
14	16	85.20%	0.00%	90.32%	99.48%	98.96%	67.96%	0.00%	0.00%	46.60%
16	18	0.01%	0.00%	0.58%	0.48%	0.96%	0.04%	0.00%	0.00%	0.17%
18	20	0.00%	0.00%	0.02%	0.03%	0.06%	0.02%	0.00%	0.00%	0.01%

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
20	22	0.00%	0.00%	0.00%	0.01%	0.02%	0.00%	0.00%	0.00%	0.00%
22	24	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
24	26	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
26	28	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
28	30	0.00%	69.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	31.54%
30	32	0.00%	28.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	12.81%
32	34	0.00%	1.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%
34	36	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%
36	38	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%
38	40	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%
40	-	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 9.20: Area of Ashdown Forest SAC in Exceedence of the 10 kg-N/ha/yr Critical Load for Nitrogen Deposition – Existing Baseline (AQC Method) [a]

Deposition (kg-N/ha/yr)	Habitat Type								
	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
>10	626.90	1202.05	260.76	236.22	181.06	86.77	66.58	6.05	2666.38

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

9.44 Figure 9.54 shows the average flux over the whole of the SAC by surface area, not taking account of differences in land cover of those areas. It is only marginally different from the equivalent plot using the EA method (Figure 9.50), with the key differences being a slightly greater contribution of woodland and a slightly smaller contribution of bracken.

9.45 Figure 9.55 shows the total contribution of different land uses to nitrogen deposition, taking account of their relative coverage areas. Again, the picture is not significantly different from that for the EA method (Figure 9.51). Woodland receives 63% of all deposition to the SAC, while heath receives 22%.

9.46 Figure 9.56 shows how the total nitrogen flux to the SAC is made up in terms of pollutant species using the AQC deposition method. Again, the differences from the pattern using the EA method are marginal, with gases now contributing 47% of all nitrogen deposition (down from 49% with the

EA method) and wet deposition contributing 44% (up from 42% with the EA method).

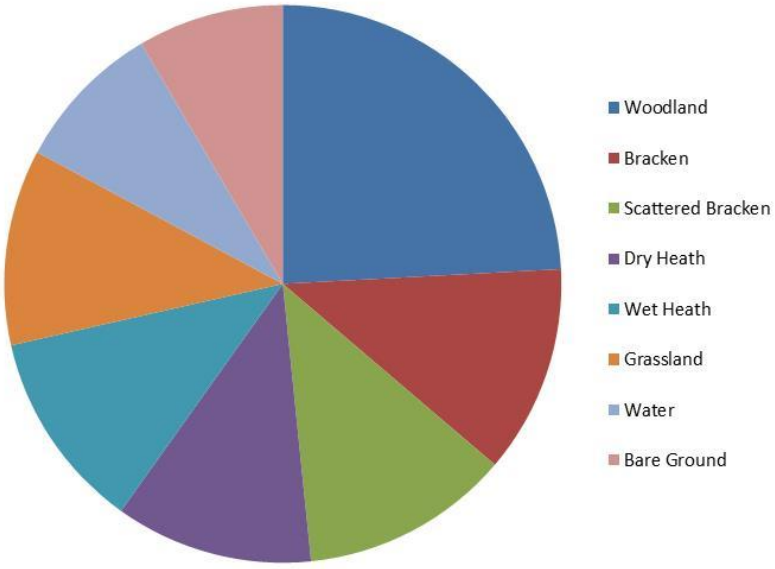


Figure 9.54: Average Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (AQC Method) – Relative Flux per Ha

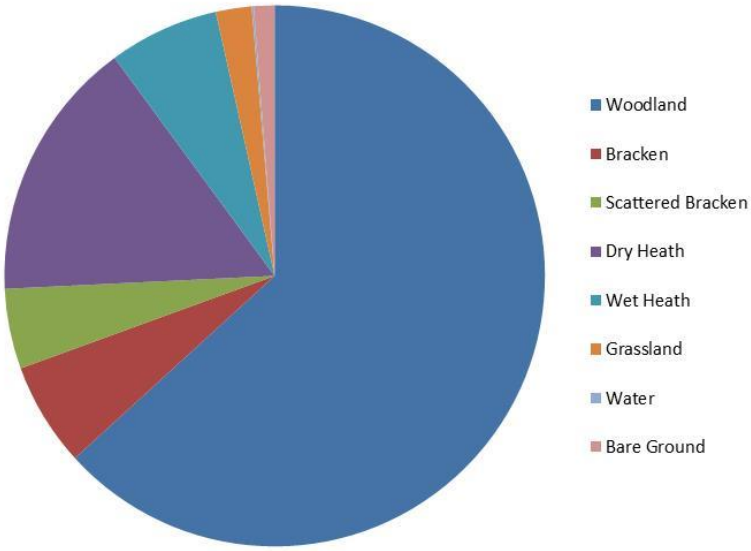


Figure 9.55: Total Nitrogen Deposition to Different Ashdown Forest SAC Land Surfaces (i.e. taking account of relative cover of each land use) (AQC Method)

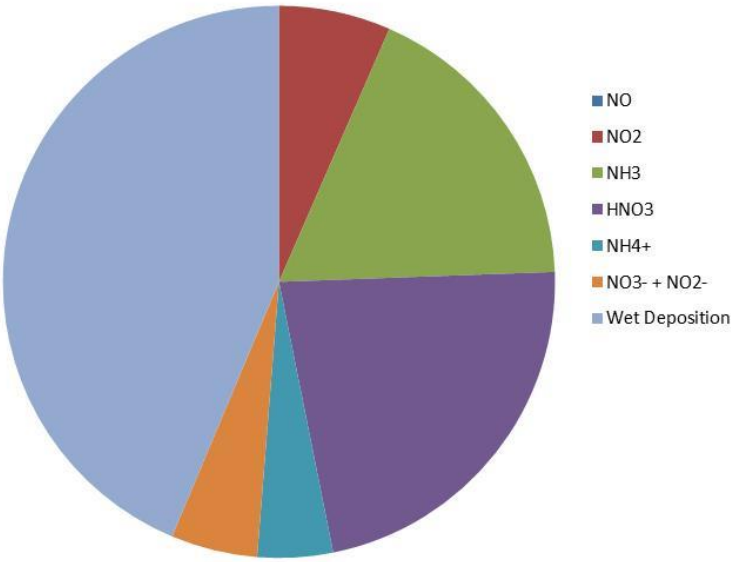


Figure 9.56: Total Nitrogen Deposition to the Ashdown Forest SAC by Pollutant (taking account of relative cover of each land use) (AQC Method)

Chapter Summary

Predicted Concentrations at, and Deposition to, the Ecological Quadrats

Annual Mean NOx

9.47 The 30 μg/m^3 critical level is predicted to have been exceeded along Transects F, G, J, and K, but only at the quadrats which are 1 m or 5 m from the kerb. The 15 μg/m^3 lower bound to the critical level range, as indicated by CEH in Paragraph 7.34, is predicted to have been exceeded at some point along all of the transects.

24-hour Mean NOx

9.48 The 75 μg/m^3 critical level is predicted to have been exceeded over most of the SAC, with concentrations dropping marginally below the critical level on Transects H, L, M, and O, with no predicted concentrations achieving the critical level within 50 m of a road.

Annual Mean NH_3

9.49 The 1 μg/m^3 critical level for NH_3 is predicted to have been exceeded at the roadside quadrats in Transects F, G, J, and K. The lower bound to the critical level range (see Paragraph 7.34) is predicted to have been exceeded in Transects E, F, G, J, K, and N. The upper bound of this critical level range is predicted to have been exceeded in Transects J, and K.

Nitrogen Deposition

9.50 Predictions made using the EA method are higher than those made using the AQC method. Regardless of the deposition method used, calculated deposition fluxes exceed the 10 kg-N/ha/yr

critical load at all of the ecological quadrats. Focusing on the observed habitat types, the maximum calculated deposition flux to any quadrat is 44 kg-N/ha/yr (Transect F, EA method), while the minimum calculated flux is 12.1 kg-N/ha/yr (Transects F and O, AQC method).

Area-wide Model Predictions

Annual Mean NOx

9.51 The area-wide model predictions show that annual mean NOx concentrations exceed the 30 μg/m^3 critical level alongside the A22 and A26. The maximum predicted concentration is 90 μg/m^3 and a total of 4.6 ha of the SAC is predicted to exceed the critical level. The maximum predicted concentration over dry or wet heath is smaller at 63 μg/m^3; still more than twice the critical level. A total of 0.4 ha (4,000 m^2) of heathland is predicted to experience an exceedence of the critical level. When using the lower-bound uncertainty range to this critical level as advised by CEH (15 μg/m^3) the exceedence area is greatly increased.

24-hour Mean NOx

9.52 The area-wide model predictions of maximum 24-hour NOx concentrations are relatively uncertain but do provide the best available estimates of area-wide conditions. Maximum 24-hour mean NOx concentrations are predicted to exceed the 70 μg/m^3 critical level over the entire SAC. The maximum predicted concentration anywhere in the SAC is 426 μg/m^3, while the maximum concentration over heath is 334 μg/m^3.

Annual Mean NH_3

9.53 Exceedences of the 1 μg/m^3 critical level are predicted alongside the A22 and A26, as well as at the junction of Crowborough Road with the B2026. These cover a total of 3.1 ha of the SAC, of which 0.1 ha (1,000 m^2) is heath. When using the lower-bound uncertainty range to the critical level as advised by CEH (0.8 μg/m^3) the exceedence areas are greatly increased. The maximum predicted concentration is 2.2 μg/m^3 (i.e. more than double the 1 μg/m^3 critical level) and the maximum concentration predicted over heath is 1.7 μg/m^3.

Nitrogen Deposition

9.54 Nitrogen deposition has been calculated using two alternative deposition methods (EA method and AQC method). Both methods predict that the 10 kg-N/ha/yr critical load is exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load are some small areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

9.55 The maximum predicted deposition fluxes are 67 kg-N/ha/yr (EA method) and 56 kg-N/ha/yr (AQC method), with the maximum fluxes to heath being 32 kg-N/ha/yr and 23 kg-N/ha/yr for the EA and AQC methods respectively. All of these values are well above the 10 kg-N/ha/yr critical load.

10 2028 No-Growth Model Results

2028 No-Growth Emissions Scenario A

10.1 This section sets out the ambient concentrations and nitrogen deposition fluxes predicted to occur in 2028 if traffic volumes[41] in 2028 are no different from those in 2015 (i.e. no growth caused by development in Wealden or elsewhere). Results are presented for emissions scenarios B and C. The 2028 No-Growth model results under emissions scenario A are identical to those for the existing baseline (since all of the model inputs are identical) and thus these are not presented again. They can be found in Chapter 9. The purpose of the No-Growth scenario is to predict the future air quality conditions if no growth within Wealden or elsewhere took place. Chapter 14 compares the results of this scenario with those of the scenario which includes both the Wealden Local Plan and growth elsewhere and thus allows the combined effects of this growth to be quantified.

2028 No-Growth Emissions Scenario B

Annual Mean NOx in 2028 No-Growth – B

10.2 Figure 10.1 shows the predicted annual mean NOx concentrations across the SAC in 2028 without any traffic growth from 2015 levels and under emissions scenario B. Figure 10.1 also defines four quadrants, which are used in Figure A7.1 to Figure A7.4 in Appendix 7 in order to display the same results with a greater resolution. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 11 $\mu g/m^3$, with concentrations less than 8 $\mu g/m^3$ predicted in many areas. Exceedences of the 30 $\mu g/m^3$ critical level are only predicted at the very kerbside of the A22 and A26[42].

10.3 Table 10.1 shows the average, maximum and minimum predicted concentrations across the whole SAC. It shows, for example, that the average predicted concentration across the whole SAC is 8.2 $\mu g/m^3$, while the maximum predicted concentration is 43.7 $\mu g/m^3$. This is predicted to occur to an area of woodland at the kerbside of the A26 at Poundgate. The location of the maximum predicted concentration in the SAC is thus different in this scenario than in the existing baseline (see Paragraph 9.18 which explains that the maximum occurs beside the A22). The traffic flows in these two scenarios are identical and the difference reflects different vehicle speed-emissions functions and different background concentration fields. In practice, though, predicted concentrations alongside the A22 and A26 are very similar in both scenarios and so the differences being highlighted are not very great. The maximum concentration over dry heath (30.6 $\mu g/m^3$) is predicted alongside the A22 around halfway between Wych Cross and Forest Row which is the same location that produced the maximum in the existing baseline. The maximum concentration

41 On those roads included explicitly in the dispersion modelling.

42 For detail of the areas of these exceedences, see Paragraph 10.4.

over wet heath (25.2 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill, which again is in the same location as the maximum in the existing baseline. The average concentration over the whole SAC is predicted to be 8.2 μg/m^3, with the averages for dry and wet heath being 8.0 μg/m^3 and 8.5 μg/m^3 respectively. The minimum concentration over the SAC is 7.6 μg/m^3, with this predicted for several receptors which are well away from roads.

10.4 Table 10.2 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. As an example of interpreting this table, it shows that 17.30 ha would experience concentrations between 12 and 14 μg/m^3, and that 0.08 ha (800 m^2) would experience an exceedence of the critical level. Most of this 0.08 ha would be woodland, but a small amount (0.01 ha) would be bracken. Less than 0.005 ha would be dry heath and none would be wet heath. Most of the predicted concentrations over areas of dry and wet heath fall within the 0-10 μg/m^3 concentration range.

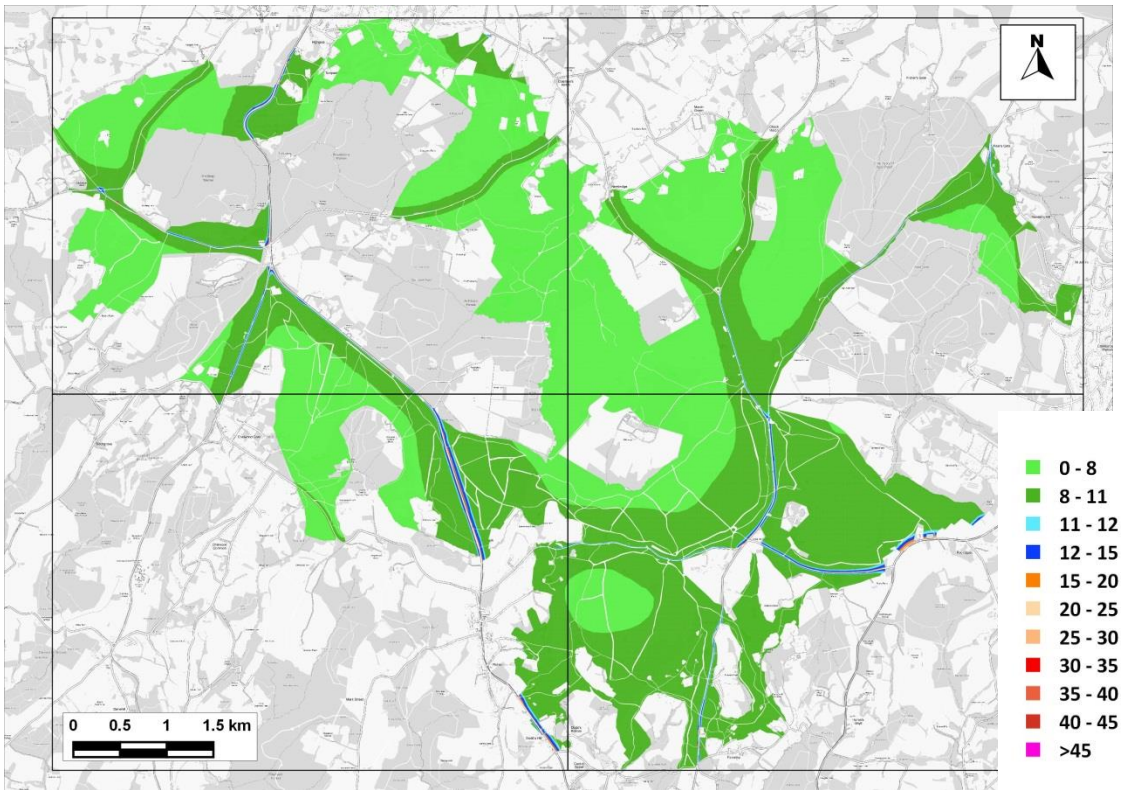


Figure 10.1: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No-Growth - B (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.1: Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth – B (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	8.3	43.7	7.6
Bracken	8.3	33.2	7.7
Scattered Bracken	8.2	23.7	7.7
Dry Heath	8.0	30.6	7.7
Wet Heath	8.5	25.2	7.7
Grassland	8.2	27.1	7.6
Water	8.0	15.3	7.6
Bare Ground	8.6	34.4	7.6
Whole SAC	8.2	43.7	7.6

Table 10.2: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - B [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	8	267.93	611.71	60.50	98.41	78.63	36.72	20.34	4.20	1178.44
8	10	354.93	530.49	182.44	129.44	96.64	48.27	39.73	1.81	1383.75
10	12	3.51	42.93	12.67	6.37	4.71	1.43	4.30	0.03	75.94
12	14	0.48	9.40	3.36	1.28	0.73	0.26	1.77	0.01	17.30
14	18	0.06	4.54	1.70	0.55	0.24	0.06	0.78	0.00	7.93
18	20	0.00	1.12	0.06	0.06	0.06	0.01	0.09	0.00	1.40
20	25	0.00	1.24	0.03	0.07	0.06	0.02	0.18	0.00	1.61
25	30	0.00	0.54	0.00	0.02	0.00	0.00	0.05	0.00	0.61
30	35	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.06
35	40	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
40	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >30		0.00	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.08

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 No-Growth – B

10.5 Figure 10.2 (also see Figure A7.5 to Figure A7.8 in Appendix 7, which show the same information with greater resolution) shows the maximum predicted 24-hour NOx concentrations across the SAC in 2028 without any traffic growth from 2015 levels and under emissions scenario B. Over most of the SAC, predicted concentrations are below the 75 μg/m^3 critical level, but exceedences of this critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Coleman's Hatch Road, the A26, Kidd's Hill, the B2188, London Rd, Crowborough Road, New Road, and the B2026[43].

10.6 Table 10.3 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (253.7 μg/m^3) is predicted to occur at an area of woodland alongside the A26 at Poundgate. The maximum concentration over dry heath (192.6 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (165.0 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 60.3 μg/m^3, with the averages for dry and wet heath being 59.0 μg/m^3 and 62.3 μg/m^3 respectively. The minimum concentration over the SAC is 55.7 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

10.7 Table 10.4 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and shows that 80.3 ha are expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 7.7 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 2.2 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 1.3 ha are predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 0.04 ha is predicted to experience concentrations above 200 μg/m^3.

[43] For detail of the areas of these exceedences, see Paragraph 10.7.

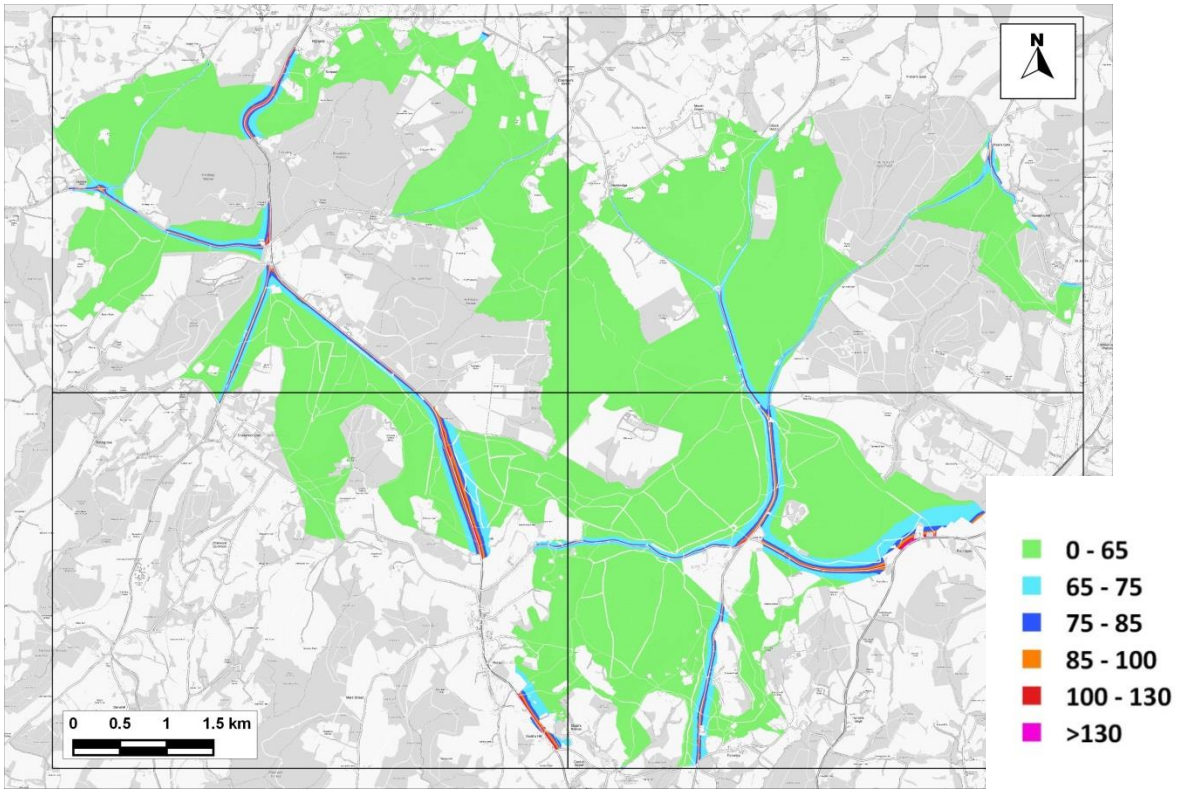


Figure 10.2: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No-Growth - B (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.3: 24-hour NOx across the Ashdown Forest SAC – 2028 No-Growth - B (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	60.4	253.7	55.7
Bracken	60.5	205.2	56.2
Scattered Bracken	60.0	156.7	56.1
Dry Heath	59.0	192.6	56.2
Wet Heath	62.3	165.0	56.6
Grassland	59.8	174.9	55.7
Water	58.4	107.8	55.9
Bare Ground	62.8	211.1	55.9
Whole SAC	60.3	253.7	55.7

Table 10.4: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - B [a]

Concentration ($\mu g/m^3$)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	523.51	856.11	122.32	160.12	130.46	63.23	41.21	5.30	1902.25
60	65	82.69	214.28	90.22	48.08	34.05	17.15	14.21	0.55	501.23
65	75	18.00	85.47	34.50	21.95	12.25	5.19	5.70	0.16	183.23
75	85	2.03	26.66	7.92	3.73	3.00	0.79	2.91	0.02	47.06
85	100	0.61	12.18	4.07	1.65	0.96	0.32	2.16	0.01	21.96
100	125	0.05	4.45	1.64	0.53	0.23	0.06	0.74	0.00	7.71
125	150	0.00	1.74	0.09	0.10	0.09	0.02	0.18	0.00	2.21
150	200	0.00	1.13	0.01	0.06	0.02	0.01	0.13	0.00	1.35
200	-	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.04
All >75		2.69	46.19	13.72	6.07	4.30	1.21	6.12	0.03	80.33

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No-Growth – B (EA Method)

10.8 Figure 10.3 (see also Figure A7.9 to Figure A7.12) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without any traffic growth from 2015 levels, under emissions scenario B and using the EA deposition model. The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water, reflecting the much slower rates of deposition to these surfaces. There is a clear differentiation in Figure 10.3 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland, even well away from roads, although the highest fluxes still occur at the roadsides[44].

10.9 Table 10.5, Table 10.6, and Table 10.7 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (50.6 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is a different location than that at which the maximum NOx concentration was predicted in this emission scenario, reflecting the importance of NH_3 and other species to the total deposition flux. The maximum deposition to dry heath (23.4 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (20.1 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average

[44] For detail of the areas within each deposition range, see Paragraph 10.10.

deposition flux over the whole SAC is predicted to be 19.4 kg-N/ha/yr, with the averages for all dry and wet heath being 13.6 kg-N/ha/yr and 13.8 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 13.2 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.8 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads..

10.10 Table 10.8 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.2 ha of the SAC, with all of this being woodland. Most of the dry and wet heath (598 ha and 219 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr range, with appreciable amounts (29 ha and 41 ha respectively) falling in the 14-16 kg-N/ha/yr deposition band.

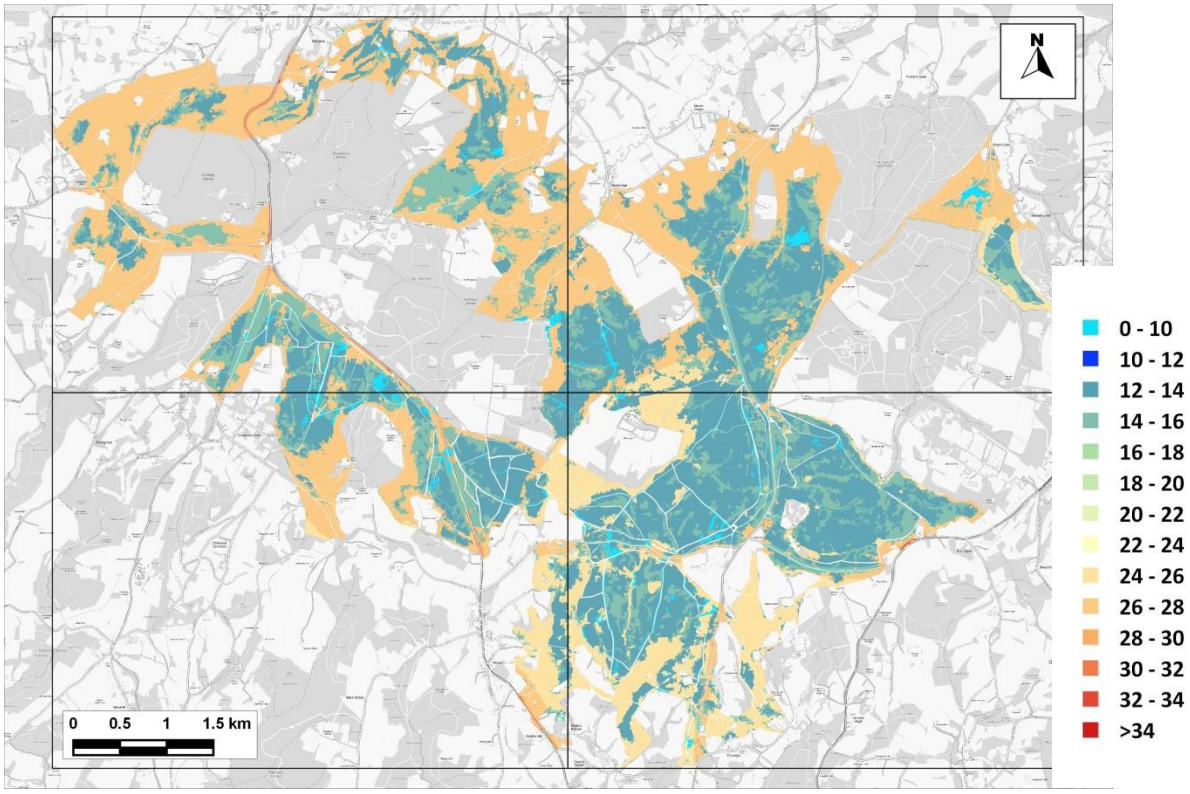


Figure 10.3: Nitrogen Deposition to SAC – 2028 No-Growth - B (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.5: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.8	6.1	6.4	2.0	1.4	8.6	26.3	45%
Bracken	<0.1	1.7	3.0	1.1	0.2	0.2	8.5	14.6	9%
Scattered Bracken	<0.1	1.7	3.0	1.1	0.2	0.2	8.5	14.7	7%
Dry Heath	<0.1	1.4	2.5	0.9	0.2	0.2	8.5	13.6	24%
Wet Heath	<0.1	1.5	2.5	0.9	0.2	0.2	8.5	13.8	10%
Grassland	<0.1	1.5	2.3	0.8	0.1	0.1	8.6	13.4	3%
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.6	9.6	0.2%
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.5	9.4	3%
Whole SAC	<0.1	1.6	4.1	3.4	1.0	0.8	8.5	19.4	-

Table 10.6: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	0.2	10.4	21.3	6.4	2.0	1.4	8.9	50.6
Bracken	<0.1	6.4	7.1	1.1	0.2	0.2	8.9	23.2
Scattered Bracken	<0.1	5.8	6.4	1.1	0.2	0.2	8.9	22.1
Dry Heath	<0.1	6.6	6.6	0.9	0.2	0.2	8.9	23.4
Wet Heath	<0.1	5.0	5.4	0.9	0.2	0.2	8.9	20.1
Grassland	<0.1	5.2	5.3	0.8	0.1	0.1	8.9	19.9
Water	<0.1	0.4	0.4	0.1	0.2	0.2	8.9	9.9
Bare Ground	<0.1	0.8	0.7	0.1	0.1	0.1	8.9	10.4
Whole SAC	0.2	10.4	21.3	6.4	2.0	1.4	8.9	50.6

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 10.7: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.7	6.0	6.4	2.0	1.4	8.0	25.5
Bracken	<0.1	1.6	2.9	1.1	0.2	0.2	8.0	14.0
Scattered Bracken	<0.1	1.6	2.9	1.1	0.2	0.2	8.1	14.1
Dry Heath	<0.1	1.4	2.4	0.9	0.2	0.2	8.0	13.2
Wet Heath	<0.1	1.4	2.4	0.9	0.2	0.2	8.0	13.2
Grassland	<0.1	1.4	2.3	0.8	0.1	0.1	8.0	12.7
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.0	9.1
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.0	8.8
Whole SAC	<0.1	0.2	0.3	0.1	0.1	0.1	8.0	8.8

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 10.8: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - B (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.14	6.05	73.19
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
12	14	597.79	0.00	219.24	0.00	0.00	86.10	0.00	0.00	903.14
14	16	29.08	0.00	40.81	235.07	179.74	0.64	0.00	0.00	485.32
16	18	0.02	0.00	0.69	1.03	1.15	0.02	0.00	0.00	2.92
18	20	0.00	0.00	0.03	0.10	0.11	0.01	0.00	0.00	0.25
20	22	0.00	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.07
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
24	26	0.00	289.71	0.00	0.00	0.00	0.00	0.00	0.00	289.71
26	28	0.00	893.81	0.00	0.00	0.00	0.00	0.00	0.00	893.81
28	30	0.00	13.29	0.00	0.00	0.00	0.00	0.00	0.00	13.29
30	32	0.00	2.17	0.00	0.00	0.00	0.00	0.00	0.00	2.17
32	34	0.00	1.36	0.00	0.00	0.00	0.00	0.00	0.00	1.36
34	36	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.60
36	38	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.54
38	40	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.37
40	-	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.22
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.10	0.00	2593.86

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No-Growth – B (AQC Method)

10.11 Figure 10.4 (see also Figure A7.13 to Figure A7.16) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without any traffic growth from 2015 levels, under emissions scenario B, and using the AQC deposition method. Over most surface types, predicted deposition fluxes using the AQC deposition method are lower than those derived using the EA deposition method. Despite this, as with the EA method, the 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water, reflecting the much slower rates of deposition to these surfaces. There is a clear differentiation in Figure 10.4

between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland even well away from roads, although the highest fluxes still occur at the roadsides[45].

10.12 Table 10.9, Table 10.10, and Table 10.11 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (46.7 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum deposition to dry heath (19.3 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (17.0 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.7 kg-N/ha/yr, with the averages for all dry and wet heath being 12.9 kg-N/ha/yr and 13.0 kg-N/ha/yr respectively. The minimum predicted fluxes to dry and wet heath both are 12.4 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (9.0 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

10.13 Table 10.12 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 66 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,595 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.03 ha of the SAC, all of which is woodland. As with the EA method results, most of the dry and wet heath is predicted to experience deposition within the 12-14 kg-N/ha/yr deposition band.

[45] For detail of the areas within each deposition range, see Paragraph 10.13.

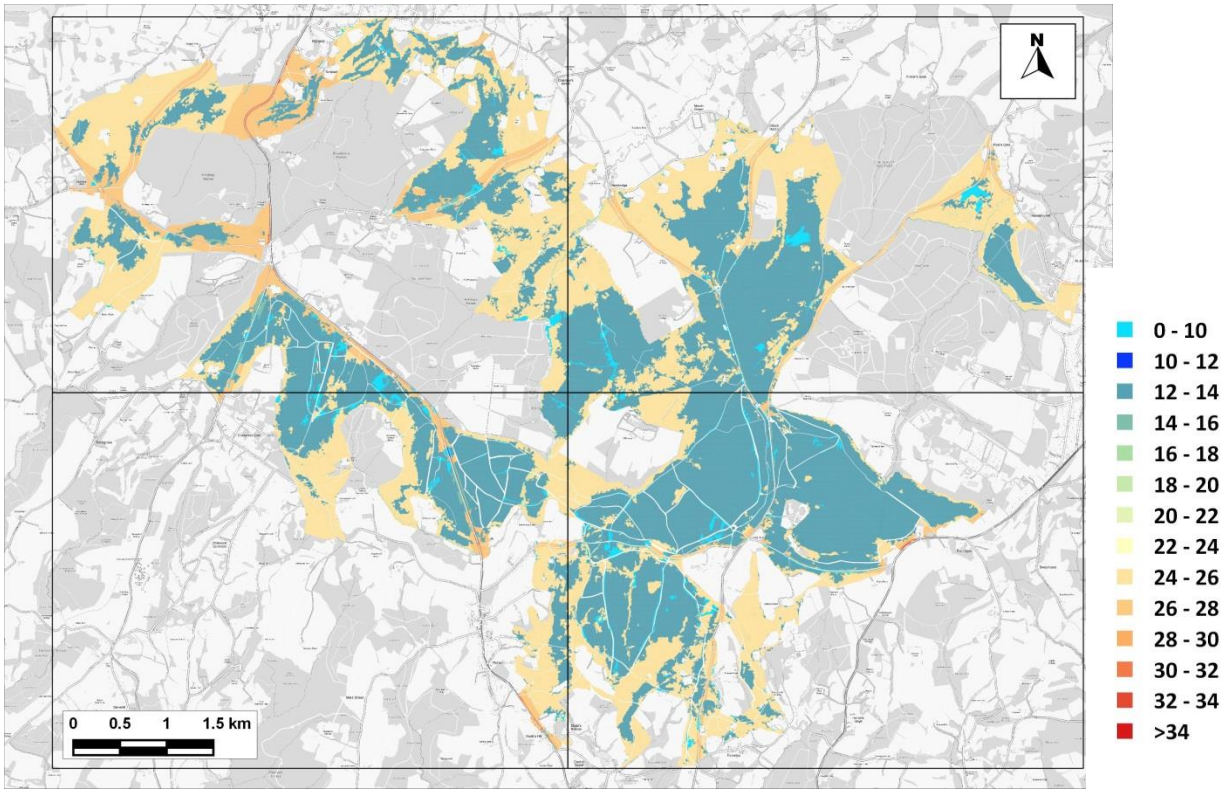


Figure 10.4: Nitrogen Deposition to SAC – 2028 No-Growth - B (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.9: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.3	6.1	6.4	2.0	1.4	8.6	25.8	45%
Bracken	<0.1	0.7	2.9	1.1	0.2	0.2	8.5	13.6	9%
Scattered Bracken	<0.1	0.7	2.9	1.1	0.2	0.2	8.5	13.6	7%
Dry Heath	<0.1	0.7	2.5	0.9	0.2	0.2	8.5	12.9	24%
Wet Heath	<0.1	0.7	2.5	0.9	0.2	0.2	8.5	13.0	10%
Grassland	<0.1	0.8	2.3	0.8	0.1	0.1	8.6	12.7	3%
Water	<0.1	0.4	0.3	0.1	0.2	0.2	8.6	9.7	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.1	8.5	9.5	3%
Whole SAC	<0.1	1.0	4.1	3.4	1.0	0.8	8.5	18.7	-

Table 10.10: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	0.0	6.8	21.3	6.4	2.0	1.4	8.9	46.7
Bracken	0.0	2.4	7.1	1.1	0.2	0.2	8.9	19.1
Scattered Bracken	0.0	1.9	6.3	1.1	0.2	0.2	8.9	18.2
Dry Heath	0.0	2.6	6.6	0.9	0.2	0.2	8.9	19.3
Wet Heath	0.0	2.0	5.3	0.9	0.2	0.2	8.9	17.0
Grassland	0.0	2.6	5.3	0.8	0.1	0.1	8.9	17.1
Water	0.0	0.6	0.4	0.1	0.2	0.2	8.9	10.1
Bare Ground	0.0	1.3	0.7	0.1	0.1	0.1	8.9	10.8
Whole SAC	0.0	6.8	21.3	6.4	2.0	1.4	8.9	46.7

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 10.11: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	0.0	1.3	6.0	6.4	2.0	1.4	8.0	25.1
Bracken	0.0	0.6	2.9	1.1	0.2	0.2	8.0	13.0
Scattered Bracken	0.0	0.6	2.9	1.1	0.2	0.2	8.1	13.1
Dry Heath	0.0	0.7	2.4	0.9	0.2	0.2	8.0	12.4
Wet Heath	0.0	0.7	2.4	0.9	0.2	0.2	8.0	12.4
Grassland	0.0	0.8	2.3	0.8	0.1	0.1	8.0	12.1
Water	0.0	0.3	0.3	0.1	0.2	0.2	8.0	9.2
Bare Ground	0.0	0.3	0.3	0.1	0.1	0.1	8.0	9.0
Whole SAC	0.0	0.3	0.3	0.1	0.1	0.1	8.0	9.0

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 10.12: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - B (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	66.58	6.01	72.59
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.04	0.69
12	14	626.77	0.00	258.42	232.48	172.53	86.72	0.00	0.00	1376.92
14	16	0.13	0.00	2.32	3.66	8.39	0.04	0.00	0.00	14.53
16	18	0.00	0.00	0.02	0.08	0.13	0.01	0.00	0.00	0.24
18	20	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.02
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1005.41	0.00	0.00	0.00	0.00	0.00	0.00	1005.41
26	28	0.00	185.72	0.00	0.00	0.00	0.00	0.00	0.00	185.72
28	30	0.00	6.97	0.00	0.00	0.00	0.00	0.00	0.00	6.97
30	32	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00	1.99
32	34	0.00	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.82
34	36	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.61
36	38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.38
38	40	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.13
40	-	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.66	0.04	2594.46

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

2028 No-Growth Emissions Scenario C

Annual Mean NOx in 2028 No-Growth – C

10.14 Figure 10.5 (also see Figure A7.17 to Figure A7.20) shows the predicted annual mean NOx concentrations across the SAC in 2028 without any traffic growth from 2015 levels; this time under emissions scenario C. Predicted concentrations using emissions scenario C are lower than those using emissions scenario B. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 11 $\mu g/m^3$, with concentrations less than 8 $\mu g/m^3$ predicted in many areas. Exceedences of the 30 $\mu g/m^3$ critical level are only predicted at the very kerbside of the A22 and

A26[46].

10.15 Table 10.13 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (32.3 μg/m^3) is predicted to occur at an area of woodland alongside the A26 at Poundgate. The maximum concentration over dry heath (23.5 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (19.8 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 8.0 μg/m^3, with the averages for dry and wet heath being 7.8 μg/m^3 and 8.2 μg/m^3 respectively. The minimum concentration over the SAC is 7.5 μg/m^3, with this predicted for several areas which are well away from roads.

10.16 Table 10.14 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. While it appears from this table that there is no exceedence, this is because the numbers are rounded to the nearest 100 m^2. In practice, as explained in Paragraphs 10.14 and 10.15, exceedences of the critical level have been predicted at the kerbside of both the A22 and the A26. The area of exceedence is, however, less than 0.005 ha. Most of the predicted concentrations over areas of dry and wet heath fall within the 0-10 μg/m^3 concentration range (626 ha and 253 ha respectively).

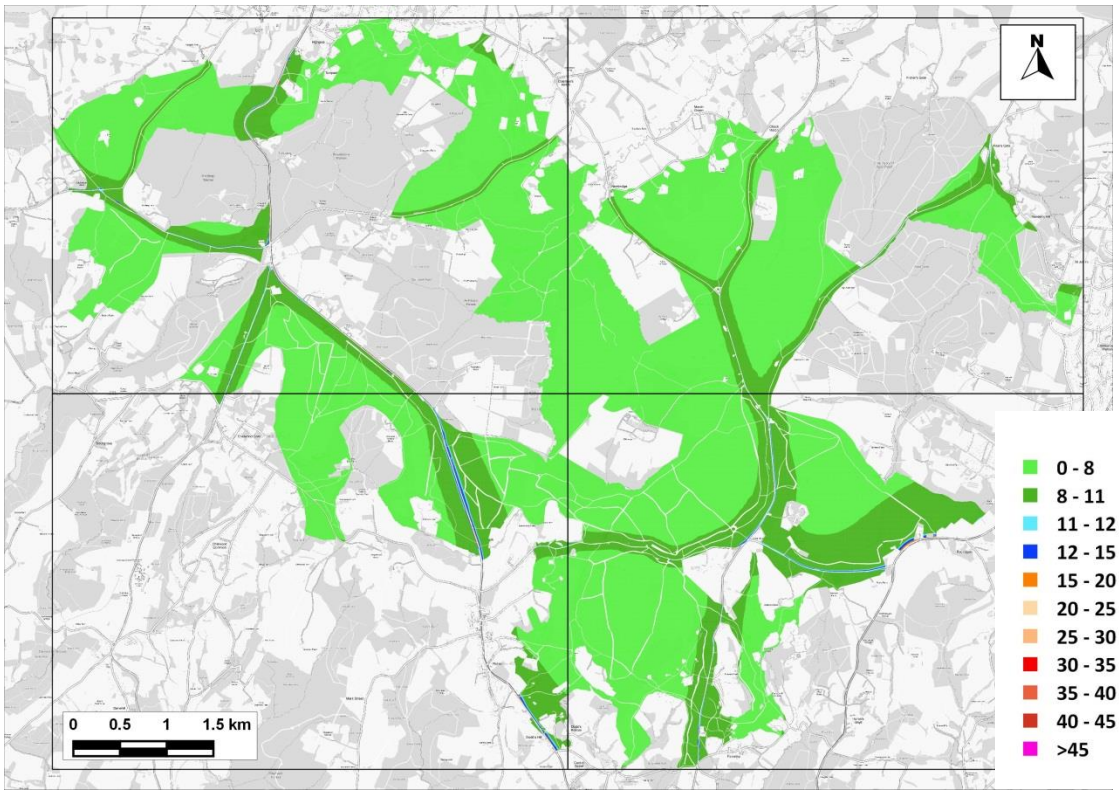


Figure 10.5: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No-Growth - C (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

[46] For detail of the areas of these exceedences, see Paragraph 10.16.

Table 10.13: Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth – C (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	8.0	32.2	7.5
Bracken	8.0	25.2	7.6
Scattered Bracken	7.9	18.7	7.6
Dry Heath	7.8	23.5	7.6
Wet Heath	8.2	19.8	7.6
Grassland	7.9	21.3	7.5
Water	7.8	12.9	7.5
Bare Ground	8.2	26.1	7.5
Whole SAC	8.0	32.2	7.5

Table 10.14: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - C [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	8	538.26	893.89	130.70	166.64	134.02	66.54	42.83	5.43	1978.30
8	10	87.40	279.02	121.82	66.00	44.81	19.58	19.90	0.60	639.14
10	12	1.19	21.79	6.53	2.91	1.88	0.56	3.46	0.02	38.33
12	14	0.05	3.61	1.49	0.47	0.19	0.05	0.65	0.00	6.52
14	18	0.00	2.63	0.22	0.14	0.13	0.03	0.27	0.00	3.42
18	20	0.00	0.60	0.01	0.03	0.02	0.01	0.09	0.00	0.76
20	25	0.00	0.48	0.00	0.02	0.00	0.00	0.03	0.00	0.54
25	30	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
30	35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >30		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 No-Growth – C

10.17 Figure 10.6 (also see Figure A7.21 to Figure A7.24) shows the maximum predicted 24-hour NOx concentrations across the SAC in 2028 without any traffic growth from 2015 levels and under emissions scenario C. Predicted concentrations using emissions scenario C are lower than those using emissions scenario B. Over most of the SAC, predicted concentrations are below the 75 μg/m^3 critical level, but exceedences of this critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Coleman's Hatch Rd, the A26, the B2188, London Rd, Crowborough Rd, New Rd, and the B2026[47].

10.18 Table 10.15 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (200.6 μg/m^3) is predicted to occur at an area of woodland alongside the A26 at Poundgate. The maximum concentration over dry heath (155.8 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (134.9 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 58.3 μg/m^3, with the averages for dry and wet heath being 57.3 μg/m^3 and 59.7 μg/m^3 respectively. The minimum concentration over the SAC is 55.1 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

10.19 Table 10.16 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and shows that 35.92 ha are expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 3.4 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 1.2 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, and 0.1 ha is predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3. Less than 0.005 ha is predicted to experience concentrations above 200 μg/m^3.

[47] For detail of the areas of these exceedences, see Paragraph 10.19.

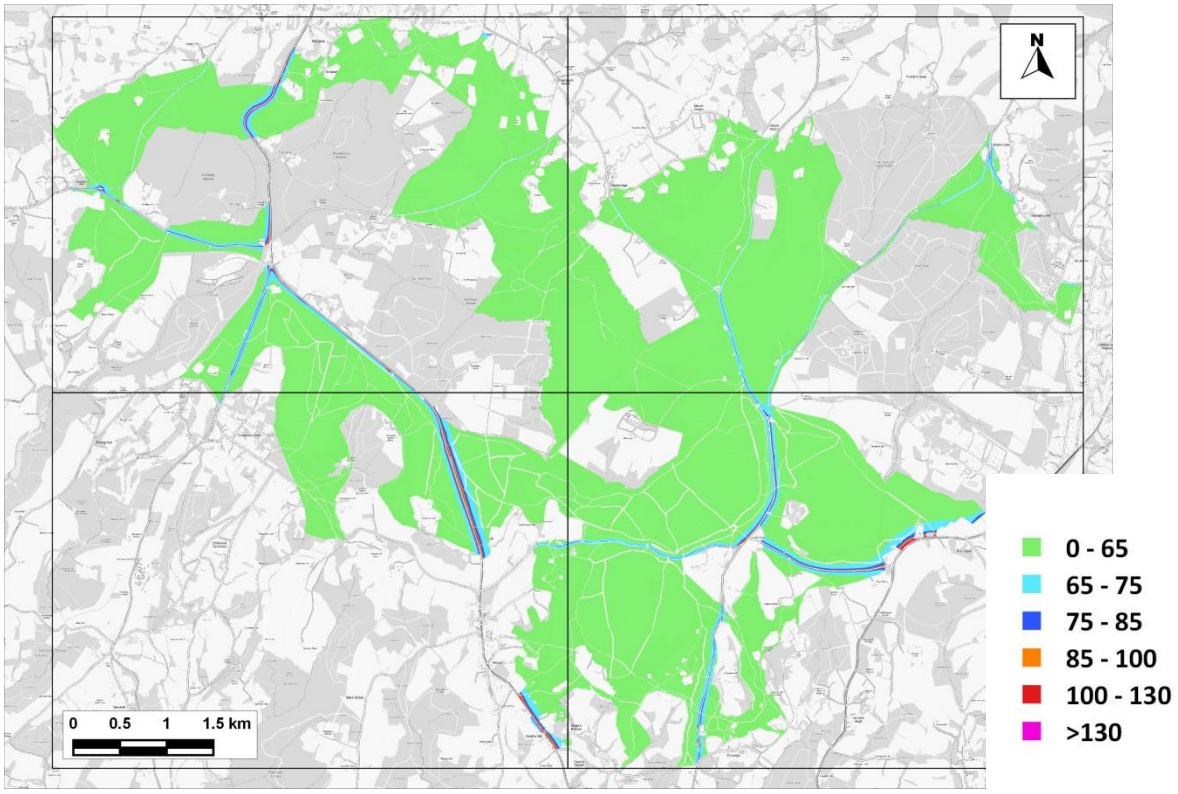


Figure 10.6: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No-Growth - C (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.15: 24-hour NOx across the Ashdown Forest SAC – 2028 No-Growth - C (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	58.4	200.6	55.1
Bracken	58.4	164.6	55.5
Scattered Bracken	58.1	128.4	55.4
Dry Heath	57.3	155.8	55.4
Wet Heath	59.7	134.9	55.7
Grassland	57.9	143.5	55.1
Water	57.0	92.9	55.3
Bare Ground	60.1	169.4	55.2
Whole SAC	58.3	200.6	55.1

Table 10.16: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No-Growth - C [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	592.16	1019.67	187.08	194.43	157.51	76.78	51.51	5.67	2284.80
60	65	28.34	105.59	49.93	30.27	15.45	7.25	7.35	0.31	244.49
65	75	5.65	55.61	17.58	9.03	6.63	2.29	4.98	0.06	101.84
75	85	0.68	12.96	4.03	1.70	1.06	0.35	2.12	0.01	22.91
85	100	0.07	4.57	1.93	0.60	0.26	0.06	0.88	0.00	8.38
100	125	0.00	2.58	0.20	0.14	0.13	0.03	0.27	0.00	3.35
125	150	0.00	0.96	0.00	0.05	0.02	0.01	0.12	0.00	1.15
150	200	0.00	0.12	0.00	0.01	0.00	0.00	0.00	0.00	0.13
200	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >75		0.75	21.18	6.17	2.49	1.46	0.46	3.39	0.01	35.92

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No-Growth – C (EA Method)

10.20 Figure 10.7 (see also Figure A7.25 to Figure A7.28) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without any traffic growth from 2015 levels, under emissions scenario C, and using the EA deposition method. Predicted fluxes using emissions scenario C are lower than those using emissions scenario B. However, as with previous nitrogen deposition datasets, the 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water; again reflecting the much slower rates of deposition to these surfaces. There is a clear differentiation in Figure 10.7 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland even well away from roads, although the highest fluxes still occur at the roadsides[48].

10.21 Table 10.17, Table 10.18, and Table 10.19 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (47.3 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum deposition to dry heath (21.5 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (18.7 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average

[48] For detail of the areas within each deposition range, see Paragraph 10.22.

deposition flux over the whole SAC is predicted to be 18.9 kg-N/ha/yr, with the averages for all dry and wet heath being 13.3 kg-N/ha/yr and 13.5 kg-N/ha/yr respectively. The minimum predicted fluxes to both dry and wet heath are 12.9 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.6 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

10.22 Table 10.20 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.03 ha (300 m^2) of the SAC, with all of this being woodland. Most of the dry and wet heath (625 ha and 251 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr range.

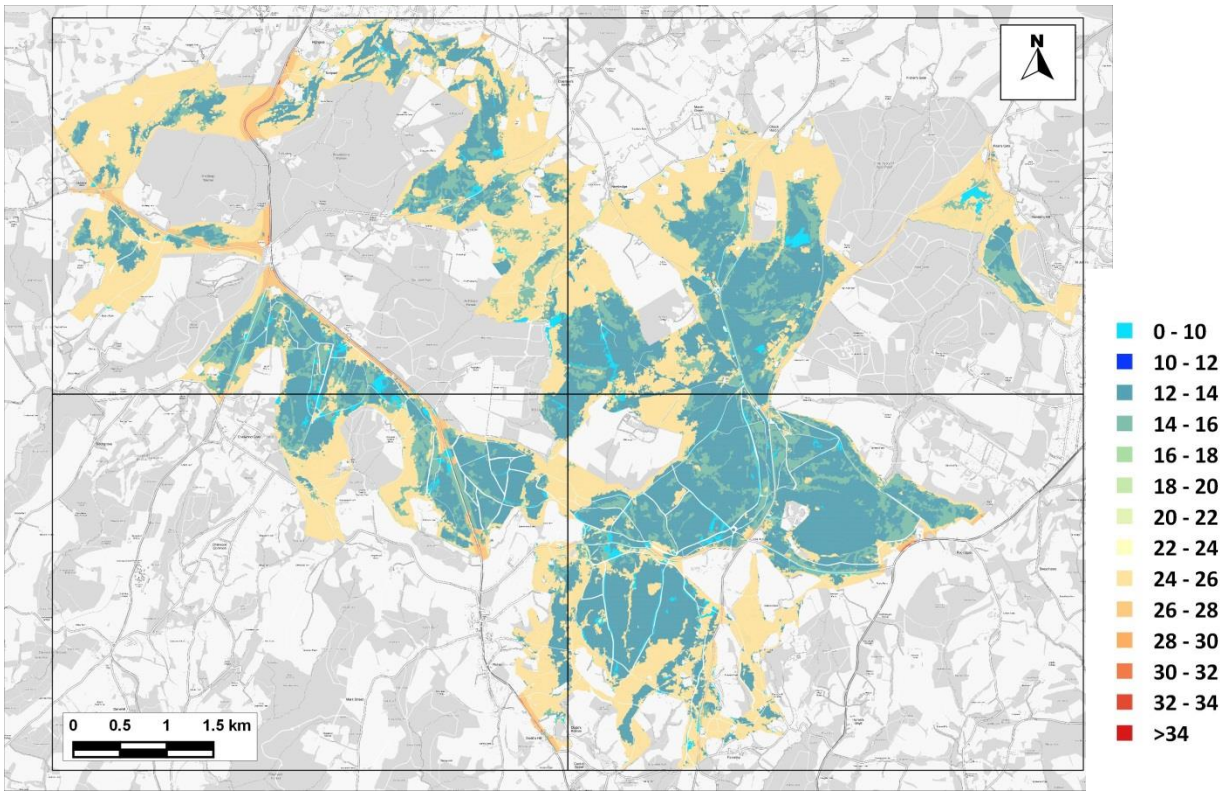


Figure 10.7: Nitrogen Deposition to SAC – 2028 No-Growth - C (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.17: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.7	6.1	5.9	2.0	1.3	8.4	25.5	45%
Bracken	<0.1	1.6	3.0	1.0	0.2	0.2	8.3	14.3	9%
Scattered Bracken	<0.1	1.6	3.0	1.0	0.2	0.2	8.4	14.3	7%
Dry Heath	<0.1	1.4	2.5	0.8	0.2	0.2	8.3	13.3	24%
Wet Heath	<0.1	1.5	2.5	0.8	0.2	0.2	8.3	13.5	10%
Grassland	<0.1	1.4	2.3	0.7	0.1	0.1	8.4	13.1	3%
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.4	9.4	0.2%
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.3	9.1	3%
Whole SAC	<0.1	1.6	4.1	3.1	1.0	0.7	8.3	18.9	-

Table 10.18: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	8.0	21.3	5.9	2.0	1.3	8.7	47.3
Bracken	<0.1	4.9	7.1	1.0	0.2	0.2	8.7	21.4
Scattered Bracken	<0.1	4.5	6.4	1.0	0.2	0.2	8.7	20.5
Dry Heath	<0.1	5.0	6.6	0.8	0.2	0.2	8.7	21.5
Wet Heath	<0.1	3.9	5.4	0.8	0.2	0.2	8.7	18.7
Grassland	<0.1	4.1	5.3	0.7	0.1	0.1	8.7	18.4
Water	<0.1	0.3	0.4	0.1	0.2	0.2	8.7	9.7
Bare Ground	<0.1	0.6	0.7	0.1	0.1	0.1	8.7	10.0
Whole SAC	<0.1	8.0	21.3	5.9	2.0	1.3	8.7	47.3

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 10.19: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.6	6.0	5.9	2.0	1.3	7.8	24.8
Bracken	<0.1	1.6	2.9	1.0	0.2	0.2	7.8	13.7
Scattered Bracken	<0.1	1.6	2.9	1.0	0.2	0.2	7.9	13.8
Dry Heath	<0.1	1.4	2.4	0.8	0.2	0.2	7.8	12.9
Wet Heath	<0.1	1.4	2.4	0.8	0.2	0.2	7.8	12.9
Grassland	<0.1	1.4	2.3	0.7	0.1	0.1	7.8	12.5
Water	<0.1	0.2	0.3	0.1	0.2	0.2	7.9	8.9
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	7.8	8.6
Whole SAC	<0.1	0.2	0.3	0.1	0.1	0.1	7.8	8.6

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 10.20: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - C (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.24	6.05	73.28
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	14	625.24	0.00	251.01	27.11	18.65	86.57	0.00	0.00	1008.59
14	16	1.66	0.00	9.61	208.65	161.97	0.18	0.00	0.00	382.07
16	18	0.00	0.00	0.14	0.41	0.34	0.02	0.00	0.00	0.90
18	20	0.00	0.00	0.00	0.04	0.08	0.00	0.00	0.00	0.13
20	22	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.02
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1126.17	0.00	0.00	0.00	0.00	0.00	0.00	1126.17
26	28	0.00	67.73	0.00	0.00	0.00	0.00	0.00	0.00	67.73
28	30	0.00	4.56	0.00	0.00	0.00	0.00	0.00	0.00	4.56
30	32	0.00	1.71	0.00	0.00	0.00	0.00	0.00	0.00	1.71
32	34	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.73
34	36	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.59
36	38	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.37
38	40	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.15
40	-	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.00	0.00	2593.76

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No-Growth – C (AQC Method)

10.23 Figure 10.8 (see also Figure A7.29 to Figure A7.32) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without any traffic growth from 2015 levels, under emissions scenario C, this time using the AQC deposition method. Predicted concentrations using emissions scenario C are lower than those using emissions scenario B. Furthermore, over most surfaces, predicted deposition fluxes using the AQC deposition method are lower than those derived using the EA deposition method. Despite this, and as with previous nitrogen deposition datasets, the 10 kg-

N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 10.8 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland even well away from roads, although the highest fluxes still occur at the roadsides[49].

10.24 Table 10.21, Table 10.22, and Table 10.23 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (44.4 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum deposition to dry heath (18.4 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (16.3 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.2 kg-N/ha/yr, with the averages for all dry and wet heath being 12.6 kg-N/ha/yr and 12.7 kg-N/ha/yr respectively. The minimum predicted fluxes to both dry and wet heath are 12.2 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.8 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

10.25 Table 10.24 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.02 ha of the SAC (200 m^2), all of which is woodland. As with the EA method results, most of the dry and wet heath (627 and 260 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr deposition band.

[49] For detail of the areas within each deposition range, see Paragraph 10.25.

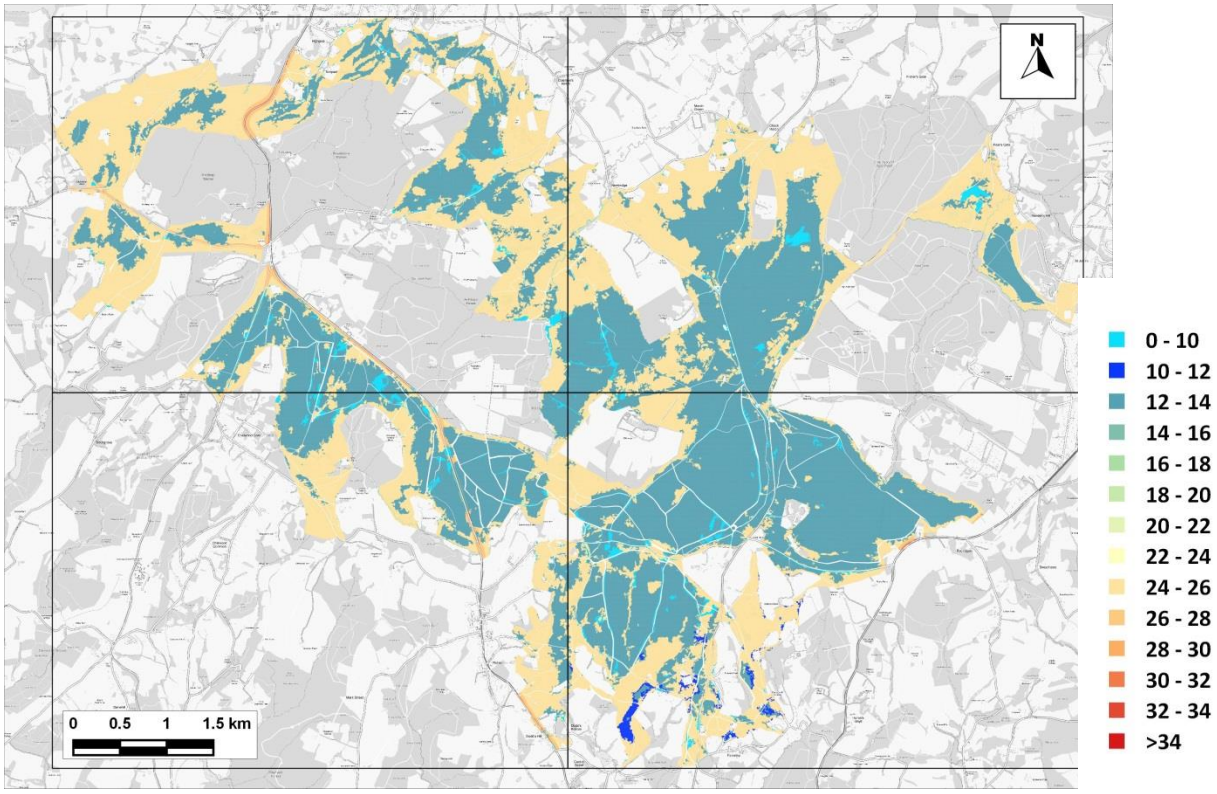


Figure 10.8: Nitrogen Deposition to SAC – 2028 No-Growth - C (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 10.21: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No-Growth - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.3	6.1	5.9	2.0	1.3	8.4	25.1	45%
Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	8.3	13.3	9%
Scattered Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	8.4	13.4	7%
Dry Heath	<0.1	0.7	2.5	0.8	0.2	0.2	8.3	12.6	24%
Wet Heath	<0.1	0.7	2.5	0.8	0.2	0.2	8.3	12.7	10%
Grassland	<0.1	0.8	2.3	0.7	0.1	0.1	8.4	12.4	3%
Water	<0.1	0.4	0.3	0.1	0.2	0.2	8.4	9.5	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.1	8.3	9.3	3%
Whole SAC	<0.1	1.0	4.1	3.1	1.0	0.7	8.3	18.2	-

Table 10.22: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth – C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	5.2	21.3	5.9	2.0	1.3	8.7	44.4
Bracken	<0.1	1.8	7.1	1.0	0.2	0.2	8.7	18.3
Scattered Bracken	<0.1	1.5	6.3	1.0	0.2	0.2	8.7	17.5
Dry Heath	<0.1	2.0	6.6	0.8	0.2	0.2	8.7	18.4
Wet Heath	<0.1	1.6	5.3	0.8	0.2	0.2	8.7	16.3
Grassland	<0.1	2.0	5.3	0.7	0.1	0.1	8.7	16.3
Water	<0.1	0.5	0.4	0.1	0.2	0.2	8.7	9.8
Bare Ground	<0.1	1.0	0.7	0.1	0.1	0.1	8.7	10.4
Whole SAC	<0.1	5.2	21.3	5.9	2.0	1.3	8.7	44.4

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 10.23: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No-Growth - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.3	6.0	5.9	2.0	1.3	7.8	24.4
Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	7.8	12.8
Scattered Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	7.9	12.9
Dry Heath	<0.1	0.7	2.4	0.8	0.2	0.2	7.8	12.2
Wet Heath	<0.1	0.7	2.4	0.8	0.2	0.2	7.8	12.2
Grassland	<0.1	0.8	2.3	0.7	0.1	0.1	7.8	11.8
Water	<0.1	0.3	0.3	0.1	0.2	0.2	7.9	9.0
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.1	7.8	8.8
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.1	7.8	8.8

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 10.24: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No-Growth - C (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.16	6.05	73.21
10	12	0.00	0.00	0.00	0.00	0.00	13.12	0.08	0.00	13.20
12	14	626.88	0.00	260.00	235.10	179.11	73.62	0.00	0.00	1374.70
14	16	0.02	0.00	0.76	1.08	1.87	0.03	0.00	0.00	3.76
16	18	0.00	0.00	0.00	0.03	0.08	0.00	0.00	0.00	0.12
18	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1165.87	0.00	0.00	0.00	0.00	0.00	0.00	1165.87
26	28	0.00	30.64	0.00	0.00	0.00	0.00	0.00	0.00	30.64
28	30	0.00	2.95	0.00	0.00	0.00	0.00	0.00	0.00	2.95
30	32	0.00	1.23	0.00	0.00	0.00	0.00	0.00	0.00	1.23
32	34	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.72
34	36	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.45
36	38	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.16
38	40	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
40	-	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.08	0.00	2593.84

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Chapter Summary

10.26 The No-Growth model predicts the future air quality conditions across the SAC assuming that there is no growth in traffic either within Wealden or elsewhere. For NOx concentrations and nitrogen deposition, these predictions are made for three alternative emissions scenarios: A, B, and C. However, because emissions scenario A assumes no change from the current position, these predictions are identical to those for the existing baseline and are not described again. For NH_3, only one emissions scenario is considered (scenario A) and these results are thus as set out for the existing baseline.

Annual Mean NOx

10.27 Predicted annual mean NOx concentrations in No-Growth emissions scenarios B and C are both lower than those in the existing baseline (which uses the same traffic data but emissions scenario A). This reflects differences in the different emissions models. Concentrations are, however, predicted to continue to exceed the critical level under both emissions scenarios B, and C. Both the area of exceedence, and the degree to which the critical level is exceeded, is smallest in emissions scenario C. In emissions scenario B, the maximum predicted annual mean NOx concentration is 44 $\mu g/m^3$ and a total of 0.1 ha (1,000 m^2) is predicted to exceed the 30 $\mu g/m^3$ critical level. In emissions scenario C, the maximum predicted concentration is 32 $\mu g/m^3$ and a total of 0.005 ha (50 m^2) is predicted to exceed the 30 $\mu g/m^3$ critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (31 $\mu g/m^3$, 24 $\mu g/m^3$ for emissions scenarios B and C respectively). Thus, the 30 $\mu g/m^3$ critical level is not predicted to be exceeded over heathland in emissions scenario C. The level of the lower-bound uncertainty range to the critical level as advised by CEH (15 $\mu g/m^3$) is, however, exceeded.

24-hour Mean NOx

10.28 As was the case for annual mean NOx, all of the predicted maximum 24-hour mean concentrations in No-Growth emissions scenarios B and C are lower than those in the existing baseline (which uses the same traffic data but emissions scenario A). Maximum 24-hour mean NOx concentrations are predicted to exceed the critical level under both emissions scenarios B, and C. Both the area of exceedence, and the degree to which the critical level is exceeded, is smallest in emissions scenario C. In emissions scenario B, the maximum predicted concentration is 254 $\mu g/m^3$ and a total of 80 ha is predicted to exceed the 75 $\mu g/m^3$ critical level. Under emissions scenario C, the maximum predicted concentration is 201 $\mu g/m^3$ and a total of 36 ha is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (193 $\mu g/m^3$, and 156 $\mu g/m^3$ for emissions scenarios B and C respectively) but the 75 $\mu g/m^3$ critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C).

Nitrogen Deposition

10.29 As well as the two emissions scenarios (B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). All of the predicted deposition fluxes in No-Growth emissions scenarios B and C are lower than those in the existing baseline (which uses the same traffic data but emissions scenario A). Under both emissions scenarios and both deposition models, the 10 kg-N/ha/yr critical load is predicted to be exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load, under any of the emissions scenarios or deposition models, are some areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

10.30 The maximum predicted fluxes under emissions scenario B are 51 and 47 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 23 and 19 kg-N/ha/yr respectively. The maximum predicted fluxes under emissions scenario C are 47 and 44 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 22 and 18 kg-N/ha/yr respectively.

10.31 Thus, even in the most optimistic emissions scenario considered (scenario C) and deposition method (AQC method), deposition fluxes are predicted to be well above the critical load at the worst-case heathland location considered, and the critical load will be exceeded over virtually the entire SAC. Using the results for less optimistic scenarios, the exceedences are even greater.

11 2028 No WDC-Growth Model Results

11.1 This section sets out the ambient concentrations and nitrogen deposition fluxes predicted to occur in 2028 if traffic volumes grow to 2028 in line with the amended Tempro 7.2 reference case (WDC no growth) assumptions but without any growth within Wealden district associated with the Wealden Local Plan. Results are presented for emissions scenarios A, B and C. The purpose of the No WDC-Growth scenario is to predict future air quality conditions if growth outside of Wealden takes place but growth associated with the Wealden Local Plan does not. Chapter 13 compares the results of this scenario with those of the scenario which includes both the Wealden Local Plan and growth outside of Wealden and thus allows the effects of the Wealden Local Plan on its own to be quantified.

2028 No WDC-Growth Emissions Scenario A

Annual Mean NOx in 2028 No WDC-Growth – A

11.2 Figure 11.1 (also see Figure A8.1 to Figure A8.4) shows the predicted annual mean NOx concentrations across the SAC under emissions scenario A. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 15 μg/m^3, with concentrations less than 12 μg/m^3 predicted in many areas. Exceedences of the 30 μg/m^3 critical load are predicted alongside the A22, Hindleap Lane, Plawhatch Lane, the A275, Crowborough Rd, the B2026, New Rd, and the A26[50].

11.3 Table 11.1 shows the average, maximum and minimum predicted concentrations across the whole SAC. This shows that the average predicted concentration across the SAC as a whole is 12.4 μg/m^3, but that the maximum concentration predicted at any one location (A22 immediately north of Hindleap Lane) is 104.2 μg/m^3. Because most of the SAC is not alongside roads, the minimum concentration (at 10.9 μg/m^3) is quite close to the average (at 12.4 μg/m^3). The average concentration over dry heath is 11.9 μg/m^3, while to wet heath it is 13.1 μg/m^3. These values are well below the 30 μg/m^3 critical level and also below the 15 μg/m^3 lower-bound uncertainty range to the critical level identified by CEH. The maximum predicted concentrations over areas that currently support dry and wet heath are 75.6 μg/m^3 and 57.0 μg/m^3 respectively. Both of these values are predicted close to the A22, with the highest concentration over dry heath predicted north of Wych Cross, and the highest concentration over wet heath predicted near to the bottom of Millbrook Hill.

11.4 Table 11.2 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. As an example of how to interpret this table, it shows that 1,668 ha are predicted to experience concentrations between 10 and 12 μg/m^3, and that 6.8 ha will experience an exceedence of the

[50] For detail of the areas of these exceedences, see Paragraph 11.4.

critical level. Of this 6.8 ha, 4.75 ha will be woodland, 0.91 ha wet heath, 0.54 ha bracken, 0.06 ha grassland and 0.54 ha bare ground.

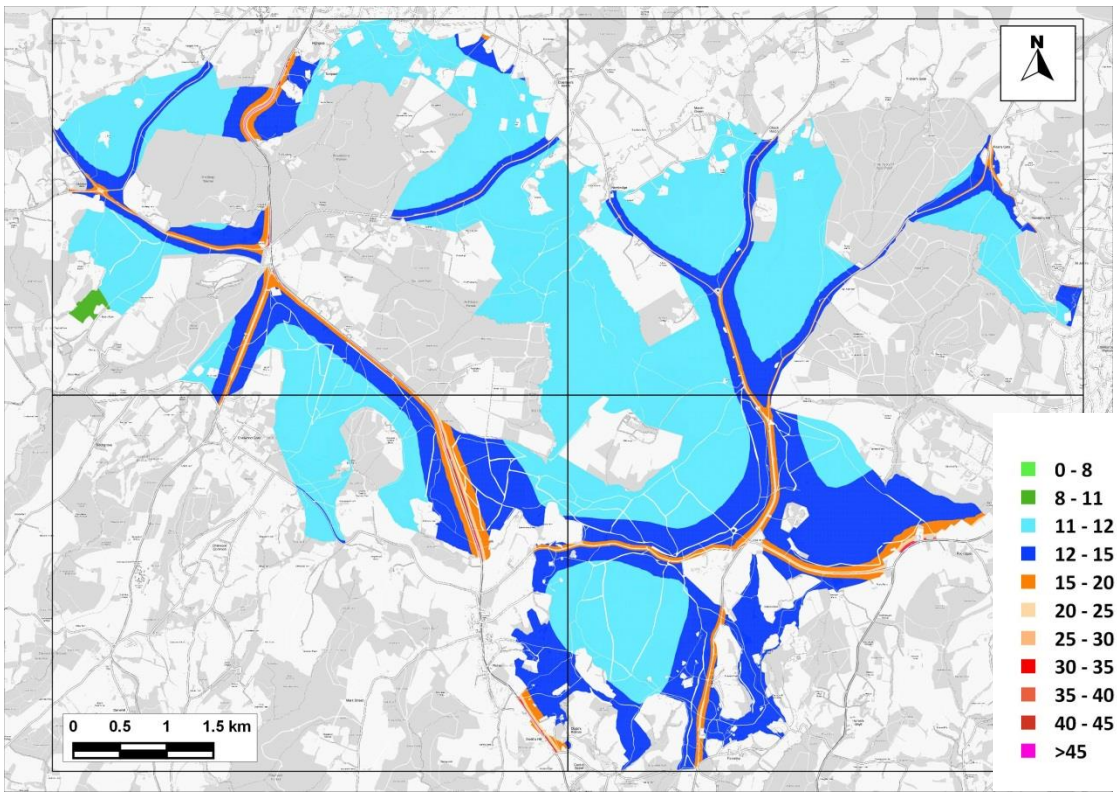


Figure 11.1: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No WDC-Growth - A (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.1: Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – A (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	12.4	104.2	10.9
Bracken	12.4	69.8	11.1
Scattered Bracken	12.3	56.1	11.0
Dry Heath	11.9	75.6	11.0
Wet Heath	13.1	57.0	11.2
Grassland	12.2	59.6	10.9
Water	11.8	31.7	11.0
Bare Ground	13.2	69.2	11.0
Whole SAC	12.4	104.2	10.9

Table 11.2: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - A [a]

Concentration ($\mu g/m^3$)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	12	451.23	771.85	98.51	143.86	113.22	50.96	33.46	4.95	1668.02
12	14	157.20	306.23	116.48	67.93	51.47	29.90	22.48	0.91	752.60
14	18	16.50	87.39	35.01	20.39	12.83	5.10	6.17	0.17	183.57
18	20	1.06	13.70	3.87	1.67	1.79	0.33	1.70	0.01	24.13
20	25	0.81	14.09	4.25	1.63	1.25	0.38	2.08	0.01	24.50
25	30	0.08	4.04	1.74	0.44	0.25	0.05	0.82	0.00	7.43
30	35	0.00	1.82	0.61	0.13	0.10	0.02	0.18	0.00	2.85
35	40	0.00	0.77	0.21	0.07	0.05	0.01	0.11	0.00	1.23
40	-	0.00	2.16	0.09	0.10	0.10	0.02	0.25	0.00	2.72
All >30		0.00	4.75	0.91	0.30	0.24	0.06	0.54	0.00	6.80

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 No WDC-Growth – A

11.5 Figure 11.2 (also see Figure A8.5 to Figure A8.8) shows the maximum predicted 24-hour NOx concentrations across the SAC under emissions scenario A. The 75 $\mu g/m^3$ critical level is predicted to be exceeded across the entire SAC, with concentrations well above the critical level close to roads.

11.6 Table 11.3 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (472.8 $\mu g/m^3$) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (378.2 $\mu g/m^3$) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (308.7 $\mu g/m^3$) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 88.8 $\mu g/m^3$, with the averages for dry and wet heath being 86.1 $\mu g/m^3$ and 93.3 $\mu g/m^3$ respectively. The minimum concentration over the SAC is 79.4 $\mu g/m^3$, with this predicted for several receptors within areas of woodland and grassland, all well away from any roads.

11.7 Table 11.4 shows how much of Ashdown Forest SAC is expected to experience different ranges of

concentrations, and highlights that the entire area is expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 176 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 39 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 17 ha are predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 5 ha are predicted to experience concentrations above 200 μg/m^3.

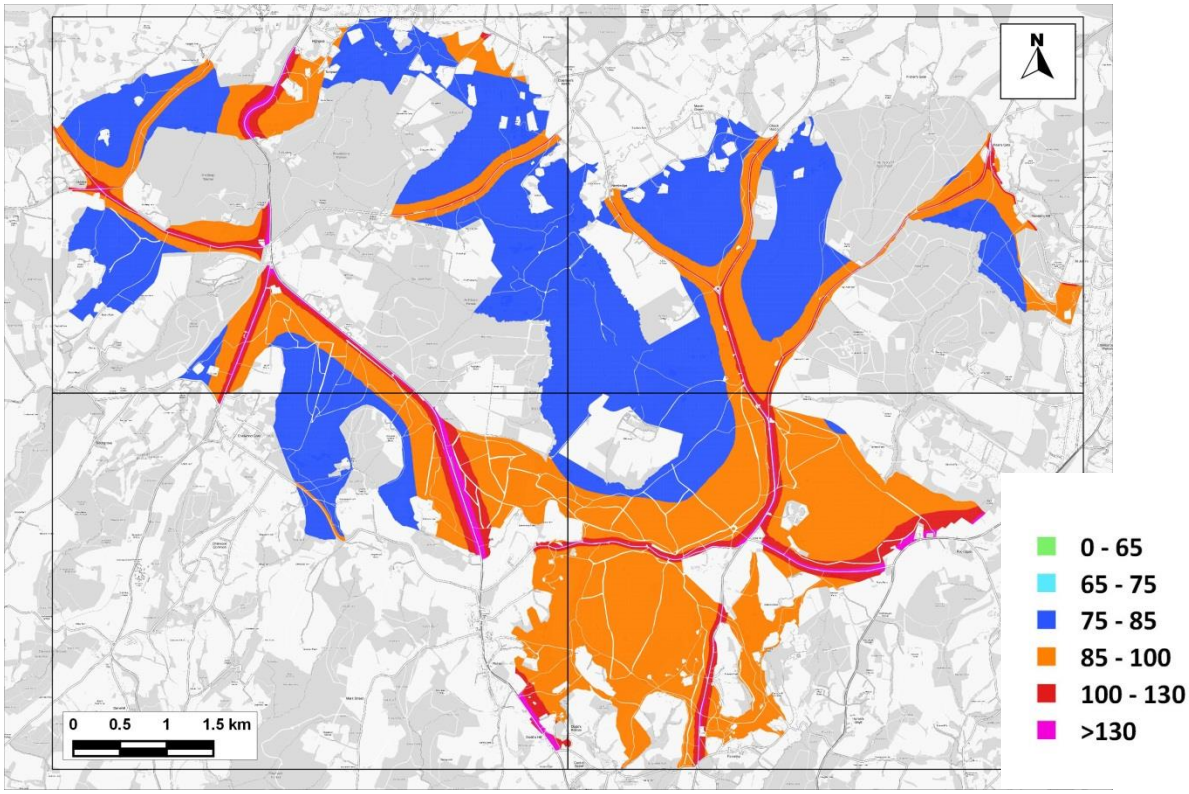


Figure 11.2: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No WDC-Growth - A (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.3: 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – A (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	89.1	472.8	79.4
Bracken	89.0	357.5	80.5
Scattered Bracken	88.4	305.1	80.1
Dry Heath	86.1	378.2	80.2
Wet Heath	93.3	308.7	81.2
Grassland	88.0	319.0	79.4
Water	85.2	198.1	79.8
Bare Ground	93.9	355.4	79.8
Whole SAC	88.8	472.8	79.4

Table 11.4: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - A [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	85	293.02	629.68	65.92	106.56	82.60	37.31	22.00	4.42	1241.51
85	100	316.56	452.33	150.80	106.40	82.67	43.81	34.14	1.45	1188.17
100	125	15.43	84.42	33.54	19.33	12.36	4.86	6.06	0.16	176.16
125	150	1.58	22.47	6.22	2.74	2.67	0.55	2.89	0.02	39.12
150	200	0.31	9.42	3.69	0.97	0.56	0.21	1.70	0.01	16.87
200	-	0.00	3.74	0.58	0.22	0.19	0.04	0.44	0.00	5.22
All >75		626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Annual Mean NH_3 in 2028 No WDC-Growth

11.8 Figure 11.3 (also see Figure A8.9 to Figure A8.12) shows the predicted annual mean NH_3 concentrations across the SAC without the Local Plan. Over most of the SAC, annual mean NH_3

concentrations are predicted to be less than 0.6 μg/m^3, but exceedences of the 1 μg/m^3 critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Crowborough Road, the B2026, and the A26[51].

11.9 Table 11.5 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (2.5 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (1.9 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (1.5 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 0.59 μg/m^3, with the averages for dry and wet heath being 0.59 μg/m^3 and 0.60 μg/m^3 respectively. The minimum concentration over the SAC is 0.58 μg/m^3, with this predicted for many areas which are well away from roads.

11.10 Table 11.6 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 1 μg/m^3 critical level. Most of the SAC (1,985 ha) would experience concentrations of less than 0.59 ubm3. 4.27 ha are predicted to experience concentrations above the 1 μg/m^3 critical level, with 3.29 ha of this being woodland, 0.26 ha being heath, 0.3 ha being bracken, 0.04 ha being grassland, and 0.38 ha being bare ground.

[51] For detail of the areas of these exceedences, see Paragraph 11.10.

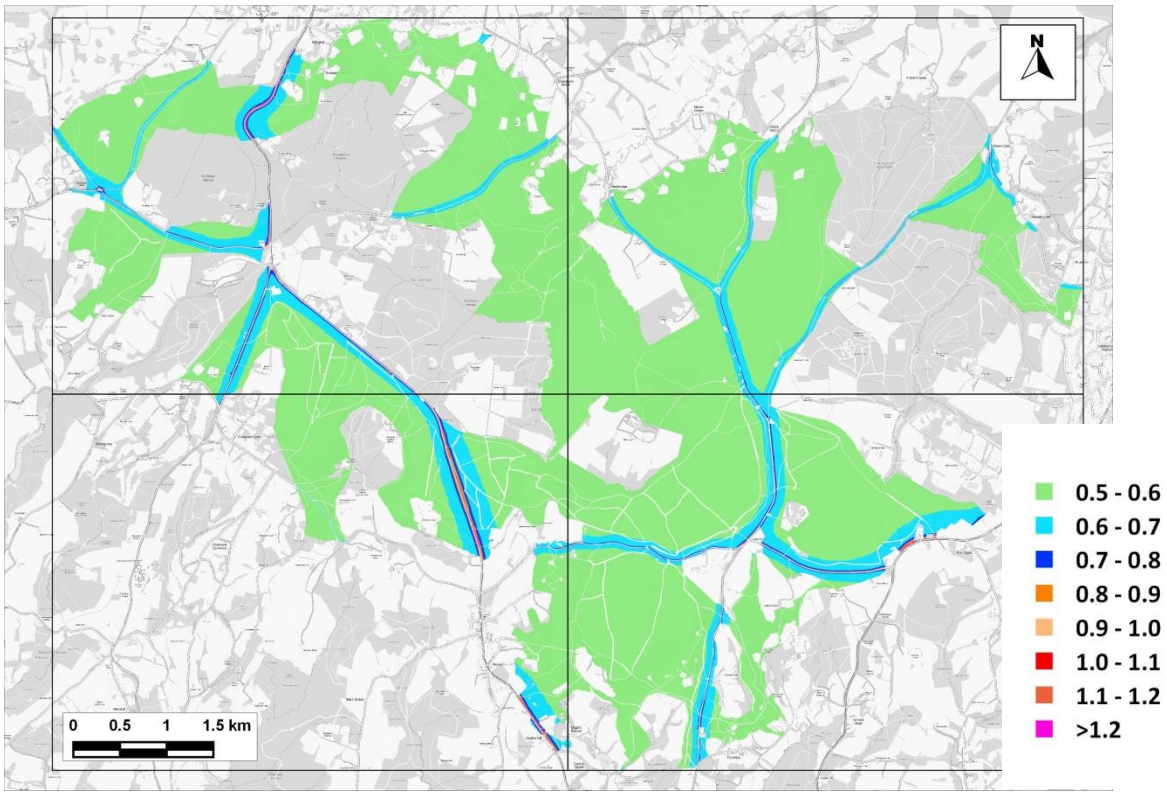


Figure 11.3: Predicted Annual Mean NH_3 Concentrations across the SAC– 2028 No WDC-Growth (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.5: Annual Mean NH_3 across the Ashdown Forest SAC – 2028 No WDC-Growth (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	0.60	2.5	0.58
Bracken	0.59	1.7	0.58
Scattered Bracken	0.59	1.5	0.58
Dry Heath	0.59	1.9	0.58
Wet Heath	0.60	1.5	0.58
Grassland	0.59	1.6	0.58
Water	0.59	0.9	0.58
Bare Ground	0.61	1.7	0.58
Whole SAC	0.59	2.5	0.58

Table 11.6: Summary of Annual Mean NH_3 across the Ashdown Forest SAC – 2028 No WDC-Growth [a]

Concentration ($\mu g/m^3$)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0.58	0.59	548.67	884.53	131.62	174.99	132.09	66.80	40.72	5.25	1984.66
0.59	0.6	48.00	125.55	58.40	28.89	24.29	10.11	10.77	0.40	306.41
0.6	0.7	29.06	164.34	63.12	29.66	22.19	9.30	11.25	0.38	329.29
0.7	0.8	1.07	18.47	4.98	1.88	1.93	0.45	2.90	0.01	31.69
0.8	0.9	0.08	4.11	1.77	0.49	0.30	0.05	0.96	0.00	7.77
0.9	1	0.01	1.77	0.61	0.18	0.10	0.02	0.26	0.00	2.95
1	1.1	0.00	0.99	0.15	0.06	0.05	0.01	0.12	0.00	1.39
1.1	1.2	0.00	0.57	0.07	0.04	0.04	0.01	0.06	0.00	0.77
1.2	-	0.00	1.73	0.04	0.04	0.07	0.02	0.20	0.00	2.10
All >1		0.00	3.29	0.26	0.14	0.16	0.04	0.38	0.00	4.27

Nitrogen Deposition in 2028 No WDC-Growth – A (EA Method)

11.11 Figure 11.4 (see also Figure A8.13 to Figure A8.16) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without the Local Plan, under emissions scenario A, and using the EA deposition method. As with all other nitrogen deposition datasets, the 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. The colours shown in Figure 11.4 do not follow smooth gradations like those used to describe concentrations. This is because deposition is heavily influenced by land cover type and so Figure 11.4 contains step-changes in predicted deposition where the land cover changes from one habitat type to another. The highest predicted deposition fluxes are predicted to occur to woodland, and predicted deposition fluxes greater than 30 kg-N/ha/yr are predicted for many areas of woodland even well away from roads. Conversely, deposition fluxes less than 24 kg-N/ha/yr are predicted in many areas even close to roads where the land cover type is shorter (i.e. not woodland)[52].

