A12 Chelmsford to A120 widening scheme TR010060

6.1 ENVIRONMENTAL STATEMENT CHAPTER 6 AIR QUALITY

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A12 Chelmsford to A120 widening scheme

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ENVIRONMENTAL STATEMENT
CHAPTER 6 AIR QUALITY

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CONTENTS

LIST OF TABLES

6 Air quality

6.1 Topic introduction

6.1.1 Air pollution is associated with adverse health impacts and is recognised as a contributing factor in the onset of conditions such as heart disease and cancer. In addition, air pollution disproportionately affects the most vulnerable in society: children and the elderly, and those with pre-existing heart and lung conditions. There is often a strong correlation with issues of inequality because areas with poor air quality are also often less affluent areas (Department for Environment, Food and Rural Affairs (Defra), 2006). Furthermore, in certain circumstances air pollution may adversely affect ecosystems through elevated nitrogen and acid deposition.

6.1.2 This chapter presents the information required by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) to be provided in the Environmental Statement for the proposed A12 Chelmsford to A120 widening scheme (the proposed scheme) in respect of air quality.

6.1.3 The effects of both construction and operation of the proposed scheme have been assessed. The assessment considers the Do Minimum (DM) scenario (without the proposed scheme) and Do Something (DS) scenario (with the proposed scheme). The assessment, which has been undertaken in line with Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality (Highways England, 2019), considers the following matters:

- Baseline conditions: a review of existing air quality conditions within the study area
- Construction dust: a qualitative assessment of the potential impacts of construction dust on relevant sensitive receptors
- Local air quality: a detailed assessment of the potential air quality impacts of the proposed scheme, during both its construction and operation, on representative sensitive human health receptors within the study area
- Designated and local wildlife sites: an assessment of the potential for changes in air quality as a result of the proposed scheme to impact relevant designated and local ecological sites within the study area
- Compliance risk: an assessment of the potential risk of the proposed scheme to affect compliance with the annual mean nitrogen dioxide (NO_2) EU Limit Value in the ‘shortest possible time’

6.1.4 This chapter is supported by the following figures [TR010060/APP/6.2]:

- Figure 6.1 Air Quality Assessment Area
- Figure 6.2 Air Quality Baseline Conditions
- Figure 6.3 Background NO_2 Concentrations

- Figure 6.4 Construction Dust Assessment – Sensitive Receptors
- Figure 6.5 Modelled NO_2 Concentrations in the Peak Construction Year (2025) Do Something Scenario for Human Health Receptors
- Figure 6.6 Modelled Change in NO_2 Between the Peak Construction Year (2025) Do Something and Do Minimum Traffic Scenarios for Human Health Receptors
- Figure 6.7 Modelled Ecological Receptors
- Figure 6.8 Modelled Compliance Risk Assessment Receptors
- Figure 6.9 Modelled NO_2 Concentrations in the Opening Year (2027) Do Something Scenario for Human Health Receptors
- Figure 6.10 Modelled Change in NO_2 Between the Opening Year (2027) Do Something and Do Minimum Traffic Scenarios for Human Health Receptors

6.1.5 This chapter is supported by the following appendices [TR010060/APP/6.3]:

- Appendix 6.1 Air Quality Monitoring Results
- Appendix 6.2 Traffic Data for the Affected Route Network
- Appendix 6.3 Dispersion Modelling Process
- Appendix 6.4 Verification of the Dispersion Model Results
- Appendix 6.5 Air Quality Modelling Results
- Appendix 6.6 Project Air Quality Action Plan

6.1.6 This chapter uses some technical air quality terminology. These terms are presented and described in Chapter 18: Glossary and acronyms, of the Environmental Statement [TR010060/APP/6.1].

6.2 Competent expert evidence

6.2.1 The assessment has been undertaken and reported by a team of competent air quality specialists. The competent expert responsible for the assessment is a Technical Director with a PhD in transport emissions quantification and member of the Institute of Air Quality Management (IAQM). The competent expert has over 20 years' experience of undertaking air quality assessments for major infrastructure and linear projects, including highways, for which the process of Environmental Impact Assessment (EIA) has been required.

6.3 Stakeholder engagement

6.3.1 Stakeholder engagement has been undertaken with the four local authorities through whose authority areas the proposed scheme passes. These local authorities are Colchester Borough Council, Chelmsford City Council, Maldon District Council and Braintree District Council. This engagement was undertaken in August 2020 and focused on describing and then agreeing the

scope of the air quality assessment methodology to support the Environmental Statement.

6.3.2 Further engagement was undertaken in April 2021 to provide an overview of the Preliminary Environmental Information Report (PEIR) (Highways England, 2021), and in March 2022 to update stakeholders on the content and conclusions of the Environmental Statement.

6.3.3 Table 6.1 provides a summary of the key stakeholder feedback and key requirements from the Planning Inspectorate as identified within the Scoping Opinion (Planning Inspectorate, 2021) relevant to the assessment of air quality.

Table 6.1 Key Scoping Opinion feedback for air quality

Stakeholder	Comment	Response
Planning Inspectorate	Ensure that observed air quality monitoring trends and results from the application of the Department of Environment, Food and Rural Affairs' (Defra's) annual mean NO_2 projection tool are fully explained in the Environmental Statement.	Observed trends from air quality monitoring sites managed by local authorities relevant to the study area are included in Section 6.8 of this chapter. The Defra annual mean NO_2 roadside projection tool was not applied to the monitored results because future NO_2 concentrations were modelled at receptors as part of the assessment.
Planning Inspectorate	Provide detail as to how study-based air quality monitoring was collected, processed, and annualised.	Details of the collection, processing and annualisation of air quality monitoring data is provided in Appendix 6.1 of the Environmental Statement [TR010060/APP/6.3].
Planning Inspectorate	Provide justification for the placement of National Highways air quality monitoring sites.	The proposed scheme specific air quality monitoring locations (commissioned by National Highways) were selected to complement existing local authority monitoring and to better facilitate the setting up of the air quality model (e.g. for the purposes of model verification). A representative number of locations were selected near the existing and proposed alignment of the A12 to indicate local baseline conditions. Where data from monitoring sites were not subsequently used for the purposes of model verification, justification for their exclusion is provided in Appendix 6.4 of the Environmental Statement [TR010060/APP/6.3].

Stakeholder	Comment	Response
Planning Inspectorate	Provide clarification if background nitrogen oxides (NO_X) concentrations exceed 30µg/m^3 which is the air quality objective (AQO) for NOx for the protection of ecological habitats.	Mapped background concentrations indicate that NO_X concentrations within the study area are below 30µg/m^3 in the 2019 base year. In addition, background concentrations are projected to be below 30µg/m^3 in the assessed peak construction year (2025) and opening year (2027). Further details are provided in Section 6.8 of this chapter.
Planning Inspectorate	Provide clarification on the spatial distribution of background concentrations. More specifically, show the concentration gradient across the Traffic Reliability Area (TRA) with respect to the Order Limits.	Background concentration ranges across the modelled receptor locations are presented in tabular form in Section 6.8 of this chapter. Figure 6.3 [TR010060/APP/6.2] shows the spatial distribution of background NO_2 concentrations as 1km grid squares.
Planning Inspectorate	There is little or no information provided about Defra's Pollution Climate Mapping (PCM).	Details of Defra's PCM model (Defra, 2020a) have been provided in Section 6.8 of this chapter and Figure 6.2 [TR010060/APP/6.2].
Planning Inspectorate	Ensure that justification of the selected receiving environment is fully described as per DMRB LA 105.	Justification for the selection of receptors has been provided in Section 6.8 of this chapter. Worst-case receptors (e.g. those expected to experience the highest pollutant concentrations and / or greatest changes in pollutant concentrations) have been selected within the study area.
Colchester Borough Council	The Environmental Scoping Report proposes an assessment of air quality in relation to the proposed scheme using DMRB LA 105. The proposed air quality assessment methodology is acceptable; however we would like to draw attention to the air pollution hotspot on the A120 in Marks Tey. The scoping report neglects monitoring data collected by Colchester Borough Council in 2019 which suggest relatively poor air quality on the A120 approximately 1km from the A12 junction 25. Air quality conditions at this location are described in the 2020 Colchester Borough Council Air Quality Annual Status Report and it is essential that any comprehensive assessment takes this into account.	The latest available representative monitoring data (i.e. 2019) have been collated for the relevant local authorities and presented in Section 6.8 of this chapter. Pollutant concentrations have been modelled at worst-case receptors in this air quality assessment within 200m of roads where air quality traffic screening criteria are exceeded. The assessment includes receptors located beside the A120 between Great Tey Road and junction 25 as shown on Figure 6.9 [TR010060/APP/6.2].

Stakeholder	Comment	Response
Maldon District Council	Any construction dust assessment should have regard to the IAQM guidance document: Assessment of Dust from Demolition and Construction 2014 (revised 2016).	The assessment has followed DMRB LA 105 guidance on the assessment of construction dust. DMRB LA 105 is informative for the assessment of major road schemes. The level of construction dust mitigation required following assessment with the DMRB LA 105 methodology would be equivalent to the outcomes with the IAQM guidance.
Maldon District Council	Any air quality assessment should have regard to the IAQM guidance document: Land-Use Planning and Development Control: Planning for Air Quality 2017.	The assessment has followed DMRB LA 105 guidance. DMRB LA 105 assesses significant effects against relevant thresholds for air quality.

6.3.4 The full Scoping Opinion, as well as the Applicant's response regarding how and where comments have been addressed in the Environmental Statement and draft Development Consent Order (DCO), is included within Appendix 5.1 [TR010060/APP/6.3] of the Environmental Statement.

6.3.5 Table 6.2 identifies the key feedback received from the statutory consultation. All comments raised during the statutory consultation, as well as the Applicant's responses, are included in the Consultation Report [TR010060/APP/5.1].

Table 6.2 Key statutory consultation feedback for air quality

Stakeholder	Comment	Response
Maldon District Council	This Council is concerned at the environmental impacts of congestion and pollution in Hatfield Peverel village originating from the Maldon District. How can the Council improve local air quality caused by congestion and queuing traffic on local road connections if the local road connections are not improved to connect to the A12?	Modelling studies undertaken and reported within the PEIR indicated that changes in road traffic emissions as a result of the proposed scheme would not result in significant air quality impacts in the Hatfield Peverel area. The results of an updated air quality assessment for the DCO application, based on revised traffic model outputs, is reported in the Environmental Statement. The overall results in Section 6.9 and Section 6.11 of this chapter agree broadly with those at PEIR and again indicate that the proposed scheme would not result in significant air quality impacts in the Hatfield Peverel area.

Stakeholder	Comment	Response
Maldon District Council	The Council is concerned at the recent (November and December 2019) declaration of Air Quality Management Areas (AQMA) in Maldon and Danbury, both on the A414. Whilst we acknowledge the proposed scheme would alleviate some congestion on local roads (caused when the A12 is closed), the District's residents and businesses rely on all of these local roads to connect to the A12 national road network.	Whilst it is acknowledged that AQMAs have recently been declared in both Maldon and Danbury, changes in traffic conditions in excess of the traffic scoping criteria defined in paragraph 2.1 of DMRB LA 105 are unlikely to occur in these areas. As such, air quality would not be significantly impacted in either of these areas as a result of the proposed scheme.
Colchester Borough Council	The inclusion of traffic lights at the junction of the A120 (Coggeshall Road) and A12. This would evidently lead to increasing queuing and increasing pollution from idling traffic.	The section of the A120 where monitoring is being undertaken by the Colchester Borough Council is an area of public interest, having been raised at the consultation event held at Marks Tey Village Hall, and as a result has been assessed in this chapter up to Great Tey Road. The traffic model applied for the Environmental Statement accounted for road traffic delays at this location. The subsequent air quality modelling and assessment for the opening year (2027) showed that there are no exceedances of AQOs as a result of the proposed scheme (i.e. the predicted annual mean NO_2 concentration for receptor CBC137 indicated 23.3µg/m^3; for CBC136, 23.4µg/m^3; and for R163, 23.2µg/m^3).
Copford with Easthorpe Parish Council	It is understood from the consultation that air pollution is already above acceptable standards at the sensors serving Ashbury Drive and Godmans Lane but no studies have been carried out on the traffic queuing from the Marks Tey boundary and beyond, an issue we have been assured will be looked into.	

Stakeholder	Comment	Response
Copford with Easthorpe Parish Council	Concerns raised about the apparent lack of any air quality modelling or extrapolation in both Copford and Easthorpe as this key health indicator has recently been shown to be a significant cause in health related issues and early death.	The spatial extent of the air quality assessment has been defined using the traffic scoping criteria published in DMRB LA 105. None of these criteria were exceeded along roads in Copford in the PEIR, and as a result no sensitive receptors were modelled in this area. Easthorpe Road was included in the modelling assessment at PEIR as a location of public interest because of its proposed use for access to a proposed satellite compound and as such local receptors were identified here. No significant air quality impacts were recorded in the PEIR in this area. Both Copford and Easthorpe locations were assessed for the Environmental Statement. The air quality modelling and assessment in this chapter agree with the PEIR and show that there are no exceedances of AQOs with the proposed scheme in these locations.

6.3.6 Air quality specialists from the assessment team attended community events on the following occasions:

- Marks Tey Community Event - 23 July 2021
- Marks Tey Parish Council Meeting - 4 November 2021
- Copford with Easthorpe Parish Council Meeting - 20 October 2021

6.3.7 Following discussions with members of the public at the Marks Tey community event, some slight spatial enhancements were made to the assessment methodology in terms of the study area extent and the receiving environment (e.g. the study area was extended to Great Tey Road from junction 25 (Marks Tey interchange) and additional modelling receptors were included along Inworth Road) to alleviate general concerns regarding changes in air quality in specific locations. These concerns were not specifically itemised in the Consultation Report [TR010060/APP/5.1].

6.4 Legislative and policy framework

Legislation

6.4.1 The Environment Act 1995 provides a framework within which the Government is required to produce a national air quality strategy (NAQS) setting out standards, objectives and measures for improving ambient air quality. The current NAQS is the ‘Clean Air Strategy 2019’ (Defra, 2019), which sets out the plans and policies to help the UK meet ambient air quality standards for individual pollutants. Local authorities are required to review air quality in their areas and undertake an assessment of whether the identified air quality standards and objectives are being achieved. Where this is not or is not likely to

be the case then the local authority shall designate AQMA and prepare an action plan.

6.4.2 National AQOs are defined in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002. The Ambient Air Quality Directive (2008/50/EC) forms the basis for UK air quality legislation. EU Limit Values are transposed into UK law by the Air Quality Standards Regulations 2010. The 2010 Regulations were amended in 2020 so as to continue to apply independently of EU membership.

6.4.3 The AQOs most relevant to the proposed scheme, for nitrogen oxides (NO_X), nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter less than 10µm (PM_{10}), are shown in Table 6.3. Pollutant $PM_{2.5}$ is also listed as the finer fraction of PM_{10} to include much of the combustion-based particulates responsible for serious respiratory illnesses.

Table 6.3 AQOs for NOx, NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Concentration	Averaging period
Nitrogen oxides (NO_x)	30µg/m^3	Annual mean
Nitrogen dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40µg/m^3	Annual mean
Particulate matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40µg/m^3	Annual mean
Particulate matter ($PM_{2.5}$)	20µg/m^3	Annual mean

National policy

National Policy Statements

6.4.4 The National Networks National Policy Statement (NNNPS) (Department for Transport, 2014) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects on the national road and rail networks in England. The Secretary of State uses the NNNPS as the primary basis for making decisions on DCO applications.

