# A417 Missing Link

# Preliminary Environmental Information Report

## Chapter 5 Air Quality

28 September 2020

# Table of contents



## Table of Tables

# 5 Air quality

## 5.1 Introduction

5.1.1 This chapter assesses the potential air quality impacts from the construction and operation of the A417 Missing Link (the proposed scheme), following the methodology set out in Design Manual for Roads and Bridges (DMRB) LA 105 Air quality[1].

5.1.2 This chapter details the methodology followed for the air quality assessment, summarises the regulatory and policy framework related to air quality and describes the existing environment in the area surrounding the proposed scheme. The potential impacts of the proposed scheme on identified receptors during both the construction and operational phases are assessed. Following this, the mitigation and residual effects of the proposed scheme are discussed, along with the limitations of the assessment.

## 5.2 Competent expert evidence

5.2.1 The Air Quality Lead expert is a senior air quality consultant with over 10 years' experience with air quality assessment, they have a MSc from Imperial College and are a Chartered Environmentalist, Chartered Scientist, Full Member of the Institution of Air Quality Management and Member of the Institution of Environmental Science. Full details of relevant project experience are provided in Preliminary Environmental Information (PEI) report Appendix 1.2.

## 5.3 Legislative and policy framework

5.3.1 As discussed in PEI report Chapter 1 Introduction the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the National Policy Statement for National Networks (NPSNN), which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 5-1 identifies the NPSNN policies relevant to air quality and specifies where in the PEI report chapter information is provided to address the policy.

**Table 5-1 Relevant NPSNN for applicant's air quality assessment**

| Relevant NPSNN paragraph reference | Requirement of the NPSNN | Where in the PEI report chapter is information provided to address this policy. |
|---|---|---|
| 5.7 | The environmental statement should describe:<br>• existing air quality levels;<br>• 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<br>• 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 are described in section 5.7 and Appendix 5.4 Air quality baseline data.<br><br>Forecasts of air quality at the time of opening are described in section 5.10 and full results are provided in Appendix 5.6 air quality operational phase impacts.<br><br>There are no significant effects associated with the proposed scheme. The justification of the conclusion is described in section 5.10. |

| Relevant NPSNN paragraph reference | Requirement of the NPSNN | Where in the PEI report chapter is information provided to address this policy. |
|---|---|---|
| 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. | The assessment has used the most recent information from Highways England for vehicle emissions[2]. The impact of emissions has been assessed using detailed modelling as described in section 5.4 and Appendix 5.2 Air quality operational assessment methodology. |
| 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. | The proposed scheme will not affect the UK's ability to comply with the air quality limit values. Results are provided in section 5.10. |
| 5.11 | Air quality considerations are likely to be particularly relevant where schemes are proposed:<br>• within or adjacent to Air Quality Management Areas (AQMA); roads identified as being above Limit Values or nature conservation sites (including Natura 2000 sites and SSSIs, including those outside England); and<br>• where changes are sufficient to bring about the need for a new AQMAs or change the size of an existing AQMA; or bring about changes to exceedances of the Limit Values, or where they may have the potential to impact on nature conservation sites. | Section 5.7 and Appendix 5.4 Air quality baseline data describe the AQMAs in the study area. There are no significant impacts predicted in AQMAs or at designated ecological sites as described in section 5.10. |
| 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. | The proposed scheme will not affect the UK's ability to comply with the air quality limit values and does not result in any significant impacts at sensitive receptors Results are provided in section 5.10. |
| 5.13 | The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:<br>• result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or<br>• 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. | The proposed scheme will not affect the UK's ability to comply with the air quality limit values. Results are provided in section 5.10. |

5.3.2 Details of relevant European, national and local legislation, policy and guidance have been provided in PEI report Appendix 5.1 Air quality legislation, policy and guidance.

5.3.3 A list of relevant national, regional and local policies is set out below.

**European and National planning policy**

5.3.4 The EU and national legislation and policies of relevance include:

- EU Directive on ambient air quality (2008/50/EC);
- Part IV of the Environment Act (1995);
- Air Quality (England) (Amendment) Regulations 2000, amended in 2002;
- National Planning Policy Framework (2019); and
- National Policy Statement for National Networks (NPSNN).

**Regional policy**

5.3.5 The regional planning policies of relevance include:

- Cotswolds AONB Management Plan 2018-2023, in particular Policy CE11: Major Development;
- Gloucestershire's Local Transport Plan 2015-2031, in particular Policy LTP PD 4.9 Environment; and
- Joint Core Strategy for Gloucester, Cheltenham and Tewkesbury (JCS) 2011-2031 (December 2017), in particular Policy SD3: Sustainable Design and Construction.

**Local planning policy**

5.3.6 The local planning policies of relevance include:

- Cheltenham Local Plan (Pre-submission) 2011-2031;
- Cotswold District Council Local Plan 2011-2031, in particular Policy EN15 Pollution and Contaminated Land;
- Gloucester City Council Draft Local Plan 2016-2031, in particular Policy D10: Air quality and Policy H1: Sustainable Transport;
- South Gloucestershire Council Local Plan (Core Strategy) 2006 – 2027, in particular Policy CS9 – Managing the Environment and Heritage;
- Stroud District Council Local Plan 2015-2031, in particular ES5 Air quality;
- Swindon Borough Local Plan 2026, in particular Policy TR1: Sustainable Transport Networks and Policy EN7: Pollution;
- Tewkesbury Borough Council Draft Local Plan 2011-2031;
- West Berkshire Core Strategy (2006 – 2026), in particular Transport (CS 13);
- West Oxfordshire Local Plan 2031, in particular Policy OS3: Prudent use of natural resources, Policy CO16, and Policy EH8: Environmental protection; and
- Wiltshire Council Local Plan (Core Strategy) 2026, in particular Policy 55: Air quality.

5.3.7 Potential effects on air quality resulting from the proposed scheme have been assessed following the method in DMRB LA 105 and the Defra Local Air Quality Management Technical Guidance (LAQM TG.16)[3].

## 5.4 Assessment methodology

5.4.1 The A417 Missing Link Environmental Impact Assessment Scoping Report[4] determined that a 'detailed' level of assessment is required for the EIA as there is potential for significant impacts to air quality at sensitive human and ecological and part of the scheme area is within an (AQMA). The detailed assessment includes construction traffic and operational phase impacts.

5.4.2 A detailed air quality assessment has therefore been undertaken to establish the potential effects of the proposed scheme on local air quality as outlined in the scoping report[4]. Impacts during the construction phase will be assessed following DMRB LA 105 in order to feed into the Environmental Management Plan (EMP) to accompany the ES.

