

# HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 3 and  
Additional Provision 4 Environmental Statement

Volume 5 | Technical appendices

Air Quality

(AQ-001-006, AQ-001-007)

October 2015

SES3 and AP4 ES 3.5.1.1

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High Speed Two (HS2) Limited,  
One Canada Square,  
London  
E14 5AB

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: [HS2enquiries@hs2.org.uk](mailto:HS2enquiries@hs2.org.uk)

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This table shows the topics covered by the technical appendices in this volume, and the reference codes for them.

CFA name and number	Code
CFA6, South Ruislip to Ickenham	AQ-001-006
CFA7, Colne Valley	AQ-001-007

SES<sub>3</sub> and AP<sub>4</sub> ES Appendix AQ-001-006

Environmental topic:	Air quality	AQ
Appendix name:	Data appendix	001
Community forum area:	South Ruislip to Ickenham	006



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# 1 Introduction

## 1.1 Structure of this air quality assessment appendix

1.1.1 This appendix provides an update to:

- Appendix AQ-001-006 from the main Environmental Statement (ES) (Volume 5, Appendix AQ-001-006); and
- Appendix AQ-001-006 from the Supplementary Environmental Statement (SES) and Additional Provision 2 Environmental Statement (AP<sub>2</sub> ES) (Volume 5: Appendix AQ-001-006).

1.1.2 This update should be read in conjunction with these appendices.

1.1.3 This appendix is structured as follows:

- dust impact evaluation and risk rating (Section 2); and
- air quality assessment - road traffic (Section 3).

1.1.4 Maps referred to throughout this air quality appendix are contained in the Volume 5 Air Quality Map Book, within this Supplementary Environmental Statement 3 (SES<sub>3</sub>) and Additional Provision 4 ES (AP<sub>4</sub> ES).

## 1.2 Scope of this assessment

1.2.1 This air quality assessment considers changes to local air quality as a result of:

- changes to the design or construction assumptions which do not require changes to the Bill;
- changes to the design of the scheme that are outside the existing limits of the Bill (i.e. AP<sub>4</sub> amendments); and
- updates to traffic models.

### Methodology, data sources and design criteria

1.2.2 The assessment scope, key assumptions and limitations for air quality are set out in the SMR Addendum 3 (Volume 5: Appendix CT-001-000/4) of the Supplementary Environmental Statement 2 (SES<sub>2</sub>) and Additional Provision 3 Environmental Statement (AP<sub>3</sub> ES).

# 2 Dust impact evaluation and risk rating

2.1.1 This section provides details of the assessment of dust emissions during construction of the scheme. Since the submission of the main ES, new guidance<sup>1</sup> has been published by the Institute of Air Quality Management (IAQM). This assessment follows the approach described in the new guidance. Maps of the assessed receptors

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<sup>1</sup> Institute of Air Quality Management, (2014), *Guidance on the assessment of dust from demolition and construction*, London.



in relation to the scheme and associated construction activities are contained within the Volume 5 Air Quality Map Book within this SES3 and AP4 ES.

## 2.2 Amended sustainable placement strategy

2.2.1 This amendment provides for alternative arrangements for placement and management of sustainable placement in West Ruislip. Sustainable placement in the main ES includes an existing landfill site, revised quantities and alternative sustainable placement locations.

### Dust emission magnitude

2.2.2 Each dust generating activity has been assigned a dust emission magnitude as shown in Table 1.

Table 1: West Ruislip tunnel portal, dust emission magnitude for construction activities

Activity	Dust emission magnitude	Reasoning
Demolition	Medium	Building volume less than 20,000m <sup>3</sup> Potentially dusty construction material (concrete)
Earthworks	Large	Total material moved greater than 100,000 tonnes Total site area >10,000m <sup>2</sup>
Construction	Medium	Building volume between 25,000 and 100,000m <sup>3</sup> Potentially dusty construction material (concrete)
Trackout	Large	Greater than 50 heavy goods vehicles (HGVs) per day
Haul route	Large	Greater than 50 HGVs per day

### Assessed receptors and sensitivity of the area

2.2.3 The site is located in a sparsely populated area, with less than 10 residential receptors identified within 20m of the site, and 10 to 100 residential receptors within 20m of the trackout route. Residential receptors are high sensitivity receptors for both dust soiling and health effects. Background PM10 concentrations are predicted to be less than 24µg/m<sup>3</sup>.

2.2.4 The sensitivity of the area to dust soiling and human health impacts has been assessed for each dust-generating activity in Table 2. The sensitivity of trackout has been identified as high, and all other activities identified as medium for dust soiling effects, and low for human health effects due to the low density of high sensitivity receptors combined with the low ambient PM10 concentrations in the surrounding area.

Table 2: West Ruislip tunnel portal, sensitivity of the area to dust soiling and human health

Activity	Dust soiling	Human health
Demolition	Medium	Low
Earthworks	Medium	Low
Construction	Medium	Low
Trackout	High	Low
Haul route	Medium	Low

### Risk of impacts

- 2.2.5 Taking into consideration the dust emission magnitude and the sensitivity of the area, the site has been classified as high (Table 3). It should be noted that this is the risk prior to the implementation of mitigation measures which are embedded within the project as part of the draft Code of Construction Practice (CoCP).
- 2.2.6 It is anticipated that with the implementation of the measures described in the draft CoCP, the impacts will be slight adverse and effects not significant, as was the case in the main ES.

Table 3: West Ruislip tunnel portal, summary dust risk table prior to mitigation

Activity	Dust soiling	Human health
Demolition	Medium risk	Low risk
Earthworks	Medium risk	Low risk
Construction	Medium risk	Low risk
Trackout	High risk	Low risk
Haul route	Medium risk	Low risk

### Dust emission magnitude

- 2.2.7 Each dust generating activity has been assigned a dust emission magnitude as shown in Table 4. Information used to determine the dust emissions magnitude for each of the activities has been taken from Technical Note C221-MMD-CL-NOT-010-5000.

Table 4: West Ruislip rail head (including Harvil Road realignment and sustainable placement areas), dust emission magnitude for construction activities

Activity	Dust emission magnitude	Reasoning
Demolition	Medium	Building volume less than 20,000m <sup>3</sup> Potentially dusty construction material (concrete)
Earthworks	Large	Total material moved greater than 100,000 tonnes Total site area >10,000m <sup>2</sup>
Construction	Medium	Building volume between 25,000 and 100,000m <sup>3</sup> Potentially dusty construction material (concrete)
Trackout	Large	Greater than 50 HGVs per day
Haul route	Large	Greater than 50 HGVs per day

### Assessed receptors and sensitivity of the area

- 2.2.8 The site is located in a sparsely populated area, with less than 10 residential receptors identified within 20m of the site. Residential receptors are high sensitivity receptors for both dust soiling and health effects. Background PM<sub>10</sub> concentrations are predicted to be less than 24µg/m<sup>3</sup>.
- 2.2.9 The sensitivity of the area to dust soiling and human health has been assessed for each dust-generating activity in Table 5. The sensitivity of all activities has been identified as medium for dust soiling effects, and low for human health effects due to the low density of high sensitivity receptors combined with the low ambient PM<sub>10</sub> concentrations in the surrounding area.

