

## High Speed Rail (West Midlands - Crewe)

Supplementary Environmental Statement 2 and  
Additional Provision 2 Environmental Statement

Volume 5: Technical appendices

CA5: South Cheshire  
Air quality report (AQ-001-005)

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## Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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# 1 Introduction

## 1.1 Structure of this appendix

- 1.1.1 This document is an appendix to the air quality assessment which forms part of Volume 5 of the Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES) for the South Cheshire community area (CA5).
- 1.1.2 This appendix provides details of changes to the air quality assessment since the production of the High Speed Two (HS2) Phase 2a (West Midlands - Crewe) Environmental Statement (ES)<sup>1</sup> published in July 2017 (the main ES), as well as the Supplementary Environmental Statement (SES1) and Additional Provision Environmental Statement (AP1 ES) published in March 2018<sup>2</sup>.
- 1.1.3 This report should be read in conjunction with Volume 5, Appendix AQ-001-005, which accompanied the main ES.
- 1.1.4 Maps referred to in this appendix are contained in the SES2 and AP2 ES Volume 5: Air quality Map Book, Map Series AQ-01. In addition, the traffic data used for the air quality assessment is set out in Background Information and Data (BID)<sup>3</sup> which accompanies the SES2 and AP2 ES (see BID-AQ-002-000: Traffic data used for the air quality assessment in the SES2 and AP2 ES).
- 1.1.5 In this appendix the scheme is referred to as the AP2 revised scheme, which is the SES2 scheme (i.e. the SES1 scheme, submitted to Parliament in March 2018, with the changes described in the SES2) as amended by the AP2 amendments.
- 1.1.6 Where it has been possible to differentiate the air quality assessment between the SES2 changes and the AP2 amendments, this has been done and presented in this report. However, the assessment of road traffic emissions is a combined assessment of both SES2 changes and AP2 amendments in this area.

## 1.2 Scope, methodology, data sources, assumptions and limitations

- 1.2.1 The assessment scope, key assumptions and limitations are as set out in the main ES Environmental Impact Assessment Scope and Methodology Report and its Addendum (see main ES Volume 5: Appendix CT-001-001<sup>4</sup> and Volume 5: Appendix CT-001-002<sup>5</sup>).

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<sup>1</sup> HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>

<sup>2</sup> HS2 Ltd (2018), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Supplementary Environmental Statement and Additional Provision Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-supplementary-environmental-statement-and-additional-provision-environmental-statement>

<sup>3</sup> HS2 Ltd (2019), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Background Information and Data to accompany Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement*, <https://www.gov.uk/government/organisations/high-speed-two-limited>

<sup>4</sup> HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Impact Assessment Scope and Methodology Report, Main ES, Volume 5: Appendix CT-001-001*, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627187/E23\\_EIA\\_SMR\\_CT-001-001\\_WEB.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627187/E23_EIA_SMR_CT-001-001_WEB.pdf)

<sup>5</sup> HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Impact Assessment Scope and Methodology Report Addendum, Main ES, Volume 5: Appendix CT-001-002*, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627188/E24A\\_CT-001-002\\_Part\\_1\\_WEB.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627188/E24A_CT-001-002_Part_1_WEB.pdf) and [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627189/E24-B\\_CT-001-002\\_Part\\_B\\_WEB.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627189/E24-B_CT-001-002_Part_B_WEB.pdf)

1.2.2 In order to differentiate between the original scheme and the subsequent changes, the following terms are used:

- 'the original scheme' – the Bill scheme submitted to Parliament in July 2017, which was assessed in the main ES;
- 'the SES1 scheme' – the original scheme with the changes described in the SES1 submitted in March 2018;
- 'the AP1 revised scheme' – the SES1 scheme as amended by the AP1 submitted in March 2018;
- 'the SES2 scheme' – the SES1 scheme with the changes described in the SES2; and
- 'the AP2 revised scheme' – the SES2 scheme as amended by the AP2.

## 2 Baseline air quality data

### 2.1 Overview

2.1.1 Since the production of the main ES, air quality measurements for the baseline year of 2016 have become available. Background pollutant concentrations provided by the Department for Environment, Food and Rural Affairs (Defra) have also been updated.

