



High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Technical appendices

CA3: Stone and Swynnerton

Air quality report (AQ-001-003)



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Department for Transport

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1 Introduction

- 1.1.1 This document is the air quality assessment Appendix for the Stone and Swynnerton community area (CA3); it comprises:
- a discussion of relevant policies and guidance (Section 2);
 - baseline air quality data (Section 3);
 - dust impact evaluation and risk rating (Section 4);
 - the air quality assessment - road traffic (Section 5); and
 - the air quality assessment - train movements (Section 6).
- 1.1.2 Maps referred to throughout this appendix are contained in the Volume 5, Air Quality Map Book, Map Series AQ-01.
- 1.1.3 In addition, the traffic data used for the air quality assessment is set out in Background Information and Data (BID)¹, (see BID-AQ-002-000: Traffic data used for the air quality assessment).
- 1.1.4 The assessment scope, key assumptions and limitations and the methodology for determining significance of effects for air quality are set out in Volume 1² and the Scope and Methodology Report (SMR)³ and its Addendum⁴.

¹ HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Background Information and Data*, www.gov.uk/hs2.

² See Environmental Statement Volume 1, Introduction to the Environmental Statement

³ *Environmental Impact Assessment Scope and Methodology Report*, Volume 5: Appendix CT-001-001

⁴ *Environmental Impact Assessment Scope and Methodology Report Addendum*, Volume 5: Appendix CT-001-002

2 Relevant policies and guidance

- 2.1.1 The Stone and Swynnerton area lies within the administrative area of Stafford Borough Council (SBC).

Stafford Borough Council

- 2.1.2 The Plan for Stafford Borough Council⁵ sets out a vision for the development of the Borough outlining the key strategic policies to guide where new development will take place, whilst ensuring that new developments meet local needs and are in-line with national policy.
- 2.1.3 Policy T1 (Transport) outlines that a sustainable transport system will be achieved through: ‘...Seeking to reduce the impact of traffic from new development on the road networks, by ensuring that the generation of traffic is minimised through sustainable transport measures. Ensuring that all developments that generate significant traffic flows, including commercial traffic must be located in close proximity to the primary road network, do not have a negative impact on the network or at junctions, air quality, and nearby communities, and should have adequate capacity to accommodate the development or can be improved or mitigated as part of the development’.
- 2.1.4 In relation to air quality, Policy N5 (Sites of European, National & Local Nature Conservation Importance) outlines that in relation to air quality issues identified, planning permission will only be granted where:
1. ‘It can be demonstrated that development will not significantly contribute to adverse effects caused by local and/or diffuse air pollution at European sites, alone or in combination with other plans and projects;
 2. Where development would result in an increase in local and/or diffuse air pollution at European Sites, it would be expected to include measures in line with the Staffordshire Local Transport Plan towards securing an equivalent improvement in air quality, or reduction in emissions from other sources; and
 3. Require a pollution-neutral strategy for major development near to European sites.’

⁵ Stafford Borough Council (2014), *The Plan for Stafford Borough 2011 – 2031 (Adopted 19 June 2014)*, <http://www.staffordbc.gov.uk/live/Documents/Planning%20Policy/Plan%20for%20Stafford%20Borough/PFSB-Adoption.pdf>.

3 Baseline air quality data

3.1 Existing air quality

Local authority review and assessment information

- 3.1.1 SBC has reviewed air quality throughout the area since 2004, following Department for Environment, Food and Rural Affairs (Defra) local air quality management (LAQM) regime⁶.
- 3.1.2 No Air Quality Management Areas (AQMAs) have been declared⁷ within the Stone and Swynnerton area.

Local air quality monitoring data

- 3.1.3 Monitoring sites within the study area that are considered relevant for this assessment are shown in Volume 5: Map AQ-01-103. The following sections provide a summary of the recorded pollutant concentrations at these sites.
- 3.1.4 The pollutant concentrations can be compared to the air quality standards:
- 40µg/m³ as an annual mean for nitrogen dioxide (NO₂) and particulate matter (PM₁₀);
 - 200µg/m³ one-hour mean for NO₂ not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
 - 50µg/m³ 24-hour mean for PM₁₀ not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
 - 25µg/m³ as an annual mean for fine particulate matter (PM_{2.5}).

Continuous monitoring

- 3.1.5 There are no continuous monitoring sites operated by SBC in the Stone and Swynnerton area.

Diffusion tubes

- 3.1.6 SBC undertakes air quality monitoring with the use of passive diffusion tube as part of its LAQM process, with 31 diffusion tube sites positioned within the Borough. Of these, there are 15 diffusion tube sites located within the Stone and Swynnerton area for monitoring NO₂ concentrations.
- 3.1.7 Table 1 summarises the results from the diffusion tube sites that are considered relevant for the assessment of air quality in this study area. At the time of assessment, measurements for 2015 were the latest published annual monitoring baseline data.

⁶ In fulfilment of Part IV of the *Environment Act 1995*. London, Her Majesty's Stationary Office

⁷ Stafford Borough Council (2016), *2016 Air Quality Annual Status Report*, <http://www.staffordbc.gov.uk/live/Documents/Environmental%20Health/Air-Quality-Annual-Status-Report.pdf>.

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Table 1: Annual mean NO₂ concentrations recorded at diffusion tube monitoring sites⁸

Site	Ordnance Survey coordinates	Annual mean NO ₂ concentrations (µg/m ³)			
		2012	2013	2014	2015
No.5 (Kerbside)	390231, 334928	34	29	32	33
No.8 (Kerbside)	385680, 342220	38	30	37	38
No.9 (Kerbside)	387347, 338484	29	26	24	24
No.10 (Kerbside)	387282, 339057	24	24	26	22
No.13 (Kerbside)	390310, 332960	22	24	20	28
No.14 (Kerbside)	390090, 333150	22	24	20	29
No.16 (Kerbside)	388666, 335429	26	30	25	29
No.19 (Kerbside)	391149, 331930	20	26	19	26
No.26 (Kerbside)	390048, 333273	35	29	33	24
No.40 (Receptor)	384920, 341520	22	23	21	26
Stone (Kerbside)	390050, 333270	31	27	31	37
Tittensor (Kerbside)	387350, 338490	29	26	23	23
Trentham (Background)	386450, 341230	36	26	37	24
M6 Clayton (Kerbside)	385080, 342022	37	33	37	38
No.M6.2 (Receptor)	385096, 342012	32	33	32	32

Background pollutant concentrations

- 3.1.8 Estimates of background air quality were obtained from the Defra maps⁹. Background NO₂ and PM₁₀ concentrations are within air quality standards throughout the study area. Annual mean NO₂ concentrations in the study area were in the range 11.0µg/m³ – 19.9µg/m³ in 2016. Annual mean PM₁₀ and PM_{2.5} concentrations were in the range 12.6µg/m³ – 17.5µg/m³ and 9.0µg/m³ – 11.8µg/m³ in 2016 respectively.
- 3.1.9 While the diffusion tube sites in Table 1 can be used to indicate trends in concentrations in urban locations, they are not considered to be representative of the predominantly rural area through which the Proposed Scheme will pass within the study area. On this basis, the Defra background concentrations maps have been used to characterise the baseline air quality for the study area. These maps indicate the average background pollutant concentrations across the Stone and Swynnerton area are within the relevant air quality standards.

⁸ Stafford Borough Council (2016), *2016 Air Quality Annual Status Report*, <http://www.staffordbc.gov.uk/live/Documents/Environmental%20Health/Air-Quality-Annual-Status-Report.pdf>.

