High Speed Rail (West Midlands - Crewe)

Supplementary Environmental Statement and Additional Provision Environmental Statement

Volume 5: Technical appendices

Air quality report (AQ-001-000)

March 2018

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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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A report prepared for High Speed Two (HS2) Limited:

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1 Introduction

1.1 Structure of the air quality appendix

1.1.1 This document is an appendix which forms part of Volume 5 of the Supplementary Environmental Statement (SES) and Additional Provision Environmental Statement (AP ES).

1.1.2 This appendix provides an update to the air quality impact assessment presented in the High Speed Rail (West Midlands - Crewe) Environmental Statement (ES)[1] published in July 2017 (the main ES), as a result of the SES changes and amendments assessed as part of the SES and AP ES. This update should be read in conjunction with Volume 5: Appendix AQ-001-001 and Volume 5: Appendix AQ-001-003 of the main ES.

1.1.3 This appendix covers the following community areas (CAs):

- CA1: Fradley to Colton; and
- CA3: Stone and Swynnerton.

1.2 Scope of the assessment

1.2.1 This air quality assessment considers changes to local air quality as a result of changes to the scheme that are outside the existing limits of the Bill (i.e. AP amendments). These are limited to changes in construction traffic flows from each amendment.

1.2.2 In this report the scheme is referred to as the AP revised scheme, which is the original scheme (i.e. the Bill scheme submitted to Parliament in July 2017) as amended by the SES changes and AP amendments.

1.3 Methodology, data sources and design criteria

1.3.1 The assessment scope, key assumptions and limitations and the methodology for determining significance of effects for air quality are set out in Volume 1 of the main ES and in the main ES Scope and Methodology Report (SMR) and its addendum (see main ES Volume 5: Appendix CT-001-001[2] and Volume 5: Appendix CT-001-002[3]).

1.3.2 Since the preparation of the main ES, Department for Environment, Food and Rural Affairs (Defra) has released new versions of tools for undertaking air quality assessments[4], namely the emissions factor toolkit, background maps and the NOx to NO2 conversion tool. This air quality assessment has therefore used the latest available road traffic emission factors and background maps. However, the emissions for the traffic flows relating to the 'without the scheme' scenario remain as previously calculated for the main ES.

[1] HS2 Ltd (2017), High Speed Rail (West Midlands-Crewe) Environmental Statement, https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement.
[2] HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Impact Assessment Scope and Methodology Report, Volume 5: Appendix CT-001-001*. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627187/E23_EIA_SMR_CT-001-001_WEB.pdf.
[3] HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Scope and Methodology Report Addendum, Volume 5: Appendix CT-001-002*. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627188/E24A_CT-001-002_Part_1_WEB.pdf
[4] Department for Environment, Food and Rural Affairs (2017). *Local air quality management*. https://laqm.defra.gov.uk/whatsnew.html.

2 Fradley to Colton

2.1 Additional land permanently required for new site haul route and HS2 maintenance access route from Pipe Lane and modifications to existing highways (AP-001-003)

Assessment of construction traffic emissions

Construction traffic data

2.1.1 Construction traffic data in this area has been updated to reflect the changes in flows associated with the amendment. The screening process identified one road in the Fradley to Colton area exceeding the Design Manual for Roads and Bridges (DMRB) thresholds for changes in annual average daily traffic (AADT) and/or changes in daily Heavy Goods Vehicle (HGV) flows. This is the B5014 Ridware Road/Uttoxeter Road, where a reduction in construction traffic flows is anticipated due to the proposed amendment, when compared to the main ES.

2.1.2 Traffic data for construction vehicles using the haul routes and moving between compounds has also been included in the assessment. An increase in construction traffic flows is anticipated due to the proposed amendment of the haul routes in this area.

Receptors assessed

2.1.3 Sensitive receptors have been selected from an OS AddressBase Premium database. The receptors consist of residential properties, schools and care homes within 200m of the screened in roads and represent worst-case exposure locations (Table 1).

2.1.4 No designated ecological sites were identified within 200m of the screened in roads during construction of the AP revised scheme.