Table 5: West Ruislip rail head (including Harvil Road realignment and sustainable placement areas), sensitivity of the area to dust soiling and human health

Activity	Dust soiling	Human health
Demolition	Medium	Low
Earthworks	Medium	Low
Construction	Medium	Low
Trackout	Medium	Low
Haul route	Medium	Low

### Risk of impacts

- 2.2.10 Taking into consideration the dust emission magnitude and the sensitivity of the area, the site has been classified as medium (Table 6). It should be noted that this is the risk prior to the implementation of mitigation measures which are embedded within the project as part of the draft Code of Construction Practice (CoCP).

- 2.2.11 It is anticipated that with the implementation of the measures described in the draft CoCP, the impacts will be slight adverse and effects not significant, as was the case in the main ES.

Table 6: West Ruislip rail head (including Harvil Road realignment and sustainable placement areas), summary dust risk table prior to mitigation

Activity	Dust soiling	Human health
Demolition	Medium risk	Low risk
Earthworks	Medium risk	Low risk
Construction	Medium risk	Low risk
Trackout	Medium risk	Low risk
Haul route	Medium risk	Low risk

## 3 Assessment of road traffic emissions

### 3.1 Overall assessment approach

- 3.1.1 The overall assessment approach remains the same as described in Appendix AQ-001-006 of the main ES. Where changes to this approach have been employed, these are detailed in section 3.2. In this study area the ADMS-Roads atmospheric dispersion model has been used for the assessment.
- 3.1.2 As detailed in Volume 1 and the SMR Addendum 3 (Volume 5: Appendix CT001-000/4) of the SES2 and AP3 ES, since the publication of the main ES, the Environmental Protection UK (EPUK) and the IAQM have issued new guidance<sup>2</sup> on assessing the impact of traffic emissions, which introduces a new set of impact descriptors. The 2015 IAQM/EPUK guidance differs from the previous 2010 guidance<sup>3</sup>, which was used in the main ES, in that it treats a similar increase in ambient pollution concentrations as having a greater impact, and therefore more likely to have a significant effect. Where applicable, a comparison has been provided in the results tables between the new impact descriptors, those that would arise if the previous guidance was used and what was reported in the main ES.

### 3.2 Construction (2021)

- 3.2.1 Construction traffic data used in this assessment are detailed in Volume 5 SES3 and AP4 Appendix TR-001-000.

#### Receptors assessed

- 3.2.2 Receptors assessed are listed in Table 7.

<sup>2</sup> Moorcroft & Barrowcliffe et al, (2015) *Land-Use Planning & Development Control: Planning for Air Quality*, London: Institute of Air Quality Management.

<sup>3</sup> Environmental Protection UK, (2010), *Development Control: Planning for Air Quality*.

## SES<sub>3</sub> and AP<sub>4</sub> ES Appendix AQ-001-006

Table 7: Modelled receptors (construction phase)

Receptor	Description/location	Ordnance Survey (OS) coordinates
6-5	2 Swakeleys Road	507942, 186227
6-8	195 Swakeleys Road	506601, 186094
6-10	9 Woodhall Close	506013, 185521
6-18	253 Park Road	506166, 185475
6-20	218 Swakeleys Road	506574, 186136
6-21	205 Swakeleys Road	506574, 186059
6-22	16 Shorediche Close	506644, 186133
6-23	Woodside, Park Road	506220, 185452
6-24	Oakwood, Warren Road	506231, 185626
6-25	8A Woodhall Close	505943, 185516
6-26	247 Harefield Road	506166, 185424
6-27	4 Long Lane	507938, 186190
6-28	2-4 High Road	507993, 186204
6-29	6-8 Swakeleys Road	507883, 186253
6-30	15A Swakeleys Road	507883, 186218
6-31	279 Swakeleys Road	506246, 185665
6-32	259 Swakeleys Road	506334, 185818
6-33	1 Roker Park Avenue	506443, 185961
6-40	White Bear Public House, Ickenham Road	506522, 186026
6-50	Shorthill Cottage, Harvil Road	506178, 185385
6-51	181 Swakeleys Road	506332, 187132
6-52	West Ruislip Court, Ickenham Road	506729, 186208
6-53	West Ruislip Station, Ickenham Road	508530, 186945

## SES<sub>3</sub> and AP<sub>4</sub> ES Appendix AQ-001-006

Receptor	Description/location	Ordnance Survey (OS) coordinates
6-54	23-27 High Road, Ickenham	508355, 186798
6-55	Priors Farm, West End Road	508023, 186374
6-60	Woodside, Park Road	506218, 185448
6-61	253 Park Road	506220, 185421
6-62	190 Swakeleys Road	506166, 185426
6-63	168 Swakeleys Road	506728, 186268
6-64	163 Swakeleys Road	506864, 186267
6-65	30 Swakeleys Road	506923, 186234
6-66	58 Swakeleys Road	507780, 186314
6-67	Melthorne Court, High Road, Ickenham	507766, 186282
6-68	61 High Rd, Ickenham	508054, 186434
6-69	71 High Rd, Ickenham	508120, 186587
6-70	Aylsham Drive	508178, 186651
6-71	Station Parade, Ickenham Road	508187, 186603
6-72	116 Ickenham Road	508496, 186921
6-73	1 Harwell Close	508474, 186933
6-74	85 Sharps Lane	508535, 186996
6-76	Highway Farm, Harvil Road	506657, 186149

### Background concentrations

3.2.3 The background concentrations used in the assessment are shown in Table 8 taken from the Department for Environment, Food and Rural Affairs (Defra) maps <sup>4</sup>.

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<sup>4</sup> Department for Environment, Food and Rural Affairs (2011) *Defra background maps 2011*; <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011> (accessed August 2015).

## SES<sub>3</sub> and AP<sub>4</sub> ES Appendix AQ-001-006

Table 8: Background 2012 and 2017 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations (µg/m <sup>3</sup> )					
	2012			2017		
	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>
6-5	36.4	23.5	19.5	31.0	20.5	18.3
6-8	33.0	21.6	19.1	28.1	18.9	17.9
6-10	45.6	28.5	22.0	38.3	24.6	20.6
6-18	45.6	28.5	22.0	38.3	24.6	20.6
6-20	33.0	21.6	19.1	28.1	18.9	17.9
6-21	33.0	21.6	19.1	28.1	18.9	17.9
6-22	33.0	21.6	19.1	28.1	18.9	17.9
6-23	45.6	28.5	22.0	38.3	24.6	20.6
6-24	45.6	28.5	22.0	38.3	24.6	20.6
6-25	46.4	28.3	21.7	38.5	24.9	20.3
6-26	45.6	28.5	22.0	38.3	24.6	20.6
6-27	36.4	23.5	19.5	31.0	20.5	18.3
6-28	36.4	23.5	19.5	31.0	20.5	18.3
6-29	36.4	23.5	19.5	31.0	20.5	18.3
6-30	36.4	23.5	19.5	31.0	20.5	18.3
6-31	45.6	28.5	22.0	38.3	24.6	20.6
6-32	45.6	28.5	22.0	38.3	24.6	20.6
6-33	45.6	28.5	22.0	38.3	24.6	20.6
6-40	33.0	21.6	19.1	28.1	18.9	17.9
6-50	45.6	28.5	22.0	38.3	24.6	20.6
6-51	28.2	18.8	18.2	24.2	16.5	17.2
6-52	33.0	21.6	19.1	28.1	18.9	17.9