⁹ Department for Environment, Food and Rural Affairs (Defra) (2013), *Defra Background Pollutant Concentration Maps*, <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>.

Local emission sources

- 3.1.10 The main sources of pollution within the study area are road vehicles and agricultural activities. Major roads include the M6, A34 Stafford Road/The Fillybrooks, A51 Stone Road and the A519 Newcastle Road. Other emission sources include five industrial installations (regulated by the Environment Agency) with permits for emissions to air; namely,
- Biffa Waste Services Ltd, Meece Landfill Site (Permit Number BV4967IW);
 - Biffa Waste Services Ltd, Westgate, Cold Meece (Permit Number BWo096IJ);
 - Amey LG Limited; Meece Highways Depot (Permit Number RP3835RD);
 - Infinis (Re-Gen) Ltd, Westgate, Cold Meece (Permit Number BW1157IQ); and
 - Carrs Billington Agriculture (Operations) Limited, Cold Meece (Permit Number TP3132SL).
- 3.1.11 Contributions to local pollutant concentrations made by these industrial installations are included within background concentrations used in this assessment.

4 Construction dust assessment

4.1.1 This section provides details of the assessment of dust emissions during construction of the Proposed Scheme. Due to the elongated nature of the Proposed Scheme and associated dust generating activities, the construction dust assessment has been undertaken in detail for distinct assessment areas in the Stone and Swynnerton area.

4.2 Dust soiling and human health effects

Assessed receptors and sensitivity of the area

4.2.1 The assessment of dust soiling and human health effects has been undertaken for the following areas from south to north. Table 2 presents the sensitivity of each area to dust soiling and human health effects.

- area around Pirehill Lane: there are demolition activities, earthworks or trackout activities in this area. Residential dwellings are located within 100m of construction activities;
- area around the B5026 Eccleshall Road and Yarlet Lane: there are demolition activities within 200m of residential dwellings in this area. Residential dwellings are also located within 20m of earthworks, construction and trackout activities;
- area around Blakelow and Grange Cottages: there are no demolition activities in this area. Residential dwellings are located within 20m of earthworks, construction and trackout activities;
- area around Tittensor Road, Swynnerton and Stab Lane: there are no demolition activities in this area. Residential dwellings are located within 20m of earthworks, construction and trackout activities;
- area around the A519 Newcastle Road: there are no demolition activities in this area. Residential dwellings are located within 50m of earthworks and construction, and within 20m of trackout activities;
- area around Common Lane (North) and The Hattons: there are no demolition activities in this area. Residential dwellings are located within 20m of earthworks, construction and trackout activities; and
- area around Bent Lane: there are demolition activities within 50m of residential dwellings in this area. Residential dwellings are also located within 20m of earthworks, construction and trackout activities.

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Table 2: Sensitivity of area to dust soiling and human health effects

Effect	Demolition	Earthworks	Construction	Trackout
Area around Pirehill Lane				
Dust soiling	Medium	Medium	Medium	Medium
Human health	Low	Low	Low	Low
Area around the B5026 Eccleshall Road and Yarlet Lane				
Dust soiling	Low	Medium	Medium	Medium
Human health	Low	Low	Low	Low
Area around Blakelow and Grange Cottages				
Dust soiling	n/a	Medium	Medium	Medium
Human health	n/a	Low	Low	Low
Area around Tittensor Road, Swynnerton and Stab Lane				
Dust soiling	n/a	Medium	Medium	Medium
Human health	n/a	Low	Low	Low
Area around the A519 Newcastle Road				
Dust soiling	n/a	Low	Low	Medium
Human health	n/a	Low	Low	Low
Area around Common Lane (North) and The Hattons				
Dust soiling	n/a	Medium	Medium	Medium
Human health	n/a	Low	Low	Low
Area around Bent Lane				
Dust soiling	Low	Medium	Medium	Medium
Human health	Low	Low	Low	Low

Dust emission magnitude

4.2.2 Each dust-generating activity has been assigned a dust emission magnitude as shown in Table 3.

Table 3: Dust emission magnitude for dust soiling and human health effects

Area	Demolition	Earthworks	Construction	Trackout
Area around Pirehill Lane	Small	Large	Small	Large
Area around the B5026 Eccleshall Road and Yarlet Lane	Small	Large	Large	Large
Area around Blakelow and Grange Cottages	n/a	Large	Small	Large

Area	Demolition	Earthworks	Construction	Trackout
Area around Tittensor Road, Swynnerton and Stab Lane	n/a	Large	Medium	Large
Area around the A519 Newcastle Road	n/a	Large	Medium	Large
Area around Common Lane (North) and The Hattons	n/a	Large	Small	Large
Area around Bent Lane	Small	Large	Medium	Large

Risk of impacts

4.2.3 Taking into consideration the dust emissions magnitude of each activity and the sensitivity of each area, the risk of dust effects has been defined for each area as shown in Table 4.

Table 4: Risk of dust soiling and human health effects

Effect	Demolition	Earthworks	Construction	Trackout
Area around Pirehill Lane				
Dust soiling	Low risk	Medium risk	Negligible	Medium risk
Human health	Negligible	Low risk	Negligible	Low risk
Area around the B5026 Eccleshall Road and Yarlet Lane				
Dust soiling	Negligible	Medium risk	Medium risk	Medium risk
Human health	Negligible	Low risk	Low risk	Low risk
Area around Blakelow and Grange Cottages				
Dust soiling	n/a	Medium risk	Low risk	Medium risk
Human health	n/a	Low risk	Negligible	Low risk
Area around Tittensor Road, Swynnerton and Stab Lane				
Dust soiling	n/a	Medium risk	Medium risk	Medium risk
Human health	n/a	Low risk	Low risk	Low risk
Area around the A519 Newcastle Road				
Dust soiling	n/a	Low risk	Low risk	Medium risk
Human health	n/a	Low risk	Low risk	Low risk
Area around Common Lane (North) and The Hattons				
Dust soiling	n/a	Medium risk	Low risk	Medium risk
Human health	n/a	Low risk	Negligible	Low risk
Area around Bent Lane				

Effect	Demolition	Earthworks	Construction	Trackout
Dust soiling	Negligible	Medium risk	Medium risk	Medium risk
Human health	Negligible	Low risk	Low risk	Low risk

4.3 Ecological effects

Assessed receptors and sensitivity of the area

4.3.1 The assessment of ecological effects has been undertaken for the following areas from south to north. Table 5 presents the sensitivity of each to ecological effects:

- area around the M6 Meaford viaduct: there are no demolition activities in this area. Two ecological receptors (Birchwood Ancient Woodland and Highlow Local Wildlife Site) are located within 20m of earthworks, construction and trackout activities;
- area around Tittensor Road; there are no demolition activities in this area. An ecological receptor (Closepit Plantation Local Wildlife Site) is located within 20m of earthworks, construction and trackout activities;
- area around the A519 Newcastle Road: there are no demolition activities in this area. An ecological receptor (Clifford's Wood Ancient Woodland and Local Wildlife Site) is located within 20m of earthworks, construction and trackout activities; and
- area around Common Lane (North); there are no demolition activities in this area. An ecological receptor (Hatton Common Local Wildlife Site) is located within 20m of earthworks, construction and trackout activities

4.3.2 One additional ecological receptor, Swynnerton Old Park Ancient Woodland, is located further than 50m away from any dust generating activities in the Stone and Swynnerton area, and therefore the effects on this ecological receptor are considered to be negligible.

