In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix AQ-001-0MA01

Air quality

MA01: Hough to Walley's Green

Air quality report

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Department for Transport

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1 Introduction

1.1.1 The report is an appendix to the air quality assessment for the Proposed Scheme in relation to the Hough to Walley's Green area (MA01).

1.1.2 This appendix comprises:

- baseline air quality data;
- construction dust assessment; and
- assessment of road traffic emissions.

1.1.3 Maps referred to throughout this appendix are contained in the Volume 5, Air quality Map Book: map AQ-01-301.

1.1.4 Additional data used for the air quality assessment, including traffic data, are set out in Background Information and Data (BID) (BID AQ-002-0MA01)[1].

1.1.5 The assessment scope, key assumptions and limitations, and the methodology for determining significance of effects for air quality are set out in Volume 1, Introduction and methodology, Section 9 and the Environmental Impact Assessment Scope and Methodology Report (SMR) (see Volume 5: Appendix CT-001-00001).

1.1.6 The air quality standards relevant to this assessment are:

- 40µg/m^3 as an annual mean for nitrogen dioxide (NO_2) and fine particulate matter (PM_{10});
- 200µg/m^3 one-hour mean for NO_2 not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
- 50µg/m^3 24-hour mean for PM_{10} not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
- 25µg/m^3 as an annual mean for fine particulate matter ($PM_{2.5}$).

[1] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data*, *Additional data used in the air quality assessment,* BID AQ-002-0MA01. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

2 Baseline air quality data

2.1 Existing air quality

Local authority review and assessment information

2.1.1 The Hough to Walley's Green area lies within the administrative area of Cheshire East Council (CEC). All councils review air quality throughout the area following the local air quality management (LAQM) regime from the Department for Environment, Food and Rural Affairs (Defra)[2].

2.1.2 There are no Air Quality Management Areas (AQMA) within the Hough to Walley's Green area.

Local air quality monitoring data

2.1.3 Monitoring sites within the study area that are relevant for this assessment are shown in the accompanying map AQ-01-301. The following sections provide a summary of the recorded pollutant concentrations at these sites. Further details on monitoring data are presented in BID AQ-002-0MA01[1].

Diffusion tubes

2.1.4 The local authorities in this area undertake air quality monitoring with the use of passive diffusion tubes as part of their LAQM process. There are 14 diffusion tube sites within the Hough to Walley's Green area. These are located in Crewe near the A534 Nantwich Road, Wistaston Road and Earle Street.

2.1.5 HS2 Ltd has undertaken additional monitoring for the purpose of validating the air quality assessment at two locations in this area.

2.1.6 Measurements of NO_2 were within the air quality standard at sites with available data in 2018.

Background pollutant concentrations

2.1.7 Estimates of background air quality were obtained from the Defra maps[2]. Background pollutant concentrations are within the air quality standards throughout the study area.

[2] Department for Environment, Food and Rural Affairs (Defra) (2020), *Defra Background Pollutant Concentration Maps*. Available online at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

Table 1 presents the range of background pollutant concentrations within Hough to Walley's Green area for the existing and future baseline.

2.1.8 Background pollutant concentrations for the operational year of 2038 have been taken from the Defra background maps for 2030, which is the latest available year of data. The 2030 background maps have been assumed to be representative of the future baseline conditions during operation of the Proposed Scheme.

Table 1: Range of background pollutant concentrations

Pollutant	Background concentrations (µg/m³)		
	2018	2025	2038
Annual mean NOx	8.1µg/m³ to 24.1µg/m³	6.3µg/m³ to 19.6µg/m³	5.8µg/m³ to 18.7µg/m³
Annual mean NO_2	6.3µg/m³ to 16.9µg/m³	5.0µg/m³ to 14.2µg/m³	4.7µg/m³ to 13.6µg/m³
Annual mean PM_{10}	9.7µg/m³ to 13.3µg/m³	8.8µg/m³ to 12.3µg/m³	8.7µg/m³ to 12.3µg/m³
Annual mean $PM_{2.5}$	6.4µg/m³ to 8.9µg/m³	5.7µg/m³ to 8.1µg/m³	5.6µg/m³ to 8.1µg/m³

3 Construction dust assessment

3.1.1 This section provides details of the assessment of dust emissions during construction of the Proposed Scheme. Due to the linear nature of the Proposed Scheme and its associated dust generating activities, the construction dust assessment has been undertaken in detail for distinct assessment areas in the Hough to Walley's Green area.

3.2 Dust soiling and human health effects

Assessed receptors and sensitivity of the area

3.2.1 The assessment of dust soiling and human health effects has been undertaken for the following areas from south to north:

- area around Hough: there are no demolition activities in this area. Residential dwellings are located within 20m of earthworks, construction and trackout[3] activities;
- area around Leighton: residential dwellings are located within 350m of demolition activities and within 20m of earthworks, construction and trackout activities;
- area around Crewe: there are no demolition activities in this area. Residential dwellings are located within 20m of earthworks, construction and trackout activities; and
- area around Walley's Green: residential dwellings are located within 20m of demolition, earthworks, construction and trackout activities.

3.2.2 Table 2 presents the sensitivity of each area to dust soiling and human health effects.

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

Effect	Demolition	Earthworks	Construction	Trackout
Area around Hough				
Dust soiling	Not applicable	High	High	High
Human health	Not applicable	Medium	Medium	Medium
Area around Leighton				
Dust soiling	Low	High	High	Medium
Human health	Low	Medium	Medium	Low
Area around Crewe				
Dust soiling	Not applicable	High	High	High
Human health	Not applicable	Medium	Medium	Medium
Area around Walley's Green				
Dust soiling	High	High	High	High
Human health	Medium	Medium	Medium	Medium

[3] Trackout refers to the transport of dust and dirt from the construction site(s) onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

Dust emission magnitude

3.2.3 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

Area	Demolition	Earthworks	Construction	Trackout
Area around Hough	Not applicable	Large	Large	Medium
Area around Leighton	Small	Medium	Medium	Medium
Area around Crewe	Not applicable	Medium	Medium	Medium
Area around Walley's Green	Small	Large	Large	Large