## SES<sub>3</sub> and AP<sub>4</sub> ES Appendix AQ-001-006

Receptor (or zone of receptors)	Concentrations (µg/m <sup>3</sup> )					
	2012			2017		
	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>
6-53	34.4	22.4	19.2	29.4	19.6	18.0
6-54	34.4	22.4	19.2	29.4	19.6	18.0
6-55	34.4	22.4	19.2	29.4	19.6	18.0
6-60	45.6	28.5	22.0	38.3	24.6	20.6
6-61	45.6	28.5	22.0	38.3	24.6	20.6
6-62	45.6	28.5	22.0	38.3	24.6	20.6
6-63	33.0	21.6	19.1	28.1	18.9	17.9
6-64	33.0	21.6	19.1	28.1	18.9	17.9
6-65	33.0	21.6	19.1	28.1	18.9	17.9
6-66	36.4	23.5	19.5	31.0	20.5	18.3
6-67	36.4	23.5	19.5	31.0	20.5	18.3
6-68	34.4	22.4	19.2	29.4	19.6	18.0
6-69	34.4	22.4	19.2	29.4	19.6	18.0
6-70	34.4	22.4	19.2	29.4	19.6	18.0
6-71	34.4	22.4	19.2	29.4	19.6	18.0
6-72	34.4	22.4	19.2	29.4	19.6	18.0
6-73	34.4	22.4	19.2	29.4	19.6	18.0
6-74	34.4	22.4	19.2	29.4	19.6	18.0
6-76	33.0	21.6	19.1	28.1	18.9	17.9

### Detailed modelling results

- 3.2.4 This section presents the summary of the modelled pollutant concentrations for the assessed receptors and the resulting impact descriptor following the latest IAQM/EPUK guidance. As a comparison, the impact descriptor using the previous EPUK guidance has also been provided along with what was reported in the main ES.



Table 9: Summary of annual mean NO<sub>2</sub> results (construction)

Receptor	NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-5	44.1	37.9	37.2	-0.7	Moderate beneficial	Slight beneficial	Slight adverse
6-8	46.8	40.6	38.6	-2.0	Moderate beneficial	Slight beneficial	Substantial adverse
6-10	56.7	48.6	47.0	-1.5	Substantial beneficial	Slight beneficial	Moderate adverse
6-18	69.8	59.4	58.7	-0.7	Substantial beneficial	Slight beneficial	Moderate adverse
6-20	45.3	39.2	37.4	-1.8	Moderate beneficial	Slight beneficial	Substantial adverse
6-21	42.6	36.8	35.0	-1.9	Slight beneficial	Negligible	Substantial adverse
6-22	50.3	43.8	41.7	-2.1	Moderate beneficial	Moderate beneficial	Substantial adverse
6-23	75.5	64.9	63.1	-1.8	Substantial beneficial	Slight beneficial	Slight adverse
6-24	74.8	65.3	62.8	-2.5	Substantial beneficial	Moderate beneficial	Substantial adverse
6-25	51.3	43.7	42.5	-1.2	Moderate beneficial	Slight beneficial	Moderate adverse
6-26	64.8	54.7	53.0	-1.8	Substantial beneficial	Slight beneficial	Slight adverse
6-27	41.4	35.6	35.3	-0.3	Negligible	Negligible	Slight adverse
6-28	47.1	40.7	40.7	0.0	Negligible	Negligible	Slight adverse

Receptor	NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-29	39.1	33.5	32.6	-0.9	Slight beneficial	Negligible	Slight adverse
6-30	37.5	32.2	31.5	-0.7	Slight beneficial	Negligible	Slight adverse
6-31	68.1	59.5	56.9	-2.6	Substantial beneficial	Moderate beneficial	Substantial adverse
6-32	60.0	52.4	50.1	-2.3	Substantial beneficial	Moderate beneficial	Substantial adverse
6-33	54.6	47.7	45.2	-2.6	Substantial beneficial	Moderate beneficial	Substantial adverse
6-40	48.9	42.7	39.8	-2.9	Substantial beneficial	Moderate beneficial	N/A
6-50	68.4	57.2	55.0	-2.2	Substantial beneficial	Moderate beneficial	N/A
6-51	28.0	24.2	24.2	0.0	Negligible	Negligible	N/A
6-52	44.8	38.7	37.1	-1.6	Moderate beneficial	Slight beneficial	N/A
6-53	60.4	52.7	52.2	-0.5	Moderate beneficial	Slight beneficial	N/A
6-54	51.7	44.5	44.8	0.3	Moderate adverse	Negligible	N/A
6-55	43.7	37.6	37.5	-0.2	Negligible	Negligible	N/A
6-60	75.7	65.1	63.3	-1.8	Substantial beneficial	Slight beneficial	N/A
6-61	66.7	56.8	55.2	-1.6	Substantial beneficial	Slight beneficial	N/A

Receptor	NO <sub>2</sub> concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-62	64.5	54.5	52.8	-1.7	Substantial beneficial	Slight beneficial	N/A
6-63	52.1	45.5	43.8	-1.7	Substantial beneficial	Slight beneficial	N/A
6-64	36.4	31.1	30.2	-1.0	Slight beneficial	Negligible	N/A
6-65	34.9	29.9	29.0	-0.9	Negligible	Negligible	N/A
6-66	38.4	33.0	31.9	-1.1	Slight beneficial	Negligible	N/A
6-67	34.7	29.8	29.1	-0.6	Negligible	Negligible	N/A
6-68	47.0	40.5	40.4	-0.1	Negligible	Negligible	N/A
6-69	42.4	36.3	36.4	0.2	Negligible	Negligible	N/A
6-70	44.7	38.2	38.5	0.2	Slight adverse	Negligible	N/A
6-71	43.0	36.8	37.0	0.2	Negligible	Negligible	N/A
6-72	58.2	50.4	50.6	0.3	Moderate adverse	Negligible	N/A
6-73	45.6	39.0	39.1	0.1	Negligible	Negligible	N/A
6-74	45.9	39.4	38.1	-1.3	Moderate beneficial	Slight beneficial	N/A
6-76	54.4	47.5	45.1	-2.4	Substantial beneficial	Moderate beneficial	N/A

3.2.5 As set out in Volume 1 and the SMR Addendum 3 (Volume 5: Appendix CT001-000/4) of the SES2 and AP3 ES, EPUK and the IAQM have issued new guidance<sup>5</sup> on assessing air quality impacts. The main difference from the previous guidance is that it describes a similar increase in pollutant concentrations as having greater adverse impact, and therefore having a greater potential for significant effects. For example, where the baseline NO<sub>2</sub> concentration is under the standard at 38µg/m<sup>3</sup> and increases by 1.5µg/m<sup>3</sup> to 39.5µg/m<sup>3</sup> with the scheme, the previous guidance defined this as a slight adverse impact, while the new guidance defines this as a moderate adverse impact. The increased emphasis on severity in the descriptors in the new guidance is particularly accentuated for receptors where baseline concentrations are at or above the objective value, as is the case in parts of London. This is illustrated in the results in Table 9. The 6th column shows the impact descriptor using the 2015 guidance, and the 7th column shows the impact descriptor using the 2010 guidance. It can be seen that more of the descriptors using the 2015 guidance are moderate or substantial than with the 2010 guidance, for the same change in annual mean NO<sub>2</sub> concentration.