Table 5: Sensitivity of area to ecological effects

Area	Demolition	Earthworks	Construction	Trackout
Area around the M6 Meaford viaduct	n/a	Low	Low	Low
Area around Tittensor Road	n/a	Low	Low	Low
Area around the A519 Newcastle Road	n/a	Low	Low	Low
Area around Common Lane (North)	n/a	Low	Low	Low

Dust emission magnitude

4.3.3 Each dust-generating activity has been assigned a dust emission magnitude as shown in Table 6.

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Table 6: Dust emission magnitude for ecological effects

Area	Demolition	Earthworks	Construction	Trackout
Area around the M6 Meaford Viaduct	n/a	Large	Small	Large
Area around Tittensor Road	n/a	Large	Medium	Large
Area around the A519 Newcastle Road	n/a	Large	Medium	Large
Area around Common Lane (North)	n/a	Large	Small	Large

Risk of impacts

4.3.4 Taking into consideration the dust emissions magnitude of each activity and the sensitivity of each area, the risk of dust effects has been defined for each area as shown in Table 7.

Table 7: Risk of ecological effects

Area	Demolition	Earthworks	Construction	Trackout
Area around the M6 Meaford Viaduct	n/a	Low risk	Negligible risk	Low risk
Area around Tittensor Road	n/a	Low risk	Low risk	Low risk
Area around the A519 Newcastle Road	n/a	Low risk	Low risk	Low risk
Area around Common Lane (North)	n/a	Low risk	Negligible risk	Low risk

5 Air quality assessment - road traffic

5.1 Overall assessment approach

5.1.1 The air quality assessment for road related emissions has used the approach described in the SMR and its Addendum.

5.2 Model inputs and verification

Model parameters

5.2.1 The ADMS-Roads model was used to predict pollutant concentrations from changes in construction traffic emissions. A surface roughness of 0.5m was used for this area and a surface roughness of 0.2m was used for the meteorological site. A minimum Monin-Obukhov length of 10m and latitude of 53 degrees were used in the assessment. Meteorological data from the Shawbury site was used for the year 2016.

Model verification

5.2.2 Verification was undertaken for the year 2015 comparing monitored and modelled NO₂ concentrations (since monitoring data for 2016 was not available at the time of the assessment) on a route-wide basis. Traffic data provided was assumed to be representative of 2015. The results of this comparison are shown in Table 8.

5.2.3 Model verification was undertaken 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.

5.2.4 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 16 monitoring sites were included in the verification exercise, spread across the entire route.

Table 8: Comparison of monitored and modelled NO₂ concentrations

Site	Monitored concentration (µg/m ³)	Modelled concentration (µg/m ³)	Difference [(modelled - monitored)/monitored] * 100
A38-2/2(1) – Lichfield DC	32.6	38.2	17%
A38-2A/B – Lichfield DC	42.2	40.6	-4%
1 – Stafford BC	37.0	48.9	32%
21 – Stafford BC	27.0	29.8	10%
29 – Stafford BC	24.0	23.8	-1%
DT13 – Stoke-on-Trent CC	41.6	47.3	14%
DT14 – Stoke-on-Trent CC	40.6	47.1	16%
DT24 – Stoke-on-Trent CC	42.4	35.3	-17%
DT36 – Stoke-on-Trent CC	42.1	49.7	18%

Site	Monitored concentration ($\mu\text{g}/\text{m}^3$)	Modelled concentration ($\mu\text{g}/\text{m}^3$)	Difference [(modelled - monitored)/monitored] * 100
DT37 – Stoke-on-Trent CC	43.6	34.9	-20%
DT38 – Stoke-on-Trent CC	34.7	34.1	-2%
DT39 – Stoke-on-Trent CC	38.3	29.1	-24%
DT40 – Stoke-on-Trent CC	38.7	38.4	-1%
DT41 – Stoke-on-Trent CC	37.3	39.2	5%
DT43 – Stoke-on-Trent CC	38.4	41.2	7%
DT55 – Stoke-on-Trent CC	40.7	44.0	8%

5.2.5 As the majority of modelled NO₂ concentrations were within $\pm 25\%$ of the monitored concentrations and there was no systematic over or under prediction, no model adjustment was undertaken. Modelled concentrations of PM₁₀ and PM_{2.5} have not been adjusted.

5.3 Assessment of construction traffic emissions

5.3.1 Construction traffic data used in this assessment is detailed in the Background Information and Data (BID) (see BID-AQ-002-000: Traffic data used for the air quality assessment). 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.

Screening of traffic data

5.3.2 The screening process identified a total of six 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 heavy goods vehicles (HGVs) flows. These roads include:

- M6 motorway;
- A50 Uttoxeter Road;
- A500 Queensway;
- A5182 Trentham Road;
- A519 Newcastle Road; and
- Yarnfield Lane.

5.3.3 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

- 5.3.4 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 9). The location of all receptors is shown Volume 5: Map AQ-01-103.
- 5.3.5 No designated ecological receptors were identified within 200m of the screened in roads within the Stone and Swynnerton area during construction of the Proposed Scheme.

Table 9: Modelled receptors (construction phase)

Receptor	Description/Location	Ordnance Survey coordinates
3-C-H1	Sandyford Farm, Sandyford	385731,336206
3-C-H2	Blakelow Farm, Blakelow, Swynnerton	386676,335309
3-C-H3	Kennels Cottages, Hall Lane, Swynnerton	385733,335819
3-C-H4	White House, Stab Lane, Swynnerton	384978,336394
3-C-H5	Cliffords Wood Bungalows, Stone Road, Swynnerton	384367,336803
3-C-H6	Whitemoor Farm, Yarnfield Lane, Yarnfield	387634,333249
3-C-H7	Eastwood, Stone Road, Swynnerton	384477,336707
3-C-H8	Walton House Farm, Common Lane, Stone	389256,331854
3-C-H9	Proposed residential development for up to 500 dwellings, Eccleshall Road – Committed Development (Policy Stone 2 West & South of Stone Housing)	388958,333379
3-C-H10	Sandyford Cottage, Sandyford	385902,336414
3-C-H11	Hanchurch House, Hanchurch	385263,341022
3-C-H12	Fielding Street, Stoke-on-Trent	387813,344231
3-C-H13	Chatsworth Place, Stoke-on-Trent	393013,342098
3-C-H14	Highfield Drive, Stoke-on-Trent	389048,343636
3-C-H15	Grove Road, Stoke-on-Trent	388973,343779
3-C-H16	Newcastle Road, Clayton	385099,342011
3-C-H17	The Villa, Clayton Road, Newcastle	385104,342172
3-C-H18	Five Oaks, Knowl Wall, Beech	385319,338874
3-C-H19	Broadway Court, Broadway, Stoke-on-Trent	392992,342357
3-C-H20	South Lodge, Darlaston Park, Stone	389164,334056
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	384893,341530
3-C-H22	Meir Primary Care Centre, Weston Road, Stoke-on-Trent	393152,342292

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Receptor	Description/Location	Ordnance Survey coordinates
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	385078,341833
3-C-H24	Northwood Lane, Newcastle	385656,342223
3-C-H25	Nutbrook Avenue, Stoke-on-Trent	388438,343849
3-C-H26	Meir Road, Stoke-on-Trent	392634,342495
3-C-H27	Greathills, Top Lane, Beech	385521,337797
3-C-H28	Weston Road, Weston Coyney	393192,342412
3-C-H29	Moss House, Yarnfield Lane, Yarnfield	387323,332928
3-C-H30	Uttoxeter Road, Stoke-on-Trent	393331,342209
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Yarnfield	388478,333850
3-C-H32	Greenacres, Chase Lane, Sandyford	386114,336573
3-C-H33	Uttoxeter Road, Stoke-on-Trent	393720,342062
3-C-H34	Victoria Cottage, Moss Lane, Yarnfield	387379,333042
3-C-H35	The Bungalow, Rose Tree Avenue, Trent Vale	386094,342503

