A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 5 Air Quality

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5.1 Introduction

5.1.1 This chapter assesses the potential air quality impacts from the construction and operation of the A358 Taunton to Southfields Dualling Scheme (the 'proposed scheme') following the methodology set out in the *Design Manual for Roads and Bridges* (DMRB) LA 105 *Air Quality* [1] and the Environmental Impact Assessment (EIA) Scoping Report [2].

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 effects on human health and designated habitats are assessed. Following this, the mitigation and residual effect of the proposed scheme are discussed, along with limitations of the assessment.

5.2 Legislative and policy framework

5.2.1 As documented in the Preliminary Environmental Information (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) [3], which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 5-10 identifies the NPSNN policies relevant to air quality and specifies where in this chapter information is provided to address the policy.

Table 5-10 Relevant NPSNN for applicant's air quality assessment

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
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 Environmental Impact Assessment (EIA) requirements and/or affect the UKs ability to comply with the Air Quality Directive, the application should undertake an assessment of the impacts of the proposed project as part of the environmental statement.*	The effects of the proposed scheme on compliance are described in section 5.9 Assessment of likely significant effects. There are no significant effects associated with the proposed scheme and there is no risk of affecting the UK's ability to achieve compliance.
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 are described in section 5.6 Baseline conditions and Appendix 5.3 Air Quality Baseline Data. Forecasts of air quality at the time of opening are described in section 5.9 Assessment of likely significant effects and full results are provided in Appendix 5.5 Air Quality Operational Phase Impacts. There are no significant effects at human receptors associated with the proposed scheme. The justification of the conclusion is described in section 5.9 Assessment of likely significant effects.

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
		The changes in nitrogen (N) deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity of this PEI Report.
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 recently published version of the DMRB Screening Tool (v8) [4]. The impact of emissions has been assessed using simple modelling as described in section 5.3 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 would not affect the UK's ability to comply with the air quality limit values. Results are provided in section 5.9 Assessment of likely significant effects.
5.11	*Air quality considerations are likely to be particularly relevant where schemes are proposed:* • *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* • *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 5.6 Baseline conditions and Appendix 5.3 Air Quality Baseline Data describe the AQMAs in the study area. There are no significant effects predicted in AQMAs as described in section 5.9 Assessment of likely significant effects. The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.
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 would not affect the UK's ability to comply with the air quality limit values and would not result in any significant effects at sensitive human receptors. The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
		deposition at these locations is included in Chapter 8 Biodiversity. Results are provided in 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 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.*	The proposed scheme would not affect the UK's ability to comply with the air quality limit values. Results are provided in section 5.9 Assessment of likely significant effects.

5.2.2 Details of relevant national and local legislation, policy and guidance are provided in Appendix 5.1 Air Quality Legislation, Policy and Guidance.

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

National legislation

5.2.4 The national legislation of relevance includes:

- *Part IV of the Environment Act 1995* [5]
- *Air Quality Standards Regulations 2010* [6]
- *Environmental Protection Act 1990* [7]

National planning policy

5.2.5 The national policies of relevance include:

- *Clean Air Strategy 2019* [8]
- *National Planning Policy Framework 2019* (NPPF) [9]
- NPSNN

Regional planning policy

5.2.6 The regional planning policies of relevance include:

- *Greater Exeter Strategic Plan, in particular Policy GESP30 Movement in Exeter* [10]

Local planning policy

5.2.7 The local planning policies of relevance include:

- *East Devon Local Plan 2013 to 2031* [11], in particular *Policy EN14 Control of Pollution*
- *Exeter City Council (ECC) Core Strategy* [12], in particular *Policy CP11*

- *Mid Devon Local Plan 2013 – 2033* [13], in particular *Policy DM 3 Transport and air quality*
- *Sedgemoor Local Plan 2011 – 2032* [14], in particular *Policy D14 Managing the Transport Impacts of Development*
- *South Somerset Local Plan 2006 – 2028* [15], in particular *Policy EQ7 Pollution Control*
- *South Somerset Environment Strategy* [16]
- *Taunton Deane Local Plan 2004* [17], in particular *Policy S1*
- *Taunton Deane Core Strategy 2011 – 2028* [18], in particular *Policy DM 1 General Requirements*

5.2.8 Potential effects on air quality resulting from the proposed scheme have been assessed following the methodology set out in the DMRB LA 105 *Air quality* and the Department for Environment, Food and Rural Affairs' (Defra) *Local Air Quality Management Technical Guidance* (LAQM TG.16) [19].

5.3 Assessment methodology

5.3.1 The EIA Scoping Report determined that a 'simple' level of assessment is required for the EIA as the proposed scheme has been defined as low risk and a 'simple' approach is considered proportional. This approach has been agreed in the Planning Inspectorate's (PINS) EIA Scoping Opinion [20]. A 'simple' air quality assessment has therefore been undertaken as it would provide sufficient information to confirm that the project would not result in exceedances of the air quality thresholds. The 'simple' assessment includes construction dust and operational phase impacts.

5.3.2 Potential effects during the construction phase have been assessed following DMRB LA 105 *Air quality* and will feed into the Environmental Management Plan (EMP) attached to the ES.

5.3.3 A regional air quality assessment of total emissions of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) is no longer assessed under the latest air quality standard (DMRB LA 105 *Air quality*). A regional assessment of total carbon emissions is undertaken in Chapter 14 Climate following DMRB LA 114 *Climate* [21].

5.3.4 An 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 PM_{10} or $PM_{2.5}$ Air Quality Objectives (AQO) and Defra projected background concentrations have not indicated that there is a risk of exceeding the PM_{10} or $PM_{2.5}$ AQO or limit value (LV).

Construction

5.3.5 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.

5.3.6 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.

5.3.7 A qualitative assessment of the impacts of dust nuisance arising during construction has been undertaken, using standards set out in section 2.56 of

DMRB LA 105 *Air quality*. Properties and ecological receptors within 200 metres (m) of dust producing activities have been identified and appropriate mitigation has been recommended where required.