5.4.3 A regional air quality assessment of total emissions of $NO_2$ and particulate matter is no longer assessed under the latest air quality standard (DMRB LA105). A regional assessment of total carbon emissions in undertaken in the climate chapter following the DMRB LA114 Climate standard.

5.4.4 A detailed assessment of $PM_{10}$ and $PM_{2.5}$ has been screened out as there are no AQMAs in the study area declared for any exceedance of the AQS $PM_{10}$ or $PM_{2.5}$ objectives and no local monitoring has indicated there is a risk of the AQS $PM_{10}$ or $PM_{2.5}$ objective or EU limit values.

**Construction phase assessment**

5.4.5 Dust emissions arising from construction and demolition activities are likely to be variable in nature and would depend on the type and extent of activity, soil type and moisture, road surface conditions and weather conditions.

5.4.6 Construction, demolition and earthwork activities from the proposed scheme may all have an impact on local air quality. Trackout of material onto local roads where it can be re-suspended may also affect air quality. Trackout refers to the transport of dust and $PM_{10}$ from construction areas onto the road network.

5.4.7 A qualitative assessment of the impacts of nuisance dust arising during construction has been undertaken, using standards set out in section 2.56 of DMRB LA 105. Properties and ecological receptors within 200m of dust producing activities have been identified and appropriate mitigation recommended where required.

5.4.8 The emissions from HGVs associated with the construction of the proposed scheme have been scoped into this assessment as the duration of works would be greater than two years. The volume of construction traffic will be provided and assessed as part of the complete EIA. It will be reported in the ES accompanying the DCO application.

5.4.9 The emissions from site equipment have been scoped out of the assessment due to the temporary nature of the works and the minimal impact the site equipment would have on overall pollutant concentrations. Best practice measures to reduce emissions from site equipment will be included in the EMP.

**Local air quality assessment**

5.4.10 A detailed assessment has been carried out using an atmospheric dispersion model ADMS-Roads v5 to determine the potential effects on annual mean $NO_2$ concentrations at selected sensitive receptors (locations of relevant human exposure and ecological sites), in accordance with DMRB LA 105. In particular,

modelled concentrations have been compared with the EU limit value for annual mean $NO_2$ following the method detailed in DMRB LA 105 to provide a clear indication of the risk of delaying compliance with the EU limit value.

5.4.11 DMRB LA 105 provides instructions on determining whether an assessment should be detailed or simple. A detailed assessment will usually involve dispersion modelling to assess the proposed scheme impacts, whereas a simple approach would usually follow a spreadsheet-based assessment of changes in emissions. At the scoping stage it was identified that a detailed assessment would be carried out, due to the potential for significant impacts. This chapter provides the results of the detailed assessment.

Assessment scenarios

5.4.12 The assessment for local air quality has been undertaken for the following scenarios:

- 2016 Baseline scenario;
- 2024 Do-Minimum (DM) scenario: the traffic scenario at the modelled opening year without the proposed scheme; and
- 2024 Do-Something (DS) scenario: the modelled opening year with the proposed scheme.

5.4.13 For the PEI report, the traffic models are based on an opening year of 2024 and 2039 (15 years after opening). It is noted that the modelled years do not coincide with the revised opening and design year for the proposed scheme, however, it is considered that this difference would not materially affect the results of the assessments presented for consultation.

5.4.14 For local air quality, the modelled opening year of the proposed scheme is likely to be the worst-case scenario as vehicle emissions and background pollutant concentrations are anticipated to decrease over time due to improvements in fuel technologies.

5.4.15 Evidence from monitoring across the UK has indicated concentrations of pollutants are not reducing as quickly as predicted by Defra despite improvements to engine technology. To account for this, the future baseline projections scenarios were also calculated for 2024 following the methodology in section 2.47 of DMRB LA 105.

5.4.16 The assessment in this chapter uses data provided from the traffic model for the future years which includes future developments. The developments included in the traffic data will be detailed in the Combined Modelling and Appraisal (ComMA) Report which will accompany the DCO application.

Local air quality modelling

5.4.17 The inputs to the modelling process included:

- traffic data;
- receptor locations;
- meteorological data; and
- background concentrations.

5.4.18 Further details of the dispersion modelling inputs are provided in PEI report Appendix 5.2 Air quality operational assessment methodology.

Traffic data

5.4.19 Traffic data has been provided for the air quality assessment by the project transport modelling specialists. Traffic data provided represents the average conditions occurring in four specific time periods in a day (AM peak, inter-peak, PM peak and off peak). For the time periods in Table 5-2 the following data parameters were provided:

- traffic flow, defined as vehicles/hour;
- percentage heavy duty vehicles (HDV);
- vehicle speeds, in kilometres per hour (kph); and
- speed band information for use in calculation of emission factors in accordance with DMRB LA 105.

**Table 5-2 Traffic time periods**

| Traffic period | Time period |
|---|---|
| AM peak (AM) | 3 hours (07.00 – 10.00) |
| Inter-peak (IP) | 6 hours (10.00 – 16.00) |
| PM peak (PM) | 3 hours (16.00 – 19.00) |
| Off peak (OP) | 12 hours (19.00 – 07.00) |

5.4.20 Emissions from traffic data were calculated using the emission factors provided in the latest version (version 2.3) of the Highways England speed band emissions factors spreadsheet[5]. Using this methodology allows the effects of reducing or creating congestion to be more effectively assessed within the air quality study area.

5.4.21 The GIS software, ArcMap, was used to assist in inputting the road link information into the air quality model.

Receptors

5.4.22 Human and ecological receptors have been identified and added to the air quality dispersion model.

5.4.23 The building usage was determined using the Ordnance Survey Address Base Plus dataset, and modelled points were at the nearest façade to the busiest road.

5.4.24 A total of 91 human receptors are included in the assessment that were selected using the following criteria and professional judgement:

- proximity to the affected roads;
- representativeness of the maximum effects of the proposed scheme in that region; and
- whether they are at risk of exceeding the annual mean $NO_2$ Air Quality Objective (AQO).

5.4.25 The list includes dwellings, hospitals and educational establishments; they are shown as dots on the human receptors drawing in PEI report Figure 5.2. All locations, referred to as ‘receptors’ are treated as being equally sensitive.