Background concentrations

5.3.6 The background concentrations used in the assessment are shown in Table 10 taken from the Defra maps.

Table 10: Background 2020 concentrations at assessed receptors

Receptor	Description/Location	Background concentrations in 2020 ($\mu\text{g}/\text{m}^3$)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
3-C-H1	Sandyford Farm, Sandyford	15.5	11.4	15.9	10.6
3-C-H2	Blakelow Farm, Blakelow, Swynnerton	20.4	14.6	16.6	11.0
3-C-H3	Kennels Cottages, Hall Lane, Swynnerton	13.6	10.0	13.3	9.3
3-C-H4	White House, Stab Lane, Swynnerton	12.9	9.6	14.1	9.7
3-C-H5	Cliffords Wood Bungalows, Stone Road, Swynnerton	12.9	9.6	14.1	9.7
3-C-H6	Whitemoor Farm, Yarnfield Lane, Yarnfield	20.8	14.9	16.4	10.9
3-C-H7	Eastwood, Stone Road, Swynnerton	12.9	9.6	14.1	9.7
3-C-H8	Walton House Farm, Common Lane, Stone	14.9	10.9	14.3	9.8
3-C-H9	Proposed residential development for up to 500 dwellings, Eccleshall Road – Committed Development (Policy Stone 2 West & South of Stone Housing)	16.4	11.9	14.9	10.1
3-C-H10	Sandyford Cottage, Sandyford	15.5	11.4	15.9	10.6

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Receptor	Description/Location	Background concentrations in 2020 ($\mu\text{g}/\text{m}^3$)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
3-C-H11	Hanchurch House, Hanchurch	20.0	14.3	15.5	10.5
3-C-H12	Fielding Street, Stoke-on-Trent	25.7	17.7	15.5	11.1
3-C-H13	Chatsworth Place, Stoke-on-Trent	19.0	13.7	15.0	10.6
3-C-H14	Highfield Drive, Stoke-on-Trent	21.9	15.4	15.0	10.6
3-C-H15	Grove Road, Stoke-on-Trent	25.5	17.6	16.1	11.1
3-C-H16	Newcastle Road, Clayton	20.3	14.5	15.2	10.5
3-C-H17	The Villa, Clayton Road, Newcastle	20.3	14.5	15.2	10.5
3-C-H18	Five Oaks, Knowl Wall, Beech	20.3	14.6	16.1	10.8
3-C-H19	Broadway Court, Broadway, Stoke-on-Trent	19.4	13.9	15.4	10.7
3-C-H20	South Lodge, Darlaston Park, Stone	21.2	14.9	14.1	10.1
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	18.1	13.1	15.9	10.6
3-C-H22	Meir Primary Care Centre, Weston Road, Stoke-on-Trent	19.0	13.7	15.0	10.6
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	20.0	14.3	15.5	10.5
3-C-H24	Northwood Lane, Newcastle	20.3	14.5	15.2	10.5
3-C-H25	Nutbrook Avenue, Stoke-on-Trent	25.5	17.6	16.1	11.1
3-C-H26	Meir Road, Stoke-on-Trent	19.4	13.9	15.4	10.7
3-C-H27	Greathills, Top Lane, Beech	19.8	14.3	16.2	10.8
3-C-H28	Weston Road, Weston Coyney	19.0	13.7	15.0	10.6
3-C-H29	Moss House, Yarnfield Lane, Yarnfield	14.9	10.9	13.1	9.1
3-C-H30	Uttoxeter Road, Stoke-on-Trent	19.0	13.7	15.0	10.6
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Yarnfield	16.4	11.9	14.9	10.1
3-C-H32	Greenacres, Chase Lane, Sandyford	19.2	13.9	16.2	10.8
3-C-H33	Uttoxeter Road, Stoke-on-Trent	19.0	13.7	15.0	10.6
3-C-H34	Victoria Cottage, Moss Lane, Yarnfield	20.8	14.9	16.4	10.9
3-C-H35	The Bungalow, Rose Tree Avenue, Trent Vale	19.8	14.2	15.0	10.4

Assessment results

5.3.7 Table 11, Table 12 and Table 13 provide the summary of the modelled pollutant concentrations for the assessed receptors. The magnitude of change and impact descriptors are also derived following the Institute of Air Quality Management (IAQM) / Environmental Protection UK (EPUK) methodology¹⁰.

Table 11: Predicted annual mean NO₂ concentrations and impacts (construction phase)

Receptor	Description/Location	NO ₂ concentrations (µg/m ³)		Change in NO ₂ concentrations (µg/m ³)	Impact descriptor	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H1	Sandyford Farm, Sandyford	14.8	14.9	0.1	Negligible	Not significant
3-C-H2	Blakelow Farm, Blakelow, Swynnerton	22.3	22.4	0.1	Negligible	Not significant
3-C-H3	Kennels Cottages, Hall Lane, Swynnerton	12.5	12.6	0.1	Negligible	Not significant
3-C-H4	White House, Stab Lane, Swynnerton	11.3	11.4	0.1	Negligible	Not significant
3-C-H5	Cliffords Wood Bungalows, Stone Road, Swynnerton	12.0	12.0	0.0	Negligible	Not significant
3-C-H6	Whitemoor Farm, Yarnfield Lane, Yarnfield	26.2	26.8	0.6	Negligible	Not significant
3-C-H7	Eastwood, Stone Road, Swynnerton	11.2	11.2	0.0	Negligible	Not significant
3-C-H8	Walton House Farm, Common Lane, Stone	14.5	14.5	0.0	Negligible	Not significant
3-C-H9	Proposed residential development for up to 500 dwellings, Eccleshall Road – Committed Development (Policy Stone 2 West & South of Stone Housing)	14.0	14.2	0.2	Negligible	Not significant
3-C-H10	Sandyford Cottage, Sandyford	18.4	18.6	0.2	Negligible	Not significant
3-C-H11	Hanchurch House, Hanchurch	34.5	34.9	0.4	Negligible	Not significant

¹⁰ IAQM (2017), *Land-use planning & development control: Planning for air quality*

Receptor	Description/Location	NO ₂ concentrations (µg/m ³)		Change in NO ₂ concentrations (µg/m ³)	Impact descriptor	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H12	Fielding Street, Stoke-on-Trent	21.2	21.3	0.1	Negligible	Not significant
3-C-H13	Chatsworth Place, Stoke-on-Trent	17.6	17.6	0.0	Negligible	Not significant
3-C-H14	Highfield Drive, Stoke-on-Trent	20.3	20.3	0.0	Negligible	Not significant
3-C-H15	Grove Road, Stoke-on-Trent	23.1	23.2	0.1	Negligible	Not significant
3-C-H16	Newcastle Road, Clayton	27.0	27.4	0.4	Negligible	Not significant
3-C-H17	The Villa, Clayton Road, Newcastle	25.0	25.2	0.2	Negligible	Not significant
3-C-H18	Five Oaks, Knowl Wall, Beech	21.4	21.6	0.2	Negligible	Not significant
3-C-H19	Broadway Court, Broadway, Stoke-on-Trent	23.5	23.6	0.1	Negligible	Not significant
3-C-H20	South Lodge, Darlaston Park, Stone	17.9	18.0	0.1	Negligible	Not significant
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	24.7	24.9	0.2	Negligible	Not significant
3-C-H22	Meir Primary Care Centre, Weston Road, Stoke-on-Trent	21.4	21.4	0.0	Negligible	Not significant
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	25.4	25.7	0.3	Negligible	Not significant
3-C-H24	Northwood Lane, Newcastle	23.4	23.7	0.3	Negligible	Not significant
3-C-H25	Nutbrook Avenue, Stoke-on-Trent	21.0	21.0	0.0	Negligible	Not significant
3-C-H26	Meir Road, Stoke-on-Trent	22.4	22.4	0.0	Negligible	Not significant
3-C-H27	Greathills, Top Lane, Beech	22.4	22.5	0.1	Negligible	Not significant
3-C-H28	Weston Road, Weston Coyney	21.0	21.1	0.1	Negligible	Not significant
3-C-H29	Moss House, Yarnfield Lane, Yarnfield	14.4	14.4	0.0	Negligible	Not significant