Table 1: Modelled human receptors (construction phase)

Receptor	Description/location	Ordnance survey coordinates
1-C-H3	Luthbur, Pipe Ridware, Rugeley	409284, 318075
1-C-H8	Parva House, Pipe Ridware	409568, 317786
1-C-H9	Dimble Cottage, Blithbury	408055, 319729
1-C-H11	Woodhouse Farm, Pipe Ridware	409088, 318737
1-C-H13	Conversion of existing agricultural buildings to two dwellings on Pipe Lane (12_01025_COU)	408777, 318507
1-C-H38	Eastfields, Hill Ridware	408644, 317474
1-C-H44	Thimble Cottage, Hill Ridware	408126, 317839
1-C-H45	Oaklands Close, Hill Ridware	408038, 317920
1-C-H46	Henry Chadwick Primary School, Hill Ridware	408283, 317799

Background pollutant concentrations

2.1.5 The background pollutant concentrations used in the assessment are shown in Table 2, taken from the Defra maps[5].

Table 2: Background 2020 pollutant concentrations at assessed receptors

Receptor	Description/location	Background pollutant concentrations in 2020 (µg/m³)			
		NOx	NO2	PM10	PM2.5
1-C-H3	Luthbur, Pipe Ridware, Rugeley	12.1	9.0	13.9	9.7
1-C-H8	Parva House, Pipe Ridware	12.9	9.5	13.6	9.6
1-C-H9	Dimble Cottage, Blithbury	12.1	9.0	13.9	9.6
1-C-H11	Woodhouse Farm, Pipe Ridware	12.1	9.0	13.9	9.7
1-C-H13	Conversion of existing agricultural buildings to two dwellings on Pipe Lane (12_01025_COU)	12.5	9.2	13.7	9.7
1-C-H38	Eastfields, Hill Ridware	13.5	9.9	14.1	10.0
1-C-H44	Thimble Cottage, Hill Ridware	13.5	9.9	14.1	10.0
1-C-H45	Oaklands Close, Hill Ridware	13.5	9.9	14.1	10.0
1-C-H46	Henry Chadwick Primary School, Hill Ridware	13.5	9.9	14.1	10.0

Assessment results

2.1.6 Table 3 to Table 5 provide the summary of the modelled pollutant concentrations for the assessed human receptors. The magnitude of change and impact descriptor are also derived following the Institute of Air Quality Management (IAQM)/Environmental Protection UK (EPUK) methodology[6].

[5] Department for Environment Food and Rural Affairs (2017), *Background maps*. https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.
[6] IAQM (2017), *Land-use planning & development control: Planning for air quality.* http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

Table 3: Predicted annual mean NO_2 concentrations and impacts (construction phase)

Receptor	Description/location	NO_2 concentration ($\mu g/m^3$)		Change in NO_2 concentrations ($\mu g/m^3$)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
1-C-H3	Luthbur, Pipe Ridware, Rugeley	7.2	7.3	0.1	Negligible	Not significant
1-C-H8	Parva House, Pipe Ridware	8.0	8.0	0.0	Negligible	Not significant
1-C-H9	Dimble Cottage, Blithbury	7.6	7.8	0.2	Negligible	Not significant
1-C-H11	Woodhouse Farm, Pipe Ridware	7.2	7.3	0.1	Negligible	Not significant
1-C-H13	Conversion of existing agricultural buildings to two dwellings on Pipe Lane (12_01025_COU)	7.4	7.4	0.0	Negligible	Not significant
1-C-H38	Eastfields, Hill Ridware	8.6	8.7	0.1	Negligible	Not significant
1-C-H44	Thimble Cottage, Hill Ridware	8.8	8.8	0.0	Negligible	Not significant
1-C-H45	Oaklands Close, Hill Ridware	8.8	8.8	0.0	Negligible	Not significant
1-C-H46	Henry Chadwick Primary School, Hill Ridware	8.3	8.3	0.0	Negligible	Not significant

Table 4: Predicted annual mean PM10 concentrations and impacts (construction phase)

Receptor	Description/location	PM10 concentration ($\mu g/m^3$)		Change in PM10 concentrations ($\mu g/m^3$)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
1-C-H3	Luthbur, Pipe Ridware, Rugeley	12.8	12.8	0.0	Negligible	Not significant
1-C-H8	Parva House, Pipe Ridware	12.4	12.4	0.0	Negligible	Not significant
1-C-H9	Dimble Cottage, Blithbury	13.0	13.0	0.0	Negligible	Not significant

Receptor	Description/location	PM10 concentration (µg/m³)		Change in PM10 concentrations (µg/m³)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
1-C-H11	Woodhouse Farm, Pipe Ridware	12.8	12.8	0.0	Negligible	Not significant
1-C-H13	Conversion of existing agricultural buildings to two dwellings on Pipe Lane (12_01025_COU)	12.6	12.6	0.0	Negligible	Not significant
1-C-H38	Eastfields, Hill Ridware	12.9	12.9	0.0	Negligible	Not significant
1-C-H44	Thimble Cottage, Hill Ridware	12.9	12.9	0.0	Negligible	Not significant
1-C-H45	Oaklands Close, Hill Ridware	12.9	12.9	0.0	Negligible	Not significant
1-C-H46	Henry Chadwick Primary School, Hill Ridware	12.8	12.8	0.0	Negligible	Not significant