5.3.8 The construction phase of the proposed scheme is expected to last for more than three years. At the time of writing, construction traffic data for the PEI Report is not yet available. A construction traffic assessment has therefore been scoped out of this PEI Report. During production of the Environmental Statement (ES) the construction phase vehicle movements will be made available. These vehicle movements will be screened against the standards outlined in DMRB LA 105 *Air quality* and a 'simple' assessment will be carried out if the thresholds are exceeded.

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

Operation

5.3.10 A 'simple' assessment has been carried out using the most recently published version of the DMRB Screening Tool (v8) to determine the potential effects on annual mean NO_2 concentrations at selected sensitive receptors (locations of relevant human health exposure and ecological sties), in accordance with DMRB LA 105 *Air quality*. In particular, modelled concentrations have been compared with the LV for annual mean NO_2 following the method detailed in DMRB LA 105 *Air quality* to provide a clear indication of the risk of delaying compliance with the LV.

5.3.11 DMRB LA 105 *Air quality* provides instructions on determining whether an assessment should be 'detailed' or 'simple'. A 'detailed' assessment would usually involve air dispersion modelling to assess the proposed scheme impacts, whereas a simple approach would usually follow a spreadsheet-based assessment to calculate any changes in emissions. At the EIA Scoping stage it was identified that a 'simple' assessment would be carried out as the proposed scheme has been defined as low risk with regard to air quality. A 'simple' approach is considered proportional and will provide sufficient information to confirm that the proposed scheme will not result in exceedances of the air quality thresholds. This chapter provides the results of the 'simple' assessment.

Assessment scenarios

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

- 2019 Baseline scenario
- 2023 Do-Minimum (DM) scenario: the traffic scenario at the modelled opening year without the proposed scheme
- 2023 Do-Something (DS) scenario: the modelled opening year with the proposed scheme

5.3.13 For the PEI Report, the operational air quality assessment is based on an opening year of 2023 using Project Control Framework (PCF) stage 2 traffic data due to the traffic data available at the time of writing which was based on PCF stage 2 (options selection stage). The PCF stage 3 traffic data based on a 2028

opening year was not available at the time of assessment for the PEI Report due to programme constraints. Vehicle emissions and background concentrations used in this assessment to reflect 2023 are higher than those which would be used for 2028 and therefore this reflects a conservative approach. For the ES, the operational air quality assessment will be based on an opening year of 2028. Further detail is provided in paragraph 5.3.19.

5.3.14 For local air quality, the modelled opening year of 2023 for 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.

5.3.15 Evidence from monitoring across the UK has indicated that pollutant concentrations are not reducing as quickly as predicted by Defra despite improvements to engine technology. To account for this, the future baseline projection scenarios were also calculated for 2023 following the methodology in section 2.47 of DMRB LA 105 *Air quality*.

5.3.16 The air quality 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 are detailed in the uncertainty log in the PCF stage 2 Combined Modelling and Appraisal (ComMA) Report [22].

DMRB screening tool

5.3.17 The inputs to the DMRB Screening Tool include:

- Traffic data
- Distance from receptor to centre of road
- Road width
- Background concentrations

Traffic data

5.3.18 Traffic data for the air quality assessment has been provided by the transport modelling specialists. The traffic data provided consists of:

- 24-hour annual average daily traffic (AADT)
- percentage of heavy-duty vehicles (HDV)
- speed band information for use in calculation of emission factors following DMRB LA 105 *Air quality*

5.3.19 The baseline traffic data provided represented a baseline year of 2015. Following advice obtained from the transport modelling specialists a 3% growth factor was applied to this data to scale traffic flows from 2015 to 2019.

5.3.20 PCF stage 2 traffic data has been provided by the transport modelling specialists for use in this assessment, with a traffic reliability area (TRA) based on the refined PCF stage 3 assessment extent. This is because PCF stage 3 traffic data was not available at the time of assessment due to programme constraints. The PCF stage 2 traffic data has been screened against the DMRB LA 105 *Air quality* thresholds to define the affected road network (ARN). It is noted that due to the changes in screening criteria between the DMRB approach used at PCF stage 2 and the current DMRB LA 105 *Air quality*, the ARN in the PEI Report has changed compared to the PCF stage 2 assessment.

5.3.21 The PCF stage 3 traffic data will be used for the ES. As and when PCF stage 3 traffic data is available for the ES, the study area will be determined and baseline conditions and receiving environment sensitivity reviewed.

5.3.22 Emissions from traffic data were calculated within the most recently published DMRB Screening Tool (v8) [4] which contains version 2.3 of the Highways England speed band emissions factors spreadsheet, which are based on the most recently available emission factors from Defra in their emission factor tool kit v10 [23]. Using this methodology allows the effects of reducing or creating congestion to be more effectively assessed within the air quality study area.

5.3.23 Geographic information system (GIS) software, ArcMap©, was used to input road link information in the air quality spreadsheet model.

Receptors

5.3.24 Human and ecological receptors have been identified and included in the assessment.

5.3.25 The building usage was determined using the Ordnance Survey (OS) Address Base Plus dataset, and air quality calculations were made at the nearest façade to the busiest road.

5.3.26 A total of 44 human receptors were identified for inclusion in the assessment. These were selected using professional judgement based on the following criteria:

- proximity to affected roads
- representativeness of the maximum effects of the proposed scheme in that region
- whether they are at risk of exceeding the annual mean NO_2 AQO

5.3.27 The list includes dwellings, hospitals and educational establishments and the locations are shown in Figure 5.1 Human Receptors. All locations, referred to as ‘receptors’ are treated as being equally sensitive.

Designated habitat sites

5.3.28 To assess the impacts on ecosystems, the study area was reviewed to identify designated ecological habitats within 200m of the ARN, following sections 2.25 to 2.26.1 of DMRB LA 105 *Air quality*. 21 designated habitat sites were identified along the ARN. The designated habitat sites are shown in Figure 5.2 Ecology Receptors. Details of the designated sites are provided in Appendix 5.5 Air Quality Operational Phase Impacts. Additional information is provided in Chapter 8 Biodiversity.

5.3.29 Effects at ecological receptors have been assessed in accordance with the method set out in section 2.97 to 2.102 of DMRB LA 105 *Air quality*.

5.3.30 As the assessment has followed a ‘simple’ assessment approach, a single point has been added to the edge of each ecological site closest to the road. Following an initial assessment, any sites which predicted a change in N deposition of over 1%, compared with the lower critical load were identified. For the identified sites, receptor transects (receptor points every 10m away from the roadside) up to 200m from the source were modelled to assess the drop-off in emissions and deposition with increasing distances from the road.

5.3.31 Following DMRB LA 105 *Air quality* guidance, the magnitude of change in annual mean N deposition at the designated habitats has been determined. DMRB LA 105 *Air quality* notes that where the magnitude of change is less than 0.4 kilograms of nitrogen per hectare per annum (kg N/ha/yr) it is not considered to result in any loss of species and unlikely to be significant.

Background concentrations

5.3.32 '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 be 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.

5.3.33 The Defra air quality website [24] provides NO_x and NO_2 and $PM_{2.5}$ for each 1 kilometre by 1 kilometre grid square covering England. These data were abstracted for use in the assessment.

5.3.34 The total Defra background concentrations (with no road sector contributions removed) have been used in the modelling. This is because only the roads directly adjacent to the receptor being assessed are included in the model. Therefore, this avoids the risk of double counting road traffic emissions from additional road sources in the grid square.

5.3.35 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 2.2 - 8.7µg/m^3 (micrograms per cubic metre). The monitored background concentrations are well below the national annual mean air quality objective for NO_2. Due to the limited existing background monitoring data available specifically for the study area, and the geographical spread of the ARN, this assessment has used concentrations from the Defra maps to provide background concentrations. Details of the comparison and details of sites selected are provided in Appendix 5.3 Air Quality Baseline Data.

Model verification

5.3.36 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 [25]. 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 Figure 5.3 Verification Points of this PEI Report.

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

5.3.38 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.

5.3.39 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).
- Uncertainty in emissions/emission factors.

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

5.3.41 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 Appendix 5.4 Air Quality Sites Used for Verification.

5.3.42 Further detail on the verification process is provided in Appendix 5.4 Air Quality Sites Used for Verification.

NOx to NO_2 conversion

5.3.43 The approach to calculating the conversion of roadside nitrogen oxide (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 [26]; the version released in August 2020 (v8.1) has been used.

5.3.44 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. Section 2.47 to 2.55 of DMRB LA 105 *Air quality* provides a method to address uncertainty in predicted future roadside NO_2 concentrations. This assessment has followed the method set out in DMRB LA 105 *Air quality* to calculate the projected base year and apply gap factors to the modelled results.

Compliance risk assessment

5.3.45 DMRB LA 105 *Air quality* provides a method for the assessment of the risk of the proposed scheme being non-compliant with the LVs. The compliance risk assessment is undertaken using the modelling results from the local air quality assessment. To undertake the compliance risk assessment, the following information has been collected:

- local air quality model results
- Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network [27]
- Defra's zones and agglomerations maps [28]

5.3.46 Defra uses the PCM model to report against compliance. The current PCM model results have concentrations predicted for each year between 2018 and 2030.

5.3.47 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.

5.3.48 A review was carried out to identify any qualifying features as defined in section 2.64 of DMRB LA 105 *Air quality* and receptors added if they are within 15m. Nine receptors have been assessed at qualifying features along the PCM links along with the corresponding local model 4m validation points at each location.

5.3.49 To determine the compliance risk of the proposed scheme, the Compliance Risk Flow Chart in Figure 2.79 of DMRB LA 105 *Air quality* has been followed.

Operational assessment criteria

5.3.50 Evaluation of the significance of the local air quality findings has been undertaken in accordance with DMRB LA 105 *Air quality* (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
- the outcomes of the compliance risk assessment

5.3.51 A view on the significance for each of the above has been provided along with supporting evidence in section 5.9 Assessment of likely significant effects.

Assessment of likely significant effects.

5.3.52 For human health, the outcomes of the assessment have been screened following DMRB LA 105 *Air quality* (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 5-11.

5.3.53 To aid the interpretation of significance of public exposure as a result of the proposed scheme, Table 2.92N in DMRB LA 105 *Air quality* 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 5-11 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

5.3.54 The evaluation of the significance of N 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 section 8.10 of Chapter 8 Biodiversity where required. The flow chart (Figure 2.98) in DMRB LA 105 *Air quality* has been used to determine significance at ecological sites.

Stakeholder engagement

5.3.55 Local authorities in the study area were contacted to request monitoring data and to inform them of the proposed scheme and the method of assessment being used. Baseline data for 2019 was provided by all local authorities. The Environmental Health Specialist at Somerset West and Taunton Council (SWTC) has highlighted the main air quality issues to consider in the assessment are around the Henlade and East Reach AQMAs [29], both of which have been assessed as part of the proposed scheme. No issues or concerns were raised by any other local authority.

5.3.56 An EIA Scoping Opinion was received from PINS on behalf of the Secretary of State (SoS) in May 2021 [20]. The comments relating to the air quality assessment have been accepted and addressed in this document where information was available for the PEI Report. Any outstanding information will be reviewed during production of the ES.

5.4 Assessment assumptions and limitations

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

- the traffic data used in the model
- the traffic emissions data
- simplifications in the DMRB screening tool used to simulate complex physical and chemical processes in the atmosphere
- the background concentrations

5.4.2 To reduce uncertainty, the pollutant concentrations predicted using the DMRB Screening Tool have been carried out using the air quality measurements from local authority data that is within the study area and has suitable data capture. The verification process has been undertaken in line with best practice guidance produced by Defra.

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

5.4.4 The most up to date emission factors and background concentrations have been used to calculate emissions and process results in the assessment.

5.4.5 It is not possible to determine the long-term impacts of the Covid-19 pandemic on traffic patterns and the consequential impact this might have on air quality related to the proposed scheme impacts on traffic emissions.

5.4.6 The assessment has been carried out based on the best information available at the time of the assessment.

5.4.7 Uncertainties or limitations related to transport data are reported in the PCF stage 2 ComMA Report. This report also outlines the forecasting assumptions, 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.

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

5.4.9 The construction dust 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.

5.4.10 The construction of the proposed scheme would be undertaken in phases. The qualitative assessment of construction dust effects described in this chapter considers the construction of the proposed scheme as a whole, including all phases of the works known at this stage.

5.4.11 Construction traffic data was not available at the time of writing the PEI Report. During production of the ES the construction phase vehicle movements will be made available. These vehicle movements will be screened against the standards outlined in DMRB LA 105 *Air quality* and a 'simple' assessment will be carried out if the thresholds are exceeded.

5.4.12 Whilst there is the potential for the proposed 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 air quality assessment comprises two sub-topics:

- A construction dust 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.
- Operational traffic air quality assessment, which relates to pollutants with the potential to affect human health and designated site at a local level during the operational phase of the proposed scheme.

Construction dust assessment

5.5.2 The study area for the construction dust assessment includes all sensitive receptors within 200m of the proposed scheme boundary. Table 2.58b of DMRB LA 105 *Air quality* was used to identify the predicted dust risk potential based on the number of receptors within 0-50m, 50-100m and 100-200m.

5.5.3 Figure 5.4 Construction Dust Buffers shows the construction dust study area. An assessment of construction dust impacts is reported in section 5.9 Assessment of likely significant effects.

Operational traffic air quality assessment

5.5.4 The study area for the assessment of local air quality has been defined following standards in DMRB LA 105 *Air quality*. 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'.

5.5.5 The ARN for the purposes of a local air quality assessment is defined as those roads within a defined 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 would change by 5m or more
- daily traffic flows would change by >=1,000 AADT
- HDV flows would change by >=200 AADT
- a change in speed band

5.5.6 Figure 5.5 Affected Road Network shows the operational traffic study area.

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

- the proposed scheme alignment
- A358 between Taunton to Axmouth
- M5 J22-J30
- A303 between Marsh and Blackford
- A372 between Langport and Podimore
- local roads joining the highways outlined above

5.6 Baseline conditions

Current baseline

5.6.1 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 DM 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.

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

- Defra UK-Air website [30]
- Defra PCM data for relevant years [31]
- Data from local authority monitoring
- GIS locations of sensitive receptors (residential properties, schools, hospitals and care homes) from OS Address Base Plus mapping
- GIS boundaries of designated ecological sites from Natural England [32]

Local air quality management summary

5.6.3 Comparing baseline conditions for relevant pollutants against the AQOs detailed in the *UK Government's Air Quality Strategy* (AQS) [33] and the LV, 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 LV 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 LV 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 LV 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)

5.6.4 There are four AQMAs within 200m of the ARN:

- Cullompton AQMA in Mid Devon District Council (MDDC)
- Yeovil AQMA in South Somerset District Council (SSDC)
- East Reach AQMA in SWTC
- Henlade AQMA in SWTC

Cullompton AQMA encompasses the entire built-up area of the town of Cullompton and was declared in 2006. Yeovil AQMA comprises the whole of the built-up area of Yeovil and was declared in 2002. East Reach AQMA encompasses the properties and street frontage on the north side of East Reach, Taunton, between the junctions with Tancred Street and Eastbourne Road, and was declared in 2003. The Henlade AQMA is located just outside of the proposed scheme boundary and comprises the properties fronting the A358, west of the bus shelter at Henlade Crossway and extending 100m further west to Greylands. Henlade AQMA was declared in 2003. All AQMAs listed have been declared for exceedances of the annual mean NO_2 objective.

5.6.5 The AQMAs are shown in Figure 5.6 AQMAs. A summary of Air Quality Action Plans (AQAP) created to address air quality issues in these AQMAs is shown in Appendix 5.1 Air Quality Legislation Policy and Guidance. The SWTC AQAP inside the 2020 ASR discusses working with "*Highways England to ensure that the implementation of the A358 scheme fits with the Council's existing development policies and leads to improvements in the local environment".*

Monitoring data

5.6.6 Local authorities have conducted air quality monitoring along the ARN. The location of the local authority monitoring sites within 200m of the ARN are shown in Figure 5.7 Monitoring locations. Information from the monitoring has been used to establish baseline air quality conditions.

5.6.7 The study area extends into six local authorities (East Devon District Council (EDDC), ECC, MDDC, Sedgemoor District Council (SDC), SWTC, SSDC).

Among these six local authorities, EDDC, ECC, MDDC, SDC and SWTC carry out diffusion tube NO_2 monitoring within the study area. There were exceedances of the AQO of 40µg/m^3 at roadside locations recorded in Sedgemoor and inside both Henlade and East Reach AQMAs in SWTC. Exceedances of the AQO inside Henlade AQMA were recorded between 2016-2018, with a maximum monitored concentration of 54.0µg/m^3 in 2018, which is well above the AQO of 40µg/m^3. There were no exceedances of the annual mean NO_2 objective measured in the study area in 2019; however, NO_2 concentrations were very close to the AQO inside Henlade and East Reach AQMA with a maximum measured concentration of 39.0µg/m^3. The monitored concentrations of PM_{10} and $PM_{2.5}$ in the study area were well below the relevant AQOs.

5.6.8 The results of local authority monitoring at the sites in the study area are presented in Appendix 5.3 Air Quality Baseline Data. The location of the monitoring sites are shown in Figure 5.7 Monitoring locations.

Defra Pollution Climate Mapping modelling

5.6.9 Predicted roadside NO_2 concentrations were obtained from Defra's PCM model [27] for the years 2019 (2018 reference year baseline projection) and 2023 (2018 reference year). In the study area Defra PCM mapping indicates no exceedances in 2019 at road links in the ARN. In 2023, Defra PCM mapping indicates all links would still comply with LV.

Modelled baseline concentrations

5.6.10 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 5.9.

Future baseline

5.6.11 The DM and DS scenarios have been set out, with the DM scenario representing the future baseline without the proposed scheme.