Receptor	Description/Location	NO ₂ concentrations (µg/m ³)		Change in NO ₂ concentrations (µg/m ³)	Impact descriptor	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H30	Uttoxeter Road, Stoke-on-Trent	23.8	23.8	0.0	Negligible	Not significant
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Yarnfield	14.9	15.0	0.1	Negligible	Not significant
3-C-H32	Greenacres, Chase Lane, Sandyford	33.0	33.2	0.2	Negligible	Not significant
3-C-H33	Uttoxeter Road, Stoke-on-Trent	21.9	21.9	0.0	Negligible	Not significant
3-C-H34	Victoria Cottage, Moss Lane, Yarnfield	18.8	18.9	0.1	Negligible	Not significant
3-C-H35	The Bungalow, Rose Tree Avenue, Trent Vale	22.1	22.3	0.2	Negligible	Not significant

Table 12: Predicted annual mean PM₁₀ concentrations and impacts (construction phase)

Receptor	Description/Location	PM ₁₀ concentrations (µg/m ³)		Change in PM ₁₀ concentrations (µg/m ³)	Impact descriptor	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H1	Sandyford Farm, Sandyford	16.4	16.4	0.0	Negligible	Not significant
3-C-H2	Blakelow Farm, Blakelow, Swynnerton	17.8	17.8	0.0	Negligible	Not significant
3-C-H3	Kennels Cottages, Hall Lane, Swynnerton	13.6	13.6	0.0	Negligible	Not significant
3-C-H4	White House, Stab Lane, Swynnerton	14.4	14.4	0.0	Negligible	Not significant
3-C-H5	Cliffords Wood Bungalows, Stone Road, Swynnerton	14.5	14.6	0.1	Negligible	Not significant
3-C-H6	Whitemoor Farm, Yarnfield Lane, Yarnfield	18.1	18.2	0.1	Negligible	Not significant
3-C-H7	Eastwood, Stone Road, Swynnerton	14.4	14.4	0.0	Negligible	Not significant
3-C-H8	Walton House Farm, Common Lane, Stone	14.8	14.8	0.0	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	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H9	Proposed residential development for up to 500 dwellings, Eccleshall Road – Committed Development (Policy Stone 2 West & South of Stone Housing)	15.2	15.2	0.0	Negligible	Not significant
3-C-H10	Sandyford Cottage, Sandyford	17.0	17.0	0.0	Negligible	Not significant
3-C-H11	Hanchurch House, Hanchurch	18.8	19.0	0.2	Negligible	Not significant
3-C-H12	Fielding Street, Stoke-on-Trent	16.5	16.5	0.0	Negligible	Not significant
3-C-H13	Chatsworth Place, Stoke-on-Trent	16.1	16.1	0.0	Negligible	Not significant
3-C-H14	Highfield Drive, Stoke-on-Trent	16.4	16.4	0.0	Negligible	Not significant
3-C-H15	Grove Road, Stoke-on-Trent	17.8	17.8	0.0	Negligible	Not significant
3-C-H16	Newcastle Road, Clayton	17.5	17.6	0.1	Negligible	Not significant
3-C-H17	The Villa, Clayton Road, Newcastle	17.3	17.4	0.1	Negligible	Not significant
3-C-H18	Five Oaks, Knowl Wall, Beech	17.2	17.2	0.0	Negligible	Not significant
3-C-H19	Broadway Court, Broadway, Stoke-on-Trent	18.2	18.2	0.0	Negligible	Not significant
3-C-H20	South Lodge, Darlaston Park, Stone	14.6	14.6	0.0	Negligible	Not significant
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	17.7	17.8	0.1	Negligible	Not significant
3-C-H22	Meir Primary Care Centre, Weston Road, Stoke-on-Trent	16.7	16.7	0.0	Negligible	Not significant
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	17.4	17.5	0.1	Negligible	Not significant
3-C-H24	Northwood Lane, Newcastle	17.7	17.8	0.1	Negligible	Not significant
3-C-H25	Nutbrook Avenue, Stoke-on-Trent	17.1	17.1	0.0	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	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H26	Meir Road, Stoke-on-Trent	17.9	17.9	0.0	Negligible	Not significant
3-C-H27	Greathills, Top Lane, Beech	17.5	17.5	0.0	Negligible	Not significant
3-C-H28	Weston Road, Weston Coyney	17.0	17.0	0.0	Negligible	Not significant
3-C-H29	Moss House, Yarnfield Lane, Yarnfield	13.7	13.7	0.0	Negligible	Not significant
3-C-H30	Uttoxeter Road, Stoke-on-Trent	18.1	18.1	0.0	Negligible	Not significant
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Yarnfield	15.4	15.4	0.0	Negligible	Not significant
3-C-H32	Greenacres, Chase Lane, Sandyford	19.2	19.3	0.1	Negligible	Not significant
3-C-H33	Uttoxeter Road, Stoke-on-Trent	17.5	17.5	0.0	Negligible	Not significant
3-C-H34	Victoria Cottage, Moss Lane, Yarnfield	17.0	17.0	0.0	Negligible	Not significant
3-C-H35	The Bungalow, Rose Tree Avenue, Trent Vale	17.3	17.4	0.1	Negligible	Not significant

Table 13: Predicted annual mean PM2.5 concentrations and impacts (construction phase)