11.12 Table 11.7, Table 11.8, and Table 11.9 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (73.4 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum deposition to dry heath (35.8 kg-N/ha/r) is predicted alongside the

[52] For detail of the areas within each deposition range, see Paragraph 11.13.

A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (28.5 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 22.3 kg-N/ha/yr (more than double the 10 kg-N/ha/yr critical load), with the averages for all dry and wet heath being 15.3 kg-N/ha/yr and 15.6 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to dry and wet heath being 14.8 kg-N/ha/yr and 14.9 kg-N/ha/yr respectively. The minimum predicted deposition flux over the entire SAC (9.7 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

11.13 Table 11.10 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only part of the SAC which is not predicted to experience an exceedence of the critical load is 8.9 ha of bare ground. The critical load will be exceeded over the remaining 2,658 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 2.9 ha of the SAC. Most of the dry and wet heath is predicted to experience deposition within the 14-16 kg-N/ha/yr deposition band.

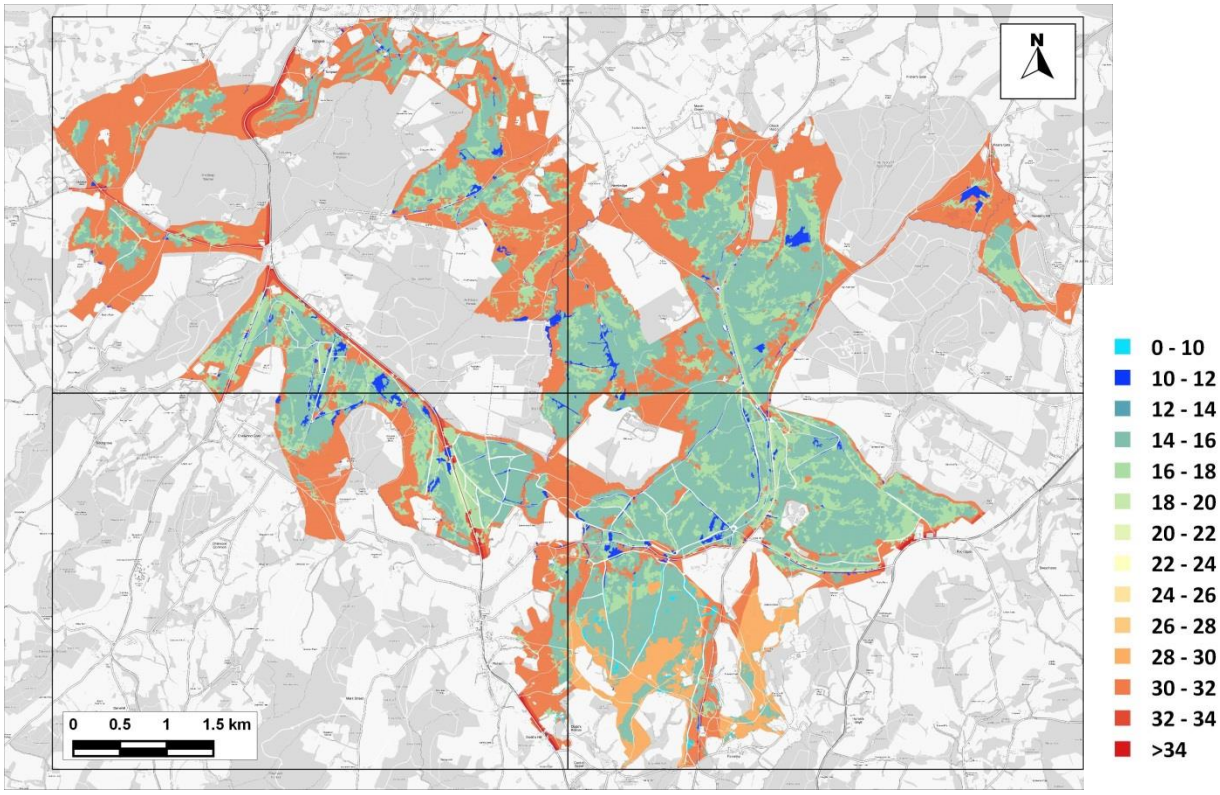


Figure 11.4: Nitrogen Deposition to SAC – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.7: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	2.6	5.7	9.1	1.9	2.1	9.4	30.6	45%
Bracken	<0.1	2.4	2.7	1.6	0.2	0.3	9.3	16.5	9%
Scattered Bracken	<0.1	2.4	2.7	1.6	0.2	0.3	9.4	16.6	7%
Dry Heath	<0.1	2.1	2.3	1.3	0.2	0.3	9.3	15.3	24%
Wet Heath	<0.1	2.2	2.3	1.3	0.2	0.3	9.3	15.6	10%
Grassland	<0.1	2.1	2.2	1.1	0.1	0.2	9.4	15.0	3%
Water	<0.1	0.3	0.3	0.1	0.2	0.3	9.4	10.6	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.2	9.3	10.3	3%
Whole SAC	<0.1	2.3	3.8	4.8	0.9	1.1	9.3	22.3	-

Table 11.8: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	5.1	21.9	23.7	9.1	1.9	2.1	9.8	73.4
Bracken	1.5	12.8	7.6	1.6	0.2	0.3	9.8	32.9
Scattered Bracken	0.6	13.1	6.8	1.6	0.2	0.3	9.8	31.8
Dry Heath	2.0	15.0	7.4	1.3	0.2	0.3	9.8	35.8
Wet Heath	0.6	11.3	5.7	1.3	0.2	0.3	9.8	28.5
Grassland	0.8	10.9	5.6	1.1	0.1	0.2	9.8	27.6
Water	<0.1	0.7	0.4	0.1	0.2	0.3	9.7	11.0
Bare Ground	0.8	1.4	0.8	0.1	0.1	0.2	9.8	12.7
Whole SAC	5.1	21.9	23.7	9.1	1.9	2.1	9.8	73.4

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 11.9: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	2.3	5.5	9.1	1.9	2.1	8.7	29.8
Bracken	<0.1	2.2	2.7	1.6	0.2	0.3	8.7	15.8
Scattered Bracken	<0.1	2.2	2.7	1.6	0.2	0.3	8.8	15.9
Dry Heath	<0.1	2.0	2.3	1.3	0.2	0.3	8.7	14.8
Wet Heath	<0.1	2.0	2.3	1.3	0.2	0.3	8.7	14.9
Grassland	<0.1	1.9	2.1	1.1	0.1	0.2	8.7	14.3
Water	<0.1	0.3	0.3	0.1	0.2	0.3	8.8	10.0
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.2	8.7	9.7
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.2	8.7	9.7

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 11.10: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No WDC-Growth - A (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	8.88	0.00	8.88
10	12	0.00	0.00	0.00	0.00	0.00	0.00	58.31	6.04	64.35
12	14	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.05
14	16	616.97	0.00	230.91	14.71	3.92	85.78	0.00	0.00	952.29
16	18	9.65	0.00	26.30	218.46	173.39	0.91	0.00	0.00	428.71
18	20	0.27	0.00	2.92	2.44	3.22	0.05	0.00	0.00	8.89
20	22	0.01	0.00	0.53	0.44	0.32	0.02	0.00	0.00	1.32
22	24	0.00	0.00	0.08	0.10	0.10	0.01	0.00	0.00	0.28
24	26	0.00	0.00	0.02	0.05	0.03	0.01	0.00	0.00	0.11
26	28	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.06
28	30	0.00	104.55	0.00	0.00	0.03	0.00	0.00	0.00	104.58
30	32	0.00	1047.90	0.00	0.00	0.02	0.00	0.00	0.00	1047.92
32	34	0.00	35.76	0.00	0.00	0.00	0.00	0.00	0.00	35.77
34	36	0.00	7.83	0.00	0.00	0.00	0.00	0.00	0.00	7.83
36	38	0.00	1.94	0.00	0.00	0.00	0.00	0.00	0.00	1.94
38	40	0.00	1.15	0.00	0.00	0.00	0.00	0.00	0.00	1.15
40	-	0.00	2.92	0.00	0.00	0.00	0.00	0.00	0.00	2.92
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	58.36	6.04	2658.16

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No WDC-Growth – A (AQC Method)

11.14 Figure 11.5 (see also Figure A8.17 to Figure A8.20) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without the Local Plan, under emissions scenario A; this time using the AQC deposition method. As noted previously, the AQC deposition method predicts generally lower fluxes (to all land uses except open water and bare ground) than the EA method. Despite this, the 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. As noted for the EA method results, the colours shown in Figure 11.5 do not follow the same smooth gradations as the predicted concentrations,

since they are affected by land cover type and the detailed habitats maps used in this study contain highly-refined (i.e. sharp) edges. There is a clear differentiation between woodland and non-woodland areas in Figure 11.5, with higher deposition fluxes occurring to the woodland, even well away from roads, although the highest fluxes still occur at the roadsides.

11.15 Table 11.11, Table 11.12, and Table 11.13 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (60.4 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than six times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (24.5 kg-N/ha/r, which is more than twice the 10 kg-N/ha/yr critical load) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (21.0 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 21.4 kg-N/ha/yr, with the averages for all dry and wet heath being 14.3 kg-N/ha/yr and 14.4 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 13.8 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (9.9 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

11.16 Table 11.14 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only part of the SAC which is not predicted to experience an exceedence of the critical load is 0.3 ha of bare ground. The critical load will be exceeded over the remaining 2,667 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 1.8 ha of the SAC. As with the EA method results, most of the dry and wet heath is predicted to experience deposition within the 14-16 kg-N/ha/yr deposition band.

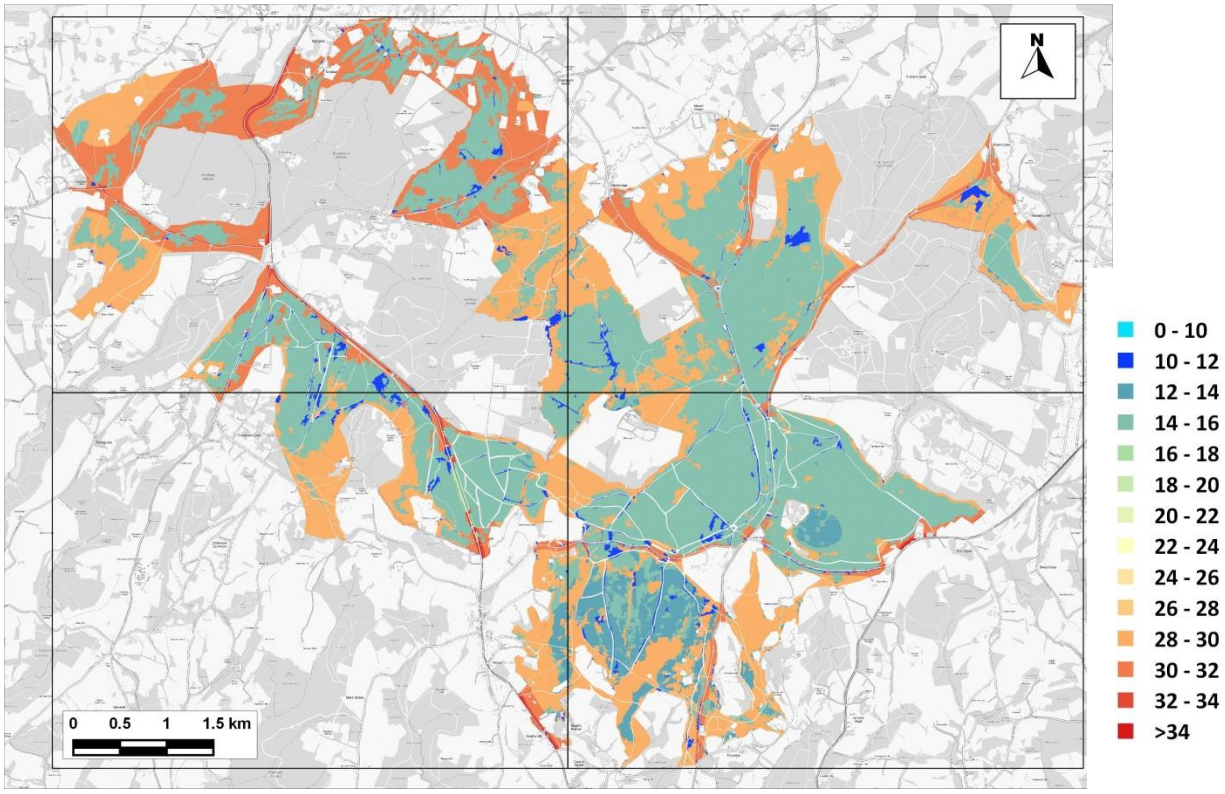


Figure 11.5: Nitrogen Deposition to SAC – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.11: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	2.0	5.7	9.1	1.9	2.1	9.4	30.0	45%
Bracken	<0.1	1.0	2.7	1.6	0.2	0.3	9.3	15.0	9%
Scattered Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	9.4	15.1	7%
Dry Heath	<0.1	1.0	2.3	1.3	0.2	0.3	9.3	14.3	24%
Wet Heath	<0.1	1.1	2.3	1.3	0.2	0.3	9.3	14.4	10%
Grassland	<0.1	1.2	2.2	1.1	0.1	0.2	9.4	14.1	3%
Water	<0.1	0.5	0.3	0.1	0.2	0.3	9.4	10.8	0.2%
Bare Ground	<0.1	0.6	0.3	0.1	0.1	0.2	9.3	10.5	3%
Whole SAC	<0.1	1.4	3.8	4.8	0.9	1.1	9.3	21.4	-

Table 11.12: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	14.1	23.7	9.1	1.9	2.1	9.8	60.4
Bracken	<0.1	4.6	7.5	1.6	0.2	0.3	9.8	23.2
Scattered Bracken	<0.1	4.3	6.8	1.6	0.2	0.3	9.8	22.3
Dry Heath	<0.1	5.7	7.4	1.3	0.2	0.3	9.8	24.5
Wet Heath	<0.1	4.3	5.7	1.3	0.2	0.3	9.8	21.0
Grassland	<0.1	5.2	5.6	1.1	0.1	0.2	9.8	21.1
Water	<0.1	1.2	0.4	0.1	0.2	0.3	9.7	11.4
Bare Ground	<0.1	2.4	0.8	0.1	0.1	0.2	9.8	12.9
Whole SAC	<0.1	14.1	23.7	9.1	1.9	2.1	9.8	60.4

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 11.13: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - A (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.8	5.5	9.1	1.9	2.1	8.7	29.2
Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	8.7	14.4
Scattered Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	8.8	14.5
Dry Heath	<0.1	0.9	2.3	1.3	0.2	0.3	8.7	13.8
Wet Heath	<0.1	1.0	2.3	1.3	0.2	0.3	8.7	13.8
Grassland	<0.1	1.1	2.1	1.1	0.1	0.2	8.7	13.4
Water	<0.1	0.5	0.3	0.1	0.2	0.3	8.8	10.2
Bare Ground	<0.1	0.5	0.3	0.1	0.1	0.2	8.7	9.9
Whole SAC	<0.1	0.5	0.3	0.1	0.1	0.2	8.7	9.9

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 11.14: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 No WDC-Growth - A (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30
10	12	0.00	0.00	0.00	0.00	0.00	0.00	66.79	6.05	72.83
12	14	84.32	0.00	15.97	0.00	0.00	27.10	0.15	0.00	127.53
14	16	542.44	0.00	242.12	234.35	178.21	59.60	0.00	0.00	1256.73
16	18	0.14	0.00	2.56	1.70	2.64	0.05	0.00	0.00	7.09
18	20	0.00	0.00	0.11	0.14	0.13	0.01	0.00	0.00	0.40
20	22	0.00	0.00	0.01	0.02	0.06	0.01	0.00	0.00	0.09
22	24	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.02
24	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	30	0.00	794.19	0.00	0.00	0.00	0.00	0.00	0.00	794.19
30	32	0.00	381.71	0.00	0.00	0.00	0.00	0.00	0.00	381.71
32	34	0.00	18.43	0.00	0.00	0.00	0.00	0.00	0.00	18.43
34	36	0.00	3.55	0.00	0.00	0.00	0.00	0.00	0.00	3.55
36	38	0.00	1.56	0.00	0.00	0.00	0.00	0.00	0.00	1.56
38	40	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.78
40	-	0.00	1.83	0.00	0.00	0.00	0.00	0.00	0.00	1.83
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	66.94	6.05	2666.75

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

2028 No WDC-Growth Emissions Scenario B

Annual Mean NOx in 2028 No WDC-Growth – B

11.17 Figure 11.6 (also see Figure A8.21 to Figure A8.24) shows the predicted annual mean NOx concentrations across the SAC under emissions scenario B. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 11 $\mu g/m^3$, with concentrations less than 8 $\mu g/m^3$ predicted in many areas. Exceedences of the 30 $\mu g/m^3$ critical level are predicted at the kerbside

of the A22 and A26[53].

11.18 Table 11.15 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (50.8 μg/m^3) is predicted to occur at an area of woodland alongside the A26 at Poundgate. The location of the maximum predicted concentration is thus different in emissions scenarios A and B, reflecting the use of different vehicle type-specific speed-emissions functions and different interpolated background concentration fields in these two scenarios. The maximum concentration over dry heath (37.5 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row which is the same location that produced the maximum in scenario A. The maximum concentration over wet heath (29.8 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill, which again is in the same location as the maximum in scenario A. The average concentration over the whole SAC is predicted to be 8.4 μg/m^3, with the averages for dry and wet heath being 8.2 μg/m^3 and 8.8 μg/m^3 respectively. The minimum concentration over the SAC is 7.7 μg/m^3, with this predicted for several receptors in areas which are well away from roads.

11.19 Table 11.16 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. A total of 0.59 ha would experience an exceedence of the critical level, with less than 0.005 ha of this being dry heath and none being wet heath. Most of the predicted concentrations over areas of dry and wet heath fall within the 0-10 μg/m^3 concentration range.

[53] For detail of the areas of these exceedences, see Paragraph 11.19.

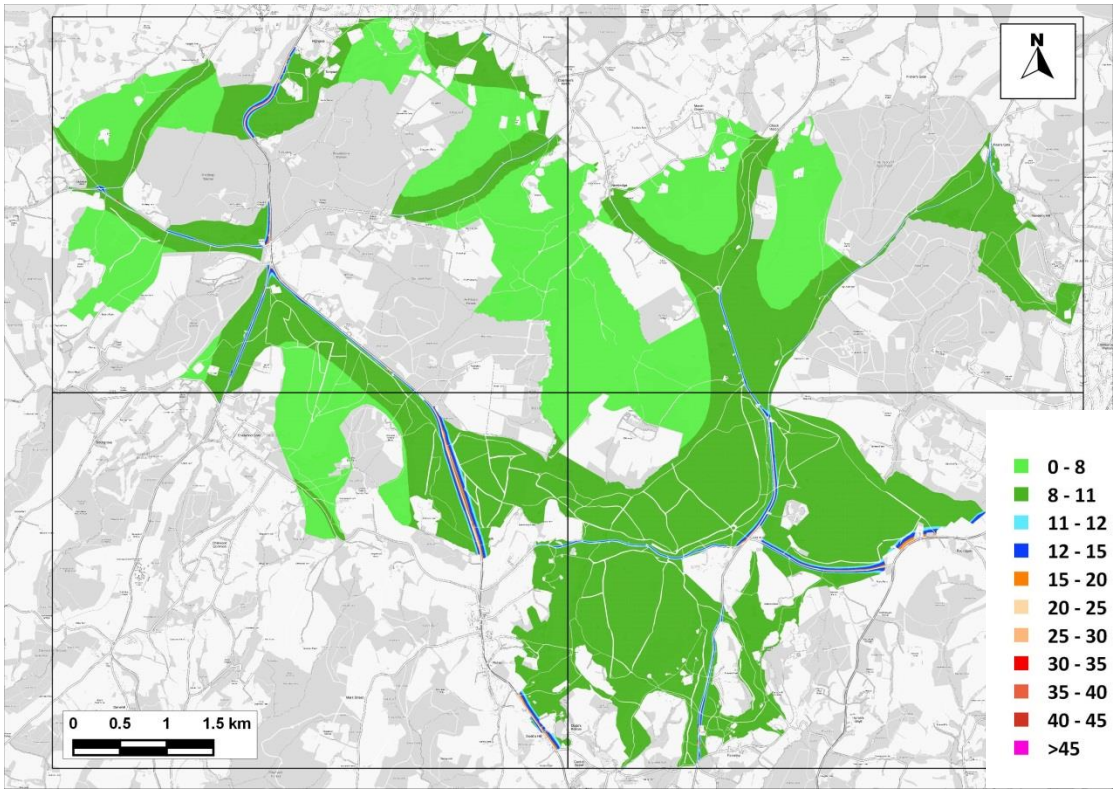


Figure 11.6: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No WDC-Growth - B (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.15: Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – B (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	8.4	50.8	7.7
Bracken	8.4	38.0	7.7
Scattered Bracken	8.4	27.9	7.7
Dry Heath	8.2	37.5	7.7
Wet Heath	8.8	29.8	7.8
Grassland	8.3	30.5	7.7
Water	8.1	17.0	7.7
Bare Ground	8.9	39.5	7.7
Whole SAC	8.4	50.8	7.7

Table 11.16: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - B [a]

Concentration (μg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	8	176.42	456.40	41.64	61.42	54.55	15.70	16.40	3.36	825.89
8	10	442.76	665.70	192.64	162.06	117.48	68.05	41.93	2.60	1693.21
10	12	6.56	53.91	18.76	9.57	6.92	2.46	4.62	0.07	102.85
12	14	0.92	14.98	4.04	1.95	1.39	0.39	2.29	0.01	25.97
14	18	0.24	6.85	3.17	0.96	0.54	0.13	1.53	0.00	13.41
18	20	0.01	1.26	0.37	0.09	0.07	0.01	0.13	0.00	1.94
20	25	0.00	1.54	0.12	0.11	0.09	0.02	0.17	0.00	2.05
25	30	0.00	0.89	0.02	0.05	0.04	0.01	0.13	0.00	1.13
30	35	0.00	0.41	0.00	0.01	0.00	0.00	0.03	0.00	0.45
35	40	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.11
40	-	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
All >30		0.00	0.53	0.00	0.02	0.00	0.00	0.03	0.00	0.59

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 No WDC-Growth – B

11.20 Figure 11.7 (also see Figure A8.25 to Figure A8.28) shows the maximum predicted 24-hour NOx concentrations across the SAC under emissions scenario B. As noted previously, concentrations under emissions scenario B are all predicted to be lower than those under emissions scenario A. Concentrations are predicted to be less than 65 μg/m^3 across most of the study area, but exceedences of the 75 μg/m^3 critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Coleman's Hatch Road, the A26, Kidd's Hill, the B2188, London Road, Crowborough Road, New Road, and the B2026[54].

11.21 Table 11.17 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (283.8 μg/m^3) is predicted to occur at an area of woodland alongside the A26 at Poundgate. The maximum concentration over dry heath (225.8 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (188.7 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is

[54] For detail of the areas of these exceedences, see Paragraph 11.18.

predicted to be 61.5 μg/m^3, with the averages for dry and wet heath being 60.0 μg/m^3 and 64.1 μg/m^3 respectively. The minimum concentration over the SAC is 56.0 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

11.22 Table 11.18 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and shows that 113.74 ha are expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 13.0 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 3 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 2 ha are predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 0.4 ha is predicted to experience concentrations above 200 μg/m^3.

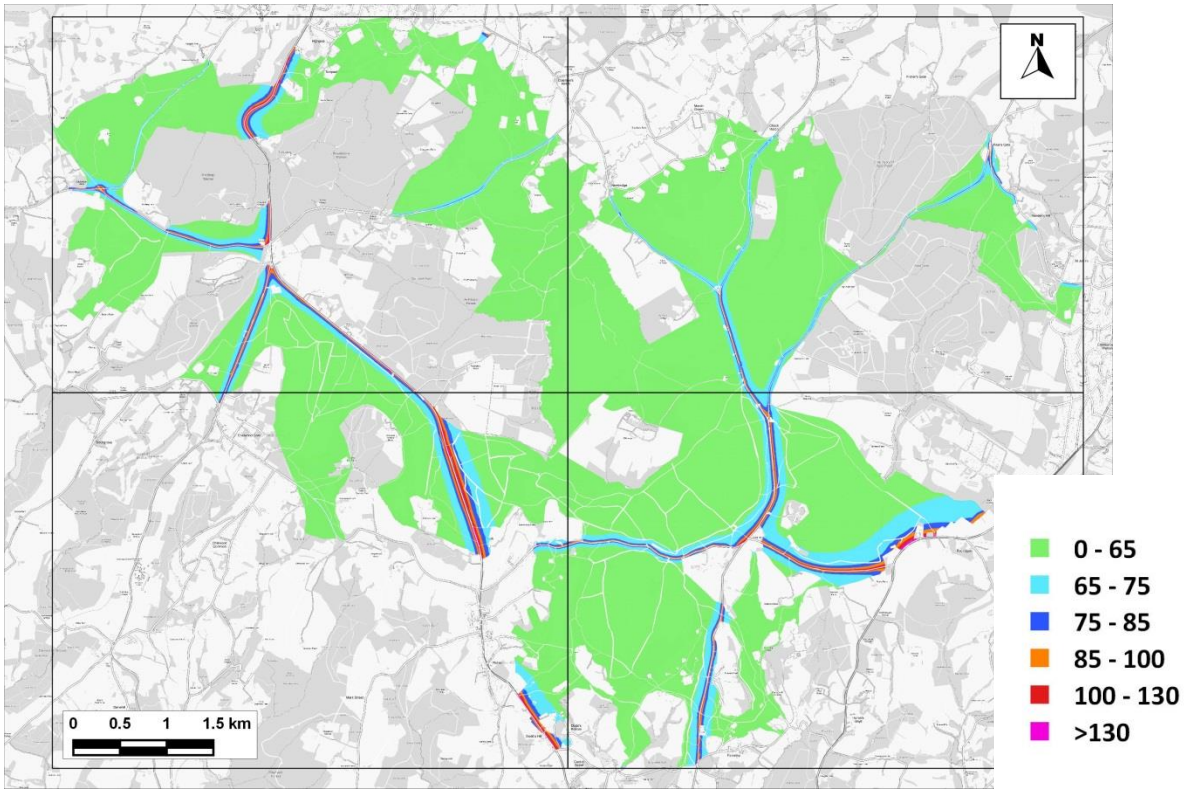


Figure 11.7: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No WDC-Growth - B (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.17: 24-hour NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – B (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	61.6	283.8	56.0
Bracken	61.7	228.2	56.7
Scattered Bracken	61.2	179.0	56.5
Dry Heath	60.0	225.8	56.5
Wet Heath	64.1	188.7	57.1
Grassland	61.0	192.2	56.1
Water	59.3	118.6	56.3
Bare Ground	64.6	234.8	56.3
Whole SAC	61.5	283.8	56.0

Table 11.18: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - B [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	416.28	747.18	92.07	134.12	108.08	48.34	31.70	4.95	1582.72
60	65	177.67	285.47	99.05	62.90	50.35	29.14	20.42	0.75	725.75
65	75	28.23	105.56	49.95	30.16	15.96	7.25	7.42	0.30	244.83
75	85	3.31	34.29	10.91	5.39	4.18	1.37	2.97	0.03	62.46
85	100	1.19	18.76	5.23	2.46	1.78	0.51	2.78	0.01	32.72
100	125	0.22	6.64	3.09	0.93	0.52	0.12	1.48	0.00	12.99
125	150	0.01	2.19	0.43	0.15	0.12	0.02	0.22	0.00	3.14
150	200	0.00	1.64	0.04	0.09	0.07	0.02	0.22	0.00	2.08
200	-	0.00	0.32	0.00	0.01	0.00	0.00	0.02	0.00	0.35
All >75		4.72	63.84	19.70	9.04	6.66	2.04	7.70	0.05	113.74

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No WDC-Growth – B (EA Method)

11.23 Figure 11.8 (also see Figure A8.29 to Figure A8.32) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without the Local Plan, under emissions scenario B, and using the EA

deposition method. Deposition fluxes are smaller than those under emissions scenario A, and greater than those in the no-growth scenario. The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 11.8 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland, even well away from roads, although the highest fluxes still occur at the roadsides[55].

11.24 Table 11.19, Table 11.20, and Table 11.21 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (55.5 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is a different location than that at which the maximum NOx concentration was predicted in this emission scenario, reflecting the importance of NH_3 and other species to the total deposition flux. The maximum deposition to dry heath (25.8 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (21.6 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 19.4 kg-N/ha/yr, with the averages for all dry and wet heath being 13.7 kg-N/ha/yr and 13.8 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 13.2 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.8 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

11.25 Table 11.22 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.7 ha of the SAC, with all of this being woodland. Most of the dry and wet heath (591 ha and 207 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr range, with appreciable amounts (35 ha and 52 ha respectively) falling in the 14-16 kg-N/ha/yr deposition band.

[55] For detail of the areas within each deposition range, see Paragraph 11.25.

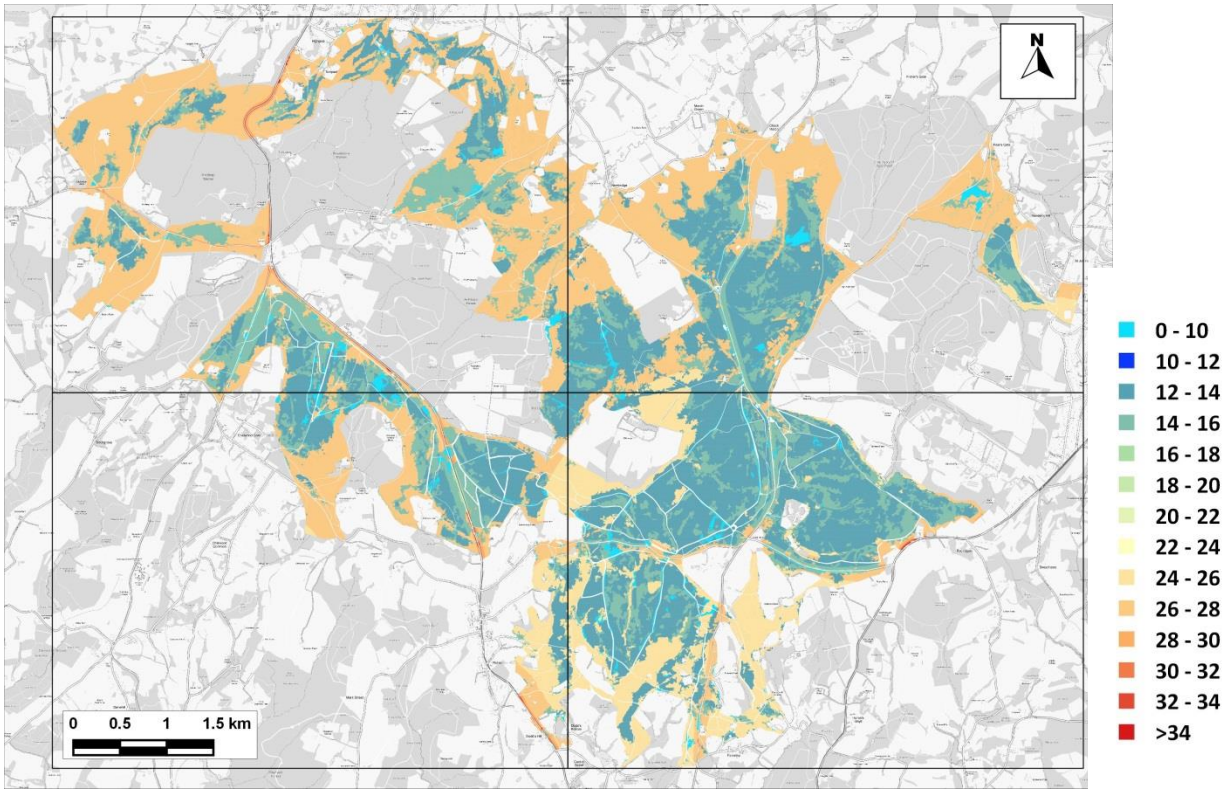


Figure 11.8: Nitrogen Deposition to SAC – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.19: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.8	6.1	6.4	2.0	1.4	8.6	26.3	45%
Bracken	<0.1	1.7	3.0	1.1	0.2	0.2	8.5	14.6	9%
Scattered Bracken	<0.1	1.7	3.0	1.1	0.2	0.2	8.5	14.7	7%
Dry Heath	<0.1	1.4	2.5	0.9	0.2	0.2	8.5	13.7	24%
Wet Heath	<0.1	1.5	2.5	0.9	0.2	0.2	8.5	13.8	10%
Grassland	<0.1	1.5	2.3	0.8	0.1	0.1	8.6	13.4	3%
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.6	9.6	0.2%
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.5	9.4	3%
Whole SAC	<0.1	1.6	4.1	3.4	1.0	0.8	8.5	19.4	-

Table 11.20: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	0.5	12.2	24.2	6.4	2.0	1.4	8.9	55.5
Bracken	<0.1	7.3	7.8	1.1	0.2	0.2	8.9	24.8
Scattered Bracken	<0.1	6.9	7.1	1.1	0.2	0.2	8.9	23.9
Dry Heath	<0.1	8.1	7.6	0.9	0.2	0.2	8.9	25.8
Wet Heath	<0.1	5.9	5.9	0.9	0.2	0.2	8.9	21.6
Grassland	<0.1	6.2	5.8	0.8	0.1	0.1	8.9	21.3
Water	<0.1	0.4	0.5	0.1	0.2	0.2	8.9	9.9
Bare Ground	<0.1	0.9	0.8	0.1	0.1	0.1	8.9	10.5
Whole SAC	0.5	12.2	24.2	6.4	2.0	1.4	8.9	55.5

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 11.21: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.7	6.0	6.4	2.0	1.4	8.0	25.6
Bracken	<0.1	1.6	2.9	1.1	0.2	0.2	8.0	14.1
Scattered Bracken	<0.1	1.6	2.9	1.1	0.2	0.2	8.1	14.2
Dry Heath	<0.1	1.4	2.4	0.9	0.2	0.2	8.0	13.2
Wet Heath	<0.1	1.4	2.4	0.9	0.2	0.2	8.0	13.2
Grassland	<0.1	1.4	2.3	0.8	0.1	0.1	8.0	12.8
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.0	9.1
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.0	8.8
Whole SAC	<0.1	0.2	0.3	0.1	0.1	0.1	8.0	8.8

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 11.22: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No WDC-Growth - B (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.05	6.05	73.10
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.18
12	14	591.40	0.00	207.10	0.00	0.00	85.83	0.00	0.00	884.32
14	16	35.44	0.00	52.22	234.47	178.93	0.90	0.00	0.00	501.97
16	18	0.05	0.00	1.36	1.53	1.89	0.02	0.00	0.00	4.86
18	20	0.00	0.00	0.08	0.16	0.14	0.01	0.00	0.00	0.40
20	22	0.00	0.00	0.01	0.04	0.05	0.01	0.00	0.00	0.10
22	24	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.05
24	26	0.00	257.83	0.00	0.00	0.00	0.00	0.00	0.00	257.84
26	28	0.00	919.08	0.00	0.00	0.00	0.00	0.00	0.00	919.08
28	30	0.00	18.39	0.00	0.00	0.00	0.00	0.00	0.00	18.39
30	32	0.00	2.89	0.00	0.00	0.00	0.00	0.00	0.00	2.89
32	34	0.00	1.40	0.00	0.00	0.00	0.00	0.00	0.00	1.40
34	36	0.00	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.82
36	38	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.48
38	40	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.47
40	-	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.69
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.18	0.00	2593.95

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No WDC-Growth – B (AQC Method)

11.26 Figure 11.9 (see also Figure A8.33 to Figure A8.36) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without the Local Plan and under emissions scenario B; this time using the AQC deposition method. Deposition fluxes are smaller than those under emissions scenario A, and greater than those in the no-growth scenario. As noted previously, they are also (for most surfaces) lower than those predicted using the EA method. The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 12.9 between woodland and non-woodland

areas, with higher deposition fluxes occurring to the woodland even well away from roads, although the highest fluxes still occur at the roadsides[56].

11.27 Table 11.23, Table 11.24, and Table 11.25 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (50.6 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than five times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (20.8 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (17.9 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.8 kg-N/ha/yr, with the averages for all dry and wet heath being 12.9 kg-N/ha/yr and 13.0 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to dry and wet heath being 12.4 kg-N/ha/yr and 12.5 kg-N/ha/yr respectively. The minimum predicted deposition flux over the entire SAC (9.0 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

11.28 Table 11.26 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 66 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,595 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.3 ha of the SAC, all of which is woodland. As with the EA method results, most of the dry and wet heath is predicted to experience deposition within the 12-14 kg-N/ha/yr deposition band.

[56] For detail of the areas within each deposition range, see Paragraph 11.28.

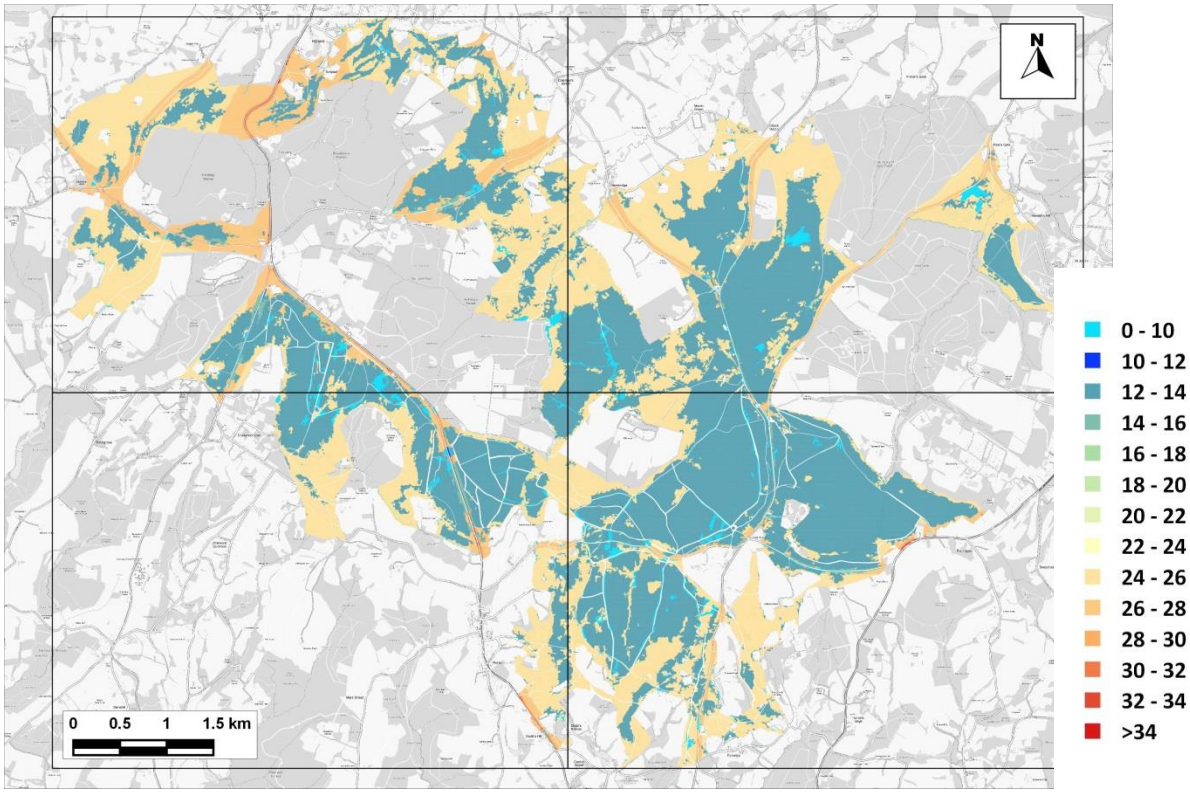


Figure 11.9: Nitrogen Deposition to SAC – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.23: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.4	6.1	6.4	2.0	1.4	8.6	25.9	45%
Bracken	<0.1	0.7	3.0	1.1	0.2	0.2	8.5	13.6	9%
Scattered Bracken	<0.1	0.7	3.0	1.1	0.2	0.2	8.5	13.7	7%
Dry Heath	<0.1	0.7	2.5	0.9	0.2	0.2	8.5	12.9	24%
Wet Heath	<0.1	0.7	2.5	0.9	0.2	0.2	8.5	13.0	10%
Grassland	<0.1	0.8	2.3	0.8	0.1	0.1	8.6	12.7	3%
Water	<0.1	0.4	0.3	0.1	0.2	0.2	8.6	9.7	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.1	8.5	9.5	3%
Whole SAC	<0.1	1.0	4.1	3.4	1.0	0.8	8.5	18.8	-

Table 11.24: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	7.9	24.1	6.4	2.0	1.4	8.9	50.6
Bracken	<0.1	2.7	7.7	1.1	0.2	0.2	8.9	20.1
Scattered Bracken	<0.1	2.3	7.0	1.1	0.2	0.2	8.9	19.2
Dry Heath	<0.1	3.1	7.5	0.9	0.2	0.2	8.9	20.8
Wet Heath	<0.1	2.3	5.9	0.9	0.2	0.2	8.9	17.9
Grassland	<0.1	2.9	5.7	0.8	0.1	0.1	8.9	18.0
Water	<0.1	0.7	0.5	0.1	0.2	0.2	8.9	10.1
Bare Ground	<0.1	1.5	0.8	0.1	0.1	0.1	8.9	11.1
Whole SAC	<0.1	7.9	24.1	6.4	2.0	1.4	8.9	50.6

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 11.25: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.3	6.0	6.4	2.0	1.4	8.0	25.2
Bracken	<0.1	0.6	2.9	1.1	0.2	0.2	8.0	13.1
Scattered Bracken	<0.1	0.6	2.9	1.1	0.2	0.2	8.1	13.2
Dry Heath	<0.1	0.7	2.4	0.9	0.2	0.2	8.0	12.4
Wet Heath	<0.1	0.7	2.4	0.9	0.2	0.2	8.0	12.5
Grassland	<0.1	0.8	2.3	0.8	0.1	0.1	8.0	12.1
Water	<0.1	0.3	0.3	0.1	0.2	0.2	8.0	9.2
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.1	8.0	9.0
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.1	8.0	9.0

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 11.26: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 No WDC-Growth - B (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	66.05	5.97	72.01
10	12	0.00	0.00	0.00	0.00	0.00	0.00	1.19	0.08	1.27
12	14	626.56	0.00	257.01	230.76	170.32	86.70	0.00	0.00	1371.35
14	16	0.34	0.00	3.69	5.31	10.54	0.06	0.00	0.00	19.93
16	18	0.00	0.00	0.07	0.13	0.15	0.02	0.00	0.00	0.37
18	20	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.06
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	973.96	0.00	0.00	0.00	0.00	0.00	0.00	973.96
26	28	0.00	212.51	0.00	0.00	0.00	0.00	0.00	0.00	212.51
28	30	0.00	10.62	0.00	0.00	0.00	0.00	0.00	0.00	10.62
30	32	0.00	2.17	0.00	0.00	0.00	0.00	0.00	0.00	2.17
32	34	0.00	1.06	0.00	0.00	0.00	0.00	0.00	0.00	1.06
34	36	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.63
36	38	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50
38	40	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.33
40	-	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.26
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	1.19	0.08	2595.03

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

2028 No WDC-Growth Emissions Scenario C

Annual Mean NOx in 2028 No WDC-Growth – C

11.29 Figure 11.10 (also see Figure A8.37 to Figure A8.40) shows the predicted annual mean NOx concentrations across the SAC under emissions scenario C. All of the predicted concentrations, using emissions scenario C, are lower than those using either scenario A or scenario B. All of the predicted concentrations in the no WDC-growth scenario are, however, higher than those for the no-growth scenario (based on comparing equivalent emissions scenarios). Over most of the SAC, annual mean NOx concentrations are predicted to be less than 11 $\mu g/m^3$, with concentrations less

than 8 μg/m^3 predicted in many areas. Exceedences of the 30 μg/m^3 critical level are predicted at the kerbside of the A22 and A26[57].

11.30 Table 11.27 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (37.4 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. This is a different location than was associated with the maximum concentration in emissions scenario B (which was beside the A26), but the same location as produced the maximum in scenario A. In practice, the maximum concentrations along both the A22 and A26 are relatively similar and so it is perhaps unsurprising that using different speed-emissions functions - and effectively assigning greater weight to different types of vehicle - alters the position of the absolute maximum. The maximum concentration over dry heath (28.2 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (22.9 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 8.1 μg/m^3, with the averages for dry and wet heath being 7.9 μg/m^3 and 8.3 μg/m^3 respectively. The minimum concentration over the SAC is 7.6 μg/m^3, with this predicted for several receptors in areas which are well away from roads.

11.31 Table 11.28 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. A total of 0.02 ha (200 m^2) would experience an exceedence of the critical level, with all of this being woodland. Most of the predicted concentrations over areas of dry and wet heath fall within the 0-10 μg/m^3 concentration range (624 ha and 248 ha respectively).

[57] For detail of the areas of these exceedences, see Paragraph 11.31.

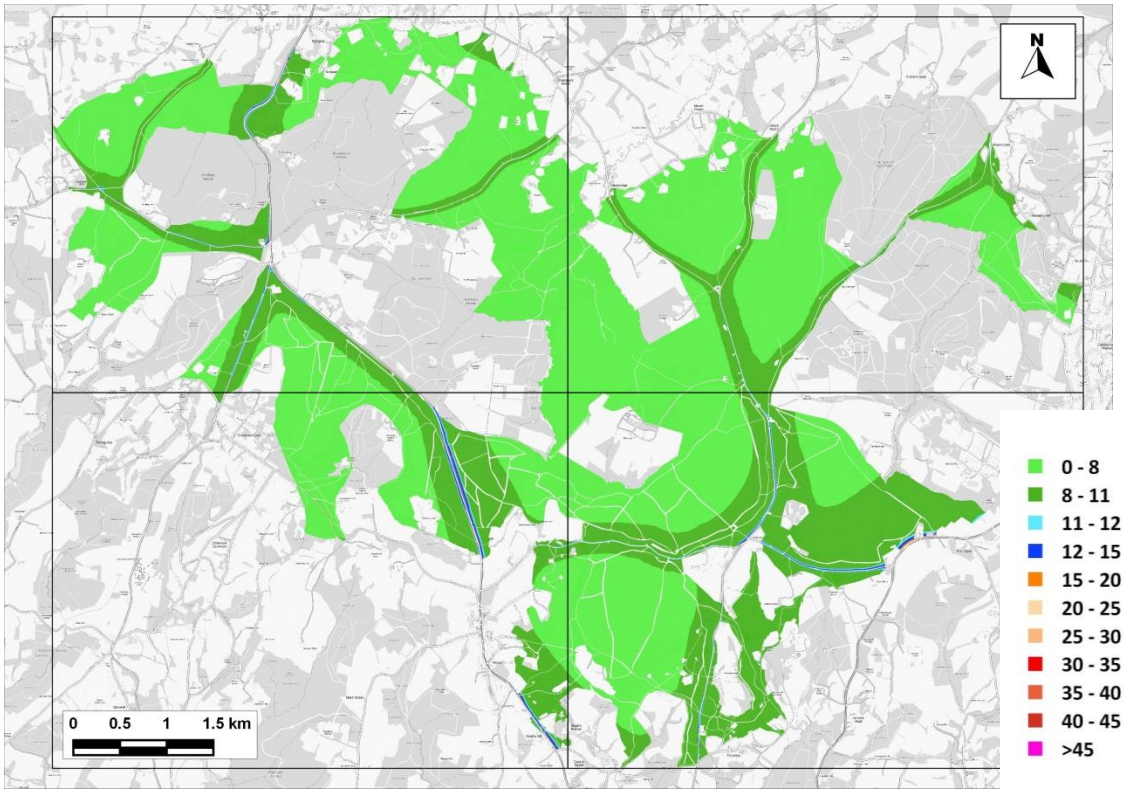


Figure 11.10: Predicted Annual Mean NOx Concentrations across the SAC– 2028 No WDC-Growth - C (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.27: Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – C (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	8.1	37.4	7.6
Bracken	8.1	28.5	7.6
Scattered Bracken	8.0	21.5	7.6
Dry Heath	7.9	28.2	7.6
Wet Heath	8.3	22.9	7.7
Grassland	8.0	23.7	7.6
Water	7.9	14.2	7.6
Bare Ground	8.4	29.6	7.6
Whole SAC	8.1	37.4	7.6

Table 11.28: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - C [a]

Concentration ($\mu g/m^3$)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	8	452.83	781.33	98.82	141.97	114.41	51.68	33.97	5.05	1680.07
8	10	171.59	378.83	149.11	89.01	62.50	34.06	27.31	0.97	913.38
10	12	2.27	31.21	9.37	4.11	3.47	0.87	4.04	0.02	55.36
12	14	0.18	5.37	2.52	0.73	0.43	0.09	1.30	0.00	10.63
14	18	0.02	3.41	0.90	0.32	0.19	0.05	0.37	0.00	5.26
18	20	0.00	0.60	0.03	0.04	0.03	0.01	0.09	0.00	0.80
20	25	0.00	1.02	0.01	0.05	0.03	0.01	0.13	0.00	1.26
25	30	0.00	0.25	0.00	0.01	0.00	0.00	0.02	0.00	0.27
30	35	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
35	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >30		0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 No WDC-Growth – C

11.32 Figure 11.11 (also see Figure A8.41 to Figure A8.44) shows the maximum predicted 24-hour NOx concentrations across the SAC under emissions scenario C. As noted previously, concentrations under emissions scenario C are all predicted to be lower than those under emissions scenarios A or B. Concentrations are predicted to be less than 65 $\mu g/m^3$ across most of the study area, but exceedences of the 75 $\mu g/m^3$ critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Coleman's Hatch Road, the A26, Kidd's Hill, the B2188, London Rd, Crowborough Rd, New Rd, and the B2026[58].

11.33 Table 11.29 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (225.0 $\mu g/m^3$) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (180.4 $\mu g/m^3$) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (152.4 $\mu g/m^3$) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over

[58] For detail of the areas of these exceedences, see Paragraph 11.34.

the whole SAC is predicted to be 59.1 μg/m^3, with the averages for dry and wet heath being 58.0 μg/m^3 and 60.9 μg/m^3 respectively. The minimum concentration over the SAC is 55.3 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

11.34 Table 11.30 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and shows that 54.64 ha are expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 5.1 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 1.6 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 0.7 ha is predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 0.01 ha (100 m^2) is predicted to experience concentrations above 200 μg/m^3.

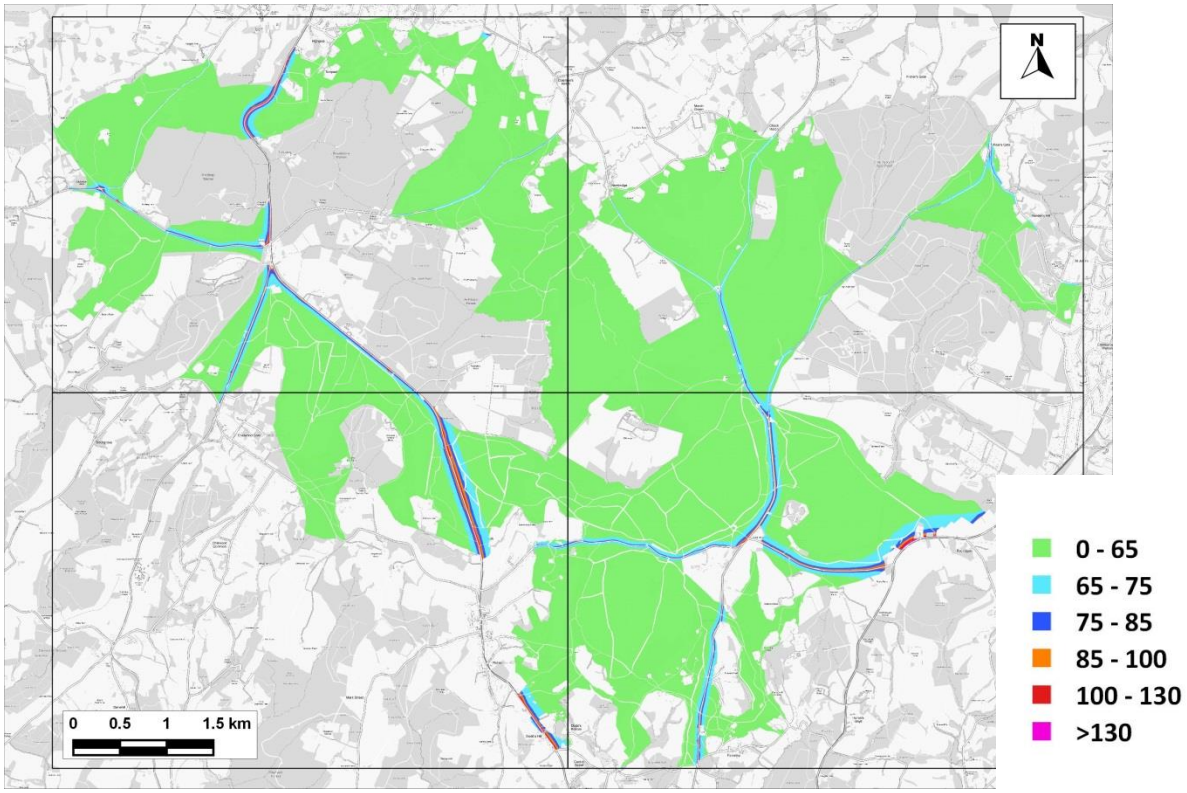


Figure 11.11: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC – 2028 No WDC-Growth - C (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.29: 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth – C (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	59.2	225.0	55.3
Bracken	59.2	182.1	55.8
Scattered Bracken	58.9	144.7	55.6
Dry Heath	58.0	180.4	55.7
Wet Heath	60.9	152.4	56.1
Grassland	58.7	156.5	55.4
Water	57.6	100.7	55.5
Bare Ground	61.3	187.4	55.5
Whole SAC	59.1	225.0	55.3

Table 11.30: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 No WDC-Growth - C [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	573.80	970.98	156.13	183.48	148.91	73.07	47.62	5.60	2159.61
60	65	41.14	133.00	70.33	35.29	20.30	9.56	9.66	0.30	319.60
65	75	10.39	66.57	24.95	13.60	9.11	3.41	5.04	0.12	133.20
75	85	1.24	19.31	5.30	2.50	1.92	0.52	2.69	0.01	33.50
85	100	0.29	7.01	3.17	0.95	0.57	0.15	1.62	0.00	13.77
100	125	0.02	3.32	0.85	0.30	0.18	0.04	0.36	0.00	5.08
125	150	0.00	1.23	0.04	0.07	0.06	0.02	0.18	0.00	1.59
150	200	0.00	0.62	0.00	0.02	0.00	0.00	0.05	0.00	0.69
200	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
All >75		1.56	31.50	9.35	3.85	2.73	0.73	4.90	0.02	54.64

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No WDC-Growth – C (EA Method)

11.35 Figure 11.12 (also see Figure A8.45 to Figure A8.48) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without the Local Plan, under emissions scenario C, and using the

EA deposition method. Deposition fluxes are smaller than those under emissions scenarios A or B, and greater than those in the no-growth scenario (for the equivalent emissions scenario). The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 11.12 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland even well away from roads, although the highest fluxes still occur at the roadsides[59].

11.36 Table 11.31, Table 11.32, and Table 11.33 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (51.4 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than five times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (23.5 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (19.9 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.9 kg-N/ha/yr, with the averages for all dry and wet heath being 13.4 kg-N/ha/yr and 13.5 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 12.9 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.6 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

11.37 Table 11.34 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.3 ha (3,000 m^2) of the SAC, with all of this being woodland. Most of the dry and wet heath (624 ha and 248 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr range.

[59] For detail of the areas within each deposition range, see Paragraph 11.37.

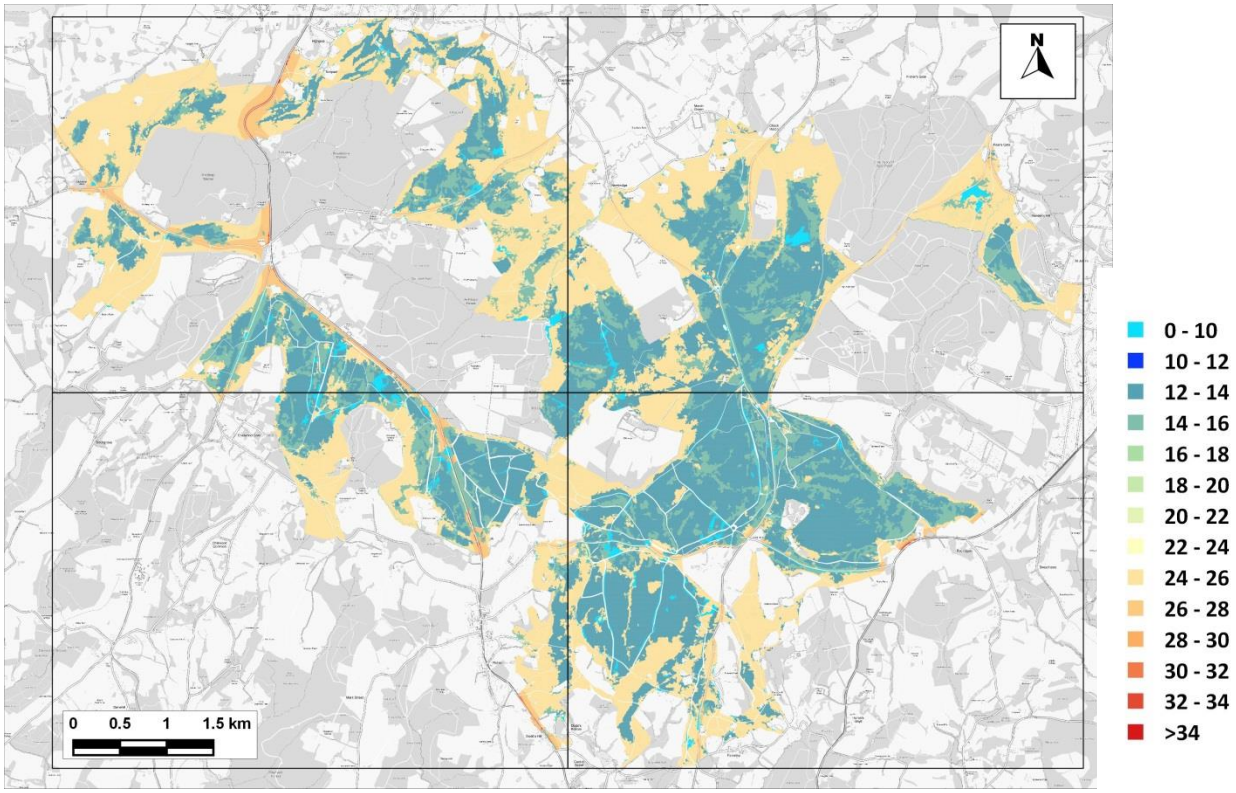


Figure 11.12: Nitrogen Deposition to SAC – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.31: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.7	6.1	5.9	2.0	1.3	8.4	25.5	45%
Bracken	<0.1	1.6	3.0	1.0	0.2	0.2	8.3	14.3	9%
Scattered Bracken	<0.1	1.6	3.0	1.0	0.2	0.2	8.4	14.4	7%
Dry Heath	<0.1	1.4	2.5	0.8	0.2	0.2	8.3	13.4	24%
Wet Heath	<0.1	1.5	2.5	0.8	0.2	0.2	8.3	13.5	10%
Grassland	<0.1	1.4	2.3	0.7	0.1	0.1	8.4	13.1	3%
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.4	9.4	0.2%
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.3	9.1	3%
Whole SAC	<0.1	1.6	4.1	3.1	1.0	0.7	8.3	18.9	-

Table 11.32: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	9.3	24.2	5.9	2.0	1.3	8.7	51.4
Bracken	<0.1	5.5	7.8	1.0	0.2	0.2	8.7	22.7
Scattered Bracken	<0.1	5.2	7.1	1.0	0.2	0.2	8.7	21.9
Dry Heath	<0.1	6.0	7.6	0.8	0.2	0.2	8.7	23.5
Wet Heath	<0.1	4.5	5.9	0.8	0.2	0.2	8.7	19.9
Grassland	<0.1	4.7	5.8	0.7	0.1	0.1	8.7	19.6
Water	<0.1	0.4	0.5	0.1	0.2	0.2	8.7	9.7
Bare Ground	<0.1	0.7	0.8	0.1	0.1	0.1	8.7	10.2
Whole SAC	<0.1	9.3	24.2	5.9	2.0	1.3	8.7	51.4

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 11.33: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.7	6.0	5.9	2.0	1.3	7.8	24.8
Bracken	<0.1	1.6	2.9	1.0	0.2	0.2	7.8	13.8
Scattered Bracken	<0.1	1.6	2.9	1.0	0.2	0.2	7.9	13.9
Dry Heath	<0.1	1.4	2.4	0.8	0.2	0.2	7.8	12.9
Wet Heath	<0.1	1.4	2.4	0.8	0.2	0.2	7.8	12.9
Grassland	<0.1	1.4	2.3	0.7	0.1	0.1	7.8	12.5
Water	<0.1	0.2	0.3	0.1	0.2	0.2	7.9	8.9
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	7.8	8.6
Whole SAC	<0.1	0.2	0.3	0.1	0.1	0.1	7.8	8.6

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 11.34: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 No WDC-Growth - C (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.21	6.05	73.25
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
12	14	623.98	0.00	247.61	24.11	14.51	86.42	0.00	0.00	996.63
14	16	2.91	0.00	12.71	211.37	165.71	0.33	0.00	0.00	393.04
16	18	0.00	0.00	0.42	0.65	0.69	0.02	0.00	0.00	1.78
18	20	0.00	0.00	0.02	0.08	0.09	0.01	0.00	0.00	0.20
20	22	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.07
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1108.32	0.00	0.00	0.00	0.00	0.00	0.00	1108.32
26	28	0.00	82.51	0.00	0.00	0.00	0.00	0.00	0.00	82.51
28	30	0.00	6.79	0.00	0.00	0.00	0.00	0.00	0.00	6.79
30	32	0.00	1.79	0.00	0.00	0.00	0.00	0.00	0.00	1.79
32	34	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.98
34	36	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.56
36	38	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.49
38	40	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.32
40	-	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.29
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.03	0.00	2593.79

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 No WDC-Growth – C (AQC Method)

11.38 Figure 11.13 (also see Figure A8.49 to Figure A8.52) shows the predicted nitrogen deposition fluxes across the SAC in 2028 without the Local Plan, under emissions scenario C, and using the AQC deposition method. Deposition fluxes are smaller than those under emissions scenarios A or B, and greater than those in the no-growth scenario (for the equivalent emissions scenario). The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 11.13 between woodland and non-woodland areas, with higher deposition fluxes occurring to the

woodland even well away from roads, although the highest fluxes still occur at the roadsides[60].

11.39 Table 11.35, Table 11.36 and Table 11.37 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (48.1 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum deposition to dry heath (19.8 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (17.1 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.3 kg-N/ha/yr, with the averages for all dry and wet heath being 12.6 kg-N/ha/yr and 12.7 kg-N/ha/yr respectively. The minimum predicted fluxes to both dry and wet heath are 12.2 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.8 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

11.40 Table 11.38 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.08 ha of the SAC (800 m^2), all of which is woodland. As with the EA method results, most of the dry and wet heath (627 and 259 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr deposition band.

[60] For detail of the areas within each deposition range, see Paragraph 11.40.

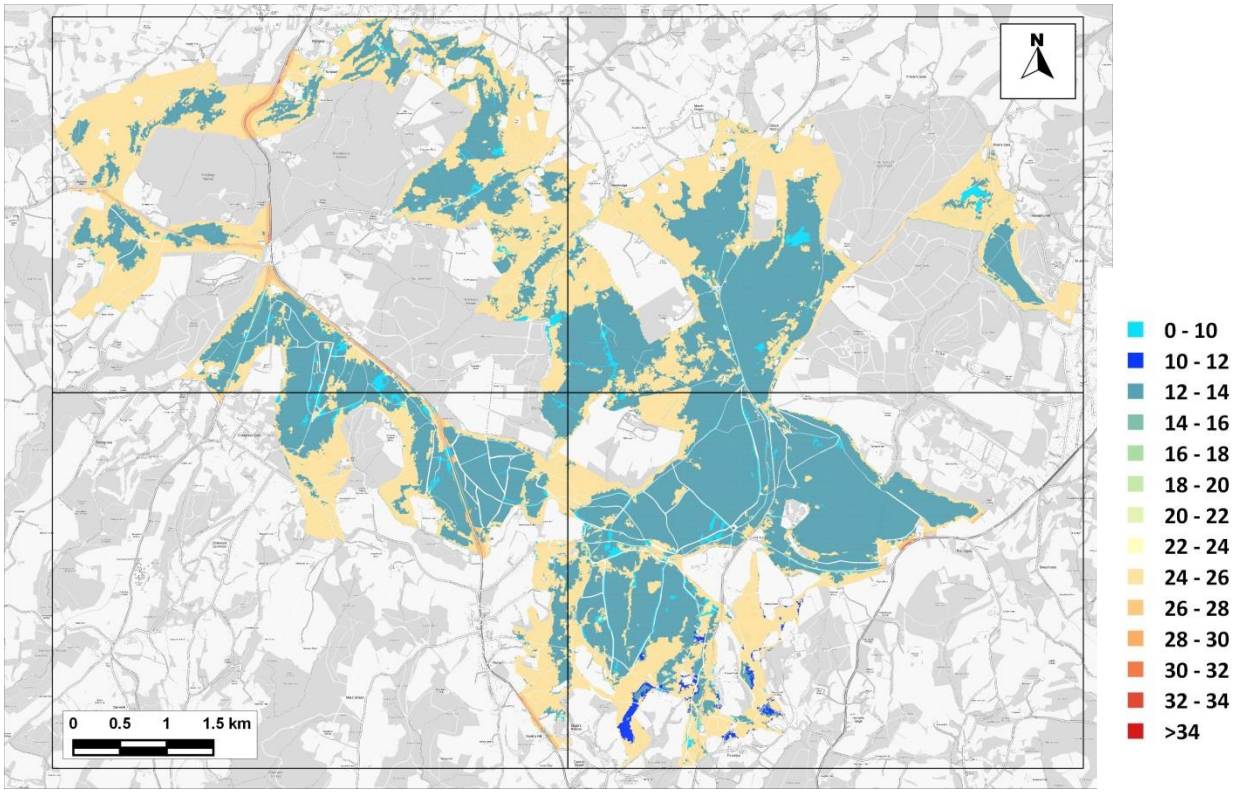


Figure 11.13: Nitrogen Deposition to SAC – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 11.35: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.3	6.1	5.9	2.0	1.3	8.4	25.1	45%
Bracken	<0.1	0.6	3.0	1.0	0.2	0.2	8.3	13.3	9%
Scattered Bracken	<0.1	0.6	3.0	1.0	0.2	0.2	8.4	13.4	7%
Dry Heath	<0.1	0.7	2.5	0.8	0.2	0.2	8.3	12.6	24%
Wet Heath	<0.1	0.7	2.5	0.8	0.2	0.2	8.3	12.7	10%
Grassland	<0.1	0.8	2.3	0.7	0.1	0.1	8.4	12.5	3%
Water	<0.1	0.4	0.3	0.1	0.2	0.2	8.4	9.5	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.1	8.3	9.3	3%
Whole SAC	<0.1	1.0	4.1	3.1	1.0	0.7	8.3	18.3	-

Table 11.36: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	6.0	24.1	5.9	2.0	1.3	8.7	48.1
Bracken	<0.1	2.0	7.7	1.0	0.2	0.2	8.7	19.2
Scattered Bracken	<0.1	1.7	7.0	1.0	0.2	0.2	8.7	18.4
Dry Heath	<0.1	2.4	7.5	0.8	0.2	0.2	8.7	19.8
Wet Heath	<0.1	1.8	5.9	0.8	0.2	0.2	8.7	17.1
Grassland	<0.1	2.2	5.7	0.7	0.1	0.1	8.7	17.1
Water	<0.1	0.6	0.5	0.1	0.2	0.2	8.7	9.8
Bare Ground	<0.1	1.1	0.8	0.1	0.1	0.1	8.7	10.5
Whole SAC	<0.1	6.0	24.1	5.9	2.0	1.3	8.7	48.1

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 11.37: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 No WDC-Growth - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.3	6.0	5.9	2.0	1.3	7.8	24.4
Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	7.8	12.8
Scattered Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	7.9	12.9
Dry Heath	<0.1	0.7	2.4	0.8	0.2	0.2	7.8	12.2
Wet Heath	<0.1	0.7	2.4	0.8	0.2	0.2	7.8	12.2
Grassland	<0.1	0.8	2.3	0.7	0.1	0.1	7.8	11.9
Water	<0.1	0.3	0.3	0.1	0.2	0.2	7.9	9.0
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.1	7.8	8.8
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.1	7.8	8.8

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 11.38: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 No WDC-Growth - C (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.07	6.05	73.12
10	12	0.00	0.00	0.00	0.00	0.00	12.58	0.17	0.00	12.75
12	14	626.84	0.00	259.27	234.52	178.13	74.15	0.00	0.00	1372.91
14	16	0.06	0.00	1.47	1.61	2.79	0.03	0.00	0.00	5.97
16	18	0.00	0.00	0.02	0.08	0.11	0.01	0.00	0.00	0.22
18	20	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.02
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1155.98	0.00	0.00	0.00	0.00	0.00	0.00	1155.98
26	28	0.00	38.81	0.00	0.00	0.00	0.00	0.00	0.00	38.81
28	30	0.00	3.84	0.00	0.00	0.00	0.00	0.00	0.00	3.84
30	32	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	1.50
32	34	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.73
34	36	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.56
36	38	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.37
38	40	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.18
40	-	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.17	0.00	2593.93

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Chapter Summary

11.41 The 2028 No WDC-Growth model predicts the future air quality conditions assuming that growth outside of Wealden takes place but there is no growth associated with the Wealden Local Plan. These predictions have been made for the three alternative emissions scenarios: A, B, and C.

Annual Mean NOx

11.42 All of the predicted annual mean NOx concentrations in the No WDC-Growth scenario are higher (for equivalent emissions scenarios) than those in the existing baseline and No-Growth scenarios

(Chapters 9, and 10), which did not include the additional growth from outside Wealden. Annual mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 104 $\mu g/m^3$ and a total of 6.8 ha of the SAC is predicted to exceed the 30 $\mu g/m^3$ critical level. In emissions scenario B, the maximum predicted concentration is 51 $\mu g/m^3$ and a total of 0.6 ha is predicted to exceed the 30 $\mu g/m^3$ critical level. Under emissions scenario C, the maximum predicted concentration is 37 $\mu g/m^3$ and a total of 0.02 ha (200 m^2) is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (76, 38, and 28 $\mu g/m^3$ for emissions scenarios A, B and C respectively). Thus, the 30 $\mu g/m^3$ critical level is not predicted to be exceeded over heath under the most optimistic emissions scenario considered (scenario C) but it is in both other scenarios. When using the lower-bound uncertainty range to this critical level as advised by CEH (15 $\mu g/m^3$) the exceedence areas are all greatly increased.

24-hour Mean NOx

11.43 As was the case for annual mean NOx, all of the predicted maximum 24-hour mean NOx concentrations in the No WDC-Growth scenario are higher (for equivalent emissions scenarios) than those in the existing baseline and No-Growth scenarios (Chapters 9, and 10), which did not include the additional growth from outside Wealden. Maximum 24-hour mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 473 $\mu g/m^3$ and the entire SAC is predicted to exceed the 75 $\mu g/m^3$ critical level. In emissions scenario B, the maximum predicted concentration is 284 $\mu g/m^3$ and a total of 114 ha is predicted to exceed the 75 $\mu g/m^3$ critical level. Under emissions scenario C, the maximum predicted concentration is 225 $\mu g/m^3$ and a total of 55 ha is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (378, 226, and 180 $\mu g/m^3$ for emissions scenarios A, B and C respectively) but the 75 $\mu g/m^3$ critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C).

Annual Mean NH_3

11.44 It was only possible to consider a single emissions scenario for NH_3. As was the case for NOx, all of the predicted annual mean NH_3 concentrations in the No WDC-Growth scenario are higher (for equivalent emissions scenarios) than those in the existing baseline and No-Growth scenarios (Chapters 9, and 10), which did not include the additional growth from outside Wealden. Exceedences of the 1 $\mu g/m^3$ critical level are predicted alongside the A22, Hindleap Lane, Plawhatch Lane, the A275, Crowborough Road, the B2026, and the A26. These cover a total of 4.3 ha of the SAC, of which 0.3 ha (3,000 m^2) is currently heath. The maximum predicted

concentration is 2.5 μg/m^3 (i.e. 2.5 times the 1 μg/m^3 critical level) and the maximum concentration predicted in an area which is currently heath is 1.9 μg/m^3. When using the lower-bound uncertainty range to the critical level as advised by CEH (0.8 μg/m^3) the exceedence areas are all greatly increased.

Nitrogen Deposition

11.45 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). All of the predicted deposition fluxes in the No WDC-Growth scenario are higher (for equivalent emissions scenarios and deposition methods) than those in the existing baseline and No-Growth scenarios (Chapters 9, and 10), which did not include the additional growth from outside Wealden. Under all three emissions scenarios and both deposition models, the 10 kg-N/ha/yr critical load is predicted to be exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load, under any of the emissions scenarios or deposition models, are some small areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

11.46 The maximum predicted deposition fluxes in emissions scenario A are 73 kg-N/ha/yr (EA method) and 60 kg-N/ha/yr (AQC method), with the maximum fluxes to any current heath being 36 kg-N/ha/yr and 25 kg-N/ha/yr for the EA and AQC methods respectively. The maximum predicted fluxes under emissions scenario B are 56 and 51 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 26 and 21 kg-N/ha/yr respectively. The maximum predicted fluxes under emissions scenario C are 51 and 48 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 24 and 20 kg-N/ha/yr respectively.

11.47 Thus, even in the most optimistic emissions scenario considered (scenario C) and deposition method (AQC method), deposition fluxes are predicted to be twice the critical load at the worst-case heathland locations considered, and the critical load will be exceeded over virtually the entire SAC. Using the results for less optimistic scenarios, the exceedences are even greater.

12 2028 With Plan Model Results

12.1 This section sets out the ambient concentrations and nitrogen deposition fluxes predicted to occur in 2028 with the Wealden Local Plan in combination with growth elsewhere, as provided by TEMPRO 7.2 data. Results are presented for emissions scenarios A, B and C. **This section does not contain comparisons against the model predictions for either the 'no WDC-growth' or the 'no-growth' scenarios. These comparisons are set out in Chapters 13, 14, and 15.**

2028 With Plan Emissions Scenario A

Annual Mean NOx in 2028 With Plan – A

12.2 Figure 12.1 (also see Figure A9.1 to Figure A9.4) shows the predicted annual mean NOx concentrations across the SAC under emissions scenario A. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 15 μg/m^3, with concentrations less than 12 μg/m^3 predicted in many areas. Exceedences of the 30 μg/m^3 critical level are predicted alongside the A22, Hindleap Lane, Plawhatch Lane, the A275, Crowborough Road, the B2026, New Road, and the A26[61].

12.3 Exceedences of the 30 μg/m^3 critical level are predicted up to approximately 20 m from the A22, 30 m from the A26, 10 m from the A275, and 5 m from New Road[62]. The predicted exceedences alongside the B2026, Crowborough Road, Hindleap Lane, and Plawhatch Lane are only at the immediate kerbside (ca. 1-2 m from the road). Exceedences of 15 μg/m^3, which is the lower-bound uncertainty range to the critical level as identified by CEH, are predicted to extend approximately 105 m from the A22, 195 m from the A26, 75 m from the A275, 110 m from the B2026, 40 m from the B2188, 85 m from the B2110, 170 m from New Road, 10 m from Kidd's Hill, 40 m from Crowborough Road, 40 m from Hindleap Lane, 10 m from Priory Road, 20 m from Plawhatch Lane, 10 m from Legsheath Lane, and 15 m from Colemans Hatch Road.

12.4 Table 12.1 shows the average, maximum and minimum predicted concentrations across the whole SAC. This shows that the average predicted concentration across the SAC as a whole is 12.5 μg/m^3, but that the maximum concentration predicted at any one location (A22 immediately north of Hindleap Lane) is 112.4 μg/m^3. Because most of the SAC is not alongside roads, the minimum concentration (at 11.0 μg/m^3) is quite close to the average (12.5 μg/m^3). The average

61 For detail of the areas of these exceedences, see Paragraph 12.5.

62 Presenting distances from roads as a single value is problematic since the distances change along the road. Because the contours from one road merge with those of others at juctions, there is no objective way to determine which point the distance should be measured from. The distances are provided here to aid reading of the report, but should be treated as being approximate and illustrative only. For detail on the areas affected, the hectare values in corresponding tables should be used. The measured distances from roads have been included in this chapter only, but given the level of precision in these distance measurements (as opposed to the detail presented by the contours themesleves and the area statistics) it would not, in any event, be possible to present meaningful changes in the distances due to the Local Plan or other predicted traffic growth.

concentration over dry heath is 12.0 μg/m^3, while to wet heath it is 13.3 μg/m^3. These values are well below the 30 μg/m^3 critical level and also below the 15 μg/m^3 lower-bound uncertainty range to the critical level identified by CEH. The maximum predicted concentrations over areas that currently support dry and wet heath are 83.6 μg/m^3 and 61.9 μg/m^3 respectively. Both of these values are predicted close to the A22, with the highest concentration over dry heath predicted north of Wych Cross, and the highest concentration over wet heath predicted near to the bottom of Millbrook Hill.

12.5 Table 12.2 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. As an example of how to interpret this table, it shows that 1,509 ha are predicted to experience concentrations between 10 and 12 μg/m^3, and that 8.2 ha will experience an exceedence of the critical level. Of this 8.2 ha, 5.6 ha will be woodland, 1.25 ha wet heath, 0.66 ha bracken, 0.07 ha grassland and 0.63 ha bare ground.

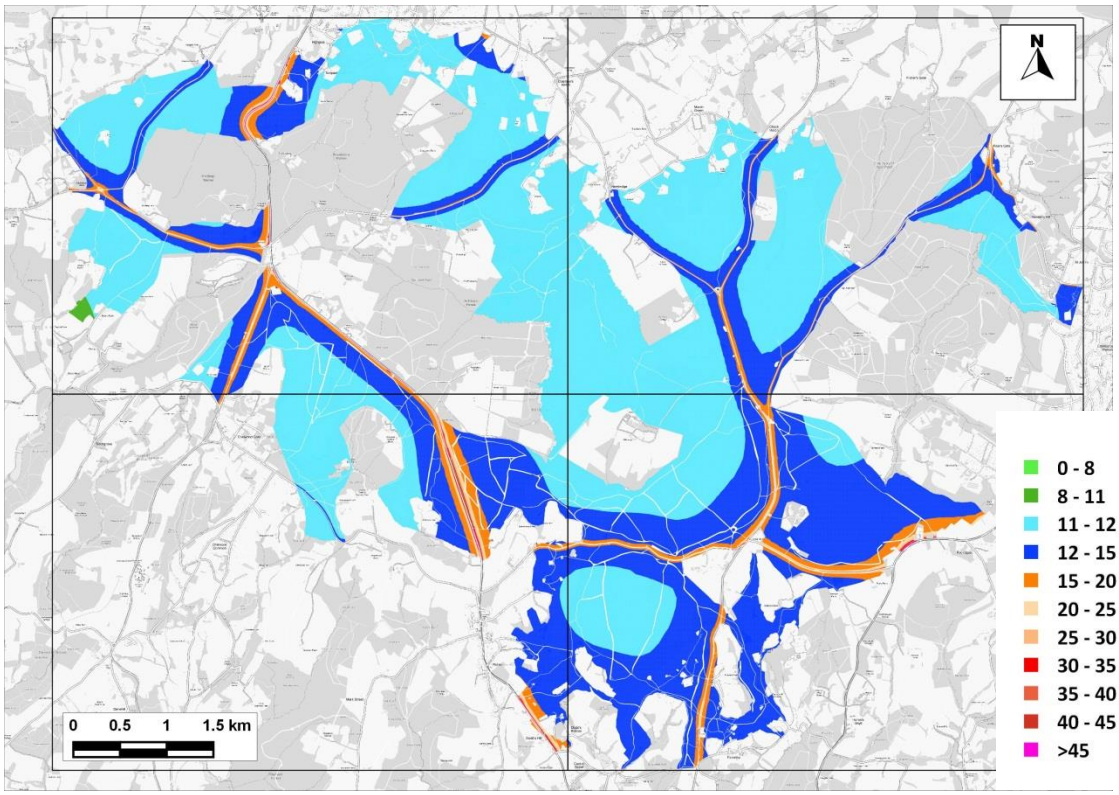


Figure 12.1: Predicted Annual Mean NOx Concentrations across the SAC– 2028 With Plan - A (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.1: Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan – A (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	12.6	112.4	11.0
Bracken	12.5	73.0	11.1
Scattered Bracken	12.4	61.0	11.1
Dry Heath	12.0	83.6	11.1
Wet Heath	13.3	61.9	11.2
Grassland	12.4	64.3	11.0
Water	11.9	33.6	11.0
Bare Ground	13.4	73.8	11.0
Whole SAC	12.5	112.4	11.0

Table 12.2: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan - A [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	12	394.77	715.53	86.06	129.11	104.17	44.63	29.72	4.83	1508.82
12	14	210.00	350.51	122.04	78.80	58.44	35.32	25.37	0.99	881.48
14	18	19.62	94.31	40.31	23.74	14.33	5.82	6.57	0.19	204.90
18	20	1.27	14.87	4.31	1.75	1.91	0.42	1.71	0.01	26.26
20	25	1.07	16.26	4.71	1.91	1.63	0.43	2.30	0.01	28.32
25	30	0.16	4.97	2.08	0.53	0.28	0.09	0.94	0.00	9.05
30	35	0.00	2.23	0.73	0.16	0.11	0.03	0.22	0.00	3.48
35	40	0.00	0.88	0.37	0.08	0.06	0.01	0.11	0.00	1.50
40	-	0.00	2.49	0.15	0.13	0.13	0.03	0.31	0.00	3.23
All >30		0.00	5.60	1.25	0.37	0.29	0.07	0.63	0.00	8.21

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 With Plan – A

12.6 Figure 12.2 (also see Figure A9.5 to Figure A9.8) shows the maximum predicted 24-hour NOx concentrations across the SAC with the Local Plan, under emissions scenario A. The 75 μg/m^3 critical level is predicted to be exceeded across the entire SAC, with concentrations well above the critical level close to roads[63].