2.1.2 This section provides the new baseline information in the South Cheshire area.

### 2.2 Local air quality monitoring data

2.2.1 Monitoring sites within the study area that are considered relevant for this assessment are shown in the SES2 and AP2 ES Volume 5: Map AQ-01-105.

#### *Continuous monitoring*

2.2.2 There are no continuous air quality monitoring sites within the South Cheshire area.

#### *Diffusion tubes*

2.2.3 There are 11 diffusion tube sites within the South Cheshire area considered relevant for the assessment of air quality. Table 1 summarises the results from these diffusion tube sites. Annual mean nitrogen dioxide (NO<sub>2</sub>) concentrations were above the air quality standard at one site along the A534 Nantwich Road in 2016.

Table 1: Annual mean NO<sub>2</sub> concentrations recorded at diffusion tube monitoring sites<sup>6</sup>

Site	Ordnance Survey coordinates	Annual mean NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )			
		2013	2014	2015	2016
CE203	370729, 354731	43	44	40	41
CE204	370736, 354695	39	38	31	35
CE206	370565, 354650	34	31	26	31
CE212	370555, 354720	36	36	30	35
CE224	370844, 355745	43	42	36	37
CE225	370874, 355748	36	37	34	35
CE226	371108, 355738	32	31	26	30
CE234	377071, 354979	37	35	27	31
CE235	370801, 354728	33	32	28	32
CE246	370871, 354315	n/a*	32	30	34

<sup>6</sup> Cheshire East Borough Council (2017), 2017 Air Quality Annual Status Report



Site	Ordnance Survey coordinates	Annual mean NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )			
		2013	2014	2015	2016
CE247	367716, 352868	n/a*	22	21	21

\* data not available for this year at this location

## 2.3 Background pollutant concentrations

- 2.3.1 Since the production of the main ES, updated background pollutant concentrations have become available from Defra<sup>7</sup>.
- 2.3.2 The updated background NO<sub>2</sub>, PM<sub>10</sub><sup>8</sup> and PM<sub>2.5</sub><sup>9</sup> concentrations are within the air quality standards throughout the study area for the baseline year of 2016. Annual mean NO<sub>2</sub> concentrations in the study area were in the range 5.6µg/m<sup>3</sup> – 18.4µg/m<sup>3</sup> in 2016. Annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were in the range 10.7µg/m<sup>3</sup> – 14.9µg/m<sup>3</sup> and 7.2µg/m<sup>3</sup> – 10.7µg/m<sup>3</sup> in 2016 respectively. The updated background pollutant concentrations are lower than those reported in the main ES.

<sup>7</sup> Department for Environment, Food and Rural Affairs (Defra), *Background mapping data for local authorities - 2015*, <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015design>

<sup>8</sup> Particulate matter with aerodynamic diameter of less than 10 micrometres.

<sup>9</sup> Particulate matter with aerodynamic diameter of less than 2.5 micrometres.

## 3 Air quality assessment – road traffic

### 3.1 Overview

3.1.1 This section provides details of the assessment of road traffic emissions during construction of the AP2 revised scheme. The assessment considers the combined effects of SES2 changes and AP2 amendments in this area.

### 3.2 Model verification

3.2.1 Since the production of the main ES, air quality measurements for the baseline year of 2016 have become available. The model verification has therefore been updated to take account of the 2016 monitoring data.

3.2.2 Model verification was undertaken on a route-wide basis where monitoring sites are located adjacent to the modelled road network. The objectives of the model verification are to evaluate model performance and to determine if model adjustment is required.

3.2.3 Some of the monitoring locations were not considered suitable for model verification, due to missing traffic or monitoring data, or other spatial considerations. A total of 21 monitoring sites were included in the verification exercise. The comparison of monitored and modelled NO<sub>2</sub> concentrations is shown in Table 2.