Table 10: Summary of annual mean PM<sub>10</sub> results (construction)

Receptor	PM <sub>10</sub> concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-5	22.0	20.5	20.4	-0.1	Negligible	Negligible	Negligible
6-8	22.1	20.6	20.3	-0.2	Negligible	Negligible	Negligible
6-10	27.0	25.2	25.2	0.0	Negligible	Negligible	Negligible
6-18	29.0	26.8	26.6	-0.2	Negligible	Negligible	Negligible
6-20	22.0	20.5	20.3	-0.2	Negligible	Negligible	Negligible
6-21	21.5	20.1	19.9	-0.2	Negligible	Negligible	Negligible
6-22	22.7	21.0	20.8	-0.3	Negligible	Negligible	Negligible

<sup>5</sup> Moorcroft and Barrowcliffe et al., (2015), Land-Use Planning & Development Control: Planning for Air Quality. London: Institute of Air Quality Management.

Receptor	PM10 concentrations ( $\mu\text{g}/\text{m}^3$ )			Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-23	29.8	27.5	27.2	-0.2	Negligible	Negligible	Negligible
6-24	29.8	27.4	27.1	-0.3	Negligible	Negligible	Negligible
6-25	25.3	23.6	23.6	0.0	Negligible	Negligible	Negligible
6-26	27.4	25.3	25.1	-0.2	Negligible	Negligible	Negligible
6-27	21.6	20.1	20.1	0.0	Negligible	Negligible	Negligible
6-28	22.7	21.0	21.0	0.0	Negligible	Negligible	Negligible
6-29	21.2	19.8	19.7	-0.1	Negligible	Negligible	Negligible
6-30	20.9	19.6	19.5	-0.1	Negligible	Negligible	Negligible
6-31	28.5	26.3	26.1	-0.3	Negligible	Negligible	Negligible
6-32	26.7	24.8	24.5	-0.3	Negligible	Negligible	Negligible
6-33	25.7	23.8	23.6	-0.3	Negligible	Negligible	Negligible
6-40	22.6	21.0	20.7	-0.3	Negligible	Negligible	Negligible
6-50	28.9	26.6	26.2	-0.3	Negligible	Negligible	Negligible
6-51	19.1	18.0	18.0	0.0	Negligible	Negligible	Negligible

Receptor	PM10 concentrations ( $\mu\text{g}/\text{m}^3$ )			Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-52	21.8	20.3	20.1	-0.2	Negligible	Negligible	Negligible
6-53	25.2	23.0	22.9	-0.1	Negligible	Negligible	Negligible
6-54	23.9	22.0	22.1	0.1	Negligible	Negligible	Negligible
6-55	21.8	20.2	20.2	0.0	Negligible	Negligible	Negligible
6-60	29.8	27.4	27.2	-0.2	Negligible	Negligible	Negligible
6-61	27.9	25.8	25.6	-0.2	Negligible	Negligible	Negligible
6-62	27.3	25.2	25.0	-0.2	Negligible	Negligible	Negligible
6-63	23.9	22.1	21.9	-0.2	Negligible	Negligible	Negligible
6-64	20.6	19.2	19.1	-0.1	Negligible	Negligible	Negligible
6-65	20.3	19.0	19.0	-0.1	Negligible	Negligible	Negligible
6-66	21.0	19.7	19.6	-0.1	Negligible	Negligible	Negligible
6-67	20.5	19.2	19.1	-0.1	Negligible	Negligible	Negligible
6-68	22.4	20.7	20.6	0.0	Negligible	Negligible	Negligible
6-69	21.9	20.3	20.4	0.0	Negligible	Negligible	Negligible

Receptor	PM <sub>10</sub> concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-70	22.4	20.7	20.8	0.0	Negligible	Negligible	Negligible
6-71	22.0	20.4	20.5	0.0	Negligible	Negligible	Negligible
6-72	25.3	23.3	23.3	0.0	Negligible	Negligible	Negligible
6-73	22.5	20.8	20.8	0.0	Negligible	Negligible	Negligible
6-74	22.1	20.4	20.2	-0.2	Negligible	Negligible	Negligible
6-76	23.4	21.6	21.3	-0.3	Negligible	Negligible	Negligible

Table 11: Summary of mean 24-hour PM<sub>10</sub> results (construction)

Receptor	Number of 24-hour mean PM <sub>10</sub> exceedances			Change in number of 24-hour mean PM <sub>10</sub> exceedances	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-5	6	4	4	0	Negligible	Negligible	Negligible
6-8	7	4	4	0	Negligible	Negligible	Negligible
6-10	18	13	13	0	Negligible	Negligible	Negligible
6-18	24	17	17	-1	Negligible	Negligible	Negligible
6-20	6	4	4	0	Negligible	Negligible	Negligible
6-21	5	3	3	0	Negligible	Negligible	Negligible

Receptor	Number of 24-hour mean PM <sub>10</sub> exceedances			Change in number of 24-hour mean PM <sub>10</sub> exceedances	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-22	8	5	4	0	Negligible	Negligible	Negligible
6-23	27	19	18	-1	Negligible	Negligible	Negligible
6-24	27	19	18	-1	Negligible	Negligible	Negligible
6-25	13	9	9	0	Negligible	Negligible	Negligible
6-26	19	13	13	-1	Negligible	Negligible	Negligible
6-27	6	4	4	0	Negligible	Negligible	Negligible
6-28	8	5	5	0	Negligible	Negligible	Negligible
6-29	5	3	3	0	Negligible	Negligible	Negligible
6-30	5	3	3	0	Negligible	Negligible	Negligible
6-31	22	16	15	-1	Negligible	Negligible	Negligible
6-32	17	12	11	-1	Negligible	Negligible	Negligible
6-33	14	10	9	-1	Negligible	Negligible	Negligible
6-40	7	5	4	0	Negligible	Negligible	Negligible
6-50	24	16	16	-1	Negligible	Negligible	Negligible



Receptor	Number of 24-hour mean PM <sub>10</sub> exceedances			Change in number of 24-hour mean PM <sub>10</sub> exceedances	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-51	2	1	1	0	Negligible	Negligible	Negligible
6-52	6	4	4	0	Negligible	Negligible	Negligible
6-53	13	8	8	0	Negligible	Negligible	Negligible
6-54	10	6	6	0	Negligible	Negligible	Negligible
6-55	6	4	4	0	Negligible	Negligible	Negligible
6-60	27	19	18	-1	Negligible	Negligible	Negligible
6-61	20	14	14	-1	Negligible	Negligible	Negligible
6-62	19	13	12	-1	Negligible	Negligible	Negligible
6-63	10	7	6	0	Negligible	Negligible	Negligible
6-64	4	3	2	0	Negligible	Negligible	Negligible
6-65	4	2	2	0	Negligible	Negligible	Negligible
6-66	5	3	3	0	Negligible	Negligible	Negligible
6-67	4	2	2	0	Negligible	Negligible	Negligible
6-68	7	4	4	0	Negligible	Negligible	Negligible

Receptor	Number of 24-hour mean PM <sub>10</sub> exceedances			Change in number of 24-hour mean PM <sub>10</sub> exceedances	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the main ES
	2012 baseline	Without scheme	With scheme				
6-69	6	4	4	0	Negligible	Negligible	Negligible
6-70	7	4	4	0	Negligible	Negligible	Negligible
6-71	6	4	4	0	Negligible	Negligible	Negligible
6-72	13	9	9	0	Negligible	Negligible	Negligible
6-73	7	4	4	0	Negligible	Negligible	Negligible
6-74	7	4	4	0	Negligible	Negligible	Negligible
6-76	9	6	5	-1	Negligible	Negligible	Negligible

