In Parliament – Session 2022 - 2023

HS2

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Volume 5: Appendix AQ-001-0MA04

Air quality

Air quality report

MA04: Broomedge to Glazebrook

Q24

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Department for Transport

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

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

ARUP+ ERM | FOSTER + PARTNERS | JACOBS
RAMBOLL | TYPSA | COSTAIN

MWJV
Mott MacDonald | WSP

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1 Introduction

1.1 Structure of this appendix

1.1.1 This report is an appendix to the air quality assessment which forms part of Volume 5 of the Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES) for the Broomedge to Glazebrook area (MA04).

1.1.2 This appendix provides details of changes to the air quality assessment since the High Speed Two (HS2) High Speed Rail (Crewe – Manchester) Environmental Statement (ES)[1] published in 2022 (the main ES).

1.1.3 This report should be read in conjunction with Volume 5, Appendix: AQ-001-0MA04, which accompanied the main ES.

1.1.4 In order to differentiate between the original proposals assessed as part of the main ES and subsequent changes, the following terms are used:

- 'the original scheme' – the Bill scheme submitted to Parliament in January 2022, which was assessed in the main ES;
- 'the SES1 scheme' – the original scheme with the changes described in SES1 that are within the existing powers of the Bill; and
- 'the AP1 revised scheme' – the original scheme as amended by the SES1 changes and AP1 amendments.

1.1.5 Maps referred to in this appendix are contained in the SES1 and AP1 ES, Volume 5, Air quality Map Book: Map Series AQ-01.

1.1.6 In addition, the traffic data used for the air quality assessment is set out in Background Information and Data (BID)[2] which accompanies the SES1 and AP1 ES (see BID AQ-002-0MA04 SES1 and AP1 ES).

1.1.7 Where it has been possible to differentiate the air quality assessment between the SES1 changes and the AP1 amendments, this has been done and presented in this report. However, the assessment of road traffic emissions is a combined assessment of both SES1 changes and AP1 amendments in this area.

[1] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement.* Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

[2] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data accompanying Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement, Additional data used in the air quality assessment*, BID AQ-002-0MA04 SES1 and AP1 ES. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-supplementary-environmental-statement-1-and-additional-provision-1-environmental-statement.

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 (SMR)[3] (see main ES Volume 5, Appendix: CT-001-00001).

1.2.2 The air quality standards for this assessment are:

- 40µg/m^3 as an annual mean for nitrogen dioxide (NO_2) and fine particulate matter (PM_{10});
- 200µg/m^3 one-hour mean NO_2 concentrations, not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
- 50µg/m^3 24-hour mean PM_{10} concentrations, not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
- 20µg/m^3 as an annual mean for very fine particulate matter ($PM_{2.5}$).

[3] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report,* Volume 5, Appendix: CT-001-00001. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

2 Construction dust assessment

2.1.1 The AP1 revised scheme does not include any activities within the Broomedge to Glazebrook area (MA04) which require a dust assessment to be undertaken.

3 Assessment of road traffic emissions

3.1 Overview

3.1.1 This section provides details of the assessment of road traffic emissions during construction of the AP1 revised scheme. The assessment considers the combined effects of the AP1 revised scheme in other community areas during construction.

3.2 Assessment of construction traffic emissions

3.2.1 The assessment of construction traffic emissions has used traffic data based on an estimate of the average daily flows in the peak year during the construction period (2025 – 2037). However, vehicle emissions and background concentrations have been taken for the first construction year in 2025. One construction scenario has been assessed for air quality to capture peak construction traffic activity at different times in the construction period. It has been assumed that the changes in construction traffic will occur for the whole year. In some cases, this is a conservative approach, as the duration of the peak traffic flows may well be much shorter. This scenario has been assessed against the relevant future baseline case without the AP1 revised scheme.

3.2.2 Traffic data in the study area have been screened to identify roads that require further assessment and to confirm the likely effect of the change in emissions from vehicles using these roads during construction of the AP1 revised scheme. Additional roads have also been included in the assessment where relevant to account for their emissions at nearby receptors.

Receptors assessed and background concentrations

3.2.3 Only human receptors which were reported in the main ES as having significant adverse effects have been considered. This is because, compared to the original scheme, changes in traffic during the construction phase are predicted to be generally lower for the AP1 revised scheme, with the highest traffic flows predicted along the M6. The locations of all relevant features are shown in the accompanying SES1 and AP1 ES, Volume 5, Air quality Map Book: Map Series AQ-01.

3.2.4 There was only one modelled human receptor reported within the main ES as having significant adverse effects. This was Receptor Nicol Avenue, Woolston (04-C-H009) and the significant impact was due to increases in annual mean NO_2 concentrations. However, this receptor has since been demolished and therefore does not require further assessment.

3.2.5 Only ecological receptors from the main ES along the M6 were considered. There was one designated ecological receptor, Woolston Eyes Site of Special Scientific Interest (SSSI), along

the M6 in MA04. This site is not sensitive to acid deposition and therefore only an assessment of NOx and nitrogen deposition is required.