6.4.5 Key policy from the NNNPS relevant to this aspect is set out in Table 6.4.

Table 6.4 NNNPS requirements for air quality

NNNPS paragraph	NNNPS requirement	How this is addressed in the assessment
5.3 to 5.4	Outlines the potential impact of construction or operation of national network projects (i.e. changes in pollutant emissions) on human health as well as protected species and habitats. These paragraphs also outline UK legislation, such as local AQOs, as well as EU legislation, such as Limit Values, for the main pollutants in the Ambient Air Quality Directive (2008/50/EC), which Member States are required to meet by various dates.	These requirements are addressed in Section 6.9 (potential impacts) of this chapter.
5.6	Where the impacts of the project (both on and off-scheme) are likely to have significant air quality effects in relation to meeting EIA requirements or affect the UK's ability to comply with the Air Quality Directive, the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement.	This chapter presents the results of an assessment of the impacts of the proposed scheme on air quality, in accordance with DMRB LA 105.
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 • 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.	Baseline air quality conditions are described in Section 6.8 of this chapter and Appendix 6.1 of the Environmental Statement [TR010060/APP/6.3]. Modelled air pollutant concentrations in the opening year (2027) DM and DS scenarios are presented and discussed in Section 6.9 of this chapter and Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3]. Potential impacts, mitigation measures and the significance of residual effects, during both the construction and operational stage of the proposed scheme, are presented and discussed in Sections 6.9, 6.10 and 6.11 of this chapter respectively.

NNNPS paragraph	NNNPS requirement	How this is addressed in the assessment
5.8	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. The applicant's assessment should be consistent with this but may include more detailed modelling to demonstrate local impacts.	Emission factors derived from Defra's Emission Factors Toolkit EFT (v10.0) have been used within this assessment (which contains the most recent projections up to 2030). EFT (v11) has since been released but would have no implications for this assessment owing to emission factors for NO_X and PM_{10} being identical up until 2030. The latest background pollutants maps and tools published on the Defra air quality assessment website were also used. No additional local fleet monitoring was undertaken in this assessment. Modelling verification provided in Appendix 6.4 of the Environmental Statement [TR010060/APP/6.3] and long-term trend adjustment factors discussed in Section 6.5 of this chapter are ways in which uncertainty in future fleet forecasts are addressed.
5.9	A judgement on the risks as to whether the project would affect the UK's ability to comply with the Ambient Air Quality Directive must be provided.	A compliance risk assessment has been undertaken in accordance with DMRB LA 105, the outcomes of which are presented in Section 6.11 of this chapter.
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.	Relevance to this decision is provided in Section 6.13 of this chapter.

NNNPS paragraph	NNNPS requirement	How this is addressed in the assessment
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.	Relevance to this decision is provided in Section 6.13 of this chapter.
5.14/15	The Secretary of State should consider whether mitigation measures put forward by the applicant are acceptable. A management plan may help codify mitigation at this stage. The proposed mitigation measures should ensure that the net impact of a project does not delay the point at which a zone will meet compliance timescales. Mitigation measures may affect the project design, layout, construction, operation and/or may comprise measures to improve air quality in pollution hotspots beyond the immediate locality of the scheme. Measures could include, but are not limited to, changes to the route of the new scheme, changes to the proximity of vehicles to local receptors in the existing route, physical means including barriers to trap or better disperse emissions, and speed control. The implementation of mitigation measures may require working with partners to support their delivery.	Mitigation of likely significant effects on human health, ecological receptors and receptors with qualifying features has been considered in Section 6.10 of this chapter.

6.4.6 As set out in Chapter 1: Introduction, of the Environmental Statement [TR010060/APP/6.1], the assessment has considered the Overarching National Policy Statement for Energy (EN-1) and National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Department of Energy and Climate Change, 2011a; 2011b) in relation to the diversion of an existing high pressure gas main (the 'gas main diversion') owned and operated by Cadent Gas Limited (Cadent). Draft versions of the updated EN-1 and EN-4 have also been considered (Department for Business, Energy and Industrial Strategy, 2021a; 2021b).

6.4.7 A review of the relevant requirements of EN-1 and EN-4 (including the draft updated versions), relating to the EIA of the gas main diversion works, identified that the requirements are not materially different to those set out in the NNNPS. As such, it is considered that by meeting the NNNPS requirements set out in Table 6.4, the requirements of EN-1 and EN-4 are also met.

National Planning Policy Framework

6.4.8 As per paragraph 186 of the National Planning Policy Framework, '*…decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement*.'

Local policy

6.4.9 In addition to the national policy set out in the NNNPS, the proposed scheme has also had regard to relevant local plans and policy. A summary of the policy framework is provided in Appendix 1.1 of the Environmental Statement [TR010060/APP/6.3]. Key local policies relevant to this aspect are included in Table 6.5.

Table 6.5 Local policy on air quality

Authority	Policy	Local policy requirement	How this is addressed in the assessment
Braintree District Council	CS8 Natural Environment and Biodiversity: Braintree District Council Local Development Framework Core Strategy (2011, updated 2021)	All development proposals will ensure the protection and enhancement of the natural environment. This will include, where appropriate, protection from air pollution.	This air quality assessment includes accounting for nitrogen (N) deposition on designated and local wildlife sites including veteran trees. The potential significance of the impacts has been assessed in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1].
	RLP 63 Air Quality: Braintree District Local Plan Review (2005)	Where the District Council considers that air quality objectives are likely to be prejudiced, as a result of development proposals and/or resultant traffic movements, applicants will be required to submit a specialist assessment. Planning permission will be refused for developments where air quality objectives cannot be met.	Within this assessment, air pollutant concentrations have been modelled at worst-case sensitive receptors, in both the DM and DS scenarios, and compared to relevant AQOs.

Authority	Policy	Local policy requirement	How this is addressed in the assessment
Chelmsford City Council	DM29 Protecting Living and Working Environments: Chelmsford Local Plan Full Council Version (2020a)	Planning permission will be granted for development proposals provided the development … is compatible with neighbouring or existing uses in the vicinity of the development by ensuring that the development avoids unacceptable levels of pollution, unless appropriate mitigation measures can be put in place and permanently maintained.	Within this assessment, air pollutant concentrations have been modelled at worst-case sensitive receptors, in both the DM and DS scenarios, and compared to relevant AQOs.
	DM30 Contamination and Pollution: Chelmsford Local Plan Full Council Version (2020a)	For developments in or adjacent to an AQMA, or where an air quality impact assessment has been provided, permission will only be granted where the Council is satisfied that after selection of appropriate mitigation the development will not have an unacceptable impact on air quality and the health and wellbeing of people.	Within this assessment, air pollutant concentrations have been modelled at worst-case sensitive receptors, both with (DS) and without (DM) the proposed scheme in place, and compared to relevant AQOs. Specific attention is given to AQMAs within the study area by including additional modelling receptors. AQMAs within the Chelmsford City boundary are not included in the study area as these locations did not meet the screening criteria included in DMRB LA 105.
Colchester Borough Council	ENV1 Environment: The Publication Draft stage of the Colchester Borough Local Plan 2017 – 2033 (emerging plan) (2017)	The Council will safeguard the Borough's biodiversity.	The air quality assessment includes accounting for N deposition on designated and local wildlife sites including veteran trees. The potential significance of the impacts has been included in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1].