Table 2: Comparison of monitored and modelled NO<sub>2</sub> concentrations

Site	Monitored concentration (µg/m <sup>3</sup> )	Modelled concentration (µg/m <sup>3</sup> )	Difference [(modelled – monitored/monitored) *100]
CE206	30.7	22.9	-25.4%
CE225	35.1	25.1	-28.4%
CE247	20.6	20.1	-2.6%
DT28	30.8	32.6	5.9%
2	34.0	49.5	45.5%
5	34.0	21.5	-36.8%
8	33.0	40.7	23.2%
10	27.0	23.4	-13.4%
21	27.0	22.4	-16.9%
26	33.0	31.0	-6.1%
29	25.0	23.4	-6.5%
M6CLAYTON	36.0	46.7	29.6%

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Site	Monitored concentration (µg/m <sup>3</sup> )	Modelled concentration (µg/m <sup>3</sup> )	Difference [(modelled – monitored)/monitored] *100]
DT13	35.0	34.0	-2.8%
DT14	39.0	34.7	-11.2%
DT36	38.0	36.8	-3.2%
DT38	37.0	29.3	-20.8%
DT39	39.0	31.7	-18.6%
DT43	41.0	37.9	-7.5%
A38-1	43.0	41.7	-3.0%
A38-2/2(1)	37.6	40.0	6.4%
A38-2A/B	45.1	42.8	-5.2%

3.2.4 As the majority of modelled NO<sub>2</sub> concentrations were within ±25% of the monitored concentrations and there was no systematic under or over prediction, no model adjustment was undertaken. Modelled concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> have not been adjusted. Therefore, no changes are predicted from the assessment presented in the main ES.

### 3.3 Assessment of construction traffic emissions

3.3.1 Construction traffic data used in this assessment is detailed in the BID that accompanies the SES2 and AP2 ES (see BID-AQ-002-000: Traffic data used for the air quality assessment in the SES2 and AP2 ES). The assessment of construction traffic emissions has used traffic data based on an estimate of the average daily flows at the peak year during the construction period (2020-2026). However, vehicle emissions and background concentrations have been taken for the first construction year in 2020.

3.3.2 As set out in SES2 and AP2 ES Volume 1, Introduction to the SES2 and the AP2 ES, since the production of the main ES, updated background pollutant concentrations<sup>7</sup> and road vehicle emission factors<sup>10</sup> have become available from Defra. These have been used in this assessment. The updated road vehicle emission factors are higher for nitrogen oxides (NO<sub>x</sub>) than those used in the main ES, especially along motorways. Therefore, higher concentrations have been predicted for the future baseline scenario (without the HS2 scheme). At locations where NO<sub>2</sub> concentrations are predicted to exceed the annual mean air quality standard of 40µg/m<sup>3</sup> without the scheme, it is more likely that a small increase in concentrations due to the scheme will result in a significant effect.

<sup>10</sup> Department for Environment, Food and Rural Affairs (Defra), *Emissions Factors Toolkit*, <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

## Screening of traffic data

3.3.3 The screening process has identified a total of six roads in the South Cheshire area for further assessment. These are:

- the M6 motorway;
- the A500 Newcastle Road/Shavington Bypass;
- the B5071;
- Den Lane;
- David Whitby Way; and
- a new road between Newcastle Road and Weston Lane.

3.3.4 Traffic data for construction vehicles using the haul roads and moving between compounds has also been included in the assessment. Further roads have been included in the assessment to account for their emissions at nearby receptors.

## Receptors assessed and background concentrations

3.3.5 Table 3 and Table 4 present the sensitive human and ecological receptors included in this assessment and the background pollutant concentrations for 2020.

Table 3: Modelled receptors (construction phase) and 2020 background pollutant concentrations

Receptor	Description/location	Ordnance Survey coordinates	Background concentrations in 2020 ( $\mu\text{g}/\text{m}^3$ )			
			NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
5-C-H1	Outline application for residential development (up to 370 units), Offices (B1), local centre comprising food and non-food retail (A1) and restaurant/public house (A3/A4), hotel (C1), car showroom and associated works including construction of new spine (13_0336n).	370829,352734	10.4	7.9	11.3	7.6
5-C-H2	Gonsley Green Farm, Blakenhall	372983,348679	7.7	6.0	11.3	7.4
5-C-H3	Basford Hall Farm, Basford	371826,352231	11.2	8.5	11.9	7.8
5-C-H4	Mill Lane End, Blakenhall	373236,348061	8.7	6.7	11.6	7.6
5-C-H5	Casey Lane, Basford	371847,351711	9.0	6.9	11.3	7.5
5-C-H6	The Coppice, Wrinehill	374305,346315	8.2	6.3	11.9	7.7
5-C-H7	Bridge Cottage, Chorlton	372668,350306	9.3	7.1	12.8	8.3
5-C-H8	New Cottages, Chorlton	372534,350201	9.3	7.1	12.8	8.3
5-C-H9	Skipton Holme, Chorlton	372021,351360	9.7	7.4	11.6	7.7

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Receptor	Description/location	Ordnance Survey coordinates	Background concentrations in 2020 ( $\mu\text{g}/\text{m}^3$ )			
			NOx	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
5-C-H10	Randilow Farm, Checkley	374675,346667	8.2	6.3	11.9	7.7
5-C-H11	Dairy Farm, Chorlton	372483,350195	9.3	7.1	12.8	8.3
5-C-H12	Basford House, Chorlton	372332,351357	9.7	7.4	11.6	7.7
5-C-H13	Heath Farm, Chorlton	372099,351064	9.7	7.4	11.6	7.7
5-C-H14	Cypress Cottage, Barthomley	376003,352810	12.1	9.2	12.8	8.3
5-C-H15	Scotts Green Cottage, Barthomley	377616,353220	17.0	12.7	14.2	9.0
5-C-H16	The Owl, Wrinehill	374009,347826	9.0	6.9	11.2	7.4
5-C-H17	Kings Croft, Wrinehill	375286,347125	8.4	6.5	10.9	7.2
5-C-H18	Dairy Farm, Wrinehill	374923,347253	9.0	6.9	11.2	7.4
5-C-H20	Newstead, Weston	372753,352603	10.7	8.1	12.0	7.9
5-C-H22	Old Boundary House, Wrinehill	375379,346981	9.3	7.1	11.7	7.6
5-C-H23	Moss Farm, Oakhanger	377084,354514	18.6	13.7	14.3	9.1
5-C-H24	Main Road, Weston	373404,352701	10.4	7.9	12.0	7.9
5-C-H25	Rose Cottage, Wrinehill	374457,347574	9.0	6.9	11.2	7.4
5-C-H26	Blue Mire Farm, Barthomley	376955,352625	12.1	9.2	12.8	8.3
5-C-H27	The Coach House, Weston Lane, Basford	372132,352336	10.7	8.1	12.0	7.9
5-C-H28	White Moss Farm, Nursery Road, Oakhanger	377067,354976	18.6	13.7	14.3	9.1
5-C-H29	Crewe Road, Shavington Cum Gresty	370439,352463	10.4	7.9	11.3	7.6

Table 4: Modelled ecological receptors (construction phase) and background data for ecological sites

Receptor	Distance to road (m)	Ordnance Survey coordinates	Description	Sensitive habitat	2020 NOx background concentration ( $\mu\text{g}/\text{m}^3$ )	2020 NO <sub>2</sub> background concentration ( $\mu\text{g}/\text{m}^3$ )	APIS data <sup>11</sup> (average total nitrogen (N) deposition)
5-C-E11	131	376963,355172	Oakhanger Moss/Midland Meres & Mosses	Broad-leaved, mixed and	11.0	8.4	45.3

<sup>11</sup> Air Pollution Information System (APIS), <http://www.apis.ac.uk/>

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Receptor	Distance to road (m)	Ordnance Survey coordinates	Description	Sensitive habitat	2020 NOx background concentration (µg/m <sup>3</sup> )	2020 NO2 background concentration (µg/m <sup>3</sup> )	APIS data <sup>11</sup> (average total nitrogen (N) deposition)
			Phase 2 SSSI <sup>12</sup> /Ramsar <sup>13</sup>	yew woodland			
5-C-E12	150	376943,355170	Oakhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar	Broad-leaved, mixed and yew woodland	11.0	8.4	45.2
5-C-E13	201	376893,355171	Oakhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar	Broad-leaved, mixed and yew woodland	11.0	8.4	45.0
5-C-E11	131	376963,355172	Oakhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar	Bog	11.0	8.4	26.9
5-C-E12	150	376943,355170	akhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar	Bog	11.0	8.4	26.8
5-C-E13	201	376893,355171	Oakhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar	Bog	11.0	8.4	26.6