3.2.6 Table 1 shows the background concentrations for NOx, background nitrogen deposition and critical loads.

Table 1: Modelled ecological receptor backgrounds, APIS data and critical loads (construction phase)

Receptor	Sensitive habitat	2025 NOx background concentration (µg/m³)	APIS data[4] of average total N deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)
Woolston Eyes SSSI	Deciduous woodland	12.6	38.9	10
	Lowland raised bog	12.6	23.4	10

Assessment results

3.2.7 Table 2 and Table 3 provide the summary of the modelled pollutant concentrations at ecological receptors.

[4] UK Centre for Ecology and Hydrology (2021), *Air Pollution Information System*. Available online at: http://www.apis.ac.uk/.

Table 2: Predicted annual mean of NOx concentrations at ecological sites (construction phase)

Ecological site	Distance to road (m)	NOx concentrations (µg/m³)		Change in NOx concentrations (µg/m³)	Comparison against air quality standard (30µg/m³)	Percent change in relation to air quality standard
		2025 without the AP1 revised scheme	2025 with the AP1 revised scheme			
Woolston Eyes SSSI (east of M6)	7	41.1	41.9	0.8	Above standard	2.7%
	10	35.9	36.6	0.7	Above standard	2.3%
	20	26.9	27.4	0.5	Within standard	1.7%
	30	21.8	22.2	0.4	Within standard	1.3%
	40	18.5	18.9	0.4	Within standard	1.3%
	50	16.2	16.5	0.3	Within standard	1.0%
	75	12.4	12.7	0.3	Within standard	1.0%
	100	10.2	10.4	0.2	Within standard	0.7%
	150	7.5	7.6	0.1	Within standard	0.3%
	200	5.9	6.1	0.2	Within standard	0.7%
Woolston Eyes SSSI (west of M6)	8	34.3	34.9	0.6	Above standard	2.0%
	10	31.7	32.3	0.6	Above standard	2.0%
	20	23.8	24.3	0.5	Within standard	1.7%
	30	19.4	19.8	0.4	Within standard	1.3%
	40	16.6	16.9	0.3	Within standard	1.0%
	50	14.5	14.8	0.3	Within standard	1.0%
	75	11.3	11.5	0.2	Within standard	0.7%
	100	9.3	9.5	0.2	Within standard	0.7%
	150	7.1	7.2	0.1	Within standard	0.3%
	200	5.7	5.8	0.1	Within standard	0.3%

Table 3: Assessment of N deposition at ecological sites (construction phase)

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)	Percent change in relation to lower critical load
		2025 without the AP1 revised scheme	2025 with the AP1 revised scheme			
Woolston Eyes SSSI (east of M6)	7	44.8	45.0	0.2	10	1.2%
	10	44.2	44.3	0.1	10	1.1%
	20	42.9	43.0	0.1	10	0.8%
	30	42.2	42.3	0.1	10	0.7%
	40	41.7	41.8	0.1	10	0.6%
	50	41.4	41.4	< 0.1	10	0.5%
	75	40.8	40.9	0.1	10	0.4%
	100	40.5	40.5	< 0.1	10	0.3%
	150	40.1	40.1	< 0.1	10	0.3%
	200	39.8	39.9	0.1	10	0.2%
Woolston Eyes SSSI (west of M6)	8	43.9	44.0	0.1	10	1.0%
	10	43.6	43.7	0.1	10	0.9%
	20	42.5	42.6	0.1	10	0.7%
	30	41.9	41.9	< 0.1	10	0.6%
	40	41.4	41.5	0.1	10	0.5%
	50	41.1	41.2	0.1	10	0.5%
	75	40.7	40.7	< 0.1	10	0.4%
	100	24.1	24.1	< 0.1	10	0.2%
	150	40.0	40.0	< 0.1	10	0.2%
	200	39.8	39.8	< 0.1	10	0.2%

3.2.8 NOx concentrations at the Woolston Eyes SSSI are predicted to be above the air quality standard with or without the AP1 revised scheme, up to between 10m and 20m to the east and west of the M6. The changes in NOx concentrations are more than 1% of the air quality standard, up to between 75m and 100m to the east of the M6 and up to between 50m and 75m to the west of the M6. The change in nitrogen deposition due to the AP1 revised scheme is also predicted to be greater than 1% of the lower critical load for this site, up to between 10m and 20m to the east of the M6 and up to between 8m and 10m to the west of the M6.

Assessment of significance

3.2.9 Compared to the main ES, significant adverse effects on annual mean NO_2 concentrations at one modelled human health receptor at Nicol Avenue, Woolston (04-C-H009) are removed as this building has been demolished. The demolition of this building has been undertaken since the publication of the main ES and is not associated with the original scheme or the AP1 revised scheme.

3.2.10 Since the change in NOx concentrations are predicted to be greater than 1% of the air quality standard, significant effects may occur at the Woolston Eyes SSSI due to NOx concentrations.

3.2.11 Since the change in N deposition is predicted to be greater than 1% of the lower critical load, significant effects may occur at the Woolston Eyes SSSI due to N deposition.

3.3 Assessment of operational traffic emissions

3.3.1 There are no operational impacts as a result of the AP1 revised scheme in the Broomedge to Glazebrook area (MA04).

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk