M54 to M6 Link Road

TR010054

Volume 6

6.1 Environmental Statement

Chapter 5 – Air Quality

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M54 to M6 Link Road

Development Consent Order 202[ ]

6.1 Environmental Statement

Chapter 5 Air Quality

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5. Air Quality

5.1. Introduction

5.1.1. This chapter assesses the potential air quality impacts of the construction and operation of the Scheme, following the methodology set out in Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1 Air Quality (HA207/07) (Ref 5.1) and associated Interim Advice Notes (IANs) (Refs 5.2, 5.3, 5.4 and 5.5). This chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to air quality and describes the existing environment in the area surrounding the Scheme. Following this, the design, mitigation and residual effects of the Scheme are presented.

5.1.2. This chapter of the Environmental Statement (ES) has been prepared by competent experts with relevant and appropriate experience. The technical lead for the air quality assessment has 14 years of relevant experience and has professional qualifications as summarised in Appendix 1.1 [TR010054/APP/6.3].

5.2. Legislative and policy framework

Legislation

5.2.1. The following legislation is of relevance to the assessment of air quality and has informed the assessment methodology:

- Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC (Ref 5.6).
- Air Quality Standards Regulations 2010 (Ref 5.7).

5.2.2. The Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC is transcribed into UK legislation by the Air Quality Standards Regulations 2010, which came into force in 2010. These air quality limit values are legally binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

Planning policy

5.2.3. The primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the National Policy Statement for National Networks (NPSNN)[1] (Ref 5.8) which sets out policies to guide how DCO applications would be decided and how the impacts of national networks infrastructure should be considered. Table 5.1 identifies the NPSNN policies relevant to the air quality assessment and where in this ES chapter information is provided to address these policy requirements.

[1] Although other policies can have weight as relevant and important matters in decision making. See Case for the Scheme for more information [TR010054/APP/7.2].

Table 5.1: NPSNN policies relevant for the air quality assessment

NPSNN para.	Requirement of the NPSNN	Location where information addresses policy requirements
5.6	Where the impacts of the project (both on and off-scheme) are likely to have significant air quality effects in relation to meeting EIA requirements and/ or affect the UKs ability to comply with the Air Quality Directive, the applicant should undertake an assessment of the impacts of the proposed project as part of the environmental statement.	Refer to Section 5.9 'Assessment of likely significant effects'.
5.7	The environmental statement should describe: • Existing air quality levels; • Forecasts of air quality at the time of opening, assuming that the scheme is not built (the future baseline) and taking account of the impact of the scheme; and • Any significant air quality effects, their mitigation and any residual effects, distinguishing between the construction and operation stages and taking account of the impact of road traffic generated by the project.	Existing air quality levels and forecast air quality at the time of opening are described in Section 5.6 'Baseline conditions'. Any significant air quality effects (or not), their mitigation and any residual effects are described in Section 5.9 'Assessment of likely significant effects'.
5.8	Department for Environment, Food and Rural Affairs (Defra) publishes future national projections of air quality based on evidence of future emissions, traffic and vehicle fleet. Projections are updated as the evidence base changes. Applicant's assessment should be consistent with this but may include more detailed modelling to demonstrate local impacts.	Refer to Section 5.3 'Assessment methodology' and Appendix 5.1 [TR010054/APP/6.3].
5.9	In addition to information on the likely significant effects of a project in relation to EIA, the Secretary of State must be provided with a judgement on the risk as to whether the project would affect the UK's ability to comply with the Air Quality Directive.	Refer to Section 5.9 'Assessment of likely significant effects'.
5.12	The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone/agglomeration.	Refer to Section 5.9 'Assessment of likely significant effects'.
5.13	The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will: • result in a zone/agglomeration which is currently reported as being	Refer to Section 5.9 'Assessment of likely significant effects'.

NPSNN para.	Requirement of the NPSNN	Location where information addresses policy requirements
	compliant with the Air Quality Directive becoming non-compliant; or • affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision	

5.2.4. An assessment of the Schemes conformity with the relevant paragraphs and provisions for air quality in the NPSNN is presented in the NPSNN Accordance Table, Appendix A of the Case for the Scheme [TR010054/APP/7.2].

5.2.5. Other relevant policies have been considered as part of the air quality assessment where these have informed the identification of receptors and resources and their sensitivity; the assessment methodology; the potential for significant environmental effects; and required mitigation. These policies include:

- The current version of the National Planning Policy Framework (NPPF) was published in 2019 (Ref 5.9), with air quality considered in paragraphs 103, 170 and 181 (conserving and enhancing the natural environment). In accordance with the NPPF, the NPSNN policies relating to the applicant's assessment are the primary source of policy guidance regarding this assessment.
- Planning Policy and Guidance (PPG), the air quality section of which was published 2014 (Ref 5.10);
- Black Country Core Strategy (observed by City of Wolverhampton Council) was adopted 2011; ENV8 (Air Quality); CSP3 (Environmental Infrastructure); and CSP5 (Transport Strategy); (Ref 5.11);
- South Staffordshire Council Core Strategy Development Plan Document adopted December 2012; Core Policy 2 (Protecting and Enhancing the Natural and Historic Environment) and Core Policy 11 (Sustainable Transport) (Ref 5.12);
- Wolverhampton Unitary Development Plan, adopted in 2006 (Ref 5.13) with selected policies saved in 2011 (Ref 5.14) following the adoption of the Black County Core Strategy; Saved Policy EP1 (Pollution Control); Saved Policy EP3 (Air Pollution);
- UK plan for tackling roadside nitrogen dioxide concentrations published July 2017 (Ref 5.15); and
- Clean Air Strategy 2019 (Ref 5.16).

5.2.6. These policies identify the need for a scheme specific air quality assessment to identify any potential air quality impact as a result of the development. The policies also identify measures to mitigate air quality effects through sustainable practices.

5.2.7. The PPG section on Air Quality (Ref 5.10), which is unchanged since March 2014, provides a summary of the air quality issues set out in the NPPF. The assessment includes analysis of the following, in accordance with the PPG:

- The existing air quality in the study area (existing baseline);
- The future air quality without the development in place (future baseline); and
- The future air quality with the development in place (with mitigation).

5.2.8. As required the assessment subsequently summarises the predicted changes in air pollution to ascertain whether the Scheme will lead to an unacceptable risk from air pollution, prevent sustained compliance with European Union (EU) limit values or fail to comply with the requirements of the Conservation of Habitats and Species Regulations (Ref 5.17), in line with the PPG. This means that the assessment is also in accordance with the NPSNN.

5.2.9. By considering the need for mitigation measures in order to minimise the impact of the Scheme on air quality, the assessment is in accordance with South Staffordshire District Council's Core Strategy (Ref 5.12).

5.2.10. In July 2017, The Department for Environment, Food and Rural Affairs (Defra) released the 'UK plan for tackling roadside nitrogen dioxide concentrations' (Ref 5.15). The plan principally focuses on empowering local councils to make major changes to their road systems. The plan requires local authorities to set out initial plans by the end of March 2018, followed by final plans by the end of December 2018. Alongside these plans a dataset of Defra's predicted pollutant concentrations along specific roads was published. This dataset is called the Pollution Climate Mapping (PCM) dataset and this is used to inform the assessment of compliance of the Scheme with EU Limit Values.

5.2.11. In January 2019, Defra published its Clean Air Strategy (Ref 5.16) which outlines proposals to tackle emissions from a range of sources. This includes providing clear effective guidance on how Air Quality Management Areas (AQMA), Clean Air Zones and Smoke Control Areas interrelate and how they can be used by local government to tackle pollution. New legislation will seek to shift the focus towards prevention of exceedances rather than tackling pollution when limits have been surpassed.

5.3. Assessment methodology

General approach

5.3.1. The methodology for the air quality assessment for the Scheme follows the guidance set out within the DMRB (Ref 5.1) and associated IANs (Refs 5.2, 5.3, 5.4 and 5.5). The assessment includes the following elements:

- construction phase dust assessment;
- construction phase combined assessment of additional construction traffic trips and traffic management;
- local operational air quality assessment for public exposure and European and nationally designated habitat sites;
- compliance risk assessment;
- Department for Transport (DfT) Web based Transport Analysis Guidance (WebTAG) plan level appraisal; and
- regional assessment of pollutant emissions.

5.3.2. Key methodology documents of relevance to the air quality impact assessment are as follows:

- DMRB, Volume 11, Section 3, Part 1 'Air Quality' (HA207/07) (Ref 5.1);
- IAN170/12: Updated air quality advice on the assessment of future NOx and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 Air Quality (Ref 5.2);
- IAN174/13: Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07) (Ref 5.3);
- IAN175/13: Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of proposed scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07) (Ref 5.4);
- IAN185/15: Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 Air Quality and Section 3, Part 7 Noise (Ref 5.5); and
- Defra Local Air Quality Management Technical Guidance LAQM.TG(16) (Ref 5.18).

5.3.3. The assessment methodology is described in detail in Appendix 5.1 [TR010054/APP/6.3].

Key environmental receptors

5.3.4. Throughout this assessment, reference is made to sensitive receptors. These are locations where members of the public may be exposed to and affected by air quality impacts. In relation to the Scheme, sensitive receptors are predominantly residential properties, but can also include, for example, schools, and internationally and nationally designated ecosystems. Where sensitive receptors are anticipated to be in a location for only a short period of time, then these locations have been considered against relevant short-term air quality objectives.

5.3.5. In this assessment the worst case receptors within the study area have been selected (i.e. receptors closest to affected roads) within 200 m, based on guidance presented in HA207/07 (page 3/2, paragraph 3.9). In this approach the receptors with the highest predicted concentration and biggest predicted change in pollutant concentration are considered. This is because the effect of pollutants from road traffic reduces with distance from the point of release, and beyond 200 m these are likely to have reduced to a concentration equivalent to background concentrations.

Construction phase

5.3.6. The key pollutants considered for the construction phase dust assessment, including any demolition works, are particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) and dust (i.e. larger particles) with the potential to settle around construction sites and cause soiling/deposition effects on surfaces. The sensitive receptors potentially affected are locations of public exposure for

both PM_{10} and dust and European or nationally designated ecosystem sites for exposure to dust.

5.3.7. Sensitive receptors identified for the construction phase dust assessment are those receptors closest to the Scheme and existing areas which would be affected by construction works (and construction compounds), up to a maximum distance of 200 m from the Scheme, based on guidance presented in HA207/07.

5.3.8. Sensitive receptors that may be affected by construction traffic movements (e.g. HGVs) are those located within 200 m of routes to and from areas of construction activity along the road network.

5.3.9. Sensitive receptors that may be affected by construction traffic management include those receptors located within 200 m of traffic management and potentially wider affected road links.

Operational phase

5.3.10. For nitrogen dioxide (NO_2) and particulate matter with diameters of less than 10 µm and 2.5 µm (PM_{10} and $PM_{2.5}$), there are two sets of ambient air quality criteria for the protection of public health, namely those set by the EU and transposed into UK law by The Air Quality Standards Regulations 2010 (Ref 5.7) and those implementing the UK National Air Quality Strategy (AQS) (Ref 5.19). A new Clean Air Strategy 2019 was published on the 14th of January 2019 (Ref 5.16). The Clean Air Strategy 2019 does not amend the air quality objective values considered for the Scheme.

5.3.11. The criteria set out in the AQS include standards and objectives for local authorities to work towards achieving. These apply in locations with relevant public exposure which are defined in the Defra technical guidance LAQM.TG(16) (Ref 5.18).

5.3.12. The air quality objectives are outlined in Table 5.2. Some pollutants have standards expressed as annual mean concentrations due to the chronic way in which they affect human health or the natural environment (i.e. effects occur after a prolonged period of exposure to elevated concentrations). Other pollutants also have standards expressed as 24-hour or 1-hour mean concentrations due to their acute effects on human health or the natural environment (i.e. after a relatively short period of exposure).

5.3.13. The air quality objectives have been set solely for the purposes of local air quality management. Under the local air quality management regime (Ref 5.20), local authorities have a duty to carry out regular assessments of air quality against the objectives. If it was unlikely that the objectives would have been met by 2010, local authorities were required to designate an AQMA and prepare an Air Quality Action Plan with the aim of achieving the objectives within the timeframes set out in Table 5.2.

5.3.14. The standards set by the EU are legally binding, mandatory limit values (LV) requiring national government compliance at the agglomeration scale. Local air quality criteria relevant to the air quality assessment for the Scheme are summarised in Table 5.2.