Risk of impacts

3.2.4 Taking into consideration the dust emission 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 Hough				
Dust soiling	Not applicable	High risk	High risk	Medium risk
Human health	Not applicable	Medium risk	Medium risk	Low risk
Area around Leighton				
Dust soiling	Negligible risk	Medium risk	Medium risk	Low risk
Human health	Negligible risk	Medium risk	Medium risk	Low risk
Area around Crewe				
Dust soiling	Not applicable	Medium risk	Medium risk	Medium risk
Human health	Not applicable	Medium risk	Medium risk	Low risk
Area around Walley's Green				
Dust soiling	Medium risk	High risk	High risk	High risk
Human health	Low risk	Medium risk	Medium risk	Medium risk

3.3 Ecological effects

Assessed receptors and sensitivity of the area

3.3.1 The assessment of ecological effects has been undertaken for the following areas from south to north:

- Mere Gutter with Basford Brook Local Wildlife Site (LWS) is located within 20m of trackout activities. There are no demolition, construction or earthworks activities in this area;

- Basford Brook LWS is located within 20m of trackout activities. There are no demolition, construction or earthworks activities in this area;
- Crewe Swift Colony LWS is located within 20m of earthworks, construction and trackout activities. There are no demolition activities in this area;
- Moss Bridge Marsh LWS is located within 20m of earthworks and construction activities. There are no demolition or trackout activities in this area;
- Spring Plantation Grassland LWS is located within 20m of earthworks and construction activities. There are no demolition or trackout activities in this area; and
- Shropshire Union Canal LWS is located within 20m of earthworks and construction activities. There are no demolition or trackout activities in this area.

3.3.2 Table 5 presents the sensitivity of each area to ecological effects.

Table 5: Sensitivity of area to ecological effects

Area	Demolition	Earthworks	Construction	Trackout
Area around Mere Gutter with Basford Brook LWS	Not applicable	Not applicable	Not applicable	Low
Area around Basford Brook LWS	Not applicable	Not applicable	Not applicable	Low
Area around Crewe Swift Colony LWS	Not applicable	Low	Low	Low
Area around Moss Bridge Marsh LWS	Not applicable	Low	Low	Not applicable
Area around Spring Plantation Grassland LWS	Not applicable	Low	Low	Not applicable
Area around Shropshire Union Canal LWS	Not applicable	Low	Low	Not applicable

Dust emission magnitude

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

Table 6: Dust emission magnitude for ecological effects

Area	Demolition	Earthworks	Construction	Trackout
Area around Mere Gutter with Basford Brook LWS	Not applicable	Not applicable	Not applicable	Medium
Area around Basford Brook LWS	Not applicable	Not applicable	Not applicable	Medium
Area around Crewe Swift Colony LWS	Not applicable	Medium	Medium	Medium
Area around Moss Bridge Marsh LWS	Not applicable	Large	Large	Not applicable
Area around Spring Plantation Grassland LWS	Not applicable	Large	Large	Not applicable
Area around Shropshire Union Canal LWS	Not applicable	Large	Large	Not applicable

Risk of impacts

3.3.4 Taking into consideration the dust emission 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 Mere Gutter with Basford Brook LWS	Not applicable	Not applicable	Not applicable	Low risk
Area around Basford Brook LWS	Not applicable	Not applicable	Not applicable	Low risk
Area around Crewe Swift Colony LWS	Not applicable	Low risk	Low risk	Low risk
Area around Moss Bridge Marsh LWS	Not applicable	Low risk	Low risk	Not applicable
Area around Spring Plantation Grassland LWS	Not applicable	Low risk	Low risk	Not applicable
Area around Shropshire Union Canal LWS	Not applicable	Low risk	Low risk	Not applicable

3.4 Summary of risks

3.4.1 The summary of risks identified within the Hough to Walley's Green area is shown in Table 8. As there are several construction locations in this area, a range of risks is shown which depend on the location of sensitive receptors and the magnitude of dust generating activities.

Table 8: Summary of risks for construction dust assessment

Activity	Dust soiling	Human health	Ecological effects
Demolition	Negligible to Medium	Negligible to Low	Not applicable
Earthworks	Medium to High	Medium	Low
Construction	Medium to High	Medium	Low
Trackout	Low to High	Low to Medium	Low

4 Assessment of road traffic emissions

4.1 Overall assessment approach

4.1.1 The air quality assessment for road traffic emissions has used the approach described in the SMR. Pollutant concentrations have been predicted at sensitive residential and ecological receptors where these are located within 200m of the affected road network. Where ecological sites have been assessed, the change in nitrogen (N) deposition has been predicted for comparison against the lower critical load for the site.

4.2 Model inputs and verification

Model parameters

4.2.1 The ADMS-Roads model was used to predict pollutant concentrations from changes in road traffic emissions. A surface roughness of 0.3m 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 Manchester Airport monitoring site was used for the year 2018.

Model verification

4.2.2 Verification was undertaken for the year 2018 comparing monitored and modelled NO_2 concentrations. The traffic data provided were assumed to be representative of 2018. The results of this comparison are shown in Table 9.

4.2.3 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.

4.2.4 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 18 monitoring sites were included in the model verification exercise, spread across both Hough to Walley's Green and Wimboldsley to Lostock Gralam areas.

Table 9: Comparison of monitored and modelled NO_2 concentrations

Site	Monitored concentration (µg/m³)	Modelled concentration (µg/m³)	Difference [(modelled - monitored) / monitored]
MA01.1	28.0	13.5	-51.8%
MA01.2	38.8	23.6	-39.2%
MA01.3	31.5	18.5	-41.2%
MA01.8	34.3	19.8	-42.3%
MA01.9	32.7	21.9	-33.1%

Site	Monitored concentration (µg/m³)	Modelled concentration (µg/m³)	Difference [(modelled - monitored) / monitored]
MA01.15	34.9	18.9	-46.0%
MA01.18	32.6	16.6	-49.2%
MA02.19	28.2	16.5	-41.4%
MA02.20	35.6	23.4	-34.2%
MA02.21	48.5	37.2	-23.4%
MA02.22	25.4	17.2	-32.2%
MA02.23	35.1	16.2	-53.9%
MA02.33	31.2	19.5	-37.6%
MA02.35	36.7	18.7	-49.0%
MA02.41	32.0	22.2	-30.7%
MA02.42	38.0	20.6	-45.7%
MA02.43	31.7	21.0	-33.7%
MA02.44	21.3	23.9	12.0%

4.2.5 As nearly all of the modelled NO_2 concentrations were greater than ±25% of the monitored concentrations and there was systematic under prediction, model adjustment was undertaken. Three adjustment factors were calculated: a factor of 1.8 for locations covered by the Northwich transport model (which includes Moulton, Northwich, Lach Dennis, Lostock Gralam and Wincham); a factor of 2.6 for locations covered by the Crewe and Winsford transport models (which include Crewe, Middlewich, Winsford); and a factor of 1.0 for locations near to the M6. Adjusted results are shown in Table 10. Modelled concentrations of PM_{10} and $PM_{2.5}$ have not been adjusted.