<sup>12</sup> Site of Special Scientific Interest (SSSI)

<sup>13</sup> Ramsar sites are wetlands of international importance designated under the Ramsar Convention

## Assessment results

3.3.6 Table 5 to Table 7 provide the summary of the modelled pollutant concentrations at the assessed receptors, including the magnitude of change and impact descriptor, and comparison against the main ES. Table 8 and Table 9 present the summary of the modelled pollutant concentrations at the assessed ecological receptors and the predicted nitrogen (N) deposition.

Table 5: Predicted annual mean NO<sub>2</sub> concentrations and impacts (construction)

Receptor	Description/location	NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )		Change in NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H1	Outline application for residential development (up to 370 units), Offices (B1), local centre comprising food and non-food retail (A1) and restaurant/public house (A3/A4), hotel (C1), car showroom and associated works including construction of new spine (13_0336n)	18.7	18.9	0.2	Negligible	Negligible	Not significant
5-C-H2	Gonsley Green Farm, Blakenhall	6.5	6.8	0.3	Negligible	Negligible	Not significant
5-C-H3	Basford Hall Farm, Basford	10.5	10.6	0.1	Negligible	Negligible	Not significant
5-C-H4	Mill Lane End, Blakenhall	7.3	7.5	0.2	Negligible	Negligible	Not significant
5-C-H5	Caseylane, Basford	8.0	8.1	0.1	Negligible	Negligible	Not significant
5-C-H6	The Coppice, Wrinehill	7.2	7.3	0.1	Negligible	Negligible	Not significant
5-C-H7	Bridge Cottage, Chorlton	7.8	8.3	0.5	Negligible	Negligible	Not significant
5-C-H8	New Cottages, Chorlton	7.7	8.5	0.8	Negligible	Negligible	Not significant
5-C-H9	Skipton Holme, Chorlton	10.1	10.4	0.3	Negligible	Negligible	Not significant

Receptor	Description/location	NO2 concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in NO2 concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H10	Randilow Farm, Checkley	7.0	7.2	0.2	Negligible	Negligible	Not significant
5-C-H11	Dairy Farm, Chorlton	7.7	8.1	0.4	Negligible	Negligible	Not significant
5-C-H12	Basford House, Chorlton	9.7	10.2	0.5	Negligible	Negligible	Not significant
5-C-H13	Heath Farm, Chorlton	8.2	8.5	0.3	Negligible	Negligible	Not significant
5-C-H14	Cypress Cottage, Barthomley	13.9	14.0	0.1	Negligible	Negligible	Not significant
5-C-H15	Scotts Green Cottage, Barthomley	25.3	25.4	0.1	Negligible	Negligible	Not significant
5-C-H16	The Owl, Wrinehill	7.5	7.6	0.1	Negligible	Negligible	Not significant
5-C-H17	Kings Croft, Wrinehill	8.7	8.8	0.1	Negligible	Negligible	Not significant
5-C-H18	Dairy Farm, Wrinehill	7.8	7.9	0.1	Negligible	Negligible	Not significant
5-C-H20	Newstead, Weston	11.4	11.4	0.0	Negligible	Negligible	Not significant
5-C-H22	Old Boundary House, Wrinehill	10.1	10.2	0.1	Negligible	Negligible	Not significant
5-C-H23	Moss Farm, Oakhanger	34.8	35.0	0.2	Negligible	Negligible	Not significant
5-C-H24	Main Road, Weston	13.5	13.5	0.0	Negligible	Negligible	Not significant
5-C-H25	Rose Cottage, Wrinehill	7.6	7.7	0.1	Negligible	Negligible	Not significant
5-C-H26	Blue Mire Farm, Barthomley	15.5	15.6	0.1	Negligible	N/A	Not significant