Authority	Policy	Local policy requirement	How this is addressed in the assessment
	TA4 Roads and Traffic: Local Development Framework Core Strategy, (selected policies revised) (2014)	Demand for car travel will be managed to prevent adverse impacts on air quality.	Within this assessment, air pollutant concentrations have been modelled at worst-case sensitive receptors, in both the DM and DS scenarios, and compared to relevant AQOs.
	ENV5 Pollution and Contaminated Land: The Publication Draft stage of the Colchester Borough Local Plan 2017 – 2033 (emerging plan) (2017)	Proposals will be supported that will not result in an unacceptable risk to public health or safety, the environment, general amenity or existing uses due to the potential of air pollution. Proposals for developments within designated AQMAs or where development within a nearby locality may impact on an AQMA are required, first, to be located in such a way as to reduce emissions overall, and secondly to reduce the direct impacts of those developments. Permission will only be granted where the Council is satisfied that after selection of appropriate mitigation the development will not have an unacceptable significant impact on air quality, health and well-being.	The study area coincides with the Lucy Lane North AQMA (junction 26, A12). Receptors at this location have been assessed against AQO, in both the DM and DS scenarios, and compared to relevant AQOs.
Maldon District Council	Policy D2 Climate Change & Environmental Impact of New Development: Maldon District Local Development Plan 2014-2029 (2017)	Minimising all forms of possible pollution including air. Any detrimental impacts and potential risks to the human and natural environment will need to be adequately addressed by appropriate avoidance, alleviation and mitigation measures. Maintain and enhance local air quality in accordance with national objectives.	Within this assessment, air pollutant concentrations have been modelled at worst-case sensitive receptors, both with (DS) and without (DM) the proposed scheme in place, and compared to relevant AQOs. Ecological sites within 200m of roads most likely to be affected by changes in air quality have been assessed for any significant effects of N deposition.

6.5 Assessment methodology

Assessment scope

6.5.1 An Environmental Scoping Report (ESR) (Highways England, 2020a) was produced to document the proposed scope of the Environmental Statement including a description of the matters that have been considered within this chapter.

6.5.2 The assessment scope was established at that time by comparing available design and land take details for the proposed scheme with data and information relating to air quality.

6.5.3 The scoping exercise was informed by the technical and reporting guidance contained in DMRB LA 105.

6.5.4 The proposed scope recorded in the ESR (Highways England, 2020a) was consulted upon as part of a formal request to the Planning Inspectorate for a Scoping Opinion.

6.5.5 The extent of the study area, which includes the impact of dust emissions on local receptors within 200m from all construction activities, and identification of the Affected Road Network (ARN) was defined following application of the following scoping criteria within DMRB LA 105:

- road alignment will change by five metres or more
- annual average daily traffic (AADT) flows will change by 1,000 or more
- heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more
- there will be a change in speed band[1]

6.5.6 Sensitive receptors within 200m of the ARN were identified and the study area defined as the ARN plus all roads within 200m of any of these sensitive receptors.

6.5.7 Baseline information, including local air quality monitoring data, was obtained from four key local authorities: Chelmsford, Braintree, Maldon and Colchester. Supplementary monitoring (commissioned by National Highways) was undertaken between 2017 and 2018 close to the A12 corridor.

6.5.8 The baseline conditions described above were used to define the receiving environment sensitivity with reference to the criteria proposed within Table 2.11a/b of DMRB LA 105. Considering the above, the sensitivity of the receiving environment was considered on balance to be ‘medium’ for the following reasons:

- 2018 monitored exceedances of the AQO for NO_2 within the study area

[1] Speed bands - A range of categories which outputs from the traffic model are grouped into, to describe their emissions. See Appendix A DMRB LA 105 (Highways England. 2019).

- monitoring concentrations at Lucy Lane North AQMA near Colchester which indicated exceedance of the AQO for NO_2 in 2018
- concentrations modelled for sensitive receptors at PCF Stage 2 (Option Selection) which were near 36µg/m^3 in the Opening Year
- the potential exceedance of lower critical load thresholds through N deposition at designated ecological sites identified within 50m of the ARN

6.5.9 The Scoping Opinion concluded that a detailed assessment methodology was appropriate using a pollution dispersion model to confirm any likely significant effects of the proposed scheme. The assessment comprises the following:

- local air quality assessment for the operation of the proposed scheme for human receptors and designated habitats
- construction phase assessment of additional construction traffic trips and traffic management on local air quality
- construction dust assessment to identify areas that could be affected by construction-phase activities
- compliance risk assessment for NO_2

6.5.10 Table 6.6 summarises the scope of the air quality assessment. These matters have been scoped in, based on the presence of sensitive human health, ecological receptors and PCM Census[2] IDs in the vicinity of the ARN for the proposed scheme.

6.5.11 The base year of the traffic model applied at PEIR was 2016. For the Environmental Statement the base year was updated to 2019 to minimise uncertainty in traffic projections between the base and the opening year. On this basis, the resulting air quality study areas differ between models. Human health, ecological and compliance risk assessment receptors may subsequently differ in location and notation between models. Application of different base year traffic models affects the air quality modelling verification which is an important step in resolving the final air quality outcomes.

6.5.12 The construction of the gas main diversion was not explicitly considered in the ESR or PEIR. Chapter 2: The proposed scheme, of the Environmental Statement [TR010060/APP/6.1] describes the proposed corridor for the gas main diversion. As the gas main diversion works are contained within the Order Limits, the scope of the construction dust assessment and construction traffic remains as described in the ESR. The sensitivity of the receiving environment has been appraised with respect to the Order Limits and the wider air quality study area.

[2] Specific sections of a road, usually between two junctions taken from the Department for Transport's national Traffic Data census. These roads are applied in the PCM tools to report air quality as a requirement of the National Air Quality Directive. These roads are identified by 'Census IDs'.

6.5.13 The assessment is therefore in line with the ESR and compliant with the Scoping Opinion.

Table 6.6 Summary of air quality scope

Matter	Scoped in - construction	Scoped in - operation
Construction dust receptors (human and ecological)	✓	*n/a*
Human health receptors	✓	✓
Designated ecological sites	✓	✓
PCM compliance risk	✓	✓

General approach

6.5.14 A detailed assessment of air quality has been undertaken in accordance with the guidance in the DMRB LA 105 Air Quality (Highways England, 2019) and in line with the ESR (Highways England, 2020a). By using the guidance within DMRB LA 105 the proposed scheme can be measured against the NNNPS policy requirements.

Construction dust

6.5.15 A construction dust assessment was undertaken in accordance with DMRB LA 105, which identified all sensitive receptors (human health and designated ecological sites) within 50m, 50–100m and 100–200m of all construction activity bounded by the Order Limits. The proximity of nearby receptors was considered in combination with the likely magnitude of construction activities to inform a qualitative assessment of the dust risk potential of the proposed scheme to the receiving environment as per Tables 2.58a and 2.58b of DMRB LA 105. The resulting risk potential was then used to inform the proposed mitigation measures included in this chapter and the first iteration of the Environmental Management Plan (EMP) [TR010060/APP/6.5].

Construction traffic

6.5.16 In accordance with paragraph 2.60 of DMRB LA 105, the impact of construction activities on vehicle movements has been assessed as the construction programme would last for more than two years. The construction traffic assessment year was 2025. This is representative of the year when construction activity is likely to be greatest (i.e. the peak construction year).

6.5.17 For the assessment of construction traffic, the study area was limited to the A12 and interconnecting roads (e.g. the A130). Construction traffic movements were estimated between junctions 15 and 29 of the A12 and interconnecting roads. Construction traffic volumes were derived from a semi-quantitative assessment, predominantly based on estimates of imported material quantities and movement of excavated materials (earthworks mass haul). Detailed information is available within the Transport Assessment [TR010060/APP/7.2]. The 2027 DM traffic data were back-casted to 2025 (the peak construction year). Traffic for the construction scenario was based on DM 2025 flows (i.e. factored from

the 2027 operational DM) plus estimated construction movements. Data were processed into a format commensurate with the operational traffic assessment described below, including derivation of speed-banded emissions and identification of a construction-traffic specific ARN. Note that the construction-based ARN has been incorporated into the operational ARN for practical assessment reasons. A spatial representation of the combined construction and operational ARNs has been included in Figure 6.1 [TR010060/APP/6.2].

6.5.18 Worst-case sensitive receptors (i.e. those receptors likely to experience the highest pollutant concentrations or the greatest changes in air pollutant concentrations within 200m of the construction traffic ARN) were identified. The operational traffic assessment included additional ecological and human health receptors. The local air quality assessment of construction traffic impacts then followed the same methodology as the operational local air quality assessment detailed below, but for the peak construction year of 2025.

Operational traffic

6.5.19 The main steps in assessing the impact of operational traffic are:

- **Traffic data**: Road traffic activity data were provided for this assessment using the A120 Braintree to Marks Tey A12 PCF Stage 3 (Preliminary design) DCO model with a base year of 2019. The final iteration of operational traffic data for the Environmental Statement was provided on 13 October 2021 and included several committed developments that form the core traffic model (see Appendix C: Transport Forecasting Package Report, of the Combined Modelling and Appraisal Report [TR010060/APP/7.3]). The construction traffic data in their final iteration were provided on 25 October 2021.

- **Defining the study area**: The operational phase study area was defined within the TRA (see Figure 6.1 [TR010060/APP/6.2]) based on changes in modelled traffic between the DM and DS scenarios (see Section 6.7 of this chapter). This provided the ARN (i.e. those roads expected to experience changes in traffic conditions with the potential to affect air quality). A representative number of worst-case human health, compliance risk and ecological receptors were then selected within 200m of the ARN. The identification of sensitive receptors is described in Section 6.8 of this chapter.

- **Emissions calculations**: Emission rates for NO_X and PM_{10} were estimated from speed-banded traffic data inputs using Highways England v3.1 speed-banded emission factors (which are based on version 10.0 of Defra's Emission Factors Toolkit) (Highways England, 2020b).

- **Dispersion modelling**: Annual mean concentrations of road NO_X and PM_{10} were modelled at receptors using the Atmospheric Dispersion Modelling System Roads (ADMS-Roads) dispersion model, version 5.0 (Cambridge Environmental Research Consultants, 2020). Meteorological inputs were included based on 2019 data from a meteorological site at Andrewsfield Aerodrome in Essex. The dispersion modelling methodology is described in full in Appendix 6.3 of the Environmental Statement [TR010060/APP/6.3].

- **Verification**: Base year (2019) modelled road NO_X concentrations were compared to monitored road NO_X in an attempt to account for any systematic bias in the air quality dispersion modelling approach, following the methodology described in Local Air Quality Management: Technical Guidance (TG16) (LAQM.TG(16); Defra, 2021). The verification process identified whether adjustment(s) to the raw modelled road NO_X concentrations were required. Based on the verification, an adjustment factor of 1.818 was applied to modelled road NO_X. The same adjustment factor was also applied to modelled road PM_{10}. The verification process is described in Appendix 6.4 of the Environmental Statement [TR010060/APP/6.3].

- **Post-processing/adjustment (NO_2)**: The verification-based model adjustment factor was applied to modelled road NOx concentrations in all scenarios. The NO_X to NO_2 conversion tool v8.1 (Defra, 2020b) was then used, along with the adjusted and sector-removed mapped background NO_2 concentrations (Defra, 2020c), to calculate annual mean NO_2 concentrations at sensitive receptors (see Section 6.8 of this chapter). Long-term trend (LTT) adjustment factors were applied to annual mean concentrations at human health and ecological receptors in accordance with the methodology described in DMRB LA 105. LTT adjustment factors are applied to ensure that the modelled roadside NO_2 concentrations derived using the Defra modelling tools are not too optimistic relative to observed roadside monitoring trends.

- **Post-processing/adjustment (PM_{10}/$PM_{2.5}$)**: The verification-based model adjustment factor was applied to modelled road PM_{10} concentrations in all scenarios. The verification-adjusted modelled road PM_{10} concentrations were added to the adjusted and sector-removed mapped background PM_{10} concentrations (Defra, 2020c). Similarly the modelled road PM_{10} concentrations were added to the sector-removed mapped background $PM_{2.5}$ concentrations to provide a proxy for $PM_{2.5}$ in absence of speed banded $PM_{2.5}$ emission factors[3]. No further adjustments were required.

- **Compliance risk receptors**: The total NO_2 concentrations at modelled compliance risk receptors adjacent to PCM links were processed as described in the bullet points above. As per paragraph 2.54 of DMRB LA 105, however, LTT adjustment factors were not applied at compliance risk receptors so as to be consistent with the approach taken by Defra. As per the DMRB LA 105 methodology, the total NO_2 concentrations were compared to the opening year Defra-modelled concentrations at PCM Census IDs[4], and any risks to the EU Limit Values were identified.

[3] See Section 6.6 (Assessment assumptions and limitations) of this chapter for $PM_{2.5}$.

[4] See Section 6.8 of this chapter for a description of the PCM Census IDs applicable to this assessment.

- **Nitrogen deposition**: Following identification of the ecological sites (explained further in Section 6.8 of this chapter), the project ecologist was consulted to confirm the relevant nitrogen-sensitive habitats. Receptors for ecological sites were placed in accordance with DMRB LA 105. Background N deposition rates and critical loads[5] were obtained from the Air Pollution Information System website (APIS) (Centre for Ecology and Hydrology, 2021)[6]. The change in DM and DS road NO_2 concentrations (verification and LTT adjusted) were converted to N deposition rates (kg N/ha/yr) using the following conversion factors recommended by DMRB LA 105:

  - grassland and similar habitats: 1µg/m^3 of NO_2 = 0.14kg N/ha/yr
  - forests and similar habitats: 1µg/m^3 of NO_2 = 0.29kg N/ha/yr

  The total N deposition rate at each receptor was then calculated by adding the road-based N deposition rates to the relevant background N deposition rates. In addition to the N deposition resulting from road NO_2 concentrations, a further contribution was added from ammonia emissions. This additional element applied the Draft National Highways Ammonia N Deposition Tool V2 (National Highways, 2021).

Assessing the significance of effects

6.5.20 The significance of the environmental effects were determined following the DMRB LA 105 criteria.

6.5.21 For the local air quality assessment at human health receptors, Table 6.7 shows the guideline bands for the number of properties experiencing a 'small' to 'large' change in NO_2 or PM_{10} that would inform a judgement of significant air quality effects at human health receptors[7]. Paragraph 2.89 of DMRB LA 105 indicates that only those sensitive receptors where there are exceedances of the air quality threshold in either the DM or DS scenarios should be considered. It is incumbent on the assessor to advise on the potential risks. For example, an effect can still be deemed significant if the number of receptors affected is below the lower guideline band of 30, for example where there are changes in concentrations in the small magnitude of change category, but the changes are approaching the medium magnitude of change criteria (e.g. 1.8 /1.9µg/m^3) then it can still be concluded that the project triggers a significant air quality effect. The guidance is therefore nonbinary in this respect. In essence, the results may fall below, within or above the guideline bands and as such resulting significance may need to be informed by other aspects affecting exposure.

6.5.22 Paragraph 2.90 of DMRB LA 105 also states that no likely significant air quality effect for human health shall be recorded where:

[5] Critical load refers to a quantitative estimate of an exposure (deposition) to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge. Assessments are concerned with lower critical load thresholds.

[6] Accessed March 2021

[7] $PM_{2.5}$ was also assessed using similar criteria but with the magnitude thresholds adjusted to represent the difference in AQO.

- the outcomes of the air quality modelling for human health indicate that all concentrations are less than the air quality thresholds
- the difference in concentrations is imperceptible, i.e. less than 1% of the air quality threshold (e.g. 0.4µg/m^3 or less for annual mean NO_2).

6.5.23 The significance was determined based on these guideline bands, in combination with professional judgement of any potential risks as described above.