Designated habitat sites

5.4.26 To assess the impacts on ecosystems the study area was reviewed to identify designated ecological habitats within 200m of the Affected Road Network (ARN) following sections 2.25 to 2.26.1 of DMRB LA 105. Twenty-six designated habitats sites were identified along the ARN. Details of the designated sites are

provided in PEI report Appendix 5.3 Air quality receptors. Additional information is provided in PEI report Chapter 8 Biodiversity. All 26 sites are shown in the ecological receptors drawing, PEI Report Figure 5.3. Further information on the ecological receptors selected is provided in PEI report Appendix 5.3 Air quality receptors. This assessment also feeds into the Habitat Regulation Assessment as appropriate

5.4.27 Effects at ecological receptors have been assessed in accordance with section 2.97 to 2.102 of DMRB LA 105.

5.4.28 Receptor transects (receptor points every 10m away from the roadside) for each of the assessed designated sites up to 200m from the source have been included to allow assessment of the drop off in emissions and deposition at increasing distances from the road. All ecological receptor locations were modelled at a height of 0m.

5.4.29 Following DMRB LA 105, in the first instance, the magnitude of change in annual mean nitrogen deposition at the designated habitats has been determined. DMRB LA 105 notes that where the magnitude of change is less than 0.4kg N/ha/yr it is not considered to result in any loss of species and unlikely to be significant.

Meteorological data

5.4.30 The effect of meteorological conditions on dispersion is accounted for in the dispersion model. The most significant factors that affect dispersion are wind speed, wind direction and atmospheric stability. The meteorological data site considered to be most representative of conditions across the study area was Little Rissington. The site is located 27 kilometres east of the proposed scheme. Data from this site was obtained from ADM Ltd in model-ready format. The wind rose shown in Figure 1.1 of PEI report Appendix 5.2 Air quality operational assessment methodology derived from this data identified the predominant wind directions as being south-westerly. Further detail on the meteorological data is provided in PEI report Appendix 5.2 Air quality operational assessment methodology.

Background concentrations

5.4.31 ‘Background’ air quality is a concept used to enable assessment of the effects of particular emission sources without the need for all sources in the area to explicitly considered. For the purpose of this assessment, the background air quality represents the contribution of all other relevant sources of air pollutants except those roads specifically included in the air quality model. The pollution due to the modelled roads has been added to the background pollution concentrations.

5.4.32 The Defra air quality website[6] provides $NO_x$ and $NO_2$ and $PM_{2.5}$ for each 1 kilometre by 1 kilometre square covering England.

5.4.33 The ‘in-grid square’ contribution from motorway, trunk ‘A’ road and primary ‘A’ road sectors have been removed from the background annual mean $NO_x$ concentration estimates, and background annual mean $NO_2$ estimates have been corrected, to account for the change in NOx concentration, using Defra’s Background $NO_2$ Calculator[7]. This process has been undertaken to avoid double counting of road traffic emissions from those road sources included in the dispersion model.

5.4.34 The Defra background concentrations with major road sector contributions removed has been used in the modelling. A comparison with local authority background monitoring data showed a small difference in concentrations between the Defra background concentrations and the local monitored background data. At the locations compared, concentrations varied by +/- 3.0 µg/m$^3$. Details of the comparison and details of sites selected are provided in PEI report Appendix 5.4 Air quality baseline data.

Model verification

5.4.35 A comparison of modelled and measured $NO_2$ concentrations has been undertaken. This process is known as model verification. Verification has been undertaken for the base year, using the principles laid out in Section A3.223 of LAQM TG.16. Additional receptor points have been included in the baseline modelling to represent the location of diffusion tube sites within 200m of the ARN to provide information for the verification exercise. The locations of selected verification points are shown in PEI report Figure 5.4.

5.4.36 The objectives of the model verification are to evaluate model performance, determine whether model adjustment is required, and to provide confidence in the assessment.

5.4.37 LAQM TG.16 suggests that if modelled annual mean $NO_2$ concentrations are within ±25% and preferably within ±10% of the monitored concentration and there is no systematic under or over prediction, then model adjustment is not considered necessary to further improve modelled results.

5.4.38 Modelled and monitored results may not compare well at some locations for several reasons including:

- uncertainties in estimated traffic flow and speed data;
- model setup (including street canyons, road widths, receptor locations);
- model limitations (treatment of roughness and meteorological data);
- uncertainty in monitoring data (notably diffusion tubes, e.g. bias adjustment factors and annualisation of short-term data); and
- uncertainty in emissions/emission factors.

5.4.39 The above factors were investigated as part of the model verification process to reduce the uncertainties as far as practicable.

5.4.40 Some monitoring locations are not suitable for model verification purposes as there may be specific local influences or they are located too close to the road, where LAQM TG.16 advises they should not be used. Therefore, each site was examined, and it was considered whether it was suitable for use in the verification study. Some locations were then removed from the verification. For those monitoring sites not used, the justification for their removal is provided in PEI report Appendix 5.5 Air quality sites used for verification.

5.4.41 Further detail on the verification process is provided in PEI report Appendix 5.5 Air quality sites used for verification.

NOx to $NO_2$ conversion

5.4.42 The approach to calculating the conversion of roadside $NO_x$ to $NO_2$ has followed the guidance in LAQM TG.16. This approach allows the calculation of $NO_2$ from $NO_x$ concentrations, taking into account the difference between ambient $NO_x$ concentration with and without the proposed scheme, the concentrations of ozone

and the different proportions of primary $NO_2$ emissions in different years. This approach is available as a spreadsheet calculator[8]; the version released in April 2019 (v7.1) has been used.

5.4.43 Emission controls on vehicles have been introduced as a measure to reduce concentrations of $NO_2$ in the atmosphere. Levels of atmospheric $NO_2$ have not reduced as quickly as predicted due to ineffective emission controls on some vehicles in real world conditions. DMRB LA 105 provides a method to address uncertainty in predicted future roadside $NO_2$ concentrations (section 2.47 to 2.55). This assessment has followed the requirements set out in DMRB LA 105 to calculate the projected base year and apply gap factors to the modelled results.

**Compliance risk assessment**

5.4.44 DMRB LA 105 provides requirements for the assessment of the risk of the proposed scheme being non-compliant with the EU Directive on Ambient Air Quality (2008/50/EC). The compliance risk assessment is undertaken using the modelling results from the local air quality assessment. To undertake compliance risk assessment, the following information is required:

- local air quality modelled results;
- Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network[9]; and
- Defra's zones and agglomerations maps[10].

5.4.45 Defra uses the PCM model to report against compliance with the EU Directive 2008/50/EC[14.] The current PCM model results have concentrations predicted for each year between 2017 and 2030.

5.4.46 To determine the study area for the compliance risk assessment the local air quality study area is compared to the compliance link locations in the PCM model. Where the two networks intersect these links form the basis of the assessment of compliance risk.

5.4.47 A review was carried out to identify any qualifying features as defined in section 2.64 of DMRB LA 105 and receptors added if they are within 15m. Thirteen receptors have been added along the PCM links and corresponding local model 4m validation points were added.

5.4.48 To determine the compliance risk of the proposed scheme, the Compliance Risk Flow Chart in figure 2.79 of DMRB LA 105 has been followed.

**Operational assessment criteria**

5.4.49 Evaluation of the significance of the local air quality findings has been undertaken in accordance with DMRB LA 105 (section 2.103). The assessment has assessed the following in order to determine whether the proposed scheme triggers a significant air quality effect:

- The effects on human health;
- The effects on designated habitats; and
- The outcomes of the compliance risk assessment.

5.4.50 A view on the significance for each of the above has been provided along with supporting evidence in section 5.10.

5.4.51 For human health the outcomes of the assessment have been screened following DMRB LA 105 (section 2.89). If a concentration is greater than the AQO and the

proposed scheme is predicted to have a greater than 1% change (compared with the relevant objective, e.g. 0.4µg/m$^3$ for annual mean $NO_2$), then the results are assigned to the change criteria shown in Table 5-3.

5.4.52 To aid the interpretation of significance of public exposure, as a result of the proposed scheme, table 2.92N in DMRB LA 105 provides the criteria which have been used in this assessment. Where predicted annual mean $NO_2$ concentrations are below the AQO or the magnitude of change is ≤0.4µg/m$^3$, effects are likely to be imperceptible.

**Table 5-3 Guideline for number of properties constituting a significant effect**

| Magnitude of change in $NO_2$ (µg/m$^3$) | Number of receptors with: | |
|---|---|---|
| | Worsening of AQO already above objective or creation of a new exceedance | Improvement of an AQO already above objective or the removal of an existing exceedance |
| Large (>4) | 1-10 | 1-10 |
| Medium (>2) | 10-30 | 10-30 |
| Small (≤0.4) | 30-60 | 30-60 |

5.4.53 The evaluation of the significance of nitrogen deposition results requires evaluation by an ecologist and therefore the significance of changes in pollutant concentrations and deposition rates at ecological designations is also discussed in PEI report Chapter 8 Biodiversity. The flow chart (figure 2.98) in DMRB LA 105 has been used to determine significance at ecological sites.

### Stakeholder engagement

5.4.54 Local authorities in the study area were contacted to inform them of the proposed scheme and the method of assessment being used. It was clarified with the Environmental Health Officer at Cotswolds District Council that receptors selected for modelling have been identified using ordnance survey (OS) address base plus data and locations are set out in PEI report Appendix 5.3 Air quality receptors and PEI report Appendix 5.6 Air quality operational phase impacts. The Environmental Health Officer at Wiltshire Council was advised that the affected road network is defined using the criteria in DMRB LA 105 and enters the Wiltshire local authority area.

## 5.5 Assessment assumptions and limitations

5.5.1 Air quality dispersion modelling has inherent areas of uncertainty, including:

- the traffic data used in the model;
- the traffic emissions data;
- simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;
- the background concentrations; and
- the meteorological data.

5.5.2 To reduce uncertainty, sensitivity testing of emissions data has been carried out using the most recent standard from Highways England, set out in DMRB LA 105. The methodology used in this assessment is designed to provide a robust assessment, reducing uncertainty caused by the above limitations.

5.5.3 Uncertainties or limitations related to transport data will be discussed in the Transport Report to accompany the DCO application. The Transport Report will outline the forecasting assumptions and deals with uncertainty in forecasting by

discussing low and high growth. The Transport Report will also outline modelling assumptions for the development of the base model and reports on the data collection for the traffic model. These limitations have been overcome as far as possible by verifying the modelled concentrations against monitoring results in appropriate locations. The traffic data used is appropriate for the purposes of this air quality assessment.

5.5.4 Road traffic flows and speeds used in the assessment were provided by the project transport modelling specialists for all the assessment scenarios. The traffic forecasting is in line with the current guidance.

## 5.6 Study area

5.6.1 The preliminary air quality assessment comprises two sub-topics:

- construction phase assessment, which is related to the risk of dust nuisance and dust emissions with potential to affect human health and ecosystems at a local level; and
- local air quality, which relates to pollutants with potential to affect human health and ecosystems at a local level.

**Construction phase assessment – dust**

5.6.2 The study area for the construction phase dust assessment includes all sensitive receptors within 200m of the red line boundary. Table 2.58b of LA 105 will be used to identify the predicted dust risk potential based on the number of receptors within 0-50m, 50-100m, 100-200m.

**Local air quality study area**

5.6.3 The study area for the assessment of local air quality has been defined following standards contained in DMRB LA 105. It comprises:

- worst case receptors within 200m of the centre line of the existing road, at the proposed scheme location;
- receptors within 200m of the centre line of the proposed scheme; and
- receptors within 200m of the centre line of any other ‘affected roads’.

5.6.4 The ARN for the purposes of a local air quality assessment is defined as those roads within a defined ‘traffic reliability area’ (TRA) (i.e. the area of the traffic model considered to provide reliable estimates of traffic when the base traffic model is compared to observed traffic) that meet any of the following traffic change criteria (based on the two-way flow on all roads). A road is included in the ARN if one or more of the following criteria are met:

- road alignment will change by 5m or more;
- daily traffic flows will change by >=1,000 annual average daily traffic (AADT);
- Heavy Duty Vehicle (HDV) flows will change by >=200 AADT; and
- a change in speed band.

5.6.5 PEI report Figure 5.1 shows the local air quality study area.

5.6.6 The study area is the affected local ARN and was defined using traffic data provided by the traffic consultants. It covers the following areas:

- A417 between Gloucester and Cirencester;
- A419 between Cirencester and Swindon;
- M5 between Tewkesbury and Falfield (J14);

- M4 J14-J15;
- A40 between Gloucester and Burford; and
- local roads joining the highways outlined above.

## 5.7 Baseline conditions

### Current baseline

5.7.1 In order to provide an assessment of the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. This provides a reference level against which any potential changes in air quality can be assessed. Since the baseline air quality is predicted to change in the future (mainly because vehicle emissions are changing), the baseline situation has also been predicted for the modelled opening year. The 'Do minimum' scenario is the predicted baseline for the modelled opening year and includes any other proposed schemes with a high level of certainty of being built.

5.7.2 Baseline air quality data has been gathered from the following sources for the air quality study area:

- Defra AQMA website[11];
- Defra PCM data for relevant years[12];
- Data from monitoring surveys carried out by Highways England and from local authority monitoring;
- GIS locations of sensitive receptors (residential properties, schools, hospitals and care homes) from OS Address Base Plus mapping; and
- GIS boundaries of designated ecological sites from Natural England[13].