Receptor	Description/location	NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )		Change in NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP <sub>2</sub> revised scheme	2020 with the AP <sub>2</sub> revised scheme				
5-C-H27	The Coach House, Weston Lane, Basford	10.1	10.1	0.0	Negligible	N/A	Not significant
5-C-H28	White Moss Farm, Nursery Road, Oakhanger	42.6	42.9	0.3	Moderate adverse	Negligible	New significant effect
5-C-H29	Crewe Road, Shavington Cum Gresty	9.6	9.6	0.0	Negligible	N/A	Not significant

Table 6: Predicted annual mean PM<sub>10</sub> concentrations and impacts (construction)

Receptor	Description/location	PM <sub>10</sub> concentrations (µg/m <sup>3</sup> )		Change in PM <sub>10</sub> concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP <sub>2</sub> revised scheme	2020 with the AP <sub>2</sub> revised scheme				
5-C-H1	Outline application for residential development (up to 370 units), Offices (B1), local centre comprising food and non-food retail (A1) and restaurant/public house (A3/A4), hotel (C1), car showroom and associated works including construction of new spine (13_0336n)	11.3	11.3	0.0	Negligible	Negligible	Not significant
5-C-H2	Gonsley Green Farm, Blakenhall	11.3	11.3	0.0	Negligible	Negligible	Not significant
5-C-H3	Basford Hall Farm, Basford	11.9	11.9	0.0	Negligible	Negligible	Not significant
5-C-H4	Mill Lane End, Blakenhall	11.6	11.6	0.0	Negligible	Negligible	Not significant
5-C-H5	Casey Lane, Basford	11.3	11.3	0.0	Negligible	Negligible	Not significant
5-C-H6	The Coppice, Wrinehill	11.9	11.9	0.0	Negligible	Negligible	Not significant
5-C-H7	Bridge Cottage, Chorlton	12.8	12.8	0.0	Negligible	Negligible	Not significant

Receptor	Description/location	PM10 concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in PM10 concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H8	New Cottages, Chorlton	12.8	12.8	0.0	Negligible	Negligible	Not significant
5-C-H9	Skipton Holme, Chorlton	11.6	11.6	0.0	Negligible	Negligible	Not significant
5-C-H10	Randilow Farm, Checkley	11.9	11.9	0.0	Negligible	Negligible	Not significant
5-C-H11	Dairy Farm, Chorlton	12.8	12.8	0.0	Negligible	Negligible	Not significant
5-C-H12	Basford House, Chorlton	11.6	11.6	0.0	Negligible	Negligible	Not significant
5-C-H13	Heath Farm, Chorlton	11.6	11.6	0.0	Negligible	Negligible	Not significant
5-C-H14	Cypress Cottage, Barthomley	12.8	12.8	0.0	Negligible	Negligible	Not significant
5-C-H15	Scotts Green Cottage, Barthomley	14.2	14.2	0.0	Negligible	Negligible	Not significant
5-C-H16	The Owl, Wrinehill	11.2	11.2	0.0	Negligible	Negligible	Not significant
5-C-H17	Kings Croft, Wrinehill	10.9	10.9	0.0	Negligible	Negligible	Not significant
5-C-H18	Dairy Farm, Wrinehill	11.2	11.2	0.0	Negligible	Negligible	Not significant
5-C-H20	Newstead, Weston	12.0	12.0	0.0	Negligible	Negligible	Not significant
5-C-H22	Old Boundary House, Wrinehill	11.7	11.7	0.0	Negligible	Negligible	Not significant
5-C-H23	Moss Farm, Oakhanger	14.3	14.3	0.0	Negligible	Negligible	Not significant
5-C-H24	Main Road, Weston	12.0	12.0	0.0	Negligible	Negligible	Not significant

Receptor	Description/location	PM10 concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in PM10 concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H25	Rose Cottage, Wrinehill	11.2	11.2	0.0	Negligible	Negligible	Not significant
5-C-H26	Blue Mire Farm, Barthomley	12.8	12.8	0.0	Negligible	N/A	Not significant
5-C-H27	The Coach House, Weston Lane, Basford	12.3	12.3	0.0	Negligible	N/A	Not significant
5-C-H28	White Moss Farm, Nursery Road, Oakhanger	14.3	14.3	0.0	Negligible	Negligible	Not significant
5-C-H29	Crewe Road, Shavington Cum Gresty	11.5	11.5	0.0	Negligible	N/A	Not significant