5.7 Potential impacts

5.7.1 Mitigation measures incorporated in the design and construction of the proposed scheme are set out in section 5.8 Design, mitigation and enhancement measures. Prior to implementation of the mitigation, the proposed scheme has the potential to affect air quality (positively or negatively), both during construction and operation.

Construction impacts

5.7.2 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.

5.7.3 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 5.9 Assessment of likely significant effects.

5.7.4 There are a number of receptors which could be directly affected by dust nuisance associated with the proposed scheme works, and there is therefore potential for adverse impacts. Best practice construction dust control measures and standard mitigation measures will be presented in the Environmental Management Plan attached to the ES. Any potential impacts would be temporary in nature.

Operational impacts

5.7.5 During the operational phase, potential air quality effects arise from emissions from vehicles using the road network. These impacts are discussed in section 5.9 Assessment of likely significant effects. On the basis of the available information, including existing monitored concentrations in the wider study area and the results from PCF stage 2, exceedances of the annual mean NO_2 objective are unlikely to occur within 200m of the ARN. Reductions in pollutant concentrations are predicted within Henlade AQMA as a result of the proposed scheme. The new alignment of the A358 would be approximately 300m south from Henlade. This would improve air quality in Henlade by reducing vehicle movements along the existing A358 which goes through the Henlade AQMA.

5.8 Design, mitigation and enhancement measures

Construction mitigation

5.8.1 During construction there is the potential for changes in air quality due to dust emissions from construction activity.

5.8.2 Best practice mitigation measures to reduce effects from construction dust will be incorporated into the Environmental Management Plan and ES.

Operational mitigation

5.8.3 No significant adverse effects on local air quality concentrations are predicted at human receptors as a result of the proposed scheme. In some locations, the proposed scheme would have a positive impact due to relieving congestion and moving the road away from receptors. Therefore, no specific mitigation or AQAPs are required for the operation of the proposed scheme.

5.8.4 Further discussion of the impacts and mitigation relating to N deposition is included in Chapter 8 Biodiversity.

Enhancement

5.8.5 There are several enhancement measures included in the preliminary scheme design which are known to improve air quality emissions. The proposed scheme has been designed to reduce congestion. The realignment of the A358 away from the Henlade AQMA would reduce pollutant concentrations at the receptor locations in Henlade.

5.9 Assessment of likely significant effects

Construction effects

5.9.1 The construction phase could affect local air quality through the generation and subsequent deposition of construction dust arising from construction.

Construction dust

5.9.2 The proposed scheme comprises the upgrade and realignment of the A358 to a high-quality dual carriageway between Southfields Roundabout on the A303 and the M5 at Taunton to address the traffic issues and long delays currently experienced along the route. Therefore, the construction dust risk potential for the proposed scheme has been categorised as large.

5.9.3 Following the method set out in DMRB LA 105 *Air quality*, sensitive human receptors and designated habitats within 200m of the proposed scheme boundary have been identified. The sensitive human receptors identified include those located along Blackbrook Way, Taunton, Ruishton, and near the existing A358 including receptors along Greenway Lane, Stoke Road, Lipe Lane, A378, Hatch Green, Ashill, Kenny and Horton Cross. Committed developments have also been reviewed and included in the assessment. The number of human receptors is set out in Table 5-12.

Table 5-12 Number of human receptors within 200 metres of construction and demolition activities

Distance	Count at distance	Cumulative count[(a)]
0-50m	374	374
50-100m	47	421
100-200m	339	760

(a) Cumulative count comprises all receptors from 0m to the maximum distance in each distance band.

5.9.4 In addition to human receptors there are three ancient woodland sites (Bickenhall Wood, Huish Coppice and Ashill Wood/Every's Copse) that are within 0-200m of the proposed scheme boundary. The human receptors and designated habitats within 200m of the proposed scheme boundary are shown in Figure 5.4 Construction Dust Buffers.

5.9.5 The receiving environment's sensitivity to construction dust has been categorised as high for the 421 human receptors and all designated habitats between 0-100m from the proposed scheme boundary. For human receptors and designated habitats between 100-200m from the proposed scheme boundary the sensitivity is low as defined in DMRB LA 105 *Air quality*.

5.9.6 There will be less than 20,000m^3 of buildings and structures demolished as part of the proposed scheme, comprising a mixture of concrete, timber, metal masonry. This includes the demolition of properties, bridges and roads. There will also be over 1,000m^2 of earthworks, comprising clay, sand and gravels with 100,000 tonnes of material to be moved. The volume of material to be constructed would be less than 25,000m^3. The exact number of HDV movements is not known at the time of writing, however there are expected to be more than 50 daily HDV trips to the site. HDVs would access the site via unpaved haul roads. Access to the haul roads will be from the existing A303 (Southfields

roundabout) and junction 25 of the M5. Further construction information, including construction and earthwork activities will be available and reported on in the ES.

5.9.7 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.

5.9.8 Mitigation to reduce impacts to a negligible level will be included within the EMP attached to the ES based on the standards outlined in DMRB LA 105 *Air quality*. This will include the development of dust management plan with measures to monitor effectiveness of mitigation, daily on-site and off-site inspections and recording of complaints/exceptional dust events.

5.9.9 With best practice mitigation measures in place the impacts are considered to be temporary, neutral and not significant.

Operational effects

Affected road network

5.9.10 Following DMRB LA 105 *Air quality* screening criteria, the ARN was identified for the area around the proposed scheme for the 2023 modelled opening year scenario. The 2023 ARN is shown in Figure 5.5 Affected Road Network and is described in more detail in section 5.5 Study area.

5.9.11 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 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 5-13.

Table 5-13 Summary of ARN traffic changes in modelled opening year (two-way traffic flow changes AADT)

Road section	DS – DM
Existing A358 alignment at Henlade AQMA (replaced by new offline portion)	-24,002
New A358 alignment south of Henlade AQMA (offline portion)	38,468
A358 at Kenny/Woodstock (Online portion)	13,613
M5 between junction 24 and 25	6,596
M5 between junction 25 and 26	5,889
A303 at Horton Cross	6,044
A372 at Podimore	1,262

Compliance links

5.9.12 Where the ARN overlaps with Defra PCM links, these have been selected and used to determine the risk of delaying compliance with the LV. In this assessment, the PCM model overlaps with the ARN around Taunton, Chard, the M5 (near Exeter) and Hamp as shown in Figure 5.8 Compliance Risk Road Network.