Table 6.7 Magnitude of change criteria in annual mean NO_2 and PM_{10}, applied in the judgement of significant air quality effects of the proposed scheme

Magnitude of change in annual mean NO_2 or PM_{10} concentration	Total number of properties with:	
	Worsening of result already above objective or creation of a new exceedance	Improvement of result already above objective or the removal of an existing exceedance
Large (>4µg/m^3)	1 to 10	1 to 10
Medium (>2µg/m^3)	10 to 30	10 to 30
Small (>0.4µg/m^3)	30 to 60	30 to 60

6.5.24 For the local air quality assessment at ecological receptors, the receptors were identified where there was potential for significant effects in terms of N deposition. As per DMRB LA 105, the criteria used to determine whether an ecological receptor had the potential to experience a significant effect were as follows:

- Total N deposition rate greater than the lower critical load[8] for the relevant habitat
- An increase in N deposition rate with the proposed scheme equivalent to more than 1% of the lower critical load
- An increase in N deposition rate of more than 0.4kg N/ha/yr. The threshold of 0.4kg N/ha/yr is based on the Natural England dose response report, referenced in Figure 2.98 of DMRB LA 105

6.5.25 At receptors where these criteria were met, results were reviewed by the competent expert for biodiversity to determine the overall significance for ecological features, as per DMRB LA 105. The results of this assessment are presented in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1].

6.5.26 For PCM compliance risk, a significant effect was concluded if the proposed scheme was perceived to create a risk of delaying the UK's reported ability to comply with the EU Limit Value (40µg/m^3 at qualifying features) in the shortest

[8] Critical load is the quantitative estimate of the level of exposure of natural systems to pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur.

possible time in accordance with the framework set out in Figure 2.79 of DMRB LA 105.

6.5.27 In accordance with DMRB LA 105, the competent expert for air quality used professional judgement to assess the effects on human health and the outcomes of the compliance risk assessment, to determine whether the proposed scheme has the potential to trigger a significant air quality effect. The competent expert for biodiversity used professional judgement to assess the significance of the air quality effect on designated sites.

6.6 Assessment assumptions and limitations

6.6.1 The air quality impact assessment was based on a series of computer models of future conditions. The process began with modelling future traffic flows, which is subject to its own inherent degree of uncertainty. The traffic model used is based on a 2019 traffic base year having been appropriately validated for assessing the proposed scheme (e.g. flows in the traffic model compared with local traffic count information).

6.6.2 Modelled PM_{10} values were used to determine the concentration of $PM_{2.5}$. The road contribution of PM_{10} was added to background $PM_{2.5}$ concentrations (Defra, 2020d) as a proxy. This assumption would be considered worst case.

6.6.3 These traffic data were used in an emissions model. The emissions data were then fed into a dispersion model and a total concentration was derived to compare future air quality conditions in both DS and DM scenarios. Vehicle fleet composition and background air quality data is based on the latest information available and are projected into the future. These projections were best representative of scheme performance in the opening year.

6.6.4 The modelling process included atmospheric dispersion modelling, which provides an estimate of concentrations arising from input emissions and historical meteorological data. The emissions and dispersion predictions combined with historic meteorological data is subject to inherent degrees of uncertainty. This uncertainty is addressed by undertaking modelling verification described in Appendix 6.4 of the Environmental Statement [TR010060/APP/6.3].

6.6.5 Emissions were calculated based on construction traffic parameters provided by the proposed scheme's Transport Modelling team. The assessment encompassed a number of assumptions and limitations, and as a consequence for emissions, the resulting traffic activity is likely to be worst case. The assumptions are described in Appendix 6.2 of the Environmental Statement [TR010060/APP/6.3].

6.6.6 As with any computer model that seeks to predict future conditions, there is uncertainty in the predictions made. Elements of impact prediction such as the specific concentration of a given pollutant at a given property, or whether an exceedance of AQOs or EU Limit Values would or would not occur at a specific location at a specific moment in time, are not precise and are always subject to a margin of error. However, the assessment process is based on the most reasonable, robust and representative methodologies available, taking advice from published guidance.

6.6.7 Sensitive receptors were determined using an Ordnance Survey AddressBase+ dataset (Ordnance Survey, 2021). There may in some cases be properties, such as those recently built, which are not yet present within these data sources. Under these circumstances, receptors for planned development were assumed to be located on the boundaries nearest to the ARN or where proposed property outlines were made available.

6.6.8 Guidance on assessing N deposition from road transport ammonia sources is not included in the DMRB LA 105. However, a methodology recently developed by National Highways (2021) was applied for this assessment. This approach is currently in draft form, and hence the results calculated are subject to the assumptions applied by the tool.

6.6.9 As discussed in Chapter 2: The proposed scheme, of the Environmental Statement [TR010060/APP/6.1], vertical limits of deviation of +/-1m (except for junction 24, where a variation of 1.5m applies) and slight horizontal deviation within the Order Limits (as shown on the Works Plans [TR010060/APP/2.2]) are proposed. For the operational assessment, changes to the road alignment of less than the DMRB LA 105 criteria of 5m are unlikely to lead to potentially significant effects on air quality and therefore would not need to be considered in detail. It is noted that the Order Limits adjacent to operational roads allow for little in terms of deviation. In addition, in terms of vertical deviation the detailed modelling assessment assumes the terrain is at grade (providing the shortest distance between sources of emissions and receptors). Air quality modelling is unlikely to be sufficiently sensitive to account for a 1m upward and or downward deviation to significantly impact on the assessment results.

6.6.10 The air quality assessment undertaken for the construction dust assessment has considered receptors and their proximity to the Order Limits. The lateral limits of deviation are within the Order Limits. Therefore, the air quality assessment has considered a worst case.

6.6.11 Taking the above into account, the limits of deviation associated with the proposed scheme are not considered to change the conclusions of the construction or operational phases of the air quality assessment.

6.7 Study area

6.7.1 In line with the DMRB LA 105 guidance (Highways England, 2019), potential air quality impacts from construction dust were considered within 200m of all construction activities (taken to be within 200m of the Order Limits).

6.7.2 The study area for the construction and operational traffic air quality assessments was defined following the screening process outlined within DMRB LA 105, which identifies an ARN from the TRA based on predicted changes in traffic between the peak construction year (2025) DM and DS or between the opening year (2027) DM and DS scenarios.

6.7.3 As per DMRB LA 105, roads were included in the ARN where criteria (see Section 6.5 of this chapter) were met between the 2025 DM and DS (for construction traffic), or between the 2027 DM and DS (for operational traffic).

6.7.4 The study area was then defined as a 200m buffer from the ARN plus all roads within 200m of any sensitive receptors (i.e. human health, ecological or PCM Census IDs) within 200m of the ARN.

6.7.5 There were a few additions to the study area in response to the statutory consultation process. This included a few residential receptors on Inworth Road and extending the study area along the A120 to the junction of Great Tey Road.

6.7.6 The ARN and TRA are shown on Figure 6.1 [TR010060/APP/6.2].

6.8 Baseline conditions

Baseline sources

6.8.1 A review of baseline air quality conditions up to year 2019 (i.e. the latest year considered most appropriate for the revised traffic model) and sensitive receptors within 200m of the ARN, has been undertaken based on information from the following sources:

- Chelmsford City Council Air Quality Annual Status Report (Chelmsford City Council, 2020b)
- Braintree District Council Air Quality Annual Status Report (Braintree District Council, 2020a)
- Maldon District Council Air Quality Annual Status Report (Maldon District Council, 2020)
- Colchester Borough Council Air Quality Annual Status Reports (Colchester Borough Council, 2020)
- Defra background mapping data (Defra, 2020d)
- Defra PCM model NO_2 projections (Defra, 2020a)
- Ordnance Survey AddressBase+ data (Ordnance Survey, 2021)
- Air Pollution Information System website (Centre for Ecology and Hydrology, 2021)
- Ecological open data (Natural England, 2020)
- Ancient Tree Inventory (Woodland Trust, 2021)

6.8.2 All data used in the baseline assessment are open access, apart from the Ordnance Survey AddressBase+ data which were purchased.