Table 10: Comparison of monitored and adjusted modelled NO_2 concentrations

Site	Monitored concentration (µg/m³)	Modelled adjusted concentration (µg/m³)	Difference [(modelled - monitored) / monitored]
MA01.1	28.0	20.1	-28.2%
MA01.2	38.8	44.8	15.6%
MA01.3	31.5	28.7	-8.8%
MA01.8	34.3	31.1	-9.2%
MA01.9	32.7	35.9	9.9%
MA01.15	34.9	29.6	-15.4%
MA01.18	32.6	24.8	-24.1%
MA02.19	28.2	21.6	-23.3%
MA02.20	35.6	33.0	-7.1%
MA02.21	48.5	54.2	11.8%
MA02.22	25.4	26.2	3.0%
MA02.23	35.1	27.6	-21.5%
MA02.33	31.2	33.5	7.3%
MA02.35	36.7	31.8	-13.5%

Site	Monitored concentration (µg/m^3)	Modelled adjusted concentration (µg/m^3)	Difference [(modelled - monitored) / monitored]
MA02.41	32.0	30.6	-4.5%
MA02.42	38.0	27.6	-27.3%
MA02.43	31.7	38.6	21.7%
MA02.44	21.3	23.9	12.0%

4.3 Assessment of construction traffic emissions

4.3.1 Construction traffic data used in this assessment is detailed in BID AQ-002-0MA01[1]. The assessment of construction traffic emissions has used traffic data based on an estimate of the average maximum daily flows in the peak year during the construction period (2025 – 2037). Vehicle emissions and background concentrations have been taken for the first construction year in 2025 as a worst case. Two construction scenarios have been assessed to capture peak construction traffic activity at different times in the construction period. It has been assumed that the changes in construction traffic will occur for the whole year. In some cases, this is a conservative approach, as the duration of the peak traffic flows may well be much shorter. These scenarios have been assessed against the relevant future baseline case without the Proposed Scheme.

4.3.2 Traffic data in the study area have been screened to identify roads that require further assessment and to confirm the likely effect of the change in emissions from vehicles using these roads during construction of the Proposed Scheme. The screening criteria are detailed in the SMR and are largely based on the Design Manual for Roads and Bridges (DMRB) thresholds for changes in annual average daily traffic (AADT), changes in daily heavy duty vehicles (HDV) flows and/or changes in road alignment by 5m or more.

4.3.3 Traffic data for construction vehicles using the site haul routes and moving between compounds have also been included in the assessment. Additional roads have been included in the assessment where relevant to account for their emissions at nearby receptors.

Receptors assessed and background concentrations

4.3.4 Sensitive receptors have been selected from the OS AddressBase Premium database. The receptors consist of residential properties, schools, hospitals and/or care homes within 200m of the screened in roads and represent worst-case exposure locations. The location of all receptors is shown in accompanying map AQ-01-301.

4.3.5 One designated ecological receptor, Oakhanger Moss Site of Special Scientific Interest (SSSI), which is part of the Midland Meres and Mosses Phase 2 Ramsar site, was identified within

200m of the screened in roads within the Hough to Walley's Green area during construction of the Proposed Scheme.

4.3.6 Details of the assessed receptors and the background concentrations used in the assessment are shown in Table 11 for human and Table 12 for ecological receptors.

Table 11: Modelled receptors and background concentrations (construction phase)

Receptor	Description/Location	Ordnance survey coordinates	Background concentrations in 2025 (µg/m3)			
			NOx	NO_2	PM_{10}	$PM_{2.5}$
01-C-H001	A500, Shavington Bypass, Willaston	367533, 351669	7.7	6.0	9.9	6.3
01-C-H002	Casey Lane, Basford	371849, 351712	7.6	6.0	9.7	6.0
01-C-H003	Wistaston Road, Willaston	368008, 352554	8.0	6.3	10.6	6.4
01-C-H004	The B5338 Crewe Road, Willaston	366967, 352590	8.2	6.5	9.8	6.3
01-C-H005	A500, Shavington Bypass, Weston	372694, 352799	8.3	6.5	10.7	6.5
01-C-H006	Barthomley Road, Barthomley	376019, 352986	9.3	7.2	11.3	6.8
01-C-H007	Weston Road, Weston	373138, 353372	10.4	8.0	10.5	6.3
01-C-H008	Middlewich Road, A51, Woolstanwood	367334, 355041	9.8	7.6	10.3	6.6
01-C-H009	Crewe Green Roundabout, Crewe	372266, 355465	10.7	8.3	10.3	6.7
01-C-H010	Sydney Road, Crewe	372277, 355587	10.7	8.3	10.3	6.7
01-C-H011	Coleridge Way, Crewe	371592, 355685	11.8	9.0	10.5	7.1
01-C-H012	Victoria Avenue, Crewe	368641, 355888	10.1	7.8	10.3	7.0
01-C-H013	Broad Street, Crewe	370414, 357027	10.7	8.3	10.4	7.1
01-C-H014	Sydney Road, Crewe	371405, 357052	13.2	10.0	10.1	6.5
01-C-H015	Sydney Road, Crewe	371401, 357082	13.2	10.0	10.1	6.5
01-C-H016	Acer Avenue, Crewe	371052, 357110	13.2	10.0	10.1	6.5
01-C-H017	Remer Street, Crewe	371338, 357134	13.2	10.0	10.1	6.5
01-C-H018	Remer Street, Crewe	371028, 357158	13.2	10.0	10.1	6.5
01-C-H019	Broad Street, Crewe	370590, 357194	10.7	8.3	10.4	7.1
01-C-H020	B5076, North Street, Crewe	370595, 357243	10.7	8.3	10.4	7.1
01-C-H021	B5076, North Street, Crewe	370555, 357264	10.7	8.3	10.4	7.1
01-C-H022	Clay Lane, Haslington	373530, 357300	9.4	7.4	9.9	6.4
01-C-H023	B5076, North Street, Crewe	370361, 357359	10.7	8.3	10.4	7.1
01-C-H024	B5076, Bradfield Road, Crewe	370313, 357381	10.7	8.3	10.4	7.1

Receptor	Description/Location	Ordnance survey coordinates	Background concentrations in 2025 (µg/m3)			
			NOx	NO_2	PM_{10}	$PM_{2.5}$
01-C-H025	Underwood Lane, Crewe	370081, 357400	10.7	8.3	10.4	7.1
01-C-H026	B5076, Bradfield Road, Crewe	370185, 357424	10.7	8.3	10.4	7.1
01-C-H027	B5076, Bradfield Road, Crewe	370163, 357436	10.7	8.3	10.4	7.1
01-C-H028	B5076, Bradfield Road, Crewe	369532, 357457	11.4	8.7	10.8	7.5
01-C-H029	Broughton Road, Crewe	370373, 357475	10.7	8.3	10.4	7.1
01-C-H030	Maw Lane, Haslington	372993, 357498	10.0	7.8	9.6	6.3
01-C-H031	Broughton Road, Crewe	370376, 357534	10.7	8.3	10.4	7.1
01-C-H032	Stoneley Road, Crewe	370666, 357613	10.7	8.3	10.4	7.1
01-C-H033	Padstow Close, Crewe	370099, 357652	10.7	8.3	10.4	7.1
01-C-H034	Hassall Road, Day Green	377886, 357680	9.0	7.0	11.6	7.2
01-C-H035	B5076, Bradfield Road, Crewe	368931, 357821	10.8	8.3	10.0	6.5
01-C-H036	Broughton Road, Crewe	370364, 357839	10.7	8.3	10.4	7.1
01-C-H037	Alsager Road, Hassall	377221, 357848	9.0	7.0	11.6	7.2
01-C-H038	Broughton Road, Crewe	370169, 357861	10.7	8.3	10.4	7.1
01-C-H039	B5076, Bradfield Road, Crewe	368837, 357941	10.8	8.3	10.0	6.5
01-C-H040	Parkers Road, Crewe	369891, 358049	9.2	7.2	9.6	6.4
01-C-H041	Alsager Road, Hassall Green	377644, 358297	10.0	7.8	11.8	7.3
01-C-H042	Warmingham Road, Crewe	370561, 358429	8.8	6.9	9.6	6.2
01-C-H043	Aysgarth Avenue, Crewe	369845, 358432	9.2	7.2	9.6	6.4
01-C-H044	A530 Middlewich Road, Bradfield Green	368048, 358879	9.6	7.5	10.4	6.3
01-C-H045	B5079 Hind Heath Road, Sandbach	374139, 360266	10.5	8.1	10.6	6.6
01-C-H046	Brookhouse Road, Sandbach	375946, 360565	11.2	8.6	10.3	6.8
01-C-H047	Warmingham CofE Primary, Warmingham	371199, 361523	8.3	6.5	9.3	5.9
01-C-H048	London Road, Elworth	373794, 361681	11.4	8.7	9.5	6.3
01-C-H049	A530 Middlewich Road, Minshull Vernon	368333, 361922	8.6	6.7	9.8	6.1

Table 12: Modelled ecological receptor backgrounds. APIS data and critical loads (construction phase)

Receptor	Sensitive habitats	2025 NOx background concentration (µg/m^3)	APIS data[4] of average total N deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)
Oakhanger Moss SSSI/Midland Meres and Mosses Phase 2 Ramsar site	Broadleaved deciduous woodland	14.6	54.0	10.0
	Lowland raised bog	9.3	31.2	5.0

Assessment results

4.3.7 Table 13 presents the predicted NO_2 impacts across all assessed scenarios for each assessed receptor. All impacts are predicted to be negligible for PM_{10} and $PM_{2.5}$. Table 14, Table 15 and Table 16 provide the summary of the modelled pollutant concentrations for the assessed receptors for the worst case construction traffic scenario. The magnitude of change and impact descriptor are also derived following the Institute of Air Quality Management (IAQM)/Environmental Protection UK (EPUK) methodology[5]. Table 17 and Table 18 provides the summary of the ecological receptors for the worst-case construction traffic scenario assessment.

Table 13: Comparison of impact descriptors across construction scenarios

Receptor	Impact descriptors for annual mean NO_2 concentrations	
	Scenario 1	Scenario 2
01-C-H001	Negligible	Negligible
01-C-H002	Negligible	Negligible
01-C-H003	Negligible	Negligible
01-C-H004	Negligible	Negligible
01-C-H005	Negligible	Negligible
01-C-H006	Negligible	Negligible
01-C-H007	Negligible	Negligible
01-C-H008	Negligible	Negligible
01-C-H009	Negligible	Negligible
01-C-H010	Negligible	Negligible
01-C-H011	Not Applicable	Negligible
01-C-H012	Negligible	Negligible
01-C-H013	Not Applicable	Negligible
01-C-H014	Negligible	Negligible

[4] Air Pollution Information System. Available online at: http://www.apis.ac.uk/.