Table 7: Predicted annual mean PM2.5 concentrations and impacts (construction)

Receptor	Description/location	PM2.5 concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in PM2.5 concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H1	Outline application for residential development (up to 370 units), Offices (B1), local centre comprising food and non-food retail (A1) and restaurant/public house (A3/A4), hotel (C1), car showroom and associated works including construction of new spine (13_0336n)	7.6	7.6	0.0	Negligible	Negligible	Not significant
5-C-H2	Gonsley Green Farm, Blakenhall	7.4	7.4	0.0	Negligible	Negligible	Not significant
5-C-H3	Basford Hall Farm, Basford	7.8	7.8	0.0	Negligible	Negligible	Not significant
5-C-H4	Mill Lane End, Blakenhall	7.6	7.6	0.0	Negligible	Negligible	Not significant
5-C-H5	Casey Lane, Basford	7.5	7.5	0.0	Negligible	Negligible	Not significant

Receptor	Description/location	PM2.5 concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in PM2.5 concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H6	The Coppice, Wrinehill	7.7	7.7	0.0	Negligible	Negligible	Not significant
5-C-H7	Bridge Cottage, Chorlton	8.3	8.3	0.0	Negligible	Negligible	Not significant
5-C-H8	New Cottages, Chorlton	8.3	8.3	0.0	Negligible	Negligible	Not significant
5-C-H9	Skipton Holme, Chorlton	7.7	7.7	0.0	Negligible	Negligible	Not significant
5-C-H10	Randilow Farm, Checkley	7.7	7.7	0.0	Negligible	Negligible	Not significant
5-C-H11	Dairy Farm, Chorlton	8.3	8.3	0.0	Negligible	Negligible	Not significant
5-C-H12	Basford House, Chorlton	7.7	7.7	0.0	Negligible	Negligible	Not significant
5-C-H13	Heath Farm, Chorlton	7.7	7.7	0.0	Negligible	Negligible	Not significant
5-C-H14	Cypress Cottage, Barthomley	8.3	8.3	0.0	Negligible	Negligible	Not significant
5-C-H15	Scotts Green Cottage, Barthomley	9.0	9.0	0.0	Negligible	Negligible	Not significant
5-C-H16	The Owl, Wrinehill	7.4	7.4	0.0	Negligible	Negligible	Not significant
5-C-H17	Kings Croft, Wrinehill	7.2	7.2	0.0	Negligible	Negligible	Not significant
5-C-H18	Dairy Farm, Wrinehill	7.4	7.4	0.0	Negligible	Negligible	Not significant
5-C-H20	Newstead, Weston	7.9	7.9	0.0	Negligible	Negligible	Not significant
5-C-H22	Old Boundary House, Wrinehill	7.6	7.6	0.0	Negligible	Negligible	Not significant

Receptor	Description/location	PM2.5 concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in PM2.5 concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme				
5-C-H23	Moss Farm, Oakhanger	9.1	9.1	0.0	Negligible	Negligible	Not significant
5-C-H24	Main Road, Weston	7.9	7.9	0.0	Negligible	Negligible	Not significant
5-C-H25	Rose Cottage, Wrinehill	7.4	7.4	0.0	Negligible	Negligible	Not significant
5-C-H26	Blue Mire Farm, Barthomley	8.3	8.3	0.0	Negligible	N/A	Not significant
5-C-H27	The Coach House, Weston Lane, Basford	8.1	8.1	0.0	Negligible	N/A	Not significant
5-C-H28	White Moss Farm, Nursery Road, Oakhanger	9.1	9.1	0.0	Negligible	Negligible	Not significant
5-C-H29	Crewe Road, Shavington Cum Gresty	7.7	7.7	0.0	Negligible	N/A	Not significant

Table 8: Predicted annual mean NOx concentrations at ecological receptors (construction)