Model verification

5.9.13 The modelled results at existing monitoring locations were used for model verification based on the method set out in paragraphs 5.3.36 to 5.3.42. Details of

the verification process and results are provided in Appendix 5.4 Air Quality Sites Used for Verification.

5.9.14 The verification factors used for each receptor are shown in Figure 5.9 Verification Factors.

5.9.15 Model verification will be reviewed and updated for the ES when PCF stage 3 traffic data is available.

Human receptors

5.9.16 This section describes the predicted concentrations at human receptor locations as a result of the proposed scheme in the baseline year (2019) and modelled opening year (2023) when there would be a change in vehicle flows which meet the DMRB LA 105 *Air quality* screening criteria.

5.9.17 The modelled NO_2 concentrations and magnitude of change for all 44 human receptors modelled are presented in Appendix 5.5 Air Quality Operational Phase Impacts. There were no predicted exceedances of the AQO at any human receptor locations assessed.

5.9.18 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 proposed scheme. The receptors were selected to show the largest changes in concentrations in the region and the highest total concentrations predicted. Three discussion regions have been used and are as follows:

- discussion region 1: Offline portion of the proposed scheme
- discussion region 2: Online portion of the proposed scheme
- discussion region 3: Wider ARN

5.9.19 Figure 5.10 Annual Mean NO_2 Concentrations shows the predicted DS annual mean NO_2 concentrations in 2023.

Discussion region 1 – Offline portion of the proposed scheme

5.9.20 In this discussion region seven receptors (see Table 5-14) have been selected to represent the scale of impacts associated with the proposed scheme. Local authority monitoring showed that roadside concentrations of annual mean NO_2 in the offline portion of the proposed scheme were below the AQO in 2019, however the NO_2 concentrations monitored in Henlade AQMA were very close to the objective with a maximum monitored concentration of 39µg/m^3. Modelled baseline concentrations at all receptor locations have been predicted to be below the NO_2 AQO.

Table 5-14 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 (DS - DM)
	X	Y	2019 Base	2023 DM	2023 DS		
4	328844	122092	10.8	9.8	13.2	3.4	13,852
5	326852	124103	36.3	33.1	12.4	-20.7	-24,002
10	326515	124298	22.8	20.8	11.1	-9.7	-24,026
18	326975	123651	6.9	6.1	9.9	3.8	38,468
19	327930	123276	21.2	19.6	13.9	-5.7	-23,580

Receptor	Grid reference (m)		Annual mean NO_2 (µg/m^3)			Change (DS – DM) (µg/m^3)	AADT change (DS - DM)
	X	Y	2019 Base	2023 DM	2023 DS		
24	328607	122816	14.6	13.5	10.1	-3.4	544
35	328211	123022	16.3	15.0	10.0	-5.0	-23,580

5.9.21 The assessment shows that there are no predicted exceedances of the annual mean NO_2 objective in 2023 as a result of the proposed scheme.

5.9.22 Traffic will be moved away from sensitive receptors located close to the existing A358 and at the Henlade AQMA as a result of the new alignment of the A358, and hence concentrations in this location reduce by 20.7µg/m^3 and 9.7µg/m^3 (receptors 5 and 10 respectively). These are the largest reductions in NO_2 concentration predicted within the ARN. The overall traffic flow on the A378, which joins with the new A358 alignment, increases but there is a reduction in congestion. For example, at receptor 24 located on the A378 at Mattock's Tree Green, AADT increases by 544 vehicles but concentrations reduce by 3.4µg/m^3 as the speed band changes from heavy congestion to free flow.

5.9.23 Where the proposed scheme moves traffic closer to existing receptors, there are increases in NO_2 concentrations, however the total annual mean NO_2 concentrations remain well below the AQO. For example, at receptor 4 which is located at Bath Cottage, the DS concentration is 13.2µg/m^3 and the increase between DM and DS is 3.4µg/m^3. Receptor 18 is located at Stoke Road, approximately 30m south of where the new alignment of the A358 will cut through the existing Stoke Road. At this receptor location the DS concentration is 9.9µg/m^3 and the increase is 3.8µg/m^3 the largest increase in this discussion region.

Discussion region 2 – Online portion of the proposed scheme

5.9.24 In this discussion region five receptors (see Table 5-16) have been selected to represent the scale of impacts associated with the proposed scheme. Local authority monitoring showed that roadside concentrations of annual mean NO_2 across the online portion of the proposed scheme were below the AQO. Modelled baseline concentrations at all receptor locations have been predicted to be below the NO_2 AQO.

Table 5-15 NO_2 concentrations at selected receptors – discussion region 2

Receptor	Grid reference (m)		Annual mean NO_2 (µg/m^3)			Change (DS – DM) (µg/m^3)	AADT change (DS – DM)
	X	Y	2019 Base	2023 DM	2023 DS		
8	330307	118772	9.5	8.6	13.0	4.4	11,806
12	330520	118563	18.7	17.1	12.6	-4.5	-21,303
37	331649	117914	8.9	7.9	10.6	2.7	12,663
38	333221	116696	9.2	8.4	11.5	3.1	12,650
43	334317	115274	23.9	22.2	24.5	2.3	6,059

5.9.25 The results show that there are no predicted exceedances of the annual mean NO_2 objective in 2023 as a result of the proposed scheme.

5.9.26 There is a general increase in traffic flows predicted on the A358 in this area leading to increases in NO_2 concentrations. This includes receptor 43, located at Southfields roundabout, where an increase in NO_2 concentration between the DM

and DS is 2.3µg/m^3, resulting in a predicted DS concentration of 24.5µg/m^3, the highest DS concentration in this discussion region.