6.8.3 In addition to the sources listed above, this review of baseline conditions includes data collected during field-based surveys for air quality and ecology.

Baseline information

6.8.4 To understand the impact of pressures on the local environment (i.e. air quality emissions) it is important to establish the status of the receiving environment by collating baseline information. Matters concerning the baseline include local air quality monitoring data; background monitoring and forecast data; and the locations of sensitive human health and ecological receptors in the study area.

6.8.5 Figure 6.1 [TR010060/APP/6.2] shows the TRA and ARN for the air quality assessment. The proposed scheme is located within the administrative boundaries of Chelmsford, Braintree, Maldon and Colchester. The study area extends over these four local authority areas.

Local authority monitoring data

6.8.6 In fulfilment of their Local Air Quality Management duties, local authorities conduct air quality monitoring across their administrative areas using automatic monitors and diffusion tubes. There are no continuous monitoring sites within the air quality study area. However, there are 13 diffusion tube locations. Figure 6.2 [TR010060/APP/6.2] shows the location and monitored annual mean 2019 NO_2 concentrations for monitoring sites in the air quality study area. Table 6.8 shows the monitoring data for the locations in the air quality study area between 2015 and 2019.

6.8.7 During this assessment, 2020 monitoring data were available. However, owing to the COVID-19 pandemic, traffic was very much reduced in 2020 and in some instances, monitoring was suspended during lockdown, albeit temporarily. On this basis monitoring data from 2020 have been excluded from the assessment as they are considered unrepresentative of typical air quality conditions.

6.8.8 Two monitoring sites in the study area measured NO_2 concentrations above the annual mean AQO (40µg/m^3) in 2019. These were BR3 at Foxden, Rivenhall, in Braintree; and CBC137 at 93B Coggeshall Road, Colchester. Site CBC137 is located at a relevant public exposure[9] location for the application of the annual mean AQO. After being distance-corrected to the nearest relevant exposure location, site BR3 is below the AQO (i.e. not in exceedance).

6.8.9 Prior to 2019 sites BR5 and BR9 had recorded exceedances of the AQO for NO_2.

6.8.10 Whilst future NO_x emissions are projected to decline, and the majority of monitoring locations are at the roadside instead of locations of relevant exposure, the baseline NO_2 monitoring data indicate that the annual mean AQO has the potential to be exceeded at locations in the air quality study area.

6.8.11 In addition to monitoring NO_2, Chelmsford City Council operates three automatic monitoring stations to measure PM_{10} concentrations. The closest of these sites (site CM2) is approximately 1km from the ARN. This site measured an annual mean concentration of 25.3µg/m^3 in 2019, which is below the annual mean AQO for PM_{10} of 40µg/m^3 by a considerable margin.

[9] Relevant public exposure is a location applicable to AQOs (TG16)

Table 6.8 Local authority diffusion tube monitoring data in the air quality study area

Site ID	Local authority	Site type	Valid data capture for 2019 (%)	Grid reference		Annual mean NO_2 concentration ($\mu g/m^3$)				
				Easting (m)	Northing (m)	2015	2016	2017	2018	2019
BR3	Braintree	Roadside	100	583859	216497	**47.1**	**46.4**	**51.9**	**46.1**	**45.8**
BR5	Braintree	Roadside	100	582002	215111	**40.8**	**45.9**	**45.3**	**40.4**	39.1
BR9	Braintree	Roadside	83	583891	216467	**43.9**	**46.3**	**46.1**	**40.7**	35.5
BR11	Braintree	Roadside	100	586386	219106	27.3	30.1	27.1	23.1	22.1
BR22	Braintree	Roadside	92	582033	215081	-	-	-	-	24.0
CB27/27A/27B	Chelmsford	Roadside	100	574080	203469	36.6	35.0	36.4	32.4	31.8
CB31	Chelmsford	Roadside	100	575265	209975	24.8	26.7	26.0	24.4	24.3
CBC90	Colchester	Roadside	100	591312	223431	25.3	28.0	26.6	27.1	26.7
CBC131	Colchester	Roadside	100	595025	225166	-	-	-	-	39.8
CBC132	Colchester	Roadside	100	595106	225123	-	-	-	-	32.5
CBC135	Colchester	Roadside	58.3	591366	223679	-	-	-	-	30.6[a]
CBC136	Colchester	Roadside	58.3	590444	223502	-	-	-	-	37.9[a]
CBC137	Colchester	Roadside	58.3	590325	223495	-	-	-	-	**44.6**[a]

Note: Values in bold denote exceedances of the level of the annual mean AQO ($40\mu g/m^3$)

[a] Monitored concentrations have been annualised by the local authority where data capture was below 75%

Project specific monitoring data

6.8.12 National Highways commissioned an NO_2 diffusion tube survey to cover perceived gaps in the coverage provided by local authority monitoring data with regard to the proposed scheme. This survey was undertaken across 11 sites between May 2017 and July 2018. Eight of the 11 sites were within 200m of the ARN and therefore considered to be appropriate for application in the air quality assessment. Further details of the survey and monitored results are presented in Appendix 6.1 of the Environmental Statement [TR010060/APP/6.3]. Annualised, bias-adjusted results for the year 2019, shown on Figure 6.2 [TR010060/APP/6.2] and in Table 6.9, were derived in accordance with the guidance provided in LAQM.TG(16) (Defra, 2021).

6.8.13 Table 6.9 shows the annualised year 2019 concentrations from the National Highways commissioned diffusion tube survey in the study area. Following annualisation, none of the survey sites were found to exceed the level of the annual mean AQO. The highest concentration of 39.8µg/m^3 was recorded at site J10, which is positioned at the A12 roadside near junction 25.

Table 6.9 Monitoring data from diffusion tube survey locations in the study area

Site ID	Grid reference		2017/2018 period data capture (%)	Weighted average 2017/2018 period NO_2 concentration (µg/m^3)	Annualised and bias adjusted 2019 NO_2 concentration (µg/m^3)
	Easting (m)	Northing (m)			
J1	575705	210324	83.3	29.1	26.7
J2	579506	212003	100.0	30.9	28.3
J3	582905	214601	100.0	37.5	34.3
J4	584052	216313	100.0	28.9	26.4
J5	585646	217244	91.7	15.4	14.3
J7	587686	218872	100.0	29.2	26.7
J8	587780	220288	91.7	22.1	20.5
J10	591515	223594	100.0	43.5	39.8

Air Quality Management Areas (AQMA)

6.8.14 There is one AQMA in the air quality study area. This is the Lucy Lane North AQMA, in the Borough of Colchester. This is located immediately adjacent to the ARN near junction 26 of the A12 and its location is shown on Figure 6.2 [TR010060/APP/6.2]. In 2019, an annual mean NO_2 concentration of 39.8µg/m^3 was measured in the AQMA, indicating compliance with the annual mean AQO for NO_2 of 40µg/m^3.

Mapped background pollutant concentrations

6.8.15 Defra background mapped concentrations cover the whole country on a 1km x 1km grid. The current maps are calibrated using 2018 monitoring and meteorological data. Referenced to year 2018, the maps are then projected annually up to 2030. These maps provide estimates of background concentrations for specific pollutants. These can then be used in air quality assessments to better understand the contribution of local sources to total pollutant concentrations. They provide an estimated breakdown of the relative sources of pollution. The maps allow for the assessment of new pollutant sources that are introduced into an area and the impact they may have upon local air quality. This is achieved by removing sector-based sources of emissions from the mapped background concentrations which avoids double counting.

6.8.16 Table 6.10 shows the range of modelled background pollutant concentrations applied within this assessment. The range covers the grid squares associated with the receptors modelled.