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	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H1	Sandyford Farm, Sandyford	10.9	10.9	0.0	Negligible	Not significant
3-C-H2	Blakelow Farm, Blakelow, Swynnerton	11.8	11.8	0.0	Negligible	Not significant
3-C-H3	Kennels Cottages, Hall Lane, Swynnerton	9.6	9.6	0.0	Negligible	Not significant
3-C-H4	White House, Stab Lane, Swynnerton	9.8	9.8	0.0	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	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H5	Cliffords Wood Bungalows, Stone Road, Swynnerton	9.9	9.9	0.0	Negligible	Not significant
3-C-H6	Whitemoor Farm, Yarnfield Lane, Yarnfield	12.0	12.0	0.0	Negligible	Not significant
3-C-H7	Eastwood, Stone Road, Swynnerton	9.8	9.8	0.0	Negligible	Not significant
3-C-H8	Walton House Farm, Common Lane, Stone	10.1	10.1	0.0	Negligible	Not significant
3-C-H9	Proposed residential development for up to 500 dwellings, Eccleshall Road – Committed Development (Policy Stone 2 West & South of Stone Housing)	10.3	10.3	0.0	Negligible	Not significant
3-C-H10	Sandyford Cottage, Sandyford	11.3	11.3	0.0	Negligible	Not significant
3-C-H11	Hanchurch House, Hanchurch	12.6	12.7	0.1	Negligible	Not significant
3-C-H12	Fielding Street, Stoke-on-Trent	11.7	11.7	0.0	Negligible	Not significant
3-C-H13	Chatsworth Place, Stoke-on-Trent	11.2	11.2	0.0	Negligible	Not significant
3-C-H14	Highfield Drive, Stoke-on-Trent	11.4	11.4	0.0	Negligible	Not significant
3-C-H15	Grove Road, Stoke-on-Trent	12.1	12.1	0.0	Negligible	Not significant
3-C-H16	Newcastle Road, Clayton	11.9	11.9	0.0	Negligible	Not significant
3-C-H17	The Villa, Clayton Road, Newcastle	11.7	11.7	0.0	Negligible	Not significant
3-C-H18	Five Oaks, Knowl Wall, Beech	11.5	11.5	0.0	Negligible	Not significant
3-C-H19	Broadway Court, Broadway, Stoke-on-Trent	12.3	12.3	0.0	Negligible	Not significant
3-C-H20	South Lodge, Darlaston Park, Stone	10.4	10.4	0.0	Negligible	Not significant
3-C-H21	Hanchurch Lane, Hanchurch, Stoke-on-Trent	11.8	11.8	0.0	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	Significance
		2020 without the Proposed Scheme	2020 with the Proposed Scheme			
3-C-H22	Meir Primary Care Centre, Weston Road, Stoke-on-Trent	11.5	11.5	0.0	Negligible	Not significant
3-C-H23	Whitmore Road, Hanchurch Crossroad, Newcastle	11.7	11.7	0.0	Negligible	Not significant
3-C-H24	Northwood Lane, Newcastle	11.9	11.9	0.0	Negligible	Not significant
3-C-H25	Nutbrook Avenue, Stoke-on-Trent	11.7	11.7	0.0	Negligible	Not significant
3-C-H26	Meir Road, Stoke-on-Trent	12.1	12.1	0.0	Negligible	Not significant
3-C-H27	Greathills, Top Lane, Beech	11.6	11.6	0.0	Negligible	Not significant
3-C-H28	Weston Road, Weston Coyney	11.7	11.7	0.0	Negligible	Not significant
3-C-H29	Moss House, Yarnfield Lane, Yarnfield	9.5	9.5	0.0	Negligible	Not significant
3-C-H30	Uttoxeter Road, Stoke-on-Trent	12.3	12.3	0.0	Negligible	Not significant
3-C-H31	Darlaston Grange Cottages, Yarnfield Lane, Yarnfield	10.4	10.4	0.0	Negligible	Not significant
3-C-H32	Greenacres, Chase Lane, Sandyford	12.7	12.8	0.1	Negligible	Not significant
3-C-H33	Uttoxeter Road, Stoke-on-Trent	12.0	12.0	0.0	Negligible	Not significant
3-C-H34	Victoria Cottage, Moss Lane, Yarnfield	11.3	11.3	0.0	Negligible	Not significant
3-C-H35	The Bungalow, Rose Tree Avenue, Trent Vale	11.7	11.7	0.0	Negligible	Not significant

5.3.8 Annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} are predicted to be within the air quality standards with and without construction of the Proposed Scheme. Since the annual mean NO₂ concentrations are predicted to be less than 60µg/m³, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM₁₀ concentrations are predicted to be below 35µg/m³, the daily mean standard is also expected to be met.

5.3.9 Negligible impacts are predicted at all receptors for annual mean NO₂, PM₁₀ and PM_{2.5} concentrations.

Assessment of significance

5.3.10 No significant effects are anticipated at any receptor in relation to annual mean NO₂, PM₁₀ and PM_{2.5} concentrations.

5.4 Assessment of operation traffic emissions

5.4.1 Operational traffic data used in this assessment is detailed in the Background Information and Data (BID) (see BID-AQ-002-000: Traffic data used for the air quality assessment). For the assessment of traffic on the highway network, data for the year 2027 was used as the operational year of the Proposed Scheme.

Screening of traffic data

5.4.2 The screening process identified a total of seven roads in the Stone and Swynnerton area exceeding the DMRB thresholds for changes in AADT or daily HGV flows and/or changes in road alignment by 5m or more. These roads include:

- B5026 Eccleshall Road;
- Yarnfield Lane;
- Tittensor Road;
- A51 Stone Road;
- A519 Newcastle Road;
- Dog Lane; and
- Bent Lane.

5.4.3 Further roads have been included in the assessment to account for their emissions at nearby receptors.

Receptors assessed

5.4.4 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 14). The location of all receptors is shown Volume 5: Map AQ-01-103.

5.4.5 No designated ecological receptors were identified within 200m of the screened in roads within the Stone and Swynnerton area during operation of the Proposed Scheme.

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Table 14: Modelled receptors (operational phase)

Receptor	Description/Location	Ordnance Survey coordinates
3-O-H1	Sandyford Cottage, Sandyford	385902,336414
3-O-H2	Long Compton, Sandyford	385429,336526
3-O-H3	Sandyford Farm, Sandyford	385731,336206
3-O-H4	Cold Norton Cottages, Eccleshall Road, Stone	388110,332202
3-O-H5	Queenswood Lodge, Swynnerton	385324,335889
3-O-H6	The Laurels, Swynnerton	385195,335803
3-O-H7	Darlaston Granage Cottages, Yarnfield Lane, Stone	388478,333850
3-O-H8	Orchard Cottage, Old Lane, Beech	384944,338176
3-O-H9	Cliffords Wood Cottage, Cliffords Wood, Swynnerton	383943,336818
3-O-H10	Keepers Cottage, Drayton, Hanchurch	383514,339392
3-O-H11	The Coach House, Stableford Court, Stableford	381495,338728
3-O-H12	Cliffords Wood Bungalows, Cliffords Wood, Swynnerton	384367,336803
3-O-H13	Brook House, Yarnfield Lane, Yarnfield	387863,333163
3-O-H14	White House, Stab Lane, Swynnerton	384978,336394
3-O-H15	Micklow House Farm, Eccleshall Road, Stone	388779,332678
3-O-H16	Shelton under Harley Farmhouse, Bent Lane, Whitmore	381720,339490
3-O-H17	Micklow Bungalow, Eccleshall Road, Stone	388997,332560
3-O-H18	Swynnerton Heath Farmhouse, Stone Road, Swynnerton	384241,336824
3-O-H19	The Willows, The Rowe, Stableford	381767,338710
3-O-H20	Whitemoor Farm, Yarnfield Lane, Yarnfield	387634,333249
3-O-H21	Victoria Cottage, Moss Lane, Yarnfield	387379,333042
3-O-H22	Proposed 92 dwellings between Common Lane and Eccleshall Road, Stone - Committed Development (14/20854/OUT)	389167,332632

Background concentrations

5.4.6 The background concentrations used in the assessment are shown Table 15 taken from the Defra maps.

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Table 15: Background 2027 concentrations at assessed receptors