## Assessment of significance

- 3.2.6 The significance of the impacts on air quality from changes in construction traffic flows associated with the amendment has been assessed in accordance with the SMR Addendum 3 (Volume 5: Appendix CT-001-000/4 of the SES<sub>2</sub> and AP<sub>3</sub> ES. An air quality management area covers part of the study area, and concentrations of NO<sub>2</sub> are in excess of the air quality standard in many locations, particularly along major roads.
- 3.2.7 The assessment has found that there will be numerous locations where the NO<sub>2</sub> concentration will be in excess of the air quality standard, with and without the amendment. Many receptor locations will, however, experience a decrease in concentrations of NO<sub>2</sub> and PM<sub>10</sub> as a consequence of changes in traffic flows brought about by the new haul route in community forum area 7. Assessed receptors along Swakeleys Road and some adjoining roads (Warren Road, Roker Park Avenue, Harvil Road and Shorediche Close) would experience substantial beneficial impacts in respect of NO<sub>2</sub> concentrations, relative to those reported in the main ES and in the SES AP<sub>2</sub> ES. These would be significant effects and would have been reported as significant using the methodology used in the main ES and SES AP<sub>2</sub>.
- 3.2.8 New significant beneficial effects would occur at assessed receptors along Swakeleys Road, Woodhall Road, Park Road, Harefield Road and Sharps Lane. These are reported as significant because of the change in methodology for describing impacts .
- 3.2.9 Two new receptors assessed on Ickenham Road and High Road Ickenham are predicted to experience moderate adverse impacts. These would be significant effects and arise through use of the new assessment methodology, as the methodology for the main ES and SES and AP<sub>2</sub> would have resulted in these impacts being described as negligible and not a significant effect.

## 4 References

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SES3 and AP4 ES Appendix AQ-001-007

Environmental topic:	Air quality	AQ
Appendix name:	Data appendix	001
Community forum area:	Colne Valley	007



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# 1 Introduction

## 1.1 Structure of this air quality assessment appendix

1.1.1 This appendix provides an update to:

- Appendix AQ-001-007 from the main Environmental Statement (ES) (Volume 5: Appendix AQ-001-007); and
- Appendix AQ-001-007 from the Supplementary Environmental Statement (SES) and Additional Provision 2 Environmental Statement (AP2 ES) (Volume 5: Appendix AQ-001-007).

1.1.2 This update should be read in conjunction with these appendices.

1.1.3 This appendix is structured as follows: air quality assessment - road traffic (Section 2).

1.1.4 Maps referred to throughout this air quality appendix are contained in the Volume 5 Air Quality Map Book, within this Supplementary Environmental Statement 3 (SES3) and Additional Provision 4 ES (AP4 ES).

## 1.2 Scope of this assessment

1.2.1 This air quality assessment considers changes to local air quality as a result of:

- changes to the design of the scheme that are outside the existing limits of the Bill (i.e. AP4 amendments); and
- updates to traffic models.

1.2.2 AP4 amendments within and outside the Colne Valley community forum area (CFA7), together with amendments to the base traffic flows and network wide traffic modelling amendments have resulted in changes to forecast traffic flows within CFA7 during construction, in comparison to those under the main ES and the SES and AP2 ES. These have been assessed as they are considered to have the potential to result in new or materially different likely significant effects on air quality.

1.2.3 The main traffic and transport changes associated with the AP4 design changes in CFA7 are:

- the use of the proposed haul road through Uxbridge Golf Course (AP4-006-004);
- changes to traffic flows resulting from the amendments to the Chiltern Tunnel South Portal; and
- amended baseline traffic and an updated traffic model.

### Methodology, data sources and design criteria

1.2.4 The assessment scope, key assumptions and limitations for air quality are set out in the SMR Addendum 3 (Volume 5: Appendix CT-001-000/4) of the Supplementary Environmental Statement 2 (SES2) and Additional Provision 3 Environmental Statement (AP3 ES).

## 2 Air quality assessment - road traffic

### 2.1 Overall assessment approach

- 2.1.1 As a result of AP<sub>4</sub> amendments and wider updates to the traffic modelling network outlined in Section 1.2, construction traffic movements in CFA7 have changed from those in the main ES and the SES and AP<sub>2</sub> assessment. These have been assessed as they are considered to have the potential to result in new or materially different effects on traffic and transport and therefore air quality.
- 2.1.2 As detailed in the SMR Addendum 3 (Volume 5: Appendix CT-001-000/4) of the SES<sub>2</sub> and AP<sub>3</sub> ES, since the publication of the main ES, the Environmental Protection UK (EPUK) and the IAQM have issued new guidance<sup>1</sup> on assessing the impact of new development, which introduces a new set of impact descriptors. The 2015 IAQM/EPUK guidance changes from the previous 2010 guidance<sup>2</sup> which was used in the main ES, in that it treats a similar increase in ambient pollution concentrations as having a greater impact, and therefore more likely to have a significant effect. Where applicable, a comparison has been provided in the results tables between the new impact descriptors, those that would arise if the previous guidance was used and what was reported in the SES and AP<sub>2</sub> ES.
- 2.1.3 Where the Design Manual for Roads and Bridges (DMRB) thresholds detailed in the SMR Addendum 3 (Volume 5: Appendix CT-001-000/4 of the SES<sub>2</sub> and AP<sub>3</sub> ES) are not exceeded, no additional assessment is required as the air quality impacts will be minimal. Where these thresholds are breached, then a quantitative assessment has been carried out.
- 2.1.4 Where the road layout is simple (for instance, where only one road link is involved), the DMRB screening method has been used to predict changes in air quality. Where the road layout is considered to be complex, the atmospheric dispersion model ADMS-Roads has been used for the assessment. Professional judgment has been used to select the appropriate tool for each area.
- 2.1.5 In this study area both the DMRB screening method and the ADMS-Roads model were used for the assessment.
- 2.1.6 An assessment of nutrient nitrogen and NO<sub>x</sub> concentrations was also undertaken at the Mid Colne Valley Site of Special Scientific Interest (SSSI) and at the Fray's Farm Meadows SSSI, because changes in traffic during construction on roads in close proximity were found to meet DMRB criteria for further assessment. The critical level and critical load, and baseline nitrogen deposition for the main habitats within the SSSI were taken from the Air Pollution Information System website<sup>3</sup>.

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<sup>1</sup> Moorcroft & Barrowcliffe et al, (2015), *Land-Use Planning & Development Control: Planning for Air Quality*, London: Institute of Air Quality Management.

<sup>2</sup> Environmental Protection UK, (2010), *Development Control: Planning for Air Quality*.

<sup>3</sup> Air Pollution Information System, <http://www.apis.ac.uk/>, (site accessed August 2015)

## 2.2 Model inputs and verification

### Model parameters for detailed assessment

- 2.2.1 The ADMS-Roads model was used for the detailed assessment. A surface roughness length of 1.5m, surface roughness at meteorological site of 0.2m, minimum Monin Obukhov length of 100m and latitude of 51.5 degrees were used in the detailed assessment. All other model parameters were model default settings. Meteorological data from the London Heathrow monitoring site was used.

### Model verification

- 2.2.2 There is no change in the verification compared to the SES and AP2 assessment.