[5] Institute of Air Quality Management (2017), *Land-Use Planning & Development Control: Planning For Air Quality.* Available online at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

Receptor	Impact descriptors for annual mean NO_2 concentrations	
	Scenario 1	Scenario 2
01-C-H015	Negligible	Negligible
01-C-H016	Negligible	Slight adverse
01-C-H017	Negligible	Negligible
01-C-H018	Negligible	Slight adverse
01-C-H019	Negligible	Negligible
01-C-H020	Moderate adverse	Moderate adverse
01-C-H021	Moderate adverse	Moderate adverse
01-C-H022	Negligible	Negligible
01-C-H023	Slight adverse	Slight adverse
01-C-H024	Negligible	Moderate adverse
01-C-H025	Negligible	Negligible
01-C-H026	Negligible	Moderate adverse
01-C-H027	Negligible	Moderate adverse
01-C-H028	Negligible	Negligible
01-C-H029	Negligible	Moderate adverse
01-C-H030	Not Applicable	Negligible
01-C-H031	Negligible	Moderate adverse
01-C-H032	Slight adverse	Negligible
01-C-H033	Negligible	Negligible
01-C-H034	Negligible	Negligible
01-C-H035	Negligible	Negligible
01-C-H036	Negligible	Moderate adverse
01-C-H037	Negligible	Negligible
01-C-H038	Slight adverse	Slight adverse
01-C-H039	Negligible	Slight beneficial
01-C-H040	Slight adverse	Moderate beneficial
01-C-H041	Negligible	Negligible
01-C-H042	Negligible	Negligible
01-C-H043	Negligible	Negligible
01-C-H044	Negligible	Negligible
01-C-H045	Negligible	Not Applicable
01-C-H046	Not Applicable	Negligible
01-C-H047	Negligible	Not Applicable
01-C-H048	Negligible	Negligible
01-C-H049	Negligible	Negligible

Table 14: Predicted annual mean NO_2 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
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H001	A500, Shavington Bypass, Willaston	28.7	28.3	-0.4	Negligible	Not significant
01-C-H002	Casey Lane, Basford	8.3	8.5	0.2	Negligible	Not significant
01-C-H003	Wistaston Road, Willaston	12.7	13.9	1.2	Negligible	Not significant
01-C-H004	The B5338 Crewe Road, Willaston	21.3	21.4	0.1	Negligible	Not significant
01-C-H005	A500, Shavington Bypass, Weston	28.8	28.7	-0.1	Negligible	Not significant
01-C-H006	Barthomley Road, Barthomley	17.4	17.4	< 0.1	Negligible	Not significant
01-C-H007	Weston Road, Weston	22.9	23.7	0.8	Negligible	Not significant
01-C-H008	Middlewich Road, A51, Woolstanwood	22.2	22.6	0.4	Negligible	Not significant
01-C-H009	Crewe Green Roundabout, Crewe	26.4	27.1	0.7	Negligible	Not significant
01-C-H010	Sydney Road, Crewe	25.0	25.3	0.3	Negligible	Not significant
01-C-H011	Coleridge Way, Crewe	18.0	19.4	1.4	Negligible	Not significant
01-C-H012	Victoria Avenue, Crewe	18.0	18.8	0.8	Negligible	Not significant
01-C-H013	Broad Street, Crewe	19.2	20.5	1.3	Negligible	Not significant
01-C-H014	Sydney Road, Crewe	25.7	26.0	0.3	Negligible	Not significant
01-C-H015	Sydney Road, Crewe	25.2	26.2	1.0	Negligible	Not significant
01-C-H016	Acer Avenue, Crewe	14.2	16.5	2.3	Slight adverse	Not significant
01-C-H017	Remer Street, Crewe	27.1	28.2	1.1	Negligible	Not significant
01-C-H018	Remer Street, Crewe	16.4	19.3	2.9	Slight adverse	Not significant
01-C-H019	Broad Street, Crewe	21.7	23.7	2.0	Negligible	Not significant
01-C-H020	B5076, North Street, Crewe	33.4	36.3	2.9	Moderate adverse	Significant
01-C-H021	B5076, North Street, Crewe	28.9	31.5	2.6	Moderate adverse	Significant

Receptor	Description/Location	NO_2 concentrations ($\mu g/m^3$)		Change in NO_2 concentrations ($\mu g/m^3$)	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H022	Clay Lane, Haslington	21.7	22.9	1.2	Negligible	Not significant
01-C-H023	B5076, North Street, Crewe	24.0	27.1	3.1	Slight adverse	Not significant
01-C-H024	B5076, Bradfield Road, Crewe	23.0	28.8	5.8	Moderate adverse	Significant
01-C-H025	Underwood Lane, Crewe	13.6	15.0	1.4	Negligible	Not significant
01-C-H026	B5076, Bradfield Road, Crewe	25.0	31.3	6.3	Moderate adverse	Significant
01-C-H027	B5076, Bradfield Road, Crewe	22.5	27.9	5.4	Moderate adverse	Significant
01-C-H028	B5076, Bradfield Road, Crewe	21.6	22.4	0.8	Negligible	Not significant
01-C-H029	Broughton Road, Crewe	15.1	19.7	4.6	Moderate adverse	Significant
01-C-H030	Maw Lane, Haslington	15.8	17.2	1.4	Negligible	Not significant
01-C-H031	Broughton Road, Crewe	15.1	20.7	5.6	Moderate adverse	Significant
01-C-H032	Stoneley Road, Crewe	14.7	18.2	3.5	Slight adverse	Not significant
01-C-H033	Padstow Close, Crewe	11.6	12.6	1.0	Negligible	Not significant
01-C-H034	Hassall Road, Day Green	16.5	17.8	1.3	Negligible	Not significant
01-C-H035	B5076, Bradfield Road, Crewe	19.4	19.7	0.3	Negligible	Not significant
01-C-H036	Broughton Road, Crewe	13.5	20.1	6.6	Moderate adverse	Significant
01-C-H037	Alsager Road, Hassall	17.7	18.9	1.2	Negligible	Not significant
01-C-H038	Broughton Road, Crewe	11.0	13.5	2.5	Slight adverse	Not significant
01-C-H039	B5076, Bradfield Road, Crewe	31.1	31.4	0.3	Negligible	Not significant
01-C-H040	Parkers Road, Crewe	17.7	20.1	2.4	Slight adverse	Not significant
01-C-H041	Alsager Road, Hassall Green	28.1	28.5	0.4	Negligible	Not significant
01-C-H042	Warmingham Road, Crewe	19.4	21.5	2.1	Negligible	Not significant
01-C-H043	Aysgarth Avenue, Crewe	9.5	9.8	0.3	Negligible	Not significant