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

Receptor	Description/location	PM2.5 concentration (µg/m³)		Change in PM2.5 concentrations (µg/m³)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
1-C-H3	Luthbur, Pipe Ridware, Rugeley	8.5	8.5	0.0	Negligible	Not significant
1-C-H8	Parva House, Pipe Ridware	8.3	8.3	0.0	Negligible	Not significant
1-C-H9	Dimble Cottage, Blithbury	8.6	8.6	0.0	Negligible	Not significant
1-C-H11	Woodhouse Farm, Pipe Ridware	8.5	8.5	0.0	Negligible	Not significant
1-C-H13	Conversion of existing agricultural buildings to two dwellings on Pipe Lane (12_01025_COU)	8.4	8.4	0.0	Negligible	Not significant
1-C-H38	Eastfields, Hill Ridware	8.6	8.6	0.0	Negligible	Not significant

Receptor	Description/location	PM2.5 concentration (µg/m³)		Change in PM2.5 concentrations (µg/m³)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
1-C-H44	Thimble Cottage, Hill Ridware	8.6	8.6	0.0	Negligible	Not significant
1-C-H45	Oaklands Close, Hill Ridware	8.6	8.6	0.0	Negligible	Not significant
1-C-H46	Henry Chadwick Primary School, Hill Ridware	8.6	8.6	0.0	Negligible	Not significant

2.1.7 Annual mean concentrations of NO_2, PM10 and PM2.5 are predicted to be within the air quality standards[7] with and without construction of the AP revised scheme. Since the annual mean NO_2 concentrations are predicted to be well below 60µg/m^3, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM10 concentrations are predicted to be below 35µg/m^3, the daily mean standard is also expected to be met.

2.1.8 Negligible impacts are predicted at all receptors for annual mean NO_2, PM10 and PM2.5 concentrations.

Assessment of significance

2.1.9 No significant effects are anticipated at any receptor in relation to annual mean NO_2, PM10 and PM2.5 concentrations.

2.1.10 The proposed amendment will not give rise to a new or different significant effect.

[7] The air quality standards are 40µg/m^3 as an annual mean for NO_2 and PM10 concentrations, and 25µg/m^3 as an annual mean for PM2.5 concentrations.

3 Stone and Swynnerton

3.1 Additional land permanently required and a change in the powers of the Bill for the viaduct crossing of the Norton Bridge and Stone Railway and track crossovers (AP-003-001)

Assessment of construction traffic emissions

Construction traffic data

3.1.1 Construction traffic data in this area has been updated to reflect the changes in flows associated with the proposed amendment. The screening process identified two roads in the Stone and Swynnerton area exceeding the Design Manual for Roads and Bridges (DMRB) thresholds for changes in annual average daily traffic (AADT) and/or changes in daily HGV flows. These roads are:

- the A519 Newcastle Road, and
- Yarnfield Lane

3.1.2 Traffic data for construction vehicles using the haul routes and moving between compounds has also been included in the assessment. The screening process identified a 3km stretch of haul route exceeding the DMRB thresholds for changes in daily HGV flows.

Receptors assessed

3.1.3 Sensitive receptors have been selected from an OS AddressBase Premium database. The receptors consist of residential properties, schools and care homes within 200m of the screened in roads and represent worst-case exposure locations (Table 6).

3.1.4 No designated ecological sites were identified within 200m of the screened in roads during construction of the AP revised scheme.

Table 6: Modelled human receptors (construction phase)

Receptor	Description/location	Ordnance survey coordinates
3-C-H11	Hanchurch House, Hanchurch	385263,341022
3-C-H20	South Lodge, Darlaston Park, Stone	389164, 334056
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	384893,341530
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	385078,341833
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Stone	388478, 333850
4-C-H6	Manor Farm Cottage, Manor Road, Madeley, Crewe	377344, 342852

Background pollutant concentrations

3.1.5 The background pollutant concentrations used in the assessment are shown in Table 7, taken from the Defra maps[8].

Table 7: Background 2020 pollutant concentrations at assessed receptors

Receptor	Description/location	Background pollutant concentrations in 2020 (µg/m³)			
		NOx	NO2	PM10	PM2.5
3-C-H11	Hanchurch House, Hanchurch	17.7	13.2	13.9	8.8
3-C-H20	South Lodge, Darlaston Park, Stone	16.7	12.3	13.1	8.9
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	15.6	11.7	14.2	8.9
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	17.7	13.2	13.9	8.8
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Yarnfield	13.1	9.9	13.5	8.8
4-C-H6	Manor Farm Cottage, Manor Road, Madeley, Crewe	8.5	6.5	11.2	7.4

Assessment results

3.1.6 Table 8 to Table 10 provide the summary of the modelled pollutant concentrations for the assessed human receptors. The magnitude of change and impact descriptor are also derived following the IAQM/EPUK methodology[9].