12.7 Concentrations greater than 100 μg/m^3 are predicted to extend approximately 120 m from the A22, 305 m from the A26, 55 m from the A275, 80 m from the B2026, 20 m from the B2188, 120 m from the B2110, 130 m from New Road, 20 m from Kidd's Hill, 55 m from Crowborough Road, 50 m from Hindleap Lane, 5 m from Priory Road, 20 m from Plawhatch Lane, 10 m from Legsheath Lane, and 20 m from Colemans Hatch Road[62]. Concentrations greater than 85 μg/m^3 are predicted alongside all roads, as well as over much of the southeastern part of the SAC.

12.8 Table 12.3 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (497.6 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (405.9 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (327.8 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 89.7 μg/m^3, with the averages for dry and wet heath being 86.8 μg/m^3 and 94.5 μg/m^3 respectively. The minimum concentration over the SAC is 79.6 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

12.9 Table 12.4 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and highlights that the entire area is expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 197 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 44 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 20 ha are predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 6 ha are predicted to experience concentrations above 200 μg/m^3.

63 For detail of the areas of these exceedences, see Paragraph 12.9.

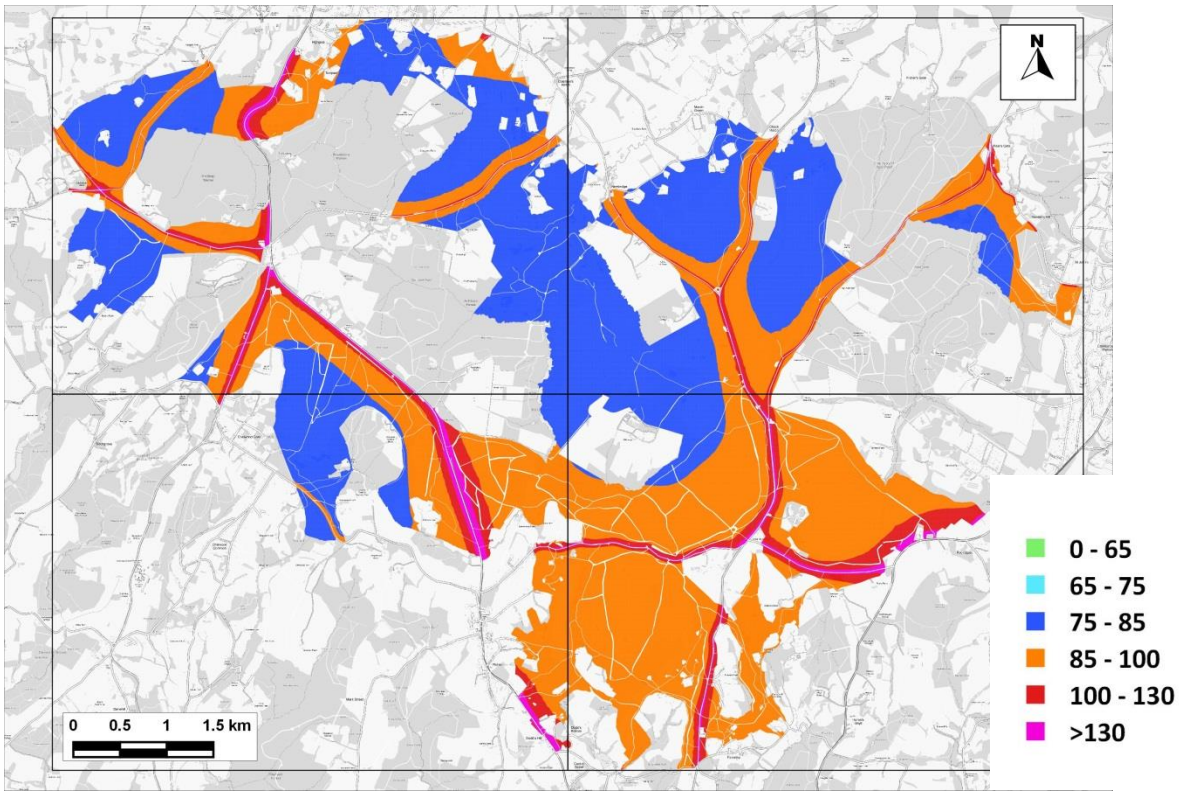


Figure 12.2: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC– 2028 With Plan - A (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.3: 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan – A (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	90.0	497.6	79.6
Bracken	89.9	369.0	80.8
Scattered Bracken	89.3	324.6	80.4
Dry Heath	86.8	405.9	80.4
Wet Heath	94.5	327.8	81.5
Grassland	88.9	336.9	79.7
Water	85.8	207.4	80.1
Bare Ground	95.2	371.9	80.0
Whole SAC	89.7	497.6	79.6

Table 12.4: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan - A [a]

Concentration ($\mu g/m^3$)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	85	260.89	576.04	55.21	93.86	74.73	35.56	20.84	4.07	1121.19
85	100	344.97	494.12	155.11	115.34	88.53	44.70	34.54	1.76	1279.07
100	125	18.64	91.18	38.41	22.58	13.82	5.55	6.38	0.18	196.73
125	150	1.93	24.96	6.99	2.99	3.00	0.63	3.03	0.02	43.55
150	200	0.46	11.34	4.17	1.19	0.75	0.28	1.92	0.01	20.12
200	-	0.00	4.42	0.88	0.27	0.24	0.06	0.53	0.00	6.40
All >75		626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Annual Mean NH_3 in 2028 With Plan

12.10 Figure 12.3 (also see Figure A9.9 to Figure A9.12) shows the predicted annual mean NH_3 concentrations across the SAC with the Local Plan. Over most of the SAC, annual mean NH_3 concentrations are predicted to be less than 0.6 $\mu g/m^3$, but exceedences of the 1 $\mu g/m^3$ critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Crowborough Road, the B2026, and the A26[64].

12.11 Concentrations greater than 1 $\mu g/m^3$ are predicted to extend approximately 20 m from the A22 and 20 m from the A26, but alongside most of the other roads listed above, these concentrations do not extend more than around 10 m from the road. Concentrations greater than 0.8 $\mu g/m^3$ extend up to approximately 30 m from both the A22 and A26, 5 m from the A275, 5 m from the B2026, 10 m from New Road, and 5 m from Plawhatch Lane. Concentrations greater than 0.6 $\mu g/m^3$ are predicted to extend approximately 185 m from the A22, 225 m from the A26, 95 m from the A275, 120 m from the B2026, 50 m from the B2188, 150 m form the B2110, 145 m from New Road, 50 m from Kidd's Hill, 80 m from Crowborough Road, 90 m from Hindleap Lane, 20 m from Priory Road, 20 m from Plawhatch Lane, 50 m from Legsheath Lane, and 45 m from Colemans Hatch Road[62].

12.12 Table 12.5 shows the average, maximum and minimum predicted concentrations across the whole

64 For detail of the areas of these exceedences, see Paragraph 12.13.

SAC. The maximum concentration anywhere in the SAC (2.7 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (2.1 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (1.6 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 0.6 μg/m^3, with the averages for dry and wet heath being 0.59 μg/m^3 and 0.60 μg/m^3 respectively. The minimum concentration over the SAC is 0.58 μg/m^3, with this predicted for many areas which are well away from roads.

12.13 Table 12.6 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 1 μg/m^3 critical level. Most of the SAC (1,941 ha) would experience concentrations of less than 0.59 μg/m^3. 4.93 ha are predicted experience concentrations above the 1 μg/m^3 critical level, with 3.65 ha of this being woodland, 0.44 ha being heath, 0.36 ha being bracken, 0.04 ha being grassland, and 0.43 ha being bare ground.

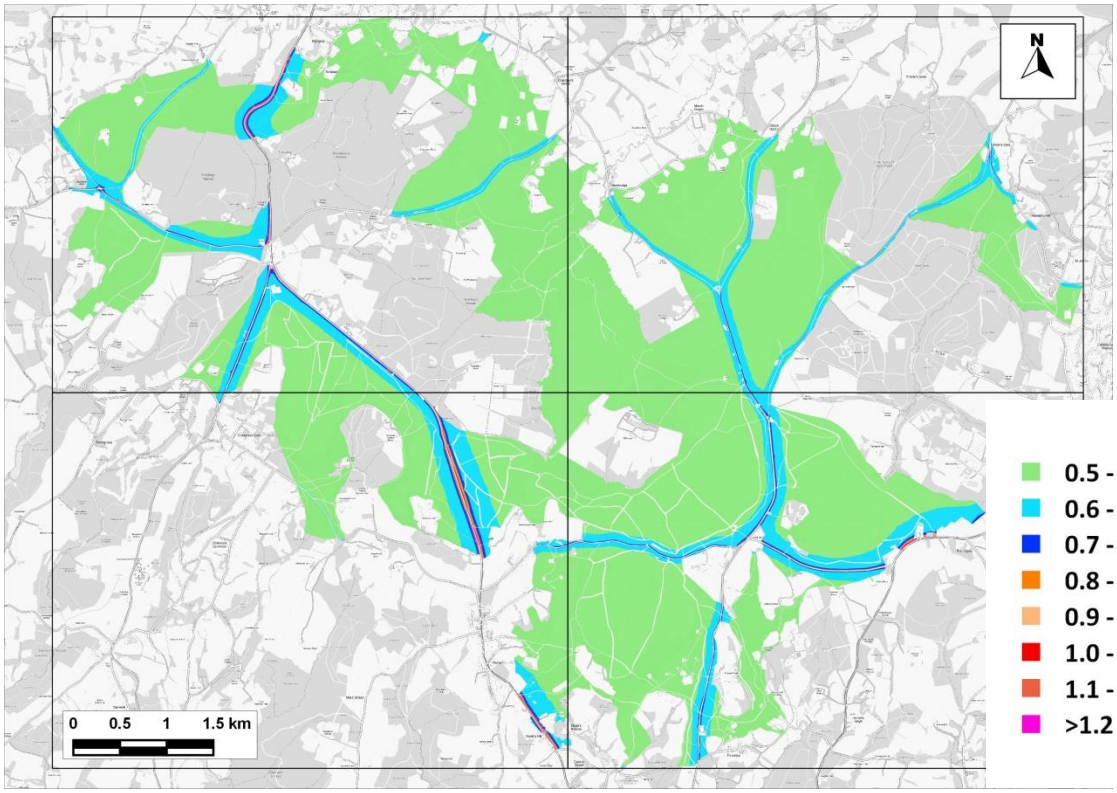


Figure 12.3: Predicted Annual Mean NH_3 Concentrations across the SAC– 2028 With Plan (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.5: Annual Mean NH_3 across the Ashdown Forest SAC – 2028 With Plan – A (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	0.60	2.7	0.58
Bracken	0.59	1.7	0.58
Scattered Bracken	0.59	1.6	0.58
Dry Heath	0.59	2.1	0.58
Wet Heath	0.60	1.6	0.58
Grassland	0.59	1.7	0.58
Water	0.59	1.0	0.58
Bare Ground	0.61	1.9	0.58
Whole SAC	0.60	2.7	0.58

Table 12.6: Summary of Annual Mean NH_3 across the Ashdown Forest SAC – 2028 With Plan [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0.58	**0.59**	539.23	868.22	125.23	171.25	128.44	64.63	38.97	5.20	1941.17
0.59	**0.6**	54.07	132.84	59.55	29.68	26.27	11.02	11.83	0.44	325.70
0.6	**0.7**	32.17	170.40	67.52	32.34	23.53	10.49	11.60	0.39	348.42
0.7	**0.8**	1.23	19.92	5.25	2.01	2.11	0.49	2.98	0.02	33.99
0.8	**0.9**	0.19	4.94	2.02	0.56	0.41	0.07	1.11	0.00	9.31
0.9	**1**	0.02	2.08	0.76	0.22	0.11	0.03	0.31	0.00	3.53
1	**1.1**	0.00	1.08	0.30	0.07	0.06	0.01	0.12	0.00	1.64
1.1	**1.2**	0.00	0.55	0.06	0.05	0.04	0.01	0.07	0.00	0.78
1.2	**-**	0.00	2.02	0.08	0.05	0.10	0.02	0.24	0.00	2.51
All >1		0.00	3.65	0.44	0.17	0.19	0.04	0.43	0.00	4.93

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 With Plan – A (EA Method)

12.14 Figure 12.4 (see also Figure A9.13 to Figure A9.16) shows the predicted nitrogen deposition fluxes across the SAC in 2028 with the Local Plan, under emissions scenario A, and using the EA deposition method. As with all other nitrogen deposition datasets, the 10 kg-N/ha/yr critical load is

predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. The colours shown in Figure 12.4 do not follow smooth gradations like those used to describe concentrations. This is because deposition is heavily influenced by land cover type and so Figure 12.4 contains step-changes in predicted deposition where the land cover changes from one habitat type to another. The highest predicted deposition fluxes are predicted to occur to woodland, and predicted deposition fluxes greater than 30 kg-N/ha/yr are predicted for many areas of woodland even well away from roads. Conversely, deposition fluxes less than 24 kg-N/ha/yr are predicted in many areas even close to roads where the land cover type is shorter (i.e. not woodland)[65].

12.15 Deposition fluxes greater than 34 kg-N/ha/yr, which is the largest deposition banding shown in the figure, are predicted to extend approximately 20 m from the A22, 40 m from the A26, 10 m from the A275, 5 m from the B2026, 5 m from the B2188, 25 m form the B2110, 15 m from New Road, 5 m from Crowborough Road, 10 m from Hindleap Lane, 5 m from Priory Road, and 5 m from Plawhatch Lane[62].

12.16 Table 12.7, Table 12.8, and Table 12.9 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (77.5 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is nearly eight times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (38.6 kg-N/ha/r, which is nearly four times the 10 kg-N/ha/yr critical load) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (30.2 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 22.3 kg-N/ha/yr (more than double the 10 kg-N/ha/yr critical load), with the averages for all dry and wet heath being 15.3 kg-N/ha/yr and 15.6 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to dry and wet heath being 14.8 kg-N/ha/yr and 14.9 kg-N/ha/yr respectively. The minimum predicted deposition flux over the entire SAC (9.7 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

12.17 Table 12.10 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only part of the SAC which is not predicted to experience an exceedence of the critical load is 8.7 ha of bare ground. The critical load will be exceeded over the remaining 2,658 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 3.3 ha of the SAC. Most of the dry and wet heath is predicted to experience deposition within the 14-16 kg-N/ha/yr deposition band.

65 For detail of the areas within each deposition range, see Paragraph 12.17.

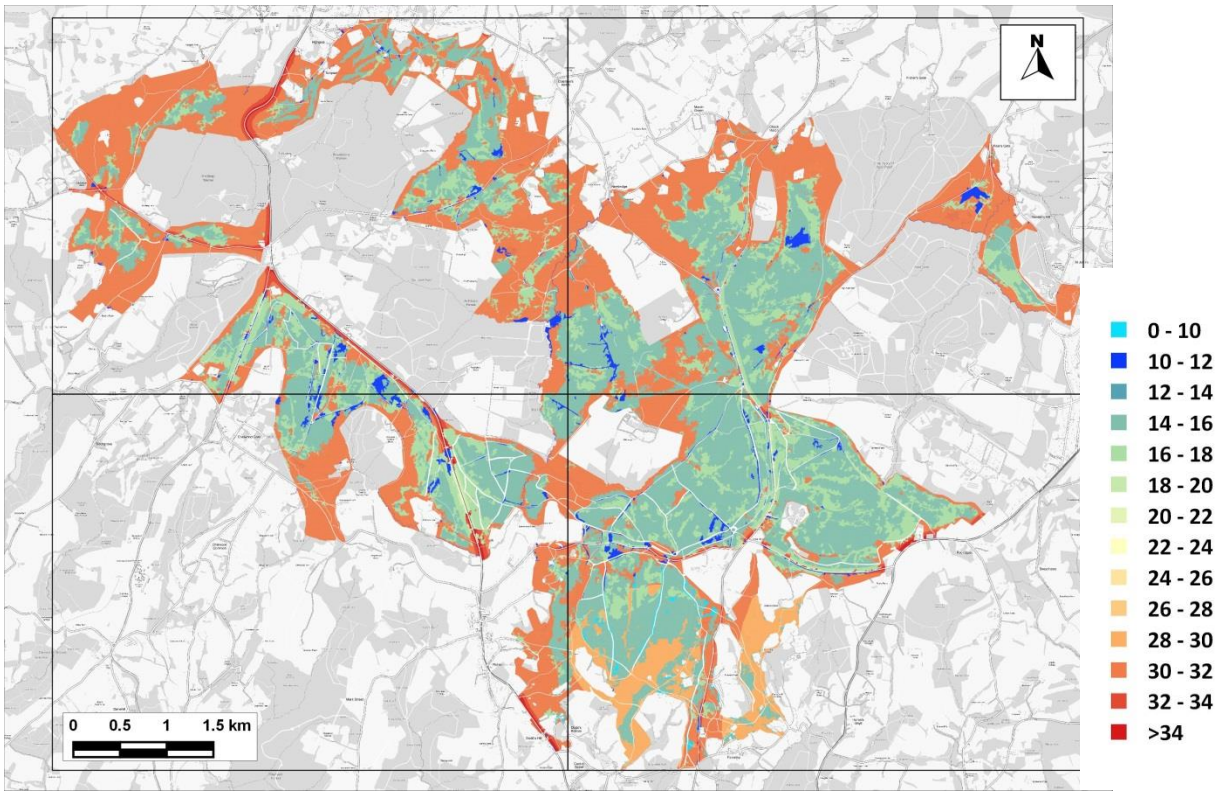


Figure 12.4: Nitrogen Deposition to SAC – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.7: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	2.6	5.7	9.1	1.9	2.1	9.4	30.7	45%
Bracken	<0.1	2.4	2.7	1.6	0.2	0.3	9.3	16.5	9%
Scattered Bracken	<0.1	2.4	2.8	1.6	0.2	0.3	9.4	16.6	7%
Dry Heath	<0.1	2.1	2.3	1.3	0.2	0.3	9.3	15.3	24%
Wet Heath	<0.1	2.3	2.3	1.3	0.2	0.3	9.3	15.6	10%
Grassland	<0.1	2.1	2.2	1.1	0.1	0.2	9.4	15.1	3%
Water	<0.1	0.3	0.3	0.1	0.2	0.3	9.4	10.6	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.2	9.3	10.3	3%
Whole SAC	<0.1	2.3	3.8	4.8	0.9	1.1	9.3	22.3	-

Table 12.8: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	5.9	23.6	25.3	9.1	1.9	2.1	9.8	77.5
Bracken	1.7	13.4	7.8	1.6	0.2	0.3	9.8	33.9
Scattered Bracken	0.9	14.2	7.3	1.6	0.2	0.3	9.8	33.6
Dry Heath	2.6	16.5	8.0	1.3	0.2	0.3	9.8	38.6
Wet Heath	0.9	12.3	6.1	1.3	0.2	0.3	9.8	30.2
Grassland	1.2	11.8	5.9	1.1	0.1	0.2	9.8	29.2
Water	<0.1	0.8	0.5	0.1	0.2	0.3	9.7	11.0
Bare Ground	1.0	1.5	0.9	0.1	0.1	0.2	9.8	13.1
Whole SAC	5.9	23.6	25.3	9.1	1.9	2.1	9.8	77.5

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 12.9: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	2.3	5.5	9.1	1.9	2.1	8.7	29.8
Bracken	<0.1	2.2	2.7	1.6	0.2	0.3	8.7	15.9
Scattered Bracken	<0.1	2.2	2.7	1.6	0.2	0.3	8.8	15.9
Dry Heath	<0.1	2.0	2.3	1.3	0.2	0.3	8.7	14.8
Wet Heath	<0.1	2.0	2.3	1.3	0.2	0.3	8.7	14.9
Grassland	<0.1	1.9	2.1	1.1	0.1	0.2	8.7	14.3
Water	<0.1	0.3	0.3	0.1	0.2	0.3	8.8	10.0
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.2	8.7	9.7
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.2	8.7	9.7

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 12.10: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 With Plan - A (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	8.72	0.00	8.72
10	12	0.00	0.00	0.00	0.00	0.00	0.00	58.44	6.05	64.48
12	14	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08
14	16	615.26	0.00	227.59	12.93	2.50	85.57	0.00	0.00	943.84
16	18	11.23	0.00	28.92	219.91	174.26	1.10	0.00	0.00	435.42
18	20	0.40	0.00	3.38	2.63	3.62	0.07	0.00	0.00	10.09
20	22	0.02	0.00	0.70	0.55	0.43	0.02	0.00	0.00	1.71
22	24	0.00	0.00	0.13	0.11	0.11	0.01	0.00	0.00	0.36
24	26	0.00	0.00	0.03	0.06	0.05	0.00	0.00	0.00	0.14
26	28	0.00	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.06
28	30	0.00	96.14	0.00	0.01	0.02	0.00	0.00	0.00	96.18
30	32	0.00	1051.11	0.00	0.00	0.03	0.00	0.00	0.00	1051.14
32	34	0.00	38.59	0.00	0.00	0.02	0.00	0.00	0.00	38.61
34	36	0.00	9.41	0.00	0.00	0.00	0.00	0.00	0.00	9.41
36	38	0.00	2.30	0.00	0.00	0.00	0.00	0.00	0.00	2.30
38	40	0.00	1.23	0.00	0.00	0.00	0.00	0.00	0.00	1.23
40	-	0.00	3.26	0.00	0.00	0.00	0.00	0.00	0.00	3.26
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	58.52	6.05	2658.33

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 With Plan – A (AQC Method)

12.18 Figure 12.5 (see also Figure A9.17 to Figure A9.20) shows the predicted nitrogen deposition fluxes across the SAC in 2028 with the Local Plan, under emissions scenario A; this time using the AQC deposition method. As noted previously, the AQC deposition method predicts generally lower fluxes (to all land uses except open water and bare ground) than the EA method. Despite this, the 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. As noted for the EA method results, the colours shown in Figure 12.5 do not follow the same smooth gradations as the predicted concentrations,

since they are affected by land cover type and the detailed habitats maps used in this study contain highly-refined (i.e. sharp) edges. There is a clear differentiation between woodland and non-woodland areas in Figure 12.5, with higher deposition fluxes occurring to the woodland, even well away from roads, although the highest fluxes still occur at the roadsides[66].

12.19 Deposition fluxes greater than 34 kg-N/ha/yr, which is the largest deposition banding shown in the figure, are predicted to extend approximately 15 m from the A22, 25 m from the A26, 5 m from the A275, 10 m form the B2110, 5 m from New Road, 5 m from Hindleap Lane, and 5 m from Plawhatch Lane[62].

12.20 Table 12.11, Table 12.12, and Table 12.13 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (63.1 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than six times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (25.7 kg-N/ha/r, which is more than twice the 10 kg-N/ha/yr critical load) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (21.7 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 21.4 kg-N/ha/yr, with the averages for all dry and wet heath being 14.3 kg-N/ha/yr and 14.4 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 13.8 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (9.9 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

12.21 Table 12.14 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only part of the SAC which is not predicted to experience an exceedence of the critical load is 0.3 ha of bare ground. The critical load will be exceeded over the remaining 2,667 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 2.1 ha of the SAC. As with the EA method results, most of the dry and wet heath is predicted to experience deposition within the 14-16 kg-N/ha/yr deposition band.

66 For detail of the areas within each deposition range, see Paragraph 12.21.

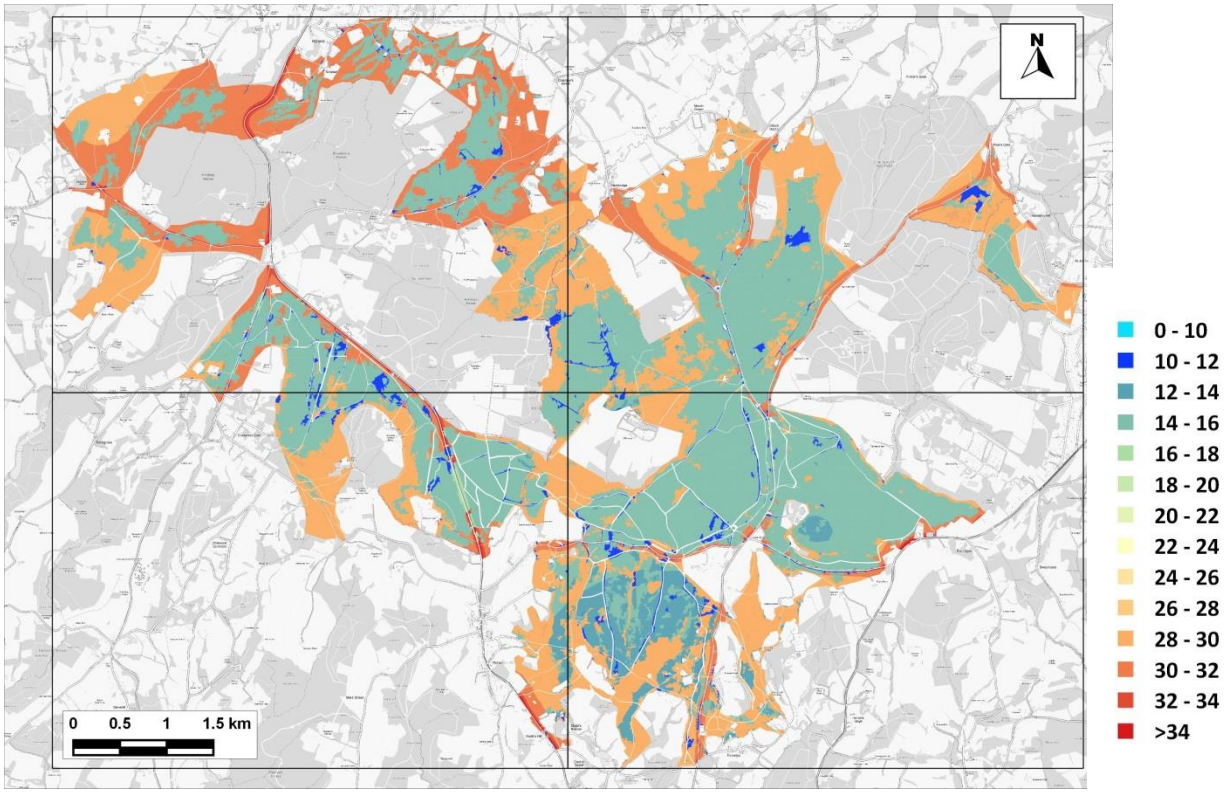


Figure 12.5: Nitrogen Deposition to SAC – 2028 With Plan - A (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.11: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	2.0	5.7	9.1	1.9	2.1	9.4	30.0	45%
Bracken	<0.1	1.0	2.7	1.6	0.2	0.3	9.3	15.0	9%
Scattered Bracken	<0.1	1.0	2.7	1.6	0.2	0.3	9.4	15.1	7%
Dry Heath	<0.1	1.0	2.3	1.3	0.2	0.3	9.3	14.3	24%
Wet Heath	<0.1	1.1	2.3	1.3	0.2	0.3	9.3	14.4	10%
Grassland	<0.1	1.2	2.2	1.1	0.1	0.2	9.4	14.1	3%
Water	<0.1	0.5	0.3	0.1	0.2	0.3	9.4	10.8	0.2%
Bare Ground	<0.1	0.6	0.3	0.1	0.1	0.2	9.3	10.5	3%
Whole SAC	<0.1	1.4	3.8	4.8	0.9	1.1	9.3	21.4	-

Table 12.12: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	15.1	25.3	9.1	1.9	2.1	9.8	63.1
Bracken	<0.1	4.8	7.8	1.6	0.2	0.3	9.8	23.7
Scattered Bracken	<0.1	4.6	7.2	1.6	0.2	0.3	9.8	23.1
Dry Heath	<0.1	6.3	8.0	1.3	0.2	0.3	9.8	25.7
Wet Heath	<0.1	4.7	6.1	1.3	0.2	0.3	9.8	21.7
Grassland	<0.1	5.6	5.9	1.1	0.1	0.2	9.8	21.9
Water	<0.1	1.3	0.5	0.1	0.2	0.3	9.7	11.5
Bare Ground	<0.1	2.6	0.9	0.1	0.1	0.2	9.8	13.2
Whole SAC	<0.1	15.1	25.3	9.1	1.9	2.1	9.8	63.1

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 12.13: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - A (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.8	5.5	9.1	1.9	2.1	8.7	29.2
Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	8.7	14.4
Scattered Bracken	<0.1	0.9	2.7	1.6	0.2	0.3	8.8	14.5
Dry Heath	<0.1	0.9	2.3	1.3	0.2	0.3	8.7	13.8
Wet Heath	<0.1	1.0	2.3	1.3	0.2	0.3	8.7	13.8
Grassland	<0.1	1.1	2.1	1.1	0.1	0.2	8.7	13.4
Water	<0.1	0.5	0.3	0.1	0.2	0.3	8.8	10.2
Bare Ground	<0.1	0.5	0.3	0.1	0.1	0.2	8.7	9.9
Whole SAC	<0.1	0.5	0.3	0.1	0.1	0.2	8.7	9.9

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 12.14: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 With Plan - A (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.28
10	12	0.00	0.00	0.00	0.00	0.00	0.00	66.76	6.05	72.81
12	14	81.22	0.00	9.88	0.00	0.00	26.71	0.19	0.00	118.00
14	16	545.44	0.00	247.63	234.05	177.85	59.97	0.00	0.00	1264.95
16	18	0.24	0.00	3.02	1.98	2.96	0.07	0.00	0.00	8.28
18	20	0.00	0.00	0.21	0.15	0.15	0.02	0.00	0.00	0.53
20	22	0.00	0.00	0.02	0.03	0.06	0.01	0.00	0.00	0.12
22	24	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.04
24	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	30	0.00	775.34	0.00	0.00	0.00	0.00	0.00	0.00	775.34
30	32	0.00	397.07	0.00	0.00	0.00	0.00	0.00	0.00	397.07
32	34	0.00	20.70	0.00	0.00	0.00	0.00	0.00	0.00	20.70
34	36	0.00	4.28	0.00	0.00	0.00	0.00	0.00	0.00	4.28
36	38	0.00	1.72	0.00	0.00	0.00	0.00	0.00	0.00	1.72
38	40	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.83
40	-	0.00	2.12	0.00	0.00	0.00	0.00	0.00	0.00	2.12
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	66.95	6.05	2666.76

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

2028 With Plan Emissions Scenario B

Annual Mean NOx in 2028 With Plan – B

12.22 Figure 12.6 (also see Figure A9.21 to Figure A9.24) shows the predicted annual mean NOx concentrations across the SAC with the Local Plan under emissions scenario B. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 11 $\mu g/m^3$, with concentrations less than 8 $\mu g/m^3$ predicted in many areas. Exceedences of the 30 $\mu g/m^3$ critical level are predicted at the kerbside of the A22 and A26, with exceedences predicted to extend approximately

5 m and 10 m respectively from each road[67]. Concentrations greater than 15 μg/m^3, which is the lower-bound of the critical level uncertainty range as advised by CEH, extend out approximately 15 m from the A22, 45 m from the A26, 5 m from the A275, 5 m from the B2026, 10 m from New Road, 10 m from Hindleap Lane, and 5 m from Plawhatch Lane[62].

12.23 Table 12.15 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (54.4 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. It is interesting to note that this is not the same location as that associated with the maximum predicted concentration in this emission scenario without the Plan (i.e. the No WDC-Growth scenario – see Paragraph 11.18). This change is caused by the additional traffic associated with the Plan. The maximum concentration over dry heath (42.7 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (33.3 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 8.5 μg/m^3, with the averages for dry and wet heath being 8.3 μg/m^3 and 8.9 μg/m^3 respectively. The minimum concentration over the SAC is 7.7 μg/m^3, with this predicted for many areas which are well away from roads.

12.24 Table 12.16 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. A total of 1.1 ha would experience an exceedence of the critical level, with less than 0.005 ha of this being either dry or wet heath. Most of the predicted concentrations over areas of dry and wet heath fall within the 8-10 μg/m^3 concentration range, but appreciable amounts of heath are predicted to experience higher concentrations than this. For example, 3.7 ha of wet heath is predicted to experience concentrations in the 14-18 μg/m^3 concentration range.

[67] For the precise areas of these exceedences, see Paragraph 12.24.

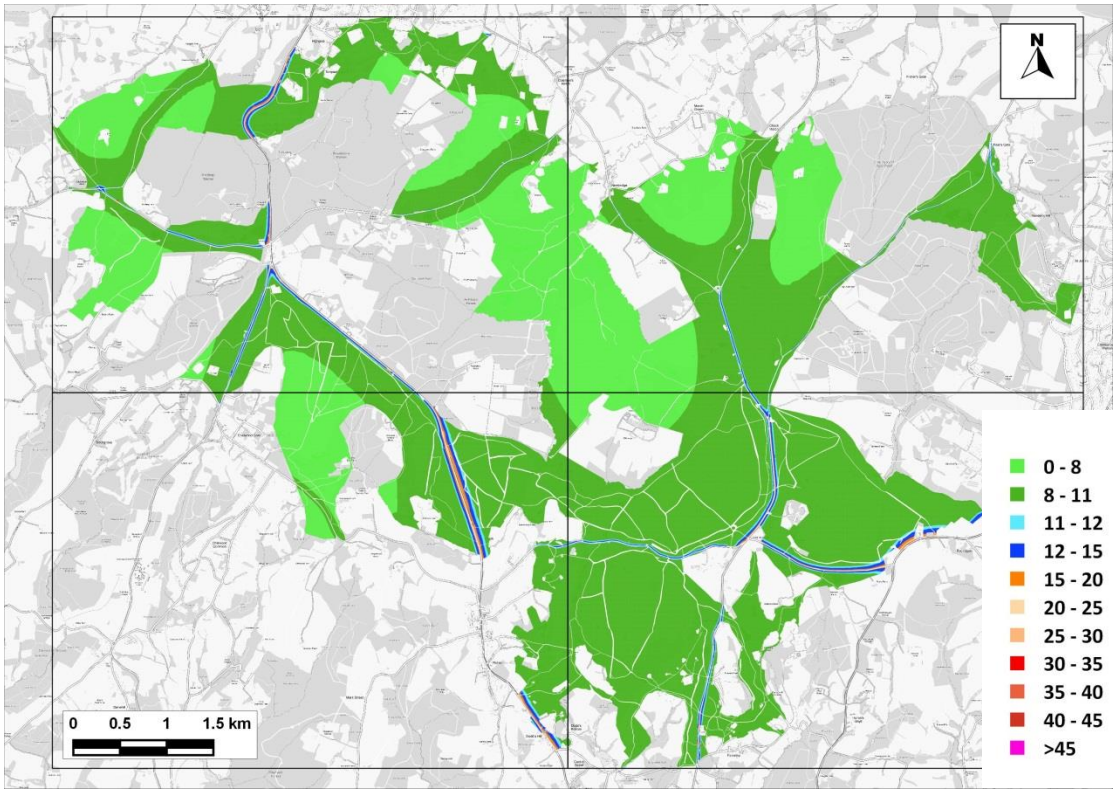


Figure 12.6: Predicted Annual Mean NOx Concentrations across the SAC– 2028 With Plan - B (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.15: Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan – B (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	8.5	54.4	7.7
Bracken	8.5	40.2	7.8
Scattered Bracken	8.5	31.1	7.7
Dry Heath	8.3	42.7	7.7
Wet Heath	8.9	33.3	7.8
Grassland	8.4	33.6	7.7
Water	8.2	18.3	7.7
Bare Ground	9.0	41.7	7.7
Whole SAC	8.5	54.4	7.7

Table 12.16: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan - B [a]

Concentration (μg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	8	117.18	356.72	34.69	40.89	43.36	11.71	13.89	1.64	620.08
8	10	499.63	755.77	195.18	180.03	127.00	71.34	43.88	4.29	1877.13
10	12	8.48	57.87	21.46	11.48	8.02	2.98	4.62	0.09	115.01
12	14	1.19	17.62	4.76	2.28	1.76	0.45	2.48	0.01	30.55
14	18	0.40	8.95	3.70	1.15	0.67	0.22	1.77	0.01	16.87
18	20	0.02	1.54	0.59	0.18	0.08	0.02	0.17	0.00	2.61
20	25	0.00	1.72	0.35	0.13	0.09	0.02	0.19	0.00	2.51
25	30	0.00	0.88	0.04	0.05	0.05	0.01	0.14	0.00	1.17
30	35	0.00	0.57	0.00	0.02	0.02	0.00	0.07	0.00	0.69
35	40	0.00	0.29	0.00	0.01	0.00	0.00	0.02	0.00	0.32
40	-	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10
All >30		0.00	0.97	0.00	0.02	0.02	0.00	0.10	0.00	1.11

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 With Plan – B

12.25 Figure 12.7 (also see Figure A9.25 to Figure A9.28) shows the maximum predicted 24-hour NOx concentrations across the SAC with the Local Plan under emissions scenario B. As noted previously, concentrations under emissions scenario B are all predicted to be lower than those under emissions scenario A. Concentrations are predicted to be less than 65 μg/m^3 across most of the study area, but exceedences of the 75 μg/m^3 critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Coleman's Hatch Rd, the A26, Kidd's Hill Road, the B2188, London Rd, Crowborough Road, New Road, and the B2026[68].

12.26 Concentrations greater than 75 μg/m^3 are predicted to extend approximately 25 m from the A22, 140 m from the A26, 30 m from the A275, 110 m from the B2026, 5 m from the B2188, 65 m form the B2110, 65 m from New Road, 5 m from Kidd's Hill, 25 m from Crowborough Road, 30 m from Hindleap Lane, 20 m from Plawhatch Lane, and 10 m from Colemans Hatch Road. Concentrations greater than 65 μg/m^3 are predicted to extend approximately 100 m from the A22, 350 m from the A26, 75 m from the A275, 275 m from the B2026, 35 m from the B2188, 155 m form the B2110,

[68] For detail of the areas of these exceedences, see Paragraph 12.27.

225 m from New Road, 30 m from Kidd's Hill, 90 m from Crowborough Road, 80 m from Hindleap Lane, 10 m from Priory Road, 25 m from Plawhatch Lane, 15 m from Legsheath Lane, and 40 m from Colemans Hatch Road[62].

12.27 Table 12.17 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (298.6 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (249.1 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (205.7 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 62.2 μg/m^3, with the averages for dry and wet heath being 60.5 μg/m^3 and 65.0 μg/m^3 respectively. The minimum concentration over the SAC is 56.2 μg/m^3, with this predicted for several receptors within woodland and grassland, all well away from any roads.

12.28 Table 12.18 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and shows that 132.16 ha are expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 16.4 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 4 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 2 ha are predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 0.7 ha is predicted to experience concentrations above 200 μg/m^3.

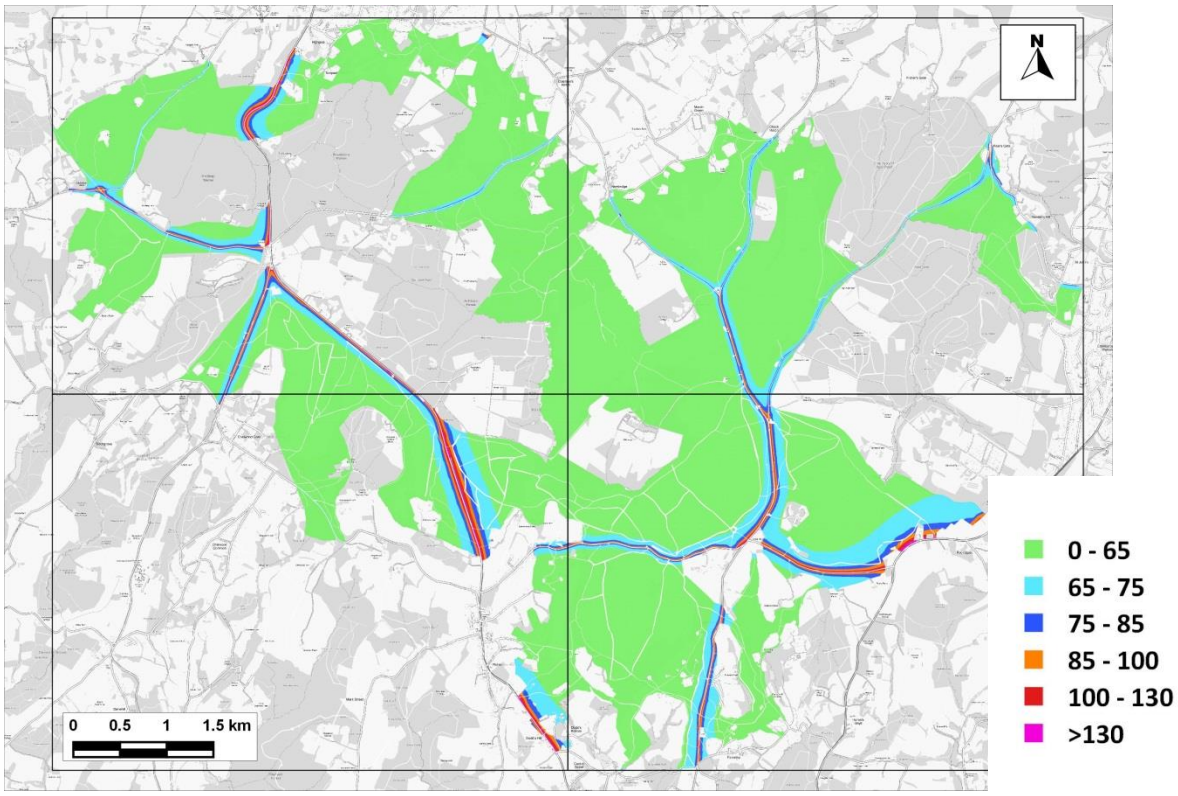


Figure 12.7: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC– 2028 With Plan - B (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.17: 24-hour NOx across the Ashdown Forest SAC – 2028 With Plan – B (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	62.3	298.6	56.2
Bracken	62.4	237.9	56.9
Scattered Bracken	61.8	195.1	56.6
Dry Heath	60.5	249.1	56.7
Wet Heath	65.0	205.7	57.3
Grassland	61.6	207.1	56.2
Water	59.8	126.2	56.5
Bare Ground	65.5	244.7	56.4
Whole SAC	62.2	298.6	56.2

Table 12.18: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan - B [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	330.50	682.13	77.23	117.96	96.13	41.98	24.86	4.77	1375.55
60	65	256.61	330.07	102.13	73.33	59.68	33.71	25.64	0.90	882.07
65	75	33.49	117.23	58.05	34.12	17.27	8.38	8.42	0.31	277.27
75	85	4.35	37.04	12.61	6.53	4.78	1.85	3.09	0.05	70.30
85	100	1.55	21.89	6.18	2.81	2.32	0.57	2.92	0.02	38.26
100	125	0.38	8.68	3.63	1.11	0.64	0.21	1.72	0.01	16.37
125	150	0.02	2.58	0.83	0.24	0.13	0.03	0.28	0.00	4.11
150	200	0.00	1.76	0.10	0.12	0.11	0.03	0.25	0.00	2.37
200	-	0.00	0.67	0.00	0.01	0.00	0.00	0.06	0.00	0.74
All >75		6.30	72.62	23.35	10.82	7.98	2.70	8.32	0.07	132.16

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 With Plan – B (EA Method)

12.29 Figure 12.8 (also see Figure A9.29 to Figure A9.32) shows the predicted nitrogen deposition fluxes across the SAC in 2028 with the Local Plan, under emissions scenario B, and using the EA deposition method. Deposition fluxes are smaller than those under emissions scenario A. The 10

kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 12.8 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland, even well away from roads, although the highest fluxes still occur at the roadsides. Deposition fluxes greater than 34 kg-N/ha/yr, which is the largest deposition banding shown in the figure, are predicted to extend approximately 20 m from the A22, 30 m from the A26, 5 m from the A275, 5 m from the B2026, 5 m from Hindleap Lane, and 5 m from Plawhatch Lane[62,69].

12.30 Table 12.19, Table 12.20, and Table 12.21 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (58.7 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is nearly six times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (27.7 kg-N/ha/r, which is nearly three times the 10 kg-N/ha/yr critical load) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (22.6 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 19.4 kg-N/ha/yr (almost double the 10 kg-N/ha/yr critical load), with the averages for all dry and wet heath being 13.7 kg-N/ha/yr and 13.9 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 13.2 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.8 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

12.31 Table 12.22 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 1 ha of the SAC, with all of this being woodland. Most of the dry and wet heath (588 ha and 202 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr range, with appreciable amounts (39 ha and 57 ha respectively) falling in the 14-16 kg-N/ha/yr deposition band.

[69] For precise detail of the areas within each deposition range, see Paragraph 12.31.

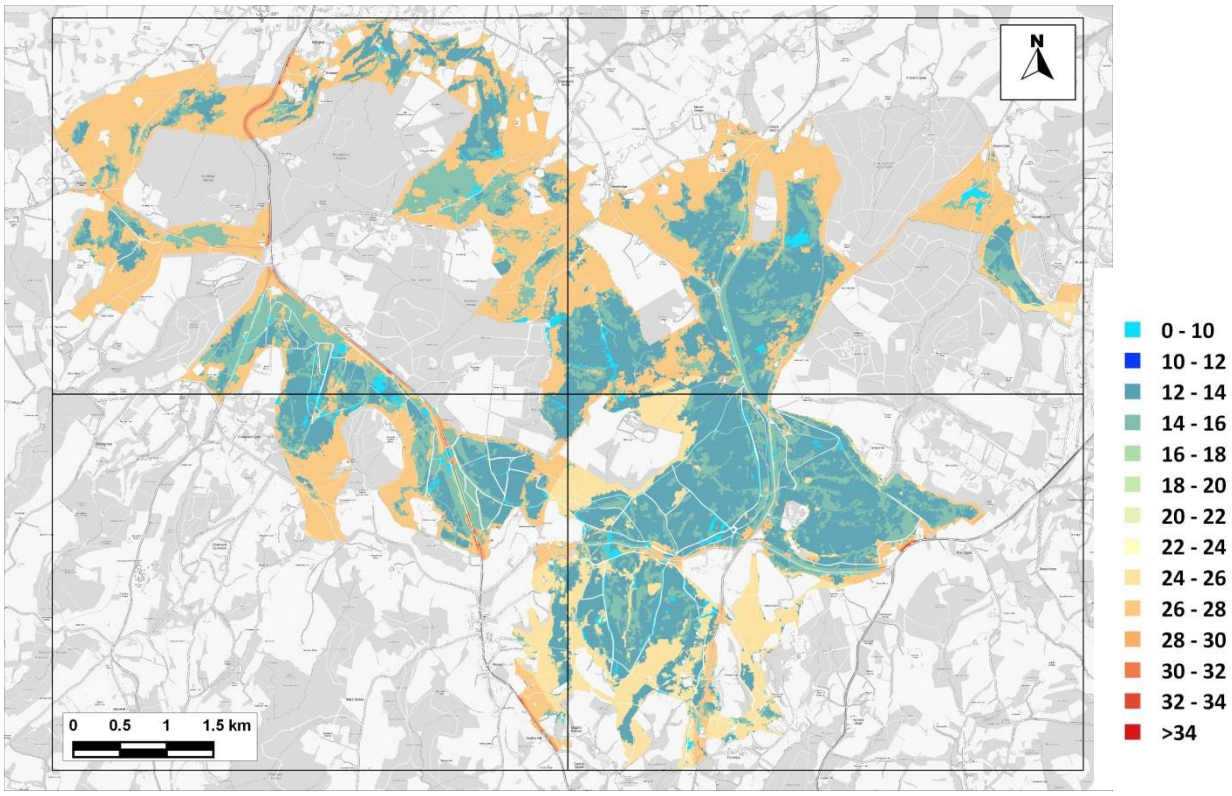


Figure 12.8: Nitrogen Deposition to SAC – 2028 With Plan - B (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.19: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.8	6.2	6.4	2.0	1.4	8.6	26.3	45%
Bracken	<0.1	1.7	3.0	1.1	0.2	0.2	8.5	14.6	9%
Scattered Bracken	<0.1	1.7	3.0	1.1	0.2	0.2	8.5	14.7	7%
Dry Heath	<0.1	1.5	2.5	0.9	0.2	0.2	8.5	13.7	24%
Wet Heath	<0.1	1.6	2.5	0.9	0.2	0.2	8.5	13.9	10%
Grassland	<0.1	1.5	2.3	0.8	0.1	0.1	8.6	13.4	3%
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.6	9.6	0.2%
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.1	8.5	9.4	3%
Whole SAC	<0.1	1.6	4.2	3.4	1.0	0.8	8.5	19.4	-

Table 12.20: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	0.8	13.4	25.8	6.4	2.0	1.4	8.9	58.7
Bracken	<0.1	7.7	8.0	1.1	0.2	0.2	8.9	25.5
Scattered Bracken	<0.1	7.7	7.5	1.1	0.2	0.2	8.9	25.1
Dry Heath	0.2	9.2	8.2	0.9	0.2	0.2	8.9	27.7
Wet Heath	<0.1	6.6	6.3	0.9	0.2	0.2	8.9	22.6
Grassland	<0.1	6.8	6.1	0.8	0.1	0.1	8.9	22.4
Water	<0.1	0.5	0.5	0.1	0.2	0.2	8.9	9.9
Bare Ground	0.1	0.9	0.9	0.1	0.1	0.1	8.9	10.7
Whole SAC	0.8	13.4	25.8	6.4	2.0	1.4	8.9	58.7

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 12.21: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.7	6.0	6.4	2.0	1.4	8.0	25.6
Bracken	<0.1	1.6	2.9	1.1	0.2	0.2	8.0	14.1
Scattered Bracken	<0.1	1.6	2.9	1.1	0.2	0.2	8.1	14.2
Dry Heath	<0.1	1.4	2.4	0.9	0.2	0.2	8.0	13.2
Wet Heath	<0.1	1.4	2.4	0.9	0.2	0.2	8.0	13.2
Grassland	<0.1	1.4	2.3	0.8	0.1	0.1	8.0	12.8
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.0	9.1
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.0	8.8
Whole SAC	<0.1	0.2	0.3	0.1	0.1	0.1	8.0	8.8

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 12.22: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 With Plan - B (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	66.99	6.05	73.04
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.24
12	14	587.71	0.00	201.69	0.00	0.00	85.60	0.00	0.00	875.00
14	16	39.09	0.00	57.02	234.13	178.67	1.12	0.00	0.00	510.03
16	18	0.09	0.00	1.91	1.79	2.10	0.03	0.00	0.00	5.92
18	20	0.00	0.00	0.13	0.23	0.17	0.01	0.00	0.00	0.54
20	22	0.00	0.00	0.02	0.06	0.06	0.01	0.00	0.00	0.14
22	24	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.06
24	26	0.00	242.22	0.00	0.00	0.02	0.00	0.00	0.00	242.24
26	28	0.00	931.02	0.00	0.00	0.00	0.00	0.00	0.00	931.02
28	30	0.00	21.03	0.00	0.00	0.00	0.00	0.00	0.00	21.03
30	32	0.00	3.51	0.00	0.00	0.00	0.00	0.00	0.00	3.51
32	34	0.00	1.48	0.00	0.00	0.00	0.00	0.00	0.00	1.48
34	36	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.85
36	38	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50
38	40	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.39
40	-	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	1.05
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.24	0.00	2594.01

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 With Plan – B (AQC Method)

12.32 Figure 12.9 (see also Figure A9.33 to Figure A9.36) shows the predicted nitrogen deposition fluxes across the SAC in 2028 with the Local Plan and under emissions scenario B; this time using the AQC deposition method. Deposition fluxes are smaller than those under emissions scenario A. As noted previously, they are also (for most surfaces) lower than those predicted using the EA method. The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 12.9 between woodland and non-woodland areas, with higher deposition fluxes occurring to the

woodland even well away from roads, although the highest fluxes still occur at the roadsides. Deposition fluxes greater than 34 kg-N/ha/yr, which is the largest deposition banding shown in the figure, are predicted to extend approximately 15 m from the A22, 10 m from the A26, and 10 m from the B2026[62,70].

12.33 Table 12.23, Table 12.24, and Table 12.25 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (53.0 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than five times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (21.8 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (18.5 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.8 kg-N/ha/yr, with the averages for all dry and wet heath being 12.9 kg-N/ha/yr and 13.0 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to dry and wet heath being 12.4 kg-N/ha/yr and 12.5 kg-N/ha/yr respectively. The minimum predicted deposition flux over the entire SAC (9.0 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

12.34 Table 12.26 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 66 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,595 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.5 ha of the SAC, all of which is woodland. As with the EA method results, most of the dry and wet heath is predicted to experience deposition within the 12-14 kg-N/ha/yr deposition band.

[70] For precise detail of the areas within each deposition range, see Paragraph 12.34.

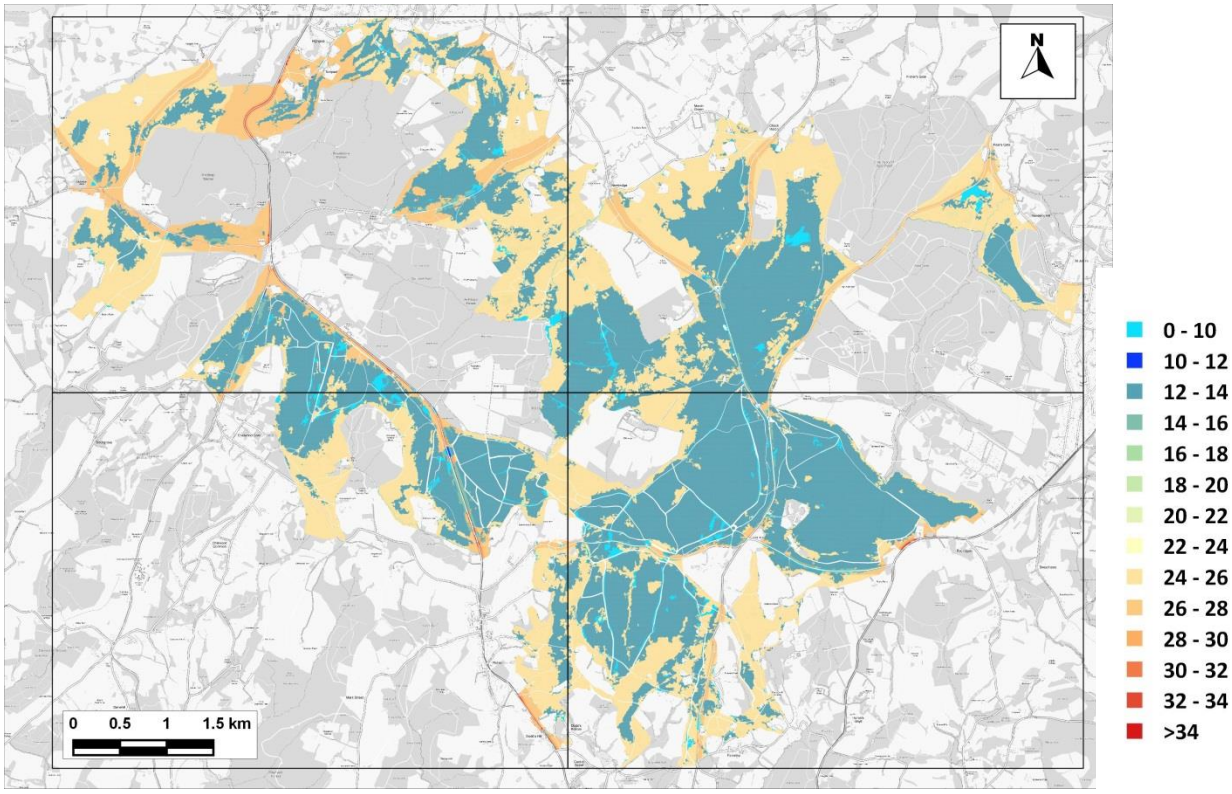


Figure 12.9: Nitrogen Deposition to SAC – 2028 With Plan - B (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.23: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.4	6.1	6.4	2.0	1.4	8.6	25.9	45%
Bracken	<0.1	0.7	3.0	1.1	0.2	0.2	8.5	13.6	9%
Scattered Bracken	<0.1	0.7	3.0	1.1	0.2	0.2	8.5	13.7	7%
Dry Heath	<0.1	0.7	2.5	0.9	0.2	0.2	8.5	12.9	24%
Wet Heath	<0.1	0.8	2.5	0.9	0.2	0.2	8.5	13.0	10%
Grassland	<0.1	0.8	2.3	0.8	0.1	0.1	8.6	12.7	3%
Water	<0.1	0.4	0.3	0.1	0.2	0.2	8.6	9.7	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.1	8.5	9.5	3%
Whole SAC	<0.1	1.0	4.1	3.4	1.0	0.8	8.5	18.8	-

Table 12.24: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	8.6	25.7	6.4	2.0	1.4	8.9	53.0
Bracken	<0.1	2.8	8.0	1.1	0.2	0.2	8.9	20.5
Scattered Bracken	<0.1	2.5	7.5	1.1	0.2	0.2	8.9	19.9
Dry Heath	<0.1	3.5	8.2	0.9	0.2	0.2	8.9	21.8
Wet Heath	<0.1	2.6	6.3	0.9	0.2	0.2	8.9	18.5
Grassland	<0.1	3.2	6.1	0.8	0.1	0.1	8.9	18.6
Water	<0.1	0.7	0.5	0.1	0.2	0.2	8.9	10.1
Bare Ground	<0.1	1.5	0.9	0.1	0.1	0.1	8.9	11.3
Whole SAC	<0.1	8.6	25.7	6.4	2.0	1.4	8.9	53.0

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 12.25: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - B (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.3	6.0	6.4	2.0	1.4	8.0	25.2
Bracken	<0.1	0.6	2.9	1.1	0.2	0.2	8.0	13.1
Scattered Bracken	<0.1	0.6	2.9	1.1	0.2	0.2	8.1	13.2
Dry Heath	<0.1	0.7	2.4	0.9	0.2	0.2	8.0	12.4
Wet Heath	<0.1	0.7	2.4	0.9	0.2	0.2	8.0	12.5
Grassland	<0.1	0.8	2.3	0.8	0.1	0.1	8.0	12.1
Water	<0.1	0.3	0.3	0.1	0.2	0.2	8.0	9.2
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.1	8.0	9.0
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.1	8.0	9.0

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 12.26: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 With Plan - B (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	65.89	5.96	71.85
10	12	0.00	0.00	0.00	0.00	0.00	0.00	1.35	0.08	1.44
12	14	626.41	0.00	256.29	229.94	169.49	86.66	0.00	0.00	1368.80
14	16	0.48	0.00	4.35	6.10	11.34	0.09	0.00	0.00	22.37
16	18	0.00	0.00	0.11	0.15	0.16	0.02	0.00	0.00	0.44
18	20	0.00	0.00	0.00	0.02	0.07	0.00	0.00	0.00	0.10
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	961.74	0.00	0.00	0.00	0.00	0.00	0.00	961.74
26	28	0.00	222.18	0.00	0.00	0.00	0.00	0.00	0.00	222.18
28	30	0.00	12.40	0.00	0.00	0.00	0.00	0.00	0.00	12.40
30	32	0.00	2.59	0.00	0.00	0.00	0.00	0.00	0.00	2.59
32	34	0.00	1.11	0.00	0.00	0.00	0.00	0.00	0.00	1.11
34	36	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.61
36	38	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.51
38	40	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.38
40	-	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.52
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	1.35	0.08	2595.20

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

2028 With Plan Emissions Scenario C

Annual Mean NOx in 2028 With Plan – C

12.35 Figure 12.10 (also see Figure A9.37 to Figure A9.40) shows the predicted annual mean NOx concentrations across the SAC with the Local Plan under emissions scenario C. All of the predicted concentrations using emissions scenario C are lower than those using either scenario A or scenario B. Over most of the SAC, annual mean NOx concentrations are predicted to be less than 11 $\mu g/m^3$, with concentrations less than 8 $\mu g/m^3$ predicted in many areas. Exceedences of the

30 μg/m^3 critical level are predicted within around 5 m of the kerb of the A22 and A26[71]. Concentrations greater than 15 μg/m^3, which is the lower-bound uncertainty range to the critical level as identified by CEH, are predicted to extend approximately 20 m from the A22, 25 m from the A26, 15 m from the B2026, 5 m from New Road, and 5 m from Hindleap Lane[62].

12.36 Table 12.27 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (40.8 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (31.7 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (25.2 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 8.1 μg/m^3, with the averages for dry and wet heath being 8.0 μg/m^3 and 8.4 μg/m^3 respectively. The minimum concentration over the SAC is 7.6 μg/m^3, with this predicted for many areas which are well away from roads.

12.37 Table 12.28 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, including the total area expected to exceed the 30 μg/m^3 critical level. A total of 0.09 ha (900 m^2) would experience an exceedence of the critical level, with less than 0.005 ha of this being dry heath and none being wet heath. Most of the predicted concentrations over areas of dry and wet heath fall within the 0-10 μg/m^3 concentration range (624 ha and 246 ha respectively), but appreciable amounts of heath are predicted to experience higher concentrations than this. For example, 1.39 ha of wet heath is predicted to experience concentrations in the 14-18 μg/m^3 concentration range.

[71] For precise detail of the areas of these exceedences, see Paragraph 12.37.

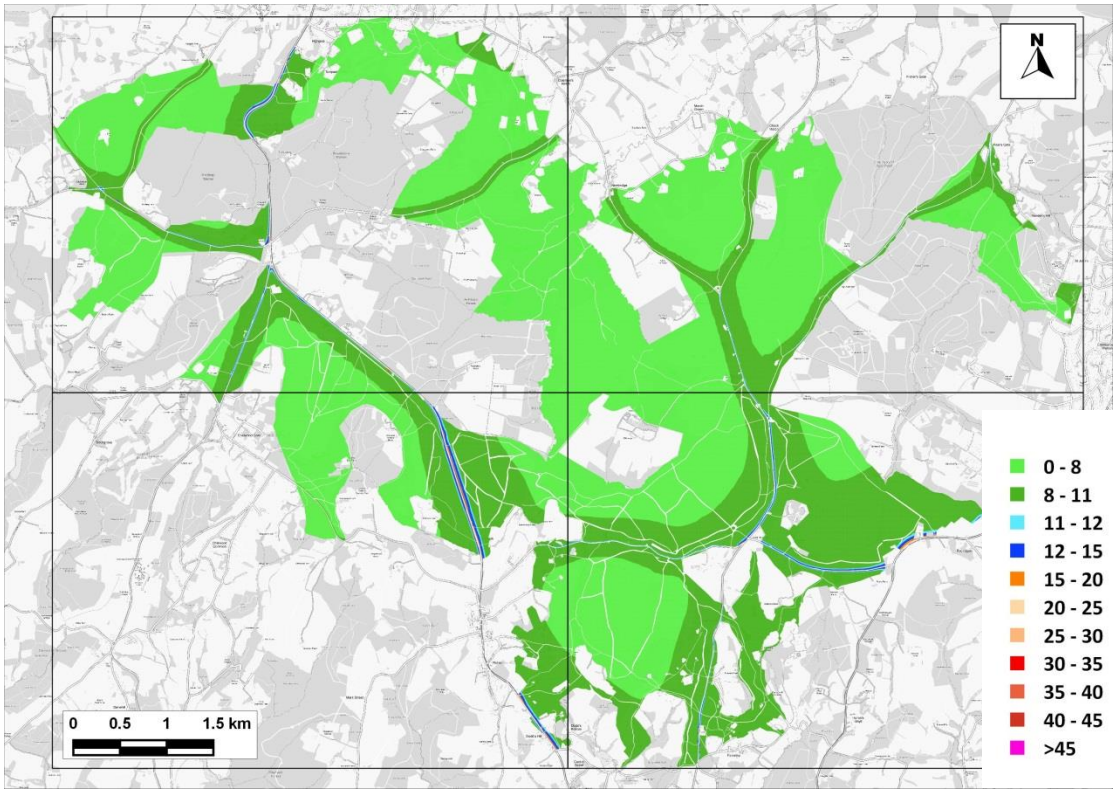


Figure 12.10: Predicted Annual Mean NOx Concentrations across the SAC– 2028 With Plan - C (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.27: Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan – C (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	8.2	40.8	7.6
Bracken	8.2	30.0	7.6
Scattered Bracken	8.1	23.7	7.6
Dry Heath	8.0	31.7	7.6
Wet Heath	8.4	25.2	7.7
Grassland	8.1	25.7	7.6
Water	7.9	15.0	7.6
Bare Ground	8.5	31.1	7.6
Whole SAC	8.1	40.8	7.6

Table 12.28: Summary of Annual Mean NOx across the Ashdown Forest SAC – 2028 With Plan - C [a]

Concentration (μg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	8	384.19	719.20	86.18	128.16	103.74	45.17	29.05	4.84	1500.52
8	10	239.47	434.19	159.59	101.88	72.40	40.28	31.65	1.17	1080.64
10	12	2.87	35.24	10.54	4.75	4.07	1.06	4.28	0.03	62.83
12	14	0.35	6.99	2.97	0.89	0.54	0.18	1.49	0.01	13.42
14	18	0.02	4.07	1.39	0.40	0.21	0.05	0.47	0.00	6.62
18	20	0.00	0.64	0.06	0.06	0.04	0.01	0.08	0.00	0.90
20	25	0.00	1.12	0.03	0.06	0.06	0.02	0.17	0.00	1.46
25	30	0.00	0.51	0.00	0.01	0.00	0.00	0.04	0.00	0.56
30	35	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
35	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >30		0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

24-hour Mean NOx in 2028 With Plan – C

12.38 Figure 12.11 (also see Figure A9.41 to Figure A9.44) shows the maximum predicted 24-hour NOx concentrations across the SAC with the Local Plan under emissions scenario C. As noted previously, concentrations under emissions scenario C are all predicted to be lower than those under emissions scenarios A or B. Concentrations are predicted to be less than 65 μg/m^3 across most of the study area, but exceedences of the 75 μg/m^3 critical level are predicted close to the A22, Hindleap Lane, Plawhatch Lane, the A275, Coleman's Hatch Road, the A26, Kidd's Hill, the B2188, London Road, Crowborough Road, New Road, and the B2026.

12.39 Concentrations greater than 75 μg/m^3 are predicted to extend approximately 35 m from the A22, 90 m from the A26, 10 m from the A275, 70 m from the B2026, 40 m form the B2110, 40 m from New Road, 10 m from Crowborough Road, 10 m from Hindleap Lane, and 5 m from Plawhatch Lane. Concentrations greater than 65 μg/m^3 are predicted to extend approximately 90 m from the A22, 195 m from the A26, 40 m from the A275, 160 m from the B2026, 15 m from the B2188, 100 m form the B2110, 110 m from New Road, 15 m from Kidd's Hill, 40 m from Crowborough Road, 40 m from Hindleap Lane, 5 m from Priory Road, 20 m from Plawhatch Lane, 5 m from Legsheath Lane,

and 15 m from Colemans Hatch Road[62,72].

12.40 Table 12.29 shows the average, maximum and minimum predicted concentrations across the whole SAC. The maximum concentration anywhere in the SAC (240.5 μg/m^3) is predicted to occur at an area of woodland alongside the A22 to the north of Hindleap Lane. The maximum concentration over dry heath (197.8 μg/m^3) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum concentration over wet heath (164.9 μg/m^3) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average concentration over the whole SAC is predicted to be 59.6 μg/m^3, with the averages for dry and wet heath being 58.4 μg/m^3 and 61.5 μg/m^3 respectively. The minimum concentration over the SAC is 55.4 μg/m^3, with this predicted for several receptors within woodland, all well away from any roads.

12.41 Table 12.30 shows how much of Ashdown Forest SAC is expected to experience different ranges of concentrations, and shows that 65.23 ha are expected to exceed the 75 μg/m^3 critical level. It also shows, for example, that 6.4 ha are expected to experience concentrations between 100 μg/m^3 and 125 μg/m^3, 2 ha are expected to experience concentrations between 125 μg/m^3 and 150 μg/m^3, 1 ha is predicted to experience concentrations between 150 μg/m^3 and 200 μg/m^3, and 0.02 ha (200 m^2) is predicted to experience concentrations above 200 μg/m^3.

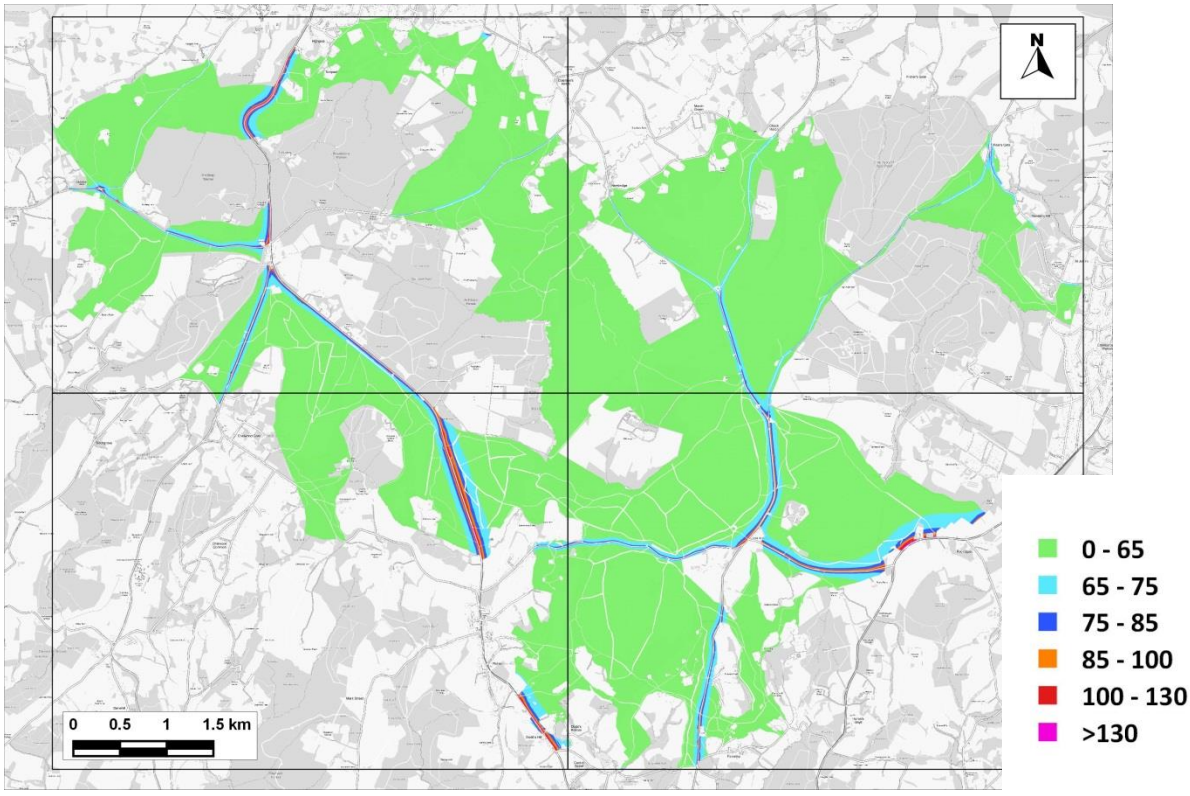


Figure 12.11: Predicted Maximum 24-hour Mean NOx Concentrations across the SAC– 2028 With Plan - C (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

72 For precise detail of the exceedence areas, see Paragraph 12.41.

Table 12.29: 24-hour NOx across the Ashdown Forest SAC – 2028 With Plan – C (µg/m^3)

Land Use	Average	Maximum	Minimum
Woodland	59.7	240.5	55.4
Bracken	59.7	189.5	55.9
Scattered Bracken	59.3	156.4	55.7
Dry Heath	58.4	197.8	55.8
Wet Heath	61.5	164.9	56.2
Grassland	59.1	167.5	55.5
Water	57.9	106.2	55.6
Bare Ground	61.9	195.0	55.6
Whole SAC	59.6	240.5	55.4

Table 12.30: Summary of Maximum 24-hour Mean NOx across the Ashdown Forest SAC – 2028 With Plan - C [a]

Concentration (µg/m^3)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	60	558.57	945.70	142.37	177.81	142.24	70.64	45.67	5.55	2088.56
60	65	53.34	147.09	78.63	37.68	25.06	11.13	10.98	0.33	364.23
65	75	12.89	71.75	28.42	16.25	10.28	4.12	5.18	0.14	149.03
75	85	1.61	22.10	6.32	2.81	2.47	0.56	2.86	0.02	38.75
85	100	0.46	9.13	3.58	1.15	0.71	0.24	1.81	0.01	17.09
100	125	0.02	3.97	1.35	0.38	0.21	0.05	0.46	0.00	6.44
125	150	0.00	1.24	0.08	0.09	0.08	0.02	0.17	0.00	1.69
150	200	0.00	1.06	0.01	0.03	0.02	0.01	0.12	0.00	1.24
200	-	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
All >75		2.10	37.51	11.34	4.47	3.48	0.88	5.41	0.03	65.23

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 With Plan – C (EA Method)

12.42 Figure 12.12 (also see Figure A9.45 to Figure A9.48) shows the predicted nitrogen deposition fluxes across the SAC in 2028 with the Local Plan, under emissions scenario C, and using the EA deposition method. Deposition fluxes are smaller than those under emissions scenarios A or B.

The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 12.12 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland even well away from roads, although the highest fluxes still occur at the roadsides. Deposition fluxes greater than 34 kg-N/ha/yr, which is the largest deposition banding shown in the figure, are predicted to extend approximately 15 m from the A22, 10 m from the A26, 10 m from the B2026, 5 m from Hindleap Lane, and 5 m from Plawhatch Lane[62,73].

12.43 Table 12.31, Table 12.32, and Table 12.33 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (54.0 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than five times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (24.9 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (20.7 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.9 kg-N/ha/yr, with the averages for all dry and wet heath being 13.4 kg-N/ha/yr and 13.5 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 12.9 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.6 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

12.44 Table 12.34 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.5 ha (5,000 m^2) of the SAC, with all of this being woodland. Most of the dry and wet heath (623 ha and 246 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr range.

[73] For precise detail of the areas within each deposition range, see Paragraph 12.44.

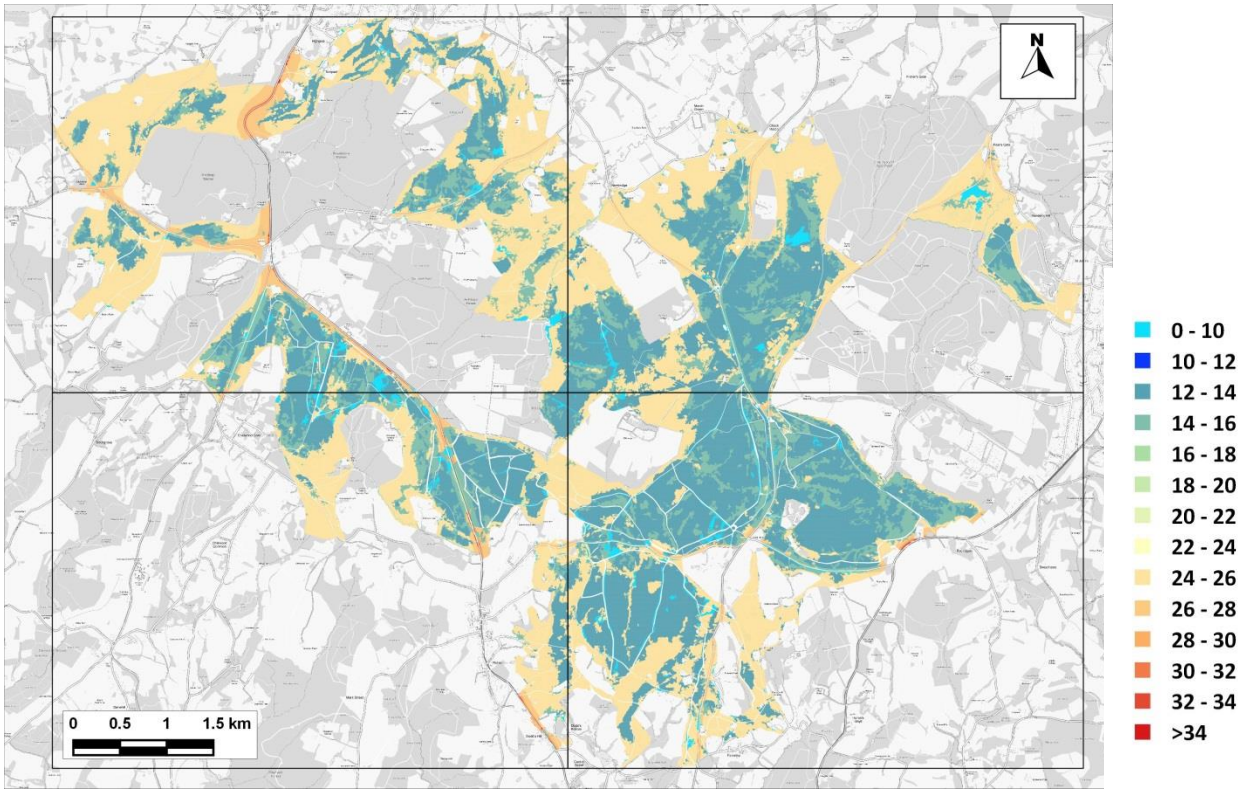


Figure 12.12: Nitrogen Deposition to SAC – 2028 With Plan – C (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.31: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.7	6.2	5.9	2.0	1.3	8.4	25.6	45%
Bracken	<0.1	1.7	3.0	1.0	0.2	0.2	8.3	14.3	9%
Scattered Bracken	<0.1	1.7	3.0	1.0	0.2	0.2	8.4	14.4	7%
Dry Heath	<0.1	1.4	2.5	0.8	0.2	0.2	8.3	13.4	24%
Wet Heath	<0.1	1.5	2.5	0.8	0.2	0.2	8.3	13.5	10%
Grassland	<0.1	1.4	2.3	0.7	0.1	0.1	8.4	13.1	3%
Water	<0.1	0.2	0.3	0.1	0.2	0.2	8.4	9.4	0.2%
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	8.3	9.1	3%
Whole SAC	<0.1	1.6	4.2	3.1	1.0	0.7	8.3	18.9	-

Table 12.32: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	0.2	10.2	25.8	5.9	2.0	1.3	8.7	54.0
Bracken	<0.1	5.8	8.0	1.0	0.2	0.2	8.7	23.3
Scattered Bracken	<0.1	5.8	7.5	1.0	0.2	0.2	8.7	22.9
Dry Heath	<0.1	6.8	8.2	0.8	0.2	0.2	8.7	24.9
Wet Heath	<0.1	5.0	6.3	0.8	0.2	0.2	8.7	20.7
Grassland	<0.1	5.2	6.1	0.7	0.1	0.1	8.7	20.4
Water	<0.1	0.4	0.5	0.1	0.2	0.2	8.7	9.7
Bare Ground	<0.1	0.7	0.9	0.1	0.1	0.1	8.7	10.3
Whole SAC	0.2	10.2	25.8	5.9	2.0	1.3	8.7	54.0

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 12.33: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (EA Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.7	6.0	5.9	2.0	1.3	7.8	24.8
Bracken	<0.1	1.6	2.9	1.0	0.2	0.2	7.8	13.8
Scattered Bracken	<0.1	1.6	2.9	1.0	0.2	0.2	7.9	13.9
Dry Heath	<0.1	1.4	2.4	0.8	0.2	0.2	7.8	12.9
Wet Heath	<0.1	1.4	2.4	0.8	0.2	0.2	7.8	12.9
Grassland	<0.1	1.4	2.3	0.7	0.1	0.1	7.8	12.5
Water	<0.1	0.2	0.3	0.1	0.2	0.2	7.9	8.9
Bare Ground	<0.1	0.2	0.3	0.1	0.1	0.1	7.8	8.6
Whole SAC	<0.1	0.2	0.3	0.1	0.1	0.1	7.8	8.6

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 12.34: Summary of Nitrogen Deposition To Ashdown Forest SAC – 2028 With Plan - C (EA Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
Hectares										
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.20	6.05	73.24
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04
12	14	623.30	0.00	245.99	22.51	13.16	86.34	0.00	0.00	991.29
14	16	3.59	0.00	14.08	212.79	166.91	0.40	0.00	0.00	397.78
16	18	0.01	0.00	0.65	0.79	0.82	0.02	0.00	0.00	2.30
18	20	0.00	0.00	0.04	0.10	0.09	0.01	0.00	0.00	0.24
20	22	0.00	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.08
22	24	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03
24	26	0.00	1100.54	0.00	0.00	0.00	0.00	0.00	0.00	1100.54
26	28	0.00	88.22	0.00	0.00	0.00	0.00	0.00	0.00	88.22
28	30	0.00	8.39	0.00	0.00	0.00	0.00	0.00	0.00	8.39
30	32	0.00	1.96	0.00	0.00	0.00	0.00	0.00	0.00	1.96
32	34	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.98
34	36	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.55
36	38	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.46
38	40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.40
40	-	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.54
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.04	0.00	2593.80

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Nitrogen Deposition in 2028 With Plan – C (AQC Method)

12.45 Figure 12.13 (also see Figure A9.49 to Figure A9.52) shows the predicted nitrogen deposition fluxes across the SAC in 2028 with the Local Plan, under emissions scenario C, and using the AQC deposition method. Deposition fluxes are smaller than those under emissions scenarios A or B, and are generally smaller than those predicted using the EA deposition method. The 10 kg-N/ha/yr critical load is predicted to be exceeded over the entire SAC with the exception of some areas of bare ground and open water. There is a clear differentiation in Figure 12.13 between woodland and non-woodland areas, with higher deposition fluxes occurring to the woodland even

well away from roads, although the highest fluxes still occur at the roadsides. Deposition fluxes greater than 34 kg-N/ha/yr, which is the largest deposition banding shown in the figure, are predicted to extend approximately 15 m from the A22, 10 m from the A26, and 5 m from the B2026[62,74].

12.46 Table 12.35, Table 12.36, and Table 12.37 show the average, maximum and minimum predicted deposition fluxes across the SAC. The maximum predicted deposition flux anywhere in the SAC (50.2 kg-N/ha/yr) is predicted to occur to an area of woodland alongside the A22 to the north of Hindleap Lane. This is more than five times the 10 kg-N/ha/yr critical load. The maximum deposition to dry heath (20.7 kg-N/ha/r) is predicted alongside the A22 around halfway between Wych Cross and Forest Row. The maximum deposition to wet heath (17.7 kg-N/ha/yr) is predicted alongside the A22 near to the bottom of Millbrook Hill. The average deposition flux over the whole SAC is predicted to be 18.3 kg-N/ha/yr, with the averages for all dry and wet heath being 12.6 kg-N/ha/yr and 12.7 kg-N/ha/yr respectively. Because most of the SAC is well away from roads, the minimum predicted fluxes are similar to the average fluxes, with the minimum predicted fluxes to both dry and wet heath being 12.2 kg-N/ha/yr. The minimum predicted deposition flux over the entire SAC (8.8 kg-N/ha/yr) is predicted for several receptors in areas of bare ground which are well away from any roads.

12.47 Table 12.38 shows how much of Ashdown Forest SAC is expected to experience different ranges of deposition fluxes, including the total area expected to exceed the 10 kg-N/ha/yr critical load. It shows that the only parts of the SAC which are not predicted to experience an exceedence of the critical load are 67 ha of bare ground and 6 ha of open water. The critical load will be exceeded over the remaining 2,594 ha of the SAC. Deposition fluxes greater than 40 kg-N/ha/yr (four times the critical load) are predicted to a total of 0.22 ha of the SAC (2,200 m^2), all of which is woodland. As with the EA method results, most of the dry and wet heath (627 and 257 ha respectively) is predicted to experience deposition within the 12-14 kg-N/ha/yr deposition band.

[74] For precise detail of the areas within each deposition range, see Paragraph 12.47.

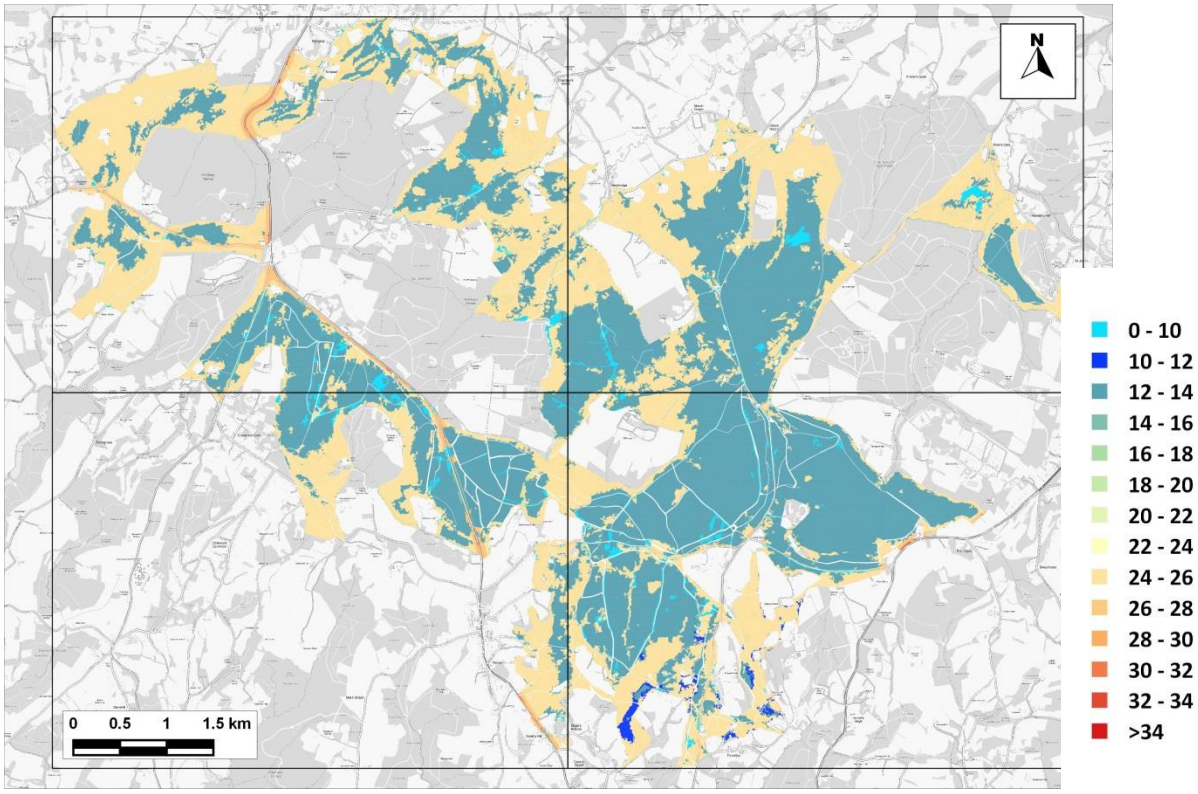


Figure 12.13: Nitrogen Deposition to SAC – 2028 With Plan - C (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 12.35: Average Nitrogen Deposition to the Ashdown Forest SAC – 2028 With Plan - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.	% of SAC Area
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$			
Woodland	<0.1	1.3	6.1	5.9	2.0	1.3	8.4	25.1	45%
Bracken	<0.1	0.6	3.0	1.0	0.2	0.2	8.3	13.3	9%
Scattered Bracken	<0.1	0.6	3.0	1.0	0.2	0.2	8.4	13.4	7%
Dry Heath	<0.1	0.7	2.5	0.8	0.2	0.2	8.3	12.6	24%
Wet Heath	<0.1	0.7	2.5	0.8	0.2	0.2	8.3	12.7	10%
Grassland	<0.1	0.8	2.3	0.7	0.1	0.1	8.4	12.5	3%
Water	<0.1	0.4	0.3	0.1	0.2	0.2	8.4	9.5	0.2%
Bare Ground	<0.1	0.4	0.3	0.1	0.1	0.1	8.3	9.3	3%
Whole SAC	<0.1	1.0	4.1	3.1	1.0	0.7	8.3	18.3	-

Table 12.36: Maximum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	6.6	25.7	5.9	2.0	1.3	8.7	50.2
Bracken	<0.1	2.1	8.0	1.0	0.2	0.2	8.7	19.6
Scattered Bracken	<0.1	1.9	7.5	1.0	0.2	0.2	8.7	19.0
Dry Heath	<0.1	2.6	8.2	0.8	0.2	0.2	8.7	20.7
Wet Heath	<0.1	2.0	6.3	0.8	0.2	0.2	8.7	17.7
Grassland	<0.1	2.4	6.1	0.7	0.1	0.1	8.7	17.6
Water	<0.1	0.6	0.5	0.1	0.2	0.2	8.7	9.9
Bare Ground	<0.1	1.2	0.9	0.1	0.1	0.1	8.7	10.7
Whole SAC	<0.1	6.6	25.7	5.9	2.0	1.3	8.7	50.2

[a] Species-specific maxima are not always co-located. The total given here is the maximum deposition to any one location.

Table 12.37: Minimum Nitrogen Deposition to the Ashdown Forest SAC at an Individual Location – 2028 With Plan - C (AQC Method) (kg-N/ha/yr)

Land Use	Dry Deposition						Wet Dep.	Total Dep.[a]
	NO	NO_2	NH_3	HNO_3	NH_4^+	$NO_3^- + NO_2^-$		
Woodland	<0.1	1.3	6.0	5.9	2.0	1.3	7.8	24.4
Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	7.8	12.8
Scattered Bracken	<0.1	0.6	2.9	1.0	0.2	0.2	7.9	12.9
Dry Heath	<0.1	0.7	2.4	0.8	0.2	0.2	7.8	12.2
Wet Heath	<0.1	0.7	2.4	0.8	0.2	0.2	7.8	12.2
Grassland	<0.1	0.8	2.3	0.7	0.1	0.1	7.8	11.9
Water	<0.1	0.3	0.3	0.1	0.2	0.2	7.9	9.0
Bare Ground	<0.1	0.3	0.3	0.1	0.1	0.1	7.8	8.8
Whole SAC	<0.1	0.3	0.3	0.1	0.1	0.1	7.8	8.8

[a] Species-specific minima are not always co-located. The total given here is the minimum deposition to any one location.

Table 12.38: Summary of Nitrogen Deposition To Ashdown Forest SAC 2028 With Plan - C (AQC Method) [a]

Deposition (kg-N/ha/yr)		Habitat Type								
From	To	Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
		Hectares								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	67.02	6.05	73.06
10	12	0.00	0.00	0.00	0.00	0.00	12.42	0.22	0.00	12.64
12	14	626.83	0.00	258.75	234.25	177.78	74.31	0.00	0.00	1371.91
14	16	0.07	0.00	1.98	1.87	3.13	0.03	0.00	0.00	7.07
16	18	0.00	0.00	0.04	0.09	0.11	0.01	0.00	0.00	0.26
18	20	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.05
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1151.26	0.00	0.00	0.00	0.00	0.00	0.00	1151.26
26	28	0.00	42.37	0.00	0.00	0.00	0.00	0.00	0.00	42.37
28	30	0.00	4.63	0.00	0.00	0.00	0.00	0.00	0.00	4.63
30	32	0.00	1.57	0.00	0.00	0.00	0.00	0.00	0.00	1.57
32	34	0.00	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.71
34	36	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.57
36	38	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.42
38	40	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.30
40	-	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.22
All >10		626.90	1202.05	260.76	236.22	181.06	86.77	0.22	0.00	2593.98

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Chapter Summary

12.1 The 2028 With Plan model predicts the future air quality conditions assuming that growth outside of Wealden takes place and also assuming traffic growth associated with the Wealden Local Plan. These predictions have been made for the same three emissions scenarios (A, B, and C) as the other 2028 scenarios.

Annual Mean NOx

12.2 All of the predicted annual mean NOx concentrations with the Local Plan are higher (for equivalent

emissions scenarios) than those described in previous chapters (Chapters 9, 10, and 11), which did not include the Local Plan. Annual mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 112 $\mu g/m^3$ and a total of 8.2 ha of the SAC is predicted to exceed the 30 $\mu g/m^3$ critical level. In emissions scenario B, the maximum predicted concentration is 54 $\mu g/m^3$ and a total of 1.1 ha is predicted to exceed the 30 $\mu g/m^3$ critical level. Under emissions scenario C, the maximum predicted concentration is 41 $\mu g/m^3$ and a total of 0.1 ha (1,000 m^2) is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (84, 43, and 32 $\mu g/m^3$ for emissions scenarios A, B and C respectively) but the 30 $\mu g/m^3$ critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C). When using the lower-bound uncertainty range to this critical level as advised by CEH (15 $\mu g/m^3$) the exceedence areas are all greatly increased.

24-hour Mean NOx

12.3 As was the case for annual mean NOx, all of the predicted maximum 24-hour mean NOx concentrations with the Local Plan are higher (for equivalent emissions scenarios) than those described in previous chapters (Chapters 9, 10, and 11), which did not include the Local Plan. Maximum 24-hour mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 498 $\mu g/m^3$ and the entire SAC is predicted to exceed the 75 $\mu g/m^3$ critical level. In emissions scenario B, the maximum predicted concentration is 299 $\mu g/m^3$ and a total of 132 ha is predicted to exceed the 75 $\mu g/m^3$ critical level. Under emissions scenario C, the maximum predicted concentration is 241 $\mu g/m^3$ and a total of 65 ha is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (406, 249, and 198 $\mu g/m^3$ for emissions scenarios A, B and C respectively) but the 75 $\mu g/m^3$ critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C).

Annual Mean NH_3

12.4 It was only possible to consider a single emissions scenario for NH_3. As was the case for NOx, all of the predicted annual mean NH_3 concentrations with the Local Plan are higher than those described in previous chapters (Chapters 9, 10, and 11), which did not include the Local Plan. Exceedences of the 1 $\mu g/m^3$ critical level are predicted alongside the A22, Hindleap Lane, Plawhatch Lane, the A275, Crowborough Road, the B2026, and the A26. These cover a total of 4.9 ha of the SAC, of which 0.4 ha (4,000 m^2) is currently heath. The maximum predicted concentration is 2.7 $\mu g/m^3$ (i.e. 2.7 times the critical level) and the maximum concentration predicted in an area which is currently heath is 2.1 $\mu g/m^3$ (more than twice the critical level). When

using the lower-bound uncertainty range to the critical level as advised by CEH (0.8 μg/m^3) the exceedence areas are all greatly increased.

Nitrogen Deposition

12.5 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). All of the predicted deposition fluxes with the Local Plan are higher (for equivalent emissions scenarios and deposition methods) than those described in previous chapters (Chapters 9, 10, and 11), which did not include the Local Plan. Under all three emissions scenarios and both deposition models, the 10 kg-N/ha/yr critical load is predicted to be exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load, under any of the emissions scenarios or deposition models, are some small areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

12.6 The maximum predicted deposition fluxes in emissions scenario A are 78 kg-N/ha/yr (EA method) and 63 kg-N/ha/yr (AQC method), with the maximum fluxes to any current heath being 39 and 26 kg-N/ha/yr for the EA and AQC methods respectively. The maximum predicted fluxes under emissions scenario B are 59 and 53 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 28 and 22 kg-N/ha/yr respectively. The maximum predicted fluxes under emissions scenario C are 54 and 50 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 25 and 21 kg-N/ha/yr respectively.

12.7 Thus, even in the most optimistic emissions scenario considered (scenario C) and deposition method (AQC method), deposition fluxes are predicted to be more than twice the critical load at the worst-case heathland locations considered, and the critical load will be exceeded over virtually the entire SAC. Using the results for less optimistic scenarios, the exceedences are even greater.

13 Changes Caused by Local Plan Alone

13.1 This section sets out the predicted changes in concentrations and fluxes that would be caused by the Wealden Local Plan in isolation. These comparisons have been derived by comparing the results of the 'With Plan' scenario against those from the 'No WDC-growth' scenario. Results are presented for emissions scenarios A, B and C.

13.2 As explained in Paragraphs 2.5 and 2.6, one of the ways in which the changes between scenarios have been described is by reporting the area over which the predicted change is greater than 1% of an annual mean critical level or critical load, or greater than 10% of the 24-hour mean critical level. These values were developed by the Environment Agency as screening criteria related to individual industrial permits. The Environment Agency considers that the impacts from individual industrial operations will be insignificant where the changes are below these levels. This does not suggest that they will necessarily be significant above these levels, merely that there is a potential for significant impacts to occur that should be considered using alternative means.

13.3 When issuing permits to operate, the Environment Agency also suggests that there is no need for additional assessment if it can be demonstrated that the predicted concentration or flux (with the proposed operation is in place) is less than the critical level or critical load. The results in this chapter thus present the area over which a change of more than 1% (or 10%) of the critical level or critical load is predicted, as well as the area where this occurs and the critical level or load is also exceeded in the With Plan scenario (i.e. the area over which both cases are met). The area over which the critical level or critical load is exceeded (irrespective of whether there is a change greater than 1% or 10%) is set out in Chapter 12.

13.4 Despite their origin, the Environment Agency screening criteria are commonly used when assessing all manner of development schemes, including those that generate road traffic. Because many interested parties are familiar with these screening criteria, they have been used in this study as one of the ways to present the results. It is not within the scope of this study to appraise whether or not the Environment Agency screening criteria provide an appropriate level of assessment, or protection, with respect to traffic-related impacts from a Local Plan.

13.5 While the 1% and 10% criteria are used to help present the results, information is also provided on the areas (in hectares) affected by a range of changes in concentrations or deposition fluxes expressed as a percentage of the critical level or critical load, namely 0.1% to 10% for annual means and 1% to 50% for 24-hour means.

Emissions Scenario A

Impacts of Plan on Annual Mean NOx – Emissions Scenario A

13.6 Figure 13.1 shows the change in predicted annual mean NOx concentrations caused by the Local

Plan under NOx emissions scenario A[75]. The Local Plan will increase annual mean NOx concentrations across the entire SAC; but over most of the area, the predicted changes are very small. Changes greater than 0.3 μg/m^3 (which represents 1% of the 30 μg/m^3 critical level) are predicted alongside the A22, A26, A275, B2026, Kidd's Hill, New Road, Crowborough Road, and Hindleap Lane. Changes greater than 0.3 μg/m^3 extend out approximately 210 m from the A22 and 160 m from the A26, as well as around 60 m from the B2026 and 150 m from New Road.

13.7 Figure 13.2 shows the area over which a change of more than 0.3 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 30 μg/m^3 critical level. In other words, Figure 13.2 shows all the areas where the orange contour from Figure 13.1 and the red contour from Figure 12.1 overlap one another. In practice, this is almost entirely limited by the extent of the 30 μg/m^3 contour from Figure 12.1. Exceedences of both the critical level and the 1% criterion are predicted at the kerbside of the A22, A26, A275, B2026, Crowborough Road, New Road and Hindleap Lane. Exceedences of both the critical level and the 1% criterion extend up to about 20 m from the A22[76] and 30 m from the A26.

13.8 The areas shown in Figure 13.2 are also summarised in the middle column of Table 13.1. This shows that 8.05 ha (80,500 m^2) of the SAC are predicted to experience both an exceedence of the 30 μg/m^3 critical level and also an increase of more than 1% of this critical level as a result of the Local Plan. Of this 8.05 ha, 5.45 ha are woodland, while 1.25 ha are heath. Table 13.1 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 163.88 ha would experience both an exceedence of 15 μg/m^3 as a total concentration and also a change of more than 1% of this value as a result of the local plan. For the upper-bound level, 2.35 ha would be thus affected.

13.9 Table 13.2 shows the average, maximum, and minimum changes in predicted annual mean NOx concentrations to the various habitats. It shows, for example, that the average predicted change in NOx concentrations to the SAC as a whole is 0.15 μg/m^3, but the maximum predicted change to any one location is 8.2 μg/m^3. This maximum change is predicted to occur to an area of woodland immediately north of the junction of the A22 with Hindleap Lane. The maximum predicted change to heath is 8.0 μg/m^3, which is predicted to occur beside the A22 between Wych Cross and Forest Row.

13.10 Table 13.3 shows how the concentration distribution will change across the SAC as a result of the Local Plan. As an example of interpreting this table, 159 ha of the SAC will move from experiencing concentrations below 12 μg/m^3 to experiencing concentrations above this level as a result of the Local Plan. An additional 0.51 ha will experience concentrations above 40 μg/m^3 as a

[75] Figure 13.1 and Figure 13.2 are accompanied by Figure A10.1 to Figure A10.8 in Appendix 10, which show the same results in more detail.

[76] These plots combine two sets of model predictions and there are areas along the A22 north of Wych Warren and near Raven Wood where the precise shape of the contour is affected by artefacts of the interpolation method. While the presence of an exceedence is considered highly likely, the precise shape of this exceedence as shown in the figure in these areas should not be relied upon. The 20 m distance given here does not include these areas.

result of the Local Plan. The Local Plan will cause an additional 1.41 ha of the SAC to exceed the critical level, of which 0.34 ha will be heath.

13.11 Table 13.4 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the different Environmental Assessment Levels (EALs) the number of hectares that are predicted to experience each percentage increase. To give an example of how to interpret this table, it shows that a total of 221.66 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 30 $\mu g/m^3$ criterion (i.e. 0.3 $\mu g/m^3$). This means that the area shown in orange in Figure 13.1 covers a total of 221.66 ha, of which 108.32 ha are woodland, 17.71 ha are dry heath, and 44.21 ha are wet heath.

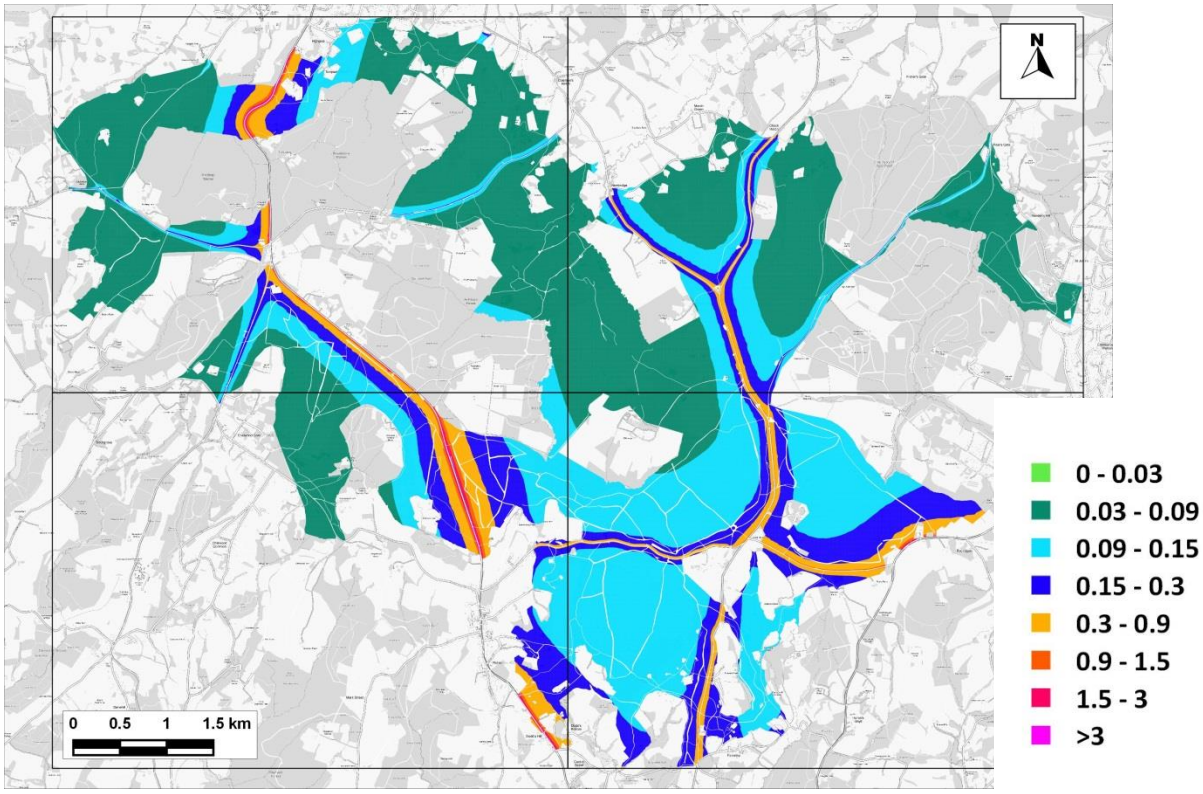


Figure 13.1: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No WDC-Growth' Under Emissions Scenario A (μg/m^3)

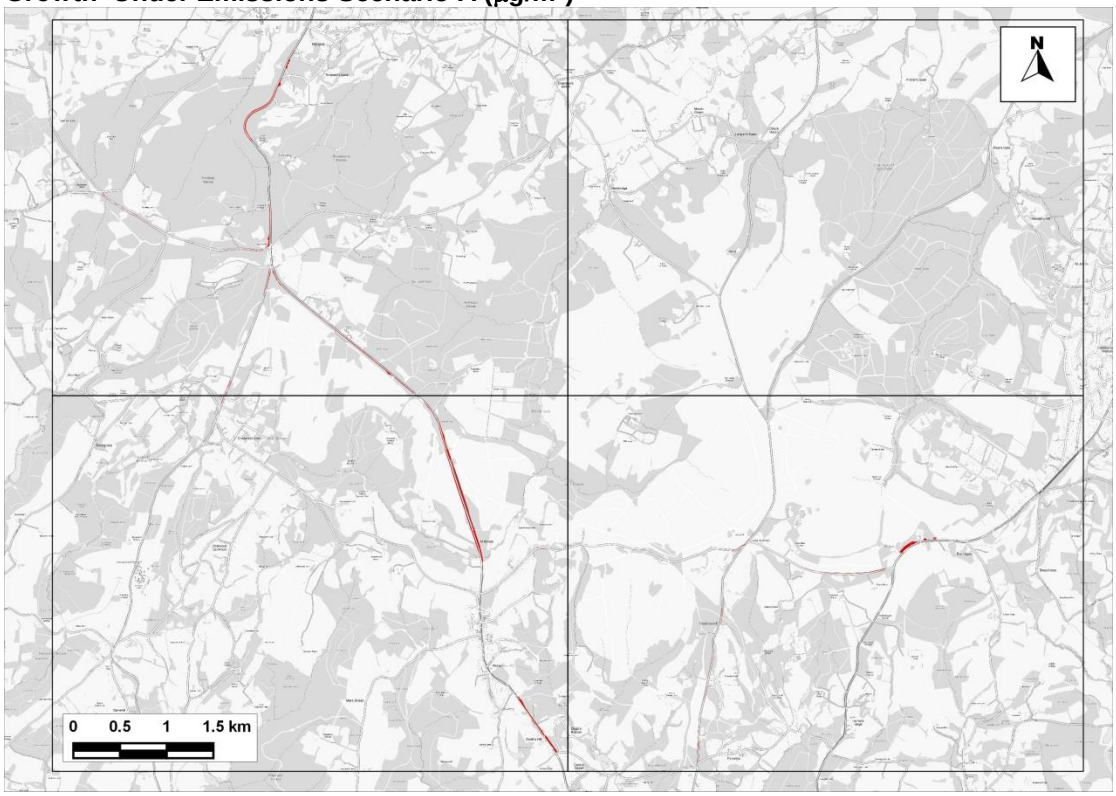


Figure 13.2: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.1: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (hectares)

Land Use	15 μg/m^3 Assessment Level	30 μg/m^3 Critical Level	45 μg/m^3 Assessment Level
Woodland	83.87	5.45	1.89
Bracken	15.52	0.37	0.07
Scattered Bracken	11.05	0.28	0.09
Dry Heath	10.18	0.00	0.00
Wet Heath	30.45	1.25	0.06
Grassland	3.75	0.07	0.02
Water	0.14	0.00	0.00
Bare Ground	8.91	0.62	0.23
Whole SAC	163.88	8.05	2.35

Table 13.2: Impacts of Plan on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.15	8.20	0.03
Bracken	0.14	3.44	0.04
Scatt. Bracken	0.14	4.99	0.03
Dry Heath	0.11	8.01	0.03
Wet Heath	0.20	5.31	0.04
Grassland	0.14	4.77	0.03
Water	0.10	1.91	0.04
Bare Ground	0.20	7.02	0.04
Whole SAC	0.15	8.20	0.03

Table 13.3: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	12	-56.46	-56.32	-12.45	-14.75	-9.04	-6.33	-3.74	-0.11	-159.20
12	14	52.79	44.28	5.56	10.88	6.97	5.41	2.89	0.08	128.87
14	18	3.12	6.93	5.29	3.35	1.50	0.72	0.40	0.02	21.34
18	20	0.21	1.17	0.44	0.08	0.12	0.09	0.01	0.00	2.13
20	25	0.26	2.17	0.47	0.28	0.38	0.05	0.22	0.00	3.82
25	30	0.08	0.93	0.34	0.09	0.02	0.04	0.12	0.00	1.63
30	35	0.00	0.41	0.12	0.04	0.01	0.01	0.04	0.00	0.63
35	40	0.00	0.10	0.16	0.00	0.01	0.00	0.00	0.00	0.27
40	-	0.00	0.34	0.06	0.03	0.02	0.01	0.05	0.00	0.51
All >30		0.00	0.85	0.34	0.07	0.04	0.01	0.09	0.00	1.41

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.4: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.5	606.53	1038.50	242.36	230.14	164.06	85.78	66.22	5.28	2438.86
	1	180.10	394.44	147.19	90.78	58.90	37.06	32.15	0.90	941.50
	3	5.67	58.19	20.17	7.29	7.14	2.69	5.84	0.06	107.06
	5	1.59	27.02	8.36	1.92	2.14	0.69	2.50	0.03	44.26
	10	0.05	6.87	2.30	0.32	0.38	0.13	0.84	0.00	10.89
30 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	606.53	1038.50	242.36	230.14	164.06	85.78	66.22	5.28	2438.86
	0.5	180.10	394.44	147.19	90.78	58.90	37.06	32.15	0.90	941.50
	1	17.71	108.32	44.21	21.10	13.97	6.43	9.76	0.16	221.66
	3	0.87	20.24	6.20	1.25	1.31	0.48	1.73	0.02	32.10
	5	0.05	6.87	2.30	0.32	0.38	0.13	0.84	0.00	10.89
	10	0.00	2.09	0.12	0.02	0.12	0.02	0.30	0.00	2.67
45 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	180.10	394.44	147.19	90.78	58.90	37.06	32.15	0.90	941.50
	0.5	35.69	146.76	66.65	35.77	20.91	10.31	12.99	0.29	329.37
	1	5.67	58.19	20.17	7.29	7.14	2.69	5.84	0.06	107.06
	3	0.13	8.79	2.86	0.41	0.42	0.20	0.95	0.00	13.76
	5	0.00	2.99	0.64	0.08	0.21	0.04	0.47	0.00	4.43
	10	0.00	1.02	0.01	0.00	0.03	0.00	0.10	0.00	1.16

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

Impacts of Plan on 24-hour Mean NOx under Emissions Scenario A

13.12 Figure 13.3 shows the change in predicted maximum 24-hour mean NOx concentrations caused by

the Local Plan under NOx emissions scenario A[77]. As noted above for annual mean NOx, the Local Plan is predicted to increase concentrations across the entire SAC, but over most of the area, the predicted changes are small. Changes greater than 7.5 μg/m^3 (which represents 10% of the 75 μg/m^3 critical level) are predicted alongside the A22 and A26, but not alongside any other modelled roads. Changes above this level extend out approximately 30 m from the A22 and 13 m from the A26.

13.13 Figure 13.4 shows the area over which there is both a change of more than 7.5 μg/m^3 and also a predicted exceedence (in the With Plan scenario) of the critical level. In practice, since the footprint of exceedences of the critical level (see Figure 12.2) is much larger than the footprint over which there will be a change greater than 10% of the critical level, the area shown in Figure 13.4 is identical to the area shown in orange in Figure 13.3. These areas are then summarised again in Table 13.5, which shows that the parts of the SAC highlighted red in Figure 13.4 cover a total of 12.08 ha, of which 2.58 ha are wet heath and 0.09 ha is dry heath.

13.14 Table 13.6 shows the average, maximum, and minimum changes in predicted maximum 24-hour NOx concentrations to the various habitats. It shows, for example, that the maximum predicted change in maximum 24-hour NOx concentrations to any location is 28.7 μg/m^3. This is predicted at an area of woodland beside the A22 between Wych Cross and Forest Row. The maximum predicted change to heath is 27.8 μg/m^3, which is also predicted to occur beside the A22 between Wych Cross and Forest Row.

13.15 Table 13.7 shows how the concentration distribution will change across the SAC as a result of the Local Plan. The critical level is already predicted to be exceeded over the entire SAC without the Local Plan and so there is no change in this statistic. The area exceeding 200 μg/m^3 is predicted to increase by 1.17 ha, while the area in the 85 to 100 μg/m^3 band will increase by 90.90 ha.

13.16 Table 13.8 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 0.46 ha will experience an increase in 24-hour mean NOx of at least 30% of the critical level.

[77] Figure 13.3 and Figure 13.4 are accompanied by Figure A10.9 to Figure A10.16 in Appendix 10, which show the same results in more detail.

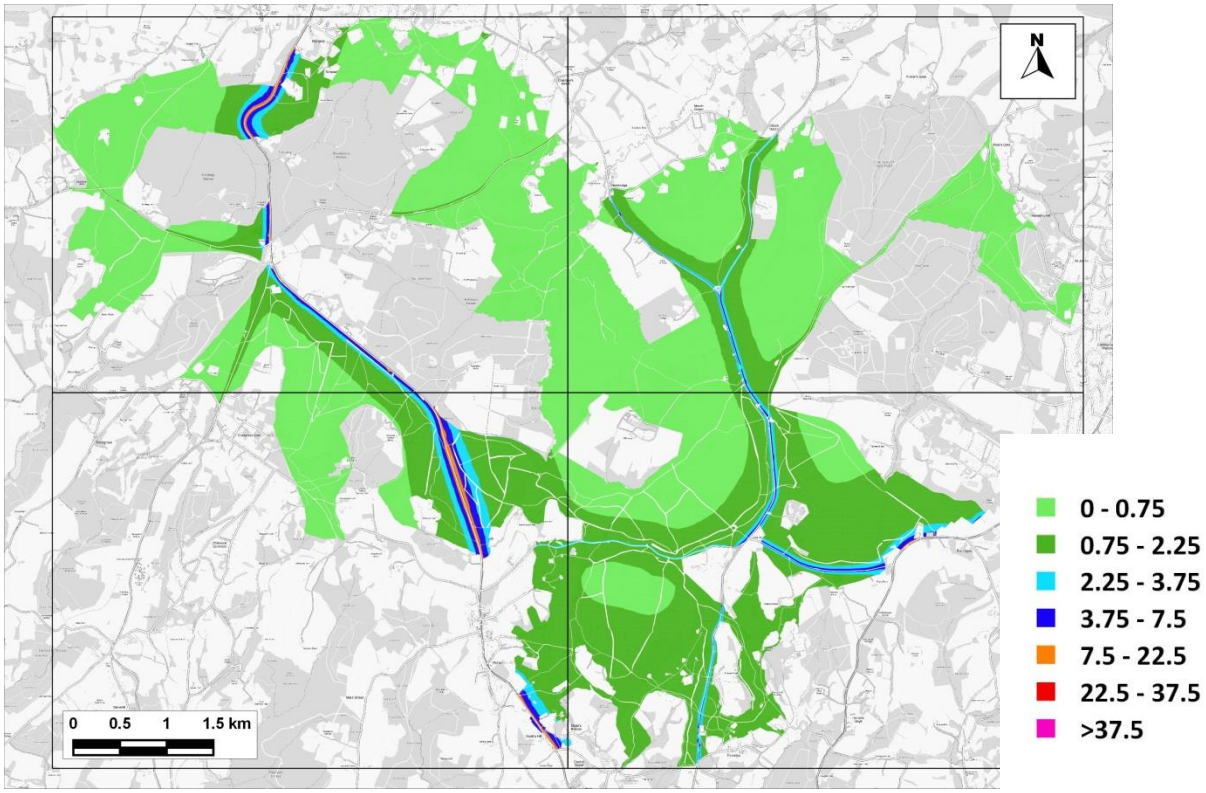


Figure 13.3: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario A (μg/m^3)

.

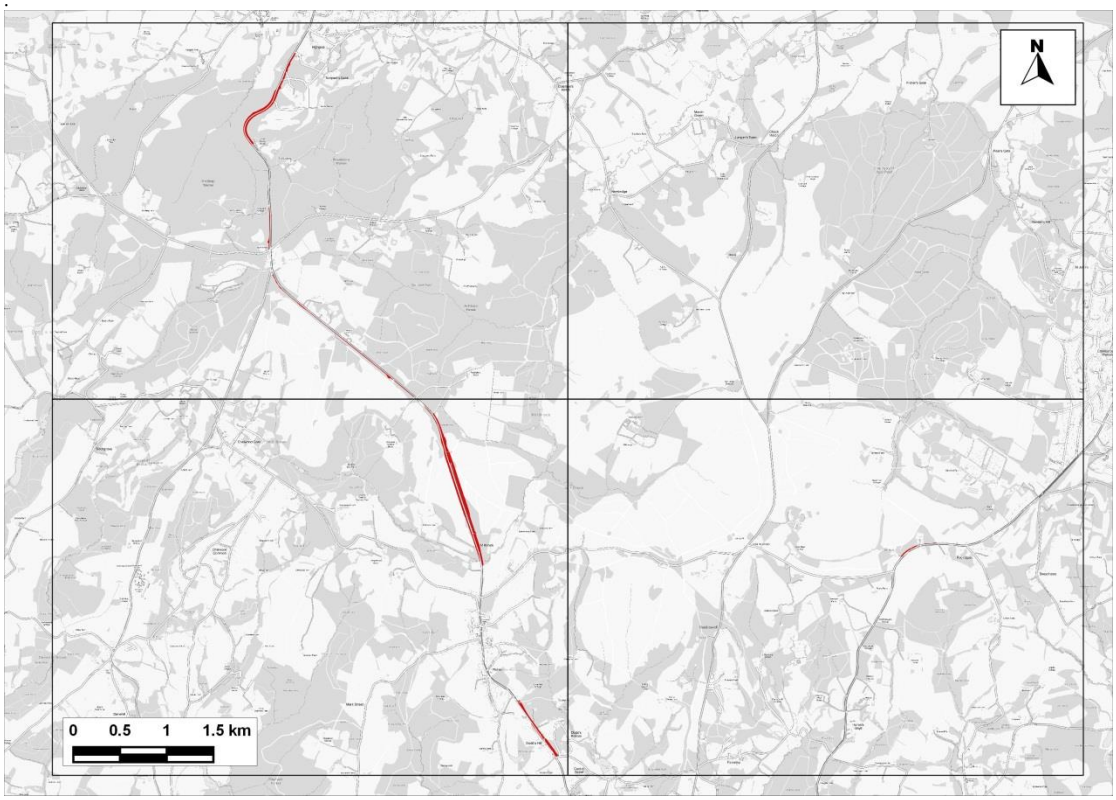


Figure 13.4: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.5: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (hectares)

Land Use	75 μg/m^3 Critical Level
Woodland	7.63
Bracken	0.31
Scattered Bracken	0.40
Dry Heath	0.09
Wet Heath	2.58
Grassland	0.17
Water	0.00
Bare Ground	0.90
Whole SAC	12.08

Table 13.6: Impacts of Plan on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.9	28.7	0.2
Bracken	0.9	15.0	0.3
Scattered Bracken	0.9	19.5	0.2
Dry Heath	0.8	27.8	0.2
Wet Heath	1.2	20.9	0.3
Grassland	0.9	19.2	0.2
Water	0.7	9.3	0.2
Bare Ground	1.2	25.6	0.2
Whole SAC	0.9	28.7	0.2

Table 13.7: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	85	-32.13	-53.64	-10.72	-12.70	-7.88	-1.75	-1.15	-0.35	-120.32
85	100	28.42	41.79	4.31	8.93	5.86	0.89	0.39	0.32	90.90
100	125	3.20	6.76	4.87	3.25	1.45	0.69	0.32	0.02	20.57
125	150	0.36	2.49	0.77	0.26	0.33	0.09	0.13	0.00	4.43
150	200	0.16	1.92	0.47	0.21	0.19	0.07	0.22	0.00	3.24
200	-	0.00	0.68	0.30	0.04	0.04	0.01	0.09	0.00	1.17
All >75		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.8: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 $\mu g/m^3$	1	239.14	426.05	156.34	103.90	69.77	38.41	36.05	1.04	1070.71
	3	8.33	72.51	27.05	10.48	9.85	3.66	6.94	0.08	138.89
	5	2.46	33.53	10.05	2.48	2.81	1.12	3.03	0.03	55.51
	10	0.09	7.63	2.58	0.31	0.40	0.17	0.90	0.00	12.08
	30	0.00	0.45	0.00	0.00	0.00	0.00	0.01	0.00	0.46
	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Impacts of Plan on Annual Mean NH_3

13.17 Figure 13.5 shows the change in predicted annual mean NH_3 concentrations caused by the Local Plan[78]. As for NOx, the Local Plan is predicted to increase annual mean NH_3 concentrations across the entire SAC, but over most of the area, the predicted changes are extremely small.

13.18 Changes greater than 0.01 $\mu g/m^3$ (which represents 1% of the 1 $\mu g/m^3$ critical level) are predicted at the kerbside of the A22, A26, Hindleap Lane, Crowborough Road, B2026, New Road, and the A275. Changes greater than 0.01 $\mu g/m^3$ extend out approximately 65 m from the A22, 15 m from the B2026, 50 m from the A26, and 20m from New Road.

13.19 Figure 13.6 shows the area over which a change of more than 0.01 $\mu g/m^3$ is predicted and total concentrations with the Plan are also predicted to be above the 1 $\mu g/m^3$ critical level (i.e. where both of these tests are met). Exceedences of both the critical level and the 1% criterion are predicted at the kerbside of the A22, A26, Hindleap Lane, Crowborough Road, B2026, New Road, and the A275. The area of exceedence extends to about 20 m from the A22, 7 m from Hindleap Lane, 2 m from Crowborough Road, 4 m from the B2026, and 20m from the A26.

13.20 The areas shown in Figure 13.6 are also summarised in the middle column of Table 13.9. This shows that 4.55 ha (45,500 m^2) of the SAC are predicted to experience both an exceedence of the 1 $\mu g/m^3$ critical level and also an increase of more than 1% of this critical level as a result of the Local Plan alone. Of this 4.55 ha, 3.32 ha are woodland, while 0.43 ha (4,300 m^2) is heath. Table 13.9 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 15.56 ha would experience both an exceedence of 0.8 $\mu g/m^3$ as a total concentration and also a change of more than 1% of this value as a result of the Local Plan. For the upper-bound level, 2.49 ha would be thus affected.

13.21 Table 13.10 shows the average, maximum, and minimum changes in predicted annual mean NH_3 concentrations to the various habitats. It shows, for example, that the average predicted change in NH_3 concentrations to the SAC as a whole is 0.0011 $\mu g/m^3$, but the maximum predicted change to any one location is 0.17 $\mu g/m^3$. This maximum change is predicted to occur to an area of woodland immediately north of the junction of the A22 with Hindleap Lane. The maximum predicted change to heath is also (when rounded) 0.17 $\mu g/m^3$. This is predicted to occur beside the A22 between Wych Cross and Forest Row.

13.22 Table 13.11 shows how the concentration distribution will change across the SAC as a result of the Local Plan. 43.5 ha of the SAC will move from experiencing concentrations below 0.59 $\mu g/m^3$ to experiencing concentrations above this level as a result of the Local Plan alone. An additional 0.26 ha is predicted to fall within the 1.0 to 1.1 $\mu g/m^3$ band as a result of the Local Plan. The Local Plan will cause an additional 0.66 ha of the SAC (6,600 m^2) to exceed the 1 $\mu g/m^3$ critical level, of which

[78] Figure 13.5 and Figure 13.6 are accompanied by Figure A10.17 to Figure A10.24 in Apendix 10.

0.18 ha will be heath.

13.23 Table 13.12 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. 41.09 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 1 μg/m^3 critical level, of which 25.00 ha are woodland, 7.57 ha are wet heath, and 1.24 ha are dry heath.

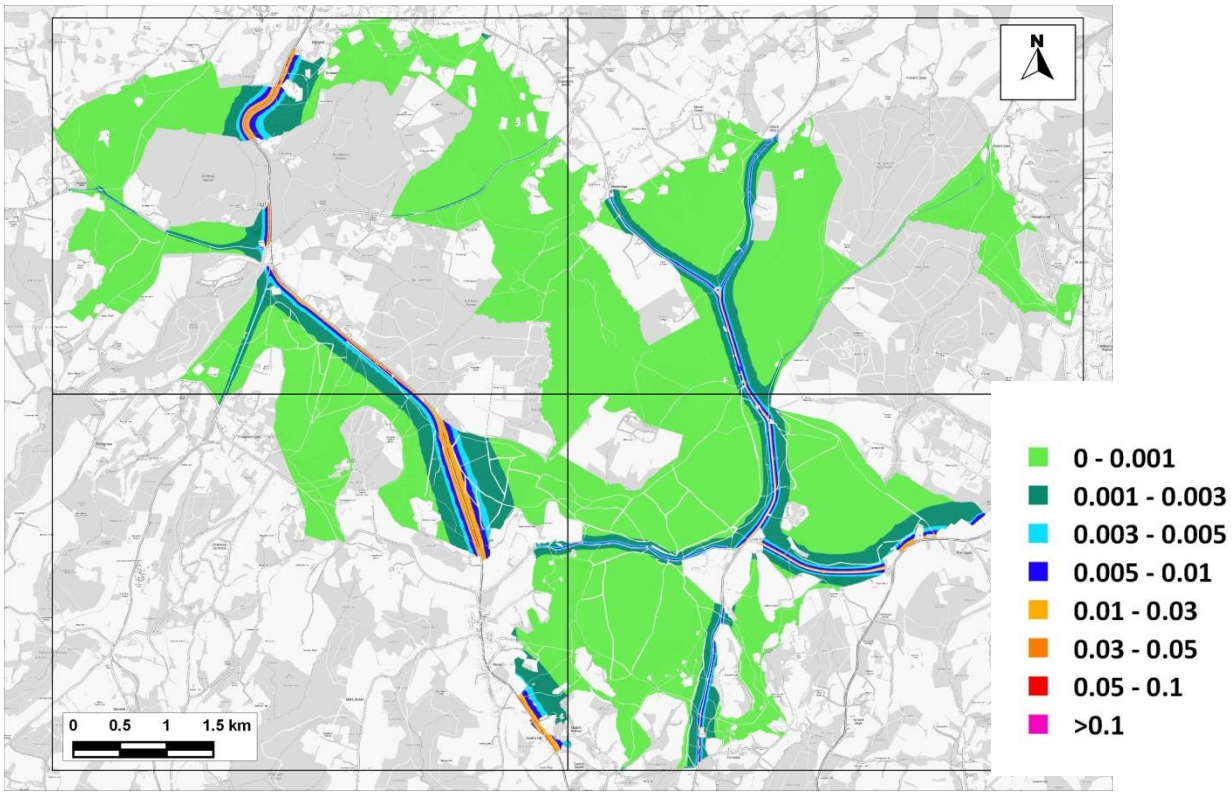


Figure 13.5: Change in Predicted Annual Mean NH_3 Comparing 'With Plan' to 'No WDC-Growth' (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

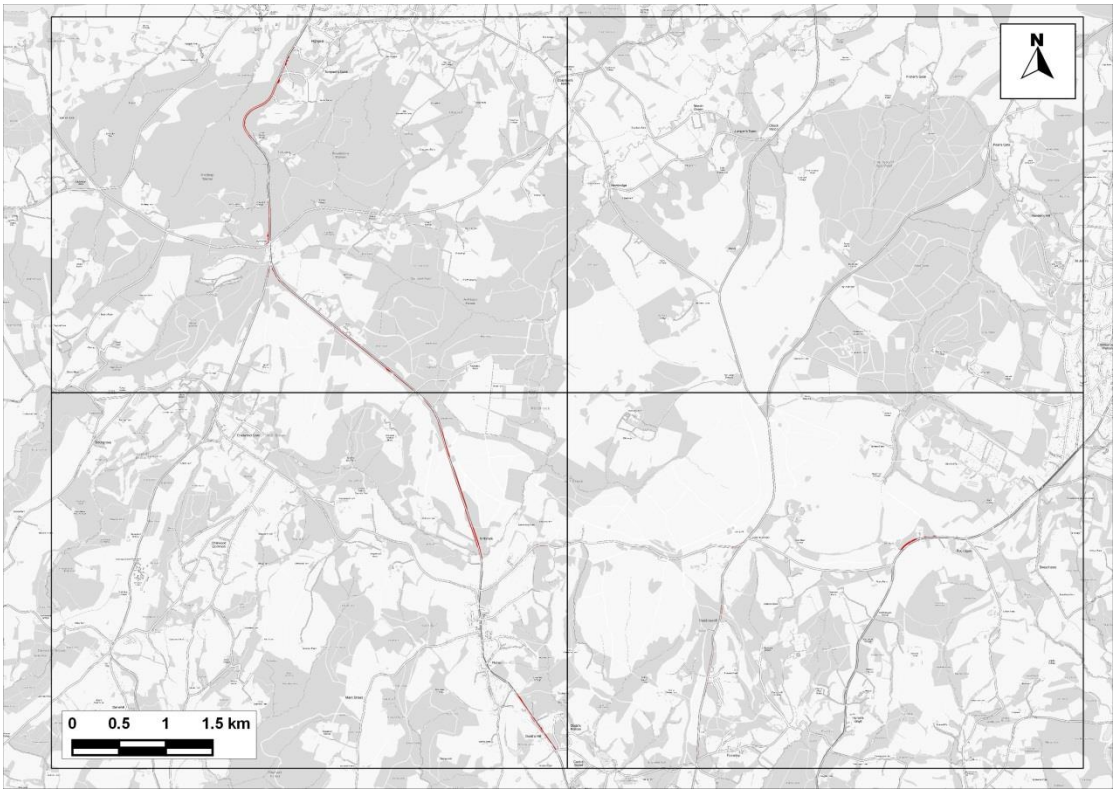


Figure 13.6: Areas in SAC Predicted to Experience an Increase in Annual Mean NH_3 Concentrations Greater than 1% of the 1 μg/m^3 Critical Level where the Critical Level would also be Exceeded (Comparing 'With Plan' to 'No WDC-Growth' Scenarios)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.9: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NH_3 Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios (hectares)

Land Use	0.8 μg/m^3 Assessment Level	1 μg/m^3 Critical Level	1.2 μg/m^3 Assessment Level
Woodland	9.36	3.32	2.01
Bracken	0.94	0.17	0.05
Scattered Bracken	0.55	0.18	0.10
Dry Heath	0.18	0.00	0.00
Wet Heath	3.07	0.43	0.08
Grassland	0.14	0.04	0.02
Water	0.00	0.00	0.00
Bare Ground	1.32	0.41	0.24
Whole SAC	15.56	4.55	2.49

Table 13.10: Impacts of Plan on Annual Mean NH_3 across the Ashdown Forest SAC (Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios)

Land Use	µg/m³ Change		
	Average	Maximum	Minimum
Woodland	0.0013	0.17	0.0001
Bracken	0.0009	0.07	0.0002
Scattered Bracken	0.0010	0.10	0.0001
Dry Heath	0.0006	0.17	0.0001
Wet Heath	0.0018	0.11	0.0002
Grassland	0.0009	0.10	0.0001
Water	0.0005	0.03	0.0001
Bare Ground	0.0021	0.14	0.0001
Whole SAC	0.0011	0.17	0.0001

Table 13.11: Change in Hectares within Different Annual Mean NH_3 Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios [a]

Total Concentration (µg/m³)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0.58	0.59	-9.44	-16.31	-6.39	-3.74	-3.65	-2.17	-1.75	-0.05	-43.50
0.59	0.6	6.07	7.29	1.14	0.80	1.98	0.91	1.06	0.04	19.29
0.6	0.7	3.10	6.06	4.40	2.67	1.34	1.19	0.35	0.01	19.13
0.7	0.8	0.16	1.45	0.27	0.13	0.18	0.04	0.08	0.00	2.30
0.8	0.9	0.10	0.83	0.25	0.07	0.11	0.02	0.16	0.00	1.54
0.9	1.0	0.01	0.31	0.15	0.04	0.01	0.01	0.05	0.00	0.57
1.0	1.1	0.00	0.10	0.14	0.01	0.01	0.00	0.00	0.00	0.26
1.1	1.2	0.00	-0.02	0.00	0.01	0.00	0.00	0.02	0.00	0.00
1.2	-	0.00	0.29	0.04	0.01	0.02	0.00	0.03	0.00	0.40
All >1		0.00	0.37	0.18	0.03	0.03	0.00	0.05	0.00	0.66

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.12: Hectares Predicted to Experience Different Levels of Change in Annual Mean NH_3 Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
0.8 µg/m^3	0.1	84.21	250.21	111.75	56.93	42.74	20.62	24.34	0.60	591.40
	0.3	16.09	106.29	41.81	16.76	13.43	5.88	10.44	0.15	210.87
	0.5	7.21	67.06	22.95	8.46	8.01	3.07	7.25	0.08	124.09
	1	2.12	33.12	9.81	2.84	2.85	0.80	3.88	0.03	55.45
	3	0.01	6.44	1.86	0.27	0.35	0.09	0.79	0.00	9.81
	5	0.00	2.90	0.46	0.07	0.19	0.04	0.43	0.00	4.09
	10	0.00	1.33	0.01	0.00	0.05	0.01	0.13	0.00	1.54
1.0 µg/m^3	0.1	60.78	206.55	93.99	46.92	34.60	17.37	19.98	0.50	480.67
	0.3	11.55	87.00	32.17	12.39	10.96	4.46	9.15	0.12	167.81
	0.5	5.16	54.13	17.64	6.03	5.81	2.09	5.96	0.06	96.88
	1	1.24	25.00	7.57	2.00	1.96	0.53	2.77	0.02	41.09
	3	0.00	4.43	1.12	0.16	0.27	0.06	0.61	0.00	6.65
	5	0.00	2.36	0.15	0.03	0.14	0.03	0.33	0.00	3.04
	10	0.00	0.74	0.00	0.00	0.00	0.00	0.06	0.00	0.80
1.2 µg/m^3	0.1	46.52	179.17	82.69	39.35	28.54	14.05	16.70	0.41	407.42
	0.3	8.66	73.95	25.99	9.68	9.13	3.57	7.96	0.10	139.06
	0.5	3.70	45.07	13.97	4.46	4.42	1.51	5.19	0.04	78.35
	1	0.75	20.19	5.94	1.48	1.40	0.43	2.13	0.01	32.34
	3	0.00	3.30	0.67	0.10	0.22	0.04	0.49	0.00	4.82
	5	0.00	1.95	0.08	0.01	0.10	0.02	0.25	0.00	2.42
	10	0.00	0.43	0.00	0.00	0.00	0.00	0.02	0.00	0.45

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 0.8 µg/m^3 is 0.008 µg/m^3, while 1% of 1.2 µg/m^3 is 0.012 µg/m^3.

Impacts of Plan on Nitrogen Deposition under Emissions Scenario A (EA Method)

13.24 Figure 13.7 shows the change in predicted nitrogen deposition caused by the Local Plan alone

under emissions scenario A and using the EA deposition method[79]. As noted for the ambient concentrations, the Local Plan will increase deposition fluxes across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted alongside the A22, Hindleap Lane, Crowborough Road, B2026, A26, Kidd's Hill, New Road, and the A275, with distances extending approximately 150 m from the A22, 5 m from Hindleap Lane, 20 m from Crowborough Road, 100 m from the A26, 60 m from the B2026, 30 m from Kidd's Hill, and 80 m from New Road.

13.25 Figure 13.8 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 13.8 is identical to the 0.1 kg-N/ha/yr contour described for Figure 13.7.

13.26 The areas shown in Figure 13.8 are also summarised in the first column of Table 13.13. This shows that 101.7 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load as a result of the Local Plan alone. Of this 101.7 ha, 68.19 ha are woodland, 15.04 ha are wet heath, and 4.37 ha are dry heath.

13.27 Table 13.14 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.03 kg-N/ha/yr, but the maximum predicted change to any one location is 4.1 kg-N/ha/yr. The maximum predicted change to heath is an increase of 2.7 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.28 Table 13.15 shows how the distribution of deposition fluxes will change as a result of the Local Plan. 0.17 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. The Local Plan alone will result in an additional 0.34 ha experiencing fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load).

13.29 Table 13.16 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 101.70 ha of the SAC would experience an increase in deposition flux of more than 1% of the critical load, and also that 7.48 ha would experience a change of more than 5% of the critical load as a result of the Local Plan alone.

[79] Figure 13.7 and Figure 13.8 are accompanied by Figure A10.25 to Figure A10.32 in Appendix 10, which show the same results in more detail.

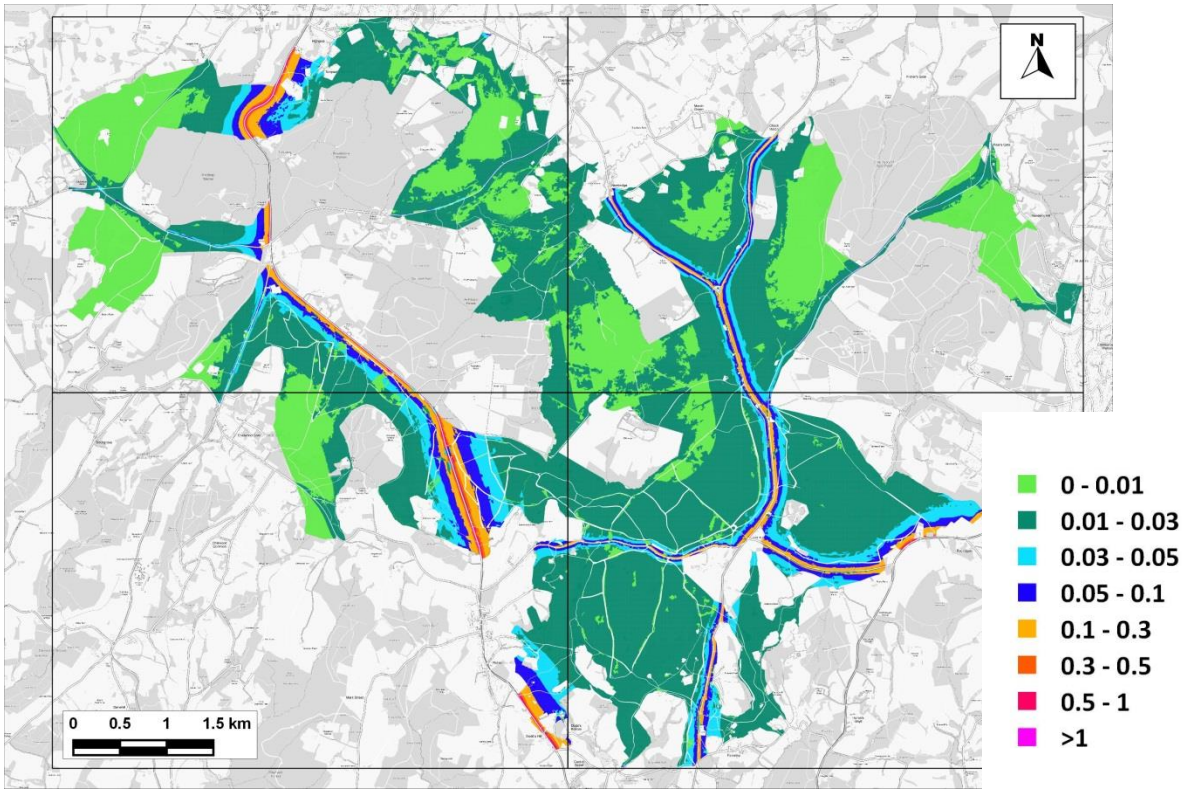


Figure 13.7: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' Under Emission Scenario A (EA Method) (kg-N/ha/yr)

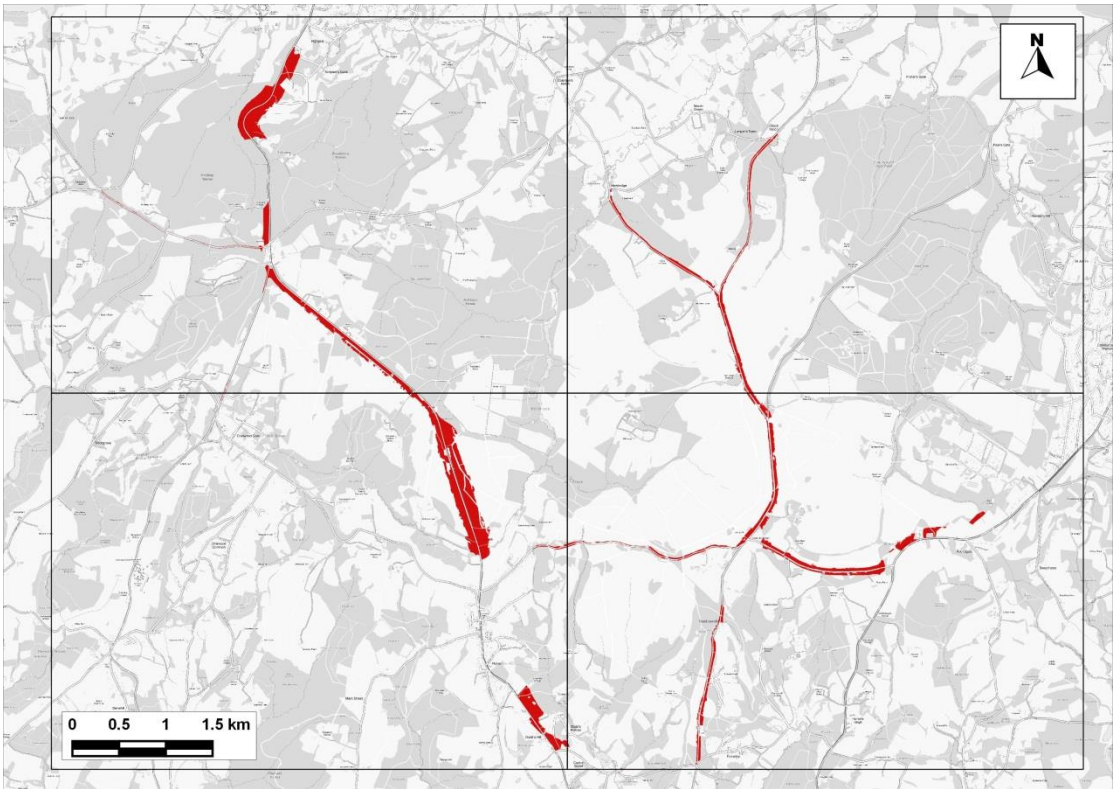


Figure 13.8: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (EA Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.13: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (EA Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	68.19	43.13	29.21
Bracken	6.12	2.86	0.74
Scattered Bracken	6.08	2.85	0.50
Dry Heath	4.37	1.78	0.01
Wet Heath	15.04	8.67	0.86
Grassland	1.65	0.61	0.04
Water	0.00	0.00	0.00
Bare Ground	0.24	0.00	0.00
Whole SAC	101.70	59.90	31.36

Table 13.14: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.03	4.1	0.02
Bracken	0.02	1.0	0.02
Scatt. Bracken	0.02	1.9	0.02
Dry Heath	0.02	2.7	0.02
Wet Heath	0.03	1.7	0.01
Grassland	0.02	1.6	0.02
Water	0.00	0.1	0.00
Bare Ground	0.01	0.4	0.00
Whole SAC	0.03	4.1	0.00

Table 13.15: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	0.00	-0.17
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.13
12	14	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04
14	16	-1.71	0.00	-3.32	-1.78	-1.42	-0.21	0.00	0.00	-8.45
16	18	1.58	0.00	2.62	1.45	0.87	0.19	0.00	0.00	6.71
18	20	0.13	0.00	0.46	0.19	0.40	0.02	0.00	0.00	1.20
20	22	0.01	0.00	0.17	0.11	0.11	0.00	0.00	0.00	0.39
22	24	0.00	0.00	0.05	0.01	0.01	0.00	0.00	0.00	0.08
24	26	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.00	0.04
26	28	0.00	0.00	0.01	0.01	-0.02	0.00	0.00	0.00	0.00
28	30	0.00	-8.41	0.00	0.00	0.00	0.00	0.00	0.00	-8.40
30	32	0.00	3.21	0.00	0.00	0.01	0.00	0.00	0.00	3.22
32	34	0.00	2.83	0.00	0.00	0.02	0.00	0.00	0.00	2.84
34	36	0.00	1.58	0.00	0.00	0.00	0.00	0.00	0.00	1.58
36	38	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.37
38	40	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
40	-	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.34
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.17

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.16: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	403.25	962.98	211.86	182.08	122.22	53.92	6.91	0.08	1943.30
	0.3	42.28	226.00	76.34	42.34	31.03	12.08	1.29	0.01	431.36
	0.5	15.36	139.42	41.00	20.03	15.21	5.45	0.66	0.00	237.12
	1	4.37	68.19	15.04	6.12	6.08	1.65	0.24	0.00	101.70
	3	0.15	16.21	2.80	0.64	0.66	0.17	0.06	0.00	20.69
	5	0.00	6.26	0.75	0.16	0.27	0.04	0.00	0.00	7.48
	10	0.00	2.46	0.03	0.01	0.09	0.01	0.00	0.00	2.60
15 kg-N/ha/yr	0.1	158.39	553.39	153.30	109.01	75.96	36.42	4.41	0.04	1090.93
	0.3	19.07	152.81	47.13	23.62	17.45	6.53	0.78	0.00	267.39
	0.5	7.20	93.22	22.73	10.11	9.52	2.83	0.37	0.00	145.98
	1	1.78	43.13	8.67	2.86	2.85	0.61	0.19	0.00	60.08
	3	0.00	7.73	1.00	0.20	0.29	0.05	0.00	0.00	9.28
	5	0.00	3.23	0.10	0.04	0.14	0.02	0.00	0.00	3.54
	10	0.00	1.68	0.00	0.00	0.05	0.00	0.00	0.00	1.73
20 kg-N/ha/yr	0.1	88.05	413.42	113.44	68.84	51.05	20.71	2.69	0.03	758.24
	0.3	10.83	117.58	31.30	14.66	12.30	4.11	0.51	0.00	191.29
	0.5	4.37	68.19	15.04	6.12	6.08	1.65	0.24	0.00	101.70
	1	0.79	29.21	5.73	1.69	1.64	0.40	0.15	0.00	39.61
	3	0.00	4.48	0.36	0.10	0.21	0.03	0.00	0.00	5.17
	5	0.00	2.46	0.03	0.01	0.09	0.01	0.00	0.00	2.60
	10	0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	1.19

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Impacts of Plan on Nitrogen Deposition Under Emissions Scenario A (AQC Method)

13.30 Figure 13.9 shows the change in predicted nitrogen deposition caused by the Local Plan alone

under emissions scenario A and using the AQC deposition method[80]. As noted previously, the Local Plan will increase deposition fluxes across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted alongside the A22, Hindleap Lane, Crowborough Road, B2026, A26, Kidd's Hill, New Road, and the A275. Changes greater than 0.1 kg-N/ha/yr extend out approximately 150 m from the A22, 15 m from Crowborough Road, 40 m from the B2026, 25 m from Kidd's Hill, 90 m from the A26, and 70 m from New Road.

13.31 Figure 13.10 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 13.10 is identical to the 0.1 kg-N/ha/yr contour described for Figure 13.9.

13.32 The areas shown in Figure 13.10 are also summarised in the first column of Table 13.17. This shows that 70.38 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load as result of the Local Plan alone. Of this 70.38 ha, 57.71 ha are woodland, 7.00 ha are wet heath, and 1.11 ha is dry heath.

13.33 Table 13.18 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.02 kg-N/ha/yr, but the maximum predicted change to any one location is 2.8 kg-N/ha/yr. The maximum predicted change to heath is an increase of 1.2 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.34 Table 13.19 shows how the distribution of deposition fluxes will change as a result of the Local Plan. 0.02 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. The Local Plan alone will result in an additional 0.29 ha experiencing fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load).

13.35 Table 13.20 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 70.38 ha of the SAC would experience an increase in deposition flux of more than 1% of the critical load, and also that 5.19 ha would experience a change of more than 5% of the critical load as a result of the Local Plan alone.

[80] Figure 13.9 and Figure 13.10 are accompanied by Figure A10.33 to Figure A10.36 in Appendix 10, which show the same results in more detail.

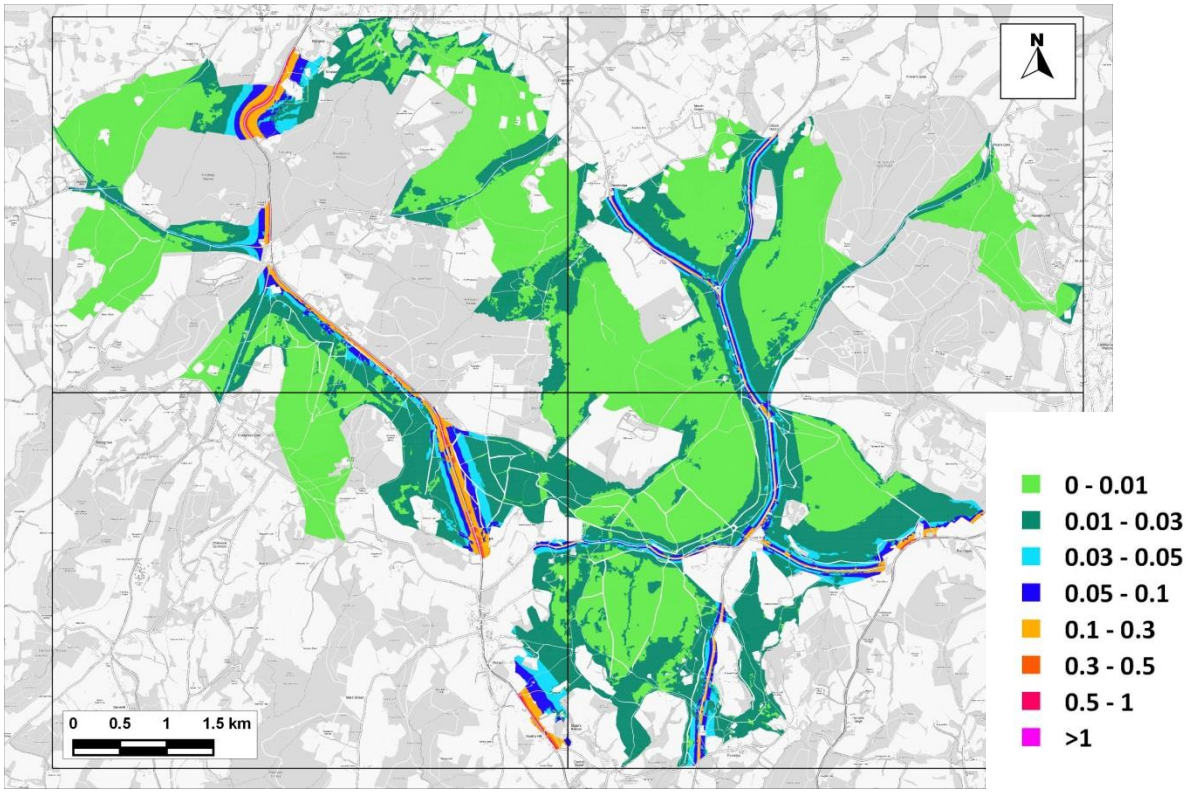


Figure 13.9: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario A (AQC Method) (kg-N/ha/yr)

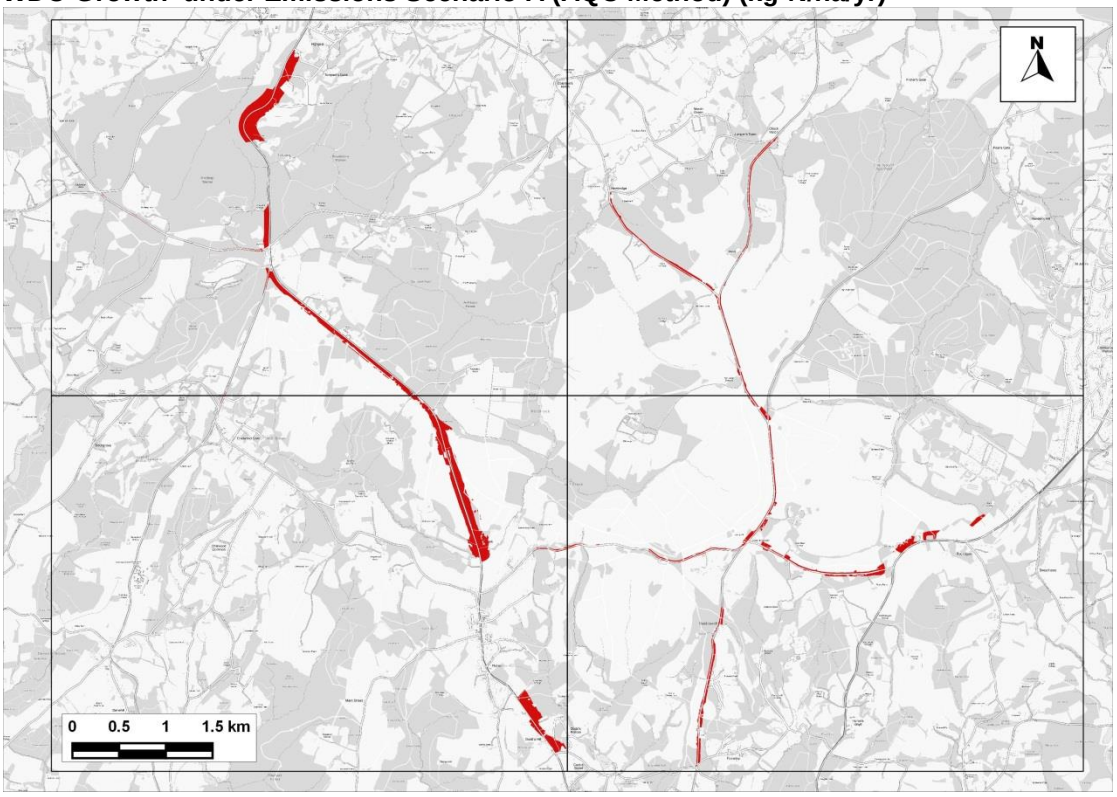


Figure 13.10: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (AQC Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0

Table 13.17: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (AQC Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	57.71	36.46	24.59
Bracken	1.80	0.70	0.03
Scattered Bracken	1.78	0.70	0.09
Dry Heath	1.11	0.29	0.00
Wet Heath	7.00	3.60	0.02
Grassland	0.54	0.31	0.01
Water	0.00	0.00	0.00
Bare Ground	0.45	0.00	0.00
Whole SAC	70.38	42.05	24.74

Table 13.18: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario A (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.03	2.8	0.02
Bracken	0.01	0.5	0.01
Scatt. Bracken	0.01	0.8	0.01
Dry Heath	0.01	1.2	0.01
Wet Heath	0.02	0.8	0.01
Grassland	0.01	0.8	0.01
Water	0.00	0.1	0.00
Bare Ground	0.01	0.3	0.00
Whole SAC	0.02	2.8	0.00

Table 13.19: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.02
10	12	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.02
12	14	-3.10	0.00	-6.09	0.00	0.00	-0.39	0.04	0.00	-9.54
14	16	3.00	0.00	5.51	-0.30	-0.36	0.37	0.00	0.00	8.22
16	18	0.09	0.00	0.46	0.28	0.33	0.02	0.00	0.00	1.18
18	20	0.00	0.00	0.10	0.02	0.02	0.00	0.00	0.00	0.13
20	22	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.02
22	24	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
24	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	30	0.00	-18.85	0.00	0.00	0.00	0.00	0.00	0.00	-18.85
30	32	0.00	15.36	0.00	0.00	0.00	0.00	0.00	0.00	15.36
32	34	0.00	2.26	0.00	0.00	0.00	0.00	0.00	0.00	2.26
34	36	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.72
36	38	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.16
38	40	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
40	-	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.29
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.20: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario A (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	122.16	726.12	136.00	71.73	51.30	34.76	10.29	0.16	1152.52
	0.3	13.65	190.25	37.39	15.28	12.45	6.02	2.72	0.02	277.78
	0.5	5.33	119.89	18.01	6.45	6.32	2.56	1.08	0.01	159.65
	1	1.11	57.71	7.00	1.80	1.78	0.54	0.45	0.00	70.38
	3	0.00	13.33	0.65	0.09	0.22	0.04	0.00	0.00	14.34
	5	0.00	5.04	0.04	0.00	0.09	0.02	0.00	0.00	5.19
	10	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00	1.99
15 kg-N/ha/yr	0.1	55.32	479.11	86.27	44.48	30.13	17.23	6.76	0.07	719.36
	0.3	6.38	131.98	20.83	7.79	7.58	3.05	1.28	0.01	178.89
	0.5	2.39	79.24	10.11	3.02	2.97	1.10	0.65	0.00	99.48
	1	0.29	36.46	3.60	0.70	0.70	0.31	0.21	0.00	42.27
	3	0.00	6.11	0.08	0.01	0.11	0.02	0.00	0.00	6.34
	5	0.00	2.69	0.00	0.00	0.02	0.00	0.00	0.00	2.71
	10	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	1.03
20 kg-N/ha/yr	0.1	31.97	306.27	63.45	29.07	20.17	11.25	5.01	0.05	467.24
	0.3	3.80	100.02	13.58	4.58	4.46	1.80	0.87	0.00	129.10
	0.5	1.11	57.71	7.00	1.80	1.78	0.54	0.45	0.00	70.38
	1	0.03	24.59	2.04	0.29	0.36	0.14	0.07	0.00	27.54
	3	0.00	3.67	0.01	0.00	0.06	0.01	0.00	0.00	3.75
	5	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00	1.99
	10	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.42

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Emissions Scenario B

Impacts of Plan on Annual Mean NOx – Emissions Scenario B

13.36 Figure 13.11 shows the change in predicted annual mean NOx concentrations caused by the Local

Plan alone under NOx emissions scenario B[81]. The Local Plan will increase annual mean NOx concentrations across the entire SAC; but over most of the area, the predicted changes are very small. Changes greater than 0.3 μg/m^3 (which represents 1% of the 30 μg/m^3 critical level) are predicted out to about 150 m from the A22, 45 m from the B2026, 75 m from New Road, and 90 m from the A26.

13.37 Figure 13.12 shows the area over which a change of more than 0.3 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 30 μg/m^3 critical level (i.e. the area over which both tests are met). Exceedences of both the critical level and the 1% criterion are predicted to extend out approximately 4 m from the A22 and 5 m from the A26. Exceedences are not predicted alongside other modelled roads.

13.38 The areas shown in Figure 13.12 are also summarised in the middle column of Table 13.21. This shows that 1.11 ha (11,100 m^2) of the SAC is predicted to experience both an exceedence of the 30 μg/m^3 critical level and also an increase of more than 1% of this critical level as a result of the Local Plan. Of this, 0.97 ha is woodland and none is currently heath. Table 13.21 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 16.50 ha would experience both an exceedence of 15 μg/m^3 as a total concentration and also a change of more than 1% of this value as a result of the local plan. For the upper-bound level, just 0.01 ha would be thus affected.

13.39 Table 13.22 shows the average, maximum, and minimum changes in predicted annual mean NOx concentrations to the various habitats. It shows, for example, that the average predicted change in NOx concentrations to the SAC as a whole is 0.09 μg/m^3, but the maximum predicted change to any one location is 5.2 μg/m^3, with the maximum change to heath being 5.17 μg/m^3. Both of these maxima are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.40 Table 13.23 shows how the concentration distribution will change across the SAC as a result of the Local Plan. It shows, for example, that 206 ha of the SAC will be moved from experiencing concentrations below 8 μg/m^3 to above this level. An additional 0.24 ha will fall within the 30 to 35 μg/m^3 band as a result of the Local Plan. The Local Plan will cause an additional 0.53 ha of the SAC (5,300 m^2) to exceed the 30 μg/m^3 critical level, none of which is heath.

13.41 Table 13.24 shows the area-wide changes in predicted concentrations in a different way. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. This shows that 105.31 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 30 μg/m^3 criterion. 1.02 ha is predicted to experience an increase of 10% of this critical level as a result of the Local Plan alone.

[81] Figure 13.11 and Figure 13.12 are accompanied by Figure A10.41 to Figure A10.48 in Appendix 10, which show the same results in more detail.

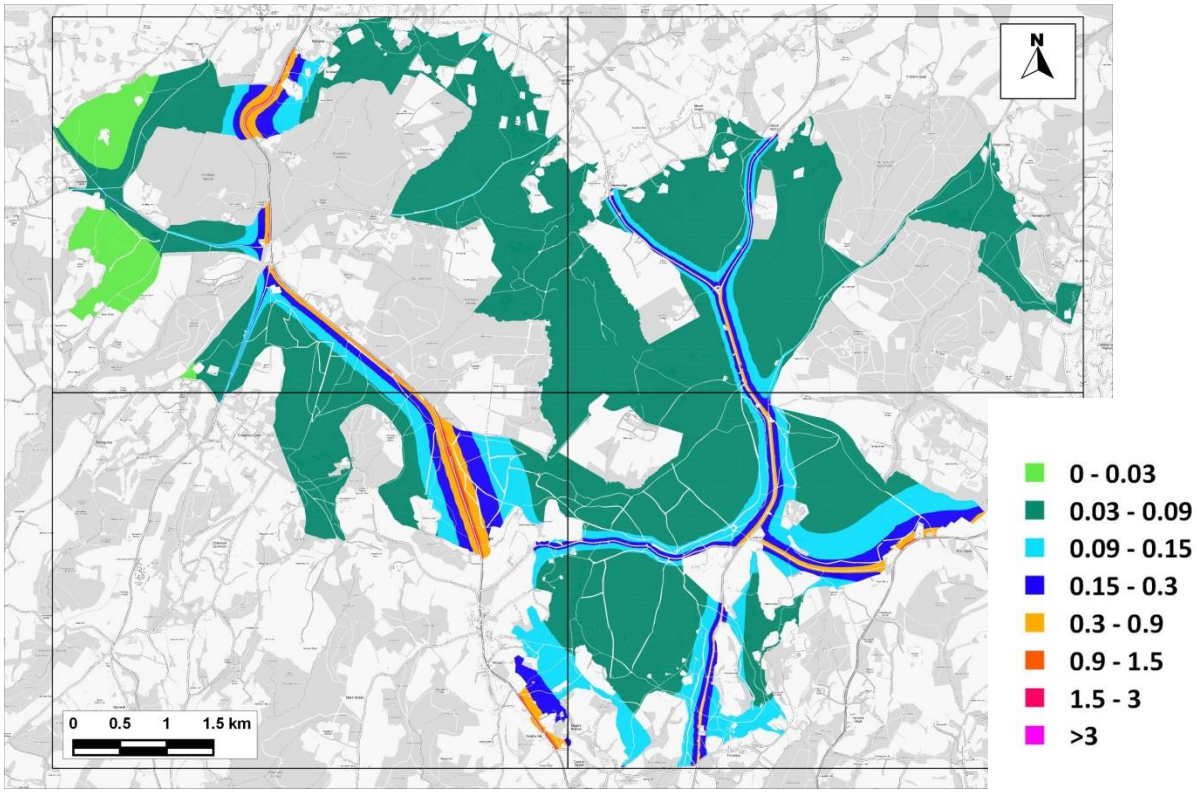


Figure 13.11: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No WDC-Growth' Under Emissions Scenario B (μg/m^3)

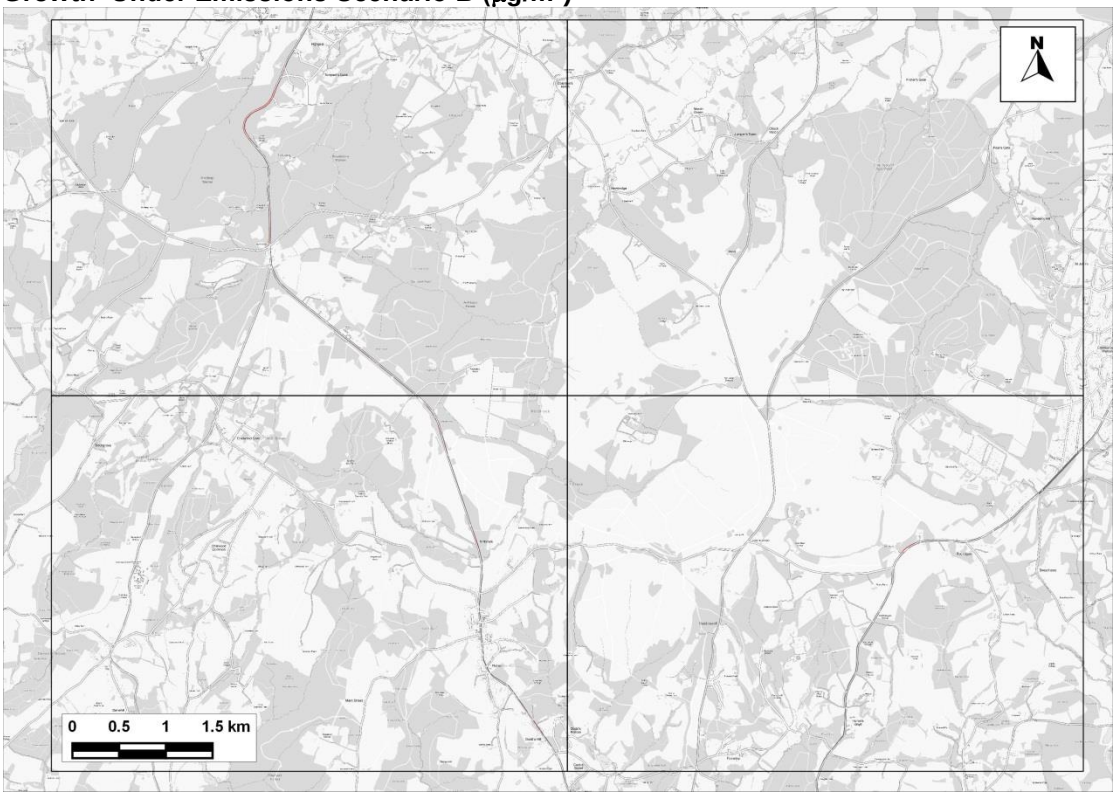


Figure 13.12: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.21: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (hectares)

Land Use	15 µg/m^3 Assessment Level	30 µg/m^3 Critical Level	45 µg/m^3 Assessment Level
Woodland	9.77	0.97	0.01
Bracken	1.00	0.02	0.00
Scattered Bracken	0.57	0.02	0.00
Dry Heath	0.15	0.00	0.00
Wet Heath	3.24	0.00	0.00
Grassland	0.14	0.00	0.00
Water	0.00	0.00	0.00
Bare Ground	1.63	0.10	0.00
Whole SAC	16.50	1.11	0.01

Table 13.22: Impacts of Plan on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B

Land Use	µg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.09	5.20	0.02
Bracken	0.09	2.23	0.03
Scatt. Bracken	0.09	3.18	0.02
Dry Heath	0.07	5.17	0.02
Wet Heath	0.13	3.44	0.03
Grassland	0.09	3.05	0.02
Water	0.06	1.28	0.02
Bare Ground	0.13	4.45	0.02
Whole SAC	0.09	5.20	0.02

Table 13.23: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	-59.25	-99.68	-6.95	-20.53	-11.19	-3.99	-2.51	-1.72	-205.81
8	10	56.87	90.08	2.53	17.97	9.53	3.29	1.95	1.69	183.92
10	12	1.93	3.96	2.70	1.91	1.11	0.53	0.00	0.02	12.16
12	14	0.27	2.64	0.72	0.33	0.37	0.06	0.19	0.00	4.58
14	18	0.17	2.10	0.52	0.20	0.13	0.09	0.24	0.00	3.46
18	20	0.01	0.28	0.23	0.09	0.02	0.01	0.04	0.00	0.67
20	25	0.00	0.18	0.22	0.02	0.01	0.00	0.02	0.00	0.46
25	30	0.00	-0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.04
30	35	0.00	0.17	0.00	0.01	0.02	0.00	0.04	0.00	0.24
35	40	0.00	0.19	0.00	0.00	0.00	0.00	0.02	0.00	0.21
40	-	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
All >30		0.00	0.43	0.00	0.01	0.02	0.00	0.06	0.00	0.53

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.24: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	613.83	1103.22	258.87	234.91	175.09	86.10	66.91	6.02	2544.94
	0.5	343.29	506.58	183.53	131.74	91.93	41.98	42.05	1.42	1342.53
	1	45.77	166.81	76.34	41.98	24.68	12.53	15.01	0.36	383.49
	3	2.10	31.61	9.49	2.45	2.57	0.92	2.98	0.03	52.14
	5	0.28	12.78	3.89	0.68	0.56	0.32	1.15	0.01	19.66
	10	0.00	2.95	0.63	0.09	0.20	0.04	0.46	0.00	4.37
30 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	343.29	506.58	183.53	131.74	91.93	41.98	42.05	1.42	1342.53
	0.5	45.77	166.81	76.34	41.98	24.68	12.53	15.01	0.36	383.49
	1	5.53	57.45	19.80	7.08	6.97	2.63	5.79	0.06	105.31
	3	0.12	8.59	2.80	0.40	0.42	0.19	0.94	0.00	13.46
	5	0.00	2.95	0.63	0.09	0.20	0.04	0.46	0.00	4.37
	10	0.00	0.90	0.00	0.00	0.02	0.00	0.09	0.00	1.02
45 µg/m^3	0.1	613.83	1103.22	258.87	234.91	175.09	86.10	66.91	6.02	2544.94
	0.3	45.77	166.81	76.34	41.98	24.68	12.53	15.01	0.36	383.49
	0.5	9.97	81.83	31.11	12.98	10.85	4.22	7.82	0.11	158.89
	1	2.10	31.61	9.49	2.45	2.57	0.92	2.98	0.03	52.14
	3	0.00	3.62	0.95	0.14	0.24	0.05	0.53	0.00	5.53
	5	0.00	1.71	0.05	0.00	0.08	0.02	0.22	0.00	2.08
	10	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.15

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

Impacts of Plan on 24-hour Mean NOx under Emissions Scenario B

13.42 Figure 13.13 shows the change in predicted maximum 24-hour mean NOx concentrations caused

by the Local Plan alone under NOx emissions scenario B[82]. The Local Plan is predicted to increase concentrations across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 7.5 μg/m^3 (which represents 10% of the 75 μg/m^3 critical level) are predicted alongside the A22 and A26 (out to approximately 20 m and 5 m respectively).