Table 5.2: Air quality standards

Pollutant	Averaging period	Limit value / objective	Date for compliance
Nitrogen dioxide (NO_2)	Annual mean	40 µg/ m^3	UK 11 June 2010
			EU 1 January 2010
	1-hour mean	200 µg/m^3 (not to be exceeded more than 18 times a year)	UK 11 June 2010
			EU 1 January 2010
Particulate matter (PM_{10})	Annual mean	40 µg/m^3	UK 11 June 2010
			EU 1 January 2005
	24-hour mean	50 µg/m^3 (not to be exceeded more than 35 times a year)	UK 11 June 2010
			EU 1 January 2005
Particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3	2020
			EU 1 January 2015
Nitrogen oxides (NOx)*	Annual mean	30 µg/m^3	UK 31 December 2000
			EU 19 July 2001
* For the protection of ecosystems			

5.3.15. The air quality objective for the protection of vegetation for nitrogen oxides (NOx) is based on the work of the United Nations Economic Commission for Europe and World Health Organisation (Ref 5.21). The objective for the protection of vegetation is an annual mean oxides of nitrogen concentration of 30 µg/m^3 and is included in The Air Quality Standards Regulations 2010 (Ref 5.7). The limit value for the protection of vegetation applies in locations more than 12.4 miles (20 km) from towns with more than 250,000 inhabitants or more than 3.1 miles (5 km) from other built-up areas, industrial installations or motorways.

5.3.16. In addition, critical loads for nitrogen and acid deposition have been determined which represent (according to current knowledge) the exposure below which there should be no significant harmful effects on 4sensitive elements of the ecosystem.

5.3.17. Critical loads are set for different types of ecosystem based on their respective sensitivity to nutrient nitrogen and acidity and have been obtained from the Air Pollution Information System (APIS) website (Ref 5.22) for each designated site with the potential to be affected by the Scheme.

5.3.18. The focus of this assessment is the change in annual mean NOx and NO_2 concentrations and rates of nitrogen deposition affecting sensitive ecosystems.

Establishing baseline conditions

Desk study

5.3.19. Baseline air quality data and sensitivity receptor data for the study have been gathered from the following sources:

- AQMA Interactive Map (Ref 5.23);
- Local Authority monitoring data (Ref 5.24, Ref 5.25, Ref 5.26, Ref 5.27, Ref 5.28, Ref 5.29 and Ref 5.30) (see Appendix 5.2 [TR010054/APP/6.3]);
- Highways England monitoring data (see Appendix 5.2 [TR010054/APP/6.3]);
- Defra PCM Model GIS data for the latest available year (Ref 5.31);
- Defra air pollution background concentration maps (Ref 5.32);
- locations of human health receptors (residential properties, schools, hospitals and elderly care homes) from Ordnance Survey (OS) base mapping (Ref 5.33); and
- boundaries of relevant designated ecological sites (Ref 5.34).

Significance of effect

5.3.20. The overall aim of the methodologies listed above is to identify potential likely significant air quality effects and compliance risks with the Ambient Air Quality Directive. A significant air quality effect is defined in IAN 174/13 and this relates to a series of key questions and changes in air quality at locations predicted to be above air quality objectives (refer to Table 5.2) with the Scheme.

5.3.21. The key questions for air quality described in IAN 174/13 are provided in Appendix 5.1 [TR010054/APP/6.3]. Following the collation of information to address those questions, an informed professional judgement, based on knowledge and experience of similar schemes, on the significance of local air quality effects for public exposure and nationally designated ecosystems has been established.

5.3.22. The questions set out in Appendix 5.1 [TR010054/APP/6.3] form the basis for determining likely significant local operational air quality effects for sensitive receptors. The question of how many people would be affected has been addressed by reference to the number of receptors predicted to experience small, medium and large changes in air quality. Where numbers of affected receptors are above the upper thresholds listed in Table 5.3 for locations above the air quality objective, this may suggest significant air quality effects are more likely.

Table 5.3: Guidance for number of properties constituting a significant effect

Magnitude of Change in NO_2 or PM_{10} ($\mu g/m^3$)	Number of receptors with:	
	Worsening of air quality already above objective or creation of a new exceedance	Improvement of air quality already above objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (>0.4 to 2)	30 to 60	30 to 60

5.3.23. The overall significance of predicted effects on local air quality is also evaluated in the context of relevant national (i.e. NPSNN) and local air quality planning policy and the findings of the compliance risk assessment as described in IAN 175/13.

5.3.24. The approach to significance is consistent with the approach outlined at the scoping stage and discussed with the local authorities that contain any of the Affected Road Network (ARN).

5.3.25. Detailed methodologies applied within this assessment are described in Appendix 5.1 [TR010054/APP/6.3], following the consideration of key environmental receptors and pollutants.

Scoping response

5.3.26. The proposed scope of the air quality assessment was detailed in the EIA Scoping Report (Ref 5.35) submitted to the Inspectorate on 11 January 2019. An overview of the Inspectorate's Scoping Opinion in relation to air quality effects is presented in Table 5.4. Where the assessment has been undertaken in accordance with the scoping opinion point, a response and the relevant ES section is provided; where an alternative approach has been agreed with the relevant stakeholders, an explanation is provided.

Table 5.4: Scoping opinion and response

Scoping Opinion	Where addressed in the ES
The Inspectorate	
The Inspectorate notes that construction plant emissions will be managed through best practice mitigation measures and that the potential impacts from dust emissions generated during the construction phase, as well as potential mitigation measures, will be addressed within the ES. Given this and the low-level likelihood that the Proposed Development would be demolished after its design life, the Inspectorate considers that significant effects are unlikely to occur and therefore agrees that these matters may be scoped out of the assessment.	Noted. No further action required.
The Inspectorate considers that the ES should include an assessment of effects associated with increased $PM_{2.5}$ resulting from the Proposed Development, where effects could be significant. In determining significance, the assessment should take into account performance against relevant target/limit values. Public Health England (PHE) have provided comment on $PM_{2.5}$ effects to human health […], to which the Applicant should have regard. Cross reference may be required in the ES to the Population and Health assessment. […] The study areas used for local and regional air quality assessment should be clearly defined and justified within the ES and include a plan that illustrates the extent of each study area. Where necessary, the 'affected road network' (ARN) boundary and the 200m boundary from the ARN should be included within such plans.	$PM_{2.5}$ concentrations with and without the Scheme is reported in Section 5.9 'Assessment of likely significant effects'. Study areas are clearly defined in Section 5.5 'Study area'. Refer to Figures 5.1 to 5.4 [TR010054/APP/6.2] which show the ARN and the 200 m study area.

Scoping Opinion	Where addressed in the ES
The Applicant should ensure that information used to inform the assessment in the ES is relevant and up to date taking into account the extent of any likely changes within the study area. The Applicant should make effort to discuss and agree with relevant consultation bodies the need for additional diffusion tube monitoring to inform the baseline assessment and include evidence of any agreement reached in the ES.	Refer to Section 5.3 'Assessment methodology', paragraphs 5.3.27 to 5.3.28 for details of consultation. Refer to Section 5.6 'Baseline conditions'. Based on the ARN sufficient monitoring data is available from Highways England and local authority sources to confirm model performance without the need for further monitoring.
On the basis that there is a risk that environmental standards will be breached, the Inspectorate expects that operational air quality effects and potential mitigation measures are further considered within the ES.	Refer to Sections 5.8 'Design, mitigation and enhancement' and Section 5.9 'Assessment of likely significant effects'.
The Inspectorate recommends that further air quality monitoring (including of PM_{10}) is undertaken to establish a robust baseline for air quality modelling.	Refer to Section 5.6 'Baseline conditions'. Based on the ARN sufficient monitoring data is available from Highways England and local authority sources to confirm model performance without the need for further monitoring.
Environment Agency	
We note mitigation measures such as dust suppression and replacement wildlife ponds are proposed as part of the scheme. If water is required for these purposes, then depending on the source of water and volumes required, abstraction or impoundment licences may be required from us.	Mitigation measures are discussed in Section 5.8 'Design, mitigation and enhancement'.
Public Health England	
We note that assessment of fine particulate matter ($PM_{2.5}$) within the air quality section is not proposed and justification for this is not provided. $PM_{2.5}$ is of interest with regard to transport emissions and the impact of air quality upon public health. We would therefore request that this be considered in the air quality assessment.	$PM_{2.5}$ concentrations with and without the Scheme are reported in Section 5.9 'Assessment of Likely Significant Effects'.
The scoping report states that air quality impacts will be modelled, and reference is made to currently available baseline monitoring data for NO_2 and PM_{10}. However, all the quoted relevant data relates to NO_2, rather than PM_{10}. The report states that no air quality monitoring is proposed. We recommend that air quality monitoring for at least PM_{10} is undertaken to provide a baseline for the modelling.	Refer to Section 5.6 'Baseline conditions'. Based on the ARN sufficient monitoring data is available from Highways England and local authority sources to confirm model performance without the need for further monitoring.
The scoping report also states that "in some circumstances it is possible to reduce impacts on air quality with appropriate mitigation measures, particularly if	Refer to Section 5.8 'Design, mitigation and enhancement'.

Scoping Opinion	Where addressed in the ES
impacts are focused in a small geographic area rather than spread across the extent of the air quality study area. However, the proposed Scheme design to date does not include specific air quality mitigation measures for the operational phase." We recommend that specific air quality mitigation measures are included for the operational phase.	
We note that the scoping report indicates that slight alteration of the route may be considered to increase the distance from properties on Dark Lane (currently 30 m from the centreline of the Scheme). We recommend that such re-routing is considered to lessen the impact on residents from air pollution.	The air quality assessment is based on the current design, as described in Chapter 2: The Scheme. Refer to Chapter 3: Assessment of Alternatives for details of options considered. Refer to Section 5.8 'Design, mitigation and enhancement'.
Hilton Parish Council	
Parish Council would ask that any Environmental Statement includes […] a separate assessment of air pollution specific to the Parish of Hilton on the basis that the proposed preferred route will, in places, be a mere 20 m away from existing housing.	The air quality assessment includes consideration of those receptors closest to the Scheme, in Hilton. Refer to Section 5.6 'Baseline conditions' for details of the existing and future baseline conditions at Hilton (paragraphs 5.6.27), Section 5.9 'Assessment of likely significant effects' (paragraph 5.9.20 and 5.9.21) and Figure 5.3 and 5.4 [TR010054/APP/6.2].

Consultation

5.3.27. Telephone conversations and/or email correspondence has been had with each Local Authority within which the Scheme has ARN. This has provided the opportunity for discussion on methodology and has allowed Environmental Health Officers at the local authorities to ask questions and raise potential issues. The local authorities to have been consulted with in this manner are:

- Cannock Chase District;
- Lichfield District;
- Shropshire County;
- South Staffordshire District;
- Telford and Wrekin District;
- Walsall District; and
- Wolverhampton City.

5.3.28. The Preliminary Environmental Information (PEI) Report for this Scheme (Ref 5.36) was published in May 2019 as part of the statutory consultation. The PEI Report presented the environmental information collected, together with the preliminary

findings of the assessment of likely significant environmental effects of the Scheme at the time. Comments received during public consultation and the associated responses, are detailed within the Consultation Report [TR010054/APP/5.1].

5.4. Assessment assumptions and limitations

5.4.1. Monitoring data have been obtained from local authorities and previous scheme-specific studies. The local operational air quality assessment uses a traffic dataset, the latest Defra local air quality management tools and guidance, and Highways England tools and guidance, with the predictions having been checked against the most recently available local air quality monitoring data. This approach minimises the assumptions and limitations of the local operational air quality assessment as far as practicable.

5.4.2. The operational air quality assessment is focussed on the immediate area along and around the Scheme and the wider ARN.

5.4.3. The construction air quality assessment is based on the best information currently available. As with all construction air quality assessments the exact details of activities will not be known before a specific contractor is appointed to complete the works and determines their exact construction methods and programme.

5.4.4. The construction of the Scheme would be undertaken in phases. The qualitative assessment of construction dust effects described in this chapter considers the construction of the Scheme as a whole, including all phases of the works. The quantitative assessment of construction phase vehicle movement emissions considers a single phase of construction, where construction vehicle movements associated with the Scheme are at their most frequent.