5.9.27 However, 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 affect the concentrations at any given receptor. Due to the widening and realignments of the A358, the carriageway is moved closer to some receptors in discussion region 2. There is an increase in AADT predicted along the roads adjacent to receptor 8 (located at Hatch Beauchamp) and receptor 37 (located at Ashill) of 11,806 and 12,663 AADT respectively. Although there would be more traffic adjacent to receptor 37, the increase in concentrations at receptor 8 (4.4µg/m^3) is higher than the change at receptor 37 (2.7µg/m^3). This difference is because the road is closer to receptor 8 by approximately 5m. Receptor 8 is predicted to have the largest increase in NO_2 concentrations in this discussion region.

5.9.28 There are also small realignments to the A358 in this section of the proposed scheme which moves traffic away from some receptors, resulting in a predicted decrease in NO_2 concentrations. For example, at receptor 12 located at Capland Lane, the DS concentration is 12.6µg/m^3 and the reduction between DM and DS is 4.5µg/m^3, the largest reduction in this discussion region. Receptor 12 is located 5m from the existing alignment of the A358 which would continue to be operational in the DS scenario. Between the DM and DS scenario, the traffic flows on the existing A358 alignment decreases by 21,303 AADT. This is because the traffic is shifted onto the new A358 alignment which is located 20m north of receptor 12 and has a traffic flow of 35,912 AADT in the DS scenario.

Discussion region 3 – Wider ARN

5.9.29 In this discussion region eight receptors (see Table 5-16) have been selected to represent the scale of impacts associated with the proposed scheme. Local authority monitoring showed that roadside concentrations of annual mean NO_2 across the wider ARN were below the AQO, however the NO_2 concentrations monitored in East Reach AQMA were close to the objective with a maximum monitored concentration of 38µg/m^3. Modelled baseline concentrations at all receptor locations have been predicted to be below the NO_2 annual mean objective.

Table 5-16 NO_2 concentrations at selected receptors – discussion region 3

Receptor	Grid reference (m)		Annual mean NO_2 (µg/m^3)			Change (DS – DM) (µg/m^3)	AADT change (DS – DM)
	X	Y	2019 Base	2023 DM	2023 DS		
16	326900	115509	8.2	7.7	6.4	-1.3	-2,330
20	324438	123017	15.5	14.4	14.7	0.3	5,889
26	352349	116016	-*	11.6	11.8	0.2	1,422
32	330238	134390	22.1	18.8	19.1	0.3	1,020
39	332842	108795	18.4	16.8	19.5	2.7	1,708
40	349443	125943	11.4	10.9	10.3	-0.6	-1,182
41	302890	107483	17.5	15.8	15.9	0.1	295
44	323271	124555	30.9	27.6	28.5	0.9	1,204
Notes: * Base traffic data was not available for the road link that the receptor is on							

5.9.30 There are no predicted exceedances of the annual mean NO_2 objective in 2023 as a result of the proposed scheme. For the majority of modelled sensitive receptors across the wider ARN, there is a slight increase in AADT traffic flows which is reflected in the increase in concentrations between the DM and DS scenarios. The speed band also determines the change in concentrations at some receptor locations, as a result of a change in congestion in the area.

5.9.31 The maximum DS concentration predicted in this discussion region is at receptor 44, located 2.5m from the edge of the road in East Reach, where an increase in AADT of 1,204 is predicted to increase NO_2 concentrations by 0.9µg/m^3 to 28.5µg/m^3. The DS concentration remains lower than the 2019 baseline concentration of 30.9µg/m^3.

5.9.32 At receptor 39, located at Victoria Avenue, the combination of a 1,708 increase in AADT, and a change in speedband from free flow to light congestion are predicted to increase NO_2 concentrations by 2.7µg/m^3. This is the maximum increase in NO_2 concentrations in this wider discussion region, resulting in a DS concentration 19.5µg/m^3.

5.9.33 There are some locations where decreases in AADT are predicted, away from the proposed scheme, leading to a predicted decrease in NO_2 concentrations. This includes at receptor 16 located at Blackwater, where the change in concentration is predicted to be -1.3µg/m^3 resulting in a DS concentration of 6.4µg/m^3.

Air quality management areas

5.9.34 A summary of the proposed scheme's impact on local AQMAs is provided in Table 5-17.

Table 5-17 Summary of AQMA modelled results

AQMA	2023 modelled results
Cullompton	The maximum predicted annual mean NO_2 concentration in the DS scenario in this AQMA occurs at receptor 41 (15.9m^3). This is well below the AQO. The predicted change as a result of the proposed scheme is 0.1µg/m^3.
Yeovil	The maximum predicted annual mean NO_2 concentration in the DS scenario in this AQMA occurs at receptor 26 (11.8µg/m^3). This is well below the AQO. The predicted change as a result of the proposed scheme is 0.2µg/m^3.
East Reach	The maximum predicted annual mean NO_2 concentration in the DS scenario in this AQMA occurs at receptor 44 (28.5µg/m^3). This is well below the AQO. The predicted change as a result of the proposed scheme is 0.9µg/m^3.
Henlade	The maximum predicted annual mean NO_2 concentration in the DS scenario in this AQMA occurs at receptor 5 (12.4µg/m^3). This is well below the AQO. The predicted change as a result of the proposed scheme is an improvement of 20.7µg/m^3. This significant improvement is a result of the new offline section of the A358 being added.

Ecological receptors

5.9.35 The change in nutrient N deposition as a result of the proposed scheme has been predicted at 21 ecological sites (with 189 modelled receptor locations, including transect points).

5.9.36 The nutrient N deposition in the baseline year and modelled opening year, and the magnitude of change between DM and DS scenarios for all ecological receptors modelled are presented in Appendix 5.5 Air Quality Operational Phase Impacts. The change in N deposition can be seen in Figure 5.11 Nitrogen deposition results.

5.9.37 The maximum increase in nutrient N deposition as a result of the proposed scheme in 2023 is predicted to be 0.5kg N/ha/year at receptor 15 at Bickenhall Wood Ancient Woodland (AW). At this location there is a 5.0% increase in N deposition as a percentage of the lower critical load for the relevant habitat (10 kg N/ha/yr). This receptor experiences an increase as the road will be dualled, bringing the carriageway closer to the site, along with an increase in AADT flows.