### Local air quality management summary

5.7.3 Comparing baseline conditions for relevant pollutants against the AQOs detailed in the UK Government's Air Quality Strategy (AQS)[14] and the EU limit values, the following has been concluded:

- National assessments have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene or benzene concentrations exceeding relevant UK AQOs and EU limit value thresholds due to emissions from traffic anywhere in the UK. As such, concentrations of these pollutants have not been modelled as it is unlikely these pollutants would be a cause for concern in terms of potential exceedances as a result of the proposed scheme.
- For particulate matter ($PM_{10}$ and $PM_{2.5}$), there are no AQMAs designated for an exceedance of UK AQOs and EU limit value thresholds in the study area. Impacts from $PM_{10}$ and $PM_{2.5}$ are scoped out of further assessment.
- Exceedances of the annual mean $NO_2$ AQO and EU limit value threshold of 40µg/m$^3$ have been identified in the air quality study area. On this basis, $NO_2$ is the focus of the air quality assessment for the proposed scheme.

### Air quality management areas (AQMA)

5.7.4 There are two AQMAs within 200m of the ARN:

- Birdlip AQMA in Cotswolds District; and
- Cheltenham AQMA in Cheltenham Borough.

5.7.5 Cotswold District Council (CDC) declared the Birdlip AQMA for exceedances of the annual mean $NO_2$ objective. The Birdlip AQMA is located within the draft DCO

boundary and includes the Air Balloon pub and the residential houses opposite known as Air Balloon cottages.

5.7.6 Cheltenham Borough Council (CBC) has declared the whole of its local authority area as an AQMA. This was declared for exceedances of the annual mean $NO_2$ objective.

5.7.7 The AQMAs are shown in PEI report Figure 5.5.

**Monitoring data**

5.7.8 Local authorities have conducted air quality monitoring along the ARN. Monitoring of air quality for $NO_2$ concentrations has been undertaken across the proposed scheme area by Highways England. The location of the local authority and proposed scheme-specific monitoring points within 200m of the ARN are shown in PEI report Figure 5.6. Information from the monitoring has been used to establish baseline air quality conditions.

**Local authority monitoring data**

5.7.9 The study area extends into ten local authorities (South Gloucestershire Council, Swindon Borough Council, West Berkshire Council, Wiltshire Council, Cheltenham Borough Council, Cotswold District Council, Gloucester District Council, Stroud District Council, Tewksbury Borough Council and West Oxfordshire District Council). Among these ten local authorities, Cheltenham, Cotswold, Gloucester, Stroud, Tewkesbury and Swindon have air quality monitoring within the study area. Concentrations of annual mean $NO_2$ have been recorded as exceeding the objective in the study area at the Birdlip AQMA between 2014 and 2017, as well as at the monitoring site 'Cheltenham 18' within the Cheltenham AQMA.

5.7.10 LAQM.TG16 discusses the relationship between annual mean and hourly mean $NO_2$ concentrations. It is considered that where monitored annual mean $NO_2$ concentrations are greater than 60µg/m$^3$, there is the potential for the hourly mean $NO_2$ objective to be exceeded. The monitoring location 'Cotswold T11/N@1S1' is a diffusion tube in the Birdlip AQMA. It recorded annual mean $NO_2$ concentrations above 60µg/m$^3$ in 2014, 2016 and 2017. The monitoring site is not at a location that sensitive receptors reside and is not considered to be a location of relevant exposure (locations of relevant exposure are defined in accordance with the LAQM.TG(16) guidance as locations where members of the public are likely to be regularly present for the averaging period of the relevant AQO). It is considered there is a low risk of the short-term objective being exceeded at a location of relevant exposure. Assessment against the short-term $NO_2$ objective is unlikely to be exceeded, the ES will include a review of modelled predictions at the worst case receptors against the 60µg/m$^3$ threshold.

5.7.11 The results of local authority monitoring at the sites in the study area are presented in PEI report Appendix 5.4 Air quality baseline data. The AQMAs and monitoring site are shown in PEIR Figure 5.5.

**Scheme specific monitoring**

5.7.12 Highways England carried out monitoring of $NO_2$ concentrations using diffusion tubes at 22 monitoring sites from January 2016 to June 2016.

5.7.13 The raw monitored results for each period are provided in PEI report Appendix 5.4 Air quality baseline data. Monitored results have been annualised, to

determine a representative annual mean concentration for comparison with the annual mean $NO_2$ objective.

5.7.14 It is necessary to bias adjust diffusion tube results as this type of monitoring is not a reference method and therefore generally has lower accuracy. The bias adjustment and annualisation was carried out by consultants on behalf of Highways England for the EIA Scoping Report[15] and has been used for this assessment.

5.7.15 The only scheme specific monitoring site that was recorded to be exceeding the annual mean $NO_2$ objective was the house opposite the Air Balloon Pub within the Birdlip AQMA. The concentration at this site was recorded as 41.7µg/m$^3$. All other monitoring results are below the objective. Full results are presented in PEI report Appendix 5.4 Air quality baseline data.

**Defra Pollution Climate Mapping modelling**

5.7.16 Predicted roadside $NO_2$ concentrations were obtained from Defra's PCM model for the years 2015 (2015 reference year baseline projection, no Clean Air Zone (CAZ) or CAZ plus scenarios) and 2024 (2017 reference year). In the study area Defra PCM mapping indicates no exceedances in 2015 at road links in the ARN. In 2024 Defra PCM mapping indicates all links would still comply with EU limit values.

**Modelled baseline concentrations**

5.7.17 In addition to the air quality monitoring information, baseline concentrations have also been predicted at relevant human and ecological receptor locations across the study area and results of the baseline modelling are included in section 5.10.

**Future baseline**

5.7.18 The 'Do Minimum' and 'Do Something' scenarios have been set out, with the 'Do Minimum' scenario representing the future baseline without the proposed scheme.

## 5.8 Potential impacts

5.8.1 Mitigation measures incorporated in the design and construction of the proposed scheme are set out in section 5.9. Prior to implementation of the mitigation, the proposed scheme has the potential to affect air quality (positively or negatively), both during construction and once in operation.

**Construction impacts**

5.8.2 During construction, potential air quality effects arise from emissions of construction dust and particulate matter (PM). These emissions occur as a result of construction activities such as demolition, earthworks, construction and trackout. The quantities of each depend on the scale and intensity of the construction works.

5.8.3 Dust has the potential to cause nuisance to property, and very high levels of soiling can affect plants and ecosystems. There is the potential for dust nuisance on receptors within 200m of construction and haulage routes associated with the proposed scheme. This nuisance, which is separate from adverse effects on health, can arise through annoyance caused by the soiling of windows, cars, washing and other property. Potential air quality effects arising from dust emissions due to earthworks and construction activities are assessed in section 5.10.

5.8.4 There are a number of receptors which could be directly affected by dust nuisance associated with the proposed scheme works or construction vehicle traffic, and there is therefore potential for adverse impacts. Best practice construction dust control measures and standard mitigation measures will be presented in the EMP to accompany the ES. It should be noted that any potential impacts would be temporary in nature.

5.8.5 During the construction phase, potential air quality effects arise from emissions from HGVs using the road network. These impacts will be assessed in the ES when traffic data related to construction is available.

### Operational impacts

5.8.6 During the operational phase, potential air quality effects arise from emissions from vehicles using the road network. These impacts are discussed in section 5.10.

## 5.9 Design, mitigation and enhancement measures

### Construction mitigation

*Embedded mitigation*

5.9.1 During construction 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 proposed scheme and wider road network with traffic management in place.

5.9.2 Best practice mitigation measures to reduce effects from construction dust will be included within the EMP to accompany the ES. These measures would include the following:

- Minimisation of areas to be stripped of vegetation.
- Dampening down of dust generating activities and materials, including site roads, during dry weather, in addition to site monitoring (e.g. periodic visual inspections within and along site boundaries);
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- As far as possible temporary roads should be hard surfaced to reduce dust generation.
- Road sweeping to be carried out on access roads and local roads to remove any material tracked out of the site.
- Management of stockpiled materials with the potential to generate dust by rolling, covering and/or revegetating as soon as appropriate.

### Operation mitigation

5.9.3 On the basis that the proposed scheme would have a positive impact (due to relieving congestion and moving the road away from receptors) on local air quality concentrations, no specific mitigation or Air Quality Action Plans are required for the operation of the proposed scheme.

### Enhancement

5.9.4 No additional enhancement measures have been included in the proposed scheme design for air quality.

## 5.10 Assessment of likely significant effects

### Construction effects

5.10.1 The construction phase could affect local air quality through the generation and subsequent deposition of construction dust arising from construction activities and vehicle movements.

Construction dust

5.10.2 The proposed scheme is a new dual carriageway bypass, therefore the construction dust risk potential for the proposed scheme has been categorised as large.

5.10.3 Following the requirements of DMRB LA 105 sensitive human receptors and designated habitats within 200m of the DCO boundary have been identified. The sensitive human receptors identified include those located at the Air Balloon roundabout, Shab Hill Farm, Acorn House, Grove Farm and other properties in the local area. The number of human receptors is set out in Table 5-4.

**Table 5-4 Number of human receptors within 200m of construction and demolition activities**

| Distance | Count at distance | Cumulative count |
|---|---|---|
| 0-50m | 55 | 55 |
| 50-100m | 30 | 85 |
| 100-200m | 47 | 132 |

5.10.4 In addition to human receptors there are designated habitats including Sites of Special Scientific Interest (SSSI), local natures reserves, and ancient woodland that are present within the draft DCO boundary and span across the full 0-200m distance from the DCO boundary. The human receptors and designated habitats within 200m of the DCO boundary are shown in PEI report Figure 5.7.

5.10.5 The receiving environment's sensitivity to construction dust has been categorised as high for the 85 human receptors between 0-100m from the DCO boundary and all designated habitats between 0-100m from the DCO boundary. For human receptors and designated habitats between 100-200m from the DCO boundary the sensitivity is low as defined in DMRB LA 105.

5.10.6 Overall it is identified that the proposed scheme could impact receptors during the construction phase and mitigation is required to reduce the frequency and intensity of dust impacts. The proposed scheme is considered to have a large construction dust risk potential.

5.10.7 Mitigation to reduce impacts to a negligible level is to be included in the EMP accompanying the ES. With best practice mitigation measures in place the impacts are considered to be temporary, neutral and not significant.

### Operational effects

Affected road network

5.10.8 Following DMRB LA 105 screening criteria, the ARN was identified for the area around the proposed scheme for the 2024 modelled opening year scenario. The 2024 ARN is shown in PEI report Figure 5.1.

5.10.9 Roads have been included in the ARN mainly based on changes to the total AADT (total AADT changes by more than plus or minus 1,000 vehicles per day) and on changes to heavy duty vehicle (HDV) volumes. A smaller number of links have also been screened in based on changes in speed. A summary table of traffic changes along the main roads identified in the ARN is provided in Table 5-5.

**Table 5-5 Summary of ARN traffic changes in modelled opening year (two-way traffic flow changes AADT)**

| Road section | Do something (DS) - Do minimum (DM) |
|---|---|
| M5 north of Gloucester | 4,636 |
| M5 south of Gloucester | -1,340 |
| A417 Gloucester to Air Balloon roundabout | 10,196 |
| A417 Air Balloon roundabout to Cirencester | 13,023 |
| A419 Cirencester to Swindon | 8,467 |
| M4 Swindon to J14 | 2,795 |

Compliance links

5.10.10 Where the ARN overlaps with Defra PCM links, these have been selected and used to determine the risk of delaying compliance with the EU limit value. In this assessment, the PCM model overlaps with the ARN around Cheltenham, Cirencester and Swindon as shown in PEI report Figure 5.8.

Model verification

5.10.11 The modelled results at existing monitoring locations were used for model verification based on the method set out in section 5.4.35. Details of the verification process and results are provided in PEI report Appendix 5.5.

5.10.12 The verification factors used for each receptor are shown in PEI report Figure 5.9.

Human receptors

5.10.13 This section describes the predicted concentrations at human receptor locations as a result of the proposed scheme in the baseline year (2016) and modelled opening year (2024) when there would be a change in vehicle flows which meet the DMRB screening criteria.

5.10.14 The modelled $NO_2$ concentrations and magnitude of change for all 86 human receptors modelled are presented in PEI report Appendix 5.6 air quality – operational phase impacts. There were no predicted exceedances of the AQO at human receptor locations.

5.10.15 Results have been presented in geographic areas known as ‘discussion regions’. Selected receptors have been chosen in each discussion region to summarise the changes in air quality as a result of the scheme. The receptors were selected to show the largest changes in concentrations in the region and the highest total concentrations predicted. Two discussion regions have been used and are as follows:

- Discussion region 1: Birdlip AQMA and scheme area; and
- Discussion region 2: Wider ARN.

5.10.16 PEI report Figure 5.10 shows the predicted DS annual mean $NO_2$ concentrations in 2024.

Discussion region 1 – Birdlip AQMA and proposed scheme area

5.10.17 In this discussion region six receptors (see Table 5-6) have been selected to represent the scale of impacts associated with the proposed scheme. Scheme-specific and local authority monitoring showed that roadside concentrations of annual mean $NO_2$ in the Birdlip AQMA were above the AQO. A maximum monitored concentration of 61µg/m$^3$ was recorded at the roadside of the Air Balloon roundabout. It is not representative of receptor exposure in this location as properties are set back further from the road. There are no predicted exceedances of the $NO_2$ annual mean objective in the baseline scenario at any of the receptor locations. There are two receptors at risk of exceedance at the Air Balloon Cottages (receptors 49 and 51).

**Table 5-6 $NO_2$ concentrations at selected receptors – discussion region 1**

| Receptor | Grid reference (m) | | Annual mean $NO_2$ (µg/m$^3$) | | | Change (DS - DM) (µg/m$^3$) | AADT change |
|---|---|---|---|---|---|---|---|
| | X | Y | 2016 Base | 2024 DM | 2024 DS | | |
| 41 | 394545 | 213635 | 23.3 | 20.0 | 10.1 | -10.0 | -33,904 |
| 49 | 393450 | 216124 | 39.6 | 33.1 | 19.9 | -13.3 | 7,322 |
| 50 | 392968 | 215759 | 16.8 | 14.1 | 16.3 | 2.2 | 7,322 |
| 51 | 393457 | 216129 | 39.1 | 32.3 | 19.3 | -13.0 | 7,322 |
| 62 | 393315 | 215952 | 17.1 | 14.4 | 13.9 | -0.4 | -32,414 |
| 86 | 393869 | 215412 | 10.3 | 8.5 | 11.6 | 3.1 | 43,600 |

5.10.18 There are no predicted exceedances of the annual mean $NO_2$ objective in 2024 as a result of the proposed scheme.

5.10.19 Traffic would be moved away from receptors at the Air Balloon roundabout and hence concentrations reduce by 13.3µg/m$^3$ and 13.0µg/m$^3$ (receptors 49 and 51). The overall traffic on the A417 does increase but the traffic flow is improved and moves away from sensitive receptors at the roundabout.

5.10.20 The traffic will be significantly reduced along the existing alignment, south of the Air Balloon Roundabout. Whilst there is a large decrease in traffic the reduction in concentrations is shown to be relatively small (-0.2µg/m$^3$). This is due to the receptors already being located away from the roadside.

5.10.21 Where the proposed scheme moves traffic closer to existing receptors the total annual mean $NO_2$ concentrations remain well below the objectives. For example, at receptor 50 where the DS concentration is 16.3µg/m$^3$ and the change is 2.2µg/m$^3$.

Discussion region 2 – wider ARN

5.10.22 In this discussion region four receptors (see Table 5-7) have been selected to represent the scale of impacts associated with the proposed scheme. Scheme-specific and local authority monitoring showed that roadside concentrations of annual mean $NO_2$ across the wider ARN were below the AQO. Modelled baseline concentrations at receptor locations have been predicted to all be below the $NO_2$ annual mean objective.

**Table 5-7 $NO_2$ concentrations at selected receptors – discussion region 2**

| Receptor | Grid reference (m) | | Annual mean $NO_2$ (µg/m³) | | | Change (DS – DM) (µg/m³) | AADT change |
|---|---|---|---|---|---|---|---|
| | X | Y | 2016 Base | 2024 DM | 2024 DS | | |
| 38 | 387674 | 217142 | 37.5 | 34.6 | 35.5 | 0.8 | -1,340 |
| 73 | 395165 | 219845 | 12.2 | 10.1 | 10.7 | 0.6 | 1,310 |
| 75 | 398850 | 218461 | 11.9 | 9.7 | 9.2 | -0.4 | -1,966 |
| 78 | 401968 | 205119 | 15.1 | 12.9 | 13.7 | 0.8 | 9,859 |

5.10.23 There are no predicted exceedances of the annual mean $NO_2$ objective in 2024 as a result of the proposed scheme. It should be noted that the change in AADT traffic flow is not the sole determinant in the resulting change in $NO_2$ concentration. The distance from road also determines how much a change in traffic flow may change the concentrations at any given receptor. This is why despite there being such a difference in change of flow at the roads next to receptors 73 and 78, the change in concentration is relatively similar 0.6 µg/m³ and 0.8 µg/m³ respectively. Receptor 73 is 13m from the nearest road and receptor 78 is 33m.

5.10.24 At locations where traffic is predicted to increase such as on the existing A417 south of the proposed scheme the concentrations remain well below the AQO at sensitive receptor locations. For example, receptor 78 experiences a 0.8µg/m³ increase in concentration, where the traffic is increasing by 9,859 AADT, with a total $NO_2$ annual mean of 13.7µg/m³.

Air quality management areas

5.10.25 A summary of the proposed scheme's impact on local AQMAs is provided in Table 5-8.

**Table 5-8 Summary of AQMA modelled results**

| AQMA | 2024 modelled results |
|---|---|
| Birdlip AQMA (Air Balloon) | The maximum predicted annual mean $NO_2$ concentration in the DS scenario in this AQMA occurs at receptor H49 (19.0µg/m³). This is below the AQO. The predicted change as a result of the proposed scheme is an improvement of 14.4µg/m³. |
| Cheltenham AQMA | The maximum predicted annual mean $NO_2$ concentration in the DS scenario in this AQMA occurs at receptor H76 (14.9µg/m³). This is below the AQO. The predicted change as a result of the proposed scheme is 0.4 µg/m³. |

### Ecological effects

5.10.26 The change in nutrient nitrogen deposition as a result of the proposed scheme has been predicted at 26 ecological receptors.

5.10.27 The nutrient nitrogen deposition in the baseline year and modelled mopening year, and the magnitude of change between 'do minimum' and 'do something' scenarios for all ecological receptors modelled are presented in PEI report appendix 5.6 Air quality operational phase impacts.

5.10.28 The maximum increase in nutrient nitrogen deposition as a result of the proposed scheme in 2024 is predicted to be 0.2kg N/ha/year at Leckhampton Hill and Charlton Kings Common SSSI. At this location, as a percentage of the lower

critical load for the relevant habitat, there is a 1.8% increase in nitrogen deposition.

5.10.29 The maximum reduction in nutrient nitrogen deposition of -4.8kg N/ha/year has been predicted at Crickley Hill and Barrow Wake SSSI, which is located adjacent to the proposed scheme, north of the A417. At this location, as a percentage of the lower critical load for the relevant habitat, there is a -47.8% decrease in nitrogen deposition. This improvement in nitrogen deposition is due to the proposed scheme moving traffic away from the designated habitat and improving traffic flow.

5.10.30 As the change in nutrient nitrogen deposition is predicted to be below 0.4kg N/ha/yr at all receptors the results are considered to be not significant as defined in DMRB LA 105.

**Compliance with the Air Quality Directive**

5.10.31 DMRB LA 105 sets the method which has been followed to assess compliance with the air quality directive based on PCM data provided by Defra.

5.10.32 All PCM links in the study area are located around Cheltenham, Cirencester and Swindon. All changes in concentrations at qualifying features close to PCM links and locations 4m from PCM links are imperceptible (<0.4µg/$m^3$).

5.10.33 Based on the results of this assessment, the compliance testing indicates that the proposed scheme is low risk as defined in DMRB LA 105 (Figure 2.79). None of the links are at risk of becoming non-compliant as a result of the proposed scheme, the date for achieving compliance would not be affected, and there would be no increase in the length of roads in exceedance in the zones.

**Compliance with local planning policies**

5.10.34 The impacts predicted due to the proposed scheme have been considered against the local planning policies listed in Appendix 5.1 Air quality legislation, policy and guidance and the actions and measures in the Councils' Air Quality Action Plans.

5.10.35 The proposed scheme is predicted to have no significant impacts in 2024 and therefore does not act against the objectives of local planning policies. The Cotswolds Area of Outstanding Natural Beauty (AONB) Management Plan (Policy CE11) states that upgrades to the Air Balloon junction should help deliver reductions to $NO_2$ concentrations. The proposed scheme helps deliver reductions in $NO_2$ concentrations in the locations that are most at risk of exceedance in the Birdlip AQMA.

5.10.36 The proposed scheme along the A417 does not result in any exceedances of the AQOs, it moves traffic away from a number of properties that are currently located within an AQMA and does not act against the objectives of local planning policies.

**Assessment of construction phase significance**

5.10.37 The overall preliminary assessment of construction phase significance takes into account the proposed scheme's effect on human health and designated habitats. Potential air quality effects arising from emissions from HGVs using the road network will be assessed when traffic data related to construction is available and will be reported in the ES.

Human health effects

5.10.38 Impacts from construction dust will be managed through best practice mitigation measures to be outlined in the EMP to accompany the ES. With best practice construction mitigation measures the impact of construction dust would be temporary, neutral and not significant.

Designated habitats effects

5.10.39 With best practice construction mitigation measures being implemented the impact of construction dust would be temporary, neutral and not significant.

Overall construction phase significance

5.10.40 The preliminary assessment of effects from the construction phase are assessed as being temporary, neutral and not significant.

**Assessment of operational phase significance**

5.10.41 The overall assessment of operational phase significance takes into account the proposed scheme's effect on human health, designated habitats and the outcomes of the compliance risk assessment.

Human health effects

5.10.42 The assessment has predicted no exceedances of the AQOs at human receptors in the do-something scenario. All concentrations of annual mean $NO_2$ are predicted to remain below the AQOs.

5.10.43 At the Air Balloon AQMA the concentrations of annual mean $NO_2$ reduce from 33.1 µg/m$^3$ to 19.9 µg/m$^3$ in 2024. This is due to the proposed scheme moving traffic away from receptor locations in the AQMA and reducing congestion.

5.10.44 With no exceedances of the AQOs at human receptor locations and improvements in the Air Balloon AQMA it is considered the proposed scheme will have no significant effects on air quality. Overall, the proposed scheme is considered to have a beneficial impact on local air quality due to the reductions in $NO_2$ concentrations within the AQMA.

Designated habitat effects

5.10.45 The assessment of effects at designated habitats has not identified any locations where the scheme would result in an increase in nitrogen deposition greater than 0.4kg N/ha/yr. The results are therefore considered to be not significant.

Compliance risk assessment

5.10.46 The proposed scheme is not predicted to impact compliance with the EU limit value.

Overall operational phase significance

5.10.47 The preliminary assessment of effects from the operational phase are assessed as being permanent, neutral and not significant.

**Assessment of overall significance**

5.10.48 The significance of the construction phase and operational phase effects are both predicted to be not significant. Therefore it is predicted the effects on air quality at human and ecological receptors would be not significant.

5.10.49 The proposed scheme is not predicted to have an effect on the UK's ability to comply with the EU limit value.

## 5.11 Monitoring

5.11.1 To aid the efficacy of dust mitigation measures during the construction phase, visual inspections or dust monitoring could be carried out to check where dust soiling is occurring and where appropriate mitigation measures can be enhanced to reduce soiling. This will be secured by commitments in the EMP to accompany the ES.

5.11.2 No significant impacts have been identified and therefore there is no requirement for future monitoring of air quality during the operational phase as a result of the proposed scheme.

## 5.12 Summary

5.12.1 The assessment has examined the potential effects of the proposed scheme on local air quality during the modelled opening year 2024 using the current traffic data.

5.12.2 A review of the current air quality legislation and planning policies relevant to the proposed scheme has been undertaken. This assessment covers each of the main areas highlighted as being essential for an air quality assessment in the NPSNN.

5.12.3 The baseline assessment demonstrates that there are existing air quality issues in the study area, with exceedances of the $NO_2$ annual mean AQO being observed in Air Balloon AQMA.

**Preliminary construction assessment**

5.12.4 Assessment of construction phase impacts from construction dust showed that the proposed scheme effect is considered to be temporary, neutral and not significant.

**Preliminary operational assessment**

5.12.5 Assessment of annual mean $NO_2$ concentrations in 2024 (modelled opening year) indicated that the proposed scheme effect is considered to be not significant.

5.12.6 An assessment of EU compliance concluded that the proposed scheme is not likely to impact the predicted date for compliance with the EU limit value.

5.12.7 Based on the professional judgement of suitably qualified and experienced specialists, it is concluded that the proposed scheme's impact in the study area on air quality concentrations is not significant.

**Further Work**

5.12.8 As part of the EIA, the operational assessment will be updated with any changes to the alignment of the proposed scheme resulting from consultation.

5.12.9 An assessment of construction phase impacts from construction traffic will be also be undertaken.

5.12.10 Further work will involve assessing air quality impacts at the existing human and ecological receptors identified in this PEI report with the updated design for both the construction and operational phases.

# Endnotes and References

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