Receptor	Description/Location	NO_2 concentrations (µg/m^3)		Change in NO_2 concentrations (µg/m^3)	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H044	A530 Middlewich Road, Bradfield Green	19.1	20.6	1.5	Negligible	Not significant
01-C-H045	B5079 Hind Heath Road, Sandbach	19.6	20.8	1.2	Negligible	Not significant
01-C-H046	Brookhouse Road, Sandbach	19.6	20.1	0.5	Negligible	Not significant
01-C-H047	Warmingham CofE Primary, Warmingham	24.7	26.6	1.9	Negligible	Not significant
01-C-H048	London Road, Elworth	28.1	29.0	0.9	Negligible	Not significant
01-C-H049	A530 Middlewich Road, Minshull Vernon	20.2	21.7	1.5	Negligible	Not significant

Table 15: Predicted annual mean PM_{10} concentrations and impacts (construction phase)

Receptor	Description/Location	PM_{10} concentrations (µg/m^3)		Change in PM_{10} concentrations (µg/m^3 2025 with the Proposed Scheme	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H001	A500, Shavington Bypass, Willaston	11.5	11.5	< 0.1	Negligible	Not significant
01-C-H002	Casey Lane, Basford	9.9	9.9	< 0.1	Negligible	Not significant
01-C-H003	Wistaston Road, Willaston	11.3	11.5	0.2	Negligible	Not significant
01-C-H004	The B5338 Crewe Road, Willaston	11.0	11.0	< 0.1	Negligible	Not significant
01-C-H005	A500, Shavington Bypass, Weston	12.1	12.1	< 0.1	Negligible	Not significant
01-C-H006	Barthomley Road, Barthomley	12.0	12.1	0.1	Negligible	Not significant
01-C-H007	Weston Road, Weston	11.9	12.0	0.1	Negligible	Not significant
01-C-H008	Middlewich Road, A51, Woolstanwood	11.7	11.8	0.1	Negligible	Not significant
01-C-H009	Crewe Green Roundabout, Crewe	12.3	12.4	0.1	Negligible	Not significant

Receptor	Description/Location	PM_{10} concentrations ($\mu g/m^3$)		Change in PM_{10} concentrations ($\mu g/m^3$ 2025 with the Proposed Scheme	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H010	Sydney Road, Crewe	12.2	12.3	0.1	Negligible	Not significant
01-C-H011	Coleridge Way, Crewe	11.5	11.7	0.2	Negligible	Not significant
01-C-H012	Victoria Avenue, Crewe	11.5	11.6	0.1	Negligible	Not significant
01-C-H013	Broad Street, Crewe	11.8	12.0	0.2	Negligible	Not significant
01-C-H014	Sydney Road, Crewe	12.0	12.1	0.1	Negligible	Not significant
01-C-H015	Sydney Road, Crewe	11.7	11.9	0.2	Negligible	Not significant
01-C-H016	Acer Avenue, Crewe	10.5	10.8	0.3	Negligible	Not significant
01-C-H017	Remer Street, Crewe	12.0	12.2	0.2	Negligible	Not significant
01-C-H018	Remer Street, Crewe	10.8	11.1	0.3	Negligible	Not significant
01-C-H019	Broad Street, Crewe	11.9	12.1	0.2	Negligible	Not significant
01-C-H020	B5076, North Street, Crewe	13.2	13.6	0.4	Negligible	Not significant
01-C-H021	B5076, North Street, Crewe	13.0	13.5	0.5	Negligible	Not significant
01-C-H022	Clay Lane, Haslington	11.2	11.3	0.1	Negligible	Not significant
01-C-H023	B5076, North Street, Crewe	12.4	12.8	0.4	Negligible	Not significant
01-C-H024	B5076, Bradfield Road, Crewe	12.3	13.0	0.7	Negligible	Not significant
01-C-H025	Underwood Lane, Crewe	11.0	11.2	0.2	Negligible	Not significant
01-C-H026	B5076, Bradfield Road, Crewe	12.6	13.5	0.9	Negligible	Not significant
01-C-H027	B5076, Bradfield Road, Crewe	12.2	13.0	0.8	Negligible	Not significant
01-C-H028	B5076, Bradfield Road, Crewe	12.5	12.6	0.1	Negligible	Not significant
01-C-H029	Broughton Road, Crewe	11.1	11.6	0.5	Negligible	Not significant
01-C-H030	Maw Lane, Haslington	10.3	10.4	0.1	Negligible	Not significant
01-C-H031	Broughton Road, Crewe	11.1	11.7	0.6	Negligible	Not significant

Receptor	Description/Location	PM_{10} concentrations (µg/m³)		Change in PM_{10} concentrations (µg/m³ 2025 with the Proposed Scheme	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H032	Stoneley Road, Crewe	11.0	11.2	0.2	Negligible	Not significant
01-C-H033	Padstow Close, Crewe	10.8	10.8	< 0.1	Negligible	Not significant
01-C-H034	Hassall Road, Day Green	12.5	12.7	0.2	Negligible	Not significant
01-C-H035	B5076, Bradfield Road, Crewe	11.2	11.3	0.1	Negligible	Not significant
01-C-H036	Broughton Road, Crewe	10.9	11.4	0.5	Negligible	Not significant
01-C-H037	Alsager Road, Hassall	12.6	12.8	0.2	Negligible	Not significant
01-C-H038	Broughton Road, Crewe	10.7	10.7	< 0.1	Negligible	Not significant
01-C-H039	B5076, Bradfield Road, Crewe	12.9	13.1	0.2	Negligible	Not significant
01-C-H040	Parkers Road, Crewe	10.6	10.9	0.3	Negligible	Not significant
01-C-H041	Alsager Road, Hassall Green	17.1	17.4	0.3	Negligible	Not significant
01-C-H042	Warmingham Road, Crewe	10.7	11.0	0.3	Negligible	Not significant
01-C-H043	Aysgarth Avenue, Crewe	9.8	9.8	< 0.1	Negligible	Not significant
01-C-H044	A530 Middlewich Road, Bradfield Green	11.5	11.9	0.4	Negligible	Not significant
01-C-H045	B5079 Hind Heath Road, Sandbach	12.0	12.2	0.2	Negligible	Not significant
01-C-H046	Brookhouse Road, Sandbach	11.5	11.6	0.1	Negligible	Not significant
01-C-H047	Warmingham CofE Primary, Warmingham	11.0	11.1	0.1	Negligible	Not significant
01-C-H048	London Road, Elworth	11.9	12.1	0.2	Negligible	Not significant
01-C-H049	A530 Middlewich Road, Minshull Vernon	11.2	11.5	0.3	Negligible	Not significant