## 2.3 Construction (2017)

- 2.3.1 Construction traffic data used in this assessment are detailed in Volume 5 SES3 and AP4 ES Appendix TR-001-000.

### Receptors assessed

- 2.3.2 There are several roads which border both CFA7 and CFA6. Where this is the case, ADMS-Roads was used to assess impacts, consistent with the assessment used for the remainder of London. On other roads in CFA7, DMRB screening was used as an initial step. Where the DMRB screening identified a likely moderate or substantial adverse impact, the receptors were also included within the more detailed ADMS-Roads model. Receptors assessed are presented in Table 1 : and in Map AQ-01-007 (Volume 5, Air Quality Map Book).

- 2.3.3 Following this approach the following roads were included in the assessment:

- Harvil Road;
- Swakeleys Road;
- A40 Western Avenue;
- A412 Denham Way/ North Orbital Road (south of satellite compounds)
- Chalfont Lane;
- Hornhill Road (west of Woodland Road); and
- M25 temporary slip roads.

- 2.3.4 By comparison to the CFA7 assessment in the SES and AP2 ES, two roads which were previously assessed have reductions in construction traffic flows. They are therefore now not included in this assessment as they no longer meet the DMRB criteria, namely:

- Lodore Road; and
- Chairmans Walk.

## SES3 and AP4 ES Appendix AQ-001-007

Table 1 : Modelled receptors (construction phase)

Receptor	Description/location	Ordnance Survey (OS) coordinates	Scenarios assessed with the scheme
7-4	Coldharbour Farm Cottages	501694, 189317	2012 base, 2017 base and construction using DMRB
7-8	Properties on Hornhill Road/The Hawthorns (Hornhill Road (west of Woodland Road))	502640, 192220	2012 base, 2017 base and construction using DMRB
7-9	1 The Drive, Ickenham (south)	506182, 185614	2012 base, 2017 base and construction using ADMS-Roads
7-10	238 Swakeleys Road	506320, 185873	2012 base, 2017 base and construction using ADMS-Roads
7-13	1 Harvil Road	506500, 186100	2012 base, 2017 base and construction using ADMS-Roads
7-14	248 Swakeleys Road	506243, 185737	2012 base, 2017 base and construction using ADMS-Roads
7-15	238 Swakeleys Road (south)	506317, 185867	2012 base, 2017 base and construction using ADMS-Roads
7-16	220 Swakeleys Road	506408, 185986	2012 base, 2017 base and construction using ADMS-Roads
7-17	Lodore Green (north)	506503, 186064	2012 base, 2017 base and construction using ADMS-Roads
7-18	1 The Drive, Ickenham (east)	506190, 185622	2012 base, 2017 base and construction using ADMS-Roads
7-19	238 Swakeleys Road (north)	506324, 185879	2012 base, 2017 base and construction using ADMS-Roads
7-20	Lodore Green (south)	506499, 186055	2012 base, 2017 base and construction using ADMS-Roads
7-21	90 The Drive, Ickenham	506428, 186529	2012 base, 2017 base and construction using ADMS-Roads
7-22	1 The Drive, Ickenham (west)	506171, 185620	2012 base, 2017 base and construction using ADMS-Roads
7-23	7 The Drive, Ickenham	506154, 185655	2012 base, 2017 base and construction using ADMS-Roads
7-24	4 Georgian Close, Ickenham	506028, 185716	2012 base, 2017 base and construction using ADMS-Roads

Receptor	Description/location	Ordnance Survey (OS) coordinates	Scenarios assessed with the scheme
7-25	3 Georgian Close, Ickenham	506013, 185744	2012 base, 2017 base and construction using ADMS-Roads
7-26	9A The Drive, Ickenham	506119, 185666	2012 base, 2017 base and construction using ADMS-Roads
7-27	Roe Wen Chalfont Lane	502956, 191509	2012 base, 2017 base and construction using DMRB

## Background concentrations

2.3.5 The background concentrations used in the assessment are shown in Table 2 : taken from the Department for Environment, Food and Rural Affairs (Defra) maps<sup>4</sup>.

Table 2 : Background 2012 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations ( $\mu\text{g}/\text{m}^3$ )					
	2012			2017		
	NOx	NO <sub>2</sub>	PM <sub>10</sub>	NOx	NO <sub>2</sub>	PM <sub>10</sub>
7-4	42.2	26.3	21.2	34.7	22.8	19.9
7-8	35.5	23.0	21.4	29.7	19.7	20.1
7-9	45.6	28.5	22.0	38.3	24.6	20.6
7-10	45.6	28.5	22.0	38.3	24.6	20.6
7-11	25.0	17.0	17.7	21.4	14.8	16.7
7-12	46.4	28.3	21.7	38.5	24.9	20.3
7-13	33.0	21.6	19.1	28.1	18.9	17.9
7-14	45.6	28.5	22.0	38.3	24.6	20.6
7-15	45.6	28.5	22.0	38.3	24.6	20.6
7-16	45.6	28.5	22.0	38.3	24.6	20.6
7-17	33.0	21.6	19.1	28.1	18.9	17.9
7-18	45.6	28.5	22.0	38.3	24.6	20.6
7-19	45.6	28.5	22.0	38.3	24.6	20.6

<sup>4</sup> Department for Environment, Food and Rural Affairs (2011) *Defra background maps 2011*; <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011> (accessed August 2015)

Receptor (or zone of receptors)	Concentrations ( $\mu\text{g}/\text{m}^3$ )					
	2012			2017		
	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>
7-20	33.0	21.6	19.1	28.1	18.9	17.9
7-21	33.0	21.6	19.1	28.1	18.9	17.9
7-22	45.6	28.5	22.0	38.3	24.6	20.6
7-23	45.6	28.5	22.0	38.3	24.6	20.6
7-24	45.6	28.5	22.0	38.3	24.6	20.6
7-25	45.6	28.5	22.0	38.3	24.6	20.6
7-26	45.6	28.5	22.0	38.3	24.6	20.6
7-27	36.2	23.3	22.0	29.9	19.9	20.7

### DMRB model results

#### 2.3.6

This section provides the summary of the modelled pollutant concentrations for the assessed receptors using the DMRB methodology and the resulting impact descriptor following the latest IAQM/EPUK guidance. As a comparison, the impact descriptor using the previous EPUK guidance has also been provided along with what was reported in the SES and AP2 ES.

Table 3 : Summary of DMRB annual mean NO<sub>2</sub> results (construction phase)

Receptor	Concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the SES and AP <sub>2</sub> ES
	2012 baseline	2017 without AP <sub>4</sub> Scheme	2017 with AP <sub>4</sub> Scheme				
7-4	36.0	29.6	29.8	0.2	Negligible	Negligible	Negligible
7-8	23.4	20.2	20.5	0.3	Negligible	Negligible	Negligible
7-27	23.6	20.2	23.2	3.3	Slight adverse	Negligible	Not assessed

Table 4 : Summary of DMRB annual mean PM<sub>10</sub> results (construction phase)

Receptor	Concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor reported in the SES and AP <sub>2</sub> ES
	2012 baseline	2017 without AP <sub>4</sub> Scheme	2017 with AP <sub>4</sub> Scheme				
7-4	23.3	21.0	21.0	0.02	Negligible	Negligible	Negligible
7-8	21.5	20.3	20.4	0.1	Negligible	Negligible	Negligible
7-27	22.1	20.8	21.0	0.26	Negligible	Negligible	Negligible

- 2.3.7 Changes in modelled concentrations have been calculated to determine the impact on local air quality. Negligible impacts have been predicted as a result of these changes in NO<sub>2</sub> concentrations resulting in no significant effect.
- 2.3.8 A negligible impact was found at all receptor in relation to PM<sub>10</sub>, with no further modelling required.