Receptor	Description/Location	Background concentrations in 2027 ($\mu\text{g}/\text{m}^3$)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
3-O-H1	Sandyford Cottage, Sandyford	13.0	9.6	15.7	10.4
3-O-H2	Long Compton, Sandyford	13.0	9.6	15.7	10.4
3-O-H3	Sandyford Farm, Sandyford	13.0	9.6	15.7	10.4
3-O-H4	Cold Norton Cottages, Eccleshall Road, Stone	17.7	12.8	16.7	11.0
3-O-H5	Queenswood Lodge, Swynnerton	11.6	8.6	13.0	9.1
3-O-H6	The Laurels, Swynnerton	11.6	8.6	13.0	9.1
3-O-H7	Darlaston Granage Cottages, Yarnfield Lane, Stone	14.2	10.4	14.6	9.9
3-O-H8	Orchard Cottage, Old Lane, Beech	11.4	8.5	13.2	9.1
3-O-H9	Cliffords Wood Cottage, Cliffords Wood, Swynnerton	10.7	8.0	13.4	9.2
3-O-H10	Keepers Cottage, Drayton, Hanchurch	10.8	8.1	11.9	8.4
3-O-H11	The Coach House, Stableford Court, Stableford	11.3	8.5	13.1	9.1
3-O-H12	Cliffords Wood Bungalows, Cliffords Wood, Swynnerton	11.0	8.2	13.9	9.5
3-O-H13	Brook House, Yarnfield Lane, Yarnfield	17.0	12.4	16.1	10.7
3-O-H14	White House, Stab Lane, Swynnerton	11.0	8.2	13.9	9.5
3-O-H15	Micklow House Farm, Eccleshall Road, Stone	17.7	12.8	16.7	11.0
3-O-H16	Shelton under Harley Farmhouse, Bent Lane, Whitmore	11.4	8.5	12.6	8.8
3-O-H17	Micklow Bungalow, Eccleshall Road, Stone	17.7	12.8	16.7	11.0
3-O-H18	Swynnerton Heath Farmhouse, Stone Road, Swynnerton	11.0	8.2	13.9	9.5
3-O-H19	The Willows, The Rowe, Stableford	11.3	8.5	13.1	9.1
3-O-H20	Whitemoor Farm, Yarnfield Lane, Yarnfield	17.0	12.4	16.1	10.7
3-O-H21	Victoria Cottage, Moss Lane, Yarnfield	17.0	12.4	16.1	10.7
3-O-H22	Proposed 92 dwellings between Common Lane and Eccleshall Road, Stone - Committed Development (14/20854/OUT)	14.0	10.3	13.8	9.6

Assessment results

5.4.7 Table 16, Table 17 and Table 18 provide the summary of the modelled pollutant concentrations for the assessed receptors. The magnitude of change and impact descriptors are also derived following the IAQM / EPUK methodology¹¹.

Table 16: Predicted annual mean NO₂ concentrations and impacts (operation phase)

Receptor	Description/Location	NO ₂ concentrations (µg/m ³)		Change in NO ₂ concentrations (µg/m ³)	Impact descriptor	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H1	Sandyford Cottage, Sandyford	12.5	12.5	0.0	Negligible	Not Significant
3-O-H2	Long Compton, Sandyford	10.7	11.1	0.4	Negligible	Not Significant
3-O-H3	Sandyford Farm, Sandyford	10.7	10.6	-0.1	Negligible	Not Significant
3-O-H4	Cold Norton Cottages, Eccleshall Road, Stone	15.0	15.1	0.1	Negligible	Not Significant
3-O-H5	Queenswood Lodge, Swynnerton	9.3	9.2	-0.1	Negligible	Not Significant
3-O-H6	The Laurels, Swynnerton	9.3	9.2	-0.1	Negligible	Not Significant
3-O-H7	Darlaston Granage Cottages, Yarnfield Lane, Stone	11.9	11.9	0.0	Negligible	Not Significant
3-O-H8	Orchard Cottage, Old Lane, Beech	10.0	10.0	0.0	Negligible	Not Significant
3-O-H9	Cliffords Wood Cottage, Cliffords Wood, Swynnerton	8.6	8.6	0.0	Negligible	Not Significant
3-O-H10	Keepers Cottage, Drayton, Hanchurch	8.2	8.2	0.0	Negligible	Not Significant
3-O-H11	The Coach House, Stableford Court, Stableford	9.1	9.1	0.0	Negligible	Not Significant
3-O-H12	Cliffords Wood Bungalows, Cliffords Wood, Swynnerton	9.3	8.9	-0.4	Negligible	Not Significant
3-O-H13	Brook House, Yarnfield Lane, Yarnfield	32.9	32.9	0.0	Negligible	Not Significant

¹¹ IAQM (2017), *Land-use planning & development control: Planning for air quality*

Receptor	Description/Location	NO ₂ concentrations (µg/m ³)		Change in NO ₂ concentrations (µg/m ³)	Impact descriptor	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H14	White House, Stab Lane, Swynnerton	8.7	8.6	-0.1	Negligible	Not Significant
3-O-H15	Micklow House Farm, Eccleshall Road, Stone	15.0	15.1	0.1	Negligible	Not Significant
3-O-H16	Shelton under Harley Farmhouse, Bent Lane, Whitmore	8.7	8.7	0.0	Negligible	Not Significant
3-O-H17	Micklow Bungalow, Eccleshall Road, Stone	15.1	14.6	-0.5	Negligible	Not Significant
3-O-H18	Swynnerton Heath Farmhouse, Stone Road, Swynnerton	9.5	9.9	0.4	Negligible	Not Significant
3-O-H19	The Willows, The Rowe, Stableford	9.0	9.0	0.0	Negligible	Not Significant
3-O-H20	Whitemoor Farm, Yarnfield Lane, Yarnfield	19.3	19.1	-0.2	Negligible	Not Significant
3-O-H21	Victoria Cottage, Moss Lane, Yarnfield	14.4	14.4	0.0	Negligible	Not Significant
3-O-H22	Proposed 92 dwellings between Common Lane and Eccleshall Road, Stone - Committed Development (14/20854/OUT)	12.3	11.8	-0.5	Negligible	Not Significant

Table 17: Predicted annual mean PM₁₀ concentrations and impacts (operation phase)

Receptor	Description/Location	PM ₁₀ concentrations (µg/m ³)		Change in PM ₁₀ concentrations (µg/m ³)	Impact descriptor	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H1	Sandyford Cottage, Sandyford	16.3	16.3	0.0	Negligible	Not Significant
3-O-H2	Long Compton, Sandyford	16.0	16.1	0.1	Negligible	Not Significant
3-O-H3	Sandyford Farm, Sandyford	15.9	15.9	0.0	Negligible	Not Significant
3-O-H4	Cold Norton Cottages, Eccleshall Road, Stone	17.2	17.2	0.0	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	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H5	Queenswood Lodge, Swynnerton	13.2	13.2	0.0	Negligible	Not Significant
3-O-H6	The Laurels, Swynnerton	13.2	13.2	0.0	Negligible	Not Significant
3-O-H7	Darlaston Granage Cottages, Yarnfield Lane, Stone	15.0	15.0	0.0	Negligible	Not Significant
3-O-H8	Orchard Cottage, Old Lane, Beech	13.7	13.7	0.0	Negligible	Not Significant
3-O-H9	Cliffords Wood Cottage, Cliffords Wood, Swynnerton	13.6	13.6	0.0	Negligible	Not Significant
3-O-H10	Keepers Cottage, Drayton, Hanchurch	11.9	11.9	0.0	Negligible	Not Significant
3-O-H11	The Coach House, Stableford Court, Stableford	13.3	13.3	0.0	Negligible	Not Significant
3-O-H12	Cliffords Wood Bungalows, Cliffords Wood, Swynnerton	14.2	14.1	-0.1	Negligible	Not Significant
3-O-H13	Brook House, Yarnfield Lane, Yarnfield	20.9	20.9	0.0	Negligible	Not Significant
3-O-H14	White House, Stab Lane, Swynnerton	14.0	14.0	0.0	Negligible	Not Significant
3-O-H15	Micklow House Farm, Eccleshall Road, Stone	17.2	17.2	0.0	Negligible	Not Significant
3-O-H16	Shelton under Harley Farmhouse, Bent Lane, Whitmore	12.7	12.7	0.0	Negligible	Not Significant
3-O-H17	Micklow Bungalow, Eccleshall Road, Stone	17.3	17.1	-0.2	Negligible	Not Significant
3-O-H18	Swynnerton Heath Farmhouse, Stone Road, Swynnerton	14.2	14.3	0.1	Negligible	Not Significant
3-O-H19	The Willows, The Rowe, Stableford	13.3	13.3	0.0	Negligible	Not Significant
3-O-H20	Whitemoor Farm, Yarnfield Lane, Yarnfield	17.7	17.6	-0.1	Negligible	Not Significant
3-O-H21	Victoria Cottage, Moss Lane, Yarnfield	16.6	16.6	0.0	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	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H22	Proposed 92 dwellings between Common Lane and Eccleshall Road, Stone - Committed Development (14/20854/OUT)	14.3	14.1	-0.2	Negligible	Not Significant