Ecological site	Distance to road (m)	NOx concentrations ( $\mu\text{g}/\text{m}^3$ )		Change in NOx concentrations ( $\mu\text{g}/\text{m}^3$ )	Comparison against the air quality standard ( $30\mu\text{g}/\text{m}^3$ )	Magnitude of change	Magnitude of change in the main ES	Significance
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme					
5-C-E11	131	26.8	27.0	0.2	Below standard	Imperceptible	Imperceptible	Not significant
5-C-E12	150	24.9	25.1	0.2	Below standard	Imperceptible	Imperceptible	Not significant
5-C-E13	201	21.6	21.8	0.2	Below standard	Imperceptible	Imperceptible	Not significant

Table 9: Assessment of N deposition at ecological receptors (construction)

Ecological site	Distance to road (m)	Dry deposition (kg N / ha / yr)		Change in N deposition (kg N / ha / yr)	Critical load (kg N / ha / yr)	% change in relation to lower critical load
		2020 without the AP2 revised scheme	2020 with the AP2 revised scheme			
5-C-E11 (Broad-leaved, mixed and yew woodland)	131	45.3	45.31	0.0	10-20	0.02%
5-C-E12 (Broad-leaved, mixed and yew woodland)	150	45.2	45.21	0.0		0.02%
5-C-E13 (Broad-leaved, mixed and yew woodland)	201	45.0	45.03	0.0		0.02%
5-C-E11 (Bogs)	131	26.9	26.88	0.0	5-10	0.03%
5-C-E12 (Bogs)	150	26.8	26.79	0.0		0.03%
5-C-E13 (Bogs)	201	26.6	26.61	0.0		0.03%

- 3.3.7 Annual mean NO<sub>2</sub> concentrations are predicted to be above the air quality standard at one receptor close to the M6 motorway in Cheshire East. A moderate adverse impact is expected at this receptor in relation to NO<sub>2</sub> concentrations. Negligible impacts are expected at all other receptors for NO<sub>2</sub> concentrations in this area. Since the annual mean NO<sub>2</sub> concentrations are predicted to be less than 60µg/m<sup>3</sup> at all receptors, the hourly mean standard is also expected to be met.
- 3.3.8 The annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are predicted to be within the air quality standards during construction of the scheme. Since the annual mean PM<sub>10</sub> concentrations are predicted to be below 35µg/m<sup>3</sup>, the daily mean standard is also expected to be met. Negligible impacts are predicted at all receptors for annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations.
- 3.3.9 NO<sub>x</sub> concentrations at the Oakhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar site are predicted to be below the air quality standard. Imperceptible changes in NO<sub>x</sub> concentrations are predicted at this site and changes in nitrogen deposition at this site are predicted to be below 1% of the lower critical load.

### Assessment of significance

- 3.3.10 One new significant air quality effect is anticipated at one receptor along the M6 in Cheshire East in relation to annual mean NO<sub>2</sub> concentrations. However, the AP2 revised scheme reduces HS2 construction traffic along this section of the M6, compared to the main ES. Therefore, the new significant effect at this location is mainly due to changes in predicted emissions in the revised future baseline. No new or different significant effects are anticipated at other receptors in the area.
- 3.3.11 No new or different significant effects are anticipated at any receptor in relation to annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations.
- 3.3.12 For ecological sites, there is considered to be an insignificant effect if the total predicted NO<sub>x</sub> concentrations are below the air quality standard of 30µg/m<sup>3</sup> or if the predicted change in NO<sub>x</sub> concentrations is less than 0.4µg/m<sup>3</sup> when the concentrations are predicted to exceed the air quality standard. Furthermore, if the change in nitrogen deposition is predicted to be less than 1% of the lower critical load, there is considered to be an insignificant effect.
- 3.3.13 At the Oakhanger Moss/Midland Meres & Mosses Phase 2 SSSI/Ramsar site, changes to nitrogen deposition are predicted to be less than 1% of the lower critical load and therefore no significant effects are anticipated at this site for air quality. Therefore, no new or different significant effects are anticipated for ecological receptors in the South Cheshire area.

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