Table 16: Predicted annual mean $PM_{2.5}$ concentrations and impacts (construction phase)

Receptor	Description/Location	$PM_{2.5}$ concentrations ($\mu g/m^3$)		Change in $PM_{2.5}$ concentrations ($\mu g/m^3$)	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H001	A500, Shavington Bypass, Willaston	7.2	7.3	0.1	Negligible	Not significant
01-C-H002	Casey Lane, Basford	6.1	6.1	< 0.1	Negligible	Not significant
01-C-H003	Wistaston Road, Willaston	6.8	6.9	0.1	Negligible	Not significant
01-C-H004	The B5338 Crewe Road, Willaston	7.0	7.0	< 0.1	Negligible	Not significant
01-C-H005	A500, Shavington Bypass, Weston	7.3	7.4	0.1	Negligible	Not significant
01-C-H006	Barthomley Road, Barthomley	7.2	7.3	0.1	Negligible	Not significant
01-C-H007	Weston Road, Weston	7.1	7.2	0.1	Negligible	Not significant
01-C-H008	Middlewich Road, A51, Woolstanwood	7.4	7.4	< 0.1	Negligible	Not significant
01-C-H009	Crewe Green Roundabout, Crewe	7.8	7.8	< 0.1	Negligible	Not significant
01-C-H010	Sydney Road, Crewe	7.8	7.8	< 0.1	Negligible	Not significant
01-C-H011	Coleridge Way, Crewe	7.7	7.8	0.1	Negligible	Not significant
01-C-H012	Victoria Avenue, Crewe	7.7	7.7	< 0.1	Negligible	Not significant
01-C-H013	Broad Street, Crewe	7.9	8.0	0.1	Negligible	Not significant
01-C-H014	Sydney Road, Crewe	7.6	7.7	0.1	Negligible	Not significant
01-C-H015	Sydney Road, Crewe	7.5	7.5	< 0.1	Negligible	Not significant
01-C-H016	Acer Avenue, Crewe	6.8	6.9	0.1	Negligible	Not significant
01-C-H017	Remer Street, Crewe	7.6	7.7	0.1	Negligible	Not significant
01-C-H018	Remer Street, Crewe	6.9	7.1	0.2	Negligible	Not significant
01-C-H019	Broad Street, Crewe	8.0	8.1	0.1	Negligible	Not significant
01-C-H020	B5076, North Street, Crewe	8.7	8.9	0.2	Negligible	Not significant
01-C-H021	B5076, North Street, Crewe	8.6	8.8	0.2	Negligible	Not significant

Receptor	Description/Location	$PM_{2.5}$ concentrations (µg/m³)		Change in $PM_{2.5}$ concentrations (µg/m³)	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H022	Clay Lane, Haslington	7.2	7.2	< 0.1	Negligible	Not significant
01-C-H023	B5076, North Street, Crewe	8.2	8.5	0.3	Negligible	Not significant
01-C-H024	B5076, Bradfield Road, Crewe	8.2	8.6	0.4	Negligible	Not significant
01-C-H025	Underwood Lane, Crewe	7.5	7.6	0.1	Negligible	Not significant
01-C-H026	B5076, Bradfield Road, Crewe	8.3	8.9	0.6	Negligible	Not significant
01-C-H027	B5076, Bradfield Road, Crewe	8.1	8.6	0.5	Negligible	Not significant
01-C-H028	B5076, Bradfield Road, Crewe	8.4	8.4	< 0.1	Negligible	Not significant
01-C-H029	Broughton Road, Crewe	7.5	7.8	0.3	Negligible	Not significant
01-C-H030	Maw Lane, Haslington	6.7	6.8	0.1	Negligible	Not significant
01-C-H031	Broughton Road, Crewe	7.5	7.8	0.3	Negligible	Not significant
01-C-H032	Stoneley Road, Crewe	7.4	7.6	0.2	Negligible	Not significant
01-C-H033	Padstow Close, Crewe	7.3	7.4	0.1	Negligible	Not significant
01-C-H034	Hassall Road, Day Green	7.7	7.8	0.1	Negligible	Not significant
01-C-H035	B5076, Bradfield Road, Crewe	7.2	7.2	< 0.1	Negligible	Not significant
01-C-H036	Broughton Road, Crewe	7.4	7.7	0.3	Negligible	Not significant
01-C-H037	Alsager Road, Hassall	7.8	7.8	< 0.1	Negligible	Not significant
01-C-H038	Broughton Road, Crewe	7.3	7.3	< 0.1	Negligible	Not significant
01-C-H039	B5076, Bradfield Road, Crewe	8.2	8.3	0.1	Negligible	Not significant
01-C-H040	Parkers Road, Crewe	7.0	7.1	0.1	Negligible	Not significant
01-C-H041	Alsager Road, Hassall Green	10.5	10.7	0.2	Negligible	Not significant
01-C-H042	Warmingham Road, Crewe	6.9	7.1	0.2	Negligible	Not significant
01-C-H043	Aysgarth Avenue, Crewe	6.5	6.5	< 0.1	Negligible	Not significant

Receptor	Description/Location	$PM_{2.5}$ concentrations (µg/m³)		Change in $PM_{2.5}$ concentrations (µg/m³)	Impact descriptor	Significance
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
01-C-H044	A530 Middlewich Road, Bradfield Green	6.9	7.2	0.3	Negligible	Not significant
01-C-H045	B5079 Hind Heath Road, Sandbach	7.4	7.5	0.1	Negligible	Not significant
01-C-H046	Brookhouse Road, Sandbach	7.4	7.5	0.1	Negligible	Not significant
01-C-H047	Warmingham CofE Primary, Warmingham	6.9	7.0	0.1	Negligible	Not significant
01-C-H048	London Road, Elworth	7.6	7.7	0.1	Negligible	Not significant
01-C-H049	A530 Middlewich Road, Minshull Vernon	6.9	7.1	0.2	Negligible	Not significant