[8] Department for Environment, Food and Rural Affairs (2017), *Background Maps*, https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.
[9] IAQM (2017), *Land-Use Planning & Development Control: Planning For Air Quality*, http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

Table 8: Predicted annual mean NO_2 concentrations and impacts (construction phase)

Receptor	Description/location	NO2 concentration (µg/m³)		Change in NO2 concentrations (µg/m³)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
3-C-H11	Hanchurch House, Hanchurch	33.8	33.9	0.1	Negligible	Not significant
3-C-H20	South Lodge, Darlaston Park, Stone	15.3	15.4	0.1	Negligible	Not significant
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	23.5	23.6	0.1	Negligible	Not significant
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	24.4	24.6	0.2	Negligible	Not significant
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Stone	12.9	12.9	0.0	Negligible	Not significant
4-C-H6	Manor Farm Cottage, Manor Road, Madeley, Crewe	7.2	7.22	0.0	Negligible	Not significant

Table 9: Predicted annual mean PM10 concentrations and impacts (construction phase)

Receptor	Description/location	PM10 concentration (µg/m³)		Change in PM10 concentrations (µg/m³)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
3-C-H11	Hanchurch House, Hanchurch	17.2	17.2	0.0	Negligible	Not significant
3-C-H20	South Lodge, Darlaston Park, Stone	13.7	13.7	0.0	Negligible	Not significant
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	16.1	16.1	0.0	Negligible	Not significant
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	15.7	15.8	0.1	Negligible	Not significant
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Stone	14.0	14.0	0.0	Negligible	Not significant
4-C-H6	Manor Farm Cottage, Manor Road, Madeley, Crewe	11.3	11.3	0.0	Negligible	Not significant

Table 10: Predicted annual mean PM2.5 concentrations and impacts (construction phase)

Receptor	Description/location	PM2.5 concentration (µg/m³)		Change in PM2.5 concentrations (µg/m³)	Impact descriptor	Significance
		2020 without the AP revised scheme	2020 with the AP revised scheme			
3-C-H11	Hanchurch House, Hanchurch	10.9	10.9	0.0	Negligible	Not significant
3-C-H20	South Lodge, Darlaston Park, Stone	9.2	9.2	0.0	Negligible	Not significant
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	10.1	10.1	0.0	Negligible	Not significant
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	10.0	10.0	0.0	Negligible	Not significant
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Stone	9.1	9.1	0.0	Negligible	Not significant
4-C-H6	Manor Farm Cottage, Manor Road, Madeley, Crewe	7.4	7.4	0.0	Negligible	Not significant

3.1.7 Annual mean concentrations of NO_2, PM10 and PM2.5 are predicted to be within the air quality standards[10] with and without construction of the AP revised scheme. Since the annual mean NO_2 concentrations are predicted to be well below 60µg/m^3, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM10 concentrations are predicted to be below 35µg/m^3, the daily mean standard is also expected to be met.

3.1.8 Negligible impacts are predicted at all receptors for annual mean NO_2, PM10 and PM2.5 concentrations.

Assessment of significance

3.1.9 No significant effects are anticipated at any receptor in relation to annual mean NO_2, PM10 and PM2.5 concentrations.

3.1.10 The proposed amendment will not give rise to a new or different significant effect.

[10] The air quality standards are 40µg/m^3 as an annual mean for NO_2 and PM10 concentrations, and 25µg/m^3 as an annual mean for PM2.5 concentrations.

4 References

Department for Environment Food and Rural Affairs (2017), *Background maps*. Available online at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

Department for Environment, Food and Rural Affairs (2017). *Local air quality management homepage*. Available online at: https://laqm.defra.gov.uk/whatsnew.html.

HS2 Ltd (2017), *High Speed Rail (West Midlands-Crewe) Environmental Statement*. Available online at: https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement.

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Impact Assessment Scope and Methodology Report, Volume 5: Appendix CT-001-001.* Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627187/E23_EIA_SMR_CT-001-001_WEB.pdf.

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Scope and Methodology Report Addendum, Volume 5: Appendix CT-001-002.* Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627188/E24A_CT-001-002_Part_1_WEB.pdf

IAQM (2017), *Land-use planning & development control: Planning for air quality* (v1.2). Available online at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

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