5.4.5. The Scheme would require works to the existing road network, which would necessitate the use of construction phase traffic management interventions during the works. The single construction period that is considered for the quantitative assessment of construction vehicle movement emissions also considers the effect of traffic management on the M54. The traffic management layouts provided by the buildability advisor indicate management of traffic on the M54 through Junction 1, whereby a lower speed limit would be enforced for a stretch of the motorway either side of Junction 1, as well as the diversion of a proportion of HGV traffic from the eastbound carriageway onto the Junction 1 eastbound diverge and merge slip roads. As a worst case assumption, this intervention on the M54 would coincide with when Scheme construction vehicle movements would be at their most frequent.

5.4.6. Elsewhere, it is not currently known what traffic management procedures would be put in place and thus to what extent traffic re-routing may take place. However, operational capacity of other roads and junctions potentially affected by the construction of the Scheme will be maintained where reasonably practicable.

5.4.7. Whilst there is the potential for the Scheme to open in phases, for the air quality assessment it has been assumed that there would be a single year of opening. The quantitative assessment of road traffic emissions therefore considers the point of full opening, at which the greatest change in road traffic movements would be experienced.

5.5. Study area

5.5.1. The assessment of construction phase traffic effects (typically Heavy Goods Vehicles (HGV) assessment and traffic management assessment) and operational phase traffic effects (local operational assessment) use a study area of 200 m around road sections likely to be affected by the Scheme during construction. This is due to the effect of pollutants from road traffic reducing with distance from the point of release, and beyond 200 m these are likely to have reduced to a concentration equivalent to background concentrations.

5.5.2. Therefore, individual sensitive receptors (within or outside AQMAs) are studied in the local operational assessment at distances of up to 200 m. The air quality study area for the construction phase HGV and traffic management assessments and the local operational assessment consider the Scheme, and those routes where the Scheme is predicted to have an impact (i.e. ARN). Affected road links (individually modelled sections of road) have been identified by comparing traffic data with the Scheme (Do-Something) and without the Scheme (Do-Minimum) against the local air quality screening criteria presented in DMRB, which are as follows:

- The road alignment would change by 5 m or more.
- The annual average daily traffic (AADT) flows would change by 1,000 or more.
- Heavy duty vehicles (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows would change by 200 AADT or more.
- Daily average speeds would change by 10 km/hr or more.
- Peak hour speed would change by 20 km/hr or more.

5.5.3. These criteria are used to identify whether significant changes in air quality are likely. If a criterion is not met or exceeded, then a significant change in air quality is not anticipated.

5.5.4. The air quality assessment has considered those areas where a change in traffic above the criteria identified above occurs in the immediate area along and around the Scheme as shown on Figure 5.1 for the construction and operation of the Scheme [TR010054/APP/6.2]. It should be noted that there are fewer affected roads during the construction phase and, therefore, a smaller study area, when compared to the operational phase assessment. Figure 5.2 shows that a number of AQMAs have affected roads for the operational scenarios and particular attention to potential air quality impacts has been paid to these locations [TR010054/APP/6.2].

5.5.5. Figure 5.1 also shows the full extent of the modelled road network used to inform this assessment, which has been defined through consultation with the transport modelling team to allow traffic Scheme effects to be evaluated [TR010054/APP/6.2]. The modelled road network is the area over which significant impacts of interventions are certain and the greatest traffic model detail has been developed.

5.5.6. Additional links are included in the local operational and construction phase air quality modelling where the additional emissions from these areas or links are required to describe pollutant concentrations at sensitive receptor locations. This has been carried out with regards to sensitive receptors along affected routes and adjacent to the Scheme.

5.5.7. The plan level study area is the same as the local assessment study area as defined in paragraph 5.5.2.

5.5.8. The regional assessment considers emissions rather than concentrations of pollutants. The regional air quality study area is based on the regional screening criteria presented in DMRB given:

- a change of more than 10% AADT; or
- a change of more than 10% to the number of HDV AADT; or
- a change in daily average speed of more than 20 km/hr.

5.5.9. The emissions presented for carbon are presented for the whole traffic model study area for consistency with WebTAG (Ref 5.37).

5.6. Baseline conditions

Air Quality Management Areas

5.6.1. There are no AQMAs within the Scheme boundary. There are however a number of AQMAs located within 200 m of the ARN and these are listed in Table 5.5.

Table 5.5: AQMAs containing affected roads

Local Authority	AQMA	Description	Pollutant and Averaging Period
Cannock Chase District Council	Cannock Chase AQMA	Area encompassing A5 (Watling Street) between junction with A34 (Walsall Road) and the district boundary with South Staffordshire. Includes the stretch of the A460 (Wolverhampton Road) between junction with A5 (Watling Street) and the district boundary.	Annual mean NO_2
Cannock Chase District Council	CCDC AQMA 2	A5 Watling Street between Churchbridge traffic islands and the district boundary with Walsall. Effectively continuing the existing AQMA to include all of the A5 within the district.	Annual mean NO_2
Lichfield City Council	A5 Muckley Corner AQMA (no.1)	Area encompassing the Muckley Corner Roundabout on the A5 along with a number of surrounding buildings.	Annual mean NO_2
South Staffordshire District Council	AQMA No.1 (Woodbank)	Area encompassing Woodbank House, Teddesley Road, Penkridge and the adjacent M6 Motorway. It is	Annual mean NO_2

Local Authority	AQMA	Description	Pollutant and Averaging Period
		understood that this AQMA is likely to soon be revoked.	
South Staffordshire District Council	AQMA No.4 (Wedges Mills)	Area encompassing properties on the western side of Wolverhampton Road (A4601), Wedges Mills from its junction with Wood Lane for a distance of 200m northwards.	Annual mean NO_2
South Staffordshire District Council	AQMA No. 5 (Oak Farm)	Oak Farm, Watling Street (A5), Four Crosses.	Annual mean NO_2
Walsall Metropolitan Borough Council	Walsall AQMA	Borough wide.	Annual mean NO_2 and hourly NO_2
Wolverhampton City Council	Wolverhampton AQMA 2005	City wide.	Annual mean NO_2 and 24-hr PM_{10}

5.6.2. The closest AQMA is the Wolverhampton city-wide AQMA, which is located within 400 m of the Scheme boundary.

Monitoring Data

5.6.3. To comply with local air quality management regime reporting requirements, local authorities often collect air quality monitoring data within their administrative area. The data are often collected through a combination of automatic monitoring stations and passive NO_2 diffusion tubes.

5.6.4. All of the NO_2 diffusion tube and automatic monitoring station data gathered by the local authorities within which the ARN is present, for 2017 (the existing baseline year considered in this assessment), is presented in Table 1 of Appendix 5.2 [TR010054/APP/6.3], along with PM_{10} and $PM_{2.5}$ data. Of that data, those that were gathered within 200 m of the ARN are summarised in Table 5.6, this includes data from two local authority automatic monitors and 29 local authority commissioned active diffusion tube monitoring sites, collected by four local authorities.

5.6.5. The data shows two exceedances to the annual mean objective value of NO_2 across the sites listed in Table 5.6. These exceedances occurred at roadside locations on the approach to the Muckley Corner roundabout in the Lichfield Council area (MUC1abc and MUC3). Elsewhere, monitored concentrations can be considered at risk of an exceedance of the annual mean objective value for NO_2, where concentrations are within 10% of the objective value. This includes two other locations on the approach to the Muckley Corner roundabout (MUC1 and MUC2), and at two locations in the Cannock Chase Council area, adjacent to the A5 north-west of Junction T7 of the M6 Toll (54WS) and adjacent to the M6 Toll south-east of Junction T7 (268WS).

Table 5.6: Local authority monitoring sites

Site ID	X	Y	Local Authority	Monitor type	Location type	Monitored annual mean conc. NO_2 2017 ($\mu g/m^3$)
PE11	393519	315327	South Staffordshire	Diffusion Tube	Roadside	26.4
PE2a	393176	313866	South Staffordshire	Diffusion Tube	Roadside	27.5
PE2b	393176	313866	South Staffordshire	Diffusion Tube	Roadside	27.8
PE2c	393176	313866	South Staffordshire	Diffusion Tube	Roadside	30.8
PE	393176	313859	South Staffordshire	Automatic	Roadside	35.0
HA2	394776	309756	South Staffordshire	Diffusion Tube	Roadside	33.2
HA5	394828	309737	South Staffordshire	Diffusion Tube	Roadside	28.8
HA6	394905	309708	South Staffordshire	Diffusion Tube	Roadside	30.4
SA2	396716	308742	South Staffordshire	Diffusion Tube	Roadside	29.4
SA5	396704	308673	South Staffordshire	Diffusion Tube	Roadside	31.9
SA6	396701	308613	South Staffordshire	Diffusion Tube	Roadside	27.6
BTLB	397952	308567	Cannock Chase	Diffusion Tube	Roadside	35.0
54WS	398251	308428	Cannock Chase	Diffusion Tube	Roadside	37.5
67WS	398051	308512	Cannock Chase	Diffusion Tube	Roadside	28.2
268WS	400731	307419	Cannock Chase	Diffusion Tube	Roadside	36.9
MUC6	408161	306556	Lichfield	Diffusion Tube	Roadside	37.5
A52A	408893	306549	Lichfield	Diffusion Tube	Roadside	31.8
MUC1	408164	306513	Lichfield	Diffusion Tube	Roadside	39.9
MUC1ABC	408164	306513	Lichfield	Diffusion Tube	Roadside	41.3

Site ID	X	Y	Local Authority	Monitor type	Location type	Monitored annual mean conc. NO_2 2017 ($\mu g/m^3$)
A52B	408667	306500	Lichfield	Diffusion Tube	Roadside	34.5
MUC2	408165	306487	Lichfield	Diffusion Tube	Roadside	36.3
MUC3	408097	306468	Lichfield	Diffusion Tube	Roadside	51.9
ST9A	391535	303346	Wolverhampton	Diffusion Tube	Roadside	31.0
A4	391258	302199	Wolverhampton	Automatic	Roadside	36.0
STA5	391258	302199	Wolverhampton	Diffusion Tube	Roadside	33.0
STA6	391258	302199	Wolverhampton	Diffusion Tube	Roadside	34.0
STA7	391258	302199	Wolverhampton	Diffusion Tube	Roadside	33.0
STA1	391390	299803	Wolverhampton	Diffusion Tube	Roadside	29.0

5.6.6. Considering the relevant pollutants and comparing these against AQS objectives, the following is concluded:

- national assessments have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene, benzene, lead and sulphur dioxide concentrations exceeding the relevant UK AQS objectives due to emissions from traffic anywhere in the UK. These pollutants have not been considered further as they are very unlikely to be present at levels which would represent potential significant impacts due to the Scheme;
- for particulate matter (PM_{10} and $PM_{2.5}$), none of the local authorities within which there is ARN have identified a current risk of annual or daily exceedances (noting that Wolverhampton City Council had identified past risk of exceedance of daily mean PM_{10} concentrations when the Wolverhampton AQMA was declared in 2005) ; and
- for the hourly mean NO_2 UK AQS objective, none of the local authorities within which there is ARN have identified a current risk of exceedance, (noting that Walsall Metropolitan Borough Council had identified past risk of exceedance of hourly mean NO_2 concentrations when the Walsall AQMA was declared in 2006), so the hourly mean for this pollutant is not considered as part of the air quality assessment in terms of having potential for significant impacts due to the Scheme.

5.6.7. On this basis, changes to the annual mean NO_2 concentrations represent the focus of the air quality assessment for public exposure (i.e. residential properties) whilst

predicted changes to the concentrations of PM_{10} and $PM_{2.5}$ are also reported consistent with the Inspectorate Scoping Opinion requirements.

5.6.8. In addition to the local authority data, Highways England has carried out passive diffusion tube monitoring at a series of locations in close proximity to the M54, M6 and M6 Toll motorways, to inform the local air quality assessment for the Scheme. The full Highways England monitoring dataset is provided in Table 3 of Appendix 5.2 [TR010054/APP/6.3] Highways England diffusion tubes located within 200 m of the ARN were utilised to supplement the data available from local authorities and were located to represent sensitive receptor exposure close to the motorways. There are 66 Highways England commissioned diffusion tube monitoring sites within 200 m of the ARN. Details of the site locations, monitoring survey periods and monitored concentrations are available in Table 5.7.

5.6.9. When annualised to 2017, to account for changes in background concentrations between the monitoring periods and the assessment base year, the data shows no exceedances or risk of exceedances of the annual mean objective value of NO_2.

Table 5.7: Highways England commissioned diffusion tube monitoring sites

Site ID	X	Y	Local Authority	Location Type	Monitored annual mean conc. NO_2 2017 ($\mu g/m^3$)
M6J13J15_009_0813	392794	318312	South Staffordshire	Roadside	19.6
M6J10AJ13_025_1012	392748	318084	South Staffordshire	Roadside	18.5
M6J10AJ13_021_0710	393019	318074	South Staffordshire	Roadside	19.4
M6J13J15_011_0813	392777	317919	South Staffordshire	Roadside	34.1
M6J13J15_007_0813	393502	315360	South Staffordshire	Roadside	30.7
M6J10AJ13_020_0710	393524	315330	South Staffordshire	Roadside	21.8
M6J13J15_008_0813	393420	315243	South Staffordshire	Roadside	24.4
M6J13J15_006_0813	393198	314062	South Staffordshire	Roadside	18.2
M6J10AJ13_040_1012	393197	314061	South Staffordshire	Roadside	17.2
M6J10AJ13_015_0710	393152	313988	South Staffordshire	Roadside	29.7
M6J10AJ13_014_0710	393179	313984	South Staffordshire	Roadside	31.2
M6J13J15_005_0813	393187	313973	South Staffordshire	Roadside	30.5

Site ID	X	Y	Local Authority	Location Type	Monitored annual mean conc. NO_2 2017 (µg/m^3)
M6J10AJ13_013_0710	393213	313967	South Staffordshire	Roadside	26.1
M6J10AJ13_012_0710	393242	313962	South Staffordshire	Roadside	26.7
M6J10AJ13_016_0710	393326	313959	South Staffordshire	Roadside	33.1
M6J13J15_002_0813	393341	313947	South Staffordshire	Roadside	34.9
M6J10AJ13_017_0710	393347	313945	South Staffordshire	Roadside	26.3
M6J10AJ13_018_0710	393371	313941	South Staffordshire	Roadside	24.3
M6J10AJ13_019_0710	393420	313932	South Staffordshire	Roadside	20.5
M6J13J15_004_0813	393181	313870	South Staffordshire	Roadside	25.5
M6J10AJ13_011_0710	393177	313866	South Staffordshire	Roadside	22.9
M6J13J15_003_0813	393097	313038	South Staffordshire	Roadside	16.7
M6J10AJ13_026_1012	391243	310706	South Staffordshire	Roadside	19.4
M6J13J15_001_0813	392496	310309	South Staffordshire	Roadside	21.7
M6J10AJ13_009_0710	392630	310258	South Staffordshire	Roadside	20.1
M6J10AJ13_008_0710	393643	310049	South Staffordshire	Roadside	23.2
M54M6TL_017_0813	396886	309188	Cannock Chase	Roadside	25.8
M54M6TL_019_0813	394133	308814	South Staffordshire	Roadside	24.2
M6J10AJ13_007_0710	394140	308783	South Staffordshire	Roadside	17.2
M54M6TL_033_0813	398011	308563	Cannock Chase	Roadside	34.2
M6J10AJ13_006_0710	394657	308500	South Staffordshire	Roadside	22.5
M54M6TL_025_0813	398169	308455	Cannock Chase	Roadside	31.4
M54M6TL_016_0813	396638	308307	South Staffordshire	Roadside	22.3

Site ID	X	Y	Local Authority	Location Type	Monitored annual mean conc. NO_2 2017 ($\mu g/m^3$)
M6J10AJ13_028_1012	397610	308200	South Staffordshire	Roadside	23.3
M54M6TL_034_0813	398687	308152	South Staffordshire	Roadside	24.9
M54M6TL_015_0813	396350	307624	South Staffordshire	Roadside	25.0
M6J10AJ13_027_1012	396348	307621	South Staffordshire	Roadside	25.2
M54M6TL_028_0813	401959	307241	Cannock Chase	Roadside	24.5
M54M6TL_014_0813	397314	307114	South Staffordshire	Roadside	20.2
M54M6TL_030_0813	404575	307082	Walsall	Roadside	19.1
M54M6TL_029_0813	403333	307005	Walsall	Roadside	18.8
M54M6TL_013_0813	397218	306936	South Staffordshire	Roadside	20.7
M54M6TL_011_0813	395917	306865	South Staffordshire	Roadside	24.4
M54M6TL_012_0813	396533	306125	South Staffordshire	Roadside	21.2
M54M6TL_010_0813	394715	306103	South Staffordshire	Roadside	19.0
M54M6TL_009_0813	394733	306064	South Staffordshire	Roadside	27.1
M54M6TL_026_0813	393818	305581	South Staffordshire	Roadside	14.3
M54M6TL_002_0813	394399	305464	South Staffordshire	Roadside	33.4
M54M6TL_003_0813	394676	305432	South Staffordshire	Roadside	14.0
M54M6TL_001_0813	394224	304946	South Staffordshire	Roadside	30.7
M54M6TL_021_0813	397196	304700	South Staffordshire	Roadside	28.8
M54M6TL_007_0813	391568	304683	South Staffordshire	Roadside	22.9
M54M6TL_008_0813	391448	304679	South Staffordshire	Roadside	18.9
M54M6TL_020_0813	397030	304396	South Staffordshire	Roadside	28.1
M54M6TL_006_0813	391680	304175	Wolverhampton	Roadside	19.6

Site ID	X	Y	Local Authority	Location Type	Monitored annual mean conc. NO_2 2017 (µg/m^3)
M6J10AJ13_003_0710	396555	304038	South Staffordshire	Roadside	21.0
M54M6TL_004_0813	396138	303737	South Staffordshire	Roadside	21.9
M54M6TL_005_0813	393843	303469	South Staffordshire	Roadside	16.1
M6J10AJ13_002_0710	396994	303433	South Staffordshire	Roadside	22.4
M6J10AJ13_001_0710	396957	303269	South Staffordshire	Roadside	22.2
M54M6TL_024_0813	397974	302165	South Staffordshire	Roadside	23.3
M54M6TL_023_0813	398216	301974	Walsall	Roadside	38.3
M54M6TL_022_0813	398121	301920	Walsall	Roadside	30.1
M6J10AJ13_029_1012	398503	301297	Walsall	Roadside	25.5
M6J10AJ13_031_1012	398975	300369	Walsall	Roadside	29.7
M6J10AJ13_030_1012	399040	300126	Walsall	Roadside	26.5

EU Limit Value compliance

5.6.10. Information on areas exceeding EU limit value thresholds (40 µg/m^3 for annual mean NO_2) is available from Defra's PCM Model (Ref 5.31). This model provides 'road contributed' concentrations of pollutants, including annual mean NO_2.

5.6.11. There are 128 Defra links present within the ARN. Of these, 12 links are predicted to exceed the EU limit value threshold based on 2017 roadside concentrations. Those predicted to exceed the Limit Value are summarised in Table 5.8.

5.6.12. Of the 128 Defra links present in the ARN, none are predicted to exceed the EU Limit Value threshold based on 2024 roadside concentrations (opening year). The highest predicted annual mean NO_2 concentration in 2024 being 28.7 µg/m^3.

Table 5.8: Roads within the study area with Defra PCM links predicted to exceed 40 µg/m^3 annual mean NO_2 in 2017

Road	Local Authority	Compliance area	Maximum predicted annual mean NO_2 in 2017 (µg/m^3)
A449	Wolverhampton City Council	West Midlands Urban Area	40.2
M6	South Staffordshire District Council	West Midlands	41.0

Defra background pollutant concentrations

5.6.13. Annual mean background pollutant concentration estimates have been sourced from Defra's 2017 based background maps for the study area for both NO_2 and PM_{10}. These maps present estimated background pollutant concentrations for the whole country at a resolution of 1 km x 1 km squares.

5.6.14. Contributions from motorways, trunk A-roads and primary A-roads within the grid squares of the background maps have been removed from the mapped concentrations using the Sector Removal Tool provided by Defra, as these sources are explicitly modelled in the assessment.

5.6.15. The range of background concentrations for the centre of each 1 km x 1 km square covering the study area for 2017 and 2024 (opening year) is presented in Table 5.9.

5.6.16. In years subsequent to 2017 background concentrations are predicted to decrease year-on-year. This is in large part due to the influence of improving vehicle exhaust emission standards over time. This decrease is most notable in the annual mean concentrations of NO_2 reported.

Table 5.9: Summary of Defra estimated background map pollutant concentrations (sector removed) across the study area

Statistic	Annual Mean NO_2		Annual Mean PM_{10}	
	2017	2024	2017	2024
Minimum	7.4	5.3	11.9	11.3
Average	14.6	10.7	14.8	14.2
Maximum	28.2	21.7	19.2	18.6

5.6.17. Designated ecological sites in the air quality study area which could include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Ramsar sites, and which contain features which are sensitive to air pollutants, are summarised in Table 5.10 and illustrated on Figure 5.1 [TR010054/APP/6.2]. Site relevant critical loads, background nitrogen deposition rates and NOx concentrations within these designated sites are also presented, which indicate that critical loads for nitrogen deposition are currently exceeded by the background contribution alone at designated sites in the air quality study area but that the critical level for NOx for the protection of vegetation (30 µg/m^3) is not exceeded at any sites (Ref 5.22).

Table 5.10: Designated ecological sites within air quality study area containing features which are sensitive to air pollutants

Designated site	Relevant nitrogen critical load class[1]	Critical load (kg N/ha/yr)[1,2]	Background nitrogen deposition (kg N/ha/yr)[1,3]	Background NOx concentration (µg/m^3)
Belvide Reservoir SSSI	Standing Open Water and Canals	10	24.9	10.0

Designated site	Relevant nitrogen critical load class[1]	Critical load (kg N/ha/yr)[1,2]	Background nitrogen deposition (kg N/ha/yr)[1,3]	Background NOx concentration (µg/m^3)
Stowe Pool and Walk Mill Clay Pit SSSI (Unit 2)	Standing Open Water and Canals	10	60.3	21.1
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (Unit 7)	Lowland Fen, Marsh, and Swamp	5	25.6	19.4
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (Unit 8)	Lowland Dwarf Shrub Heath	10	25.6	19.4
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI(Unit 9)	Lowland Dwarf Shrub Heath	10	25.6	19.7
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (Unit 13)	Standing Open Water and Canals	10	25.6	17.9
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (Unit 14)	Standing Open Water and Canals	10	25.6	19.4
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (Unit 15)	Lowland Dwarf Shrub Heath	10	25.6	19.4

[1]Relevant nitrogen critical load class, critical load, max. nitrogen deposition rate and maximum NOx concentration data taken from Air Pollution Information System website (http://www.apis.ac.uk/) (Ref 5.22). Note these values are statistics for the entire designated site. Specific values will be used in the assessment at the modelled locations.

[2]Taken from 'Indicative values within nutrient nitrogen critical load ranges for use in air pollution impact assessments' (http://www.apis.ac.uk /indicative-critical-load-values), and advice from the project ecologists.

[3]These data are the most recent available from the APIS website and are a 3-year mean for the period 2015-17.

Future baseline

5.6.18. This section provides the future baseline predictions for each year being considered within the air quality assessment, the construction phase (2021) and the operational phase (2024).

5.6.19. Selected air quality sensitive receptors have been chosen to represent relevant exposure to pollutants of concern at locations within 200 m of the ARN. For the construction phase, this includes residential receptors located adjacent to the A460 Cannock Road and stretches of the M6 and M54 on the approach to and from the A460, where construction vehicle movements converge close to the Scheme construction compounds and increase traffic flows.

5.6.20. For the operational phase this includes receptors within 200 m of the Scheme alignment, including residential properties on Dark Lane and Park Road, where there would be an increase in vehicle flows once the Scheme is in operation. It also includes locations with 200 m of the A460 Cannock Road, where there would be a large decrease in vehicle flows, due to the alternative route offered with the Scheme in operation. Elsewhere, receptors are located adjacent to the ARN identified on roads leading to and from the Scheme and the A460, including stretches of the M6, between Junction 11 and Junction 13, and between Junction 8 and Junction 10, the M54, between Junction 1 and Junction 4, the A449, between Wolverhampton and M6 Junction 13, the A5 between Telford and M6 Toll Junction T7, and the A5 on the approach to and from the Muckley Corner roundabout, and the M6 Toll, between Junction T4 and the M6 (Junction T8).

5.6.21. Predicted concentrations of annual mean NO_2 and PM_{10} along with the predicted number of days exceedance of the 24-hour PM_{10} objective are presented in Appendix 5.3 [TR010054/APP/6.3] for all receptors discussed in this section. Receptor locations are illustrated on Figure 5.3 [TR010054/APP/6.2].

Construction year baseline (2021)

5.6.22. Within the study area determined by the ARN for the construction phase, annual mean concentrations of NO_2 in the construction DM scenario are predicted to be below the 40 µg/m^3 air quality objective. The highest concentrations of up to around 36 µg/m^3 are predicted to occur at locations adjacent to the Cannock Road (A460), near to the junction of New Road and Dark Lane (R336, R374, R375 and R377). Elsewhere, annual mean concentrations are less than 30 µg/m^3. This includes at locations where the construction phase ARN covers sections of the M6, at and around Junction 11A (R301-R303) and Junction 11 (R427-R429), and the M54, east of Junction 1 (R234 and R235). Annual mean concentrations of NO_2 here peak at around 28 µg/m^3, 25 µg/m^3 and 19 µg/m^3 respectively.

5.6.23. Annual mean concentrations of PM_{10} and $PM_{2.5}$ in the construction DM scenario are well below the air quality objective values, with maximum concentrations of around 17 µg/m^3 (R383 on Cannock Road) and 11 µg/m^3 (R301 adjacent to the M6 at Junction 11a) respectively.

Opening year baseline (2024)

5.6.24. Annual mean concentrations of NO_2 are predicted to be above the 40 µg/m^3 annual mean NO_2 objective at six receptors in the 2024 Do-Minimum (DM) scenario. These receptors are all located within 50 m of the M6 - two on Lichfield Road, at Willenhall (R205 and R206) and four on Darlaston Road, in Walsall (R228-R231).

5.6.25. At receptors closest to the M6 on Darlaston Road, Walsall (R228-R231), predicted annual mean concentrations of NO_2 range from 49.6 µg/m^3 to 72.6 µg/m^3 in the DM scenario. Where annual mean concentrations exceed 60 µg/m^3 (R228 and R229), it is anticipated that the hourly mean NO_2 objective (200 µg/m^3) may also be exceeded.

5.6.26. At receptors on the east side of the M6 on Lichfield Road, Willenhall (R205-R206), predicted annual mean concentrations of NO_2 range from 45.7 µg/m^3 to 45.9 µg/m^3 in the DM scenario.

5.6.27. Elsewhere within the study area, annual mean NO_2 concentrations are predicted to be below the NO_2 objective. At the properties closest to the Scheme at Hilton and Shareshill, on Dark Lane (R312), Hilton Lane (R233 and R311) and east of the A460 (R306), annual mean NO_2 concentrations are less than 18 µg/m^3. At locations adjacent to the A460 at Featherstone and Shareshill, annual mean NO_2 concentrations range from 20.3 µg/m^3 to 33.9 µg/m^3.

5.6.28. The highest concentrations identified that are below the annual mean NO_2 objective are predicted to occur at locations close to the A449 on the approach to Junction 2 of the M54 (R045 (36.3 µg/m^3), receptors on the west side of the M6 on Lichfield Road, Willenhall (R204 (37.9 µg/m^3), receptors north of Bell Lane (A4124) at Bloxwich (R212 (38.0 µg/m^3) and R214 (36.4 µg/m^3), receptors immediately adjacent to the M6 north of Junction 8, on Brockhurst Terrace (R225 (36.4 µg/m^3), receptors immediately east of the M6, north of Penkridge (R284 (36.1 µg/m^3), and receptors on Watling Street, south of Cannock (R438 (36.8 µg/m^3).

5.6.29. Annual mean concentration of PM_{10} and $PM_{2.5}$ are well below the air quality objectives, with maximum concentrations in the study area of 26.6 µg/m^3 and 21.4 µg/m^3 respectively.

5.7. Potential impacts

5.7.1. Mitigation measures being incorporated in the design and construction of the Scheme are set out in Section 5.8. Prior to implementation of the mitigation, the Scheme has the potential to affect air quality (positively or negatively), both during construction and once in operation, in the following ways:

- there could be increased emissions of dust during construction of the Scheme from dust-raising activities on site;
- there could be emissions associated with non-road mobile machinery (NRMM) undertaking construction works;
- air quality could be affected by changes in traffic flows during construction, as a result of temporary traffic management measures and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour;
- once operational, by changes in vehicle activity (flows, speeds and composition) as a result of the Scheme; and
- air quality could be affected by any changes in the distances between sources of emissions and air quality sensitive receptors.

Construction

5.7.2. There is some potential for adverse effects during the construction of the Scheme in relation to construction dust and plant equipment (e.g. NRMM) and vehicle emissions. However, any effects on human health related to air quality would be temporary (i.e. during the period of the construction works only) and could be suitably minimised by the application of industry standard mitigation measures. Standard and further standard mitigation measures are therefore presented in Appendix 5.4 to minimise the risk of adverse effects at sensitive receptors [TR010054/APP/6.3].

Operation

5.7.3. On the basis of the available information, including existing monitored concentrations in the wider study area, exceedances of the annual mean NO_2 UK AQS objective have the potential to occur at limited locations within 200 m of the ARN.

5.7.4. Operational impacts on air quality may be difficult to avoid, but in some circumstances where significant effects are likely, it is possible to reduce or repair impacts on air quality with appropriate mitigation measures, particularly if impacts are focused in a small geographic area rather than spread across the extent of the air quality study area.

5.8. Design, mitigation and enhancement measures

Embedded mitigation

5.8.1. The Scheme has been designed, as far as possible, to avoid and minimise impacts and effects on Air Quality through the process of design-development (Refer to Chapter 3: Assessment of Alternatives) considering good design principles. Embedded mitigation defined within the DMRB as 'Design measures which are integrated into a project for the purpose of minimising environmental effects' is reported as part of the Scheme description in Chapter 2: The Scheme. The following section reports the essential mitigation required in addition to embedded mitigation to reduce and offset likely significant adverse environmental effects.

Essential mitigation

5.8.2. A number of essential mitigation measures have been identified to reduce, remediate or compensate likely significant adverse environmental effects.

Construction

5.8.3. The duration of the Scheme's construction programme is approximately three years. During this period there is the potential for changes in air quality due to dust emissions from construction activity, emissions from site plant equipment and HGVs and also from changes in traffic flows along the Scheme and wider road network with traffic management in place.

5.8.4. A Construction Environmental Management Plan (CEMP) will be prepared and implemented by the construction contractor, which will incorporate measures set out within the Outline Environmental Management Plan (OEMP) [TR010054/APP/6.11]. The CEMP will include a range of best practice construction phase dust mitigation measures required for all works undertaken where there is potential for adverse effects on sensitive receptors (e.g. residential properties, schools and hospitals).

5.8.5. The types of activities with the potential to generate dust during the construction phase include:

- movement of vehicles;
- enabling works (e.g. verge clearance);
- earthworks;

- minor demolition (e.g. concrete bases and footings);
- excavation and installation of drains and communication ducts;
- construction of retaining walls etc.;
- surfacing works;
- central reserve works;
- installation of verge furniture and planting vegetation; and
- stock piling and storage of materials.

5.8.6. The above activities would be mitigated using standard mitigation measures as presented in Appendix 5.4 [TR010054/APP/6.3] for example:

- develop and implement a series of dust management measures and monitoring measures (e.g. periodic visual inspections within and along site boundaries);
- all construction plant would use fuel equivalent to ultra-low sulphur diesel (ULSD) where possible;
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; and
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site) where reasonably practicable.

5.8.7. Where standard mitigation measures may not be sufficient to minimise emissions of dust alone, further standard mitigation measures are proposed as presented in Appendix 5.4 [TR010054/APP/6.3].

5.8.8. The mitigation measures listed in Appendix 5.4 [TR010054/APP/6.3] are based on industry best practice and those presented by the Institute of Air Quality Management (IAQM) in their guidance on the assessment of dust from demolition and construction sites (Ref 5.38).

5.8.9. Locations considered to be higher risk, and therefore requiring the application of further standard measures are those with sensitive receptors (e.g. residential properties, schools and hospitals) close to the works i.e. within 200 m.

5.8.10. As part of good practice for locations with higher dust risks and closer proximity to dust sensitive receptors (e.g. demolition of exiting highway infrastructure and earthworks for the Scheme cuttings) monitoring may be required. Monitoring may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/ or visual inspections. The final details of any monitoring will be consulted upon between the contractor and South Staffordshire District Council and these details will be outlined in the final CEMP, with outline information included in the OEMP [TR010054/APP/6.11].

Operation

5.8.11. No essential mitigation measures are considered to be required for the operational phase of the Scheme. The Do-Something pollutant concentrations and impacts

reported in Section 5.9 demonstrate that the operation of the Scheme would not have a significant effect on local air quality that would require essential mitigation.

Enhancement measures

5.8.12. There are no specific enhancement measures proposed for air quality during the operation of the Scheme.

5.9. Assessment of likely significant effects

Construction

Dust Assessment

5.9.1. There is potential for temporary adverse impacts from dust emissions to occur at sensitive receptors located close to the Scheme during the construction works.

5.9.2. The following sensitive receptors are located within 200 m of the Scheme boundary:

- residential properties and the Red White and Blue Public House, at Featherstone, the nearest of which to the Scheme boundary are to the west of Cannock road;
- residential properties at Hilton, the nearest of which are located on Hilton Lane, Dark Lane and Park Road, to the east and west of the Scheme respectively; and
- residential properties located close to Junction 11 of the M6, the nearest of which are on Wolverhampton Road.

5.9.3. There are no nationally or internationally designated ecological receptors located within 200 m of the Scheme boundary, although there are locally designated conservation sites and ancient woodland.

5.9.4. The locations listed above could be affected by construction dust emissions. However, the specific activities that are most likely to generate dust and have receptors within 200 m of are as follows:

- earthworks, particularly those associated with lowering of grade, affecting residential properties on Dark Lane, Park Road and Hilton Lane in Hilton and Brookfield Farm, Shareshill;
- construction work across the length of the Scheme, affecting properties on A460 Cannock Road, Featherstone, and Dark Lane, Park Road and Hilton Lane, in Hilton;
- haul routes potentially affecting residential properties on Cannock Road, Featherstone, and Dark Lane and Hilton Lane, in Hilton; and
- material stockpiles, including those at the two construction compounds, affecting residential properties on A460 Cannock Road and isolated properties near Shareshill and Little Saredon.

5.9.5. Site specific mitigation measures may be necessary to avoid significant temporary effects on air quality for these activities and locations, in addition to standard mitigation measures. These measures are outlined in the OEMP [TR010054/APP/6.11] and Appendix 5.4 [TR010054/APP/6.3]. Adoption of such

measures would minimise the risk of significant adverse dust effects, such that no likely significant air quality effects would be expected.

5.9.6. Other emissions associated with the construction phase such as mobile or stationary plant are also not expected to cause a significant air quality effect at receptors. This is because these emissions will be controlled through mitigation measures provided in Appendix 5.4 [TR010054/APP/6.3] and are included in the OEMP [TR010054/APP/6.11]. Further details of the construction plant considered are listed in Appendix 5.4 [TR010054/APP/6.3].

Local air quality assessment

5.9.7. This section provides the predictions for the effect of both traffic management (the diversion of vehicles at M54 Junction 1) and additional HGVs on sensitive receptors located along affected routes for the construction phase.

5.9.8. Predicted concentrations and changes in annual mean NO_2, PM_{10} and $PM_{2.5}$ along with the predicted number of days exceedance of the 24-hour PM_{10} objective are presented in Appendix 5.3 [TR010054/APP/6.3] for all receptors discussed in this section. Receptor locations are illustrated on Figures 5.4 [TR010054/APP/6.2].

NO_2

5.9.9. Annual mean concentrations of NO_2 are predicted to be below the 40 µg/m^3 annual mean NO_2 objective at all human health receptors within the construction phase study area, in the 2024 Do-Something (DS) scenario. The highest concentrations are around 38 µg/m^3 at locations adjacent to the A460 Cannock Road, as construction vehicles converge to and from the construction site compounds.

5.9.10. Of the sensitive receptors for human health that were modelled to consider construction phase effects, most are predicted to experience an imperceptible change in annual mean NO_2 concentrations (±≤0.4 µg/m^3). DMRB IAN 174/13 (Ref 5.3) defines the predicted magnitude of change in concentration into bands of which imperceptible is the smallest (less than 0.4µg/m^3). Specific changes in NO_2 concentrations as a result of the Scheme's construction are only listed below where more than an imperceptible change is predicted:

- The maximum predicted worsening in of NO_2 annual mean concentrations experienced at any of the human health receptors in the construction phase study area is +0.5 µg/m^3.
- There would be a worsening of +0.5 µg/m^3 of the NO_2 annual mean concentration experienced at two receptors at the following location:
  - residential properties on the A460 Cannock Road (R374and R377), due to an increase in HDV traffic (+420 AADT and 220 HDVs).
- All other receptors are predicted to experience an imperceptible increase in annual mean NO_2 concentrations.

5.9.11. In summary, the maximum annual mean NO_2 concentration in the construction phase DS would be below the national air quality objective. As such, the construction of the Scheme would not perceptibly worsen NO_2 concentrations that are already above objective, nor does it create any new exceedances. Neither

does it perceptibly improve NO_2 concentrations above the air quality objective or remove an existing exceedance of the objective.

PM_{10} and $PM_{2.5}$

5.9.12. Annual mean concentrations of PM_{10} and $PM_{2.5}$ are predicted to be below the air quality objective values for all receptors considered in the construction phase study area, in the construction phase DS scenario. PM_{10} concentrations peak at around 17 µg/m^3 at locations adjacent to the A460 Cannock Road, and $PM_{2.5}$ peaks at around 11 µg/m^3 at locations adjacent to the M6 at Junction 11A. The maximum number of days exceeding the 24-hour PM_{10} objective at any receptor is 1 day.

5.9.13. The most sensitive areas of the study area, where annual mean concentrations of PM_{10} are highest, are well below the air quality objective and the impact of the Scheme is imperceptible. At locations where the Scheme would have its highest impacts, the DS concentrations would be well below the air quality objective values. As such, the construction of the Scheme would not perceptibly worsen PM_{10} concentrations that are already above objective, nor does it create any new exceedances. It does not perceptibly improve PM_{10} concentrations above the air quality objective or remove an existing exceedance of the objective.

Operation

Local air quality assessment

5.9.14. This section provides the predictions for the effect of the operation of the Scheme on traffic flows, composition and speed on sensitive receptors located along affected routes for the operational phase.

5.9.15. Predicted concentrations and changes in annual mean NO_2, PM_{10} and $PM_{2.5}$ along with the predicted number of days exceedance of the 24-hour PM_{10} objective are presented in Appendix 5.3 [TR010054/APP/6.3] for all receptors discussed in this section. Receptor locations are illustrated on Figures 5.3 [TR010054/APP/6.2].

NO_2

5.9.16. Annual mean concentrations of NO_2 are predicted to be above the 40 µg/m^3 annual mean NO_2 objective at six receptors in the 2024 DS scenario. These receptors are all located within 50 m of the M6 - two on Lichfield Road, at Willenhall (R205 and R206) and four on Darlaston Road, in Walsall (R228-R231).

5.9.17. Of the sensitive receptors for human health that were modelled and are predicted to be within the 40 µg/m^3 annual mean NO_2 objective, more than half (275 out of 521) are predicted to experience an imperceptible change in annual mean NO_2 concentrations (±≤0.4 µg/m^3). Specific changes in NO_2 concentrations as a result of the Scheme's operation are only listed below where more than an imperceptible change is predicted:

- There would be improvements of >-4 µg/m^3 to the NO_2 annual mean concentrations experienced at 14 receptors (R334-R336, R373-R383) located closest to the A460 Cannock Road, through Featherstone and Hilton, to the west of the Scheme, resulting in concentrations of 18.5 µg/m^3 to 21.3 µg/m^3. This is due to the decrease in traffic flow on this road (-21,985 AADT, -3072

HDVs and a change of speed band in the AM-peak, Inter-peak and PM-peak periods) as a result of the alternative route provided by the Scheme.

- There would be improvements of between -2.1 to -4.0 µg/m^3 of the NO_2 annual mean concentration experienced at 10 receptors in the following five locations:
  - six receptors set further back from the A460 Cannock Road (R330-R333, R359, R385) on Dark Lane and New Lane at Featherstone and Hilton; resulting in concentrations of 17.8 µg/m^3 to 19.2 µg/m^3. This is due to the decrease in traffic flow on the A460 Cannock Road, in Hilton and Featherstone (-21,985 AADT, -3072 HDVs and a change in speed band in the AM-peak, Inter-peak and PM-peak periods), as a result of the alternative route provided by the Scheme;
  - one receptor (R307) on Church Road, Shareshill west of the Scheme, resulting in a concentration of 17.6 µg/m^3, due to the decrease in traffic flow (-23,879 AADT -3,165 HDVs and a change in speed band in the Inter-peak period) on the A460 Cannock Road, in Shareshill, as a result of the alternative route provided by the Scheme;
  - one receptor (R259) on Gailey Roundabout, resulting in a concentration of 22.1 µg/m^3, predominantly due to the decrease in traffic flow (-4,575 AADT and -337 HDVs) on the A5 between the Gailey Roundabout and the M6 at Junction 12;
  - one receptor (R292) on Watling Street, Gailey, resulting in a concentration of 25.8 µg/m^3, due to the decrease in traffic flow (-4,309 AADT and -310 HDVs) on the A5 between the Gailey Roundabout and the M6 at Junction 12; and
  - one receptor (R253) on Stafford Road, Standeford, resulting in a concentration of 18.1 µg/m^3, due to a decrease in traffic flow (-3,740 AADT and -165 HDVs on the southbound carriageway and -3,432 AADT and -113 HDVs on the northbound carriageway) on the A449.
- There would be improvement of between -0.5 to -2.0 µg/m^3 of the NO_2 annual mean concentrations experienced at 113 receptors. These include the following locations:
  - several receptors in close proximity to the A5, west of the A449 (R001-R007, R009, R010-R013, R015, R018-R020 and R022), due to a decrease in traffic and HDV flows (-2,757 AADT and -214 HDVs);
  - a number of receptors located adjacent to the A462 and Lichfield Road corridor, east and northeast of Wolverhampton (including R157-R159, R161, R163 -R180, R182, R183, R185, and R187-R189), due to a decrease in traffic (-1,707 AADT and -310 HDVs);
  - a number of receptors located off the A460, north of the M54 (including R239, R240, R250-R258), due to a decrease in traffic flow (-2,520 AADT and -165 HDVs on the northbound carriageway and -2,194 AADT and -86 HDVs on the southbound carriageway) and the A449, north of the A5 (R260-R264, R266, R270-R272, R275, R277 and R279), again due to a decrease in traffic flow (-2,593 AADT and -173 HDVs); and

  - receptors located adjacent to New Road, between the A460 and the A449 (R386, R387, R389, R390, R392 and R393), due to a decrease in traffic flow (-2,406 AADT and -71 HDVs).

- There would be a worsening of between +0.5 to +2.0 µg/m^3 of the NO_2 annual mean concentration experienced at 103 receptors These include the following locations:
  - receptors located adjacent to the M54, west of Junction 2 (R037, R038, R041-R044), due to an increase in traffic and HDV flows (+2,157 AADT and +218 HDVs on the eastbound carriageway and +2,403 AADT and +175 HDVs on the westbound carriageway);
  - receptors on the A449 south of the M54 (R046-R049, R051-R056, R058 and R078), due to an increase in traffic flow (+1,752 AADT and +296 HDVs on the northbound carriageway and +574 AADT and +16 HDVs on the southern carriageway);
  - receptors on the B4484, between the A460 and Lichfield Road, in Wolverhampton (R113, R115, R121, R123, R124, R129 and R130), due to an increase in traffic flow (+1,303 AADT and +40 HDVs);
  - receptors along the A460, south of the M54 (R134, R136-R138, R140-R145, R151, R153 and R154), due to an increase in traffic (+5,056 AADT, +298 HDVs and a change in speed band in the AM-peak, Inter-peak and PM-peak periods);
  - two receptors adjacent to the M6, between Junction 12 and Junction 13 (R283 and R284), due to an increase in traffic flow (+1,603 AADT and +67 HDVs on the northbound carriageway and +1984 AADT and +80 HDVs on the southbound carriageway);
  - multiple receptors located near to the operational Scheme (+24,168 AADT and +2,212 HDVs on the northbound carriageway and +25,154 AADT and +2,413 HDVs on the southbound carriageway), on the A460 Cannock Road (R305 and R306), Hilton Lane (R310 and R311), Dark Lane (R314-R319) and Park Road (R337-R344 and R369-R372), but set back further than those on the same roads that experience a greater level of impact; and
  - receptors on the A4601 between M6 Junction 11 and Wedge Mills (R404-R420, R422-R425 and R427-R429), due to an increase in traffic flow (+1,916 AADT and +140 HDVs).
- There would be a worsening of between +2.1 to +4.0 µg/m^3 of the NO_2 annual mean concentration experienced at six receptors in the following three locations:
  - two receptors (R312 and R313) on Dark Lane, resulting in concentrations of 19.9 µg/m^3 and 19.8 µg/m^3 respectively, due to presence of traffic flows associated with the operational Scheme (+24,168 AADT and +2,212 HDVs on the northbound carriageway and +25,154 AADT and +2,413 HDVs on the southbound carriageway);
  - one receptor (R045) on the A449 immediately adjacent to Junction 2 of the M54, resulting in concentrations of 38.5 µg/m^3, due to the increase in flow

on the M54 east of Junction 2 (+2,296 AADT and +167 on eastbound carriageway and +2355 AADT and +228 HDVs on westbound carriageway), the M54 Junction 2 eastbound slip on (+6,784 AADT and +426 HDVs and a change in speed band in the AM-peak, Inter-peak and PM-peak periods) and the nearest section of the M54/A449 roundabout at Junction 2 (+4,783 AADT and +349 HDVs), which offsets the decrease in traffic flow on the A449 Stafford Road (-433 AADT and -1,620 HDVs) on southbound carriageway and -337 AADT and -1,731 HDVs on northbound carriageway); and

  - three receptors (R135, R152 and R155) on the A460 to the south of the M54, resulting in concentrations of 29.0 µg/m^3, due to an increase in traffic flow on a stretch of Cannock Road to the north of Old Fallings Lane (+2,034 AADT and +93 HDVs), and concentrations of 22.2, µg/m^3 and 21.7 µg/m^3, due to an increase in traffic flow on a stretch of Cannock Road to the north of Underhill Lane (+5,056 AADT and +298 HDVs).

- There would be no worsening of more than 4 µg/m^3 of the NO_2 annual mean concentrations at any sensitive receptors.

5.9.18. At the receptors closest to the M6 on Darlaston Road, Walsall (R228-R231), predicted annual mean concentrations of NO_2 range from 49.5 µg/m^3 to 72.5 µg/m^3 in the DS scenario, following imperceptible decreases in NO_2 concentration (-0.1 µg/m^3) with the Scheme in place. This is due to a decrease in HDV movements on the adjacent M6 (-220 AADT and -122 HDVs on the northbound carriageway and -50 AADT and -81 HDVs on the southbound carriageway) and on Darlaston Road (-53 AADT and -2 HDVs). As the annual mean concentrations remain above 60 µg/m^3 at R229 and R230, it is anticipated that the hourly mean NO_2 objective (200 µg/m^3) may be exceeded there also. All other receptors considered are predicted to be below the annual mean NO_2 concentration of 60 µg/m^3, therefore there would be no other anticipated exceedances of the hourly NO_2 objective with the Scheme in place.

5.9.19. At receptors on the east side of the M6 on Lichfield Road, Willenhall (R205-R206), predicted annual mean concentrations of NO_2 range from 45.7 µg/m^3 to 45.4 µg/m^3 in the DS, following imperceptible decreases in NO_2 concentrations (-0.2 µg/m^3) with the Scheme in place. This is due to a decrease in HDV movements on the adjacent M6 (-667 AADT and -123 HDVs on the northbound carriageway and -276 AADT and -17 HDVs on the southbound carriageway) and on Lichfield Road (-260 AADT and -227 HDVs).

5.9.20. Elsewhere within the study area, annual mean NO_2 concentrations are predicted to be well below the NO_2 air quality objective in the DS scenario. At the properties closest to the Scheme at Hilton and Shareshill, on Dark Lane (R312), Hilton Lane (R233 and R311) and east of the A460 (R306), annual mean NO_2 concentrations are less than 20 µg/m^3. An increase of +2.8 µg/m^3 is predicted at the nearest receptor on Dark Lane to the Scheme in operation (R312), and increases of between +1.2 µg/m^3 to 1.4 µg/m^3) are predicted at the nearest receptors on Hilton Lane (R233 and R311) and east of the A460 nearest to the Scheme (R306). This is due to the introduction of new traffic movements on the Scheme itself (+24,168

AADT on the northbound carriageway and +25,154 AADT on the southbound carriageway).

5.9.21. Adjacent to the A460 at Featherstone and Hilton, annual mean NO_2 concentrations are predicted to experience a decrease with the Scheme in operation, by as much as -13.5 µg/m^3 at locations near to the Dark Lane junction (R374), and -7.3 µg/m^3 at locations adjacent to the southern section of the A460, on the current approach to and from Junction 1 of the M54 (R383). This is due to the decrease in traffic flow of -21,985 AADT and the realignment of the A460 on the approach to and from Junction 1 of the M54. At locations adjacent to the A460 in Shareshill, annual mean NO_2 concentrations are predicted to experience a small (R308 and R309) to medium decrease (R307) (-1.0 µg/m^3 to -3.8 µg/m^3). These decreases are also due to the large reduction in traffic flow anticipated on the A460, with the Scheme in operation.

5.9.22. Of the locations where the highest concentrations below the air quality objective have been predicted, two are predicted to experience a worsening as a result of the Scheme, due to increasing traffic flow on adjacent roads. These include receptors located close to the A449, on the approach to Junction 2 of the M54 (R045), which are predicted to experience a medium increase (+2.1 µg/m^3). This is due to the increase in traffic flow on the M54 east of Junction 2 (+2,296 AADT and +167 HDVs on the eastbound carriageway and +2,355 AADT and +228 HDVs on the westbound carriageway), the M54 Junction 2 eastbound slip on (+6,784 AADT, +426 HDVs and a change in speed band in the AM-peak, Inter-peak and PM-peak periods). They also include receptors immediately east of the M6, north of Penkridge (R284), which are predicted to experience a small increase (+0.5 µg/m^3), due to an increase in traffic flow (+1,603 AADT and 67 HDVs on the northbound carriageway and +1,984 AADT and +80 HDVs on the southbound carriageway).

5.9.23. Other receptors where the highest concentrations below the objective have been predicted are to experience an improvement as a result of the Scheme in operation, due to a decrease in HDV flow or traffic flow on adjacent roads. These include receptors north of Bell Lane (A4124) at Bloxwich (R212 and R214), which are predicted to experience a small decrease (-0.7 µg/m^3 and -0.4 µg/m^3 respectively). This is due to a decrease in HDVs by -233 (and AADT by -467). Receptors on the west side of the M6 on Lichfield Road, Willenhall (R204), are predicted to experience an imperceptible decrease (-0.2 µg/m^3), due to a decrease of -667 AADT and -123 HDVs on the northbound carriageway, -276 AADT and -17 HDVs on the southbound carriageway, and a decrease of -260 AADT and -227 HDVs on Lichfield Road. Receptors on Watling Street, south of Cannock (R438) are also predicted to experience an imperceptible decrease (-0.3 µg/m^3), due to a decrease of -1,667 AADT and -58 HDVs.

5.9.24. In summary, the most sensitive areas of the study area, where annual mean concentrations of NO_2 are elevated in excess of or close to the air quality objective in the DM scenario, the impact of the Scheme is imperceptible. At locations where the Scheme would have its highest impacts, the DS concentrations are well below the air quality objective values. As such, the operation of the Scheme would not perceptibly worsen NO_2 concentrations that are already above objective, nor does

it create any new exceedances. Neither does it perceptibly improve NO_2 concentrations above the air quality objective or the remove an existing exceedance of the objective.

PM_{10} and $PM_{2.5}$

5.9.25. Annual mean concentrations of PM_{10} are predicted to be below the 40 µg/m^3 objective value at all sensitive receptors for human health that were modelled within the study area, both with and without the Scheme in the opening year of 2024. The maximum concentration with the Scheme in operation is 24.9 µg/m^3 (R229). Additionally, all receptors within the study area are predicted to be below the objective for the number of days exceedance of the 24-hour PM_{10} objective, both with and with-out the Scheme.

5.9.26. For PM_{10}, the vast majority (515 out of 527) of sensitive receptors for human health that were modelled within the study area are predicted to experience an imperceptible change in annual mean PM_{10} concentrations (±≤0.4 µg/m^3) with the Scheme in operation. This is because PM_{10} is less sensitive to changes in traffic movements and speed than NO_2. Specific changes in PM_{10} concentrations are only discussed below where more than an imperceptible change is predicted:

- There would be no improvements of more than 2.0 µg/m^3 of PM_{10} annual mean concentrations.
- There would be improvements of between -0.5 to -2.0 µg/m^3 of the PM_{10} annual mean concentration at 12 receptors, predominantly due to decreasing traffic flow on the A460 in DS scenario (-21,985 AADT, -3,072 HDVs and a change in speed band in the AM-peak, Inter-peak and PM-peak periods).
- There would be no worsenings of more than 0.4 µg/m^3 of PM_{10} annual mean concentrations.

5.9.27. In summary, the most sensitive areas of the study area, where annual mean concentrations of PM_{10} are highest, are well below that air quality objective and the impact of the Scheme would be imperceptible. At locations where the Scheme has its highest impacts, the DS concentrations would be well below the air quality objective values. As such, the operation of the Scheme would not perceptibly worsen PM_{10} concentrations that are already above objective, nor does it create any new exceedances. Neither does it perceptibly improve PM_{10} concentrations above the air quality objective or remove an existing exceedance of the objective.

5.9.28. The maximum $PM_{2.5}$ background concentration in the opening year of 10.7 µg/m^3. The maximum road PM_{10} contribution (which $PM_{2.5}$ is a fraction of) is 9.3 µg/m^3 with the Scheme in operation. Therefore, total concentrations of $PM_{2.5}$ are also anticipated to be well below the objective value of 25 µg/m^3 at all receptors within the study area. Significant air quality effects are therefore not predicted for $PM_{2.5}$.

Designated ecosystem assessment

5.9.29. This section sets out the predicted effects of the Scheme for the operational phase on designated ecosystems within 200 m of the ARN.

5.9.30. The results are presented in summary for the point in each ecosystem which experiences the greatest change in each scenario in Table 5.11 and in full in

Appendix 5.3 [TR010054/APP/6.3]. The results presented are for the oxides of nitrogen (NOx) and nitrogen deposition (known as N dep, as kilograms of nitrogen per hectare per year (kg N ha^{-1} yr^{-1}).

Table 5.11: Designated ecosystem operational results summary

Ecological site	Closest point from the ARN					Distance (m) from ARN where NOx conc. <30 µg/m^3
	Distance from road source (m)	Max DS NOx conc. (µg/m^3)	Max NOx change (µg/m^3)	Max DS Ndep (kg N ha^{-1} yr^{-1})	Max Ndep change (kg N ha^{-1} yr^{-1})	
Belvide Reservoir SSSI, Unit 3	1.1	18.7	-2.4	21.5	-0.1	1.1
Four Ashes Pit SSSI	6.6	21.3	-1.7	N/A[1]	N/A[1]	6.6
Stowe Pool and Walk Mill Clay Pit SSSI, Unit 2	6.4	66.7	+5.3	52.8	+0.2	125
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI, Unit 7	96	28.9	+0.3	22.2	+<0.1	96
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI, Unit 8	1.1	64.1	+1.3	23.9	+0.1	80
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI, Unit 9	10.7	39.0	+0.8	22.7	+<0.1	40
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI, Unit 13	37.6	34.8	+0.6	22.6	+<0.1	60
Chasewater and the	1.1	64.2	+1.3	23.9	+0.1	80

Ecological site	Closest point from the ARN					Distance (m) from ARN where NOx conc. <30 µg/m^3
	Distance from road source (m)	Max DS NOx conc. (µg/m^3)	Max NOx change (µg/m^3)	Max DS Ndep (kg N ha^{-1} yr^{-1})	Max Ndep change (kg N ha^{-1} yr^{-1})	
Southern Staffordshire Coalfield Heaths SSSI, Unit 14						
Chasewater and the Southern Staffordshire Coalfield Heaths SSSI, Unit 15	53.3	29.6	+0.3	22.2	<0.1	53.3

[1] APIS has confirmed that this habitat is not sensitive to the effects of nutrient nitrogen deposition.

5.9.31. A maximum increase of +5.3 µg/m^3 in annual mean NOx concentrations are predicted at the Stowe Pool and Walk Mill Clay Pit SSSI due to the operation of the Scheme in 2024, as a result of increased traffic flows on the A460 (+4,635 AADT and +92 HDVs) and the M6 Toll (965 AADT and +240 HDV on the eastbound carriageway and +1,381 AADT and +211 HDVs on the westbound carriageway). A smaller increase in annual mean NO_X is predicted for some sections of the Chasewater and the Southern Staffordshire Coalfield Heaths SSSI, again due to increased traffic flow on the M6 Toll (+1,276 AADT and + 226 HDVs on the eastbound carriageway and +782 AADT and +223 HDVs on the westbound carriageway). An improvement in annual mean NOx is predicted to occur at sections of Four Ashes Pit SSSI, of Station Drive (-1,774 AADT and -14 HDVs) and Belvide Reservoir SSSI, on the A5, west of the A449 (-2,757 AADT and -214 HDVs). Impacts on nutrient nitrogen deposition are negligible at all sites.

5.9.32. The significance of the predicted changes in NOx and nitrogen deposition for these designated habitats is considered in Chapter 8: Biodiversity. In summary no likely significant air quality effects are anticipated from the changes in air quality predicted.

Local air quality compliance risk assessment

5.9.33. The results of the operational assessment have been used to determine compliance risks with the EU Air Quality Directive (Ref 5.6), following guidance set out within IAN 175/13 (Ref 5.4).

5.9.34. A comparison between the outcome of the local operational assessment and those links reported by Defra to the European Commission as non-compliant has been undertaken. This comparison has found that there are no links anticipated to be non-compliant with the limit values within the air quality study area for the Scheme in the opening year of 2024.

5.9.35. This indicates that there is low risk of non-compliance with the EU Air Quality Directive for the Scheme and thus an Air Quality Action Plan should not be required for either the construction or operation of the Scheme.

Operational impacts – local air quality plan level WebTAG appraisal

5.9.36. A WebTAG appraisal has been completed in respect of $PM_{2.5}$ and NO_2 exposure. The assessment has been carried out using the WebTAG methodology (Ref 5.37) which considers individual links in isolation. The results of this assessment are provided as required by DMRB guidance (Ref 5.1), in Table 5.12 to Table 5.15.

5.9.37. The results of the WebTAG appraisal for the opening year show that the score for $PM_{2.5}$ is negative, meaning a reduction in overall levels of exposure to that pollutant and, therefore providing a net benefit. A total of 11,662 properties are predicted to experience an improvement in concentrations, 1,583 properties are predicted to experience no change and 8,079 a deterioration. The WebTAG appraisal for the design year (2039) show that for $PM_{2.5}$ there is again a net benefit (shown by a negative score). A total of 14,042 properties are predicted to experience an improvement in concentrations, 1,475 properties are predicted to experience no change and 7,736 a deterioration.

Table 5.12: WebTAG results for $PM_{2.5}$ – year of opening

Aggregated Table	0-50m	50-100m	100-150m	150-200m	0-200m
Total properties across all routes (Do Minimum)	4985	5347	5595	5400	21327
Total properties across all routes (Do Something)	4975	5343	5604	5402	21324
Do Minimum $PM_{2.5}$ assessment across all routes	45521.94	46578.86	48257.99	46427.43	186786.22
Do Something $PM_{2.5}$ assessment across all routes	45353.44	46499.69	48306.85	46426.99	186586.97
Net total assessment for $PM_{2.5}$, all routes (II-I)	-199.25				
Number of properties with an improvement	11662				
Number of properties with no change	1583				
Number of properties with a deterioration	8079				

Table 5.13: WebTAG results for PM2.5 – design year

Aggregated Table	0-50m	50-100m	100-150m	150-200m	0-200m
Total properties across all routes (Do Minimum)	5409	5862	6102	5882	23255
Total properties across all routes (Do Something)	5399	5858	6111	5885	23253
Do Minimum $PM_{2.5}$ assessment across all routes	48299.48	50274.03	51690.69	49695.35	199959.55
Do Something $PM_{2.5}$ assessment across all routes	48022.06	50150.96	51707.95	49719.83	199600.80
Net total assessment for $PM_{2.5}$, all routes (II-I)	-358.75				
Number of properties with an improvement	14042				
Number of properties with no change	1475				
Number of properties with a deterioration	7736				

5.9.38. The results of the WebTAG appraisal for the opening year show that the score for NO_2 is negative, meaning a reduction in overall levels of exposure to that pollutant and, therefore, providing a net benefit. A total of 13,058 properties are predicted to experience an improvement in concentrations, 367 properties are predicted to experience no change and 7,899 a deterioration. The results of the WebTAG appraisal for the design year (2039) show that for NO_2 there is again a net benefit with a negative score. A total of 15,387 properties are predicted to experience an improvement in concentrations, 64 properties are predicted to experience no change and 7,802 a deterioration.

Table 5.14: WebTAG results for NO_2 – year of opening

Aggregated Table	0-50m	50-100m	100-150m	150-200m	0-200m
Total properties across all routes (Do Minimum)	4985	5347	5595	5400	21327

Aggregated Table	0-50m	50-100m	100-150m	150-200m	0-200m
Total properties across all routes (Do Something)	4975	5343	5604	5402	21324
Do Minimum NO_2 assessment across all routes	87431.75	74237.75	71985.57	67381.78	301036.85
Do Something NO_2 assessment across all routes	86130.69	73531.17	71579.41	66975.77	298217.04
Net total assessment for NO_2, all routes (II-I)	-2819.81				
Number of properties with an improvement	13058				
Number of properties with no change	367				
Number of properties with a deterioration	7899				

Table 5.15: WebTAG results for NO2 – design year

Aggregated Table	0-50m	50-100m	100-150m	150-200m	0-200m
Total properties across all routes (Do Minimum)	5409	5862	6102	5882	23255
Total properties across all routes (Do Something)	5399	5858	6111	5885	23253
Do Minimum NO_2 assessment across all routes	85955.62	74192.49	71048.21	66269.51	297465.83
Do Something NO_2 assessment across all routes	83941.45	73411.30	70718.74	66315.84	294387.33
Net total assessment for NO_2, all routes (II-I)	-3078.50				
Number of properties with an improvement	15387				
Number of properties with no change	64				
Number of properties with a deterioration	7802				

Operational impacts – regional assessment

5.9.39. This section outlines the results of the regional air quality assessment for the opening year (2024) and design year (2039) for CO_2, NO_X, PM_{10} and $PM_{2.5}$.

5.9.40. The results indicate that reduced emissions of NOx, PM_{10} and $PM_{2.5}$ are anticipated between the present or baseline situation and the opening year without the Scheme (see Table 5.16). These reductions are due to projected improvements in vehicle emissions over time, a small increase is predicted in CO_2, as the increase in traffic expected over time is not outweighed by expected improvements in CO_2 emissions.

5.9.41. Increases in emissions of NO_X, within the 2024 ARN, and CO_2, within the full traffic data dataset, are anticipated in the opening year with the Scheme (DS) compared to the without Scheme (DM) situation. This is primarily because of the increased traffic flows predicted with the operation of the Scheme and increases in vehicle kilometres travelled (see Table 5.17). A very small decrease in PM_{10} is anticipated along with no change in $PM_{2.5}$ emissions where the increase in vehicle kilometres travelled is offset by changes in fleet composition, with the average %HDV across the ARN reducing from 8.5% without the Scheme to 7.7% with the Scheme.

5.9.42. In comparison to national CO_2 emissions targets, increases in CO_2 from the whole of the strategic road building schemes, as noted in the NPSNN, anticipated over the next 10-15 years are considered to be small and the increases associated with the Scheme are part of that small increase.

Table 5.16: Opening year regional assessment results

Pollutant	Present (2017) (tonnes)	Without Scheme (DM) opening year (tonnes)	With Scheme (DS) opening year (tonnes)	With Scheme compared with	
				Present without Scheme (tonnes)	Future without Scheme (tonnes)
CO_2	7,247,842	7,346,761	7,360,670	+112,828	+13,909
NO_X	365.0	206.0	211.0	-154.0	+5.0
PM_{10}	26.0	24.9	24.7	-1.3	-0.2
$PM_{2.5}$	16.4	10.8	10.8	-5.6	<0.1

Table 5.17: Opening year vehicle kilometres travelled

Dataset	Baseline	Do Minimum	Do Something	Change (DS-DM)
2024 ARN	1,982,230	2,221,268	2,252,226	+30,958 (+1.4%)
Full Traffic Dataset	86,123,148	94,788,991	95,002,136	+213,145 (+0.2)

5.9.43. Total vehicle kilometres travelled in the 2017 baseline for the 2024 year of opening ARN are 1,982,230 km and 86,123,148 km across the full traffic dataset. By 2024 DM, total kilometres travelled increases by +239,038 km within the ARN and +8,665,843 km across the full traffic dataset, due to project traffic growth between 2017 and 2024. In the 2024 DS scenario, the operation of the Scheme would increase vehicle kilometres travelled beyond DM levels by +30,958, km in the ARN and +213,145 km in the full traffic dataset.

5.9.44. Increases in emissions of NO_X, within the 2039 ARN, and CO_2, within the full traffic data dataset, are anticipated in the design year with the Scheme (DS) compared to the without Scheme (DM) (see Table 5.18). This is primarily due to the increased traffic flows predicted with the operation of the Scheme and increases in vehicle kilometres travelled (see Table 5.19). A very small decrease in PM_{10} is anticipated along with an equally small increase in $PM_{2.5}$ emissions where the increase in vehicle kilometres travelled is offset by changes in fleet composition, with the average %HDV across the ARN reducing from 7.7% without the Scheme to 7.0% with the Scheme.

Table 5.18: Design year regional assessment results

Pollutant	Present (2017) (tonnes)	Without Scheme (DM) opening year (tonnes)	With Scheme (DS) opening year (tonnes)	With Scheme compared with	
				Present without Scheme (tonnes)	Future without Scheme (tonnes)
CO_2	7,247,842	8,040,439	8,055,419	+807,578	+14,981
NO_X	416.4	164.1	168.7	-247.7	+4.6
PM_{10}	30.3	32.1	31.9	+1.6	-0.1
$PM_{2.5}$	19.0	14.1	14.2	-4.8	+0.1

Table 5.19: Design year vehicle kilometres travelled

Dataset	Baseline	Do Minimum	Do Something	Change
2039 ARN	2,278,003	2,889,809	2,940,536	+50,727 (+1.8%)
Full Traffic Dataset	86,123,148	109,081,226	109,326,946	+245,720 (+0.2%)

5.9.45. Total vehicle kilometres travelled in the 2017 baseline for the 2039 design year ARN are 2,278,003 km and 86,123,148 km across the full traffic dataset. By 2039 DM, total kilometres travelled increase by +611,807 km within the ARN and +22,958,078 km across the full traffic dataset, due to project traffic growth between 2017 and 2039. In the 2039 DS scenario, the operation of the Scheme would increase vehicle kilometres travelled beyond DM levels by +50,727 km in the ARN and +245,720 km in the full traffic dataset.

Significance of Effect

5.9.46. The significance of the operational air quality effects as a result of the Scheme has been evaluated and results presented in Table 5.20. This focuses on annual mean NO_2, where locations are predicted to experience concentrations greater than the air quality objectives in the existing baseline scenario. Table 5.21 presents supporting information concerning the key question of how many people would be affected.

Table 5.20: Numbers of properties affected, local operational assessment

Magnitude of Change in NO_2 ($\mu g/m^3$)	Number of receptors with:	
	Worsening of air quality already above objective or creation of a new exceedance	Improvement of air quality already above objective or the removal of an existing exceedance
Large (>4)	0 (1 to 10)	0 (1 to 10)
Medium (>2 to 4)	0 (10 to 30)	0 (10 to 30)
Small (>0.4 to 2)	0 (30 to 60)	0 (30 to 60)

5.9.47. Numbers in brackets set out threshold for significant effect as per Table 2.3 in the DMRB (Ref 5.4). There are no locations where receptors are predicted to experience a perceptible increase in annual mean NO_2 concentrations that would cause a new exceedance of the NO_2 annual mean air quality objective or worsen an existing exceedance of the objective.

5.9.48. No locations are affected by potentially significant changes in PM_{10} or $PM_{2.5}$ and all receptors are predicted to below the relevant objective values for these pollutants.

Table 5.21: Evaluation of local operational air quality significance

Key criteria questions	Yes/No	Supporting information
Is there a risk that environmental standards will be breached?	Yes	Annual mean concentrations of NO_2 are predicted to be exceeded during the construction and operation of the Scheme.
Will there be a large change in environmental conditions?	No	No large adverse changes are predicted, above an air quality objective.
Will the effect continue for a long time?	No	As no large adverse changes are predicted, above an air quality objective, the effect is not considered to last a long time.
Will many people be affected?	No	No properties are predicted to be affected by small, medium or large changes in air quality above an air quality objective for the protection of human health.
Is there a risk that designated sites, areas or features will be affected?	No	See Chapter 8: Biodiversity.
Will it be difficult to avoid or reduce or repair or compensated for the effect?	No	No predicted significant effects to mitigate.
On balance is the overall effect significant	No	See below
Evidence in support of the judgement There are limited predicted annual mean concentrations of NO_2 above the air quality objective in the first year of operation for the Scheme in the air quality study area. The predicted change in pollutant concentrations at these locations is imperceptible. Therefore, there are no small, medium or large changes in air quality above the air quality objective. A compliance risk assessment has been undertaken for the air quality study area. This found that there are no links reported by Defra to the European Commission as non-compliant in the first year of Scheme operation within the air quality study area. This indicates there is no compliance risk for the Scheme. The air quality effects of the Scheme for European and National designated ecosystem sites are considered in Chapter 8: Biodiversity. The ecology assessment has concluded that the predicted changes in air quality and nitrogen deposition are not significant. Temporary construction effects associated with dust and plant equipment, are also not considered to be significant with the implementation of mitigation measures as outlined in the OEMP [TR010054/APP/6.11].		

Key criteria questions	Yes/No	Supporting information
Overall, as there are no properties with adverse changes in air quality (small, medium or large) above the objective and there is no adverse effect on air quality for compliance links or European and nationally designated habitat sites, an overall evaluation of 'not significant' has been assigned to the Scheme for traffic emissions in either the construction or operational phases for air quality effects.		

5.10. Monitoring

Construction

5.10.1. No significant effects have been identified for the air quality construction assessment. However, monitoring may be required, as discussed in paragraph 5.8.10.

Operation

5.10.2. As no significant effects have been identified for the air quality operation assessment, no monitoring is proposed.

5.11. References

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Ref 5.3 Highways Agency (2013). Interim Advice Note 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA 207/07).

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Ref 5.11 Dudley Metropolitan Borough Council, Sandwell Metropolitan Borough Council, Walsall Council, Wolverhampton City Council (2011) Black Country Core Strategy, adopted February 2011

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Ref 5.13 Wolverhampton City Council (2006) Wolverhampton Unitary Development Plan 2001 – 2011, adopted in June 2006, Available at <https://www.wolverhampton.gov.uk/planning/planning-policies/unitary-development-plan-and-proposals-map>

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Ref 5.16 H.M. Government (2019) Clean Air Strategy, Published 14 January 2019.

Ref 5.17 H.M. Government (2010) The Conservation of Habitats and Species Regulations 2010, Statutory Instrument No. 490, The Stationary Office.

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Ref 5.20 H.M. Government (1995) The Environment Act.

Ref 5.21 United Nations Economic Commission for Europe (2002) Empirical Critical Loads for nitrogen – Expert Workshop, Berne. Eds. Acherman and Bobbink. Environmental Documentation No164, SAEFL.

Ref 5.22 Air Pollution Information System (APIS) (2018) website (http://www.apis.ac.uk/).

Ref 5.23 Department for Environment, Food and Rural Affairs (2017), Defra Air Quality Management Areas Interactive Map. Available at < http://uk-air.defra.gov.uk/aqma/maps>

Ref 5.24 Cannock Chase District Council (2018), Cannock Chase District Council 2017 Air Quality Annual Status Report (ASR), published July 2017.

Ref 5.25 Lichfield City Council (2018), Lichfield City Council 2017 Air Quality Annual Status Report (ASR), published July 2017.

Ref 5.26 Shropshire Council (2018), Draft Shropshire Council 2017 Air Quality Annual Status Report (ASR), published July 2017.

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Ref 5.31 Department of Environment, Food and Rural Affairs (Defra) (2017), Defra PCM mapping available at: <http://uk-air.defra.gov.uk/data/gis-mapping>

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