Table 17: Predicted annual mean NOx concentrations at ecological sites (construction phase)

Ecological site	Distance to road (m)	NOx concentrations (µg/m³)		Change in NOx concentrations (µg/m³)	Comparison against air quality standard (30µg/m³)
		2025 without the Proposed Scheme	2025 with the Proposed Scheme		
Oakhanger Moss SSSI/Midland Meres and Mosses Phase 2 Ramsar site	122	18.0	18.1	0.1	Within standard
	150	16.7	16.8	0.1	Within standard
	200	15.3	15.4	0.1	Within standard

Table 18: Assessment of N deposition at ecological sites (construction phase)

Ecological site	Distance to road (m)	Dry deposition (kg N/ha/yr)		Change in N deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)	Change in relation to lower critical load
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
Oakhanger Moss SSSI/Midland Meres and Mosses Phase 2 Ramsar site – deciduous woodland and lowland raised bog	122	55.4	55.4	< 0.1	10	0.2%
	150	55.2	55.2	< 0.1	10	0.2%
	200	31.7	31.7	< 0.1	5	0.1%
	122	31.9	31.9	< 0.1	5	0.2%

Ecological site	Distance to road (m)	Dry deposition (kg N/ha/yr)		Change in N deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)	Change in relation to lower critical load
		2025 without the Proposed Scheme	2025 with the Proposed Scheme			
Oakhanger Moss SSSI/Midland Meres and Mosses Phase 2 Ramsar site – lowland raised bog	150	31.8	31.8	< 0.1	5	0.2%
	200	31.7	31.7	< 0.1	5	0.1%

4.3.8 The annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted to be within the air quality standards with and without construction of the Proposed Scheme at all receptors assessed. Since the annual mean NO_2 concentrations are predicted to be below 60µg/m^3, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM_{10} concentrations are predicted to be below 35µg/m^3, the daily mean standard is also expected to be met.

4.3.9 For annual mean NO_2, moderate adverse impacts are predicted at five receptors on the B5076 North Street/Bradfield Road and three on Broughton Road. Impacts at these receptors are representative of impacts at other properties along these roads. Slight adverse impacts are predicted at six receptors on Acer Avenue, Remer Street, the B5076 North Street, Stoneley Road, Broughton Road and Parkers Road. Negligible impacts are predicted at all other modelled receptors for annual mean NO_2 concentrations. Negligible impacts are predicted at all residential receptors for annual mean PM_{10} and $PM_{2.5}$ concentrations.

4.3.10 NOx concentrations at the Oakhanger Moss SSSI/Midland Meres and Mosses Phase 2 Ramsar site are predicted to be within the air quality standard. The change in N deposition due to the Proposed Scheme is predicted to be less than 1% of the lower critical load for this site.

Assessment of significance

4.3.11 No significant effects are anticipated at any receptor in relation to annual mean PM_{10} and $PM_{2.5}$ concentrations. Significant adverse effects are anticipated at eight human receptors in relation to annual mean NO_2 concentrations.

4.3.12 Since the predicted NOx concentrations are within the air quality standard and the change in N deposition is predicted to be less than 1% of the lower critical load, no significant effects are predicted at the Oakhanger Moss SSSI/Midland Meres and Mosses Phase 2 Ramsar site.

4.4 Assessment of operational traffic emissions

Operational traffic model

4.4.1 Operational traffic data used in this assessment are detailed in BID AQ-002-MA01[1]. For the assessment of traffic on the highway network, data for the year 2038 were used as the operational year of the Proposed Scheme.

Screening of traffic data

4.4.2 The screening process identified one road in the Hough to Walley's Green area exceeding the DMRB thresholds for changes in AADT or daily HDV flows and/or changes in road alignment by 5m or more. This is the A530 Nantwich Road.

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

Receptors assessed and background concentrations

4.4.4 Sensitive receptors have been selected from the 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. The location of all receptors is shown on accompanying map AQ-01-101.

4.4.5 No designated ecological receptors were identified within 200m of the screened in roads within the Hough to Walley's Green area during operation of the Proposed Scheme.

4.4.6 Details of the assessed receptors and the background concentrations used in the assessment are shown in Table 19 for human receptors.

Table 19: Modelled human receptors and background concentrations (operational phase)

Receptor	Description/Location	Ordnance survey coordinates	Background concentrations in 2038 (µg/m^3)			
			NOx	NO_2	PM_{10}	$PM_{2.5}$
01-O-H001	A530 Middlewich Road, Occleston	368335, 361931	8.1	6.4	9.7	6.0

Assessment results

4.4.7 Table 20, Table 21 and Table 22 provide the summary of the modelled pollutant concentrations for the assessed human receptors. The magnitude of change and impact descriptor are also derived following the IAQM/EPUK methodology[5].

4.4.8 The annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are predicted to be within the air quality standards with and without the operation of the Proposed Scheme. Since the annual mean NO_2 concentrations are predicted to be below 60µg/m^3, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM_{10} concentrations are predicted to be below 35µg/m^3, the daily mean standard is also expected to be met.

4.4.9 Negligible impacts are predicted at all human receptors for annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations.

Table 20: Predicted annual mean NO_2 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
		2038 without the Proposed Scheme	2038 with the Proposed Scheme			
01-O-H001	A530 Middlewich Road, Occleston	11.7	10.4	-1.3	Negligible	Not significant

Table 21: Predicted annual mean PM_{10} 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
		2038 without the Proposed Scheme	2038 with the Proposed Scheme			
01-O-H001	A530 Middlewich Road, Occleston	11.0	10.7	-0.3	Negligible	Not significant

Table 22: Predicted annual mean $PM_{2.5}$ concentrations and impacts (operation phase)

Receptor	Description/Location	$PM_{2.5}$ concentrations (µg/m^3)		Change in $PM_{2.5}$ concentrations (µg/m^3)	Impact descriptor	Significance
		2038 without the Proposed Scheme	2038 with the Proposed Scheme			
01-O-H001	A530 Middlewich Road, Occleston	6.8	6.6	-0.2	Negligible	Not significant

Assessment of significance

4.4.10 No significant effects are anticipated at any receptors in relation to annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations.

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