13.43 Figure 13.14 shows the area over which there is both a change of more than 7.5 μg/m^3 and also a predicted exceedence (in the With Plan scenario) of the critical level. In practice, since the footprint of exceedences of the critical level is larger than the footprint over which there will be a change greater than 10% of the critical level, the area shown in Figure 13.14 is identical to the area shown in orange in Figure 13.13. These areas are then summarised again in Table 13.25, which shows that the parts of the SAC highlighted red in Figure 13.14 cover a total of 6.35 ha, of which 4.13 ha are woodland, and 1.18 ha is heath.

13.44 Table 13.26 shows the average, maximum, and minimum changes in predicted maximum 24-hour NOx concentrations to the various habitats. It shows, for example, that the maximum predicted change in maximum 24-hour NOx concentrations to any one location is 23.4 μg/m^3. This same change is predicted to areas of both woodland and dry heath, both of which are at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.45 Table 13.27 shows how the concentration distribution will change across the SAC as a result of the Local Plan. 207.17 ha will move from experiencing concentrations below 60 μg/m^3 to above this level and 0.40 ha will begin experiencing concentrations greater than 200μg/m^3 as a result of the Plan alone. The Local Plan will cause an additional 18.42 ha of the SAC to exceed the critical level; of which 1.57 ha is dry heath and 3.65 ha are wet heath.

13.46 Table 13.28 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 6.35 ha will experience an increase in 24-hour mean NOx of at least 10% of the critical level, while 77.99 ha will experience an increase of at least 3% of the critical level.

[82] Figure 13.13 and Figure 13.14 are accompanied by Figure A10.49 to Figure A10.56 in Appendix 10, which shows the same results in more detail.

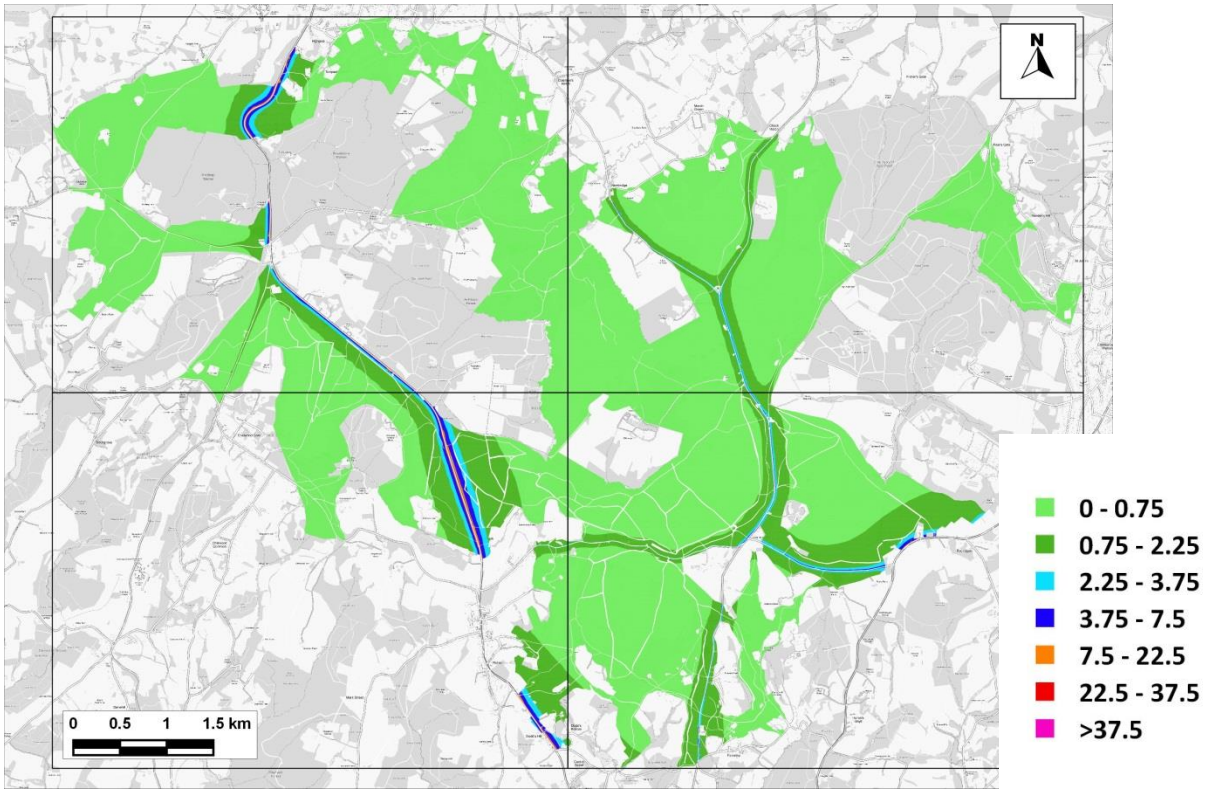


Figure 13.13: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario B (μg/m^3)

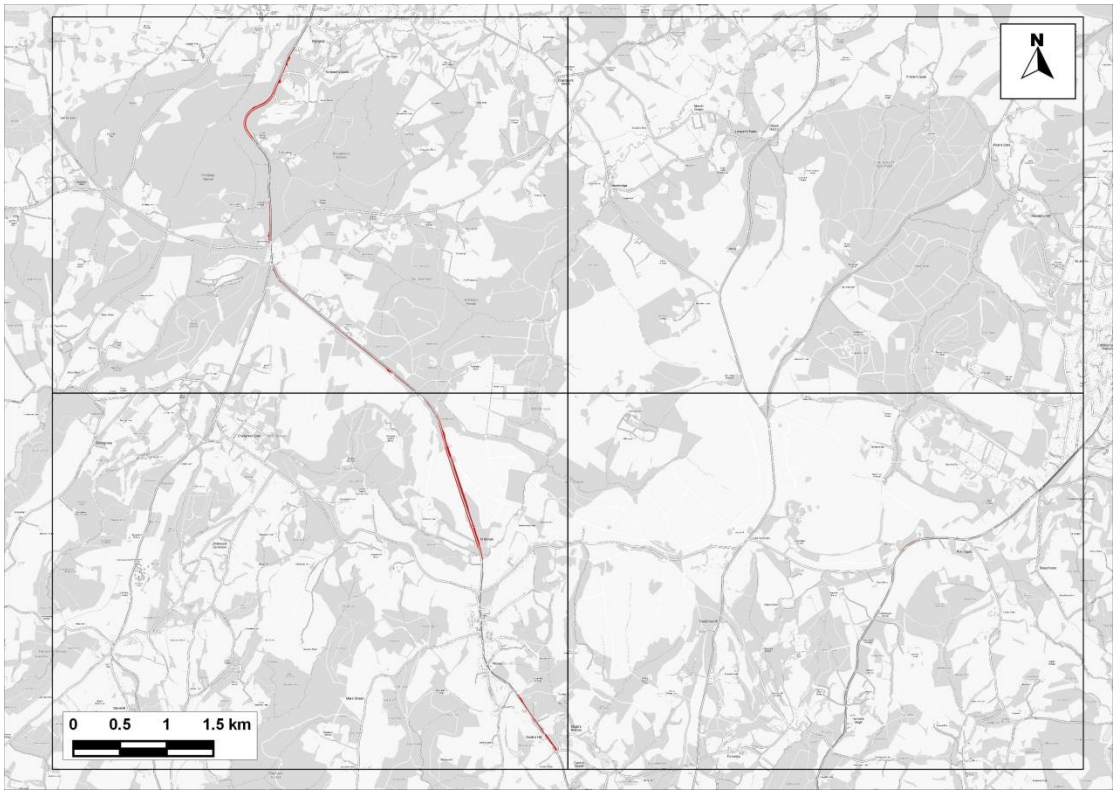


Figure 13.14: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.25: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (hectares)

Land Use	75 μg/m^3 Critical Level
Woodland	4.13
Bracken	0.13
Scattered Bracken	0.27
Dry Heath	0.00
Wet Heath	1.18
Grassland	0.06
Water	0.00
Bare Ground	0.58
Whole SAC	6.35

Table 13.26: Impacts of Plan on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.66	23.4	0.15
Bracken	0.64	12.2	0.19
Scattered Bracken	0.62	16.0	0.16
Dry Heath	0.53	23.4	0.16
Wet Heath	0.89	17.0	0.21
Grassland	0.63	15.3	0.16
Water	0.47	7.6	0.17
Bare Ground	0.88	20.5	0.17
Whole SAC	0.65	23.4	0.15

Table 13.27: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	-85.78	-65.05	-14.84	-16.17	-11.96	-6.36	-6.84	-0.18	-207.17
60	65	78.95	44.60	3.08	10.43	9.32	4.57	5.22	0.15	156.32
65	75	5.26	11.67	8.11	3.96	1.31	1.13	1.00	0.01	32.43
75	85	1.04	2.75	1.70	1.14	0.60	0.48	0.12	0.01	7.83
85	100	0.36	3.13	0.95	0.35	0.54	0.06	0.15	0.00	5.55
100	125	0.16	2.04	0.54	0.17	0.12	0.09	0.24	0.00	3.38
125	150	0.01	0.39	0.40	0.09	0.02	0.01	0.06	0.00	0.97
150	200	0.00	0.13	0.06	0.02	0.04	0.01	0.03	0.00	0.29
200	-	0.00	0.35	0.00	0.01	0.00	0.00	0.04	0.00	0.40
All >75		1.57	8.79	3.65	1.78	1.32	0.66	0.62	0.02	18.42

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.28: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 $\mu g/m^3$	1	66.65	205.69	96.87	51.61	31.47	16.10	19.42	0.47	488.27
	3	3.84	44.78	14.13	4.30	4.56	1.79	4.53	0.06	77.99
	5	0.85	20.22	6.01	1.11	1.30	0.48	1.62	0.02	31.60
	10	0.00	4.13	1.18	0.13	0.27	0.06	0.58	0.00	6.35
	30	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Impacts of Plan on Annual Mean NH_3

13.47 There is no traffic-related NH_3 emissions Scenario B

Impacts of Plan on Nitrogen Deposition under Emissions Scenario B (EA Method)

13.48 Figure 13.15 shows the change in predicted nitrogen deposition caused by the Local Plan alone

under emissions scenario B and using the EA deposition method[83]. The Local Plan will increase deposition fluxes across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted alongside the A22, Hindleap Lane, Crowborough Road, the B2026, the A26, Kidd's Hill, New Road, and the A275. Changes greater than 0.1 kg-N/ha/yr extend out approximately 125 m from the A22, 35 m from the A275, 15 m from Crowborough Road, 40 m from the B2026, 20 m from Kidd's Hill, 55 m from New Road, and 80 m from the A26.

13.49 Figure 13.16 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 13.16 is identical to the 0.1 kg-N/ha/yr contour described for Figure 13.15.

13.50 The areas shown in Figure 13.16 are also summarised in the first column of Table 13.29. This shows that 70.15 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load as a result of the Local Plan alone. Of this 70.15 ha, 51.36 ha are woodland, 9.45 ha are wet heath, and 2.11 ha are dry heath.

13.51 Table 13.30 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.02 kg-N/ha/yr, but the maximum predicted change to any one location is 3.2 kg-N/ha/yr. The maximum predicted change to heath is an increase of 1.9 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.52 Table 13.31 shows how the distribution of deposition fluxes will change as a result of the Local Plan. 0.06 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. The Local Plan alone will result in an additional 0.36 ha experiencing fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load).

13.53 Table 13.32 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 70.15 ha of the SAC would experience an increase in deposition flux of more than 1% of the critical load, and also that 4.71 ha would experience a change of more than 5% of the critical load as a result of the Local Plan alone.

[83] Figure 13.15 and Figure 13.16 are accompanied by Figure A10.57 to Figure A10.64 in Appendix 10, which show the same results in more detail.

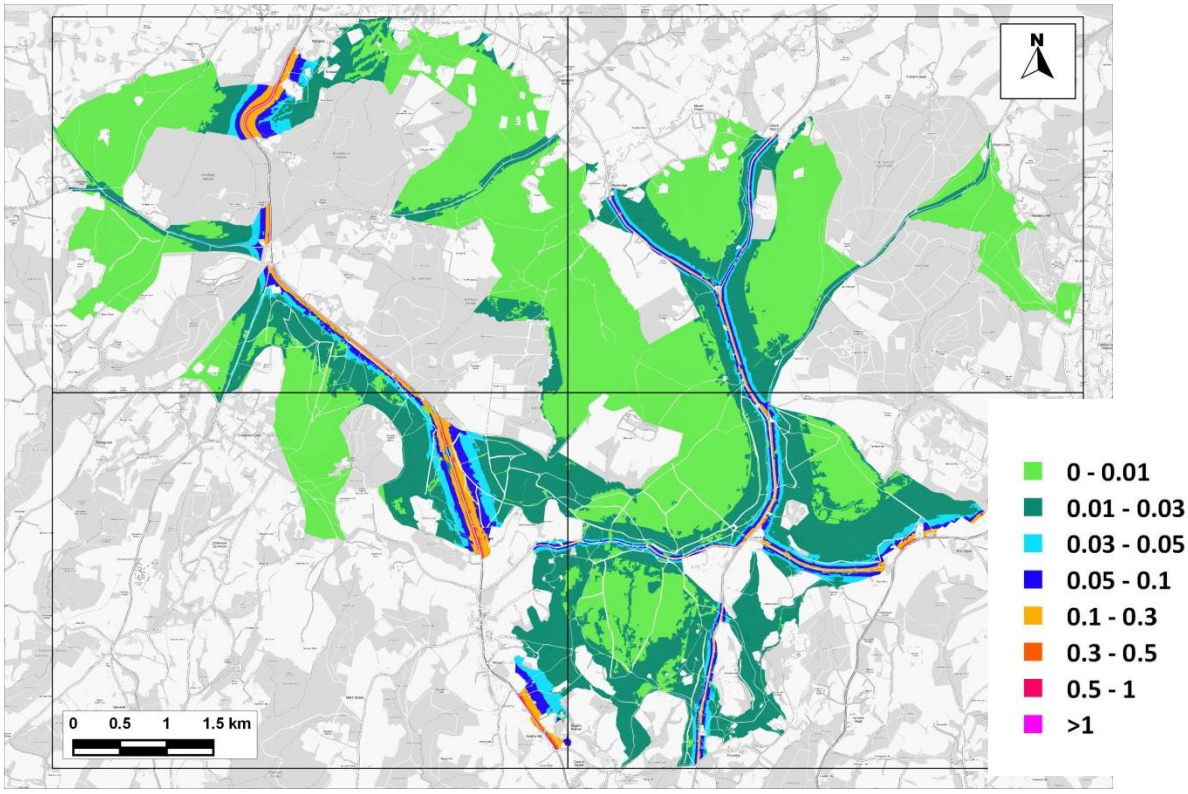


Figure 13.15: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' Under Emission Scenario B (EA Method) (kg-N/ha/yr)

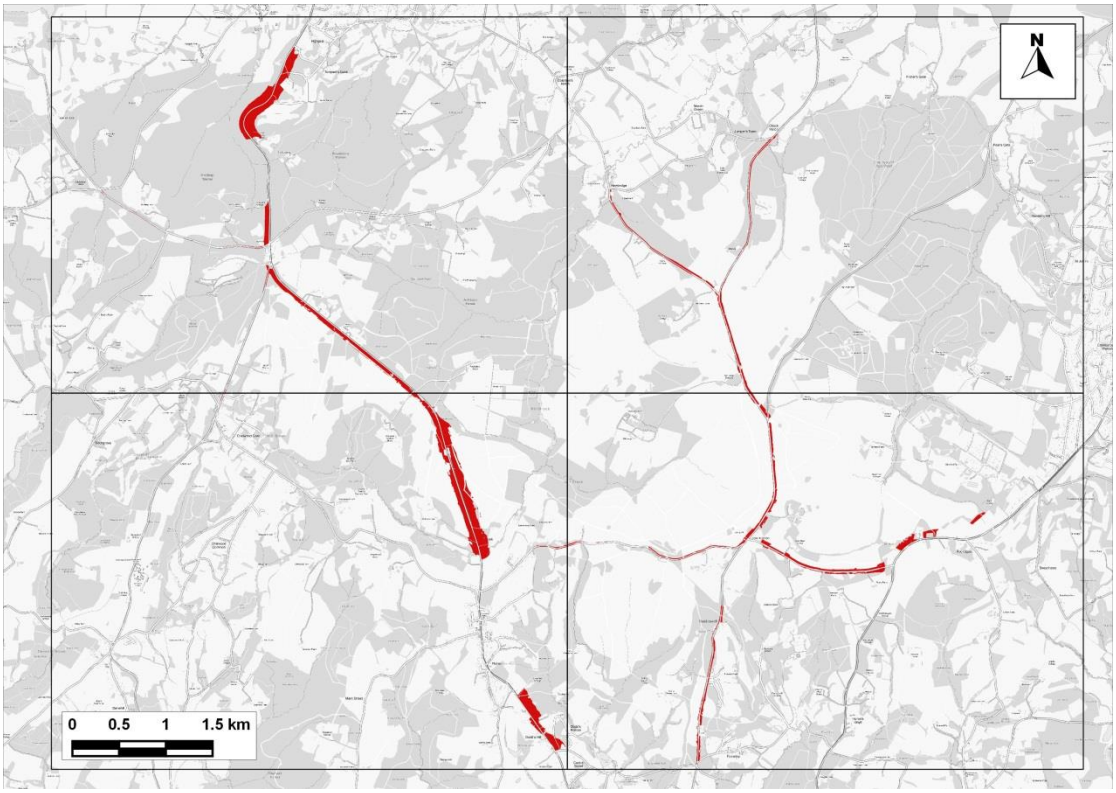


Figure 13.16: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (EA Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.29: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (EA Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	51.36	31.27	21.43
Bracken	3.23	1.60	0.07
Scattered Bracken	3.22	1.51	0.11
Dry Heath	2.11	0.51	0.00
Wet Heath	9.45	4.72	0.02
Grassland	0.68	0.17	0.01
Water	0.00	0.00	0.00
Bare Ground	0.10	0.00	0.00
Whole SAC	70.15	39.78	21.65

Table 13.30: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.03	3.2	0.01
Bracken	0.02	0.7	0.01
Scatt. Bracken	0.02	1.3	0.01
Dry Heath	0.01	1.9	0.01
Wet Heath	0.02	1.1	0.01
Grassland	0.01	1.0	0.01
Water	0.002	0.04	0.002
Bare Ground	0.004	0.2	0.002
Whole SAC	0.02	3.2	0.002

Table 13.31: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.06	0.00	-0.06
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06
12	14	-3.69	0.00	-5.40	0.00	0.00	-0.23	0.00	0.00	-9.32
14	16	3.65	0.00	4.80	-0.35	-0.26	0.22	0.00	0.00	8.07
16	18	0.04	0.00	0.55	0.26	0.21	0.01	0.00	0.00	1.06
18	20	0.00	0.00	0.04	0.07	0.03	0.00	0.00	0.00	0.13
20	22	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.04
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	-15.62	0.00	0.00	0.02	0.00	0.00	0.00	-15.59
26	28	0.00	11.94	0.00	0.00	0.00	0.00	0.00	0.00	11.94
28	30	0.00	2.64	0.00	0.00	0.00	0.00	0.00	0.00	2.64
30	32	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.62
32	34	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09
34	36	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
36	38	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
38	40	0.00	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	-0.08
40	-	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.36
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.32: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	164.19	592.95	156.03	111.43	77.85	36.78	4.83	0.05	1144.10
	0.3	20.81	167.59	49.77	24.99	18.48	6.96	0.90	0.00	289.50
	0.5	7.97	106.61	24.54	10.97	10.16	3.06	0.45	0.00	163.76
	1	2.11	51.36	9.45	3.23	3.22	0.68	0.10	0.00	70.15
	3	0.00	11.26	1.35	0.25	0.34	0.06	0.00	0.00	13.26
	5	0.00	4.27	0.18	0.06	0.18	0.03	0.00	0.00	4.71
	10	0.00	2.01	0.00	0.00	0.05	0.00	0.00	0.00	2.06
15 kg-N/ha/yr	0.1	75.30	385.37	102.82	61.63	45.88	18.50	2.60	0.02	692.12
	0.3	9.66	117.99	28.33	13.07	11.37	3.63	0.52	0.00	184.58
	0.5	3.93	69.90	13.76	5.53	5.48	1.43	0.23	0.00	100.26
	1	0.67	31.27	5.36	1.60	1.51	0.36	0.01	0.00	40.78
	3	0.00	5.15	0.36	0.08	0.21	0.03	0.00	0.00	5.83
	5	0.00	2.63	0.02	0.00	0.09	0.01	0.00	0.00	2.76
	10	0.00	1.16	0.00	0.00	0.00	0.00	0.00	0.00	1.16
20 kg-N/ha/yr	0.1	44.72	250.43	79.03	43.82	32.38	12.56	1.53	0.01	464.48
	0.3	5.78	88.37	19.16	8.27	7.99	2.28	0.34	0.00	132.20
	0.5	2.11	51.36	9.45	3.23	3.22	0.68	0.10	0.00	70.15
	1	0.25	21.43	3.31	0.82	0.81	0.22	0.00	0.00	26.84
	3	0.00	3.24	0.08	0.02	0.13	0.02	0.00	0.00	3.49
	5	0.00	2.01	0.00	0.00	0.05	0.00	0.00	0.00	2.06
	10	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Impacts of Plan on Nitrogen Deposition Under Emissions Scenario B (AQC Method)

13.54 Figure 13.17 shows the change in predicted nitrogen deposition caused by the Local Plan alone

under emissions scenario B and using the AQC deposition method[84]. The Local Plan will increase deposition fluxes across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted alongside the A22, Hindleap Lane, Crowborough Road, the B2026, the A26, Kidd's Hill, New Road, and the A275. Changes greater than 0.1 kg-N/ha/yr extend out approximately 110 m from the A22, 30 m from the A275, 8 m from Crowborough Road, 30 m from the B2026, 20 m from Kidd's Hill, 45 m from New Road, and 75 m from the A26.

13.55 Figure 13.18 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 13.18 is identical to the 0.1 kg-N/ha/yr contour described for Figure 13.17.

13.56 The areas shown in Figure 13.18 are also summarised in the first column of Table 13.33. This shows that 53.33 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load as a result of the Local Plan alone. Of this 53.33 ha, 45.16 ha are woodland, 4.74 ha are wet heath, and 0.49 ha is dry heath.

13.57 Table 13.34 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.02 kg-N/ha/yr, but the maximum predicted change to any location is 2.4 kg-N/ha/yr. The maximum predicted change to heath is an increase of 1.0 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.58 Table 13.35 shows how the distribution of deposition fluxes will change as a result of the Local Plan. 0.17 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. The Local Plan alone will result in an additional 0.26 ha experiencing fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load).

13.59 Table 13.36 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 53.33 ha of the SAC would experience an increase in deposition flux of more than 1% of the critical load, and also that 3.81 ha would experience a change of more than 5% of the critical load as a result of the Local Plan alone.

[84] Figure 13.17 and Figure 13.18 are accompanied by Figure A10.65 to Figure A10.68 in Appendix 10, which show the same results in more detail.

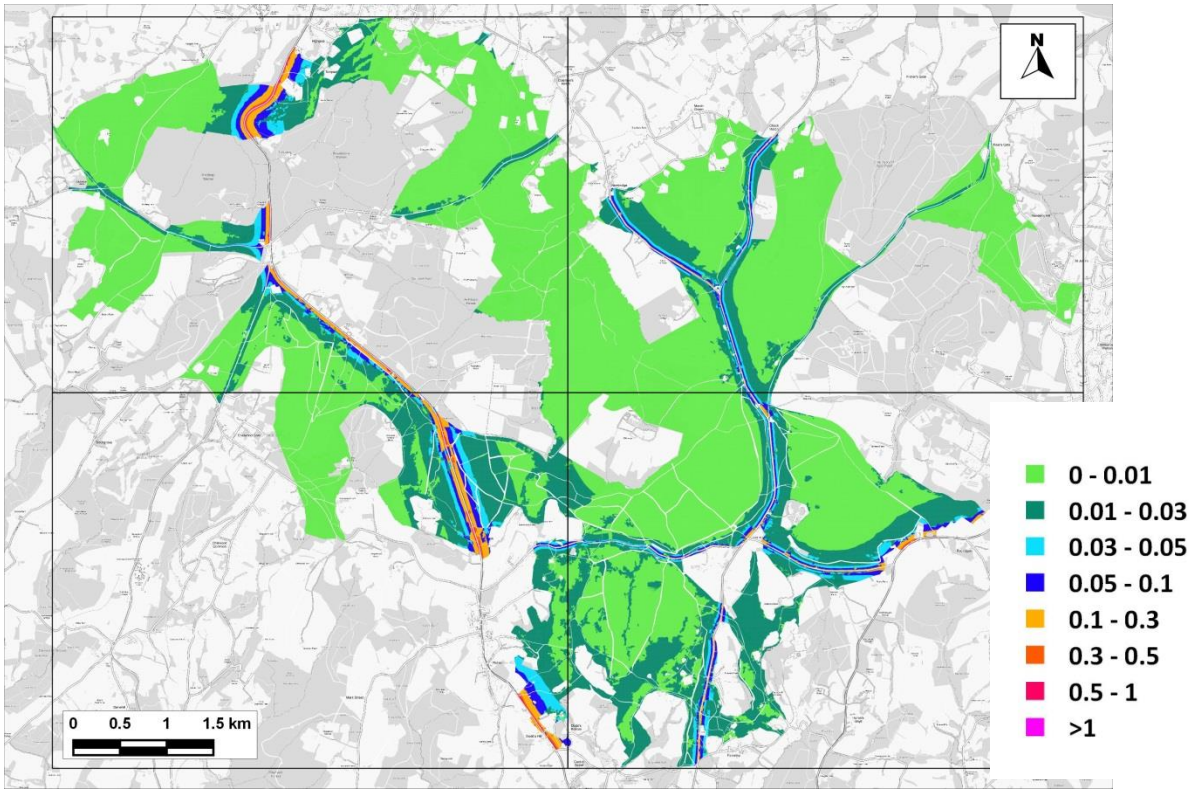


Figure 13.17: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario B (AQC Method) (kg-N/ha/yr)

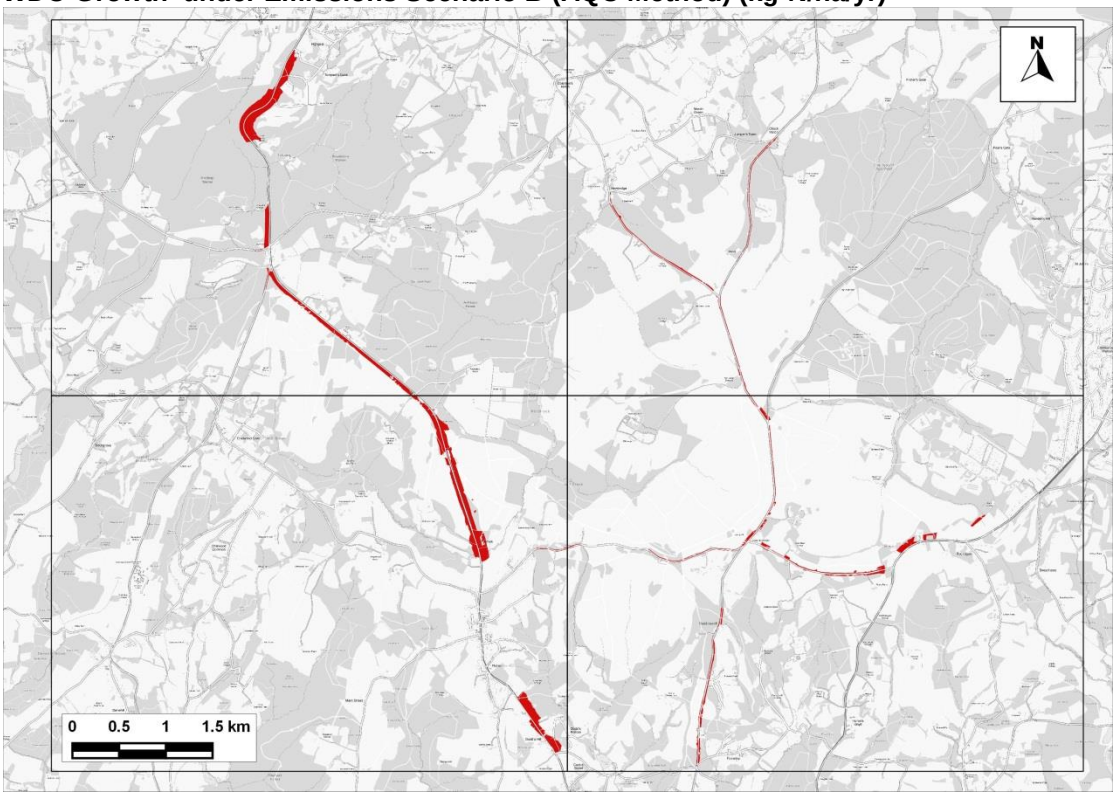


Figure 13.18: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (AQC Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.33: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario B (AQC Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	45.16	27.08	18.71
Bracken	1.21	0.40	0.00
Scattered Bracken	1.09	0.39	0.00
Dry Heath	0.49	0.00	0.00
Wet Heath	4.74	0.75	0.00
Grassland	0.37	0.04	0.00
Water	0.00	0.00	0.00
Bare Ground	0.27	0.00	0.00
Whole SAC	53.33	28.66	18.71

Table 13.34: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing With Plan to No WDC-Growth Scenarios under Emissions Scenario B (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.02	2.4	0.01
Bracken	0.01	0.4	0.01
Scatt. Bracken	0.01	0.7	0.01
Dry Heath	0.01	1.0	0.01
Wet Heath	0.02	0.6	0.01
Grassland	0.01	0.7	0.01
Water	0.002	0.1	0.003
Bare Ground	0.005	0.2	0.003
Whole SAC	0.02	2.4	0.003

Table 13.35: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.16	-0.01	-0.17
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.01	0.17
12	14	-0.14	0.00	-0.71	-0.82	-0.83	-0.04	0.00	0.00	-2.55
14	16	0.14	0.00	0.67	0.79	0.80	0.03	0.00	0.00	2.44
16	18	0.00	0.00	0.04	0.02	0.01	0.00	0.00	0.00	0.07
18	20	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.04
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	-12.22	0.00	0.00	0.00	0.00	0.00	0.00	-12.22
26	28	0.00	9.67	0.00	0.00	0.00	0.00	0.00	0.00	9.67
28	30	0.00	1.78	0.00	0.00	0.00	0.00	0.00	0.00	1.78
30	32	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.41
32	34	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
34	36	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
36	38	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
38	40	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
40	-	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.26
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.01	0.17

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.36: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario B (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	65.36	520.05	95.14	49.56	35.21	18.40	6.96	0.07	790.75
	0.3	8.28	149.52	25.20	10.00	9.45	3.65	1.42	0.01	207.53
	0.5	3.28	93.41	12.22	4.14	4.07	1.43	0.73	0.00	119.27
	1	0.49	45.16	4.74	1.21	1.09	0.37	0.27	0.00	53.33
	3	0.00	9.39	0.24	0.05	0.17	0.03	0.00	0.00	9.88
	5	0.00	3.71	0.02	0.00	0.07	0.01	0.00	0.00	3.81
	10	0.00	1.65	0.00	0.00	0.00	0.00	0.00	0.00	1.65
15 kg-N/ha/yr	0.1	30.98	300.06	62.58	29.20	20.72	10.74	4.56	0.04	458.89
	0.3	4.01	103.99	14.33	5.08	4.96	1.78	0.83	0.00	134.97
	0.5	1.25	61.36	7.46	2.09	2.06	0.54	0.42	0.00	75.18
	1	0.07	27.08	2.37	0.44	0.41	0.16	0.08	0.00	30.62
	3	0.00	4.44	0.03	0.00	0.09	0.01	0.00	0.00	4.57
	5	0.00	2.30	0.00	0.00	0.00	0.00	0.00	0.00	2.30
	10	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.65
20 kg-N/ha/yr	0.1	17.41	213.98	43.92	19.46	14.45	6.93	2.93	0.03	319.10
	0.3	2.21	77.84	9.83	3.02	2.98	0.91	0.56	0.00	97.35
	0.5	0.49	45.16	4.74	1.21	1.09	0.37	0.27	0.00	53.33
	1	0.00	18.71	1.19	0.18	0.28	0.07	0.00	0.00	20.44
	3	0.00	2.85	0.00	0.00	0.03	0.00	0.00	0.00	2.89
	5	0.00	1.65	0.00	0.00	0.00	0.00	0.00	0.00	1.65
	10	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.19

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Emissions Scenario C

Impacts of Plan on Annual Mean NOx – Emissions Scenario C

13.60 Figure 13.19 shows the change in predicted annual mean NOx concentrations caused by the Local

Plan alone under NOx emissions scenario C[85]. The Local Plan will increase annual mean NOx concentrations across the entire SAC; but over most of the area, the predicted changes are very small. Changes greater than 0.3 μg/m^3 (which represents 1% of the 30 μg/m^3 critical level) are predicted to extend out approximately 100 m from the A22, 20 m from the B2026, 60 m from the A26, and 25 m from New Road.

13.61 Figure 13.20 shows the area over which a change of more than 0.3 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 30 μg/m^3 critical level. Exceedences of both the critical level and the 1% criterion are predicted to extend out approximately 3 m from the A22 and 1 m from the A26. Exceedences are not predicted alongside other modelled roads.

13.62 The areas shown in Figure 13.20 are also summarised in the middle column of Table 13.37. This shows that 0.09 ha (900 m^2) of the SAC is predicted to experience both an exceedence of the 30 μg/m^3 critical level and also an increase of more than 1% of this critical level as a result of the Local Plan. All of this is woodland. Table 13.21 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 6.28 ha would experience both an exceedence of 15 μg/m^3 as a total concentration and also a change of more than 1% of this value as a result of the local plan. For the upper-bound level, none of the SAC would be thus affected.

13.63 Table 13.38 shows the average, maximum, and minimum changes in predicted annual mean NOx concentrations to the various habitats. It shows, for example, that the average predicted change in NOx concentrations to the SAC as a whole is 0.06 μg/m^3, but the maximum predicted change to any one location is 3.49 μg/m^3, with the maximum change to heath being 3.47 μg/m^3. Both of these maxima are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.64 Table 13.39 shows how the concentration distribution will change across the SAC as a result of the Local Plan. It shows, for example, that 179 ha of the SAC will be moved from experiencing concentrations below 8 μg/m^3 to above this level. An additional 0.07 ha (700 m^2) of the SAC will be caused to exceed the critical level as a result of the Local Plan alone under this emissions scenario.

13.65 Table 13.40 shows the area-wide changes in predicted concentrations in a different way. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage increase. This shows that 56.04 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 30 μg/m^3 criterion. 2.14 ha are predicted to experience an increase of at least 5% of this critical level as a result of the Local Plan alone.

[85] Figure 13.19 and Figure 13.20 are accompanied by Figure A10.73 to Figure A10.80 in Appendix 10, which show the same results in more detail.

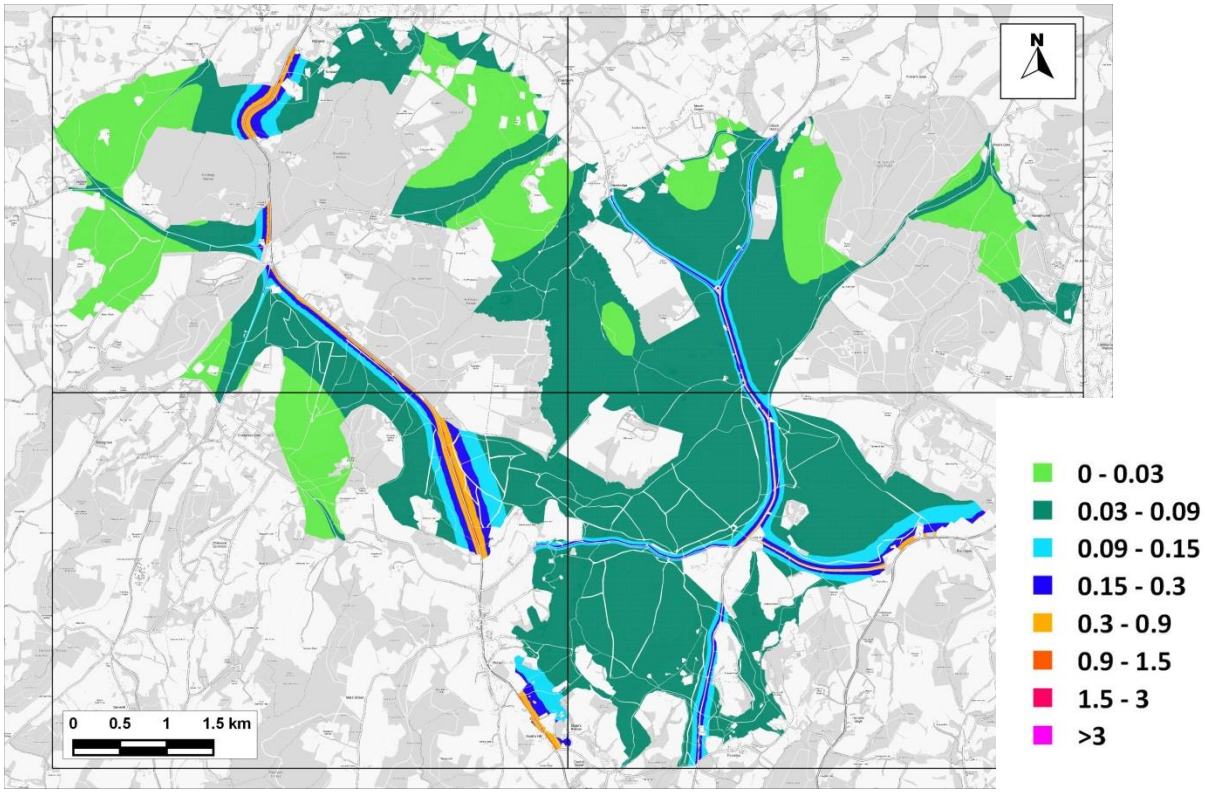


Figure 13.19: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No WDC-Growth' Under Emissions Scenario C (μg/m^3)

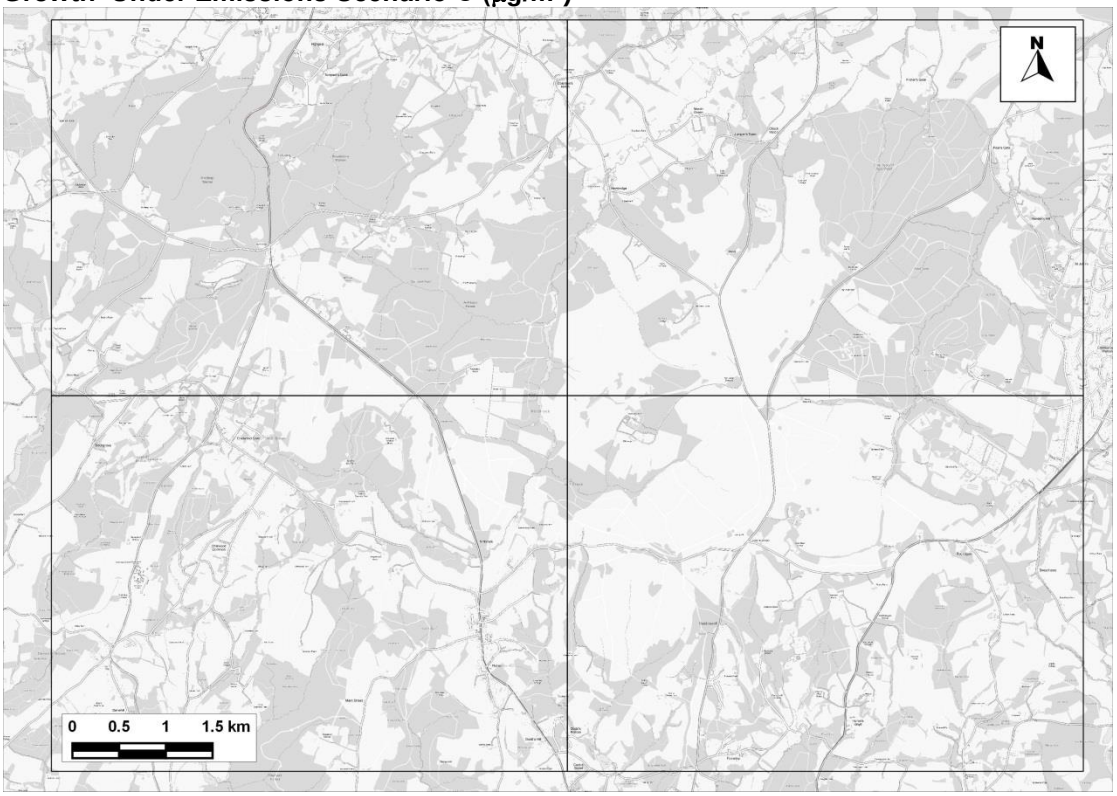


Figure 13.20: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.37: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (hectares)

Land Use	15 µg/m^3 Assessment Level	30 µg/m^3 Critical Level	45 µg/m^3 Assessment Level
Woodland	4.39	0.09	0.00
Bracken	0.31	0.00	0.00
Scattered Bracken	0.21	0.00	0.00
Dry Heath	0.01	0.00	0.00
Wet Heath	0.78	0.00	0.00
Grassland	0.06	0.00	0.00
Water	0.00	0.00	0.00
Bare Ground	0.53	0.00	0.00
Whole SAC	6.28	0.09	0.00

Table 13.38: Impacts of Plan on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C

Land Use	µg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.06	3.49	0.01
Bracken	0.06	1.50	0.02
Scatt. Bracken	0.06	2.12	0.01
Dry Heath	0.05	3.47	0.01
Wet Heath	0.09	2.32	0.02
Grassland	0.06	2.05	0.01
Water	0.04	0.87	0.01
Bare Ground	0.09	2.96	0.02
Whole SAC	0.06	3.49	0.01

Table 13.39: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	-68.65	-62.14	-12.64	-13.80	-10.67	-6.51	-4.92	-0.20	-179.54
8	10	67.88	55.36	10.48	12.88	9.90	6.22	4.34	0.20	167.26
10	12	0.59	4.03	1.17	0.65	0.60	0.19	0.23	0.00	7.47
12	14	0.17	1.62	0.44	0.17	0.11	0.09	0.19	0.00	2.79
14	18	0.00	0.66	0.49	0.08	0.02	0.01	0.09	0.00	1.36
18	20	0.00	0.03	0.03	0.02	0.01	0.00	-0.01	0.00	0.10
20	25	0.00	0.10	0.02	0.01	0.03	0.00	0.04	0.00	0.20
25	30	0.00	0.26	0.00	0.00	0.00	0.00	0.03	0.00	0.29
30	35	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
35	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >30		0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.40: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	527.79	807.62	224.27	195.16	131.59	72.76	53.06	4.69	2016.93
	0.5	94.94	273.49	116.74	62.77	40.23	26.40	23.63	0.66	638.87
	1	15.21	100.95	40.29	18.58	13.00	5.73	9.35	0.15	203.26
	3	0.57	16.84	5.10	0.99	0.91	0.41	1.48	0.01	26.31
	5	0.01	5.57	1.82	0.25	0.32	0.08	0.74	0.00	8.79
	10	0.00	1.75	0.06	0.00	0.08	0.02	0.23	0.00	2.14
30 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	94.94	273.49	116.74	62.77	40.23	26.40	23.63	0.66	638.87
	0.5	15.21	100.95	40.29	18.58	13.00	5.73	9.35	0.15	203.26
	1	2.36	33.79	10.08	2.73	2.80	1.04	3.19	0.03	56.04
	3	0.00	3.80	1.03	0.15	0.25	0.05	0.55	0.00	5.84
	5	0.00	1.75	0.06	0.00	0.08	0.02	0.23	0.00	2.14
	10	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.15
45 µg/m^3	0.1	527.79	807.62	224.27	195.16	131.59	72.76	53.06	4.69	2016.93
	0.3	15.21	100.95	40.29	18.58	13.00	5.73	9.35	0.15	203.26
	0.5	4.08	47.22	15.18	4.91	4.94	1.90	4.87	0.06	83.16
	1	0.57	16.84	5.10	0.99	0.91	0.41	1.48	0.01	26.31
	3	0.00	2.03	0.11	0.02	0.11	0.02	0.29	0.00	2.59
	5	0.00	0.64	0.00	0.00	0.00	0.00	0.05	0.00	0.68
	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

Impacts of Plan on 24-hour Mean NOx under Emissions Scenario C

13.66 Figure 13.21 shows the change in predicted maximum 24-hour mean NOx concentrations caused

by the Local Plan alone under NOx emissions scenario C[86]. The Local Plan is predicted to increase concentrations across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 7.5 μg/m^3 (which represents 10% of the 75 μg/m^3 critical level) are predicted alongside the A22 (out approximately 10 m from the kerb) and A26 (out approximately 1 m from the kerb), but not alongside any other modelled roads.

13.67 Figure 13.22 shows the area over which there is both a change of more than 7.5 μg/m^3 and also a predicted exceedence (in the With Plan scenario) of the critical level. In practice, since the footprint of exceedences of the critical level is larger than the footprint over which there will be a change greater than 10% of the critical level, the area shown in Figure 13.22 is identical to the area shown in orange in Figure 13.21. These areas are then summarised again in Table 13.41, which shows that the parts of the SAC highlighted red in Figure 13.22 cover a total of 2.87 ha, of which 2.19 ha are woodland, and 0.17 ha (1,700 m^2) is heath.

13.68 Table 13.42 shows the average, maximum, and minimum changes in predicted maximum 24-hour NOx concentrations to the various habitats. It shows, for example, that the maximum predicted change in maximum 24-hour NOx concentrations to any one location is 17.5 μg/m^3, with the maximum predicted change to heath being 17.4 μg/m^3. Both of these values represent individual locations at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.69 Table 13.43 shows how the concentration distribution will change across the SAC as a result of the Local Plan. 71.05 ha will move from experiencing concentrations below 60 μg/m^3, and an additional 0.54 ha will begin experiencing concentrations between 150 and 200 μg/m^3 as a result of the Plan alone. The Local Plan alone will cause an additional 10.59 ha of the SAC to exceed the critical level, of which 0.54 ha is dry heath, and 2.00 ha are wet heath.

13.70 Table 13.44 shows the area-wide changes in predicted concentrations in a different way. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. This summarises the change in concentration that would be expected over different areas. It shows, for example, that 2.87 ha will experience an increase in 24-hour mean NOx of at least 10% of the critical level, while 41.33 ha will experience an increase of at least 3% of the critical level.

[86] Figure 13.21 and Figure 13.22 are accompanied by Figure A10.81 to Figure A10.88 in Appendix 10, which show the same results in more detail.

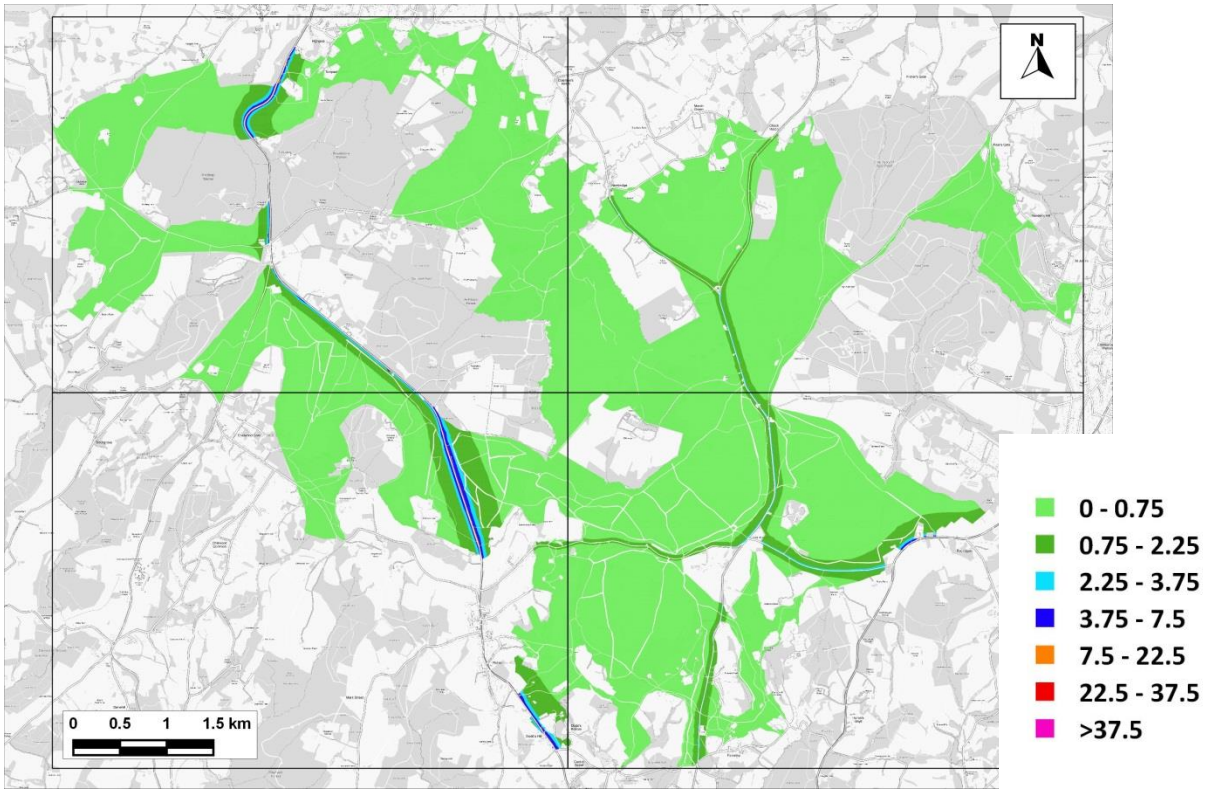


Figure 13.21: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario C (μg/m^3)

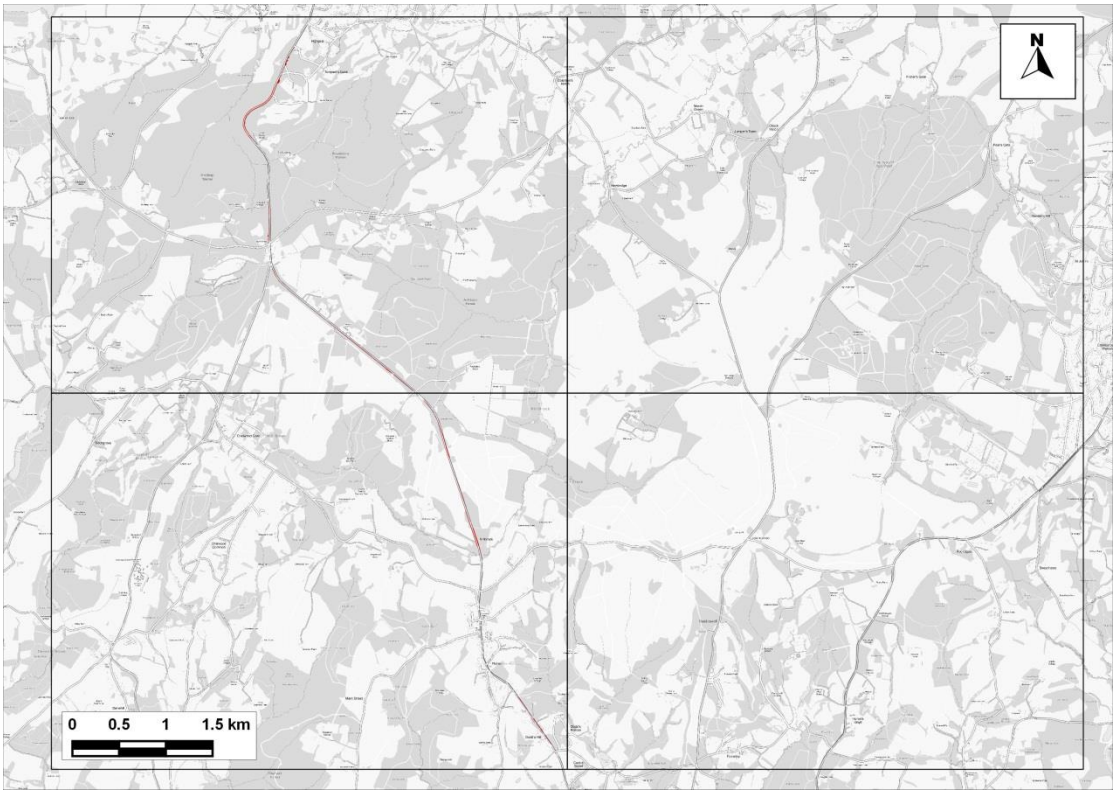


Figure 13.22: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.41: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (hectares)

Land Use	75 μg/m^3 Critical Level
Woodland	2.19
Bracken	0.03
Scattered Bracken	0.13
Dry Heath	0.00
Wet Heath	0.17
Grassland	0.02
Water	0.00
Bare Ground	0.33
Whole SAC	2.87

Table 13.42: Impacts of Plan on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.45	17.5	0.10
Bracken	0.43	8.9	0.13
Scattered Bracken	0.42	11.7	0.11
Dry Heath	0.35	17.4	0.11
Wet Heath	0.61	12.5	0.16
Grassland	0.42	11.2	0.10
Water	0.32	5.5	0.11
Bare Ground	0.60	15.2	0.11
Whole SAC	0.44	17.5	0.10

Table 13.43: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	-15.23	-25.28	-13.76	-5.67	-6.68	-2.43	-1.96	-0.05	-71.05
60	65	12.19	14.09	8.29	2.39	4.75	1.56	1.32	0.03	44.63
65	75	2.49	5.18	3.47	2.65	1.17	0.72	0.13	0.02	15.83
75	85	0.37	2.79	1.03	0.31	0.55	0.05	0.17	0.00	5.26
85	100	0.17	2.12	0.41	0.20	0.14	0.09	0.18	0.00	3.32
100	125	0.00	0.65	0.50	0.08	0.02	0.01	0.09	0.00	1.36
125	150	0.00	0.01	0.05	0.02	0.02	0.00	-0.01	0.00	0.10
150	200	0.00	0.44	0.01	0.01	0.02	0.01	0.07	0.00	0.54
200	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
All >75		0.54	6.01	2.00	0.62	0.75	0.15	0.51	0.01	10.59

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.44: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 $\mu g/m^3$	1	23.07	122.48	52.00	25.32	15.94	7.82	10.74	0.19	257.56
	3	1.38	25.69	7.77	1.64	2.00	0.63	2.20	0.02	41.33
	5	0.16	9.37	3.04	0.40	0.44	0.23	0.99	0.00	14.62
	10	0.00	2.19	0.17	0.03	0.13	0.02	0.33	0.00	2.87
	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Impacts of Plan on Annual Mean NH_3

13.71 There is no traffic-related NH_3 emissions Scenario C

Impacts of Plan on Nitrogen Deposition under Emissions Scenario C (EA Method)

13.72 Figure 13.23 shows the change in predicted nitrogen deposition caused by the Local Plan alone

under emissions scenario C and using the EA deposition method[87]. The Local Plan will increase deposition fluxes across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted out to approximately 85 m from the A22, 7 m Crowborough Road, 30 m from the B2026, 25 m from Kidd's Hill, 30 m from New Road, and 60 m from the A26.

13.73 Figure 13.24 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 13.24 is identical to the 0.1 kg-N/ha/yr contour described for Figure 13.23.

13.74 The areas shown in Figure 13.24 are also summarised in the first column of Table 13.45. This shows that 54.53 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load as a result of the Local Plan alone. Of this 54.53 ha, 41.95 ha are woodland, 6.77 ha are wet heath, and 1.07 ha is dry heath.

13.75 Table 13.46 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.02 kg-N/ha/yr, but the maximum predicted change to any one location is 2.6 kg-N/ha/yr. The maximum predicted change to heath is an increase of 1.4 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.76 Table 13.47 shows how the distribution of deposition fluxes will change as a result of the Local Plan. 0.01 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. The Local Plan alone will result in an additional 0.25 ha experiencing fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load).

13.77 Table 13.48 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 54.53 ha of the SAC would experience an increase in deposition flux of more than 1% of the critical load, and also that 3.61 ha would experience a change of more than 5% of the critical load as a result of the Local Plan alone.

[87] Figure 13.23 and Figure 13.24 are accompanied by Figure A10.89 to Figure A10.96 in Appendix 10, which show the same results in more detail.

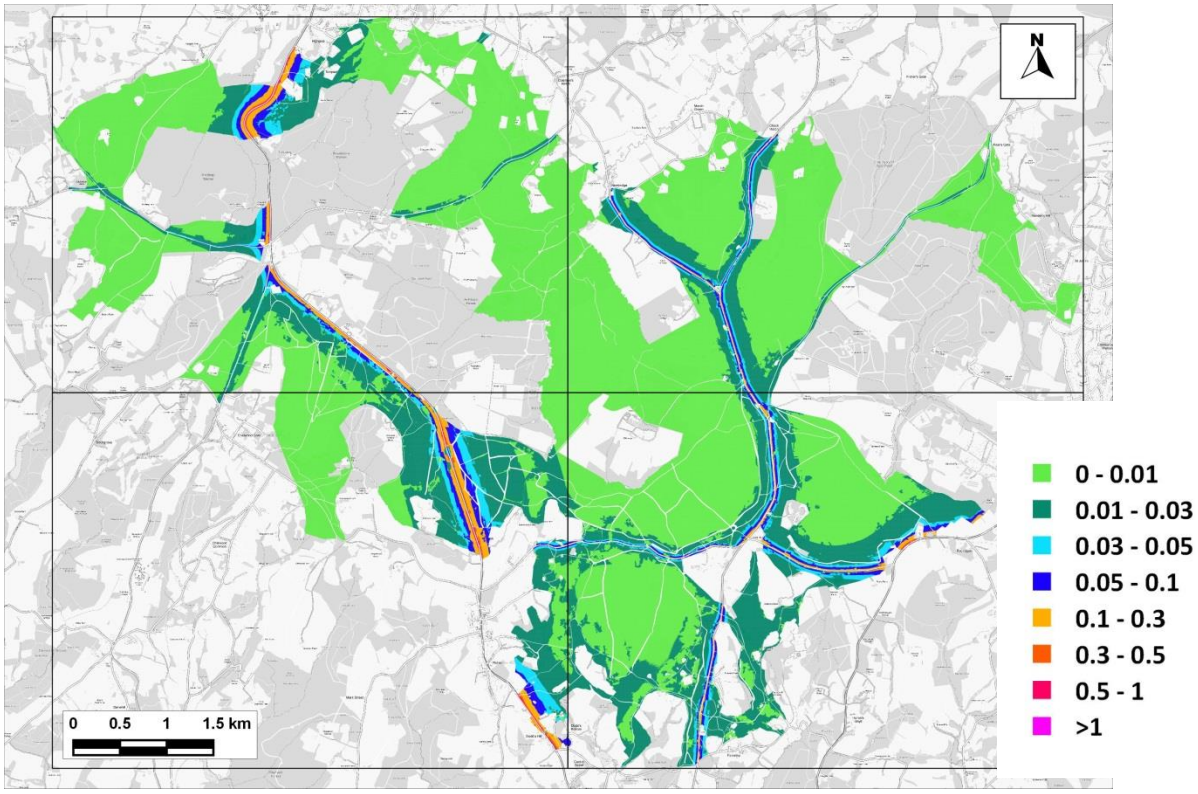


Figure 13.23: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' Under Emission Scenario C (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

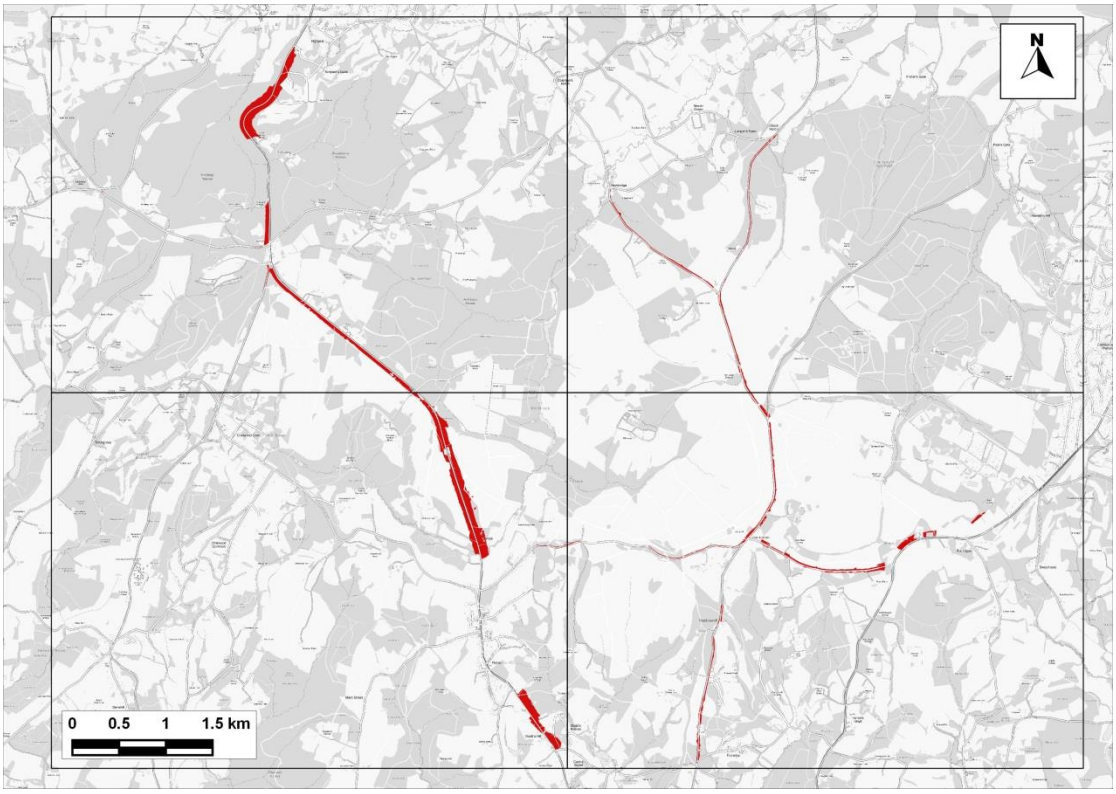


Figure 13.24: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (EA Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.45: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (EA Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	41.95	24.95	16.83
Bracken	2.13	0.94	0.02
Scattered Bracken	2.12	0.89	0.08
Dry Heath	1.07	0.14	0.00
Wet Heath	6.77	2.55	0.00
Grassland	0.47	0.06	0.00
Water	0.00	0.00	0.00
Bare Ground	0.02	0.00	0.00
Whole SAC	54.53	29.54	16.93

Table 13.46: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.02	2.6	0.01
Bracken	0.01	0.6	0.01
Scatt. Bracken	0.01	1.0	0.01
Dry Heath	0.01	1.4	0.01
Wet Heath	0.02	0.9	0.01
Grassland	0.01	0.8	0.01
Water	0.001	0.03	0.001
Bare Ground	0.003	0.1	0.002
Whole SAC	0.02	2.6	0.002

Table 13.47: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
12	14	-0.69	0.00	-1.63	-1.59	-1.35	-0.08	0.00	0.00	-5.34
14	16	0.68	0.00	1.38	1.42	1.20	0.07	0.00	0.00	4.74
16	18	0.01	0.00	0.23	0.15	0.13	0.01	0.00	0.00	0.52
18	20	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.04
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
22	24	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
24	26	0.00	-7.79	0.00	0.00	0.00	0.00	0.00	0.00	-7.79
26	28	0.00	5.72	0.00	0.00	0.00	0.00	0.00	0.00	5.72
28	30	0.00	1.60	0.00	0.00	0.00	0.00	0.00	0.00	1.60
30	32	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.17
32	34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	38	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
38	40	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
40	-	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.48: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	88.58	472.06	114.16	69.17	51.35	20.51	3.31	0.03	819.17
	0.3	12.07	140.19	34.23	16.03	13.11	4.39	0.65	0.00	220.67
	0.5	5.02	87.11	17.10	7.12	6.99	1.89	0.33	0.00	125.56
	1	1.07	41.95	6.77	2.13	2.12	0.47	0.02	0.00	54.53
	3	0.00	8.29	0.70	0.14	0.26	0.04	0.00	0.00	9.44
	5	0.00	3.39	0.06	0.02	0.12	0.02	0.00	0.00	3.61
	10	0.00	1.69	0.00	0.00	0.00	0.00	0.00	0.00	1.69
15 kg-N/ha/yr	0.1	44.01	265.46	78.60	43.45	32.01	12.44	1.65	0.01	477.64
	0.3	5.96	96.76	19.65	8.56	8.21	2.33	0.37	0.00	141.84
	0.5	2.25	57.17	9.77	3.39	3.40	0.70	0.14	0.00	76.82
	1	0.29	24.95	3.54	0.94	0.89	0.23	0.00	0.00	30.85
	3	0.00	4.00	0.10	0.03	0.15	0.02	0.00	0.00	4.29
	5	0.00	2.30	0.00	0.00	0.06	0.00	0.00	0.00	2.36
	10	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.72
20 kg-N/ha/yr	0.1	26.69	197.92	57.41	29.23	21.98	8.33	1.06	0.01	342.63
	0.3	3.60	72.42	12.98	5.16	5.11	1.28	0.23	0.00	100.78
	0.5	1.07	41.95	6.77	2.13	2.12	0.47	0.02	0.00	54.53
	1	0.03	16.83	2.04	0.45	0.44	0.09	0.00	0.00	19.88
	3	0.00	2.79	0.02	0.00	0.09	0.01	0.00	0.00	2.92
	5	0.00	1.69	0.00	0.00	0.00	0.00	0.00	0.00	1.69
	10	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Impacts of Plan on Nitrogen Deposition Under Emissions Scenario C (AQC Method)

13.78 Figure 13.25 shows the change in predicted nitrogen deposition caused by the Local Plan alone

under emissions scenario C and using the AQC deposition method[88]. The Local Plan will increase deposition fluxes across the entire SAC, but over most of the area, the predicted changes are very small. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted out to approximately 80 m from the A22, 25 m from the A275, 7 m from Crowborough Road, 20 m from the B2026, 18 m from Kidd's Hill, 35 m from New Road, and 55 m from the A26.

13.79 Figure 13.26 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 13.26 is identical to the 0.1 kg-N/ha/yr contour described for Figure 13.25.

13.80 The areas shown in Figure 13.26 are also summarised in the first column of Table 13.49. This shows that 44.11 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load as result of the Local Plan alone. Of this 44.11 ha, 38.05 ha are woodland, 3.68 ha are wet heath, and 0.30 ha is dry heath.

13.81 Table 13.50 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.01 kg-N/ha/yr, but the maximum predicted change to any one location is 2.2 kg-N/ha/yr. The maximum predicted change to heath is an increase of 0.9 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

13.82 Table 13.51 shows how the distribution of deposition fluxes will change as a result of the Local Plan. 0.05 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. The Local Plan alone will result in an additional 0.14 ha of the SAC experiencing fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load).

13.83 Table 13.52 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 25.09 ha of the SAC would experience an increase in deposition flux of more than 1% of the critical load, and also that 2.01 ha would experience a change of more than 5% of the critical load as a result of the Local Plan alone.

[88] Figure 13.25 and Figure 13.26 are accompanied by Figure A10.97 to Figure A10.100 in Appendix 10, which show the same results in more detail.

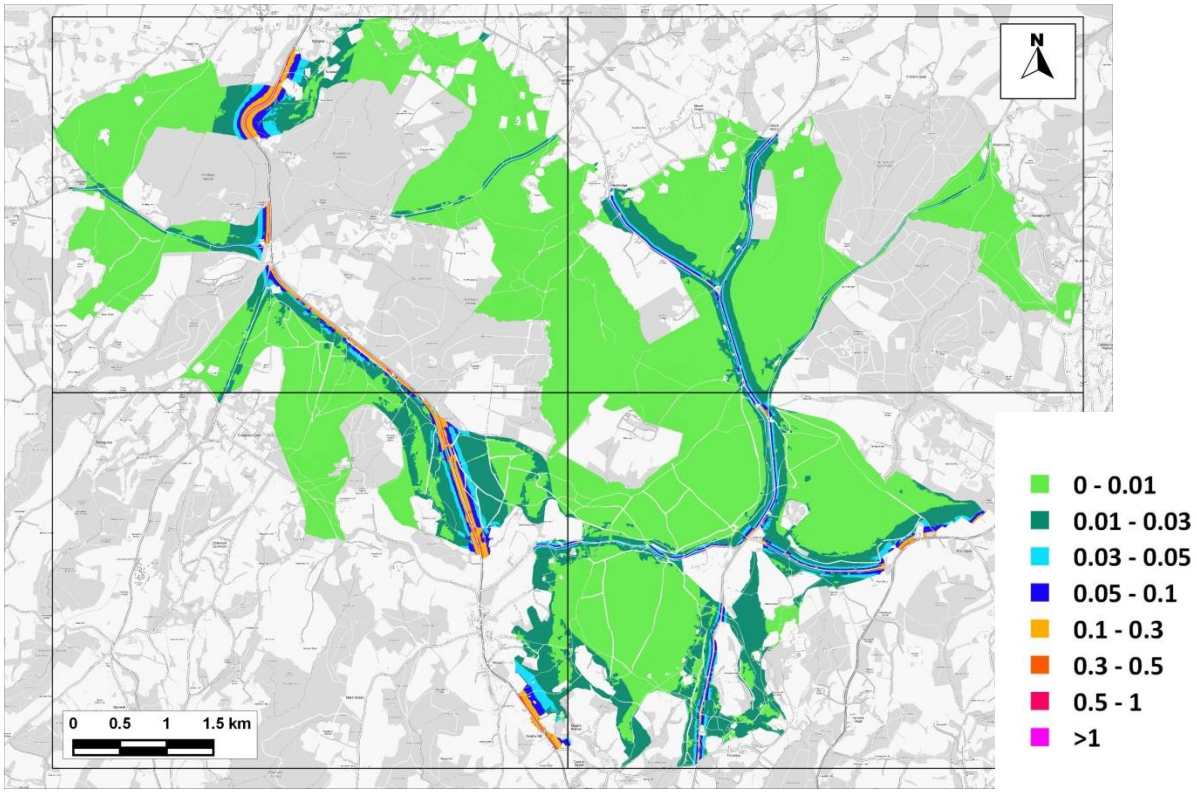


Figure 13.25: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No WDC-Growth' under Emissions Scenario C (AQC Method) (kg-N/ha/yr)

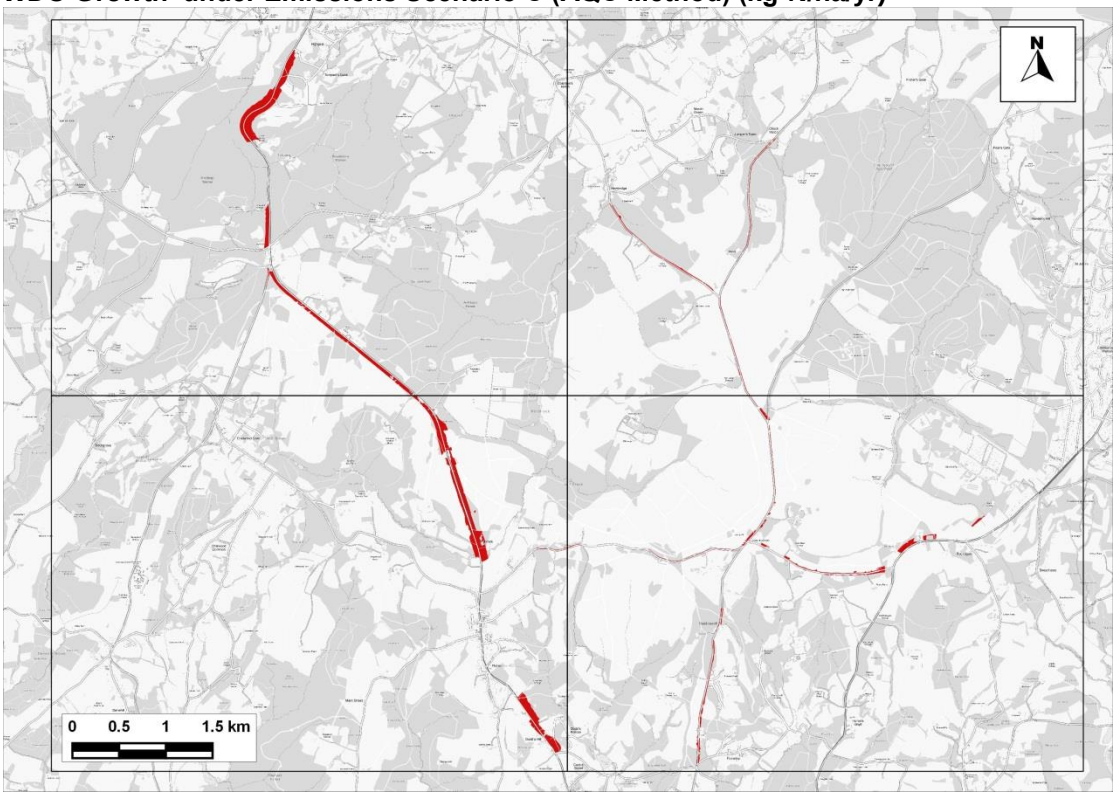


Figure 13.26: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (AQC Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 13.49: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (AQC Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	38.05	22.73	15.06
Bracken	0.84	0.19	0.00
Scattered Bracken	0.81	0.27	0.00
Dry Heath	0.30	0.00	0.00
Wet Heath	3.68	0.27	0.00
Grassland	0.28	0.02	0.00
Water	0.00	0.00	0.00
Bare Ground	0.14	0.00	0.00
Whole SAC	44.11	23.49	15.06

Table 13.50: Impacts of Plan on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No WDC-Growth' Scenarios under Emissions Scenario C (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.02	2.2	0.01
Bracken	0.01	0.4	0.01
Scatt. Bracken	0.01	0.6	0.01
Dry Heath	0.01	0.9	0.01
Wet Heath	0.01	0.6	0.01
Grassland	0.01	0.6	0.01
Water	0.002	0.05	0.002
Bare Ground	0.004	0.2	0.002
Whole SAC	0.01	2.2	0.002

Table 13.51: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.05	0.00	-0.05
10	12	0.00	0.00	0.00	0.00	0.00	-0.16	0.05	0.00	-0.11
12	14	-0.01	0.00	-0.52	-0.27	-0.36	0.16	0.00	0.00	-1.00
14	16	0.01	0.00	0.50	0.25	0.33	0.00	0.00	0.00	1.10
16	18	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.04
18	20	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	-4.72	0.00	0.00	0.00	0.00	0.00	0.00	-4.72
26	28	0.00	3.56	0.00	0.00	0.00	0.00	0.00	0.00	3.56
28	30	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.78
30	32	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
32	34	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
34	36	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
36	38	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
38	40	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
40	-	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.14
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.05

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 13.52: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No WDC-Growth' Scenarios Under Emissions Scenario C (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	42.37	403.91	76.69	39.46	27.24	13.33	5.11	0.05	608.15
	0.3	5.87	127.36	19.49	7.71	7.44	2.57	0.95	0.00	171.39
	0.5	2.23	78.91	9.88	3.14	3.12	0.85	0.50	0.00	98.63
	1	0.30	38.05	3.68	0.84	0.81	0.28	0.14	0.00	44.11
	3	0.00	7.25	0.12	0.03	0.14	0.02	0.00	0.00	7.56
	5	0.00	3.03	0.00	0.00	0.05	0.00	0.00	0.00	3.09
	10	0.00	1.38	0.00	0.00	0.00	0.00	0.00	0.00	1.38
15 kg-N/ha/yr	0.1	20.46	232.36	48.53	22.30	16.23	7.51	2.90	0.03	350.32
	0.3	2.81	87.43	11.13	3.71	3.73	1.12	0.57	0.00	110.49
	0.5	0.75	52.00	5.84	1.59	1.51	0.44	0.28	0.00	62.40
	1	0.00	22.73	1.67	0.26	0.34	0.08	0.00	0.00	25.09
	3	0.00	3.58	0.01	0.00	0.06	0.01	0.00	0.00	3.66
	5	0.00	2.01	0.00	0.00	0.00	0.00	0.00	0.00	2.01
	10	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.46
20 kg-N/ha/yr	0.1	11.95	178.44	33.46	14.28	11.97	4.81	1.72	0.01	256.64
	0.3	1.40	65.51	7.95	2.38	2.35	0.56	0.38	0.00	80.52
	0.5	0.30	38.05	3.68	0.84	0.81	0.28	0.14	0.00	44.11
	1	0.00	15.06	0.78	0.13	0.25	0.04	0.00	0.00	16.27
	3	0.00	2.54	0.00	0.00	0.01	0.00	0.00	0.00	2.55
	5	0.00	1.38	0.00	0.00	0.00	0.00	0.00	0.00	1.38
	10	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Chapter Summary

13.84 The changes that would be caused by the Wealden Local Plan in isolation have been derived by comparing the results of the 'With Plan' scenario against those from the 'No WDC-growth' scenario. For NOx and nitrogen deposition, results are presented for emissions scenarios A, B and C. For

ammonia concentrations, results are presented for scenario A only. The results are presented as changes in both concentrations and deposition fluxes, as well as changes in relation to different percentages of the critical level or critical load (from 0.1% to 10% for annual mean values and from 1% to 50% for 24-hour means).

Annual Mean NOx

13.85 The Local Plan alone will increase annual mean NOx concentrations across the entire SAC; but over most of the area, the predicted increases are very small (average predicted changes over the SAC as a whole are 0.15, 0.09, and 0.06 μg/m^3 in emissions scenarios A, B, and C respectively). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan. The biggest increases are predicted close to roads; with the largest predicted increases being 8.2, 5.2, and 3.5 μg/m^3 in scenarios A, B, and C respectively. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical level, and the total areas predicted to experience this change are 222, 105, and 56 ha in emissions scenarios A, B, and C respectively. When these areas are restricted to include only the region where the critical level will also be exceeded, they reduce to 8.1, 1.1, and 0.09 ha in emissions scenarios A, B, and C respectively. The area of SAC exceeding the critical level is predicted to increase by 1.4, 0.5, and 0.07 ha as a result of the Local Plan in scenarios A, B, and C respectively. In emissions scenario C, there would be no exceedence of the critical level without the Plan, but an exceedence is predicted with the Plan.

24-hour NOx

13.86 As with annual mean NOx, the Local Plan alone will increase concentrations across the entire SAC; but over most of the area, the predicted increases are very small (average predicted increases over the SAC as a whole are 0.9, 0.7, and 0.4 μg/m^3 in scenarios A, B, and C respectively). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan. The biggest increases are predicted close to roads; with the largest predicted increases being 29, 23, and 18 μg/m^3 in scenarios A, B, and C respectively. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 10% of the critical level, and the total areas predicted to experience this change are 12.1, 6.4, and 2.9 ha in emissions scenarios A, B, and C respectively. These increases (>10% of the critical level) are all predicted in areas where the critical level will also be exceeded. The area exceeding the critical level is predicted to increase by 18.4 and 10.6 ha in scenarios B and C respectively. The area of exceedence is only not predicted to change in emissions scenario A because the entire SAC is already predicted to exceed without the Plan.

Annual Mean NH_3

13.87 As with NOx, the Local Plan alone will increase concentrations across the entire SAC; but over most of the area, the predicted increases are very small (the average predicted change over the SAC as a whole is 0.001 μg/m^3). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan. The biggest increases are predicted close to roads; with the largest predicted change being 0.17 μg/m^3. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical level, and the total area predicted to experience this change is 41.1 ha. When this area is restricted to include only the region where the critical level will also be exceeded, it reduces to 4.6 ha. When the lower-bound to the critical level uncertainty range is considered, this area increases to 15.6 ha. The area exceeding the 1 μg/m^3 critical level is predicted to increase by 0.7 ha as a result of the Wealden Local Plan.

Nitrogen Deposition

13.88 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). The 10 kg-N/ha/yr critical load is predicted to be exceeded over almost the entire SAC either without or with the Local Plan. The Local Plan will increase deposition fluxes across the entire SAC; but over most of the area, the predicted increases are very small. These SAC-wide increases will alter the predicted deposition at all locations, meaning that the total area falling within different deposition bands will change, and the maximum predicted fluxes will increase. as a result of the Plan. The biggest increases are predicted close to roads; with the largest increase (4.1 kg-N/ha/yr) predicted to woodland in emissions scenario A and the EA deposition method. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical load, and the total areas predicted to experience this change are 101.7, 70.2, and 54.5 ha for emissions scenarios A, B, and C respectively using the EA deposition method and 70.4, 53.3, and 44.1 ha for scenarios A, B, and C using the AQC deposition method.

14 Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth

14.1 This section sets out the predicted changes in concentrations and fluxes that would be caused by the Wealden Local Plan in combination with other predicted traffic growth. These comparisons have been derived by comparing the results of the 'With Plan' scenario against those from the 'No-growth' scenario for equivalent emissions scenarios. Results are presented for emissions scenarios A, B and C.

Emissions Scenario A

In Combination (Traffic) impacts on Annual Mean NOx – Emissions Scenario A

14.2 Figure 14.1 shows the change in predicted annual mean NOx concentrations caused by the Local Plan in combination with other projected traffic growth under NOx emissions scenario A[89]. Changes greater than 0.3 μg/m^3 (which represents 1% of the 30 μg/m^3 critical level) are predicted over the entire southeastern portion of the study area, as well as alongside all modelled roads. Changes greater than 3 μg/m^3 (10% of the critical level) are predicted alongside the A22, A26, A275, B2026, Kidd's Hill, New Road, Coleman's Hatch Road, Crowborough Road, and Hindleap Lane.