Table 18: Predicted annual mean PM2.5 concentrations and impacts (operation phase)

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	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H1	Sandyford Cottage, Sandyford	10.8	10.8	0.0	Negligible	Not Significant
3-O-H2	Long Compton, Sandyford	10.6	10.7	0.1	Negligible	Not Significant
3-O-H3	Sandyford Farm, Sandyford	10.5	10.5	0.0	Negligible	Not Significant
3-O-H4	Cold Norton Cottages, Eccleshall Road, Stone	11.3	11.3	0.0	Negligible	Not Significant
3-O-H5	Queenswood Lodge, Swynnerton	9.3	9.2	-0.1	Negligible	Not Significant
3-O-H6	The Laurels, Swynnerton	9.2	9.2	0.0	Negligible	Not Significant
3-O-H7	Darlaston Granage Cottages, Yarnfield Lane, Stone	10.1	10.1	0.0	Negligible	Not Significant
3-O-H8	Orchard Cottage, Old Lane, Beech	9.4	9.4	0.0	Negligible	Not Significant
3-O-H9	Cliffords Wood Cottage, Cliffords Wood, Swynnerton	9.3	9.3	0.0	Negligible	Not Significant
3-O-H10	Keepers Cottage, Drayton, Hanchurch	8.4	8.4	0.0	Negligible	Not Significant
3-O-H11	The Coach House, Stableford Court, Stableford	9.2	9.2	0.0	Negligible	Not Significant
3-O-H12	Cliffords Wood Bungalows, Cliffords Wood, Swynnerton	9.6	9.6	0.0	Negligible	Not Significant

Receptor		PM2.5 concentrations ($\mu\text{g}/\text{m}^3$)		Change in PM2.5 concentrations ($\mu\text{g}/\text{m}^3$)	Impact descriptor	Significance
		2027 without the Proposed Scheme	2027 with the Proposed Scheme			
3-O-H13	Brook House, Yarnfield Lane, Yarnfield	13.5	13.5	0.0	Negligible	Not Significant
3-O-H14	White House, Stab Lane, Swynnerton	9.5	9.5	0.0	Negligible	Not Significant
3-O-H15	Micklow House Farm, Eccleshall Road, Stone	11.3	11.3	0.0	Negligible	Not Significant
3-O-H16	Shelton under Harley Farmhouse, Bent Lane, Whitmore	8.8	8.8	0.0	Negligible	Not Significant
3-O-H17	Micklow Bungalow, Eccleshall Road, Stone	11.3	11.2	-0.1	Negligible	Not Significant
3-O-H18	Swynnerton Heath Farmhouse, Stone Road, Swynnerton	9.7	9.7	0.0	Negligible	Not Significant
3-O-H19	The Willows, The Rowe, Stableford	9.2	9.2	0.0	Negligible	Not Significant
3-O-H20	Whitemoor Farm, Yarnfield Lane, Yarnfield	11.6	11.5	-0.1	Negligible	Not Significant
3-O-H21	Victoria Cottage, Moss Lane, Yarnfield	10.9	10.9	0.0	Negligible	Not Significant
3-O-H22	Proposed 92 dwellings between Common Lane and Eccleshall Road, Stone - Committed Development (14/20854/OUT)	9.9	9.8	-0.1	Negligible	Not Significant

- 5.4.8 The annual mean NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to be within the air quality standards with and without operation of the Proposed Scheme. Since the annual mean NO₂ concentrations are predicted to be less than 60µg/m³, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM₁₀ concentrations are predicted to be less than 35µg/m³, the daily mean standard is also expected to be met.
- 5.4.9 Negligible impacts are predicted at all receptors for annual mean NO₂, PM₁₀ and PM_{2.5} concentrations.

Assessment of significance

- 5.4.10 No significant effects are anticipated at any receptor in relation to annual mean NO₂, PM₁₀ and PM_{2.5} concentrations.

6 Air quality assessment – train movements

6.1 Overall assessment approach

6.1.1 The air quality assessment for train related emissions has used the approach described in the SMR and its Addendum.

6.2 Assessment of train emissions during construction

6.2.1 The operation of diesel trains associated with the Stone Railhead have been assessed for their emissions of NO₂ and sulphur dioxide (SO₂) to local air quality.

6.2.2 Screening criteria are set out by Defra¹² to determine the potential risk of exceedance from stationary diesel and/or moving locomotives at relevant sensitive receptors.

6.2.3 There are no locations of relevant exposure within 15m of where diesel locomotives will be regularly (at least 3 times a day) stationary for periods of 15 minutes. As such, the risk of exceedance of the 15-minute SO₂ air quality standard is considered to be negligible.

6.2.4 Whilst there is relevant receptor exposure within 30m of moving diesel locomotives, the background annual mean NO₂ concentrations around the Stone Railhead are lower than 25µg/m³. Therefore, the risk of exceedance of the annual mean NO₂ standard is considered to be negligible.

6.2.5 No significant effects are anticipated at any receptor in relation to diesel trains operating at the Stone Railhead during construction of the Proposed Scheme.

6.3 Assessment of train emissions during operation

6.3.1 There will be no direct atmospheric emissions from the operation of the Proposed Scheme trains that will cause an impact on air quality due to line electrification and therefore, no assessment is required. Indirect emissions from sources such as rail and brake wear have been assumed to be negligible.

¹² Department for Environment, Food and Rural Affairs (Defra) (2016) *Local Air Quality Management Technical Guidance (LAQM.TG16)*

7 References

Department for Environment, Food and Rural Affairs (2013), *Defra Background Pollutant Concentration Maps*. Available online at: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>.

Department for Environment, Food and Rural Affairs (2016), *Local Air Quality Management Technical Guidance* (LAQM.TG16).

Environment Act 1995. London, Her Majesty's Stationary Office.

Highways Agency (2007), *The Design Manual for Roads and Bridges* (Volume 11, Section 3, Part 1 Air Quality HA207/07).

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Background Information and Data. Traffic data used for the air quality assessment*, BID-AQ-002-000. Available online at: www.gov.uk/hs2.

Institute of Air Quality Management (2014), *Assessment of dust from demolition and construction*.

Institute of Air Quality Management (2017), *Land-use planning & development control: Planning for air quality* (v1.2).

Stafford Borough Council (2014), *The Plan for Stafford Borough 2011 – 2031 (Adopted 19 June 2014)*. Available online at: <http://www.staffordbc.gov.uk/live/Documents/Planning%20Policy/Plan%20for%20Stafford%20Borough/PFSB-Adoption.pdf>.

Stafford Borough Council (2016), *2016 Air Quality Annual Status Report*. Available online at: <http://www.staffordbc.gov.uk/live/Documents/Environmental%20Health/Air-Quality-Annual-Status-Report.pdf>.

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