5.9.38 There is also an increase of 0.4kg N/ha/year predicted at receptor 8, Children's Wood/Riverside Park Local Nature Reserve (LNR). This site is located is along the A38 north of Taunton and the increase is as a result of a 3,853 increase in AADT and a 339 increase in HDVs.

5.9.39 The significance of this change has been considered within section 8.1 of Chapter 8 Biodiversity.

5.9.40 The maximum reduction in nutrient N deposition of -0.2kg N/ha/year has been predicted at two sites. Deadman Sites of Special Scientific Interest (SSSI), is located west of the proposed scheme and is predicted to improve due to the realignment of the carriageway, moving traffic away from the designated habitat and improving traffic congestion. Parsonage Wood AW is located north of Bulford. A reduction in N deposition in this area is predicted due to a reduction of 1,557 AADT.

5.9.41 Increases in nutrient N deposition are predicted to be above 1% of the lower critical load at the following receptors:

- Maiden Down SSSI
- Huntspill River National Nature Reserve (NNR)
- Children's Wood/Riverside Park LNR
- Unnamed AW 1/2/3/4
- Unnamed AW 5
- Unnamed AW 6
- Bickenhall Wood AW
- Knights Wood AW
- Warren Hill AW

5.9.42 These changes cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

Compliance with the Air Quality Directive

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

5.9.44 There are no exceedances of the NO_2 AQO as a result of the proposed scheme at PCM receptors.

5.9.45 Six locations (C1, C2, C3, C4, C5, and C6), shown in Figure 5.8, are predicted to have an increase in concentration greater than 0.4µg/m^3 with a maximum increase of 2.2µg/m^3 4m from the edge of the road at receptor C6. The maximum DS concentration is also at C6 with a predicted concentration of 36.5µg/m^3. Therefore, none of the PCM receptors are at risk of exceeding, or delaying compliance with the LV in the Directive.

5.9.46 All other increases in concentrations at qualifying features close to PCM links and locations 4m from PCM links are imperceptible (<0.4µg/m^3).

5.9.47 Based on the results of this assessment, the compliance testing indicates that the proposed scheme is low risk as defined in DMRB LA 105 *Air quality* (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

5.9.48 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' AQAPs.

5.9.49 The *SWTC AQAP* inside the *2020 ASR* [34] discusses working with "*Highways England to ensure that the implementation of the A358 scheme fits with the Council's existing development policies and leads to improvements in the local environment".* It also states that *"to be able to meet air quality objectives the Council is likely to have to rely on the support of other agencies, for example, Highways England to ensure the proposed re-routing of the A358 can reduce traffic levels in the Henlade AQMA*".

5.9.50 The proposed scheme is predicted to have no significant impacts in 2023 and therefore does not act against the objectives of local planning policies.

5.9.51 The proposed scheme 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. The results of this assessment show that the operation of the proposed scheme would reduce traffic levels in the Henlade AQMA as discussed in the *SWTC AQAP* inside the *2020 ASR* which would support an argument to revoke the Henlade AQMA.

Assessment of construction phase significance

5.9.52 The overall assessment of construction phase significance takes into account the proposed scheme's effect on human health and designated habitats arising from construction dust. The effects from the construction phase are assessed as being temporary, neutral and not significant.

Human health effects

5.9.53 The proposed scheme is considered to have a large construction dust risk potential. Impacts from construction dust would be managed through best practice mitigation measures, to be outlined in the EMP. With best practice construction mitigation measures the impact of construction dust would be reduced to a negligible level.

Designated habitats effects

5.9.54 With best practice construction mitigation measures being implemented the impact of construction dust would be reduced to a negligible level.

Overall construction phase significance

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

Assessment of operational phase significance

5.9.56 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

5.9.57 The assessment has predicted no exceedances of the AQOs at human receptors in the DS scenario. All concentrations of annual mean NO_2 are predicted to remain below the AQOs.

5.9.58 At the Henlade AQMA the concentrations of annual mean NO_2 reduce from 33.1µg/m^3 to 12.4 µg/m^3 in 2023. This is due to the proposed scheme moving traffic away from receptor locations in the AQMA and a reduction in congestion.

5.9.59 With no exceedances of the AQOs at human receptor locations and improvements in the Henlade AQMA it is considered the proposed scheme would 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 habitats effects

5.9.60 The assessment of effects at designated habitats has identified locations where the proposed scheme would result in an increase in N deposition greater than 1% of the lower critical load. An assessment to determine the effect upon ecological habitats are reported in Chapter 8 Biodiversity.

Compliance risk assessment

5.9.61 The proposed scheme is not predicted to impact compliance with the LVs.

Overall operational phase significance

5.9.62 The assessment of effects from the operational phase human health effects are assessed as being permanent, neutral and not significant.

5.9.63 The assessment of effects at designated habitats cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

Assessment of overall significance

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

5.9.65 The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

5.9.66 The proposed scheme is not predicted to have an effect on the UK's ability to comply with the LVs.

5.10 Monitoring

5.10.1 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 would be secured under the DCO via the EMP in the ES for the DCO application.

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

5.10.3 Further discussion of the impacts and mitigation relating to N deposition is included in Chapter 8 Biodiversity.

5.11 Summary

5.11.1 The assessment has examined the potential effects of the proposed scheme on local air quality during the modelled opening year 2023 using the current traffic data.

5.11.2 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.

5.11.3 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 at roadside monitoring locations in Sedgemoor, and both Henlade and East Reach AQMAs in SWTC.

Construction assessment

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

Operational assessment

5.11.5 Assessment of annual mean NO_2 concentrations in 2023 (modelled opening year) on human health effects indicated that the proposed scheme is considered to be not significant.

5.11.6 An assessment of LV compliance concluded that the proposed scheme is not likely to impact the predicted date for compliance with the LV.

5.11.7 The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

5.11.8 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 in relation to human health effects is not significant.

Abbreviations List

Please refer to PEI Report Chapter 17 Abbreviations.

Glossary

Please refer to PEI Report Chapter 18 Glossary.

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