14.3 Figure 14.2 shows the area over which a change of more than 0.3 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 30 μg/m^3 critical level. In other words, Figure 13.2 shows all the areas where the orange contour from Figure 14.1 and the red contour from Figure 12.1 overlap one another. In practice, this is entirely limited by the extent of the 30 μg/m^3 contour from Figure 12.1 and so these results are very similar to those presented for the Local Plan in isolation in Chapter 13. Exceedences of both the critical level and the 1% criterion are thus predicted at the kerbside of the A22, A26, A275, B2026, Crowborough Road, New Road and Hindleap Lane. The area of exceedence extends up to about 20 m from the A22[90] and 30 m from the A26.

14.4 The areas shown in Figure 14.2 are also summarised in the middle column of Table 14.1. This shows that 8.21 ha (82,100 m^2) of the SAC are predicted to experience both an exceedence of the 30 μg/m^3 critical level and also an increase of more than 1% of this critical level as result of the Local Plan in combination with other predicted traffic growth. Of this 8.21 ha, 5.60 ha are woodland, while 1.25 ha is heath. Table 14.1 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the

[89] Figure 14.1 and Figure 14.2 are accompanied by Figure A11.1 to Figure A11.8 in Appendix 11, which show the same results in more detail.

[90] These plots combine two sets of model predictions and there are areas along the A22 north of Wych Warren and near Raven Wood where the precise shape of the contour is affected by artefacts of the interpolation method. While the presence of an exceedence is considered highly likely, the precise shape of this exceedence as shown in the figure in these areas should not be relied upon. The 20 m distance given here does not include these areas.

lower bound critical level, a total of 178.60 ha would experience both an exceedence of 15 μg/m^3 as a total concentration and also a change of more than 1% of this value as a result of the local plan in combination with other projected traffic growth. For the upper-bound level, 2.36 ha would be thus affected.

14.5 Table 14.2 shows the average, maximum, and minimum changes in predicted annual mean NOx concentrations to the various habitats. It shows, for example, that the average predicted change in NOx concentrations to the SAC as a whole is 0.45 μg/m^3, but the maximum predicted change to any one location is 22.8 μg/m^3. This maximum change is predicted to occur to an area of woodland immediately north of the junction of the A22 with Hindleap Lane. The maximum predicted change to heath is 20.2 μg/m^3, which is predicted to occur beside the A22 between Wych Cross and Forest Row.

14.6 Table 14.3 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth. As an example of interpreting this table, 450.17 ha of the SAC will move from experiencing concentrations below 12 μg/m^3 to experiencing concentrations above this level as a result of the Local Plan with other projected traffic growth. An additional 1.42 ha will experience concentrations above 40 μg/m^3 as a result of the Local Plan in combination with other traffic. The Local Plan in combination with other projected traffic growth will cause an additional 3.61 ha of the SAC to exceed the 30 μg/m^3 critical level, of which 0.83 ha is wet heath.

14.7 Table 14.4 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. To give an example of how to interpret this table, it shows that a total of 1,556 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 30 μg/m^3 critical level. This means that the area shown in orange in Figure 14.1 covers a total of 1,556 ha, of which 394 ha are dry heath and 206 ha are wet heath.

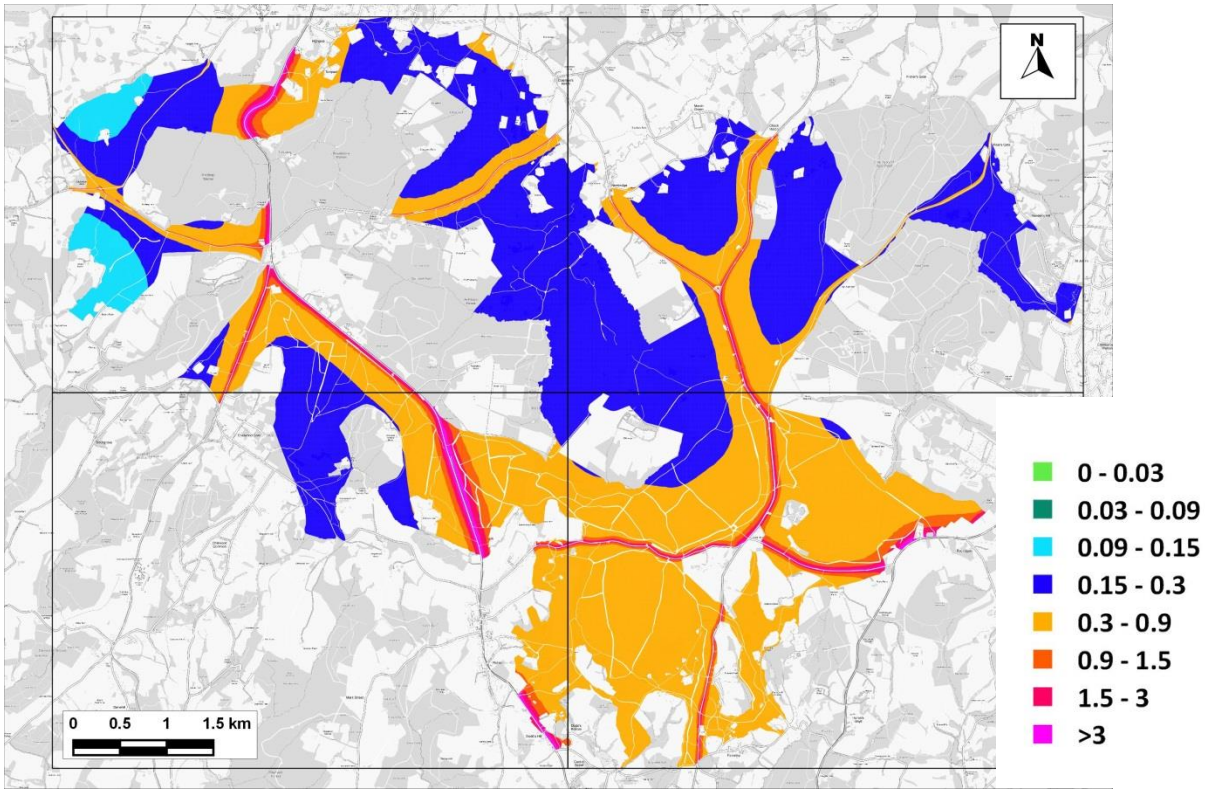


Figure 14.1: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No Growth' Under Emissions Scenario A (μg/m^3)

.

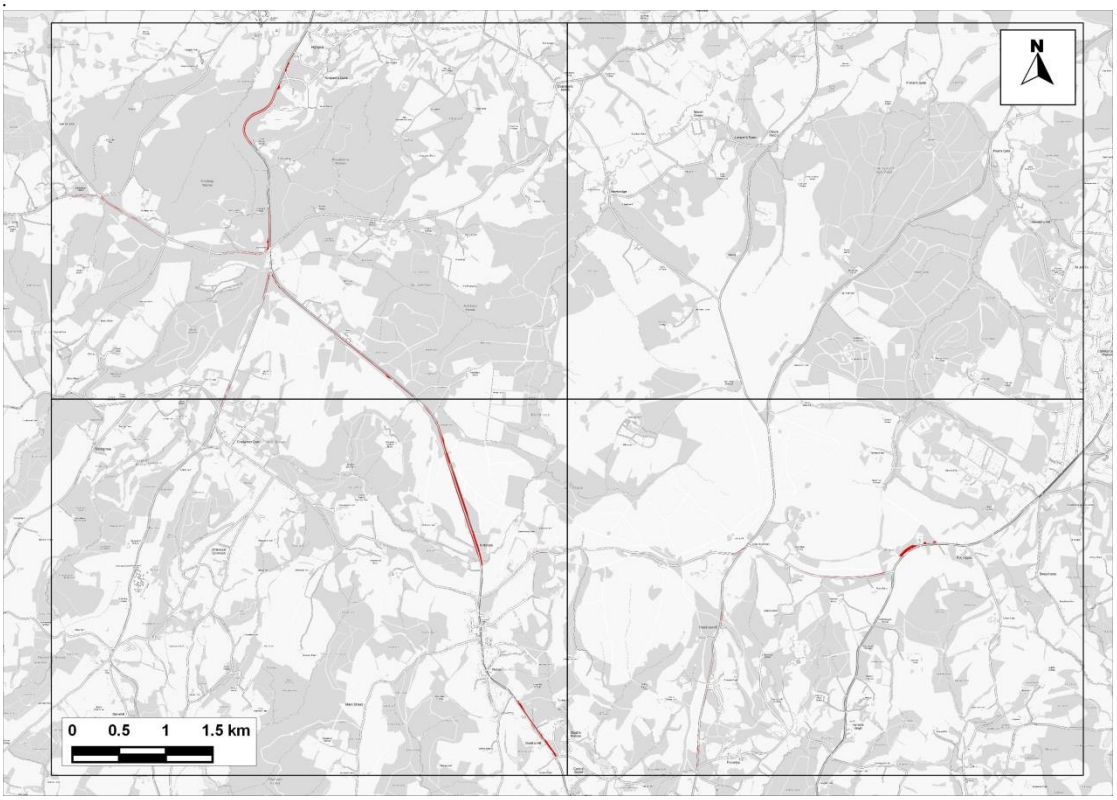


Figure 14.2: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.1: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (hectares)

Land Use	15 μg/m^3 Assessment Level	30 μg/m^3 Critical Level	45 μg/m^3 Assessment Level
Woodland	93.97	5.60	1.89
Bracken	15.81	0.37	0.07
Scattered Bracken	12.07	0.29	0.09
Dry Heath	10.35	0.00	0.00
Wet Heath	32.60	1.25	0.06
Grassland	4.08	0.07	0.02
Water	0.15	0.00	0.00
Bare Ground	9.59	0.63	0.23
Whole SAC	178.60	8.21	2.36

Table 14.2: In Combination (Traffic) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.45	22.8	0.11
Bracken	0.45	11.6	0.15
Scatt. Bracken	0.44	12.5	0.12
Dry Heath	0.36	20.2	0.12
Wet Heath	0.63	13.0	0.16
Grassland	0.42	11.8	0.12
Water	0.32	5.0	0.12
Bare Ground	0.66	17.1	0.13
Whole SAC	0.45	22.8	0.11

Table 14.3: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	12	-138.86	-169.38	-42.20	-37.70	-28.04	-21.56	-11.88	-0.53	-450.17
12	14	127.47	132.32	22.73	26.09	21.94	19.03	9.37	0.46	359.41
14	18	9.94	21.47	14.74	9.83	3.99	2.09	0.68	0.06	62.79
18	20	0.60	4.56	1.51	0.41	0.80	0.18	0.41	0.01	8.48
20	25	0.70	6.90	1.35	0.93	1.06	0.19	0.64	0.00	11.77
25	30	0.14	1.94	1.04	0.27	0.13	0.05	0.54	0.00	4.10
30	35	0.00	1.00	0.40	0.08	0.04	0.02	0.09	0.00	1.63
35	40	0.00	0.17	0.30	0.03	0.01	0.00	0.04	0.00	0.55
40	-	0.00	1.02	0.13	0.07	0.07	0.01	0.12	0.00	1.42
All >30		0.00	2.19	0.83	0.18	0.12	0.03	0.24	0.00	3.61

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.4: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	1	626.90	1198.66	260.76	236.22	181.06	86.75	67.24	6.05	2663.63
	3	116.64	288.06	136.71	68.91	52.36	22.11	27.60	0.70	713.11
	5	27.79	135.54	60.61	30.61	19.79	7.56	13.53	0.30	295.74
	10	4.49	49.98	16.22	5.81	5.67	1.68	6.74	0.05	90.64
30 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.5	626.90	1198.66	260.76	236.22	181.06	86.75	67.24	6.05	2663.63
	1	394.38	593.69	208.69	152.46	109.15	50.37	45.08	1.87	1555.69
	3	16.62	104.89	43.56	20.45	15.37	5.19	11.06	0.20	217.33
	5	4.49	49.98	16.22	5.81	5.67	1.68	6.74	0.05	90.64
	10	0.40	13.25	4.26	1.01	0.79	0.30	1.65	0.01	21.67
45 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1198.66	260.76	236.22	181.06	86.75	67.24	6.05	2663.63
	0.5	592.59	976.13	237.58	217.49	162.46	85.79	58.92	4.92	2335.88
	1	116.64	288.06	136.71	68.91	52.36	22.11	27.60	0.70	713.11
	3	5.74	58.52	20.09	7.55	7.26	2.26	7.60	0.07	109.10
	5	1.35	24.66	7.76	2.21	1.94	0.58	3.55	0.02	42.07
	10	0.00	5.10	1.41	0.30	0.29	0.06	0.64	0.00	7.80

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

In Combination (Traffic) Impacts on 24-hour Mean NOx under Emissions Scenario A

14.8 Figure 14.3 shows the change in predicted maximum 24-hour mean NOx concentrations caused by

the Local Plan in combination with other predicted traffic growth under NOx emissions scenario A[91]. Increases are predicted across the entire SAC, but away from roads, these changes are more modest. Changes greater than 7.5 μg/m^3 (which represents 10% of the 75 μg/m^3 critical level) are predicted to extend out approximately 120 m from the A22, 35 m from Hindleap Lane, 30 m from the B2026, 100 m from the A275, 40 m from Crowborough Road, 15 m from Coleman's Hatch Road, 20 m from Kidd's Hill, 130 m from the A26, 30 m from the A275, and 75 m from New Road.

14.9 Figure 14.4 shows the area over which there is both a change of more than 7.5 μg/m^3 and also a predicted exceedence (in the With Plan scenario) of the critical level. In practice, since the footprint of exceedences of the critical level (see Figure 12.2) is much larger than the footprint over which there will be a change greater than 10% of the critical level, the area shown in Figure 14.4 is identical to the area shown in orange in Figure 14.3. These areas are then summarised again in Table 14.5, which shows that the parts of the SAC highlighted red in Figure 14.3 cover a total of 127.8 ha, of which 23.93 ha are wet heath and 7.16 ha are dry heath.

14.10 Table 14.6 shows the average, maximum, and minimum changes in predicted maximum 24-hour NOx concentrations to the various habitats. It shows, for example, that the maximum predicted change in maximum 24-hour NOx concentrations to any one location is 73.0 μg/m^3. This is predicted at an area of woodland beside the A22 between Wych Cross and Forest Row. The maximum predicted change to heath is 72.2 μg/m^3, which is also predicted to occur beside the A22 between Wych Cross and Forest Row.

14.11 Table 14.7 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth. The critical level is already predicted to be exceeded over the entire SAC without any of this additional traffic, so there is no change in this statistic. The area exceeding 200 μg/m^3 is predicted to increase by 2.83 ha, while the area in the 85 to 100 μg/m^3 band will increase by 434.2 ha.

14.12 Table 14.8 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 127.8 ha will experience an increase in 24-hour mean NOx of at least 10% of the critical level, while 2.28 ha will experience increases of at least 50% of the critical level.

[91] Figure 14.3 and Figure 14.4 are accompanied by Figure A11.9 to Figure A11.16 in Appendix 11, which show the same results in more detail.

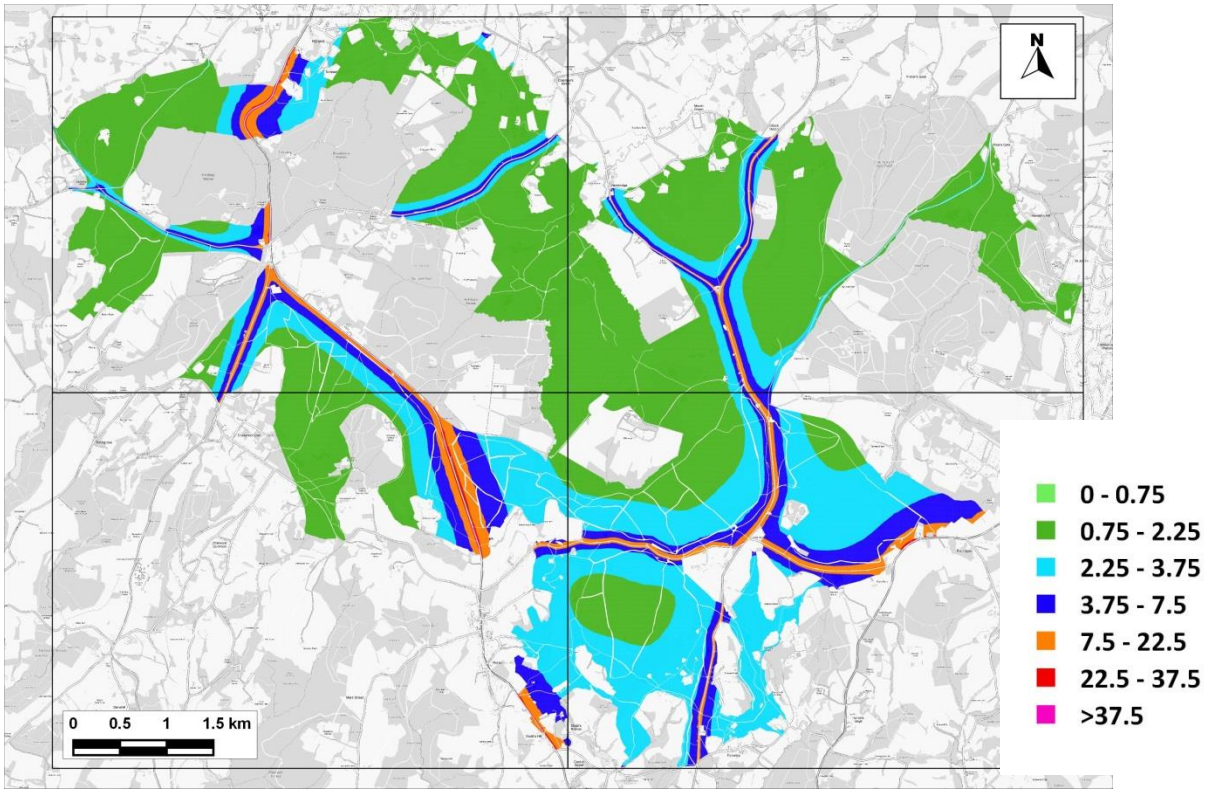


Figure 14.3: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No Growth' under Emissions Scenario A (μg/m^3)

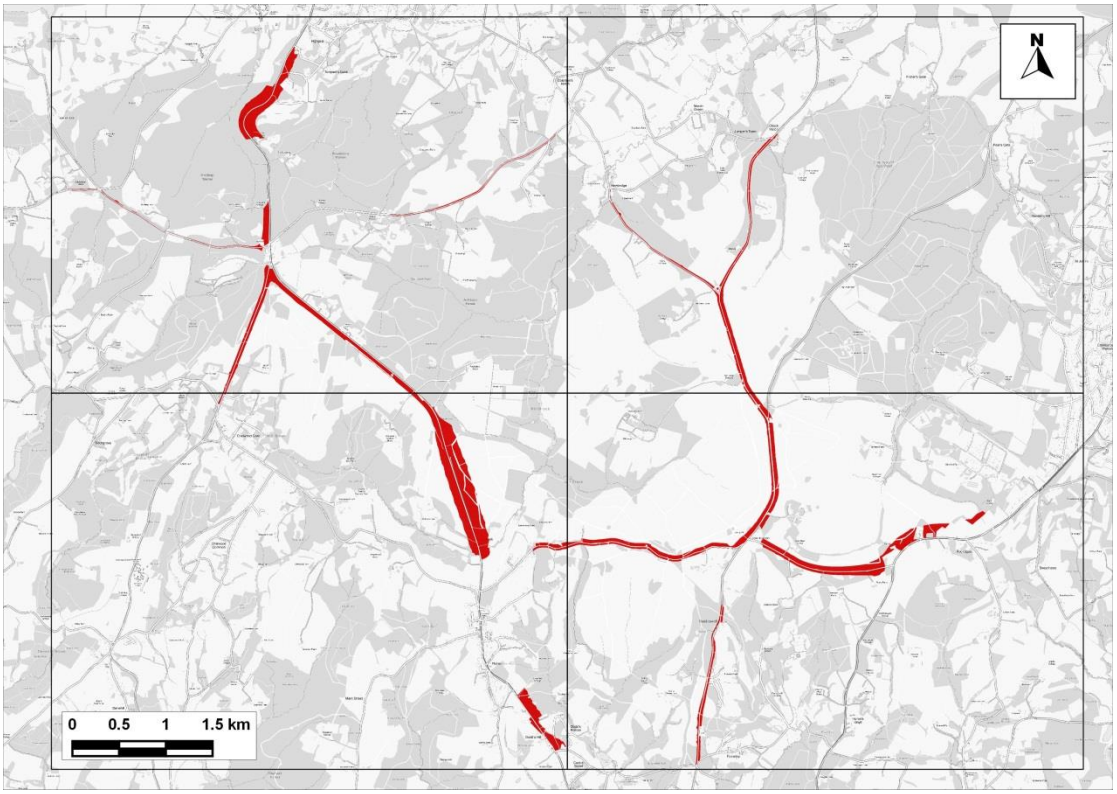


Figure 14.4: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.5: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (hectares)

Land Use	75 μg/m^3 Critical Level
Woodland	66.98
Bracken	9.58
Scattered Bracken	8.91
Dry Heath	7.16
Wet Heath	23.93
Grassland	2.80
Water	0.09
Bare Ground	8.32
Whole SAC	127.78

Table 14.6: In Combination (Traffic) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	2.8	73.0	0.8
Bracken	2.9	42.9	1.0
Scattered Bracken	2.8	50.4	0.8
Dry Heath	2.4	72.2	0.8
Wet Heath	3.9	52.8	1.1
Grassland	2.7	48.8	0.8
Water	2.1	24.8	0.8
Bare Ground	4.0	64.3	0.9
Whole SAC	2.9	73.0	0.8

Table 14.7: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenario Under Emissions Scenario A [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	85	-184.97	-182.56	-42.08	-47.26	-38.33	-13.82	-11.88	-0.84	-521.75
85	100	173.95	146.60	23.49	36.08	32.41	11.41	9.50	0.77	434.20
100	125	9.63	20.58	13.99	9.42	3.83	1.99	0.55	0.06	60.04
125	150	1.02	8.72	2.28	1.07	1.60	0.21	0.77	0.01	15.67
150	200	0.37	4.96	1.65	0.59	0.38	0.19	0.86	0.01	9.02
200	-	0.00	1.70	0.68	0.11	0.10	0.02	0.21	0.00	2.83
All >75		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.8: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 $\mu g/m^3$	1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	3	259.40	460.53	176.17	110.19	81.73	40.51	37.88	1.12	1167.55
	5	49.64	181.68	89.17	45.46	28.50	12.41	17.27	0.44	424.57
	10	7.16	66.98	23.93	9.58	8.91	2.80	8.32	0.09	127.78
	30	0.00	5.56	1.65	0.32	0.31	0.06	0.70	0.00	8.59
	50	0.00	1.87	0.07	0.01	0.10	0.01	0.22	0.00	2.28

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

In Combination (Traffic) Impacts on Annual Mean NH_3

14.13 Figure 14.5 shows the change in predicted annual mean NH_3 concentrations caused by the Local Plan in combination with other projected traffic growth (see also Figure A11.17 Figure A11.20). Increases are predicted over the entire SAC, but the greatest changes are close to roads. Changes greater than 0.01 $\mu g/m^3$ (which represents 1% of the 1 $\mu g/m^3$ critical level) are predicted

out to approximately 150 m from the A22, 25 m from Hindleap Lane, 40 m from the A275, 25 m from Kidd's Hill, 50 m from the B2026, 70 m from New Road, 50 m from Crowborough Road, and 100 m from the A26.

14.14 Figure 14.6 shows the area over which a change of more than 0.01 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 1 μg/m^3 critical level (see also Figure A11.21 Figure A11.24). Exceedences of both the critical level and the 1% criterion are predicted to extend out to approximately 20 m from the A22, 20 m from the A26, 7 m from Hindleap Lane, 4 m from the B2026, and 2 m from Crowborough Road.

14.15 The areas shown in Figure 14.6 are also summarised in the middle column of Table 14.9. This shows that 4.92 ha (49,200 m^2) of the SAC are predicted to experience both an exceedence of the 1 μg/m^3 critical level and also an increase of more than 1% of this critical level as result of the Local Plan in combination with other projected traffic growth. Of this 4.92 ha, 3.65 ha are woodland, while 0.44 ha (4,400 m^2) is heath. Table 14.9 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 17.75 ha would experience both an exceedence of 0.8 μg/m^3 as a total concentration and also a change of more than 1% of this value. For the upper-bound level, 2.51 ha would be thus affected.

14.16 Table 14.10 shows the average, maximum, and minimum changes in predicted annual mean NH_3 concentrations to the various habitats. It shows, for example, that the average predicted change in NH_3 concentrations to the SAC as a whole is 0.0035 μg/m^3, but the maximum predicted change to any one location is 0.47 μg/m^3. This maximum change is predicted to occur to an area of woodland immediately north of the junction of the A22 with Hindleap Lane. The maximum predicted change to heath is 0.42 μg/m^3. This is predicted to occur beside the A22 between Wych Cross and Forest Row.

14.17 Table 14.11 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth. 141.77 ha of the SAC will move from experiencing concentrations below 0.59 μg/m^3 to experiencing concentrations above this level. An additional 1.10 ha is predicted to experience concentrations above 1.2 μg/m^3. The Local Plan in combination with other projected traffic growth will cause an additional 1.87 ha of the SAC to exceed the 1 μg/m^3 critical level, of which 0.32 ha (3,200 m^2) is wet heath.

14.18 Table 14.12 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. 170.8 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 1 μg/m^3 critical load, while 4.35 ha are expected to experience an increase greater than 10% of the critical load.

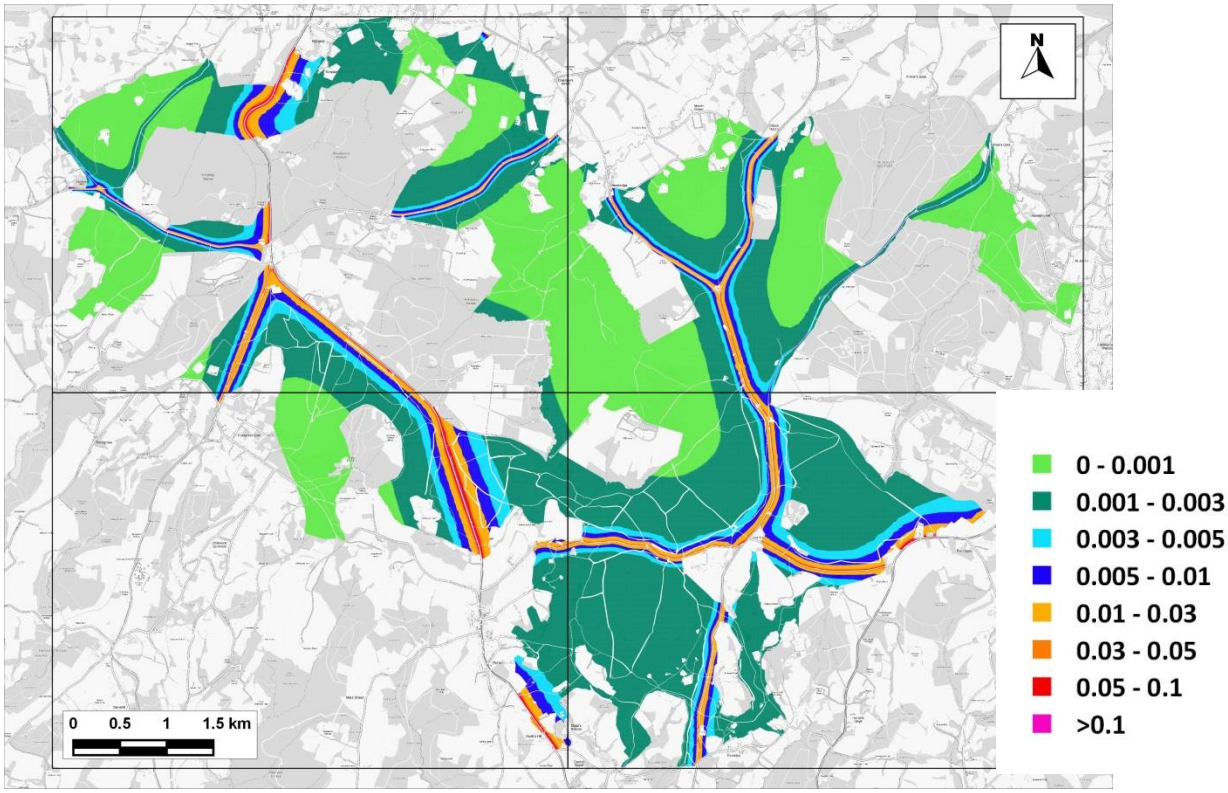


Figure 14.5: Change in Predicted Annual Mean NH_3 Comparing 'With Plan' to 'No Growth' Scenarios ($\mu g/m^3$)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

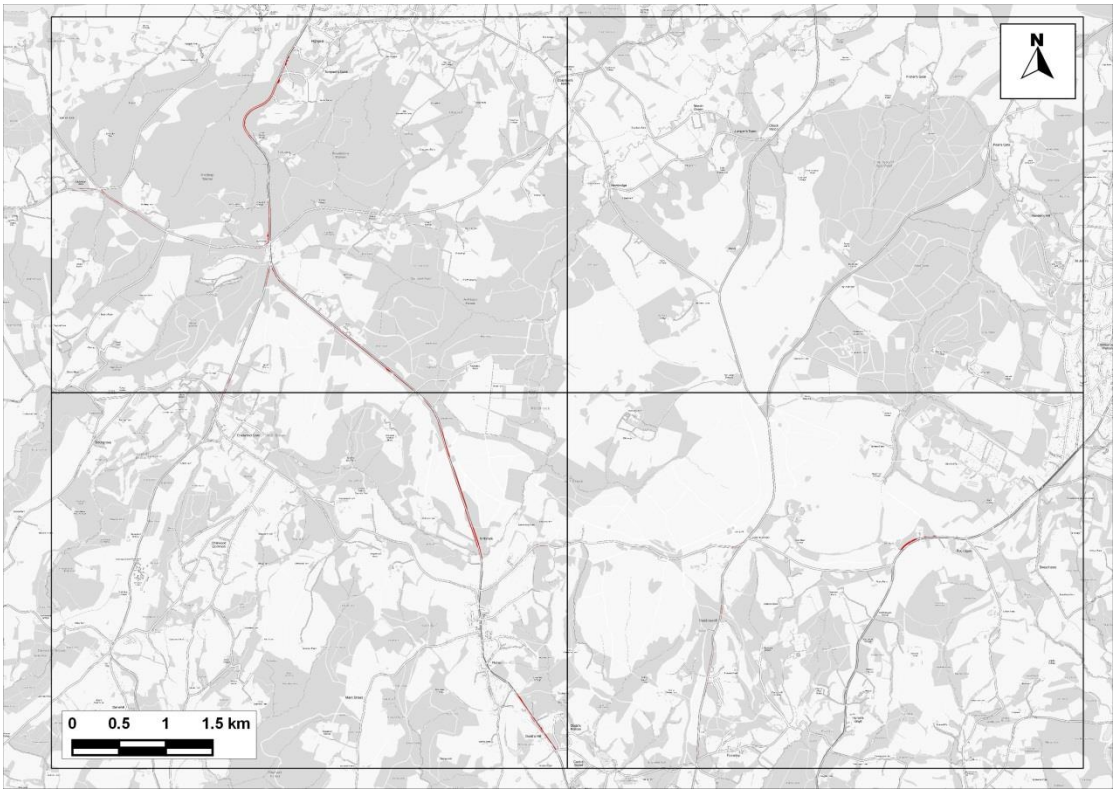


Figure 14.6: Areas in SAC Predicted to Experience an Increase in Annual Mean NH_3 Concentrations Greater than 1% of the 1 μg/m^3 Critical Level where the Critical Level would also be Exceeded (Comparing 'With Plan' to 'No Growth Scenarios)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.9: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NH_3 Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' and 'No Growth' Scenarios (hectares)

Land Use	0.8 μg/m^3 Assessment Level	1 μg/m^3 Critical Level	1.2 μg/m^3 Assessment Level
Woodland	10.66	3.65	2.02
Bracken	0.95	0.17	0.05
Scattered Bracken	0.72	0.19	0.10
Dry Heath	0.21	0.00	0.00
Wet Heath	3.22	0.44	0.08
Grassland	0.14	0.04	0.02
Water	0.00	0.00	0.00
Bare Ground	1.86	0.43	0.24
Whole SAC	17.75	4.92	2.51

Table 14.10: In Combination (Traffic) Impacts on Annual Mean NH_3 across the Ashdown Forest SAC (Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' and 'No Growth' Scenarios)

Land Use	µg/m³ Change		
	Average	Maximum	Minimum
Woodland	0.0039	0.47	0.00033
Bracken	0.0031	0.21	0.00055
Scattered Bracken	0.0034	0.25	0.00044
Dry Heath	0.0019	0.42	0.00046
Wet Heath	0.0056	0.26	0.00062
Grassland	0.0028	0.24	0.00034
Water	0.0018	0.08	0.00038
Bare Ground	0.0072	0.35	0.00039
Whole SAC	0.0035	0.47	0.00033

Table 14.11: Change in Hectares within Different Annual Mean NH_3 Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios [a]

Total Concentration (µg/m³)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0.58	0.59	-28.61	-52.97	-24.70	-11.52	-12.88	-5.41	-5.53	-0.15	-141.77
0.59	0.6	17.77	20.37	7.01	2.40	7.45	2.27	3.01	0.05	60.33
0.6	0.7	10.09	23.13	15.05	8.14	4.26	2.94	1.05	0.10	64.75
0.7	0.8	0.58	5.81	1.02	0.56	0.85	0.16	0.69	0.01	9.66
0.8	0.9	0.15	1.92	0.85	0.21	0.21	0.03	0.48	0.00	3.85
0.9	1.0	0.02	0.50	0.44	0.13	0.03	0.01	0.15	0.00	1.30
1.0	1.1	0.00	0.37	0.22	0.02	0.01	0.00	0.05	0.00	0.68
1.1	1.2	0.00	0.02	0.04	0.03	0.01	0.00	0.00	0.00	0.10
1.2	-	0.00	0.83	0.06	0.03	0.05	0.01	0.10	0.00	1.10
All >1		0.00	1.23	0.32	0.08	0.07	0.01	0.15	0.00	1.87

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.12: Hectares Predicted to Experience Different Levels of Change in Annual Mean NH_3 Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
0.8 µg/m³	0.1	516.00	876.21	240.52	205.68	147.29	82.07	54.93	4.87	2127.56
	0.3	95.00	279.64	131.08	61.45	51.76	22.13	27.29	0.67	669.01
	0.5	44.92	190.43	86.46	38.94	30.34	13.11	17.88	0.42	422.50
	1	15.79	109.19	42.23	16.41	15.28	5.13	11.73	0.19	215.95
	3	2.42	34.25	10.53	3.49	3.60	0.75	5.76	0.02	60.80
	5	0.65	16.42	4.96	1.36	1.22	0.34	2.61	0.01	27.58
	10	0.00	4.36	0.99	0.23	0.26	0.05	0.57	0.00	6.46
1.0 µg/m³	0.1	419.21	690.41	221.95	170.83	123.23	65.91	47.62	2.62	1741.80
	0.3	67.83	236.50	109.71	51.59	41.45	17.52	22.85	0.58	548.04
	0.5	31.95	161.37	69.94	29.39	23.47	9.58	15.34	0.34	341.38
	1	10.92	88.78	32.44	12.05	12.20	3.96	10.26	0.15	170.76
	3	1.40	25.73	7.70	2.44	2.28	0.53	4.38	0.02	44.47
	5	0.29	10.83	3.35	0.84	0.77	0.19	1.57	0.00	17.85
	10	0.00	3.10	0.47	0.13	0.19	0.04	0.43	0.00	4.35
1.2 µg/m³	0.1	321.14	590.11	203.90	137.96	104.00	54.43	42.67	1.87	1456.08
	0.3	51.99	206.36	94.98	43.66	34.20	14.67	19.31	0.50	465.67
	0.5	24.27	140.19	57.87	23.98	19.39	7.28	13.72	0.29	286.99
	1	8.45	74.43	25.84	9.38	9.69	2.92	9.23	0.11	140.07
	3	0.87	19.57	5.84	1.70	1.51	0.41	3.24	0.01	33.16
	5	0.10	7.46	2.23	0.56	0.50	0.10	0.97	0.00	11.91
	10	0.00	2.56	0.18	0.07	0.15	0.03	0.34	0.00	3.33

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 0.8 µg/m^3 is 0.008 µg/m^3, while 1% of 1.2 µg/m^3 is 0.012 µg/m^3.

In Combination (Traffic) Impacts on Nitrogen Deposition under Emissions Scenario A (EA Method)

14.19 Figure 14.7 shows the change in predicted nitrogen deposition caused by the Local Plan in combination with other projected traffic growth under emissions scenario A and using the EA deposition method (also see Figure A11.25 to Figure A11.28). Increases are predicted over the

entire SAC, with the greatest changes close to roads. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted out to approximately 500 m from the A22, 150 m from the A275, 200 m from Crowborough Road, 200 m from the B2026, 100 m from Kidd's Hill, 300 m from the A26, and 55 m Coleman's Hatch Road.

14.20 Figure 14.8 (also see Figure A11.29 to Figure A11.32) shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 14.8 is identical to the 0.1 kg-N/ha/yr contour described for Figure 14.7.

14.21 The areas shown in Figure 14.8 are also summarised in the first column of Table 14.13. This shows that 429.2 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load. Of this 429.2 ha, 228.7 ha are woodland, 78.37 ha are wet heath, and 37.94 ha are dry heath.

14.22 Table 14.14 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.09 kg-N/ha/yr, but the maximum predicted change to any one location is 11.0 kg-N/ha/yr. The maximum predicted change to heath is an increase of 6.9 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

14.23 Table 14.15 shows how the distribution of deposition fluxes will change as a result of the Local Plan in combination with other projected traffic growth. 0.42 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. An additional 1.05 ha is predicted to experience fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load) as a result of the Local Plan in combination with other projected traffic growth.

14.24 Table 14.16 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 1,088 ha of the SAC would experience an increase in deposition flux of at least 0.5% of the critical load, and that 15.12 ha would experience a change of more than 10% of the critical load as a result of the Local Plan in combination with other projected traffic growth.

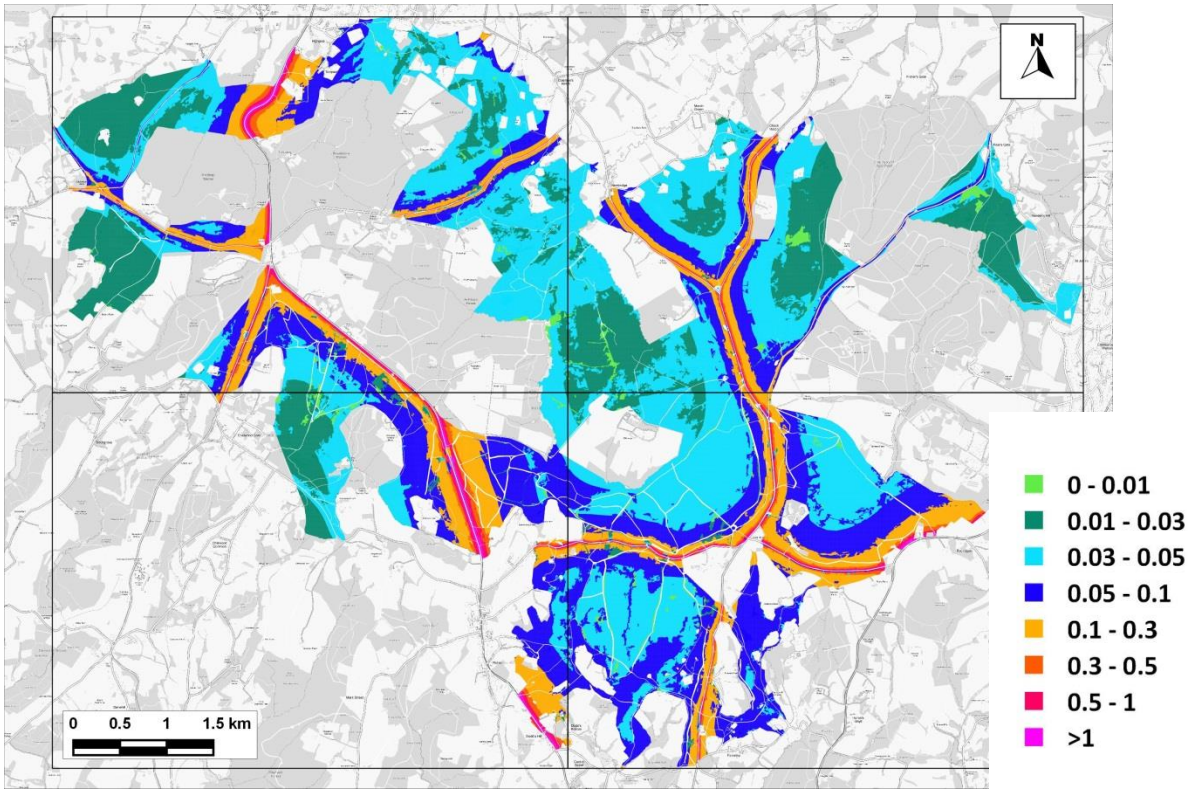


Figure 14.7: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios Under Emission Scenario A (EA Method) (kg-N/ha/yr)

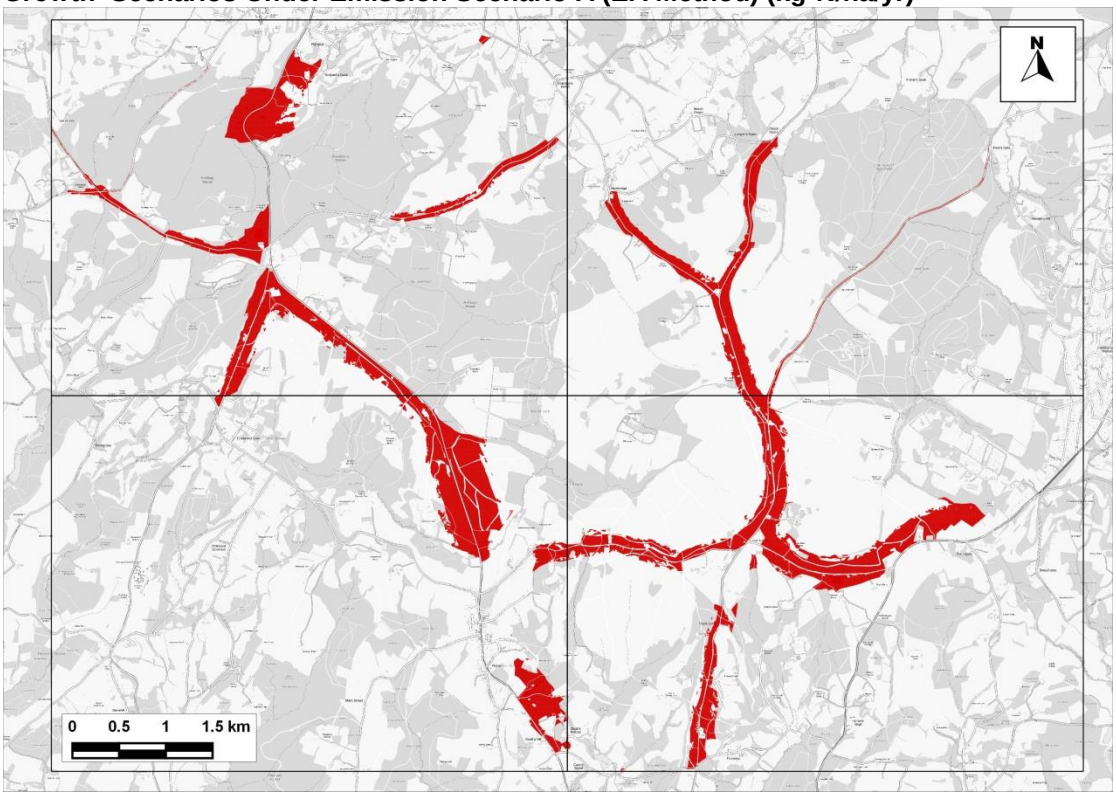


Figure 14.8: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (EA Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.13: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (EA Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	228.74	155.31	116.00
Bracken	41.58	22.28	0.75
Scattered Bracken	31.26	18.18	0.68
Dry Heath	37.94	17.01	0.02
Wet Heath	78.37	45.82	0.87
Grassland	10.21	5.10	0.04
Water	0.00	0.00	0.00
Bare Ground	1.12	0.00	0.00
Whole SAC	429.21	263.69	118.37

Table 14.14 In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.11	11.0	0.06
Bracken	0.08	3.8	0.05
Scatt. Bracken	0.08	4.6	0.05
Dry Heath	0.05	6.9	0.05
Wet Heath	0.11	4.0	0.05
Grassland	0.06	3.9	0.05
Water	0.01	0.1	0.01
Bare Ground	0.02	1.1	0.01
Whole SAC	0.09	11.0	0.01

Table 14.15: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.42	0.00	-0.42
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.35
12	14	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07
14	16	-4.95	0.00	-11.16	-4.48	-5.73	-0.49	0.00	0.00	-26.81
16	18	4.61	0.00	9.13	3.25	3.93	0.44	0.00	0.00	21.37
18	20	0.33	0.00	1.45	0.86	1.48	0.03	0.00	0.00	4.14
20	22	0.02	0.00	0.45	0.27	0.23	0.00	0.00	0.00	0.97
22	24	0.00	0.00	0.09	0.04	0.04	0.00	0.00	0.00	0.17
24	26	0.00	0.00	0.02	0.04	0.01	0.00	0.00	0.00	0.07
26	28	0.00	0.00	0.01	0.01	-0.01	0.01	0.00	0.00	0.02
28	30	0.00	-26.50	0.00	0.00	0.01	0.00	0.00	0.00	-26.48
30	32	0.00	10.06	0.00	0.00	0.03	0.00	0.00	0.00	10.10
32	34	0.00	10.19	0.00	0.00	0.02	0.00	0.00	0.00	10.21
34	36	0.00	4.33	0.00	0.00	0.00	0.00	0.00	0.00	4.33
36	38	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.74
38	40	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.13
40	-	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	1.05
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.42

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.16: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	28.88	0.74	2623.38
	0.3	434.58	1035.64	225.03	200.72	143.12	63.53	9.00	0.11	2111.72
	0.5	150.45	564.39	160.48	99.47	79.83	27.43	5.53	0.03	1087.60
	1	37.94	228.74	78.37	41.58	31.26	10.21	1.12	0.00	429.21
	3	4.84	73.46	16.53	7.01	7.36	1.37	0.20	0.00	110.78
	5	1.35	38.92	7.37	2.86	2.78	0.47	0.13	0.00	53.88
	10	0.02	12.39	1.57	0.55	0.52	0.06	0.00	0.00	15.12
15 kg-N/ha/yr	0.1	626.57	1202.05	260.76	236.22	181.06	86.68	16.68	0.37	2610.40
	0.3	194.36	616.74	176.64	122.22	95.08	34.69	6.26	0.04	1246.02
	0.5	64.67	310.61	106.11	55.93	46.99	15.93	2.47	0.01	602.71
	1	17.01	155.31	45.82	22.28	18.18	5.10	0.51	0.00	264.21
	3	1.83	45.29	8.76	3.40	3.57	0.57	0.14	0.00	63.57
	5	0.34	20.93	3.42	1.17	1.05	0.19	0.05	0.00	27.16
	10	0.00	5.21	0.36	0.14	0.21	0.03	0.00	0.00	5.95
20 kg-N/ha/yr	0.1	615.49	1178.66	259.85	235.59	178.72	86.41	12.66	0.26	2567.64
	0.3	99.96	437.82	133.74	75.64	62.96	21.70	4.11	0.02	835.95
	0.5	37.94	228.74	78.37	41.58	31.26	10.21	1.12	0.00	429.21
	1	9.87	116.00	29.50	13.73	13.41	3.33	0.32	0.00	186.17
	3	0.76	30.09	5.28	2.00	1.75	0.33	0.09	0.00	40.30
	5	0.02	12.39	1.57	0.55	0.52	0.06	0.00	0.00	15.12
	10	0.00	3.24	0.08	0.06	0.13	0.02	0.00	0.00	3.52

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

In Combination (Traffic) Impacts on Nitrogen Deposition Under Emissions Scenario A (AQC Method)

14.25 Figure 14.9 (also see Figure A11.33 to Figure A11.36) shows the change in predicted nitrogen deposition caused by the Local Plan in combination with other projected traffic growth under

emissions scenario A and using the AQC deposition method. Increases are predicted over the entire SAC, with the greatest changes close to roads. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted to extend out to approximately 375 m from the A22, 110 m from the A275, 120 m from Crowborough Road, 130 m from the B2026, 55 m from Coleman's Hatch Road, 80 m from Kidd's Hill, 215 m from the A26, and 150 m from New Road.

14.26 Figure 14.10 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load (i.e. the area over which both of these tests are met). In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 14.10 is identical to the 0.1 kg-N/ha/yr contour described for Figure 14.9.

14.27 The areas shown in Figure 14.10 are also summarised in the first column of Table 14.17. This shows that 281.2 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load. Of this 281.2 ha, 196.3 ha are woodland, 35.9 ha are wet heath, and 12.5 ha are dry heath.

14.28 Table 14.18 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.06 kg-N/ha/yr, but the maximum predicted change to any one location is 7.2 kg-N/ha/yr. The maximum predicted change to heath is an increase of 3.0 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

14.29 Table 14.19 shows how the distribution of deposition fluxes will change as a result of the Local Plan in combination with other projected traffic growth. 0.38 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. An additional 0.84 ha is predicted to experience fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load) as a result of the Local Plan in combination with other projected traffic growth.

14.30 Table 14.20 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 679.6 ha of the SAC would experience an increase in deposition flux of at least 0.5% of the critical load, that 281.2 ha would experience an increase of at least 1% of the critical load, and that 9.47 ha would experience an increase of at least 10% of the critical load as a result of the Local Plan in combination with other projected traffic growth.

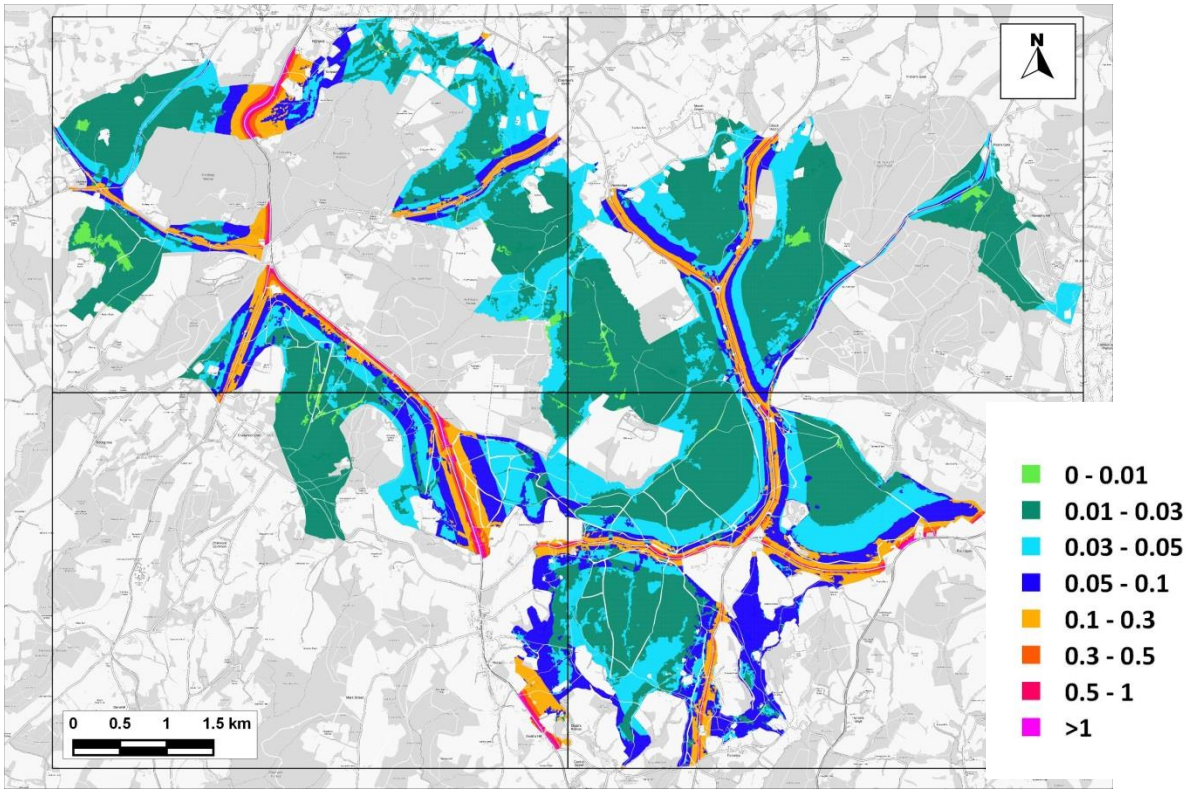


Figure 14.9: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method) (kg-N/ha/yr)

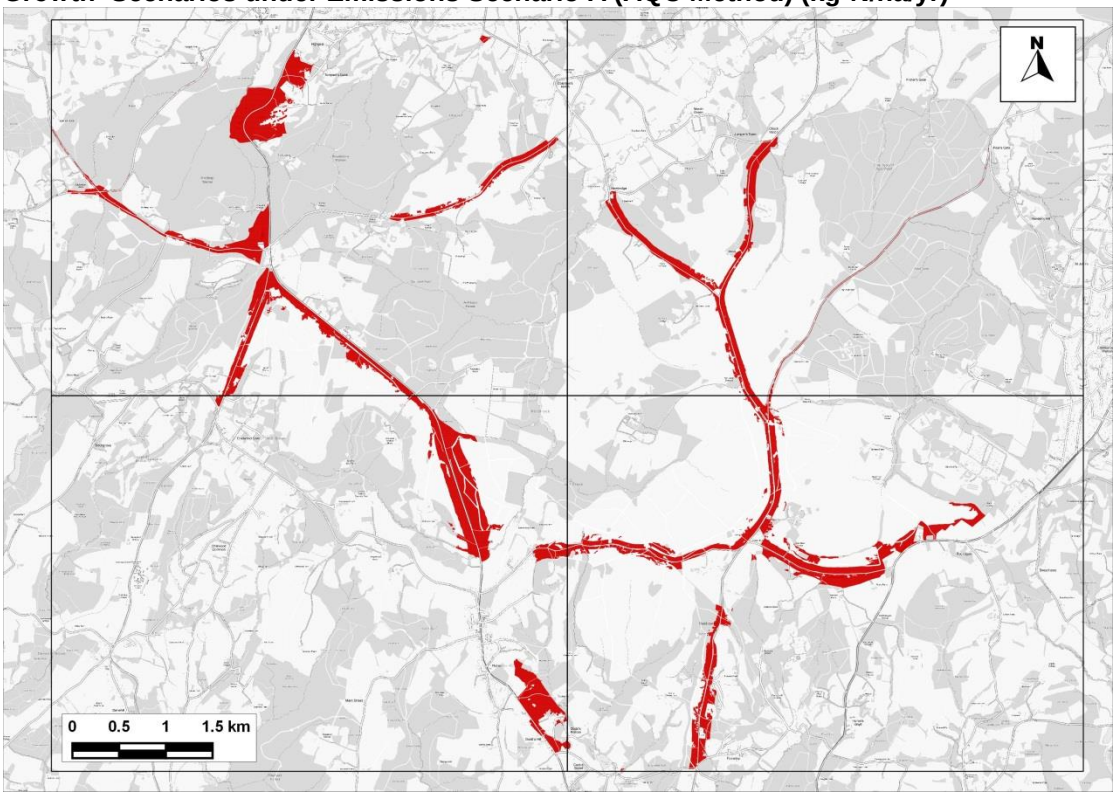


Figure 14.10: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.17: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	196.33	133.92	98.80
Bracken	14.57	7.37	0.03
Scattered Bracken	13.67	7.61	0.09
Dry Heath	12.51	2.64	0.00
Wet Heath	35.93	11.78	0.02
Grassland	4.77	0.58	0.01
Water	0.01	0.00	0.00
Bare Ground	3.39	0.00	0.00
Whole SAC	281.18	163.90	98.96

Table 14.18: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario A (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.09	7.2	0.05
Bracken	0.04	1.6	0.03
Scatt. Bracken	0.04	2.0	0.03
Dry Heath	0.03	3.0	0.03
Wet Heath	0.06	1.9	0.03
Grassland	0.04	1.9	0.03
Water	0.01	0.2	0.01
Bare Ground	0.03	0.7	0.01
Whole SAC	0.06	7.2	0.01

Table 14.19: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.38	0.00	-0.38
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.26
12	14	-11.53	0.00	-13.81	0.00	0.00	-1.04	0.12	0.00	-26.27
14	16	11.35	0.00	12.12	-0.95	-1.33	1.00	0.00	0.00	22.19
16	18	0.18	0.00	1.51	0.85	1.23	0.03	0.00	0.00	3.82
18	20	0.00	0.00	0.17	0.07	0.04	0.00	0.00	0.00	0.28
20	22	0.00	0.00	0.02	0.02	0.02	0.01	0.00	0.00	0.06
22	24	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.04
24	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	30	0.00	-65.72	0.00	0.00	0.00	0.00	0.00	0.00	-65.72
30	32	0.00	55.45	0.00	0.00	0.00	0.00	0.00	0.00	55.45
32	34	0.00	7.21	0.00	0.00	0.00	0.00	0.00	0.00	7.21
34	36	0.00	1.69	0.00	0.00	0.00	0.00	0.00	0.00	1.69
36	38	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.37
38	40	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.16
40	-	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.84
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.38

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.20: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario A (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	620.74	1202.05	260.76	235.42	178.55	86.47	42.93	1.53	2628.47
	0.3	146.37	840.66	155.66	77.70	61.66	32.86	12.30	0.24	1327.45
	0.5	49.30	443.27	89.92	43.20	30.79	14.77	8.24	0.08	679.58
	1	12.51	196.33	35.93	14.57	13.67	4.77	3.39	0.01	281.18
	3	1.10	62.92	6.72	2.15	1.89	0.53	0.32	0.00	75.63
	5	0.12	32.12	2.41	0.63	0.56	0.15	0.07	0.00	36.06
	10	0.00	9.10	0.14	0.07	0.14	0.02	0.00	0.00	9.47
15 kg-N/ha/yr	0.1	542.53	1197.77	238.62	206.77	147.58	85.85	26.84	0.65	2446.61
	0.3	60.12	516.49	101.29	48.77	36.08	16.95	8.90	0.10	788.69
	0.5	22.28	254.99	54.23	23.26	18.35	7.57	5.56	0.03	386.28
	1	6.09	133.92	19.88	7.37	7.61	2.37	1.17	0.00	178.41
	3	0.25	37.22	3.11	0.83	0.75	0.22	0.13	0.00	42.51
	5	0.00	16.54	0.66	0.17	0.22	0.04	0.00	0.00	17.63
	10	0.00	3.98	0.01	0.00	0.06	0.01	0.00	0.00	4.06
20 kg-N/ha/yr	0.1	383.29	1135.22	210.31	150.40	110.07	61.08	17.79	0.45	2068.62
	0.3	34.93	329.24	72.20	32.86	23.98	11.16	6.99	0.04	511.40
	0.5	12.51	196.33	35.93	14.57	13.67	4.77	3.39	0.01	281.18
	1	3.25	98.80	12.74	4.55	4.69	1.17	0.60	0.00	125.80
	3	0.01	24.47	1.34	0.37	0.30	0.07	0.02	0.00	26.57
	5	0.00	9.10	0.14	0.07	0.14	0.02	0.00	0.00	9.47
	10	0.00	2.66	0.00	0.00	0.00	0.00	0.00	0.00	2.66

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Emissions Scenario B

In Combination (Traffic) impacts on Annual Mean NOx – Emissions Scenario B

14.31 Figure 14.11 shows the change in predicted annual mean NOx concentrations caused by the Local

Plan in combination with other projected traffic growth under NOx emissions scenario B (see also Figure A11.41 to Figure A11.44). Changes are predicted over the entire SAC, with the greatest changes near to roads. Changes greater than 0.3 μg/m^3 (which represents 1% of the 30 μg/m^3 critical level) are predicted to extend out approximately 480 m from the A22, 520 m from the A26, 125 m from the A275, 420 m from New Road, 200 m from the B2026, 275 m from Crowborough Road, 140 m from Hindleap Lane, 80 m from Kidd's Hill, and 60 m from Coleman's Hatch Road.

14.32 Figure 14.12 (see also Figure A11.45 to Figure A11.48) shows the area over which a change of more than 0.3 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 30 μg/m^3 critical level. In practice, this is entirely limited by the extent of the 30 μg/m^3 contour from Figure 12.6 and so these results are very similar to those presented for the Local Plan in isolation in Chapter 13. Exceedences of both the critical level and the 1% criterion are thus predicted to extend out to about 4 m from the A22 and 5 m from the A26 but not along other roads.

14.33 The areas shown in Figure 14.12 are also summarised in the middle column of Table 14.21. This shows that 1.11 ha (11,100 m^2) of the SAC is predicted to experience both an exceedence of the 30 μg/m^3 critical level and also an increase of more than 1% of this critical level as result of the Local Plan in combination with other predicted traffic growth. Of this 1.11 ha, 0.97 ha (9,700 m^2) is woodland and none is currently heath. Table 14.21 also shows the equivalent values using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 16.79 ha would experience both an exceedence of 15 μg/m^3 as a total concentration and also a change of more than 1% of this value. For the upper-bound level, 0.01 ha would be thus affected.

14.34 Table 14.22 shows the average, maximum, and minimum changes in predicted annual mean NOx concentrations to the various habitats. It shows, for example, that the average predicted change in NOx concentrations to the SAC as a whole is 0.27 μg/m^3, but the maximum predicted change to any one location is 12.8 μg/m^3. This maximum change is predicted to occur to an area of woodland immediately north of the junction of the A22 with Hindleap Lane. The maximum predicted change to heath is 12.1 μg/m^3, which is predicted to occur beside the A22 between Wych Cross and Forest Row.

14.35 Table 14.23 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth under emissions scenario B. As an example of interpreting this table, 558.36 ha of the SAC will move from experiencing concentrations below 8 μg/m^3 to experiencing concentrations above this level as a result of the Local Plan with other projected traffic growth. An additional 0.10 ha will experience concentrations above 40 μg/m^3. The Local Plan in combination with other projected traffic growth will cause an additional 1.04 ha of the SAC to exceed the 30 μg/m^3 critical level, none of which is currently heath.

14.36 Table 14.24 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to

experience each percentage increase. To give an example of how to interpret this table, it shows that a total of 601.76 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 30 μg/m^3 critical level, of which 124.81 ha are wet heath and 87.86 ha are dry heath.

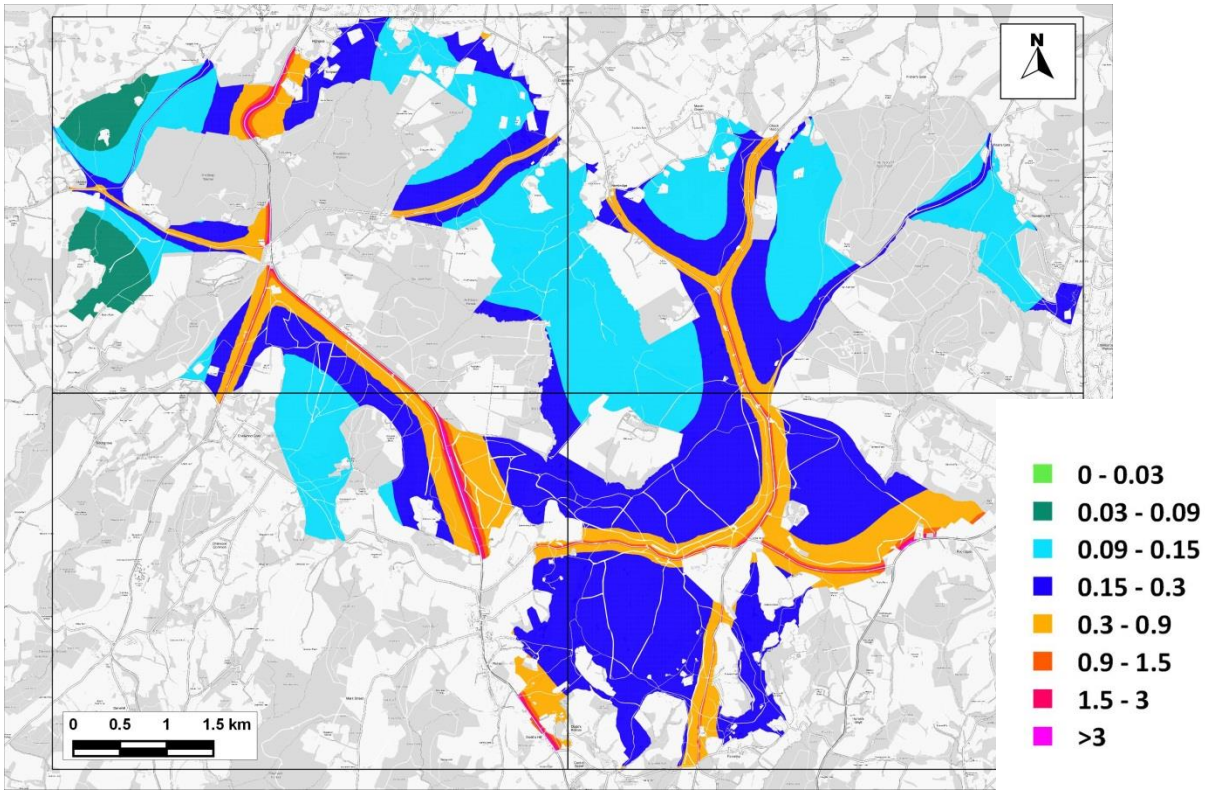


Figure 14.11: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No Growth' Under Emissions Scenario B (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

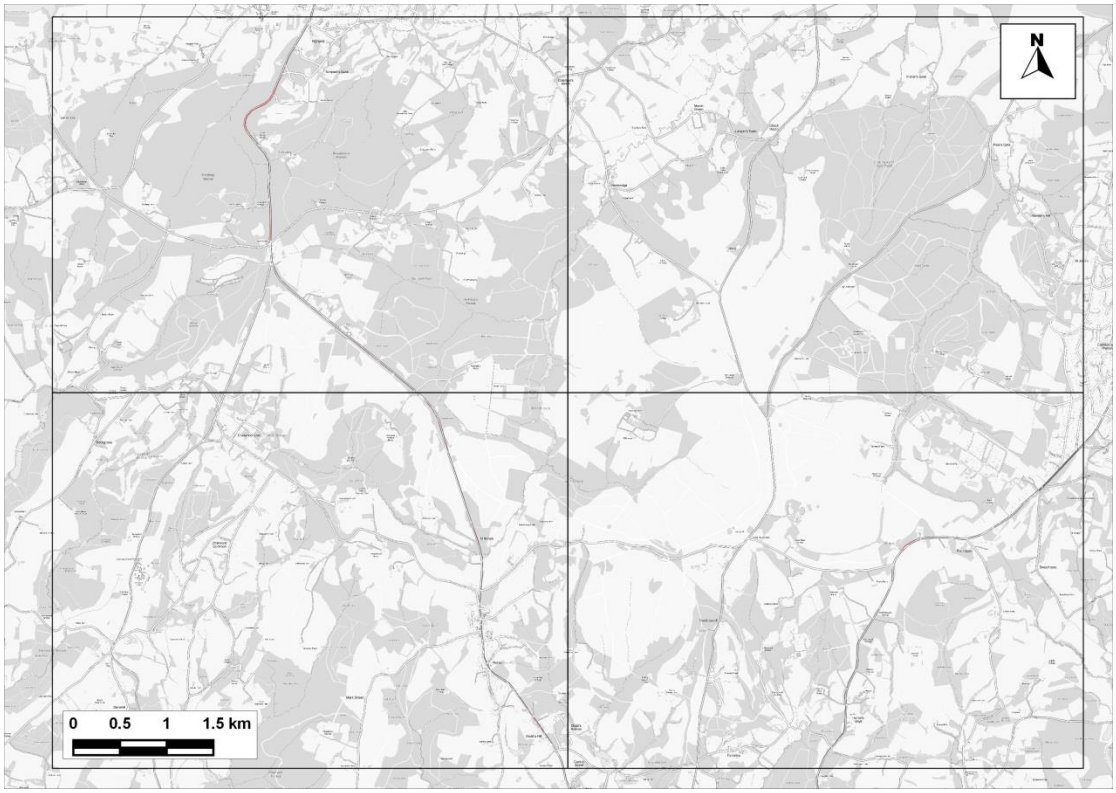


Figure 14.12: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.21: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (hectares)

Land Use	15 μg/m^3 Assessment Level	30 μg/m^3 Critical Level	45 μg/m^3 Assessment Level
Woodland	10.04	0.97	0.01
Bracken	1.00	0.02	0.00
Scattered Bracken	0.58	0.02	0.00
Dry Heath	0.16	0.00	0.00
Wet Heath	3.24	0.00	0.00
Grassland	0.14	0.00	0.00
Water	0.00	0.00	0.00
Bare Ground	1.63	0.10	0.00
Whole SAC	16.79	1.11	0.01

Table 14.22: In Combination (Traffic) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B

Land Use	µg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.27	12.8	0.07
Bracken	0.27	7.0	0.09
Scatt. Bracken	0.26	7.4	0.08
Dry Heath	0.21	12.1	0.07
Wet Heath	0.37	8.0	0.10
Grassland	0.25	7.1	0.07
Water	0.19	3.0	0.07
Bare Ground	0.40	10.3	0.07
Whole SAC	0.27	12.8	0.07

Table 14.23: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B [a]

Total Concentration (µg/m^3)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	-150.75	-254.99	-25.81	-57.52	-35.27	-25.01	-6.45	-2.56	-558.36
8	10	144.70	225.28	12.73	50.59	30.37	23.07	4.16	2.49	493.39
10	12	4.98	14.94	8.80	5.11	3.31	1.56	0.32	0.06	39.07
12	14	0.71	8.22	1.40	1.00	1.02	0.20	0.71	0.00	13.25
14	18	0.35	4.42	2.00	0.60	0.43	0.16	0.99	0.01	8.94
18	20	0.02	0.42	0.53	0.12	0.03	0.01	0.08	0.00	1.21
20	25	0.00	0.48	0.31	0.06	0.04	0.01	0.01	0.00	0.90
25	30	0.00	0.34	0.04	0.03	0.05	0.01	0.09	0.00	0.56
30	35	0.00	0.52	0.00	0.01	0.02	0.00	0.07	0.00	0.63
35	40	0.00	0.28	0.00	0.01	0.00	0.00	0.02	0.00	0.31
40	-	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10
All >30		0.00	0.90	0.00	0.02	0.02	0.00	0.09	0.00	1.04

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.24: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	1	600.38	1016.65	239.81	222.47	166.23	85.77	64.62	5.26	2401.19
	3	28.57	137.30	62.24	31.28	20.25	7.76	13.77	0.30	301.46
	5	6.97	66.35	23.74	9.35	8.87	2.75	8.33	0.09	126.46
	10	0.95	20.25	6.51	1.75	1.48	0.48	2.91	0.01	34.34
30 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.5	600.38	1016.65	239.81	222.47	166.23	85.77	64.62	5.26	2401.19
	1	87.86	242.11	124.81	59.72	44.41	18.18	24.12	0.54	601.76
	3	4.57	50.65	16.71	5.97	5.97	1.72	6.91	0.05	92.55
	5	0.95	20.25	6.51	1.75	1.48	0.48	2.91	0.01	34.34
	10	0.00	4.22	1.09	0.25	0.26	0.04	0.57	0.00	6.44
45 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	600.38	1016.65	239.81	222.47	166.23	85.77	64.62	5.26	2401.19
	0.5	203.69	405.06	167.48	96.06	72.48	38.49	35.06	0.98	1019.30
	1	28.57	137.30	62.24	31.28	20.25	7.76	13.77	0.30	301.46
	3	1.40	25.08	8.00	2.29	2.09	0.59	3.73	0.02	43.19
	5	0.09	7.99	2.65	0.58	0.40	0.13	0.93	0.00	12.77
	10	0.00	2.20	0.13	0.06	0.12	0.02	0.30	0.00	2.83

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

In Combination (Traffic) Impacts on 24-hour Mean NOx under Emissions Scenario B

14.37 Figure 14.13 (also see Figure A11.49 to Figure A11.52) shows the change in predicted maximum 24-hour mean NOx concentrations caused by the Local Plan in combination with other predicted traffic growth under emissions scenario B. Increases are predicted across the entire SAC, but away

from roads, these changes are more modest. Changes greater than 7.5 μg/m^3 (which represents 10% of the 75 μg/m^3 critical level) are predicted to extend out approximately 70 m from the A22, 2 m from Hindleap Lane, 15 m from the A275, 25 m from the B2026, 20 m from Crowborough Road, 25 m from New Road, 85 m from the A26, 15 m from Kidd's Hill, and 5 m from Coleman's Hatch Road.

14.38 Figure 14.14 (also see Figure A11.53 to Figure A11.56) shows the area over which there is both a change of more than 7.5 μg/m^3 and also a predicted exceedence (in the With Plan scenario) of the critical level. In practice, since the footprint of exceedences of the critical level is much larger than the footprint over which there will be a change greater than 10% of the critical level, the area shown in Figure 14.14 is identical to the area shown in orange in Figure 14.13. These areas are then summarised again in Table 14.25, which shows that the parts of the SAC highlighted red in Figure 14.14 cover a total of 61.13 ha, of which 10.89 ha are wet heath and 2.54 ha are dry heath.

14.39 Table 14.26 shows the average, maximum, and minimum changes in predicted maximum 24-hour NOx concentrations to the various habitats. It shows, for example, that the maximum predicted change in maximum 24-hour NOx concentrations to any one location is 56.7 μg/m^3. This is predicted at an area of woodland beside the A22 between Wych Cross and Forest Row. The maximum predicted change to heath is 56.6 μg/m^3, which is also predicted to occur beside the A22 between Wych Cross and Forest Row.

14.40 Table 14.27 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth. 526.7 ha will move from experiencing concentrations below 60 μg/m^3 to above this level. The area exceeding 200 μg/m^3 is predicted to increase by 0.7 ha. The Local Plan in combination with other projected traffic growth will cause an additional 51.83 ha of the SAC to exceed the critical level, of which 3.60 ha are dry heath and 9.63 ha are wet heath.

14.41 Table 14.28 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 61.13 ha will experience an increase in 24-hour mean NOx of at least 10% of the critical level, while 0.86 ha will experience increases of at least 50% of the critical level.

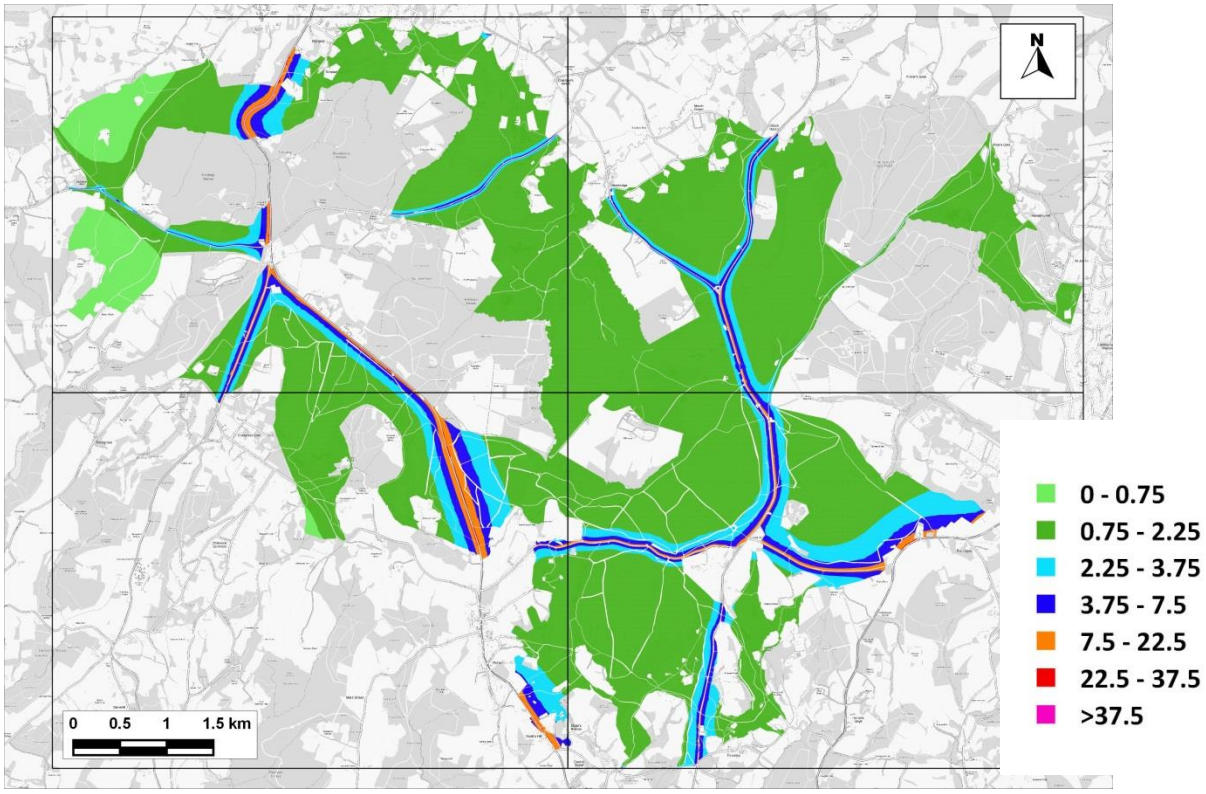


Figure 14.13: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No Growth' under Emissions Scenario B (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

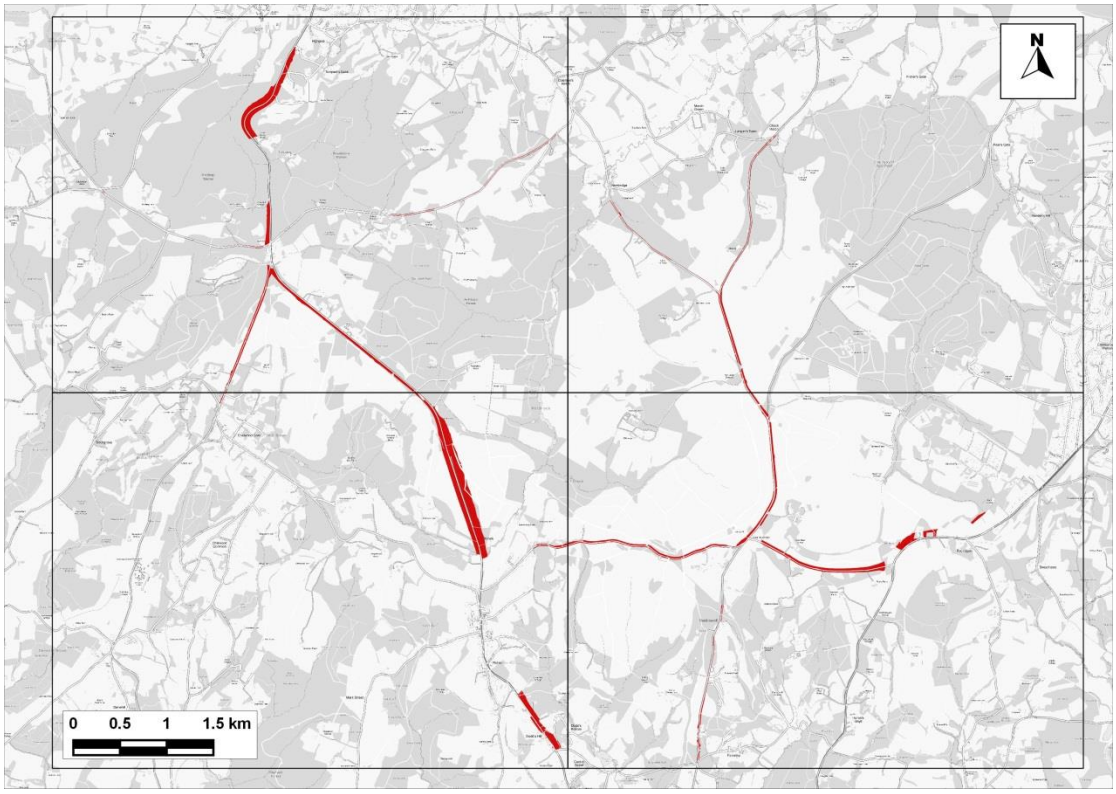


Figure 14.14: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.25: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (hectares)

Land Use	75 μg/m^3 Critical Level
Woodland	34.77
Bracken	3.44
Scattered Bracken	3.41
Dry Heath	2.54
Wet Heath	10.89
Grassland	0.88
Water	0.03
Bare Ground	5.16
Whole SAC	61.13

Table 14.26: In Combination (Traffic) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B

Land Use	µg/m^3 Change		
	Average	Maximum	Minimum
Woodland	1.9	56.7	0.5
Bracken	1.9	32.7	0.6
Scattered Bracken	1.9	38.4	0.6
Dry Heath	1.5	56.5	0.5
Wet Heath	2.6	40.7	0.7
Grassland	1.8	36.7	0.5
Water	1.4	18.4	0.5
Bare Ground	2.7	49.2	0.6
Whole SAC	1.9	56.7	0.5

Table 14.27: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenario Under Emissions Scenario B [a]

Total Concentration (µg/m^3)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	-193.01	-173.98	-45.09	-42.16	-34.33	-21.25	-16.35	-0.53	-526.70
60	65	173.92	115.79	11.91	25.25	25.63	16.56	11.43	0.35	380.84
65	75	15.49	31.76	23.55	12.17	5.02	3.20	2.71	0.14	94.04
75	85	2.32	10.37	4.69	2.80	1.78	1.06	0.18	0.03	23.24
85	100	0.94	9.71	2.11	1.16	1.36	0.25	0.77	0.01	16.30
100	125	0.33	4.24	1.99	0.57	0.40	0.15	0.98	0.01	8.67
125	150	0.02	0.84	0.75	0.14	0.04	0.01	0.10	0.00	1.90
150	200	0.00	0.64	0.09	0.06	0.09	0.02	0.12	0.00	1.02
200	-	0.00	0.63	0.00	0.01	0.00	0.00	0.06	0.00	0.70
All >75		3.60	26.43	9.63	4.75	3.68	1.49	2.20	0.04	51.83

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.28: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 µg/m^3	1	614.42	1099.67	259.54	234.78	175.63	86.08	66.93	6.02	2543.07
	3	60.48	200.62	102.69	51.15	33.87	14.48	19.75	0.46	483.51
	5	15.86	101.85	42.36	19.36	15.13	5.07	10.95	0.19	210.79
	10	2.54	34.77	10.89	3.44	3.41	0.88	5.16	0.03	61.13
	30	0.00	2.65	0.40	0.10	0.17	0.02	0.39	0.00	3.75
	50	0.00	0.77	0.00	0.00	0.01	0.00	0.07	0.00	0.86

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

In Combination (Traffic) Impacts on Annual Mean NH_3

14.42 There is no traffic-related NH_3 emissions Scenario B.

In Combination (Traffic) Impacts on Nitrogen Deposition under Emissions Scenario B (EA Method)

14.43 Figure 14.15 (also see Figure A11.57 to Figure A11.60) shows the change in predicted nitrogen deposition caused by the Local Plan in combination with other projected traffic growth under emissions scenario B and using the EA deposition method. Increases are predicted over the entire SAC, with the greatest changes close to roads. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted to extend out around 300 m from the A22, 100 m from the A275, 110 m from Crowborough Road, 100 m from the B2026, 200 m from the A26, 120 m from New Road, 65 m from Kidd's Hill, and 40 m from Coleman's Hatch Road.