### **Detailed modelling results**

- 2.3.9 This section provides the summary of the modelled pollutant concentrations for the assessed receptors using ADMS-Roads and the resulting impact descriptor following the latest IAQM/EPUK guidance. As a comparison, the impact descriptor using the previous EPUK guidance has also been provided along with what was reported in the SES and AP<sub>2</sub> ES.
- 2.3.10 The criteria used to define significance at the ecological sites identified are in line with guidance set out in the Environment Agency H<sub>1</sub> guidance document, which in turn refers back to joint Environment Agency/Natural England guidance. With regard to ecology, in order to indicate area of the habitat that may be subject to significant effects the model included transects at increasing distances away from the roadside.



Table 5 : Summary of ADMS-Roads annual mean NO<sub>2</sub> results (construction phase)

Receptor	Concentrations (µg/m <sup>3</sup> )			Change in concentrations (µg/m <sup>3</sup> )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor in the SES and AP2 ES
	2012 baseline	2017 without AP <sub>4</sub> scheme	2017 with AP <sub>4</sub> scheme				
7-9	66.2	57.0	56.1	-0.9	Substantial beneficial	Slight beneficial	Negligible
7-10	55.3	48.4	46.9	-1.5	Substantial beneficial	Slight beneficial	Slight adverse
7-13	38.0	32.8	31.4	-1.3	Slight beneficial	Negligible	Slight adverse
7-14	58.1	50.3	48.2	-2.1	Substantial beneficial	Moderate beneficial	Slight adverse
7-15	55.5	48.4	46.8	-1.6	Substantial beneficial	Slight beneficial	Slight adverse
7-16	51.0	44.3	42.2	-2.1	Substantial beneficial	Moderate beneficial	Slight adverse
7-17	45.4	39.3	36.9	-2.4	Moderate beneficial	Moderate beneficial	Slight adverse
7-18	67.9	58.7	57.3	-1.3	Substantial beneficial	Slight beneficial	Negligible
7-19	55.1	48.3	46.9	-1.4	Substantial beneficial	Slight beneficial	Slight adverse
7-20	47.7	41.5	38.8	-2.8	Substantial beneficial	Moderate beneficial	Slight adverse
7-21	34.1	29.4	28.7	-0.7	Negligible	Negligible	Negligible
7-22	61.2	52.5	51.6	-1.0	Substantial beneficial	Slight beneficial	Not assessed
7-23	52.1	44.5	43.3	-1.2	Substantial beneficial	Slight beneficial	Not assessed

Receptor	Concentrations ( $\mu\text{g}/\text{m}^3$ )			Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor in the SES and AP2 ES
	2012 baseline	2017 without AP4 scheme	2017 with AP4 scheme				
7-24	44.1	37.6	36.8	-0.8	Slight beneficial	Slight beneficial	Not assessed
7-25	42.3	36.0	35.5	-0.6	Negligible	Negligible	Not assessed
7-26	49.2	42.0	40.8	-1.2	Moderate beneficial	Slight beneficial	Not assessed

Table 6 : Summary of ADMS-Roads annual mean PM10 results (construction phase)

Receptor	Concentrations ( $\mu\text{g}/\text{m}^3$ )			Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor in the SES and AP2 ES
	2012 baseline	2017 without AP4 scheme	2017 with AP4 scheme				
7-9	28.2	26.2	26.1	0.0	Negligible	Negligible	Negligible
7-10	25.8	23.9	23.7	-0.2	Negligible	Negligible	Negligible
7-13	20.9	19.5	19.4	-0.1	Negligible	Negligible	Negligible
7-14	26.4	24.5	24.3	-0.2	Negligible	Negligible	Negligible
7-15	25.8	23.9	23.7	-0.2	Negligible	Negligible	Negligible
7-16	25.0	23.2	23.0	-0.2	Negligible	Negligible	Negligible
7-17	22.0	20.5	20.2	-0.2	Negligible	Negligible	Negligible
7-18	28.5	26.4	26.3	-0.1	Negligible	Negligible	Negligible
7-19	25.7	23.9	23.7	-0.2	Negligible	Negligible	Negligible
7-20	22.4	20.8	20.6	-0.3	Negligible	Negligible	Negligible
7-21	20.6	19.4	19.2	-0.1	Negligible	Negligible	Negligible
7-22	27.3	25.3	25.3	0.0	Negligible	Negligible	Not assessed
7-23	25.5	23.7	23.8	0.0	Negligible	Negligible	Not assessed

Receptor	Concentrations ( $\mu\text{g}/\text{m}^3$ )			Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor in the SES and AP2 ES
	2012 baseline	2017 without AP4 scheme	2017 with AP4 scheme				
7-24	24.1	22.5	22.6	0.1	Negligible	Negligible	Not assessed
7-25	23.8	22.2	22.3	0.1	Negligible	Negligible	Not assessed
7-26	25.0	23.3	23.4	0.0	Negligible	Negligible	Not assessed

Table 7 : Summary of ADMS-Roads 24-hour mean PM10 results (construction phase)

Receptor	Number of 24 hour mean PM10 exceedances			Change in number of 24 hour mean PM10 exceedances	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor in the SES and AP2 ES
	2012 baseline	2017 without AP4 scheme	2017 with AP4 scheme				
7-9	21	15	15	0	Negligible	Negligible	Negligible
7-10	14	10	10	0	Negligible	Negligible	Negligible
7-13	5	3	3	0	Negligible	Negligible	Negligible
7-14	16	11	11	0	Negligible	Negligible	Negligible
7-15	14	10	10	0	Negligible	Negligible	Negligible
7-16	12	9	8	0	Negligible	Negligible	Negligible
7-17	6	4	4	0	Negligible	Negligible	Negligible
7-18	22	16	16	0	Negligible	Negligible	Negligible
7-19	14	10	9	0	Negligible	Negligible	Negligible
7-20	7	5	4	0	Negligible	Negligible	Negligible
7-21	4	3	3	0	Negligible	Negligible	Negligible
7-22	18	13	13	0	Negligible	Negligible	Not assessed
7-23	14	10	10	0	Negligible	Negligible	Not assessed
7-24	10	7	7	0	Negligible	Negligible	Not assessed

Receptor	Number of 24 hour mean PM <sub>10</sub> exceedances			Change in number of 24 hour mean PM <sub>10</sub> exceedances	Impact descriptor	Impact descriptor using the previous 2010 guidance	Impact descriptor in the SES and AP <sub>2</sub> ES
	2012 baseline	2017 without AP <sub>4</sub> scheme	2017 with AP <sub>4</sub> scheme				
7-25	10	7	7	0	Negligible	Negligible	Not assessed
7-26	12	9	9	0	Negligible	Negligible	Not assessed

Table 8 : Critical level assessment for the protection of vegetation

Receptor	NOx concentrations ( $\mu\text{g}/\text{m}^3$ )							
	2012 baseline	2017 without AP4 scheme	2017 with AP4 scheme	Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Critical level ( $\mu\text{g}/\text{m}^3$ ) (annual mean)	Change in concentrations as % of critical level	Total NOx as a % of critical level	Potentially significant?
<b>7-11 Mid Colne Valley SSSI</b>								
7-11 (10m)	38.1	32.3	32.8	0.6	30.0	1.9%	109.4%	Yes
7-11 (20m)	34.5	29.4	29.7	0.3	30.0	1.1%	99.0%	Yes
7-11 (50m)	31.4	26.8	27.0	0.2	30.0	0.5%	89.9%	No
7-11 (100m)	30.1	25.7	25.8	0.1	30.0	0.3%	86.0%	No
7-11 (150m)	29.6	25.4	25.4	0.0	30.0	0.2%	84.7%	No
7-11 (200m)	29.3	25.2	25.2	0.0	30.0	0.1%	83.9%	No
<b>7-12 Fray's Farm Meadows SSSI</b>								
7-12 (20m from A40)	187.4	148.6	151.1	2.5	30	8.33%	504%	Yes
7-12 (50m from A40)	105.2	84.4	85.1	0.7	30	2.33%	284%	Yes
7-12 (100m from A40)	76.0	61.6	61.8	0.2	30	0.67%	206%	No
7-12 (150m from A40)	64.4	52.5	52.5	0.0	30	0.00%	175%	No

Receptor	NOx concentrations ( $\mu\text{g}/\text{m}^3$ )							
	2012 baseline	2017 without AP <sub>4</sub> scheme	2017 with AP <sub>4</sub> scheme	Change in concentrations ( $\mu\text{g}/\text{m}^3$ )	Critical level ( $\mu\text{g}/\text{m}^3$ ) (annual mean)	Change in concentrations as % of critical level	Total NOx as a % of critical level	Potentially significant?
7-12 (0 m from Haul Road)	49.7	41.1	41.8	0.7	30	2.33%	139%	Yes
7-12 (25m from Haul Road)	49.6	41.0	41.2	0.2	30	0.67%	137%	No
7-12 (50m from Haul Road)	49.6	41.0	41.0	0.0	30	0.00%	137%	No
7-12 (100m from Haul Road)	49.6	41.0	40.9	-0.1	30	-0.33%	136%	No
7-12 (200m from Haul Road)	49.4	40.9	40.8	-0.1	30	-0.33%	136%	No



Table 9 : Critical load - nutrient nitrogen deposition

Receptor	Nitrogen deposition rate (kg N/ha/year)							
	2012 baseline deposition	2017 without AP4 Scheme	2017 with AP4 Scheme	Change in deposition (kg N/ha/year)	Critical load range (kg N/ha/year)	Change in deposition as % of critical load	Total nitrogen deposition as a % of critical load	Potentially significant?
<b>7-11 Mid Colne Valley SSSI</b>								
7-11 (10m)	22.4	21.6	21.7	0.1	15 - 25	0.5 (Low) 0.3 (High)	144 (Low) 87 (High)	No
7-11 (20m)	21.9	21.2	21.2	0.05	15 - 25	0.3 (Low) 0.2 (High)	141 (Low) 85 (High)	No
7-11 (50m)	21.5	20.8	20.8	0.02	15 - 25	0.1 (Low) 0.1 (High)	139 (Low) 83 (High)	No
7-11 (100m)	21.3	20.6	20.7	0.01	15 - 25	0.1 (Low) 0.0 (High)	138 (Low) 83 (High)	No
7-11 (150m)	21.2	20.6	20.6	0.007	15 - 25	0.10(Low) 0.0 (High)	137 (Low) 82 (High)	No
7-11 (200m)	21.2	20.6	20.6	0.005	15 - 25	0.0 (Low) 0.0 (High)	137 (Low) 82 (High)	No
<b>7-12 Fray's Farm Meadows SSSI</b>								
7-12 (20m from A40)	41.9	34.3	34.7	0.4	20-30	1.8(Low) 1.2(High)	173(Low) 116(High)	Yes

Receptor	Nitrogen deposition rate (kg N/ha/year)							
	2012 baseline deposition	2017 without AP4 Scheme	2017 with AP4 Scheme	Change in deposition (kg N/ha/year)	Critical load range (kg N/ha/year)	Change in deposition as % of critical load	Total nitrogen deposition as a % of critical load	Potentially significant?
7-12 (50m from A40)	30.1	25.1	25.2	0.1	20-30	0.5(Low) 0.3(High)	126(Low) 84(High)	No
7-12 (100m from A40)	25.9	21.8	21.8	0.03	20-30	0.1(Low) 0.1(High)	109(Low) 73(High)	No
7-12 (150m from A40)	24.2	20.5	20.5	0.0	20-30	0.0(Low) 0.0(High)	102(Low) 68(High)	No
7-12 (at edge of Haul Road)	22.1	18.9	19.0	0.1	20-30	0.5(Low) 0.3(High)	95(Low) 63(High)	No
7-12 (25m from Haul Road)	22.1	18.8	18.9	0.03	20-30	0.1(Low) 0.1(High)	94(Low) 63(High)	No
7-12 (50m from Haul Road)	22.1	18.8	18.8	0.0	20-30	0.0(Low) 0.0(High)	94(Low) 63(High)	No
7-12 (100m from Haul Road)	22.1	18.8	18.8	-0.01	20-30	-0.1(Low) -0.0(High)	94(Low) 63(High)	No
7-12 (200m from Haul Road)	22.1	18.8	18.8	-0.01	20-30	-0.1(Low) 0.0(High)	94(Low) 63(High)	No

## Assessment of significance

- 2.3.14 The assessment predicted that there will be some locations where air quality standards are exceeded, with and without the AP<sub>4</sub> revised scheme. Most assessed receptor locations will also experience a decrease in concentrations of NO<sub>2</sub> and PM<sub>10</sub> with the AP<sub>4</sub> revised scheme.
- 2.3.15 NO<sub>2</sub> impacts during the construction phase were predicted in the main ES to be moderate or substantial adverse at receptors on and bordering Swakeleys Road. In Part 1 of the SES and AP<sub>2</sub> ES these were reduced to slight adverse, at worst. The AP<sub>4</sub> amendments predict that there will be a moderate beneficial impact at this location. This is also the case at Lodore Green, where a moderate beneficial impact is predicted. These are different significant effects compared to the main ES and the SES and AP<sub>2</sub> ES. There are also other beneficial effects predicted in CFA7 as a result of the changes in traffic flows.
- 2.3.16 With regard to sensitive ecological habitats, following detailed assessment using ADMS-Roads, it was found that the scheme will have a potentially significant adverse effect for additional NO<sub>x</sub> concentrations on those parts of the Mid Colne Valley SSSI within 20m of the A40 road. Potentially significant effects were also identified in respect of additional NO<sub>x</sub> concentrations on those parts of Fray's Farm Meadows SSSI within 50m of the A40 road, and in respect of nutrient nitrogen deposition within 20m of the road. These findings are unchanged from the main ES and SES and AP<sub>2</sub> ES, and there is no change in the overall significance of the predicted effects. It is highly likely that the small increases will not have a measurable effect on the plant communities within the respective SSSIs. No significant effects are reported next to the new haul route.

## 3 References

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**High Speed Two (HS2) Limited**

One Canada Square  
London E14 5AB

**T** 020 7944 4908

**E** [hs2enquiries@hs2.org.uk](mailto:hs2enquiries@hs2.org.uk)

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