14.44 Figure 14.16 (also see Figure A11.61 to Figure A11.64) shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 14.16 is almost identical to the 0.1 kg-N/ha/yr contour described for Figure 14.15.

14.45 The areas shown in Figure 14.16 are also summarised in the first column of Table 14.29. This shows that 276.6 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load. Of this 276.6 ha, 167.3 ha are woodland, 46.2 ha are wet heath, and 17.2 ha are dry heath.

14.46 Table 14.30 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the

SAC as a whole is 0.06 kg-N/ha/yr, but the maximum predicted change to any one location is 8.1 kg-N/ha/yr. The maximum predicted change to heath is an increase of 4.3 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

14.47 Table 14.31 shows how the distribution of deposition fluxes will change as a result of the Local Plan in combination with other projected traffic growth. 0.15 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. An additional 0.84 ha is predicted to experience fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load) as a result of the Local Plan in combination with other projected traffic growth.

14.48 Table 14.32 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 613 ha of the SAC would experience an increase in deposition flux of at least 0.5% of the critical load, 277 ha would experience an increase of at least 1% of the critical load[92], and that 8.23 ha would experience a change of more than 10% of the critical load as a result of the Local Plan in combination with other projected traffic growth.

[92] This is marginally different from the figure given in Table 14.29, since a change greater than 1% of the critical load is predicted to a very small amount of bare ground where the critical load will not be exceeded.

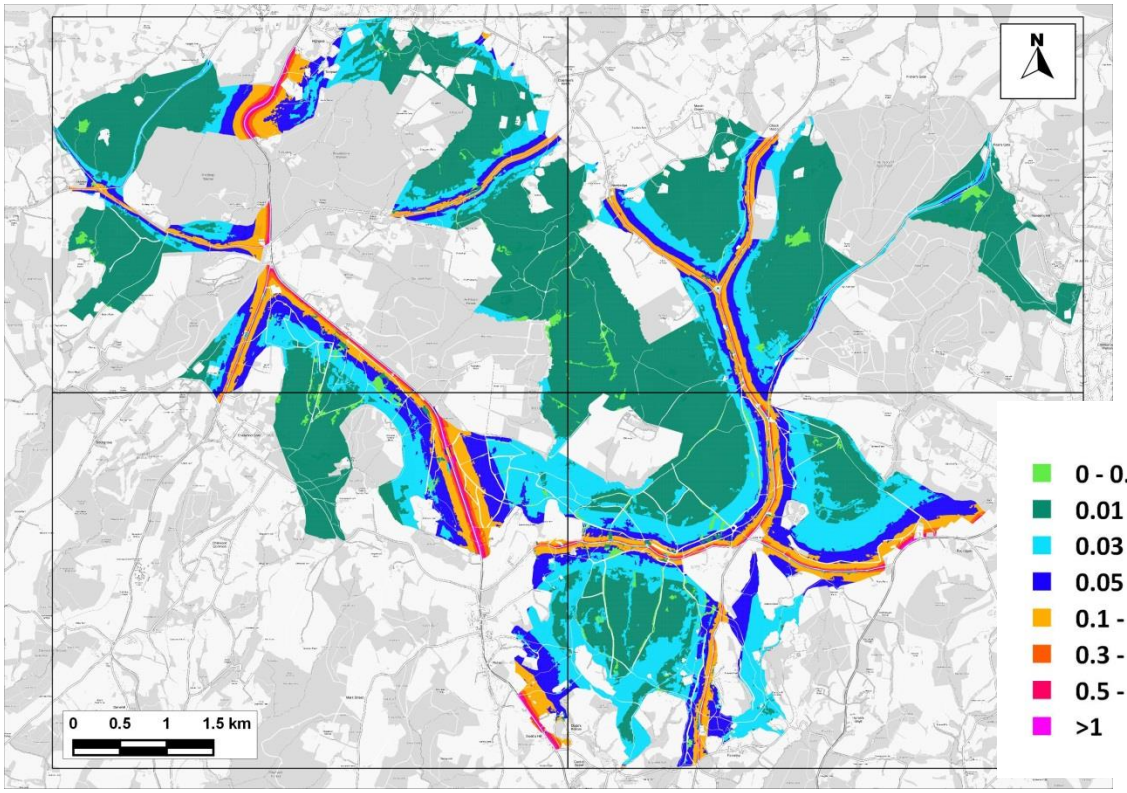


Figure 14.15: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios Under Emission Scenario B (EA Method) (kg-N/ha/yr)

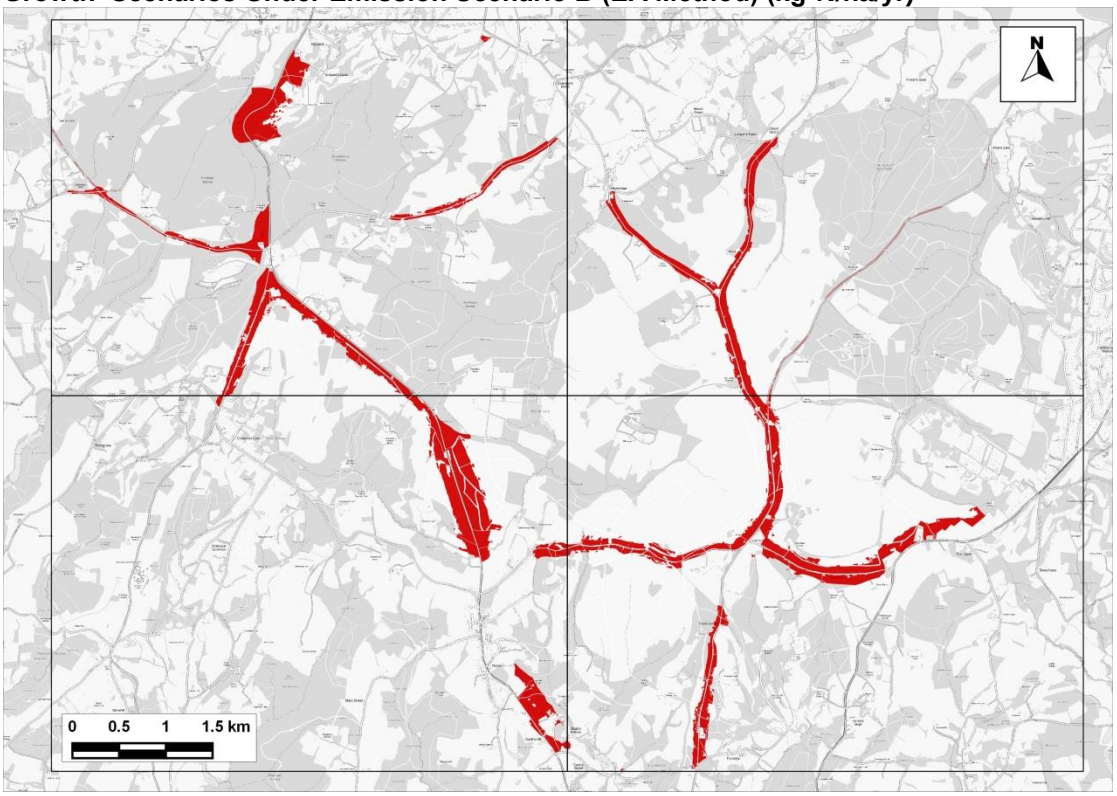


Figure 14.16: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (EA Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.29: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (EA Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	167.33	113.55	83.56
Bracken	22.25	9.34	0.07
Scattered Bracken	18.27	10.31	0.12
Dry Heath	17.23	0.89	0.00
Wet Heath	46.22	6.41	0.02
Grassland	5.12	0.18	0.01
Water	0.00	0.00	0.00
Bare Ground	0.22	0.00	0.00
Whole SAC	276.63	140.68	83.79

Table 14.30: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.078	8.1	0.043
Bracken	0.051	2.2	0.034
Scatt. Bracken	0.055	3.0	0.030
Dry Heath	0.032	4.3	0.031
Wet Heath	0.074	2.6	0.034
Grassland	0.040	2.5	0.029
Water	0.0049	0.1	0.006
Bare Ground	0.012	0.4	0.006
Whole SAC	0.060	8.1	0.006

Table 14.31: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	0.00	-0.15
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
12	14	-10.08	0.00	-17.55	0.00	0.00	-0.50	0.00	0.00	-28.13
14	16	10.02	0.00	16.21	-0.94	-1.07	0.49	0.00	0.00	24.71
16	18	0.07	0.00	1.22	0.76	0.95	0.01	0.00	0.00	3.00
18	20	0.00	0.00	0.10	0.13	0.06	0.00	0.00	0.00	0.29
20	22	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.00	0.07
22	24	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.05
24	26	0.00	-47.49	0.00	0.00	0.02	0.00	0.00	0.00	-47.46
26	28	0.00	37.21	0.00	0.00	0.00	0.00	0.00	0.00	37.21
28	30	0.00	7.74	0.00	0.00	0.00	0.00	0.00	0.00	7.74
30	32	0.00	1.34	0.00	0.00	0.00	0.00	0.00	0.00	1.34
32	34	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.13
34	36	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25
36	38	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
38	40	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
40	-	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.84
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.32: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	624.37	1202.05	260.70	236.22	181.06	86.47	16.35	0.34	2607.56
	0.3	178.60	635.16	171.60	114.61	89.84	31.34	6.57	0.04	1227.74
	0.5	62.32	327.36	104.44	55.03	45.79	15.54	2.94	0.01	613.43
	1	17.23	167.33	46.22	22.25	18.27	5.12	0.58	0.00	276.99
	3	2.00	53.26	9.31	3.63	3.94	0.60	0.02	0.00	72.77
	5	0.42	26.67	3.87	1.33	1.20	0.21	0.00	0.00	33.69
	10	0.00	7.26	0.52	0.18	0.23	0.03	0.00	0.00	8.23
15 kg-N/ha/yr	0.1	592.37	1145.96	252.43	234.65	176.51	85.11	11.42	0.20	2498.66
	0.3	76.09	377.99	116.34	61.87	52.35	18.12	3.73	0.02	706.51
	0.5	29.56	218.39	67.16	34.09	26.06	8.00	1.02	0.00	384.29
	1	8.40	113.55	25.66	11.40	11.72	2.74	0.32	0.00	173.78
	3	0.61	30.97	4.70	1.68	1.53	0.28	0.00	0.00	39.76
	5	0.01	13.33	1.25	0.47	0.45	0.05	0.00	0.00	15.58
	10	0.00	3.43	0.06	0.04	0.12	0.01	0.00	0.00	3.67
20 kg-N/ha/yr	0.1	415.30	1044.57	220.68	190.68	134.68	59.99	9.17	0.12	2075.19
	0.3	44.74	266.98	87.62	46.52	35.90	11.87	1.82	0.01	495.47
	0.5	17.23	167.33	46.22	22.25	18.27	5.12	0.58	0.00	276.99
	1	5.06	83.56	17.25	7.31	7.72	1.44	0.17	0.00	122.53
	3	0.16	19.75	2.57	0.86	0.81	0.09	0.00	0.00	24.23
	5	0.00	7.26	0.52	0.18	0.23	0.03	0.00	0.00	8.23
	10	0.00	2.55	0.01	0.00	0.08	0.01	0.00	0.00	2.65

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

In Combination (Traffic) Impacts on Nitrogen Deposition Under Emissions Scenario B (AQC Method)

14.49 Figure 14.17 (also see Figure A11.65 to Figure A11.68) shows the change in predicted nitrogen deposition caused by the Local Plan in combination with other projected traffic growth under

emissions scenario B and using the AQC deposition method. Increases are predicted over the entire SAC, with the greatest changes close to roads. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted to extend out approximately 260 m from the A22, 95 m from the A275, 85 m from Crowborough Road, 100 m from the B2026, 35 m from Coleman's Hatch Road, 230 m from the A26, 100 m from New Road, and 50 m from Kidd's Hill.

14.50 Figure 14.18 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 14.18 is almost identical to the 0.1 kg-N/ha/yr contour described for Figure 14.17.

14.51 The areas shown in Figure 14.18 are also summarised in the first column of Table 14.33. This shows that 202.9 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load. Of this 202.9 ha, 150 ha are woodland, 23.4 ha are wet heath, and 7.5 ha are dry heath.

14.52 Table 14.34 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.0046 kg-N/ha/yr, but the maximum predicted change to any one location is 6.3 kg-N/ha/yr. The maximum predicted change to heath is an increase of 2.5 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

14.53 Table 14.35 shows how the distribution of deposition fluxes will change as a result of the Local Plan in combination with other projected traffic growth. 0.74 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. An additional 0.49 ha is predicted to experience fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load) as a result of the Local Plan in combination with other projected traffic growth.

14.54 Table 14.36 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 425 ha of the SAC would experience an increase in deposition flux of at least 0.5% of the critical load, 203 ha would experience an increase of at least 1% of the critical load[93], and that 6.09 ha would experience a change of more than 10% of the critical load as a result of the Local Plan in combination with other projected traffic growth.

[93] This is marginally different from the figure given in Table 14.33, since a change greater than 1% of the critical load is predicted to a very small amount of bare ground where the critical load will not be exceeded.

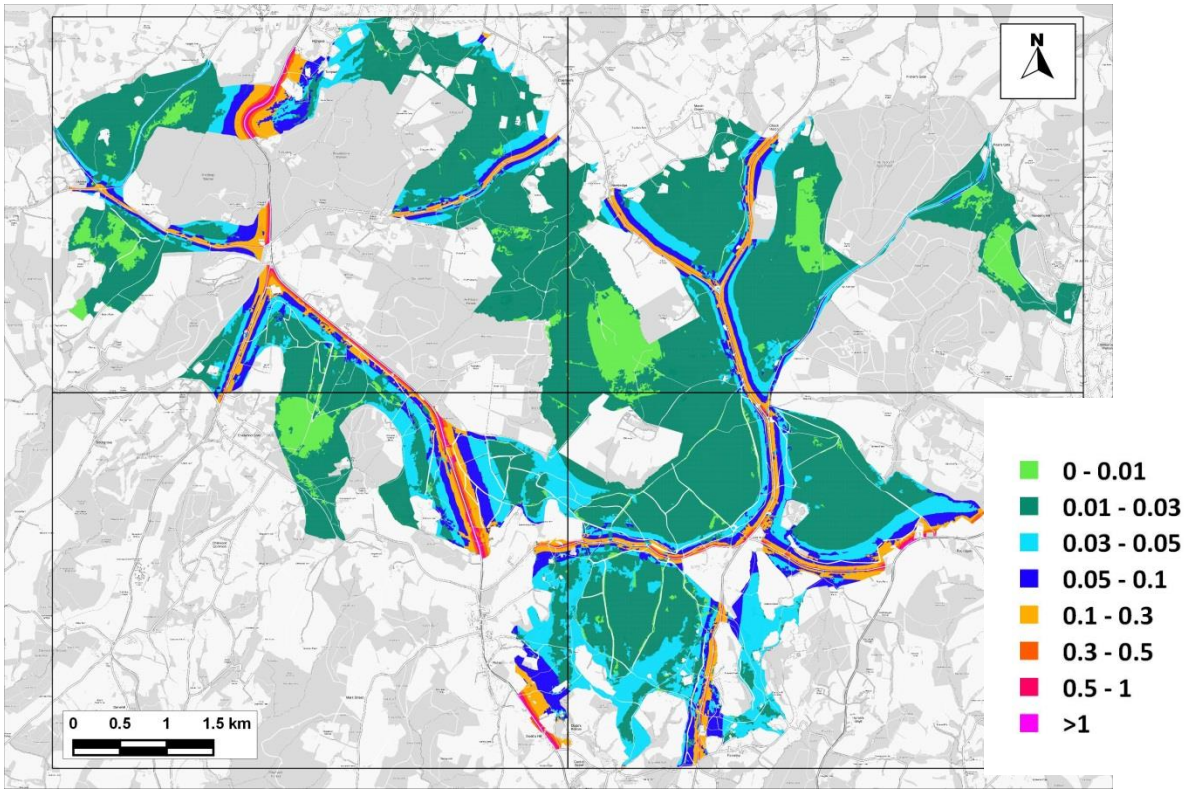


Figure 14.17: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method) (kg-N/ha/yr)

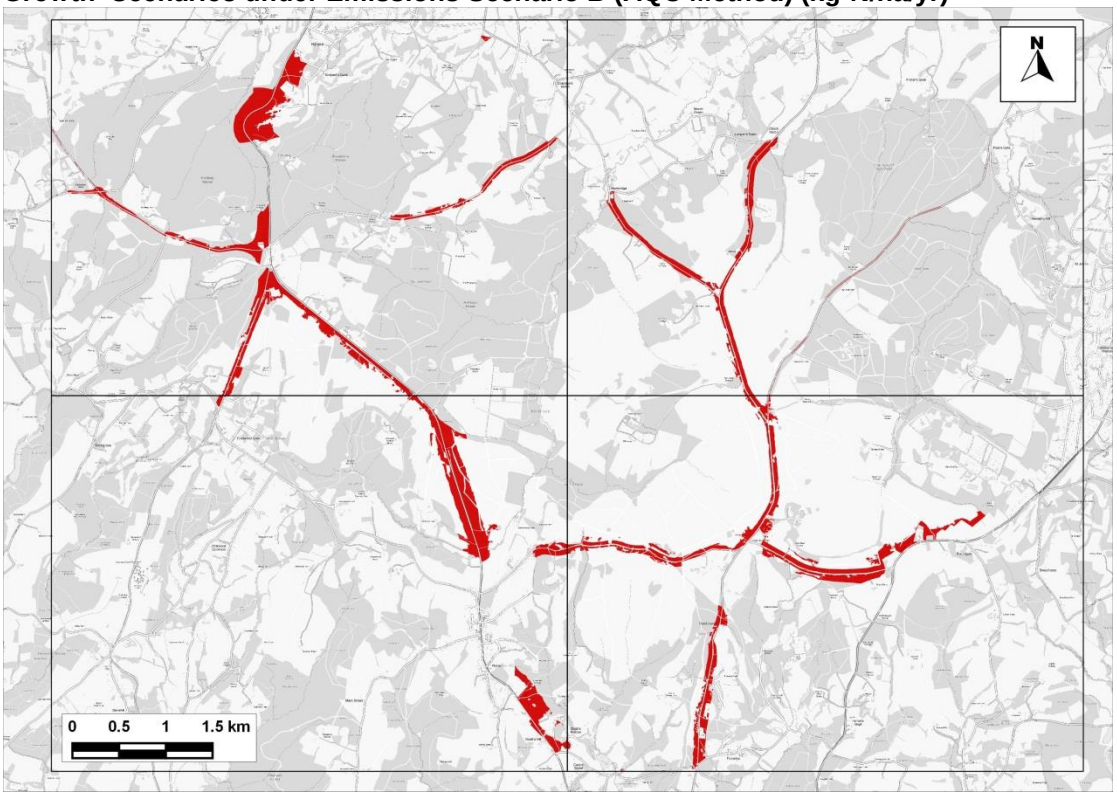


Figure 14.18: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.33: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	149.99	100.57	74.19
Bracken	9.09	0.68	0.00
Scattered Bracken	9.35	0.80	0.00
Dry Heath	7.46	0.00	0.00
Wet Heath	23.36	0.76	0.00
Grassland	2.78	0.04	0.00
Water	0.00	0.00	0.00
Bare Ground	0.82	0.00	0.00
Whole SAC	202.85	102.86	74.20

Table 14.34: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario B (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.069	6.3	0.037
Bracken	0.029	1.4	0.019
Scatt. Bracken	0.031	1.7	0.017
Dry Heath	0.020	2.5	0.019
Wet Heath	0.046	1.6	0.021
Grassland	0.027	1.6	0.020
Water	0.0067	0.1	0.008
Bare Ground	0.017	0.5	0.008
Whole SAC	0.046	6.3	0.008

Table 14.35: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.69	-0.05	-0.74
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.05	0.74
12	14	-0.36	0.00	-2.13	-2.53	-3.04	-0.06	0.00	0.00	-8.12
14	16	0.36	0.00	2.03	2.45	2.95	0.05	0.00	0.00	7.84
16	18	0.00	0.00	0.09	0.07	0.03	0.00	0.00	0.00	0.20
18	20	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.00	0.08
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	-43.67	0.00	0.00	0.00	0.00	0.00	0.00	-43.67
26	28	0.00	36.47	0.00	0.00	0.00	0.00	0.00	0.00	36.47
28	30	0.00	5.44	0.00	0.00	0.00	0.00	0.00	0.00	5.44
30	32	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.60
32	34	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.29
34	36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	38	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.14
38	40	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25
40	-	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.49
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.05	0.74

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.36: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario B (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	543.51	1199.42	239.65	210.79	153.01	85.28	24.54	0.59	2456.81
	0.3	66.37	559.00	107.82	52.19	40.40	17.89	8.80	0.09	852.56
	0.5	25.87	277.95	60.23	26.95	20.61	8.19	5.57	0.03	425.39
	1	7.46	149.99	23.36	9.09	9.35	2.78	1.29	0.00	203.32
	3	0.49	46.78	4.33	1.26	1.15	0.31	0.16	0.00	54.47
	5	0.00	22.79	1.15	0.34	0.29	0.06	0.00	0.00	24.63
	10	0.00	5.91	0.05	0.02	0.10	0.02	0.00	0.00	6.09
15 kg-N/ha/yr	0.1	331.31	1117.34	199.42	135.79	103.93	52.36	15.28	0.32	1955.75
	0.3	31.94	313.31	68.59	31.41	23.63	9.97	6.27	0.03	485.15
	0.5	12.11	193.30	35.15	14.52	13.84	4.45	2.65	0.01	276.02
	1	3.32	100.57	13.05	4.88	5.12	1.09	0.54	0.00	128.56
	3	0.02	26.83	1.61	0.47	0.42	0.07	0.01	0.00	29.43
	5	0.00	10.75	0.20	0.10	0.16	0.03	0.00	0.00	11.24
	10	0.00	2.98	0.00	0.00	0.03	0.00	0.00	0.00	3.02
20 kg-N/ha/yr	0.1	155.48	900.95	161.07	84.58	68.23	31.56	11.91	0.22	1414.00
	0.3	18.76	235.08	47.77	20.73	17.21	6.15	4.21	0.02	349.91
	0.5	7.46	149.99	23.36	9.09	9.35	2.78	1.29	0.00	203.32
	1	1.69	74.19	8.56	2.96	2.93	0.63	0.35	0.00	91.32
	3	0.00	16.61	0.65	0.18	0.23	0.04	0.00	0.00	17.71
	5	0.00	5.91	0.05	0.02	0.10	0.02	0.00	0.00	6.09
	10	0.00	2.16	0.00	0.00	0.00	0.00	0.00	0.00	2.16

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Emissions Scenario C

In Combination (Traffic) impacts on Annual Mean NOx – Emissions Scenario C

14.55 Figure 14.19 (see also Figure A11.73 to Figure A11.76) shows the change in predicted annual

mean NOx concentrations caused by the Local Plan in combination with other projected traffic growth under NOx emissions scenario C. Changes are predicted over the entire SAC, with the greatest changes predicted near to roads. Changes greater than 0.3 μg/m^3 (which represents 1% of the 30 μg/m^3 critical level) are predicted to extend out approximately 250 m from the A22 and A26, 100 m from Crowborough Road, 250 m from New Road, 75 m from the A275, 50 m from Kidd's Hill, and 50 m from Hindleap Lane.

14.56 Figure 14.20 (see also Figure A11.77 to Figure A11.80) shows the area over which a change of more than 0.3 μg/m^3 is predicted and total concentrations with the Plan are also predicted to be above the 30 μg/m^3 critical level. In practice, this is entirely limited by the extent of the 30 μg/m^3 contour from Figure 12.10 and so these results are very similar to those presented for the Local Plan in isolation in Chapter 13. Exceedences of both the critical level and the 1% criterion are thus predicted out to around 3 m from the A22 and 1 m from the A26.

14.57 The areas shown in Figure 14.20 are also summarised in the middle column of Table 14.37. This shows that 0.09 ha (900 m^2) of the SAC is predicted to experience both an exceedence of the 30 μg/m^3 critical level and also an increase of more than 1% of this critical level as result of the Local Plan in combination with other predicted traffic growth. All of this is woodland and none is currently heath. Table 14.37 also shows the equivalent figures using the upper- and lower-bound uncertainty ranges to the critical level as identified by CEH. In the case of the lower bound critical level, a total of 6.63 ha would experience both an exceedence of 15 μg/m^3 as a total concentration and also a change of more than 1% of this value as a result of the Local Plan in combination with other projected traffic growth. For the upper-bound level, none of the SAC would be thus affected.

14.58 Table 14.38 shows the average, maximum, and minimum changes in predicted annual mean NOx concentrations to the various habitats. It shows, for example, that the average predicted change in NOx concentrations to the SAC as a whole is 0.18 μg/m^3, but the maximum predicted change to any one location is 8.6 μg/m^3. This maximum change is predicted to occur to an area of woodland immediately north of the junction of the A22 with Hindleap Lane. The maximum predicted change to heath is 8.1 μg/m^3, which is predicted to occur beside the A22 between Wych Cross and Forest Row.

14.59 Table 14.39 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth under emissions scenario B. As an example of interpreting this table, 477.8 ha of the SAC will move from experiencing concentrations below 8 μg/m^3 to experiencing concentrations above this level as a result of the Local Plan with other projected traffic growth. An additional 0.53 ha will move into the 25 to 30 μg/m^3 band as a result of the Local Plan in combination with other traffic. The Local Plan in combination with other projected traffic growth will cause an additional 0.09 ha (900 m^2) of the SAC to exceed the 30 μg/m^3 critical level.

14.60 Table 14.40 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table

shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. To give an example of how to interpret this table, it shows that a total of 320.9 ha are predicted to experience an increase in annual mean concentrations greater than 1% of the 30 μg/m^3 critical level, of which 66.65 ha are wet heath and 31.26 ha are dry heath.

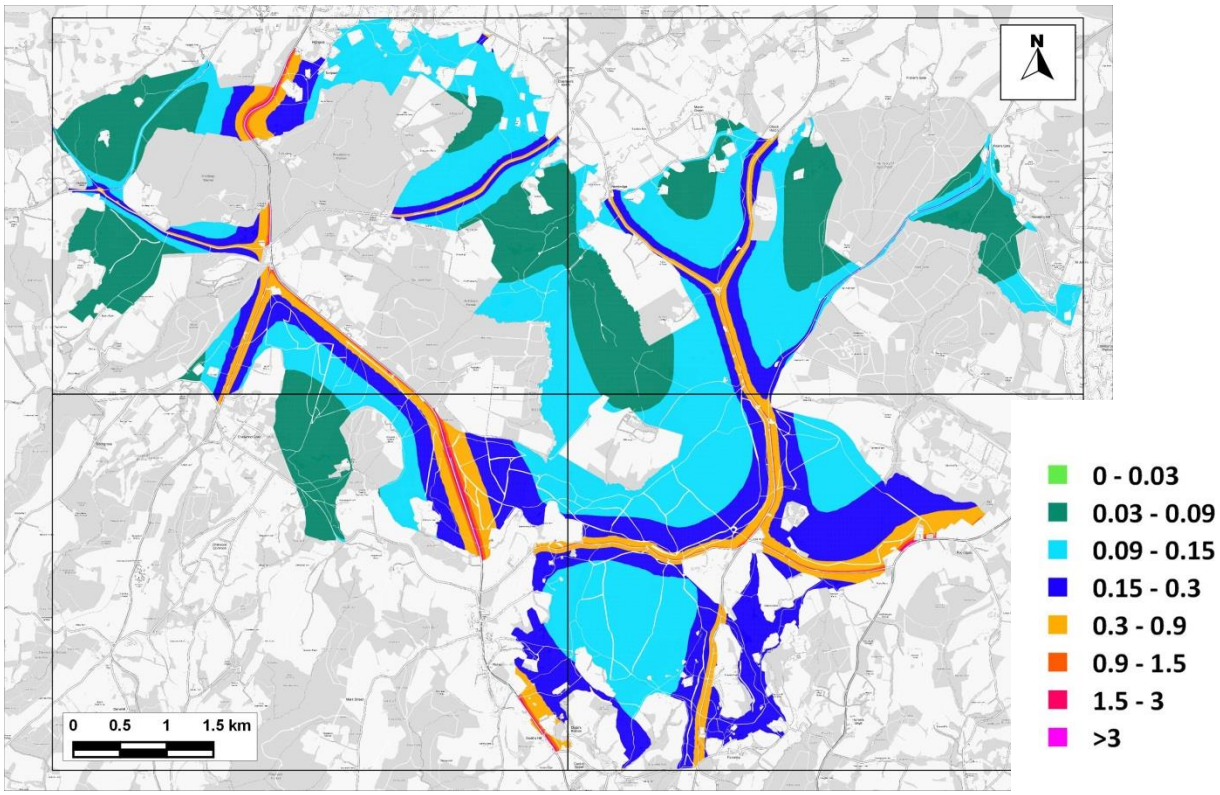


Figure 14.19: Change in Predicted Annual Mean NOx Comparing 'With Plan' to 'No Growth' Under Emissions Scenario C (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

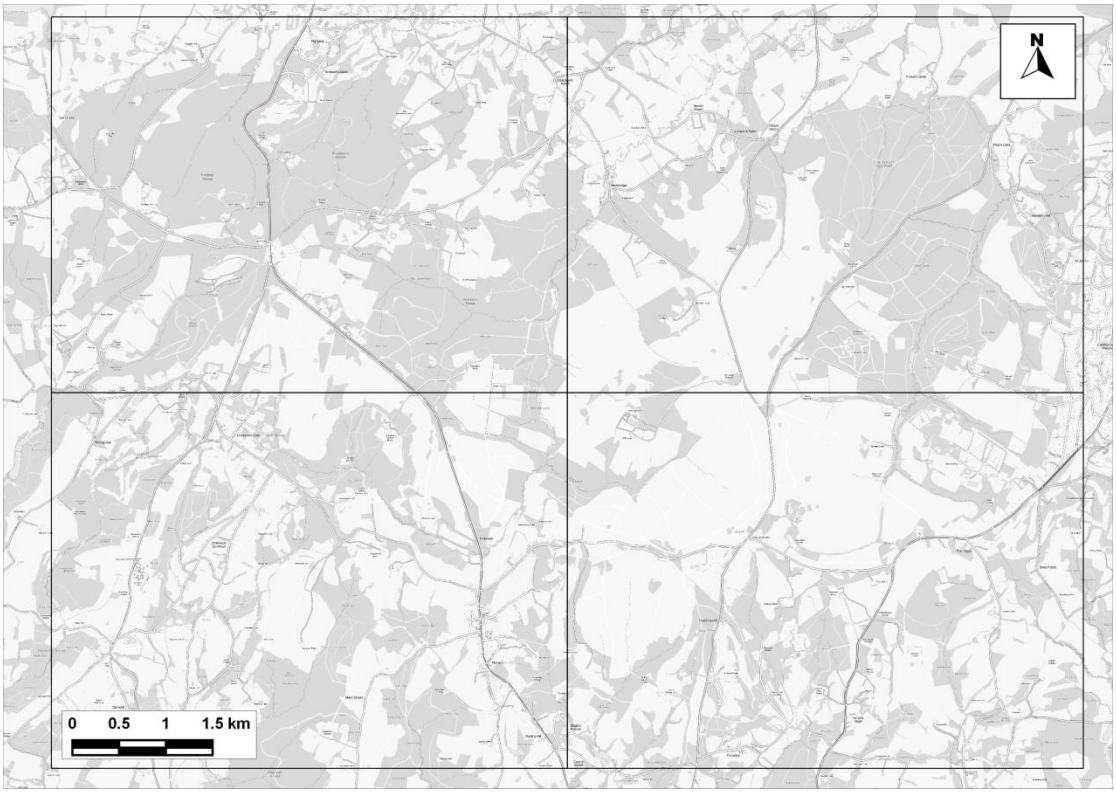


Figure 14.20: Areas in SAC Predicted to Experience an Increase in Annual Mean NOx Concentrations Greater than 1% of the 30 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.37: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Annual Mean NOx Greater than 1% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (hectares)

Land Use	15 μg/m^3 Assessment Level	30 μg/m^3 Critical Level	45 μg/m^3 Assessment Level
Woodland	4.70	0.09	0.00
Bracken	0.31	0.00	0.00
Scattered Bracken	0.22	0.00	0.00
Dry Heath	0.01	0.00	0.00
Wet Heath	0.78	0.00	0.00
Grassland	0.06	0.00	0.00
Water	0.00	0.00	0.00
Bare Ground	0.54	0.00	0.00
Whole SAC	6.63	0.09	0.00

Table 14.38: In Combination (Traffic) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C

Land Use	µg/m^3 Change		
	Average	Maximum	Minimum
Woodland	0.18	8.6	0.04
Bracken	0.18	4.8	0.06
Scatt. Bracken	0.18	5.0	0.05
Dry Heath	0.14	8.1	0.05
Wet Heath	0.25	5.4	0.07
Grassland	0.16	4.8	0.05
Water	0.12	2.1	0.05
Bare Ground	0.27	6.9	0.05
Whole SAC	0.18	8.6	0.04

Table 14.39: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C [a]

Total Concentration (µg/m^3)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	-154.07	-174.69	-44.53	-38.47	-30.28	-21.37	-13.78	-0.59	-477.78
8	10	152.07	155.17	37.77	35.88	27.59	20.69	11.75	0.57	441.49
10	12	1.68	13.46	4.02	1.84	2.18	0.50	0.82	0.01	24.51
12	14	0.31	3.38	1.48	0.42	0.35	0.13	0.84	0.00	6.91
14	18	0.02	1.45	1.18	0.25	0.08	0.02	0.20	0.00	3.20
18	20	0.00	0.04	0.06	0.02	0.03	0.00	-0.01	0.00	0.14
20	25	0.00	0.64	0.03	0.04	0.06	0.01	0.14	0.00	0.92
25	30	0.00	0.48	0.00	0.01	0.00	0.00	0.04	0.00	0.53
30	35	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
35	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All >30		0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.09

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.40: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.5	615.91	1125.64	259.86	235.20	177.27	86.44	66.94	6.02	2573.27
	1	339.55	519.56	194.29	130.27	98.56	42.80	42.71	1.50	1369.25
	3	9.84	80.63	30.80	13.18	11.54	3.61	9.40	0.14	159.14
	5	2.70	36.71	11.43	3.77	3.66	0.93	5.42	0.03	64.64
	10	0.11	8.45	2.81	0.61	0.42	0.15	0.97	0.00	13.53
30 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	615.91	1125.64	259.86	235.20	177.27	86.44	66.94	6.02	2573.27
	0.5	339.55	519.56	194.29	130.27	98.56	42.80	42.71	1.50	1369.25
	1	31.26	144.61	66.65	33.68	21.52	8.52	14.33	0.32	320.89
	3	1.51	26.26	8.32	2.43	2.24	0.60	3.89	0.02	45.27
	5	0.11	8.45	2.81	0.61	0.42	0.15	0.97	0.00	13.53
	10	0.00	2.26	0.14	0.07	0.13	0.02	0.31	0.00	2.92
45 µg/m^3	0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	0.3	339.55	519.56	194.29	130.27	98.56	42.80	42.71	1.50	1369.25
	0.5	57.77	197.53	100.11	50.27	32.82	13.99	19.16	0.45	472.11
	1	9.84	80.63	30.80	13.18	11.54	3.61	9.40	0.14	159.14
	3	0.28	10.90	3.60	0.81	0.64	0.23	1.38	0.00	17.84
	5	0.00	3.47	0.77	0.20	0.22	0.04	0.50	0.00	5.19
	10	0.00	1.03	0.01	0.00	0.03	0.00	0.11	0.00	1.18

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

In Combination (Traffic) Impacts on 24-hour Mean NOx under Emissions Scenario C

14.61

14.62 Figure 14.21 (also see Figure A11.81 to Figure A11.84) shows the change in predicted maximum

24-hour mean NOx concentrations caused by the Local Plan in combination with other predicted traffic growth under emissions scenario C. Increases are predicted across the entire SAC, but away from roads, these changes are more modest. Changes greater than 7.5 μg/m^3 (which represents 10% of the 75 μg/m^3 critical level) are predicted out approximately 50 m from the A22, 10 m from the A275, 8 m from Crowborough Road, 10 m from the B2026, 25 m from New Road, and 50 m from the A26.

14.63 Figure 14.22 (also see Figure A11.85 to Figure A11.88) shows the area over which there is both a change of more than 7.5 μg/m^3 and also a predicted exceedence (in the With Plan scenario) of the critical level. In practice, since the footprint of exceedences of the critical level is much larger than the footprint over which there will be a change greater than 10% of the critical level, the area shown in Figure 14.14 is identical to the area shown in orange in Figure 14.13. These areas are summarised in Table 14.41, which shows that the parts of the SAC highlighted red in Figure 14.22 cover a total of 27.27 ha, of which 5.27 ha are wet heath and 0.61 ha is dry heath.

14.64 Table 14.42 shows the average, maximum, and minimum changes in predicted maximum 24-hour NOx concentrations to the various habitats. It shows, for example, that the maximum predicted change in maximum 24-hour NOx concentrations to any one location is 42.2 μg/m^3. This is predicted at an area of woodland beside the A22 between Wych Cross and Forest Row. The maximum predicted change to heath is 42.0 μg/m^3, which is also predicted to occur beside the A22 between Wych Cross and Forest Row.

14.65 Table 14.43 shows how the concentration distribution will change across the SAC as a result of the Local Plan in combination with other projected traffic growth. 196.2 ha will move from experiencing concentrations below 60 μg/m^3 to above this level. The area exceeding 200 μg/m^3 is predicted to increase by 0.02 ha. The Local Plan in combination with other projected traffic growth will cause an additional 29.31 ha of the SAC to exceed the critical level; of which 1.35 ha is dry heath and 5.17 ha are wet heath.

14.66 Table 14.44 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 27.27 ha will experience an increase in 24-hour mean NOx of at least 10% of the critical level, while 0.15 ha (1,500 m^2) will experience increases of at least 50% of the critical level.

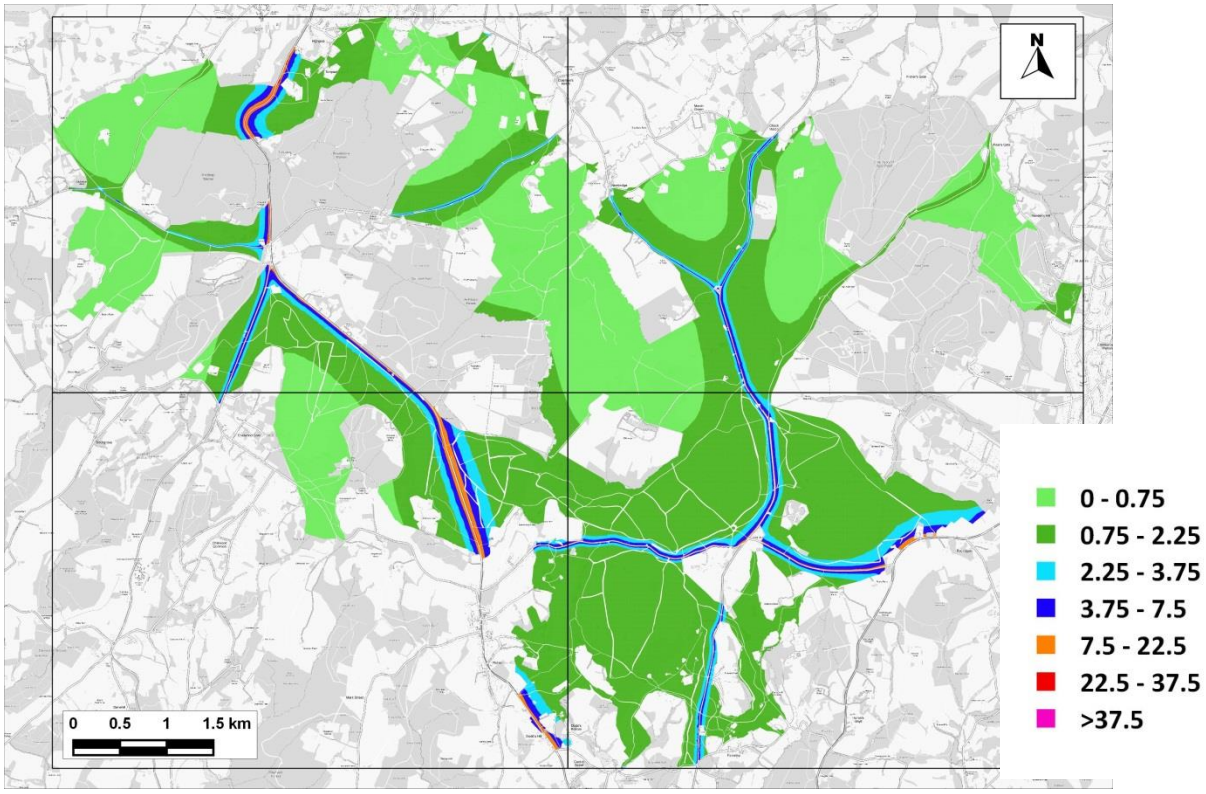


Figure 14.21: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' to 'No Growth' under Emissions Scenario C (μg/m^3)

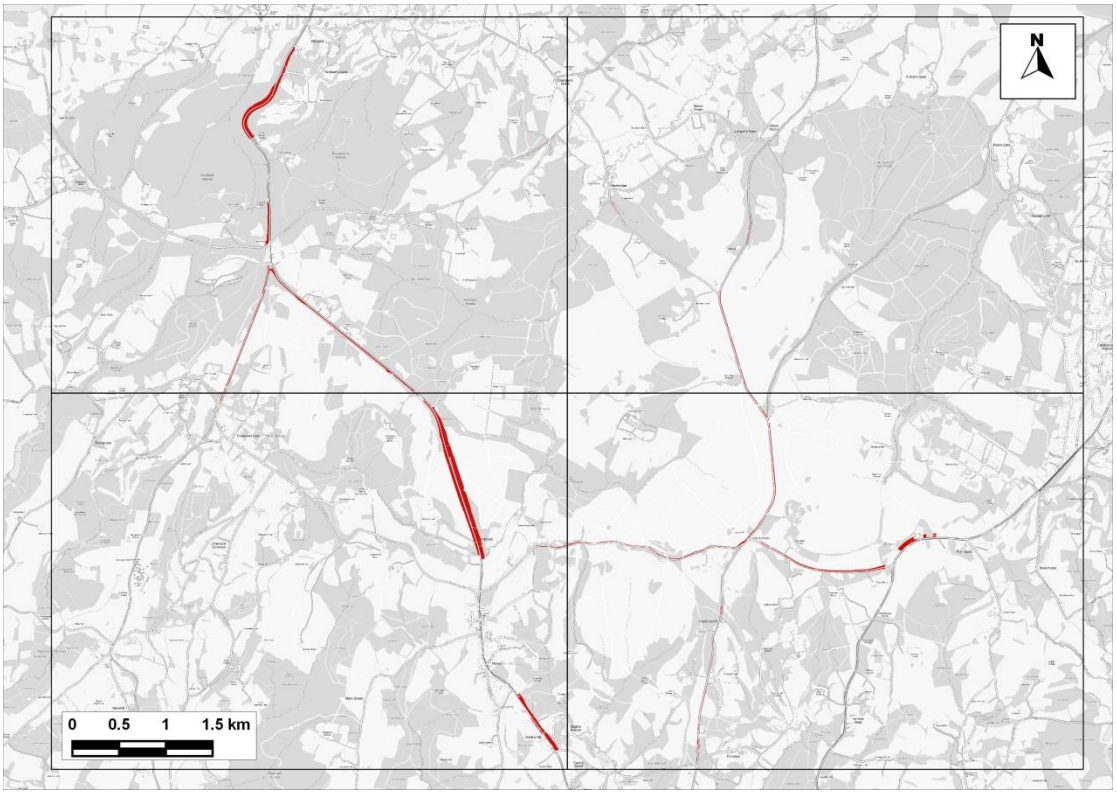


Figure 14.22: Areas in SAC Predicted to Experience an Increase in 24-hour Mean NOx Concentrations Greater than 10% of the 75 μg/m^3 Critical Level where the Critical Level would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.41: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Maximum 24-hour Mean NOx Greater than 10% of the Critical Level, where the Critical Level will also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (hectares)

Land Use	75 μg/m^3 Critical Level
Woodland	16.47
Bracken	1.30
Scattered Bracken	1.11
Dry Heath	0.61
Wet Heath	5.27
Grassland	0.38
Water	0.01
Bare Ground	2.12
Whole SAC	27.27

Table 14.42: In Combination (Traffic) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C

Land Use	μg/m^3 Change		
	Average	Maximum	Minimum
Woodland	1.3	42.2	0.3
Bracken	1.3	24.9	0.4
Scattered Bracken	1.3	28.0	0.4
Dry Heath	1.0	42.0	0.4
Wet Heath	1.8	30.0	0.5
Grassland	1.2	26.8	0.3
Water	0.9	13.2	0.4
Bare Ground	1.9	36.3	0.4
Whole SAC	1.3	42.2	0.3

Table 14.43: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' to 'No Growth' Scenario Under Emissions Scenario C [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	-33.58	-73.96	-44.70	-16.62	-15.27	-6.14	-5.84	-0.12	-196.24
60	65	25.00	41.51	28.70	7.41	9.61	3.88	3.63	0.02	119.75
65	75	7.24	16.14	10.83	7.22	3.64	1.83	0.19	0.09	47.18
75	85	0.93	9.14	2.29	1.11	1.41	0.21	0.74	0.01	15.84
85	100	0.39	4.55	1.65	0.56	0.46	0.18	0.92	0.01	8.71
100	125	0.02	1.39	1.15	0.24	0.08	0.02	0.19	0.00	3.09
125	150	0.00	0.28	0.08	0.05	0.06	0.01	0.06	0.00	0.54
150	200	0.00	0.94	0.01	0.02	0.02	0.01	0.12	0.00	1.11
200	-	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
All >75		1.35	16.32	5.17	1.98	2.02	0.43	2.02	0.01	29.31

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.44: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 $\mu g/m^3$	1	418.63	636.32	214.50	162.76	113.97	57.48	46.35	2.67	1652.69
	3	22.46	121.36	53.17	25.48	17.84	6.37	12.45	0.25	259.38
	5	5.92	59.09	20.59	7.59	7.56	2.30	7.77	0.07	110.89
	10	0.61	16.47	5.27	1.30	1.11	0.38	2.12	0.01	27.27
	30	0.00	1.51	0.03	0.01	0.06	0.01	0.18	0.00	1.79
	50	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.15

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

In Combination (Traffic) Impacts on Annual Mean NH_3

14.67 There is no traffic-related NH_3 emissions Scenario C.

In Combination (Traffic) Impacts on Nitrogen Deposition under Emissions Scenario C (EA Method)

14.68 Figure 14.23 (also see Figure A11.89 to Figure A11.92) shows the change in predicted nitrogen deposition caused by the Local Plan in combination with other projected traffic growth under emissions scenario C and using the EA deposition method. Increases are predicted over the entire SAC, with the greatest changes close to roads. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted to extend out approximately 260 m from the A22, 90 m from the 275, 95 m from Crowborough Road, 100 m from the B2026, 90 m from New Road, and 200 m from the A26.

14.69 Figure 14.24 (also see Figure A11.93 to Figure A11.96) shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 14.24 is almost identical to the 0.1 kg-N/ha/yr contour described for Figure 14.23.

14.70 The areas shown in Figure 14.24 are also summarised in the first column of Table 14.45. This shows that 214.49 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load. Of this 214.49 ha, 140.54 ha are woodland, 31.44 ha are wet heath, and 10.54 ha are dry heath.

14.71 Table 14.46 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.05 kg-N/ha/yr, but the maximum predicted change to any one location is 6.8 kg-N/ha/yr. The maximum predicted change to heath is an increase of 3.4 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

14.72 Table 14.47 shows how the distribution of deposition fluxes will change as a result of the Local Plan in combination with other projected traffic growth. 0.04 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. An additional 0.51 ha is predicted to experience fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load) as a result of the Local Plan in combination with other projected traffic growth.

14.73 Table 14.48 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 458 ha of the SAC would experience an increase in deposition flux of at least 0.5% of the critical load, 215 ha would experience an increase of at least 1% of the critical load, and that 5.83 ha would experience a change of more than 10% of the critical load as a result of the Local Plan in combination with other

projected traffic growth.

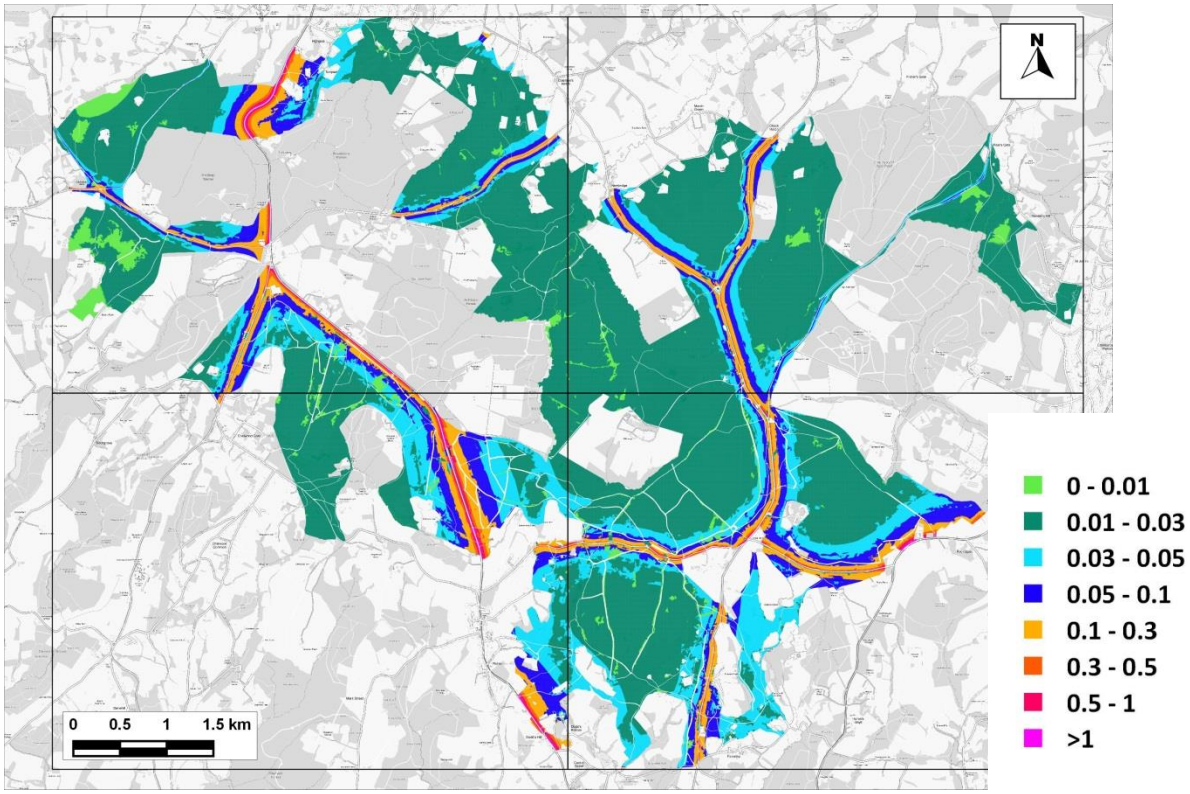


Figure 14.23: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios Under Emission Scenario C (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

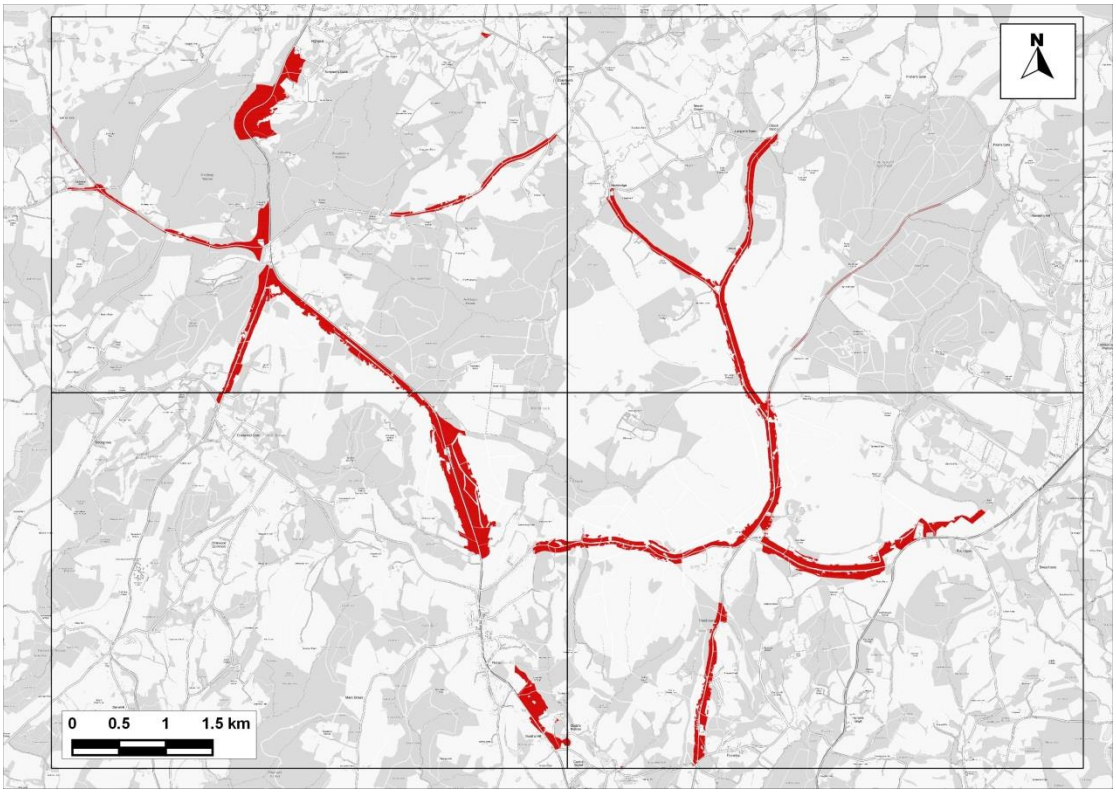


Figure 14.24: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (EA Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.45: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (EA Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	140.54	93.77	69.02
Bracken	14.42	3.65	0.02
Scattered Bracken	14.03	5.27	0.08
Dry Heath	10.54	0.22	0.00
Wet Heath	31.44	3.00	0.00
Grassland	3.49	0.06	0.00
Water	0.00	0.00	0.00
Bare Ground	0.04	0.00	0.00
Whole SAC	214.49	105.96	69.13

Table 14.46: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.064	6.8	0.033
Bracken	0.038	1.8	0.025
Scatt. Bracken	0.042	2.4	0.022
Dry Heath	0.024	3.4	0.022
Wet Heath	0.057	2.1	0.025
Grassland	0.030	2.0	0.021
Water	0.004	0.1	0.004
Bare Ground	0.009	0.3	0.004
Whole SAC	0.048	6.8	0.004

Table 14.47: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.04
10	12	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04
12	14	-1.95	0.00	-5.03	-4.60	-5.49	-0.23	0.00	0.00	-17.30
14	16	1.94	0.00	4.48	4.14	4.94	0.21	0.00	0.00	15.71
16	18	0.01	0.00	0.51	0.38	0.48	0.01	0.00	0.00	1.39
18	20	0.00	0.00	0.04	0.06	0.01	0.01	0.00	0.00	0.11
20	22	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.05
22	24	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03
24	26	0.00	-25.64	0.00	0.00	0.00	0.00	0.00	0.00	-25.64
26	28	0.00	20.49	0.00	0.00	0.00	0.00	0.00	0.00	20.49
28	30	0.00	3.83	0.00	0.00	0.00	0.00	0.00	0.00	3.83
30	32	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25
32	34	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25
34	36	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
36	38	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09
38	40	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25
40	-	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.51
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.48: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	610.33	1184.39	259.62	235.18	178.02	86.11	12.63	0.25	2566.53
	0.3	94.01	487.87	129.92	71.86	60.42	20.80	4.91	0.02	869.81
	0.5	37.81	257.54	78.16	41.07	31.26	10.10	1.64	0.01	457.58
	1	10.54	140.54	31.44	14.42	14.03	3.49	0.43	0.00	214.88
	3	0.96	43.16	6.19	2.41	2.23	0.39	0.00	0.00	55.33
	5	0.10	20.74	2.26	0.75	0.71	0.07	0.00	0.00	24.63
	10	0.00	5.40	0.15	0.10	0.17	0.02	0.00	0.00	5.83
15 kg-N/ha/yr	0.1	404.23	1067.51	218.43	186.66	132.38	58.28	9.31	0.13	2076.92
	0.3	45.01	285.44	87.82	46.61	36.10	11.95	2.12	0.01	515.06
	0.5	17.87	180.41	47.22	22.76	18.56	5.22	0.64	0.00	292.67
	1	5.38	93.77	18.09	7.70	8.08	1.54	0.21	0.00	134.75
	3	0.22	24.68	2.87	0.98	0.92	0.12	0.00	0.00	29.78
	5	0.00	9.77	0.64	0.21	0.26	0.04	0.00	0.00	10.91
	10	0.00	2.94	0.02	0.01	0.09	0.01	0.00	0.00	3.06
20 kg-N/ha/yr	0.1	224.01	768.89	185.73	135.62	106.23	37.94	7.56	0.05	1466.03
	0.3	26.60	220.57	62.61	31.15	24.28	7.30	1.01	0.00	373.53
	0.5	10.54	140.54	31.44	14.42	14.03	3.49	0.43	0.00	214.88
	1	2.85	69.02	11.66	4.88	5.21	0.76	0.10	0.00	94.49
	3	0.01	15.21	1.23	0.47	0.44	0.05	0.00	0.00	17.41
	5	0.00	5.40	0.15	0.10	0.17	0.02	0.00	0.00	5.83
	10	0.00	2.17	0.00	0.00	0.04	0.00	0.00	0.00	2.22

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

In Combination (Traffic) Impacts on Nitrogen Deposition Under Emissions Scenario C (AQC Method)

14.74 Figure 14.25 (also see Figure A11.97 to Figure A11.100) shows the change in predicted nitrogen deposition caused by the Local Plan in combination with other projected traffic growth under

emissions scenario C and using the AQC deposition method. Increases are predicted over the entire SAC, with the greatest changes close to roads. Changes greater than 0.1 kg-N/ha/yr (which represents 1% of the 10 kg-N/ha/yr critical load) are predicted to extend out approximately 240 m from the A22, 80 m from the A275, 80 m from Crowborough Road, 95 m from the B2026, 75 m from New Road, and 200 m from the A26.

14.75 Figure 14.26 shows the area over which a change of more than 0.1 kg-N/ha/yr is predicted and total deposition fluxes with the Plan are also predicted to be above the 10 kg-N/ha/yr critical load. In practice, since the critical load is predicted to be exceeded across almost the entire SAC, the line shown in Figure 14.26 is almost identical to the 0.1 kg-N/ha/yr contour described for Figure 14.25.

14.76 The areas shown in Figure 14.26 are also summarised in the first column of Table 14.49. This shows that 169 ha of the SAC are predicted to experience both an exceedence of the 10 kg-N/ha/yr critical load and also an increase of more than 1% of this critical load. Of this 169 ha, 128.32 ha are woodland, 18.41 ha are wet heath, and 5.44 ha are dry heath.

14.77 Table 14.50 shows the average, maximum, and minimum changes in predicted deposition fluxes to the various habitats. It shows, for example, that the average predicted change in deposition to the SAC as a whole is 0.04 kg-N/ha/yr, but the maximum predicted change to any one location is 5.8 kg-N/ha/yr. The maximum predicted change to heath is an increase of 2.2 kg-N/ha/yr. Both of these changes are predicted to occur at the immediate kerbside of the A22 between Wych Cross and Forest Row.

14.78 Table 14.51 shows how the distribution of deposition fluxes will change as a result of the Local Plan in combination with other projected traffic growth. 0.14 ha of the SAC will move from being below to above the 10 kg-N/ha/yr critical load. This is all either bare ground or open water, reflecting the point that all other cover types already exceed the critical load. An additional 0.20 ha is predicted to experience fluxes greater than 40 kg-N/ha/yr (i.e. four times the critical load) as a result of the Local Plan in combination with other projected traffic growth.

14.79 Table 14.52 shows the area-wide changes in predicted concentrations in a different way. This summarises the change in concentration that would be expected over different areas. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage increase. It shows, for example, that 346 ha of the SAC would experience an increase in deposition flux of at least 0.5% of the critical load, 169 ha would experience an increase of at least 1% of the critical load, and that 4.52 ha would experience a change of more than 10% of the critical load as a result of the Local Plan in combination with other projected traffic growth.

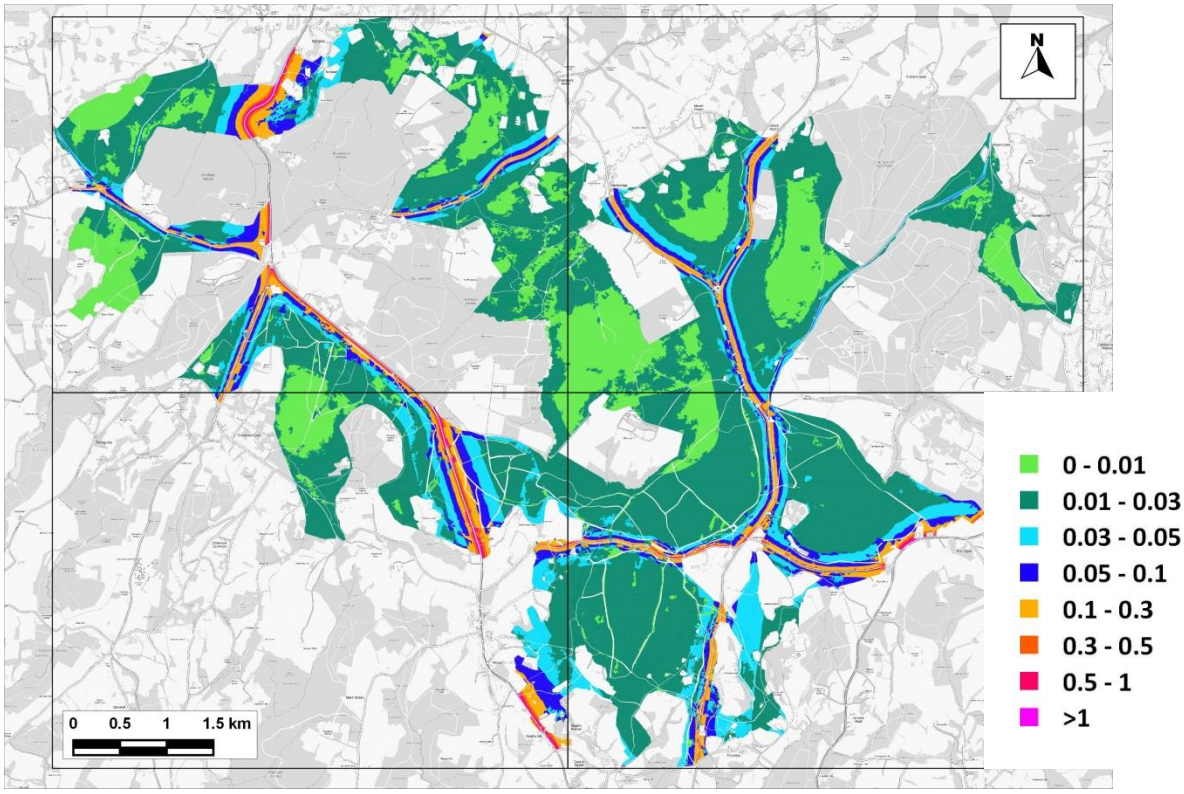


Figure 14.25: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method) (kg-N/ha/yr)

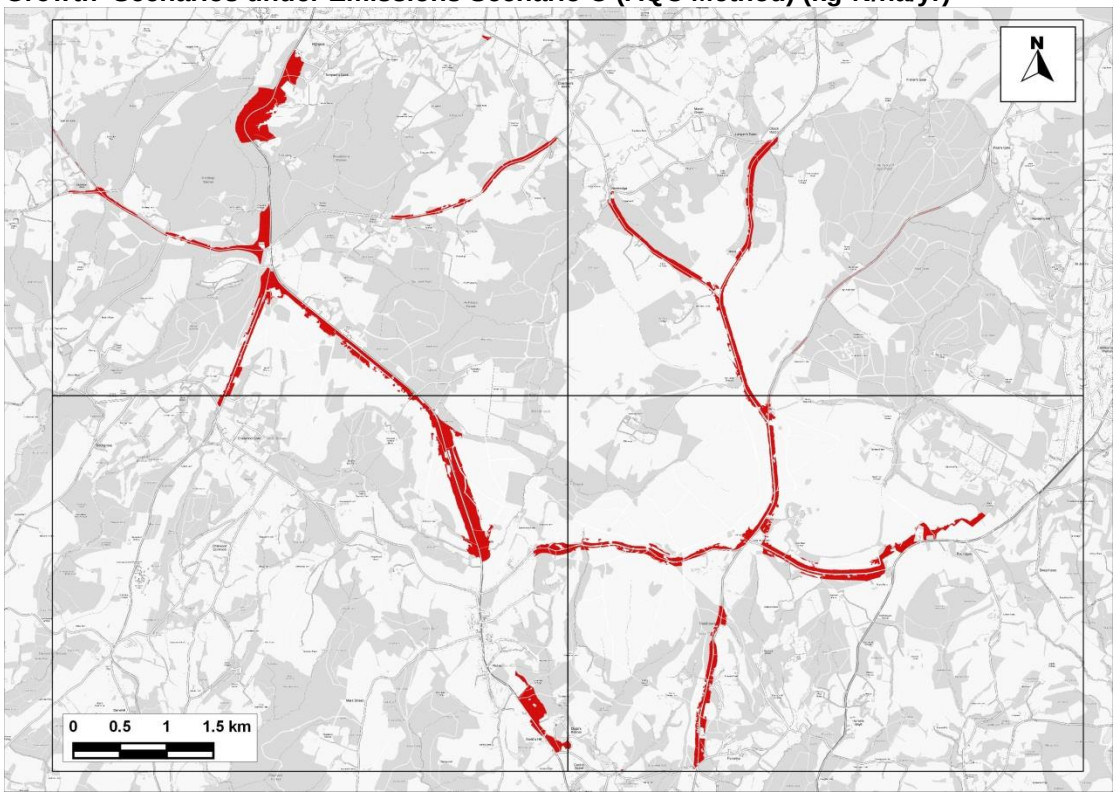


Figure 14.26: Areas in SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the 10 kg-N/ha/yr Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 14.49: Areas in Ashdown Forest SAC Predicted to Experience an Increase in Nitrogen Deposition Greater than 1% of the Critical Load where this Critical Load would also be Exceeded - Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method) (hectares)

Land Use	10 kg-N/ha/yr Lower-bound Critical Load	15 kg-N/ha/yr Critical Load Mid-Point	20 kg-N/ha/yr Upper-bound Critical Load
Woodland	128.32	85.50	63.04
Bracken	7.26	0.33	0.00
Scattered Bracken	7.53	0.37	0.00
Dry Heath	5.44	0.00	0.00
Wet Heath	18.41	0.28	0.00
Grassland	1.83	0.02	0.00
Water	0.00	0.00	0.00
Bare Ground	0.20	0.00	0.00
Whole SAC	169.00	86.51	63.04

Table 14.50: In Combination (Traffic) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' to 'No Growth' Scenarios under Emissions Scenario C (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum	Minimum
Woodland	0.058	5.8	0.029
Bracken	0.024	1.3	0.015
Scatt. Bracken	0.026	1.5	0.013
Dry Heath	0.016	2.2	0.015
Wet Heath	0.038	1.4	0.016
Grassland	0.021	1.3	0.015
Water	0.005	0.1	0.005
Bare Ground	0.012	0.4	0.006
Whole SAC	0.038	5.8	0.006

Table 14.51: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	-0.14	0.00	-0.14
10	12	0.00	0.00	0.00	0.00	0.00	-0.70	0.14	0.00	-0.56
12	14	-0.05	0.00	-1.25	-0.84	-1.33	0.69	0.00	0.00	-2.79
14	16	0.05	0.00	1.22	0.78	1.26	0.00	0.00	0.00	3.31
16	18	0.00	0.00	0.04	0.05	0.03	0.01	0.00	0.00	0.13
18	20	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.05
20	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	-14.61	0.00	0.00	0.00	0.00	0.00	0.00	-14.61
26	28	0.00	11.74	0.00	0.00	0.00	0.00	0.00	0.00	11.74
28	30	0.00	1.67	0.00	0.00	0.00	0.00	0.00	0.00	1.67
30	32	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.34
32	34	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
34	36	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
36	38	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.26
38	40	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.28
40	-	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.20
All >10		0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.14

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 14.52: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' to 'No Growth' Scenarios Under Emissions Scenario C (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	0.1	403.04	1149.57	215.77	165.99	118.07	62.86	16.34	0.34	2131.97
	0.3	44.91	403.68	85.80	42.39	31.36	13.15	6.92	0.04	628.24
	0.5	18.24	233.61	46.76	20.73	17.30	5.81	3.51	0.01	345.98
	1	5.44	128.32	18.41	7.26	7.53	1.83	0.65	0.00	169.44
	3	0.26	38.64	3.17	0.94	0.86	0.18	0.06	0.00	44.10
	5	0.00	18.20	0.73	0.21	0.25	0.04	0.00	0.00	19.43
	10	0.00	4.70	0.02	0.01	0.08	0.01	0.00	0.00	4.82
15 kg-N/ha/yr	0.1	169.56	980.84	168.02	92.79	74.92	32.73	11.64	0.20	1530.70
	0.3	21.79	254.81	53.47	24.09	19.04	6.77	4.21	0.02	384.19
	0.5	8.84	165.21	26.87	10.98	11.23	3.22	1.33	0.00	227.67
	1	2.28	85.50	10.20	3.72	3.93	0.71	0.36	0.00	106.70
	3	0.00	21.76	1.02	0.31	0.28	0.05	0.00	0.00	23.42
	5	0.00	8.17	0.11	0.06	0.14	0.02	0.00	0.00	8.49
	10	0.00	2.62	0.00	0.00	0.01	0.00	0.00	0.00	2.63
20 kg-N/ha/yr	0.1	92.12	658.58	128.94	63.48	52.08	21.85	9.40	0.13	1026.58
	0.3	12.89	200.37	36.82	15.68	14.62	4.52	2.29	0.01	287.21
	0.5	5.44	128.32	18.41	7.26	7.53	1.83	0.65	0.00	169.44
	1	1.02	63.04	6.51	2.29	2.07	0.45	0.21	0.00	75.59
	3	0.00	13.11	0.36	0.13	0.19	0.03	0.00	0.00	13.82
	5	0.00	4.70	0.02	0.01	0.08	0.01	0.00	0.00	4.82
	10	0.00	1.89	0.00	0.00	0.00	0.00	0.00	0.00	1.89

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Chapter Summary

14.80 The changes that would be caused by the Wealden Local Plan in combination with other predicted traffic growth have been derived by comparing the results of the 'With Plan' scenario against those from the 'No-growth' scenario. For NOx and nitrogen deposition, results are presented for

emissions scenarios A, B and C. For ammonia concentrations, results are presented for scenario A only. The results are presented as changes in both concentrations and deposition fluxes, as well as changes in relation to different percentages of the critical level or critical load (from 0.1% to 10% for annual mean values and from 1% to 50% for 24-hour means).

Annual Mean NOx

14.81 The Local Plan in combination with other predicted traffic growth will increase concentrations across the entire SAC (average predicted increases over the SAC as a whole are 0.45 μg/m^3 (emissions scenario A), 0.27 μg/m^3 (scenario B), and 0.18 μg/m^3 (scenario C)). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest predicted increases being 22.8, 12.8, and 8.6 μg/m^3 in scenarios A, B, and C respectively. The total area of the SAC affected by different magnitudes of change has been presented. One of these change magnitudes is 1% of the critical level, and the total areas predicted to experience this change are 1,556, 602, and 321 ha in emissions scenarios A, B, and C respectively. When these areas are restricted to include only the region where the critical level will also be exceeded, they reduce to 8.2, 1.1, and 0.09 ha in emissions scenarios A, B, and C respectively. The area of SAC exceeding the critical level is predicted to increase by 3.6, 1.0, and 0.09 ha as a result of the Local Plan in combination with other traffic growth in scenarios A, B, and C respectively. In the case of emissions scenario C, an exceedence is not predicted without this additional traffic but is predicted with it.

24-hour NOx

14.82 As with annual mean NOx, the Local Plan in combination with other traffic growth will increase concentrations across the entire SAC (average predicted increases over the SAC as a whole are 2.9, 1.9, and 1.3 μg/m^3 in emissions scenarios A, B, and C respectively). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest predicted increases being 73, 57, and 42 μg/m^3 in scenarios A, B, and C respectively. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 10% of the critical level, and the total areas predicted to experience this change are 128, 61, and 27 ha in emissions scenarios A, B, and C respectively. These increases (>10% of the critical level) are all predicted in areas where the critical level will also be exceeded. The area exceeding the critical level is predicted to increase by 52 and 29 ha in scenarios B and C respectively. The area of exceedence is only not predicted to change in emissions scenario A because the entire SAC is already predicted to exceed without any traffic growth.

Annual Mean NH_3

14.83 As with NOx, the Local Plan in combination with other traffic growth will increase concentrations across the entire SAC (the average predicted change over the SAC as a whole is 0.004 μg/m^3). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentration will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest predicted change being 0.47 μg/m^3. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical level, and the total area predicted to experience this change is 171 ha. When this area is restricted to include only the region where the critical level will also be exceeded, it reduces to 4.9 ha. When the lower-bound to the critical level uncertainty range is considered, this area increases to 17.8 ha. The area exceeding the 1 μg/m^3 critical level is predicted to increase by 1.9 ha as a result of the Wealden Local Plan in combination with other traffic growth.

Nitrogen Deposition

14.84 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). The 10 kg-N/ha/yr critical load is predicted to be exceeded over almost the entire SAC either without or with the Local Plan in combination with other traffic growth. The Local Plan in combination with other traffic growth will increase deposition fluxes across the entire SAC. These SAC-wide increases will alter the predicted deposition at all locations, meaning that the total area falling within different deposition bands changes as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest increase (11.0 kg-N/ha/yr) predicted to woodland in emissions scenario A and the EA deposition method. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical load, and the total areas predicted to experience this change are 429, 277, and 215 ha for emissions scenarios A, B, and C respectively using the EA deposition method and 281, 203, and 169 ha for scenarios A, B, and C using the AQC deposition method.

15 Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth and National and International Emissions Projections

15.1 This section sets out the predicted changes in concentrations and fluxes that would be caused by the Wealden Local Plan in combination with other predicted traffic growth and changes in national and international emissions projections. This includes changes in emissions per vehicle associated with technological improvements, as well as reductions in emissions from many other sectors. These comparisons have been derived by comparing the results of the 'With Plan' scenario using emissions scenarios B and C against those from the 'Existing Baseline' scenario (which uses emissions scenario A).

15.2 For all of the comparisons presented in this chapter, the predicted reductions in emissions driven by new technology and national and international policy are greater than the increases in emissions caused by the additional traffic associated with the Wealden Local Plan and growth outside of the district. This means that if the technological and policy improvements predicted nationally and internationally all deliver their anticipated benefits, then air quality will be better, and nitrogen deposition fluxes will be smaller, than they are at present.

15.3 It has already been shown that the Local Plan (see Chapter 13) and the Local Plan in combination with other traffic growth (see Chapter 14) will cause concentrations and fluxes to be higher than would otherwise be the case. Thus, while all of the results in this chapter are presented as benefits, it should be recognised that these benefits would be greater without the traffic associated with the Local Plan. In other words the Local Plan will cancel out some of the benefits that have been predicted due to new technology and national and international policy measures. The precise amount by which the Plan will do this is shown in Chapter 13 for the Plan in isolation and Chapter 14 for the Plan in combination with other traffic growth.

15.4 This current report does not seek to interpret the concentration and deposition results in terms of ecological impacts or in terms of compatibility with legislation and policy. This is done elsewhere, in particular in the Habitats Regulations Assessment being prepared for the Local Plan. Despite this distinction, it is nevertheless noted that this chapter was prepared prior to the publication of the Opinion of Advocate General Kokott of the European Court of Justice, delivered on 25 July 2018 which has a clear bearing on the results in this chapter. The results presented in this chapter are still considered to provide useful information, but it has already been shown, in Chapter 12, that the critical levels and critical loads will continue to be exceeded within the SAC in emissions scenarios B and C. In this context, the Advocate General is clear in relation to future-year emissions projections such as these that:

"it is not sufficient, for the purposes of approval of additional nitrogen deposition, if deposition declines overall, but the land in question is still overloaded with nitrogen. (in these circumstances)

the expected decrease in nitrogen emissions may not be taken into account in the decision on the approval of additional nitrogen deposition" (ECJ, 2018) Paragraph 98 (see also Paragraph 169).

Emissions Scenario B

In Combination (Traffic + Emissions Projections) impacts on Annual Mean NOx – Emissions Scenario B

15.5 Figure 15.1 (also see Figure A12.1 to Figure A12.4) shows the change in predicted annual mean NOx concentrations caused by moving from emissions scenario A (in 2015) to scenario B (in 2028), taking account of both the Local Plan and other projected traffic growth. Reductions in concentrations are predicted across the entire SAC. Across most of the area, these reductions will be less than or equal to 4 $\mu g/m^3$, but the changes are larger close to main roads, with reductions of more than 8 $\mu g/m^3$ predicted in many places.

15.6 Table 15.1 shows the average, maximum, and minimum reductions in predicted annual mean NOx concentrations to the various habitats. Table 15.1 shows, for example, that the average predicted reduction in NOx concentrations to the SAC as a whole is 3.6 $\mu g/m^3$, but the maximum predicted reduction in concentration anywhere is 35.2 $\mu g/m^3$. The minimum improvement is a reduction of 3.2 $\mu g/m^3$.

15.7 Table 15.2 shows how the concentration distribution will change across the SAC. As an example of interpreting this table, 620.08 ha of the SAC will move from experiencing concentrations above 8 $\mu g/m^3$ to experiencing concentrations below this level. 3.49 ha would move from exceeding to not exceeding the 30 $\mu g/m^3$ critical level, of which 0.41 ha is wet heath.

15.8 Table 15.3 shows the area-wide changes in predicted concentrations in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. The entire SAC is predicted to experience reductions greater than 10% of both the 15 $\mu g/m^3$ and 30 $\mu g/m^3$ assessment levels.

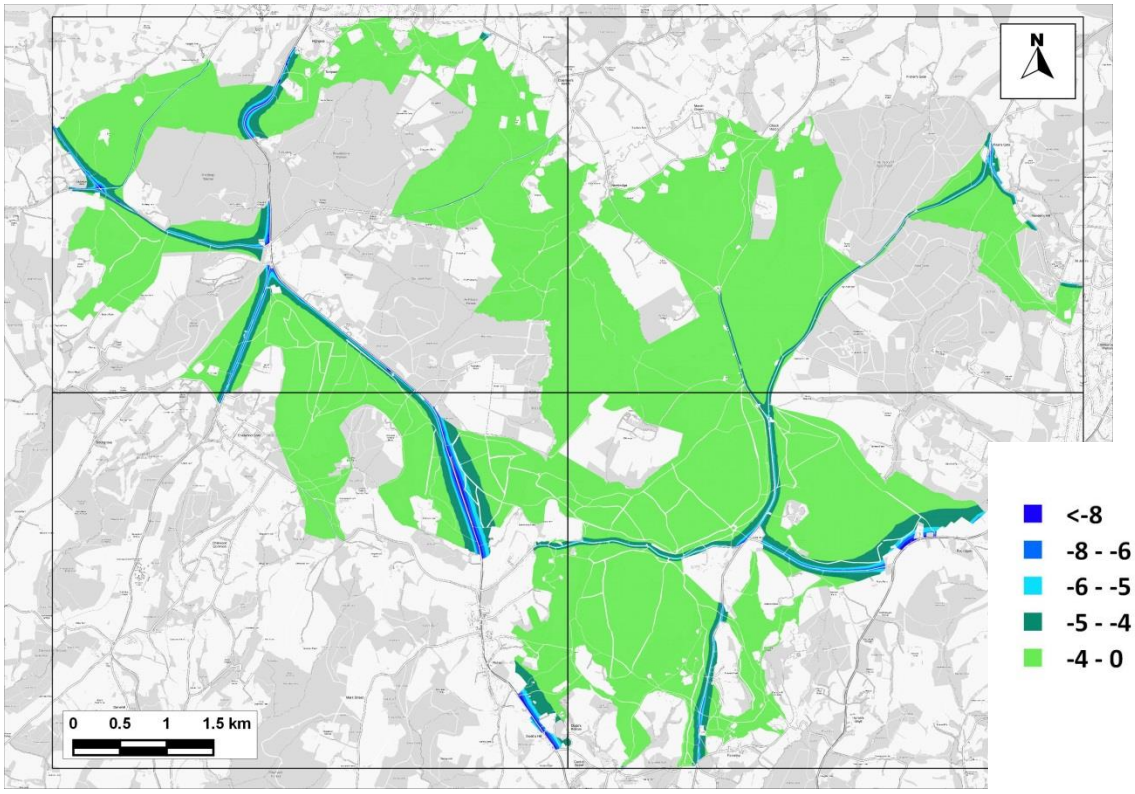


Figure 15.1: Change in Predicted Annual Mean NOx Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (µg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.1: In Combination (Traffic + Emissions Projections) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A

Land Use	µg/m^3 Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-3.6	-35.2	-3.2
Bracken	-3.5	-21.3	-3.2
Scatt. Bracken	-3.5	-17.4	-3.2
Dry Heath	-3.4	-20.7	-3.2
Wet Heath	-3.7	-17.5	-3.3
Grassland	-3.5	-19.6	-3.2
Water	-3.4	-10.3	-3.2
Bare Ground	-3.8	-19.1	-3.2
Whole SAC	-3.6	-35.2	-3.2

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.2: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	117.18	356.72	34.69	40.89	43.36	11.71	13.89	1.64	620.08
8	10	499.63	755.77	195.18	180.03	127.00	71.34	43.88	4.29	1877.13
10	12	-525.15	-827.04	-106.80	-155.33	-124.19	-63.20	-36.99	-5.27	-1844.0
12	14	-81.34	-200.57	-94.55	-50.43	-34.75	-15.83	-13.52	-0.52	-491.51
14	18	-9.27	-63.89	-21.88	-12.76	-9.68	-3.51	-4.12	-0.12	-125.24
18	20	-0.65	-8.77	-2.20	-1.17	-1.03	-0.22	-1.12	-0.01	-15.17
20	25	-0.37	-7.64	-3.02	-0.85	-0.47	-0.22	-1.47	-0.01	-14.04
25	30	-0.02	-2.15	-1.01	-0.21	-0.10	-0.03	-0.26	0.00	-3.78
30	35	0.00	-0.65	-0.32	-0.07	-0.05	-0.01	-0.06	0.00	-1.15
35	40	0.00	-0.42	-0.07	-0.05	-0.04	-0.01	-0.05	0.00	-0.63
40	-	0.00	-1.37	-0.03	-0.06	-0.06	-0.01	-0.18	0.00	-1.71
All >30		0.00	-2.43	-0.41	-0.17	-0.15	-0.03	-0.29	0.00	-3.49

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.3: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
30 µg/m^3	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
45 µg/m^3	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	4.59	71.83	18.82	7.94	7.51	2.31	6.42	0.07	119.48

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

In Combination (Traffic + Emissions Projections) Impacts on 24-hour Mean NOx under Emissions Scenario B

15.9 Figure 15.2 (also see Figure A12.5 to Figure A12.8) shows the change in predicted 24-hour mean NOx concentrations caused by moving from emissions scenario A (in 2015) to scenario B (in

2028), taking account of both the Local Plan and other projected traffic growth. Reductions in concentrations are predicted across the entire SAC. Across most of the area, these reductions will be 25 μg/m^3 or less, but the changes are larger close to main roads, with reductions of more than 35 μg/m^3 predicted in many places.

15.10 Table 15.4 shows the average, maximum, and minimum reductions in predicted 24-hour mean NOx concentrations for the various habitats. It shows, for example, that the average predicted reduction to the SAC as a whole is 25 μg/m^3, but the largest predicted reduction anywhere is 128 μg/m^3.

15.11 Table 15.5 shows how the concentration distribution will change across the SAC. 2,535 ha of the SAC would move from exceeding to not exceeding the 75 μg/m^3 critical level.

15.12 Table 15.6 shows the area-wide changes in predicted concentrations in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages of the critical level the number of hectares that are predicted to experience each percentage reduction. The entire SAC is predicted to experience reductions of at least 30% of the critical level, with 29.27 ha predicted to experience a reduction of at least 50% of the critical level.

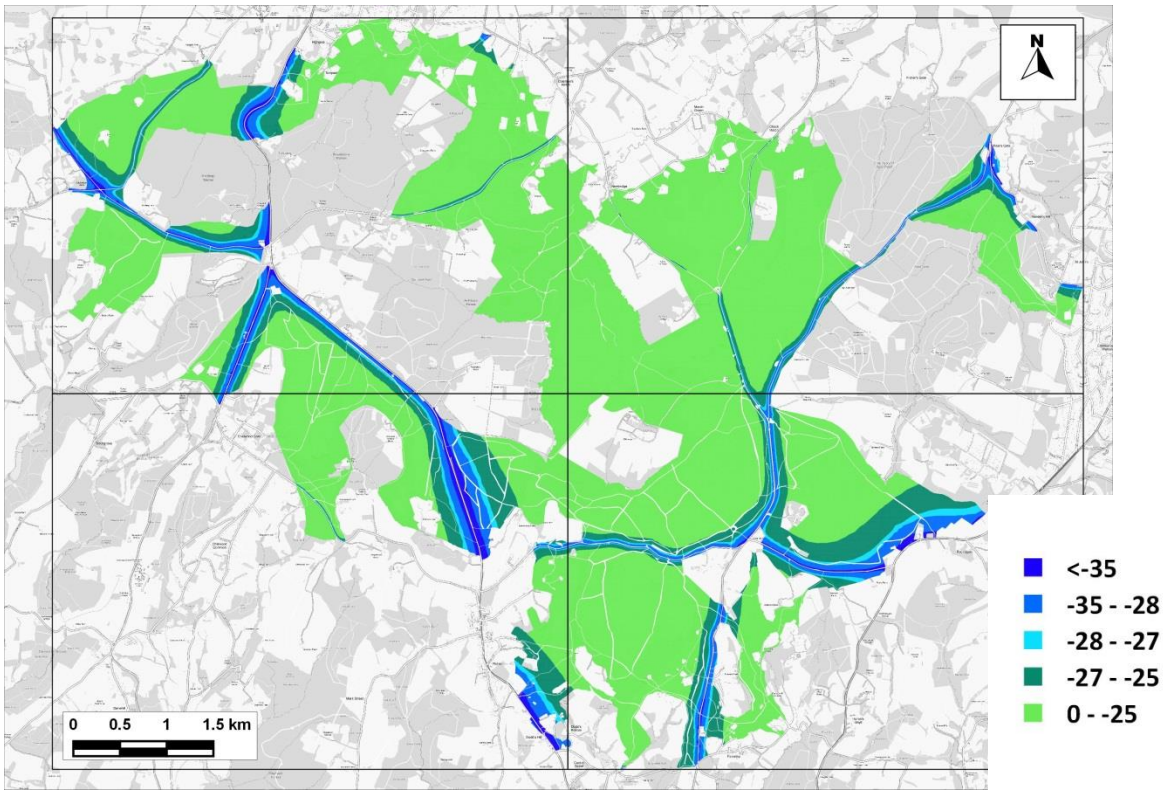


Figure 15.2: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.4: In Combination (Traffic + Emissions Projections) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A

Land Use	µg/m^3 Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-25	-128	-23
Bracken	-25	-88	-23
Scattered Bracken	-25	-79	-23
Dry Heath	-24	-85	-23
Wet Heath	-26	-79	-23
Grassland	-25	-86	-23
Water	-24	-56	-23
Bare Ground	-26	-84	-23
Whole SAC	-25	-128	-23

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction

Table 15.5: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a]

Total Concentration (µg/m^3)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	330.50	682.13	77.23	117.96	96.13	41.98	24.86	4.77	1375.55
60	65	256.61	330.07	102.13	73.33	59.68	33.71	25.64	0.90	882.07
65	75	33.49	117.23	58.05	34.12	17.27	8.38	8.42	0.31	277.27
75	85	-441.52	-721.56	-84.68	-134.58	-108.27	-47.52	-29.64	-4.87	-1572.6
85	100	-169.47	-325.62	-125.44	-76.45	-53.79	-32.72	-22.12	-0.98	-806.61
100	125	-8.63	-61.92	-20.80	-12.06	-9.35	-3.35	-4.10	-0.11	-120.32
125	150	-0.89	-13.67	-3.88	-1.69	-1.26	-0.39	-1.98	-0.02	-23.77
150	200	-0.09	-4.61	-2.42	-0.48	-0.26	-0.06	-0.81	0.00	-8.73
200	-	0.00	-2.05	-0.20	-0.14	-0.13	-0.03	-0.27	0.00	-2.82
All >75		-620.60	-1129.4	-237.42	-225.40	-173.07	-84.08	-58.92	-5.98	-2534.9

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.6: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 µg/m^3	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-30	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-50	0.44	18.68	4.85	1.19	1.35	0.36	2.38	0.02	29.27

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition under Emissions Scenario B (EA Method)

15.13 Figure 15.3 (also see Figure A12.9 to Figure A12.12) shows the change in predicted nitrogen deposition, predicted using the EA method, caused by moving from emissions scenario A (in 2015) to scenario B (in 2028), taking account of both the Local Plan and other projected traffic growth. Reductions in deposition fluxes are predicted across the entire SAC. Across most of the area, these reductions will be less than 3 kg-N/ha/yr, but the changes are larger close to main roads, with reductions of more than 6 kg-N/ha/yr predicted in some places.

15.14 Table 15.7 shows the average, maximum, and minimum reductions in predicted deposition to the various habitats. It shows, for example, that the average predicted reduction to the SAC as a whole is 2.8 kg-N/ha/yr, but the maximum predicted reduction is 8.2 kg-N/ha/yr.

15.15 Table 15.8 shows how the deposition distribution will change across the SAC. 63.9 ha of the SAC would move from exceeding to not exceeding the critical load, all of which represents open water or bare ground. All other habitats would continue to exceed the critical load (i.e. the assumed improvements are insufficient to cause the critical load to be achieved).

15.16 Table 15.9 shows the area-wide changes in predicted deposition in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. Almost the entire SAC is predicted to experience reductions of at least 10% of the 10 kg-N/ha/yr critical load.

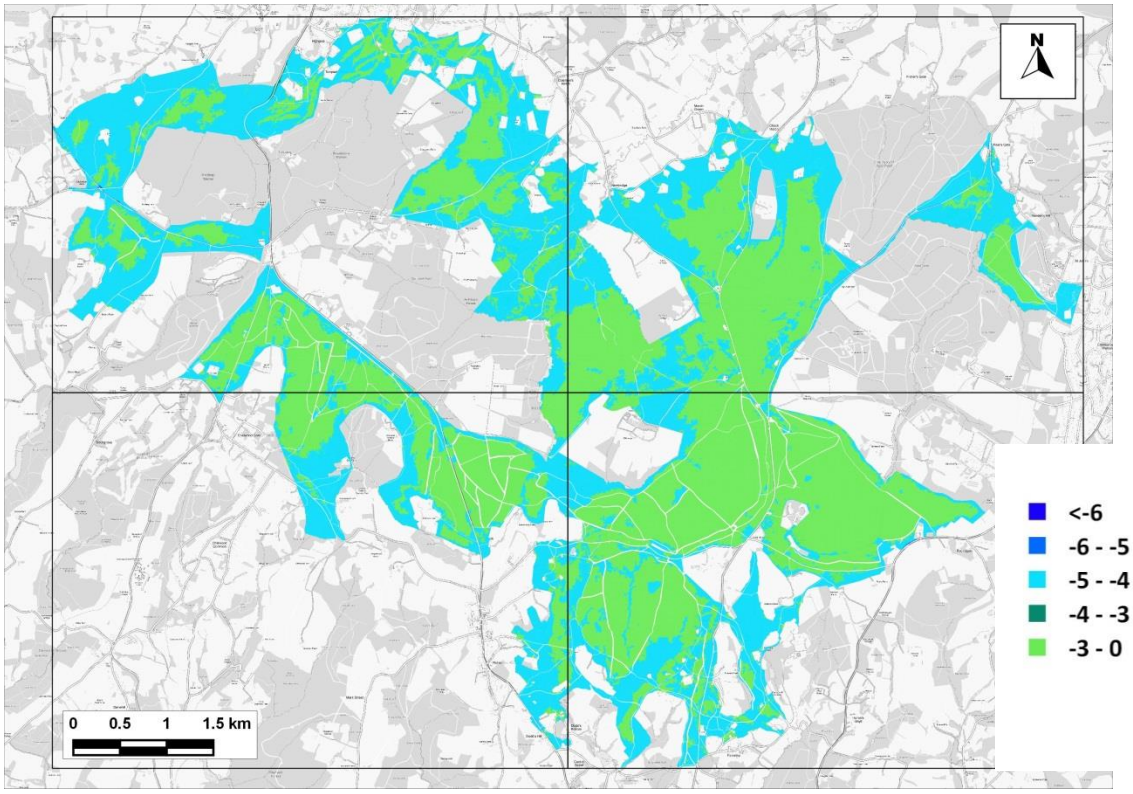


Figure 15.3: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emission Scenario A (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.7: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-4.2	-8.2	-4.2
Bracken	-1.8	-4.7	-1.7
Scatt. Bracken	-1.8	-3.9	-1.7
Dry Heath	-1.6	-4.0	-1.6
Wet Heath	-1.7	-3.5	-1.6
Grassland	-1.6	-3.6	-1.5
Water	-1.0	-1.1	-0.9
Bare Ground	-1.0	-1.5	-0.9
Whole SAC	-2.8	-8.2	-0.9

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.8: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	57.86	6.04	63.90
10	12	0.00	0.00	0.00	0.00	0.00	0.00	-57.84	-6.04	-63.89
12	14	587.71	0.00	201.69	0.00	0.00	85.60	-0.02	0.00	874.99
14	16	-581.11	0.00	-181.74	216.72	170.44	-84.93	0.00	0.00	-460.62
16	18	-6.52	0.00	-17.89	-214.86	-168.23	-0.63	0.00	0.00	-408.13
18	20	-0.07	0.00	-1.80	-1.55	-1.97	-0.02	0.00	0.00	-5.41
20	22	0.00	0.00	-0.23	-0.22	-0.15	0.00	0.00	0.00	-0.60
22	24	0.00	0.00	-0.03	-0.06	-0.03	-0.01	0.00	0.00	-0.13
24	26	0.00	242.22	-0.01	-0.02	-0.02	-0.01	0.00	0.00	242.17
26	28	0.00	931.02	0.00	-0.01	-0.03	0.00	0.00	0.00	930.99
28	30	0.00	-101.62	0.00	0.00	-0.02	0.00	0.00	0.00	-101.64
30	32	0.00	-1037.5	0.00	0.00	0.00	0.00	0.00	0.00	-1037.5
32	34	0.00	-26.92	0.00	0.00	0.00	0.00	0.00	0.00	-26.92
34	36	0.00	-4.23	0.00	0.00	0.00	0.00	0.00	0.00	-4.23
36	38	0.00	-1.07	0.00	0.00	0.00	0.00	0.00	0.00	-1.07
38	40	0.00	-0.71	0.00	0.00	0.00	0.00	0.00	0.00	-0.71
40	-	0.00	-1.16	0.00	0.00	0.00	0.00	0.00	0.00	-1.16
All >10		0.00	0.00	0.00	0.00	0.00	0.00	-57.86	-6.04	-63.90

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.9: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	2.16	0.61	2596.53
15 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	0.00	0.00	2593.76
20 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	2.16	0.61	2596.53
	-10	0.27	1202.05	3.36	3.02	3.88	0.22	0.00	0.00	1212.81

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition Under Emissions Scenario B (AQC Method)

15.17 Figure 15.4 (also see Figure A12.13 to Figure A12.16) shows the change in predicted nitrogen deposition, predicted using the AQC method, caused by moving from emissions scenario A (in

2015) to scenario B (in 2028), taking account of both the Local Plan and other projected traffic growth. Reductions in deposition fluxes are predicted across the entire SAC. Across most of the area, these reductions will be less than 3 kg-N/ha/yr, but the changes are larger close to main roads and to areas of woodland.

15.18 Table 15.10 shows the average, maximum, and minimum reductions in predicted deposition to the various habitats. It shows, for example, that the average predicted reduction to the SAC as a whole is 2.6 kg-N/ha/yr, while the maximum predicted change is 5.6 kg-N/ha/yr.

15.19 Table 15.11 shows how the deposition distribution will change across the SAC. 71.19 ha of the SAC would move from exceeding to not exceeding the critical load, all of which represents open water or bare ground. All other habitats would continue to exceed the critical load (i.e. the assumed improvements are insufficient to cause the critical load to be achieved).

15.20 Table 15.12 shows the area-wide changes in predicted deposition in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. Almost the entire SAC is predicted to experience reductions of at least 10% of the 10 kg-N/ha/yr critical load.

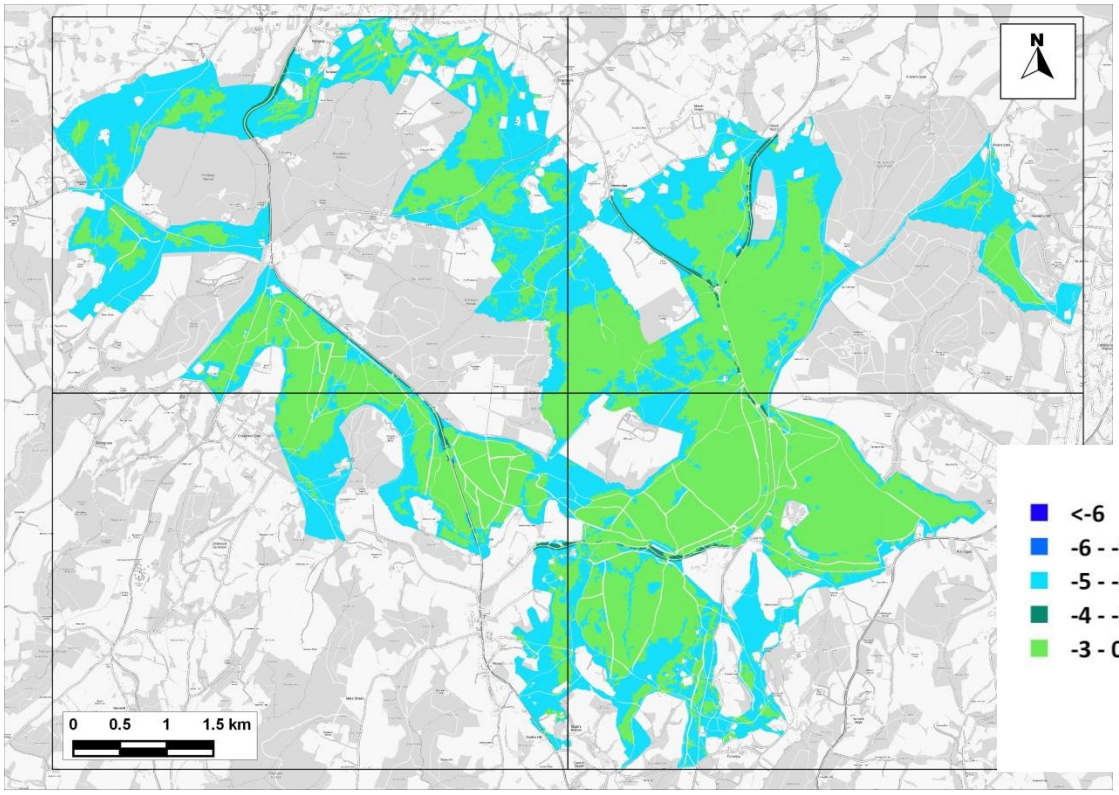


Figure 15.4: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.10: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-4.1	-5.6	-4.0
Bracken	-1.4	-1.9	-1.3
Scatt. Bracken	-1.4	-1.8	-1.3
Dry Heath	-1.3	-1.7	-1.3
Wet Heath	-1.3	-1.8	-1.3
Grassland	-1.3	-2.1	-1.3
Water	-1.0	-1.2	-1.0
Bare Ground	-1.0	-1.4	-1.0
Whole SAC	-2.6	-5.6	-1.0

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.11: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	65.22	5.96	71.19
10	12	0.00	0.00	0.00	0.00	0.00	0.00	-65.15	-5.96	-71.11
12	14	533.67	0.00	232.60	229.94	169.49	58.91	-0.08	0.00	1224.53
14	16	-533.61	0.00	-231.17	-228.89	-167.84	-58.88	0.00	0.00	-1220.4
16	18	-0.05	0.00	-1.40	-0.97	-1.57	-0.02	0.00	0.00	-4.02
18	20	0.00	0.00	-0.04	-0.06	-0.04	-0.01	0.00	0.00	-0.15
20	22	0.00	0.00	0.00	-0.01	-0.04	0.00	0.00	0.00	-0.05
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	961.74	0.00	0.00	0.00	0.00	0.00	0.00	961.74
26	28	0.00	222.18	0.00	0.00	0.00	0.00	0.00	0.00	222.18
28	30	0.00	-828.66	0.00	0.00	0.00	0.00	0.00	0.00	-828.66
30	32	0.00	-339.03	0.00	0.00	0.00	0.00	0.00	0.00	-339.03
32	34	0.00	-12.37	0.00	0.00	0.00	0.00	0.00	0.00	-12.37
34	36	0.00	-1.98	0.00	0.00	0.00	0.00	0.00	0.00	-1.98
36	38	0.00	-0.84	0.00	0.00	0.00	0.00	0.00	0.00	-0.84
38	40	0.00	-0.28	0.00	0.00	0.00	0.00	0.00	0.00	-0.28
40	-	0.00	-0.76	0.00	0.00	0.00	0.00	0.00	0.00	-0.76
All >10		0.00	0.00	0.00	0.00	0.00	0.00	-65.22	-5.96	-71.19

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.12: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario B to 'No Growth' Emissions Scenario A (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	43.05	5.99	2642.80
15 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	0.06	1202.05	0.07	0.22	0.35	0.24	0.00	0.00	1202.99
20 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	43.05	5.99	2642.80
	-10	0.00	1202.03	0.00	0.00	0.00	0.00	0.00	0.00	1202.03

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Emissions Scenario C

In Combination (Traffic + Emissions Projections) impacts on Annual Mean NOx – Emissions Scenario C

15.21 Figure 15.5 (also see Figure A12.17 to Figure A12.20) shows the change in predicted annual mean NOx concentrations caused by moving from emissions scenario A (in 2015) to scenario C (in 2028), taking account of both the Local Plan and other projected traffic growth. Reductions in concentrations are predicted across the entire SAC. Across most of the area, these reductions will be less than or equal to 4 $\mu g/m^3$, but the changes are larger close to main roads, with reductions of more than 8 $\mu g/m^3$ predicted in many places.

15.22 Table 15.13 shows the average, maximum, and minimum reductions in predicted annual mean NOx concentrations to the various habitats. Table 15.13 shows, for example, that the average predicted reduction in NOx concentrations to the SAC as a whole is 3.9 $\mu g/m^3$, but the maximum predicted reduction in concentration anywhere is 48.9 $\mu g/m^3$. The minimum improvement is a reduction of 3.3 $\mu g/m^3$.

15.23 Table 15.14 shows how the concentration distribution will change across the SAC. As an example of interpreting this table, 1,501 ha of the SAC will move from experiencing concentrations above 8 $\mu g/m^3$ to experiencing concentrations below this level. 4.52 ha would move from exceeding to not exceeding the 30 $\mu g/m^3$ critical level, of which 0.42 ha is wet heath.

15.24 Table 15.15 shows the area-wide changes in predicted concentrations in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. The entire SAC is predicted to experience reductions greater than 10% of both the 15 $\mu g/m^3$ and 30 $\mu g/m^3$ assessment levels.

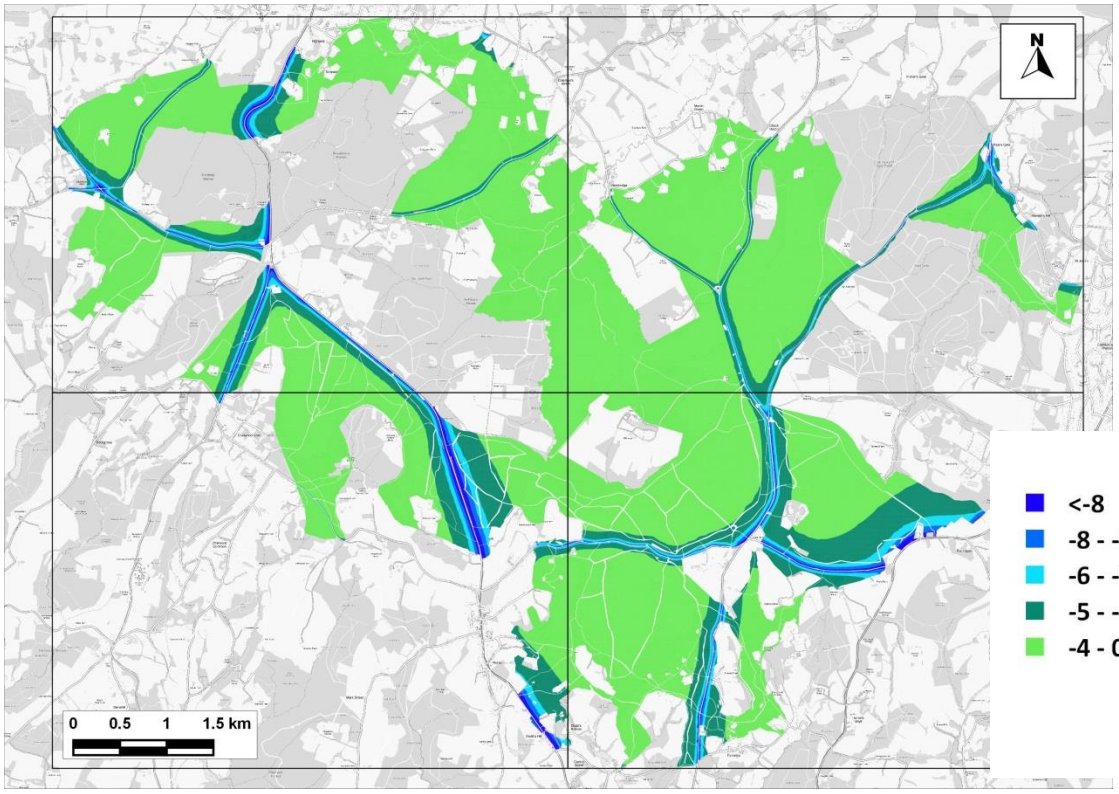


Figure 15.5: Change in Predicted Annual Mean NOx Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.13: In Combination (Traffic + Emissions Projections) Impacts on Annual Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A

Land Use	μg/m^3 Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-4.0	-48.9	-3.3
Bracken	-3.9	-31.5	-3.4
Scatt. Bracken	-3.9	-24.9	-3.3
Dry Heath	-3.7	-31.8	-3.3
Wet Heath	-4.2	-25.1	-3.4
Grassland	-3.9	-27.4	-3.3
Water	-3.7	-13.6	-3.3
Bare Ground	-4.3	-29.7	-3.3
Whole SAC	-3.9	-48.9	-3.3

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.14: Change in Hectares within Different Annual Mean NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a]

Total Concentration ($\mu g/m^3$)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	8	384.19	719.20	86.18	128.16	103.74	45.17	29.05	4.84	1500.52
8	10	239.47	434.19	159.59	101.88	72.40	40.28	31.65	1.17	1080.64
10	12	-530.77	-849.67	-117.72	-162.06	-128.14	-65.13	-37.33	-5.34	-1896.2
12	14	-82.17	-211.20	-96.34	-51.82	-35.96	-16.11	-14.50	-0.53	-508.64
14	18	-9.65	-68.78	-24.18	-13.52	-10.14	-3.68	-5.43	-0.13	-135.50
18	20	-0.67	-9.67	-2.73	-1.28	-1.07	-0.23	-1.22	-0.01	-16.88
20	25	-0.37	-8.24	-3.33	-0.92	-0.51	-0.23	-1.49	-0.01	-15.09
25	30	-0.02	-2.53	-1.05	-0.25	-0.15	-0.04	-0.35	0.00	-4.39
30	35	0.00	-1.14	-0.32	-0.09	-0.06	-0.02	-0.13	0.00	-1.76
35	40	0.00	-0.70	-0.07	-0.05	-0.04	-0.01	-0.07	0.00	-0.94
40	-	0.00	-1.47	-0.03	-0.06	-0.06	-0.01	-0.19	0.00	-1.81
All >30		0.00	-3.31	-0.42	-0.19	-0.17	-0.04	-0.39	0.00	-4.52

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.15: Hectares Predicted to Experience Different Levels of Change in Annual Mean NOx Concentrations - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
15 µg/m^3	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
30 µg/m^3	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
45 µg/m^3	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	20.84	143.81	52.03	28.32	18.70	7.07	11.71	0.22	282.69

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.
[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 30 µg/m^3 is 0.3 µg/m^3, while 1% of 45 µg/m^3 is 0.45 µg/m^3.

In Combination (Traffic + Emissions Projections) Impacts on 24-hour Mean NOx under Emissions Scenario C

15.25 Figure 15.6 (also see Figure A12.21 to Figure A12.24) shows the change in predicted 24-hour mean NOx concentrations caused by moving from emissions scenario A (in 2015) to scenario C (in

2028), taking account of both the Local Plan and other projected traffic growth. Reductions in concentrations are predicted across the entire SAC. Across most of the area, these reductions will be 27 μg/m^3 or less, but the reductions are larger close to main roads, with reductions of more than 35 μg/m^3 predicted in many places.

15.26 Table 15.16 shows the average, maximum, and minimum reductions in predicted 24-hour mean NOx concentrations to the various habitats. It shows, for example, that the average predicted reduction to the SAC as a whole is 27 μg/m^3, but the largest predicted reduction anywhere is 186 μg/m^3.

15.27 Table 15.17 shows how the concentration distribution will change across the SAC. 2,602 ha of the SAC would move from exceeding to not exceeding the 75 μg/m^3 critical level.

15.28 Table 15.18 shows the area-wide changes in predicted concentrations in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. The entire SAC is predicted to experience reductions of at least 30% of the critical level, with 106.4 ha predicted to experience a reduction of at least 50% of the critical level.

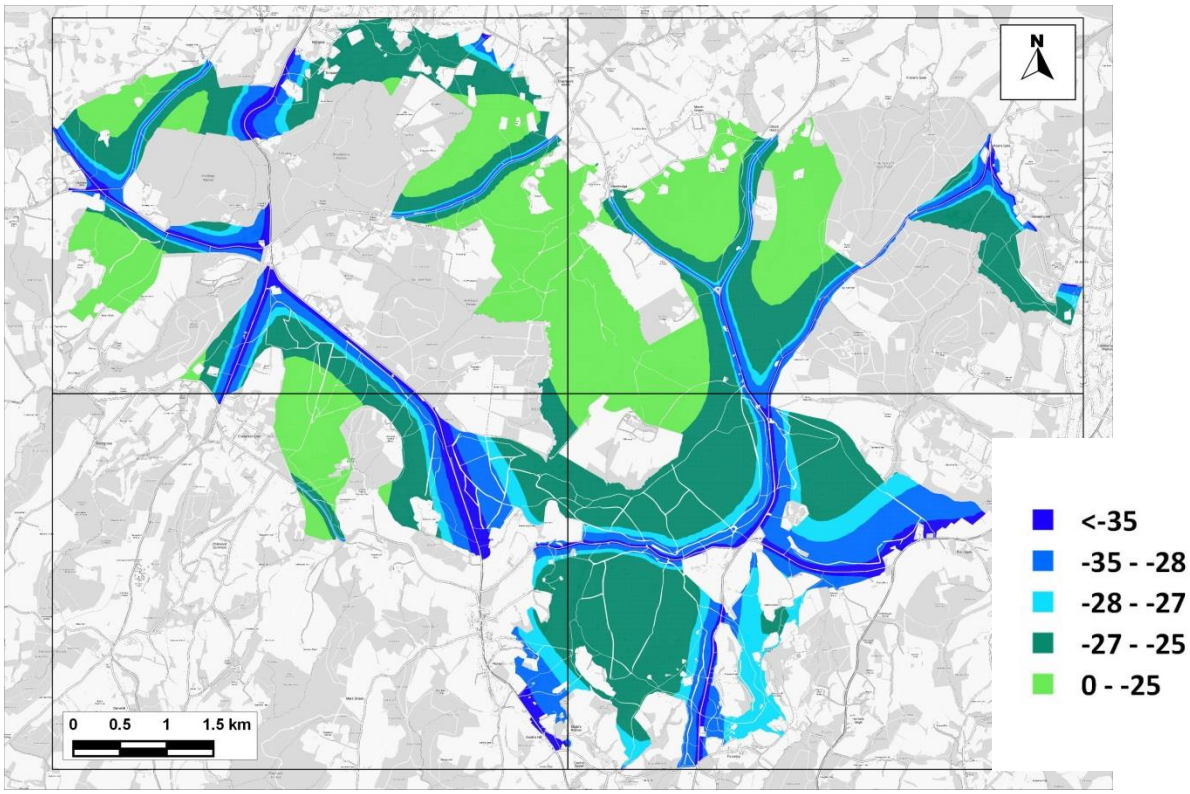


Figure 15.6: Change in Maximum Predicted 24-hour Mean NOx Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (μg/m^3)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.16: In Combination (Traffic + Emissions Projections) Impacts on 24-hour Mean NOx across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Concentrations Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A

Land Use	µg/m^3 Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-28	-186	-23
Bracken	-27	-137	-24
Scattered Bracken	-27	-118	-24
Dry Heath	-26	-136	-24
Wet Heath	-29	-118	-24
Grassland	-27	-126	-23
Water	-26	-76	-24
Bare Ground	-29	-129	-24
Whole SAC	-27	-186	-23

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.17: Change in Hectares within Different 24-hour Maximum NOx Concentration Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a]

Total Concentration (µg/m^3)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	60	558.57	945.70	142.37	177.81	142.24	70.64	45.67	5.55	2088.56
60	65	53.34	147.09	78.63	37.68	25.06	11.13	10.98	0.33	364.23
65	75	12.89	71.75	28.42	16.25	10.28	4.12	5.18	0.14	149.03
75	85	-444.25	-736.49	-90.97	-138.31	-110.59	-48.81	-29.87	-4.90	-1604.2
85	100	-170.56	-338.39	-128.04	-78.11	-55.40	-33.05	-23.24	-0.99	-827.78
100	125	-8.98	-66.64	-23.07	-12.78	-9.78	-3.51	-5.37	-0.12	-130.25
125	150	-0.91	-15.00	-4.63	-1.83	-1.31	-0.41	-2.08	-0.02	-26.19
150	200	-0.09	-5.32	-2.51	-0.57	-0.35	-0.07	-0.94	0.00	-9.86
200	-	0.00	-2.70	-0.20	-0.16	-0.13	-0.03	-0.32	0.00	-3.54
All >75		-624.80	-1164.5	-249.42	-231.75	-177.57	-85.89	-61.83	-6.02	-2601.8

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.18: Hectares Predicted to Experience Different Levels of Change in 24-hour Maximum NOx Concentrations - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A [a]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
75 µg/m^3	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-30	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-50	4.07	62.97	17.25	7.32	6.36	1.82	6.49	0.06	106.36

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition under Emissions Scenario C (EA Method)

15.29 Figure 15.7 (also see Figure A12.25 to Figure A12.28) shows the change in predicted nitrogen deposition, predicted using the EA method, caused by moving from emissions scenario A (in 2015) to scenario C (in 2028), taking account of both the Local Plan and other projected traffic growth. Reductions in deposition fluxes are predicted across the entire SAC. Across most of the area, these reductions will be less than or equal to 5 kg-N/ha/yr, but the changes are larger close to main roads, with reductions of more than 6 kg-N/ha/yr predicted in many places.

15.30 Table 15.19 shows the average, maximum, and minimum reductions in predicted deposition to the various habitats. It shows, for example, that the average predicted reduction to the SAC as a whole is 3.3 kg-N/ha/yr, but the maximum predicted reduction is 12.5 kg-N/ha/yr.

15.31 Table 15.20 shows how the deposition distribution will change across the SAC. 64.11 ha of the SAC would move from exceeding to not exceeding the critical load, all of which represents open water or bare ground. All other habitats would continue to exceed the critical load (i.e. the assumed improvements are insufficient to cause the critical load to be achieved).

15.32 Table 15.21 shows the area-wide changes in predicted fluxes in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. The entire SAC is predicted to experience reductions of at least 10% of the 10 kg-N/ha/yr critical load.

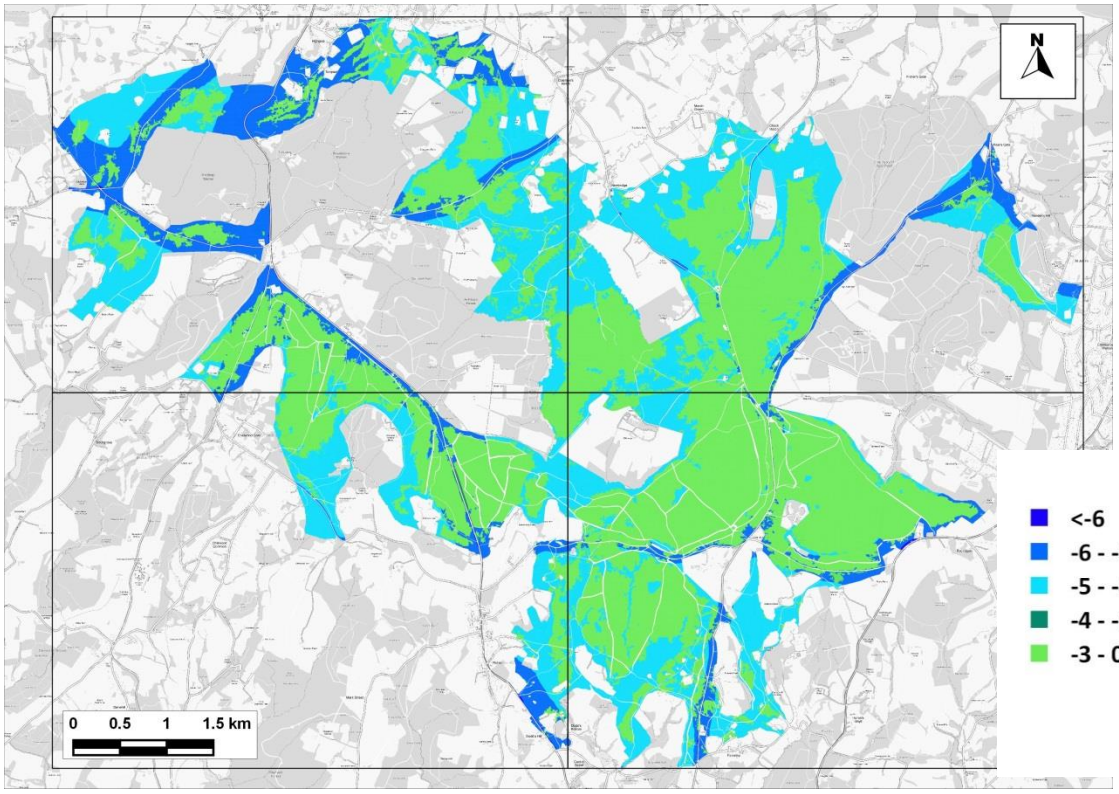


Figure 15.7: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emission Scenario A (EA Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.19: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (EA Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-5.0	-12.5	-4.9
Bracken	-2.1	-6.9	-2.0
Scatt. Bracken	-2.1	-6.1	-2.0
Dry Heath	-1.9	-6.8	-1.9
Wet Heath	-2.0	-5.4	-1.9
Grassland	-1.9	-5.3	-1.8
Water	-1.2	-1.3	-1.1
Bare Ground	-1.2	-1.9	-1.1
Whole SAC	-3.3	-12.5	-1.1

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.20: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (EA Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	58.06	6.04	64.11
10	12	0.00	0.00	0.00	0.00	0.00	0.00	-58.05	-6.04	-64.09
12	14	623.30	0.00	245.99	22.51	13.16	86.34	-0.02	0.00	991.27
14	16	-616.62	0.00	-224.67	195.39	158.68	-85.66	0.00	0.00	-572.87
16	18	-6.61	0.00	-19.14	-215.86	-169.51	-0.63	0.00	0.00	-411.75
18	20	-0.07	0.00	-1.89	-1.68	-2.05	-0.02	0.00	0.00	-5.71
20	22	0.00	0.00	-0.25	-0.27	-0.15	-0.01	0.00	0.00	-0.67
22	24	0.00	0.00	-0.03	-0.07	-0.05	-0.01	0.00	0.00	-0.16
24	26	0.00	1100.54	-0.01	-0.02	-0.04	-0.01	0.00	0.00	1100.46
26	28	0.00	88.22	0.00	-0.01	-0.03	0.00	0.00	0.00	88.19
28	30	0.00	-114.25	0.00	0.00	-0.02	0.00	0.00	0.00	-114.27
30	32	0.00	-1039.1	0.00	0.00	0.00	0.00	0.00	0.00	-1039.1
32	34	0.00	-27.42	0.00	0.00	0.00	0.00	0.00	0.00	-27.42
34	36	0.00	-4.53	0.00	0.00	0.00	0.00	0.00	0.00	-4.53
36	38	0.00	-1.11	0.00	0.00	0.00	0.00	0.00	0.00	-1.11
38	40	0.00	-0.70	0.00	0.00	0.00	0.00	0.00	0.00	-0.70
40	-	0.00	-1.67	0.00	0.00	0.00	0.00	0.00	0.00	-1.67
All >10		0.00	0.00	0.00	0.00	0.00	0.00	-58.06	-6.04	-64.11

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.21: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (EA Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
15 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	0.07	0.00	2593.83
20 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	32.32	1202.05	78.51	236.22	181.06	4.66	0.00	0.00	1734.81

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition Under Emissions Scenario C (AQC Method)

15.33 Figure 15.8 (also see Figure A12.29 to Figure A12.32) shows the change in predicted nitrogen deposition, predicted using the AQC method, caused by moving from emissions scenario A (in

2015) to scenario C (in 2028), taking account of both the Local Plan and other projected traffic growth. Reductions in deposition fluxes are predicted across the entire SAC. Across most of the area, these reductions will be less than or equal to 5 kg-N/ha/yr, but the changes are larger close to main roads, with reductions of more than 6 kg-N/ha/yr predicted in many places.

15.34 Table 15.22 shows the average, maximum, and minimum reductions in predicted deposition to the various habitats. It shows, for example, that the average predicted reduction to the SAC as a whole is 3.1 kg-N/ha/yr, but the maximum predicted reduction is 7.7 kg-N/ha/yr.

15.35 Table 15.23 shows how the deposition distribution will change across the SAC. 72.40 ha of the SAC would move from exceeding to not exceeding the critical load, all of which represents open water or bare ground. All other habitats would continue to exceed the critical load (i.e. the assumed improvements are insufficient to cause the critical load to be achieved).

15.36 Table 15.24 shows the area-wide changes in predicted fluxes in a different way, with the gradations chosen to mirror those in other chapters of this report. The table shows for different percentages for the EALs the number of hectares that are predicted to experience each percentage reduction. The entire SAC is predicted to experience reductions of at least 10% of the 10 kg-N/ha/yr critical load.

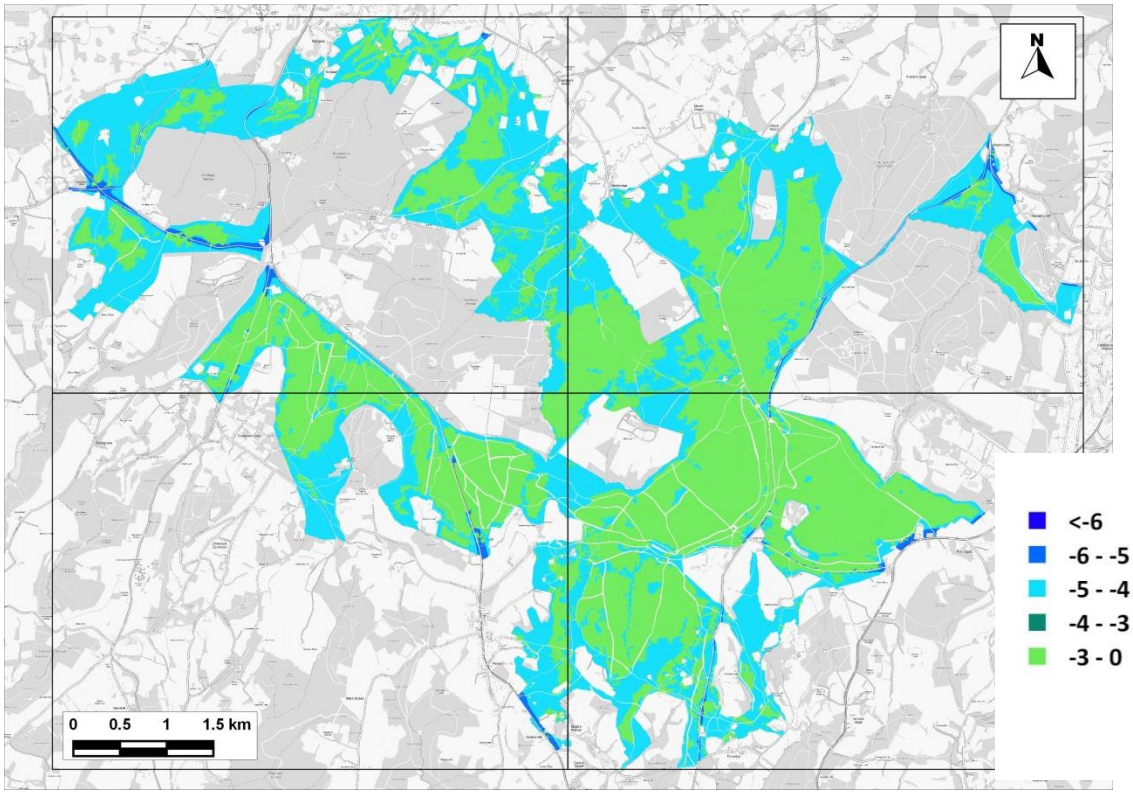


Figure 15.8: Change in Predicted Nitrogen Deposition to SAC Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) (kg-N/ha/yr)

Contains Ordnance Survey data © Crown copyright and database right 2018. Additional data sourced from third parties, including public sector information licensed under the Open Gov Licence v1.0.

Table 15.22: In Combination (Traffic + Emissions Projections) Impacts on Nitrogen Deposition across the Ashdown Forest SAC - Change in Average, Maximum, and Minimum Predicted Deposition Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method)

Land Use	Kg-N/ha/yr Change		
	Average	Maximum[a]	Minimum[a]
Woodland	-4.8	-7.7	-4.7
Bracken	-1.7	-2.4	-1.6
Scatt. Bracken	-1.7	-2.4	-1.6
Dry Heath	-1.6	-2.2	-1.6
Wet Heath	-1.6	-2.2	-1.6
Grassland	-1.6	-2.7	-1.5
Water	-1.3	-1.5	-1.2
Bare Ground	-1.2	-1.9	-1.2
Whole SAC	-3.1	-7.7	-1.2

[a] In this table, 'Maximum' describes the biggest reduction, while 'Minimum' describes the smallest reduction.

Table 15.23: Change in Hectares within Different Nitrogen Deposition Ranges - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) [a]

Total Deposition (kg-N/ha/yr)		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
From	To	Change in Area Falling Within Each Band (ha)								
0	10	0.00	0.00	0.00	0.00	0.00	0.00	66.36	6.05	72.40
10	12	0.00	0.00	0.00	0.00	0.00	12.42	-66.28	-6.05	-59.91
12	14	534.08	0.00	235.06	234.25	177.78	46.55	-0.08	0.00	1227.65
14	16	-534.03	0.00	-233.54	-233.13	-176.05	-58.93	0.00	0.00	-1235.7
16	18	-0.05	0.00	-1.47	-1.04	-1.62	-0.02	0.00	0.00	-4.20
18	20	0.00	0.00	-0.04	-0.07	-0.07	-0.02	0.00	0.00	-0.20
20	22	0.00	0.00	0.00	-0.01	-0.04	0.00	0.00	0.00	-0.05
22	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	26	0.00	1151.26	0.00	0.00	0.00	0.00	0.00	0.00	1151.26
26	28	0.00	42.37	0.00	0.00	0.00	0.00	0.00	0.00	42.37
28	30	0.00	-836.44	0.00	0.00	0.00	0.00	0.00	0.00	-836.44
30	32	0.00	-340.05	0.00	0.00	0.00	0.00	0.00	0.00	-340.05
32	34	0.00	-12.78	0.00	0.00	0.00	0.00	0.00	0.00	-12.78
34	36	0.00	-2.02	0.00	0.00	0.00	0.00	0.00	0.00	-2.02
36	38	0.00	-0.93	0.00	0.00	0.00	0.00	0.00	0.00	-0.93
38	40	0.00	-0.37	0.00	0.00	0.00	0.00	0.00	0.00	-0.37
40	-	0.00	-1.06	0.00	0.00	0.00	0.00	0.00	0.00	-1.06
All >10		0.00	0.00	0.00	0.00	0.00	0.00	-66.36	-6.05	-72.40

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

Table 15.24: Hectares Predicted to Experience Different Levels of Change in Nitrogen Deposition - Comparing 'With Plan' Emissions Scenario C to 'No Growth' Emissions Scenario A (AQC Method) [a,b]

Change in Concentration		Dry Dwarf Heath	Semi Natural Wdlnd	Wet Dwarf Heath	Brack.	Scatt Brack.	Grass	Bare Ground	Open Water	Entire SAC
EAL	% of EAL	Area (ha) to Experience Change Greater than % of EAL								
10 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
15 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	626.90	1202.05	260.76	236.22	181.06	86.77	0.47	0.00	2594.24
20 kg-N/ha/yr	-0.1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-0.5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-1	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-3	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-5	626.90	1202.05	260.76	236.22	181.06	86.77	67.24	6.05	2667.05
	-10	0.01	1202.05	0.24	0.14	0.10	0.14	0.00	0.00	1202.67

[a] Values of 0.00 represent any value less than 0.005. A Value of 0.01 ha represents 100 m^2.

[b] The change criteria are listed as both an Environmental Assessment Level (EAL) and also a percentage of that level. A given percentage will be different for each EAL, for example 1% of 10 kg-N/ha/yr is 0.1 kg-N/ha/yr, while 1% of 20 kg-N/ha/yr is 0.2 kg-N/ha/yr.

Chapter Summary

15.37 The changes that would be caused by the Local Plan in combination with other predicted traffic growth along with national and international emissions projections (i.e. the combined effect of all three processes) have been derived by comparing the results of the 'With Plan' scenarios B and C

against those from the current baseline (which uses emissions scenario A). The results are presented as changes in both concentrations and deposition fluxes, as well as changes in relation to different percentages of the critical level or critical load (from 0.1% to 10% for annual mean values and from 1% to 50% for 24-hour means).

15.38 If the technological and policy improvements predicted nationally and internationally all deliver their anticipated benefits, then air quality will be better, and nitrogen deposition fluxes will be smaller, than they are at present. While the Local Plan will cancel out some of these expected benefits, it is still the case that conditions in the future with the Plan and other traffic growth will be better than they are at present if all of the anticipated emissions improvements materialise. All of the results in this chapter are thus presented as benefits. These predicted benefits should, however, be understood in the context of an Opinion from the European Court of Justice (see Paragraph 15.4), which is that predicted benefits, such as those associated with technology and national policy, which are unrelated to the Wealden Local Plan (and will happen autonomously with or without the Plan), cannot be used to offset the adverse impacts of the Plan where the critical levels or loads are still exceeded.

16 Summary and Conclusions

16.1 This report has identified the existing and likely future air quality conditions across the Ashdown Forest SAC. The future-year predictions have covered a range of alternative scenarios and these results have been used to quantify the effects that changes in traffic flows, in particular changes caused by the Wealden Local Plan on roads within and close to the SAC, will have on air quality.

16.2 The study has used an extensive network of air quality monitors located across the Ashdown Forest SAC. These measurements have been supplemented with numerical modelling in order to: provide a more complete spatial picture than is possible from the measurements alone; calculate nitrogen deposition, which cannot be determined directly from the measurements; and predict air quality conditions in the future.

16.3 Matters related to ecological effects and compliance with policy are not considered within this current report. The outcomes of this work will assist Wealden District Council in meeting its Habitats Regulations duty as relevant to plan making.

Summary of Measurements

Results from the Automatic Monitor

16.4 Measurements made using the automatic monitor show that the critical levels for both annual mean and 24-hour mean NOx (30 $\mu g/m^3$ and 75 $\mu g/m^3$ respectively) are being achieved 1.7 m from the B2026 at Kingstanding. The automatic analyser also measures concentrations of NHx, but it is more experimental in this regard and greater weight is thus given to the reference method results provided by the co-located DELTA sampler (Paragraph 16.6).

Results from the Diffusion Tubes

16.5 Two-year average measured NO_2 concentrations were used to calculate NOx concentrations at each of the diffusion tube monitoring sites. Measured NO_2 and NOx concentrations show a clear pattern of higher concentrations close to roads; reflecting the influence of NOx emissions from road traffic. Exceedences of the 30 $\mu g/m^3$ critical level for annual mean concentrations have been measured alongside the A22, A26, B2026, and B2110. All of the locations where exceedences of this critical level were measured were within 5 m from the edges of the roads and it is clear that emissions from existing road traffic are driving these exceedences.

Results from the DELTA Samplers

16.6 Measured NH_3 concentrations at the roadside sites were much higher than those at sites well away from the roads; reflecting the influence of NH_3 emissions from road traffic. Measured, two-year average, NH_3 concentrations were below the 1 $\mu g/m^3$ critical level at five sites, but above the critical level at Site R4.3, which is 5 m from the A26. Here an average concentration of 1.2 $\mu g/m^3$ was

recorded. Emissions of NH_3 from existing traffic on the A26 are driving this exceedence of the critical level.

Results from the ALPHA Monitors

16.7 Measured NH_3 concentrations show a clear pattern of higher concentrations close to roads; again reflecting the influence of NH_3 emissions from road traffic. The highest measured concentration (1.7 $\mu g/m^3$) was measured at Site R1.1, which is 1.7 m from the A22. Exceedences of the 1 $\mu g/m^3$ critical level were also measured at four other sites beside the A22, as well as at Site R4.3 which is 5 m from the A26, and at Site T67 which is 1.8 m from the B2026. Emissions of NH_3 from existing road traffic are driving these exceedences of the critical level.

Summary of Existing Baseline Model Results

16.8 Detailed modelling has been carried out to determine the contributions of road traffic emissions to concentrations and deposition fluxes at locations between the monitoring sites. i.e. across the whole area of the SAC. The monitoring results have been used to calibrate the model to help ensure its accuracy.

Predictions at the Quadrats used for the Ecological Surveys

Annual Mean NOx

16.9 The model results show that the 30 $\mu g/m^3$ critical level was only exceeded along Transects F, G, J, and K, and then only at the quadrats which are 1 m or 5 m from the kerb. A value of 15 $\mu g/m^3$, which represents the lower bound to the uncertainty range of the critical level, was exceeded at some point along all of the transects.

24-hour Mean NOx

16.10 The 75 $\mu g/m^3$ critical level is predicted to have been exceeded over most of the SAC, with concentrations dropping marginally below the critical level on Transects H, L, M, and O, with no predicted concentrations achieving the critical level within 50 m of a road. Predicting exceedences of the 75 $\mu g/m^3$ critical level is relatively uncertain, which explains the discrepancy between the model predictions and the measurements at the automatic monitor.

Annual Mean NH_3

16.11 The model results show that the critical level for NH_3 (1.0 $\mu g/m^3$) was exceeded at the roadside quadrats in Transects F, G, J, and K. A value of 0.8 $\mu g/m^3$, which represents the lower bound to the uncertainty range of the critical level, is predicted to have been exceeded in Transects E, F, G, J, K, and N. The upper bound of the critical level range (1.2 $\mu g/m^3$) was exceeded in Transects J, and K.

Nitrogen Deposition

16.12 Nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). Predictions made using the EA method are higher than those made using the AQC method. Regardless of the deposition method used, calculated deposition fluxes exceed the 10 kg-N/ha/yr critical load at all of the ecological quadrats along all of the transects. At the observed habitat types, the maximum calculated deposition flux to any quadrat was 44 kg-N/ha/yr (Transect F, EA method), while the minimum calculated flux was 12.1 kg-N/ha/yr (Transects F and O, AQC method).

Area-wide Model Predictions

Annual Mean NOx

16.13 The area-wide model predictions show that annual mean NOx concentrations exceed the 30 $\mu g/m^3$ critical level alongside the A22 and A26. The maximum predicted concentration is 90 $\mu g/m^3$ and a total of 4.6 ha of the SAC is predicted to exceed the critical level. The maximum predicted concentration over dry or wet heath is smaller at 63 $\mu g/m^3$; still more than twice the 30 $\mu g/m^3$ critical level. A total of 0.4 ha (4,000 m^2) of heathland is predicted to experience an exceedence of the critical level. When using the lower-bound uncertainty range to this critical level (15 $\mu g/m^3$) the exceedence area is greatly increased.

24-hour Mean NOx

16.14 The area-wide model predictions of maximum 24-hour NOx concentrations are relatively uncertain but do provide the best available estimates of area-wide conditions. Maximum 24-hour mean NOx concentrations are predicted to exceed the 75 $\mu g/m^3$ critical level over the entire SAC. The maximum predicted concentration anywhere in the SAC is 426 $\mu g/m^3$, while the maximum concentration over heath is 334 $\mu g/m^3$.

Annual Mean NH_3

16.15 Exceedences of the 1 $\mu g/m^3$ critical level are predicted alongside the A22 and A26, as well as at the junction of Crowborough Road with the B2026. These cover a total of 3.1 ha of the SAC, of which 0.1 ha (1,000 m^2) is heath. When using the lower-bound uncertainty range to the critical level (0.8 $\mu g/m^3$) the exceedence areas are greatly increased. The maximum predicted concentration is 2.2 $\mu g/m^3$ (i.e. more than double the 1 $\mu g/m^3$ critical level) and the maximum concentration predicted over heath is 1.7 $\mu g/m^3$.

Nitrogen Deposition

16.16 As with the flux to the ecological survey quadrats, nitrogen deposition has been calculated using two alternative deposition methods (EA method and AQC method). Both methods predict that the 10 kg-N/ha/yr critical load is exceeded across all dry and wet heath in the SAC. The only land uses

that will not experience an exceedence of this critical load are some small areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

16.17 The maximum predicted deposition fluxes are 67 kg-N/ha/yr (EA method) and 56 kg-N/ha/yr (AQC method), with the maximum fluxes to heath being 32 kg-N/ha/yr and 23 kg-N/ha/yr for the EA and AQC methods respectively. All of these values are well above the 10 kg-N/ha/yr critical load.

Results of Future-year Scenario Modelling

2028 No-Growth Scenario

16.18 The No-Growth model predicts the future air quality conditions across the SAC assuming that there is no growth in traffic either within Wealden or elsewhere. For NOx concentrations and nitrogen deposition, these predictions are made for three alternative emissions scenarios: A, B, and C. However, because emissions scenario A assumes no change from the current position, these predictions are identical to those for the existing baseline and are not described again. For NH_3, only one emissions scenario is considered (scenario A) and these results are thus as set out for the existing baseline.

Annual Mean NOx

16.19 Predicted annual mean NOx concentrations in No-Growth emissions scenarios B and C are both lower than those in the existing baseline (which uses the same traffic data but emissions scenario A). This reflects differences in the different emissions models. Concentrations are, however, predicted to continue to exceed the critical level under both emissions scenarios B, and C. Both the area of exceedence, and the degree to which the critical level is exceeded, is smallest in emissions scenario C. In emissions scenario B, the maximum predicted annual mean NOx concentration is 44 $\mu g/m^3$ and a total of 0.1 ha (1,000 m^2) is predicted to exceed the 30 $\mu g/m^3$ critical level. In emissions scenario C, the maximum predicted concentration is 32 $\mu g/m^3$ and a total of 0.005 ha (50 m^2) is predicted to exceed the 30 $\mu g/m^3$ critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (31 $\mu g/m^3$, 24 $\mu g/m^3$ for emissions scenarios B and C respectively). Thus, the 30 $\mu g/m^3$ critical level is not predicted to be exceeded over heathland in emissions scenario C. The level of the lower-bound uncertainty range to the critical level (15 $\mu g/m^3$) is, however, exceeded.

24-hour Mean NOx

16.20 As was the case for annual mean NOx, all of the predicted maximum 24-hour mean concentrations in No-Growth emissions scenarios B and C are lower than those in the existing baseline (which uses the same traffic data but emissions scenario A). Maximum 24-hour mean NOx concentrations are predicted to exceed the critical level under both emissions scenarios B, and C. Both the area of exceedence, and the degree to which the critical level is exceeded, is smallest in emissions scenario C. In emissions scenario B, the maximum predicted concentration is 254 $\mu g/m^3$ and a

total of 80 ha is predicted to exceed the 75 μg/m^3 critical level. Under emissions scenario C, the maximum predicted concentration is 201 μg/m^3 and a total of 36 ha is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (193 μg/m^3, and 156 μg/m^3 for emissions scenarios B and C respectively) but the 75 μg/m^3 critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C).

Nitrogen Deposition

16.21 As well as the two emissions scenarios (B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). All of the predicted deposition fluxes in No-Growth emissions scenarios B and C are lower than those in the existing baseline (which uses the same traffic data but emissions scenario A). Under both emissions scenarios and both deposition models, the 10 kg-N/ha/yr critical load is predicted to be exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load, under any of the emissions scenarios or deposition models, are some areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

16.22 The maximum predicted fluxes under emissions scenario B are 51 and 47 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 23 and 19 kg-N/ha/yr respectively. The maximum predicted fluxes under emissions scenario C are 47 and 44 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 22 and 18 kg-N/ha/yr respectively.

16.23 Thus, even in the most optimistic emissions scenario considered (scenario C) and deposition method (AQC method), deposition fluxes are predicted to be well above the critical load at the worst-case heathland location considered, and the critical load will be exceeded over virtually the entire SAC. Using the results for less optimistic scenarios, the exceedences are even greater.

2028 No WDC-Growth Scenario

16.24 The 2028 No WDC-Growth model predicts the future air quality conditions assuming that growth outside of Wealden takes place but there is no growth associated with the Wealden Local Plan. These predictions have been made for the three alternative emissions scenarios: A, B, and C.

Annual Mean NOx

16.25 All of the predicted annual mean NOx concentrations in the No WDC-Growth scenario are higher (for equivalent emissions scenarios) than those in the existing baseline and No-Growth scenarios, which did not include the additional growth from outside Wealden. Annual mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). In emissions scenario A, the maximum predicted concentration is 104 μg/m^3 and a total of 6.8 ha of the SAC is predicted to exceed the 30 μg/m^3 critical level. In emissions scenario B, the

maximum predicted concentration is 51 μg/m^3 and a total of 0.6 ha is predicted to exceed the 30 μg/m^3 critical level. Under emissions scenario C, the maximum predicted concentration is 37 μg/m^3 and a total of 0.02 ha (200 m^2) is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (76, 38, and 28 μg/m^3 for emissions scenarios A, B and C respectively). Thus, the 30 μg/m^3 critical level is not predicted to be exceeded over heath under the most optimistic emissions scenario considered (scenario C) but it is in both other scenarios. When using the lower-bound uncertainty range to this critical level (15 μg/m^3) the exceedence areas are all greatly increased.

24-hour Mean NOx

16.26 As was the case for annual mean NOx, all of the predicted maximum 24-hour mean NOx concentrations in the No WDC-Growth scenario are higher (for equivalent emissions scenarios) than those in the existing baseline and No-Growth scenarios, which did not include the additional growth from outside Wealden. Maximum 24-hour mean NOx concentrations are predicted to exceed the 75 μg/m^3 critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 473 μg/m^3 and the entire SAC is predicted to exceed the 75 μg/m^3 critical level. In emissions scenario B, the maximum predicted concentration is 284 μg/m^3 and a total of 114 ha is predicted to exceed the critical level. Under emissions scenario C, the maximum predicted concentration is 225 μg/m^3 and a total of 55 ha is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (378, 226, and 180 μg/m^3 for emissions scenarios A, B and C respectively) but the 75 μg/m^3 critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C).

Annual Mean NH_3

16.27 It was only possible to consider a single emissions scenario for NH_3 (scenario A). As was the case for NOx, all of the predicted annual mean NH_3 concentrations in the No WDC-Growth scenario are higher than those in the existing baseline and No-Growth scenarios, which did not include the additional growth from outside Wealden. Exceedences of the 1 μg/m^3 critical level cover a total of 4.3 ha of the SAC, of which 0.3 ha (3,000 m^2) is currently heath. The maximum predicted concentration is 2.5 μg/m^3 (i.e. 2.5 times the 1 μg/m^3 critical level) and the maximum concentration predicted in an area which is currently heath is 1.9 μg/m^3. When using the lower-bound uncertainty range to the critical level (0.8 μg/m^3) the exceedence areas are all greatly increased.

Nitrogen Deposition

16.28 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). All of the predicted deposition fluxes in the No WDC-Growth scenario are higher (for equivalent emissions scenarios and

deposition methods) than those in the existing baseline and No-Growth scenarios, which did not include the additional growth from outside Wealden. Under all three emissions scenarios and both deposition models, the 10 kg-N/ha/yr critical load is predicted to be exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load, under any of the emissions scenarios or deposition models, are some small areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

16.29 The maximum predicted deposition fluxes in emissions scenario A are 73 kg-N/ha/yr (EA method) and 60 kg-N/ha/yr (AQC method), with the maximum fluxes to any current heath being 36 kg-N/ha/yr and 25 kg-N/ha/yr for the EA and AQC methods respectively. The maximum predicted fluxes under emissions scenario B are 56 and 51 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 26 and 21 kg-N/ha/yr respectively. The maximum predicted fluxes under emissions scenario C are 51 and 48 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 24 and 20 kg-N/ha/yr respectively.

16.30 Thus, even in the most optimistic emissions scenario considered (scenario C) and deposition method (AQC method), deposition fluxes are predicted to be twice the critical load at the worst-case heathland locations considered, and the critical load will be exceeded over virtually the entire SAC. Using the results for less optimistic scenarios, the exceedences are even greater.

2028 With Plan Scenario

16.31 The 2028 With Plan model predicts the future air quality conditions assuming that growth outside of Wealden takes place and also assuming traffic growth associated with the Wealden Local Plan. These predictions have been made for the same three emissions scenarios (A, B, and C) as the other 2028 scenarios.

Annual Mean NOx

16.32 All of the predicted annual mean NOx concentrations with the Local Plan are higher (for equivalent emissions scenarios) than those without the Local Plan. Annual mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 112 $\mu g/m^3$ and a total of 8.2 ha of the SAC is predicted to exceed the 30 $\mu g/m^3$ critical level. In emissions scenario B, the maximum predicted concentration is 54 $\mu g/m^3$ and a total of 1.1 ha is predicted to exceed the 30 $\mu g/m^3$ critical level. Under emissions scenario C, the maximum predicted concentration is 41 $\mu g/m^3$ and a total of 0.1 ha (1,000 m^2) is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (84, 43, and 32 $\mu g/m^3$ for emissions scenarios A, B and C respectively). Thus, the 30 $\mu g/m^3$ critical level is predicted to be exceeded in the most optimistic emissions

scenario considered (scenario C), which was not the case without the Local Plan (see Paragraph 16.25). When using the lower-bound uncertainty range to this critical level (15 μg/m^3) the exceedence areas are all greatly increased.

24-hour Mean NOx

16.33 As was the case for annual mean NOx, all of the predicted maximum 24-hour mean NOx concentrations with the Local Plan are higher (for equivalent emissions scenarios) than those without the Local Plan. Maximum 24-hour mean NOx concentrations are predicted to exceed the critical level under all three emissions scenarios (A, B, and C). Both the area of exceedence, and the degree to which the critical level is exceeded, is greatest in emissions scenario A and smallest in emissions scenario C. In emissions scenario A, the maximum predicted concentration is 498 μg/m^3 and the entire SAC is predicted to exceed the 75 μg/m^3 critical level. In emissions scenario B, the maximum predicted concentration is 299 μg/m^3 and a total of 132 ha is predicted to exceed the 75 μg/m^3 critical level. Under emissions scenario C, the maximum predicted concentration is 241 μg/m^3 and a total of 65 ha is predicted to exceed the critical level. The maximum predicted concentrations over areas that are currently dry or wet heath are smaller (406, 249, and 198 μg/m^3 for emissions scenarios A, B and C respectively) but the 75 μg/m^3 critical level is still predicted to be exceeded, even in the most optimistic emissions scenario considered (scenario C).

Annual Mean NH_3

16.34 It was only possible to consider a single emissions scenario for NH_3. As was the case for NOx, all of the predicted annual mean NH_3 concentrations with the Local Plan are higher than without the Local Plan. Exceedences of the 1 μg/m^3 critical level cover a total of 4.9 ha of the SAC, of which 0.4 ha (4,000 m^2) is currently heath. The maximum predicted concentration is 2.7 μg/m^3 (i.e. 2.7 times the critical level) and the maximum concentration predicted in an area which is currently heath is 2.1 μg/m^3 (more than twice the critical level). When using the lower-bound uncertainty range to the critical level (0.8 μg/m^3) the exceedence areas are all greatly increased.

Nitrogen Deposition

16.35 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). All of the predicted deposition fluxes with the Local Plan are higher (for equivalent emissions scenarios and deposition methods) than those without the Local Plan. Under all three emissions scenarios and both deposition models, the 10 kg-N/ha/yr critical load is predicted to be exceeded across all dry and wet heath in the SAC. The only land uses that will not experience an exceedence of this critical load, under any of the emissions scenarios or deposition models, are some small areas of bare ground and open water. This is because nitrogen deposition is much slower where there is no vegetation to deposit to.

16.36 The maximum predicted deposition fluxes in emissions scenario A are 78 kg-N/ha/yr (EA method) and 63 kg-N/ha/yr (AQC method), with the maximum fluxes to any current heath being 39 kg-N/ha/yr and 26 kg-N/ha/yr for the EA and AQC methods respectively. The maximum predicted fluxes under emissions scenario B are 59 and 53 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 28 and 22 kg-N/ha/yr respectively. The maximum predicted fluxes under emissions scenario C are 54 and 50 kg-N/ha/yr respectively for the EA and AQC methods, with the maximum fluxes to heath being 25 and 21 kg-N/ha/yr respectively.

16.37 Thus, even in the most optimistic emissions scenario considered (scenario C) and deposition method (AQC method), deposition fluxes are predicted to be more than twice the critical load at the worst-case heathland locations considered, and the critical load will be exceeded over virtually the entire SAC. Using the results for less optimistic scenarios, the exceedences are even greater.

Changes Caused by Local Plan Alone

16.38 The changes that would be caused by the Wealden Local Plan in isolation have been derived by comparing the results of the 'With Plan' scenario against those from the 'No WDC-growth' scenario. For NOx and nitrogen deposition, results are presented for emissions scenarios A, B and C. For ammonia concentrations, results are presented for scenario A only. The results are presented as changes in both concentrations and deposition fluxes, as well as changes in relation to different percentages of the critical level or critical load (from 0.1% to 10% for annual mean values and from 1% to 50% for 24-hour means).

Annual Mean NOx

16.39 The Local Plan alone will increase annual mean NOx concentrations across the entire SAC; but over most of the area, the predicted increases are very small (average predicted changes over the SAC as a whole are 0.15, 0.09, and 0.06 $\mu g/m^3$ in emissions scenarios A, B, and C respectively). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan. The biggest increases are predicted close to roads; with the largest predicted increases being 8.2, 5.2, and 3.5 $\mu g/m^3$ in scenarios A, B, and C respectively. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical level, and the total areas predicted to experience this change are 222, 105, and 56 ha in emissions scenarios A, B, and C respectively. When these areas are restricted to include only the region where the critical level will also be exceeded, they reduce to 8.1, 1.1, and 0.09 ha in emissions scenarios A, B, and C respectively. The area of SAC exceeding the critical level is predicted to increase by 1.4, 0.5, and 0.07 ha as a result of the Local Plan in scenarios A, B, and C respectively. In emissions scenario C, there would be no exceedence of the critical level without the Plan, but an exceedence is predicted with the Plan.

24-hour NOx

16.40 As with annual mean NOx, the Local Plan alone will increase concentrations across the entire SAC; but over most of the area, the predicted increases are very small (average predicted increases over the SAC as a whole are 0.9, 0.7, and 0.4 μg/m^3 in scenarios A, B, and C respectively). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan. The biggest increases are predicted close to roads; with the largest predicted increases being 29, 23, and 18 μg/m^3 in scenarios A, B, and C respectively. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 10% of the critical level, and the total areas predicted to experience this change are 12.1, 6.4, and 2.9 ha in emissions scenarios A, B, and C respectively. These increases (>10% of the critical level) are all predicted in areas where the critical level will also be exceeded. The area exceeding the critical level is predicted to increase by 18.4 and 10.6 ha in scenarios B and C respectively. The area of exceedence is only not predicted to change in emissions scenario A because the entire SAC is already predicted to exceed without the Plan.

Annual Mean NH_3

16.41 As with NOx, the Local Plan alone will increase concentrations across the entire SAC; but over most of the area, the predicted increases are very small (the average predicted change over the SAC as a whole is 0.001 μg/m^3). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan. The biggest increases are predicted close to roads; with the largest predicted increase being 0.17 μg/m^3. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical level, and the total area predicted to experience this is 41.1 ha. When this area is restricted to include only the region where the critical level will also be exceeded, it reduces to 4.6 ha. When the lower-bound to the critical level uncertainty range is considered, this area increases to 15.6 ha. The area exceeding the 1 μg/m^3 critical level is predicted to increase by 0.7 ha as a result of the Wealden Local Plan.

Nitrogen Deposition

16.42 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). The 10 kg-N/ha/yr critical load is predicted to be exceeded over almost the entire SAC either without or with the Local Plan. The Local Plan will increase deposition fluxes across the entire SAC; but over most of the area, the predicted increases are very small. These SAC-wide increases will alter the predicted deposition at all locations, meaning that the total area falling within different deposition bands will change, and the maximum predicted fluxes will increase. as a result of the Plan. The biggest increases are predicted close to roads; with the largest increase (4.1 kg-N/ha/yr) predicted to woodland in

emissions scenario A and the EA deposition method. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical load, and the total areas predicted to experience this change are 101.7, 70.2, and 54.5 ha for emissions scenarios A, B, and C respectively using the EA deposition method and 70.4, 53.3, and 44.1 ha for scenarios A, B, and C using the AQC deposition method.

Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth

16.43 The changes that would be caused by the Wealden Local Plan in combination with other predicted traffic growth have been derived by comparing the results of the 'With Plan' scenario against those from the 'No-growth' scenario. For NOx and nitrogen deposition, results are presented for emissions scenarios A, B and C. For ammonia concentrations, results are presented for scenario A only. The results are presented as changes in both concentrations and deposition fluxes, as well as changes in relation to different percentages of the critical level or critical load (from 0.1% to 10% for annual mean values and from 1% to 50% for 24-hour means).

Annual Mean NOx

16.44 The Local Plan in combination with other predicted traffic growth will increase concentrations across the entire SAC (average predicted increases over the SAC as a whole are 0.45 $\mu g/m^3$ (emissions scenario A), 0.27 $\mu g/m^3$ (scenario B), and 0.18 $\mu g/m^3$ (scenario C)). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest predicted increases being 22.8, 12.8, and 8.6 $\mu g/m^3$ in scenarios A, B, and C respectively. The total area of the SAC affected by different magnitudes of change has been presented. One of these change magnitudes is 1% of the critical level, and the total areas predicted to experience this change are 1,556, 602, and 321 ha in emissions scenarios A, B, and C respectively. When these areas are restricted to include only the region where the critical level will also be exceeded, they reduce to 8.2, 1.1, and 0.09 ha in emissions scenarios A, B, and C respectively. The area of SAC exceeding the critical level is predicted to increase by 3.6, 1.0, and 0.09 ha as a result of the Local Plan in combination with other traffic growth in scenarios A, B, and C respectively. In the case of emissions scenario C, an exceedence is not predicted without this additional traffic but is predicted with it.

24-hour NOx

16.45 As with annual mean NOx, the Local Plan in combination with other traffic growth will increase concentrations across the entire SAC (average predicted increases over the SAC as a whole are 2.9, 1.9, and 1.3 $\mu g/m^3$ in emissions scenarios A, B, and C respectively). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentrations will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are

predicted close to roads; with the largest predicted increases being 73, 57, and 42 μg/m^3 in scenarios A, B, and C respectively. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 10% of the critical level, and the total areas predicted to experience this change are 128, 61, and 27 ha in emissions scenarios A, B, and C respectively. These increases (>10% of the critical level) are all predicted in areas where the critical level will also be exceeded. The area exceeding the critical level is predicted to increase by 52 and 29 ha in scenarios B and C respectively. The area of exceedence is only not predicted to change in emissions scenario A because the entire SAC is already predicted to exceed without any traffic growth.

Annual Mean NH_3

16.46 As with NOx, the Local Plan in combination with other traffic growth will increase concentrations across the entire SAC (the average predicted change over the SAC as a whole is 0.004 μg/m^3). These SAC-wide increases will alter the predicted concentrations at all locations, meaning that the total area falling within different concentration bands will change, and the maximum predicted concentration will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest predicted change being 0.47 μg/m^3. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical level, and the total area predicted to experience this change is 171 ha. When this area is restricted to include only the region where the critical level will also be exceeded, it reduces to 4.9 ha. When the lower-bound to the critical level uncertainty range is considered, this area increases to 17.8 ha. The area exceeding the 1 μg/m^3 critical level is predicted to increase by 1.9 ha as a result of the Wealden Local Plan in combination with other traffic growth.

Nitrogen Deposition

16.47 As well as the three emissions scenarios (A, B, and C), nitrogen deposition has been calculated for two alternative deposition methods (EA method and AQC method). The 10 kg-N/ha/yr critical load is predicted to be exceeded over almost the entire SAC either without or with the Local Plan in combination with other traffic growth. The Local Plan in combination with other traffic growth will increase deposition fluxes across the entire SAC. These SAC-wide increases will alter the predicted deposition at all locations, meaning that the total area falling within different deposition bands will change, and the maximum predicted fluxes will increase, as a result of the Plan in combination with other traffic growth. The biggest increases are predicted close to roads; with the largest increase (11.0 kg-N/ha/yr) predicted to woodland in emissions scenario A and the EA deposition method. The total area affected by different magnitudes of change has been shown. One of these change magnitudes is 1% of the critical load, and the total areas predicted to experience this change are 429, 277, and 215 ha for emissions scenarios A, B, and C respectively using the EA deposition method and 281, 203, and 169 ha for scenarios A, B, and C using the AQC deposition method.

Changes Caused by Local Plan In Combination with Other Predicted Traffic Growth and National and International Emissions Projections

16.48 The changes that would be caused by the Local Plan in combination with other predicted traffic growth along with national and international emissions projections (i.e. the combined effect of all three processes) have been derived by comparing the results of the 'With Plan' scenarios B and C against those from the current baseline (which uses emissions scenario A). The results are presented as changes in both concentrations and deposition fluxes, as well as changes in relation to different percentages of the critical level or critical load (from 0.1% to 10% for annual mean values and from 1% to 50% for 24-hour means).

16.49 If the technological and policy improvements predicted nationally and internationally all deliver their anticipated benefits, then air quality will be better, and nitrogen deposition fluxes will be smaller, than they are at present. While the Local Plan will cancel out some of the benefits driven by technology and (inter)national policy, it is still the case that conditions in the future with the Plan (and other traffic growth) will be better than they are at present if all of the anticipated emissions reductions materialise. All of these results are thus presented as benefits (i.e. reductions in concentrations and deposition fluxes). These predicted benefits should, however, be understood in the context of an Opinion from the European Court of Justice (see Paragraph 15.4), which is that predicted benefits, such as those associated with technology and national policy, which are unrelated to the Wealden Local Plan (and will happen autonomously with or without the Plan), cannot be used to offset the adverse impacts of the Plan where the critical levels or loads are still exceeded.

Overall Conclusions

16.50 At present, the critical levels for annual mean NOx and NH_3 concentrations are being exceeded alongside roads and achieved elsewhere. The critical level for the maximum 24-hour mean NOx is likely to be being exceeded across much of the SAC; although these predictions are uncertain. The critical load for nitrogen deposition is being exceeded over virtually the entire SAC.

16.51 Predicting conditions in the future is difficult and a range of alternative emissions assumptions has been considered. Across all of these alternative assumptions, the critical loads are predicted to continue to be exceeded over almost the entire SAC in 2028, even without any traffic growth. The critical levels for 24-hour mean NOx and annual mean NH_3 will also continue to be exceeded alongside roads, and potentially further afield in the case of 24-hour mean NOx. The critical level for annual mean NOx may be achieved across the entire SAC by 2028 without any traffic growth, but this only happens in the most optimistic of the emissions scenarios considered. In the other scenarios, exceedences of this critical level persist alongside key roads.

16.52 The additional traffic caused by the Local Plan and by growth outside of Wealden, will increase concentrations and deposition fluxes. In those locations where the critical levels and critical loads are predicted to be exceeded already, this additional traffic growth will exacerbate these

exceedences. There are also many areas where the critical levels would be achieved without this traffic growth but exceeded with it.

16.53 It is not within the scope of this report to determine whether these changes might give rise to a significant effect on the habitats that make up the SAC. A Habitats Regulations Assessment for the Local Plan is being prepared separately.

17 References

AEA Energy and Environment. (2008). *Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance*. Retrieved from http://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf

APIS. (2017). *APIS*. Retrieved from Air Pollution Information System Database: www.apis.ac.uk

AQC. (2016). *Emissions of Nitrogen Oxides from Modern Diesel Vehicles.*

AQC. (2017). *CURED V3A*. Retrieved from http://www.aqconsultants.co.uk/Resources/Download-Reports.aspx

AQC. (2018). *Development of the CURED v3A Emissions Model*. Retrieved from http://www.aqconsultants.co.uk/Resources/Download-Reports.aspx

AQC. (2018). *Nitrogen Dioxide and Nitrogen Oxides Trends in the UK 2005 to 2016.* Retrieved from http://www.aqconsultants.co.uk/AQC/media/Reports/NO2-NOx-Trend-Report.pdf

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

Cape, Tang, van Dijk, Love, Sutton, and Palmer. (2004). *Concentrations of ammonia and nitrogen dioxide at roadside verges, and their contribution to nitrogen deposition.* Retrieved from Environmental Pollution, 132, 3.

Carslaw, D., & Rhys-Tyler, G. (2013, July). *Remote sensing of NO2 exhaust emissions from road vehicles*. Retrieved from http://uk-air.defra.gov.uk/assets/documents/reports/cat05/1307161149_130715_DefraRemoteSensingReport_Final.pdf

Carslaw, D., Beevers, S., Westmoreland, E., & Williams, M. (2011). *Trends in NOx and NO2 emissions and ambient measurements in the UK*. Retrieved from uk-air.defra.gov.uk/reports/cat05/1108251149_110718_AQ0724_Final_report.pdf

CEH. (2018). *UK Deposition Data*. Retrieved from http://www.pollutantdeposition.ceh.ac.uk/data

Conolly, C. D. (2016). *UK Eutrophying and Acidifying Atmospheric Pollutants (UKEAP) Annual Report 2016.*

Dammgen, E. C. (2005). *Practical considerations for addressing uncertainties in monitoring bulk deposition.* Retrieved from Environmental Pollution, 134, 535-548.

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

Defra. (2012). *UK Emission Projections of Air Quality Pollutants to 2030*. Retrieved from http://naei.defra.gov.uk/reports/reports?report_id=721

Defra. (2016a). *Review & Assessment: Technical Guidance LAQM.TG16.* Defra.

Defra. (2018a). *Defra Air Quality Website*. Retrieved from http://laqm.defra.gov.uk/

Defra. (2018b). *Defra National Statistics Release: Emissions of air pollutants in the UK, 1970 to 2016.* Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/681445/Emissions_of_air_pollutants_statistical_release_FINALv4.pdf

DfT. (2017b). *DfT Automatic traffic Counters Table TRA0305-0307.*

Directive 2008/50/EC of the European Parliament and of the Council. (2008).

ECJ. (2018). *Opinion of Advocate General Kokott on Joined Cases C-293/17 and C-294/17. Delivered on 25 July 2018.* Retrieved from http://curia.europa.eu/juris/celex.jsf?celex=62017CC0293&lang1=en&type=TXT&ancre=

Emisia. (2018). Retrieved from http://emisia.com/products/copert

Environment Agency. (2008). *Calculation of near-field critical load exceedence from generating stations.* Science Report - SC03172/SR4b.

Environment Agency. (2008b). *Review of modelling methods of near-field acid deposition.* ISBN: 978-1-84432-905-2.

Environment Agency. (2018). *Air emissions risk assessment for your environmental permit.* Retrieved from https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your- environmental-permit.

Erisman and Draaijers. (1995). *Atmospheric deposition in relation to acidification and eutrophication.* Studies in Environmental Sciences No 63. ISBN 0-444-82247-X.

Fowler et al. (2004). A Chronology of Nitrogen Deposition in the UK between 1900 and 2000. *Water, Air, and Soil Pollution: Focus, 4, 9-23*.

Fowler, Fletchard, Skiba, Coyle, & Cape., a. (1998). *The atmospheric budget of oxidised nitrogen and its role in ozone formation and deposition.* New Phytologist. 139, 11-23.

ICCT. (2017). *NOx emissions from heavy-duty and light-duty diesel vehicles in the EU: Comparison of real-world performance and current type-approval requirements*. Retrieved from http://www.theicct.org/nox-europe-hdv-ldv-comparison-jan2017

Marner and Harrison. (2004). *A spatially refined monitoring based study of atmospheric nitrogen deposition.* Atmospheric Environment 38, 5045 - 5056.

Massman. (1998). *A review of the molecular diffusivities of H20, CO2, CH4, CO, O3, SO2, NH3, N20, NO and NO2 in Air, O2, and N2 Near STP.* Atmospheric Environment 32 - 1111-1127.

NAEI. (2017). *National Atmospheric Emissions Inventory. Air Quality Pollutant Inventories for England, Scotland, Wales, and Northern Ireland: 1990-2015.*

Smith, Fowler, Sutton, Fletchard, & Coyle. (2000). *Regional estimation of pollutant gas dry deposition in the UK: model description, sensitivity analyses and outputs.* (Vol. 34). Atmospheric Environment 34 - 3757-3777.

Tang and Sutton. (2003). *Quality management in the UK national ammonia monitoring network. In: Proceedings of the International Conference: QA/QC in the field of emission and air quality measurements: harmonization, standardization and accreditation, held in Prague, 21-23 May 20.*

Tang, Y.S., Cape, J.N., and Sutton, M.A. (2001). *Development and types of passive samplers for monitoring atmospheric NO2 and NH3 concentrations, ScientificWorldJournal, 1, 513-529, https://doi: 10.1100/tsw.2001.82,.*

TNO. (2015). *NH3 Emission Factors for Road Transport.* Retrieved from http://www.emissieregistratie.nl/erpubliek/documenten/Lucht%20(Air)/Verkeer%20en%20Vervoer%20(Transport)/Wegverkeer/TNO%20(2015)%20NH3%20Emission%20Factors%20for%20road%20transport.pdf

Wehr, C. M. (2017). *Dynamics of canopy stomatal conductance, transpiration, and eveaporation in a temporate deciduous forest, validated by carbonyl sulfide uptake.* Retrieved from Biegeosciences 14, 389-401.

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