Table 6.10 Mapped background pollutant concentrations (Defra, 2020d)

Pollutant	Annual mean background pollutant concentration range (µg/m^3)		
	2019	2025	2027
NO_2	9.7 – 18.8	8 – 15.8	7.7 – 15.3
PM_{10}	14.4 – 20.3	13.2 – 19.1	13.2 – 19.0
$PM_{2.5}$	9.2 – 12.5	8.3 – 11.5	8.3 – 11.4
NO_x	12.8 – 27.2	14.6 – 27.2	10.0 – 21.4

6.8.17 Figure 6.3 [TR010060/APP/6.2] shows the spatial distribution of the NO_2 background concentrations for the year 2019, for consistency with the latest available monitoring data. The spatial overview indicates that background NO_2 concentrations in 2019 were highest in the regions of Chelmsford, Witham and Colchester.

6.8.18 There is a downward trend in NO_x and NO_2 background concentrations between 2019 and 2027, owing to improvements in vehicle emission standards, as well as expected reductions in emissions from other background sources. Concentrations of PM_{10} and $PM_{2.5}$ remain largely the same between 2019 and 2027 as emissions of particulate matter are not expected to decrease as much.

Pollution Climate Mapping baseline

6.8.19 The PCM model is a collection of models provided by Defra (Defra, 2020a). These were developed to report on compliance with the Ambient Air Quality Directive (2008/50/EC)) and are run by Ricardo Energy & Environment (on behalf of Defra). In accordance with DMRB LA 105, three PCM Census IDs that coincide with the ARN have been identified: the A12 (ID 802006208), A138 (ID 802048769) and A130 (ID 802058301).

6.8.20 The locations of the PCM Census IDs are shown on Figure 6.2 [TR010060/APP/6.2]. Table 6.11 shows the projected (2018-based) PCM annual mean NO_2 concentrations at these Census IDs (i.e. roadside concentrations) for the base year, peak construction year and opening year.

Table 6.11 PCM Census ID projected annual mean roadside NO_2 concentrations (Defra, 2020a)

PCM Census ID	Projected annual mean roadside NO_2 concentration ($\mu g/m^3$)		
	Base year (2019)	Peak construction year (2025)	Opening year (2027)
802048769	30.6	22.2	20.0
802058301	24.9	17.5	15.7
802006208	36.1	24.8	22.1

6.8.21 The projections shown in Table 6.11 indicate compliance with the EU Limit Value ($40\mu g/m^3$) at these PCM Census IDs.

Human health receptors

6.8.22 Locations that are sensitive to air quality include residential properties and buildings used by the young, elderly and other susceptible populations such as schools and hospitals, in line with DMRB LA 105 (Highways England, 2019). Sensitive human health receptors were identified within 200m of the ARN. The locations of human health receptors are shown on Figure 6.2 [TR010060/APP/6.2].

6.8.23 A total of 267 human health receptor locations were modelled, selected as those most likely to experience the highest pollutant concentrations or largest changes in air pollutant concentrations as a result of the proposed scheme. Of these receptors, 159 were assessed owing to their proximity to the construction traffic ARN, whilst 260 were assessed owing to their proximity to the operational traffic ARN. Note, the construction ARN extended beyond the operational ARN and so seven receptors were affected by construction only.

6.8.24 The placement of human health receptors was focused on areas near the ARN, where traffic modelling indicated that emissions were likely to increase or where the highest concentrations were expected to occur (i.e. at the nearest façade of the building to the road). Equally, receptors were selected to indicate where air quality is likely to improve as a result of the proposed scheme. Of the total receptors (267) modelled, 25 receptors representing 39 consented mixed use developmental planning applications within 200m of the ARN, were included (see Table 1.3 of Appendix 6.3 [TR010060/APP/6.3]). The planning application receptors were modelled at the nearest point of the planning application boundary to the ARN unless information was made available as to the actual location and use of buildings.

Ecological receptors

6.8.25 Nitrogen deposition can damage vegetation directly or affect plant health and productivity. Table 6.12 shows a summary of the designated habitats within 200m of the construction or operational traffic ARNs which were deemed to contain nitrogen-sensitive habitats. The ecological transect locations modelled in this assessment are shown on Figure 6.7 [TR010060/APP/6.2]. Transects were modelled within all nitrogen-sensitive habitats within 200m of the ARNs.

6.8.26 There are two Sites of Special Scientific Interest (SSSIs) within 200m of the ARN: Tiptree Heath SSSI and Marks Tey Brickpit SSSI. However, as a geological feature, Marks Tey Brickpit is not susceptible to N deposition effects. Nitrogen-sensitive habitats were identified in Tiptree Heath SSSI (dry shrub heath, acid grassland and broadleaved woodland) and three ecological transects were modelled for the site in this assessment. Traffic modelling indicated that vehicle flows are likely to be reduced near Tiptree Heath SSSI as a result of the proposed scheme. In addition to SSSIs, sites designated as Local Nature Reserves (LNR), Local Wildlife Sites (LWS) and ancient woodlands were identified as outlined in Table 6.12.

6.8.27 Table 6.12 shows the habitat deemed to be most sensitive to N deposition within each designated site boundary, as confirmed by the competent expert for biodiversity, and the corresponding lower critical loads and average background deposition rates associated with that habitat. However, in the case of Whetmead LNR / LWS, where most of the site is grassland, and the strip of woodland on the western boundary of the site is to be removed as part of the proposed scheme, it was considered appropriate to produce calculations for grassland rather than woodland, even though woodland has a lower critical load than grassland. The existing average background deposition rate is greater than the lower critical load in 25 of the designated sites identified in the air quality study area.

6.8.28 In addition, a total of 52 verified and potential veteran tree locations were identified in the study area, the locations of which are shown on Figure 6.7 [TR010060/APP/6.2]. Five of these locations represent groups of trees identified on the scheme-specific arboricultural surveys. Based on the available information from these surveys, the total number of veteran trees within 200m of the ARN was therefore 65 trees, i.e. 65 trees of which 13 reside near to one of the 52 receptor locations. A further 24 veteran trees were identified within 200m of the Order Limits. Veteran trees were considered as ‘broadleaved, mixed and yew woodland’ with a lower critical load of 10kg N/ha/yr. The average nitrogen background deposition rates ranged from 29.96 to 38.22kg N/ha/yr across all veteran trees in the assessment. Therefore, the existing average background deposition rate is greater than the lower critical load at all veteran tree locations in the air quality study area.

Table 6.12 Summary of designated habitats with nitrogen-sensitive features and habitats modelled in this assessment

Site name	Site designation	Number of transects modelled	Priority habitat	Lower critical load (kg N/ha/yr)	Average background deposition rate (kg N/ha/yr
Galleywood Common	LNR/LWS	4	Neutral grassland	20	18.3
Lady Grove	Ancient woodland/LWS	3	Broadleaved, mixed and yew woodland	10	32.8
Sir Hughes' Woods	LWS	1	Broadleaved, mixed and yew woodland	10	32.8
Sandon Pit	LWS	1	Calcareous grassland	15	18.3
Sandon Riverside	LWS	1	Broadleaved, mixed and yew woodland	10	33.6
Boreham Road Gravel Pits/ Porter's Grove	LWS/potential ancient woodland	2	Broadleaved, mixed and yew woodland	10	31.8
Stonage Wood	LWS	1	Broadleaved, mixed and yew woodland	10	33.6
Whetmead	LNR/LWS	2	Neutral grassland	20	16.94
Braxted Park	LWS	3	Broadleaved, mixed and yew woodland	10	32.5
Tiptree Heath	SSSI	3	Dwarf shrub heath	10	18.5
Inworth Grange Pits	LWS	1	Acid grassland	10	18.3
Kelvedon Hall Wood	Ancient woodland/LWS	1	Broadleaved, mixed and yew woodland	10	32.5
Brockwell Meadows	LWS	1	Neutral grassland	20	18.3
Inworth Wood	Ancient woodland/LWS	1	Broadleaved, mixed and yew woodland	10	32.5
Perry's Wood	Ancient woodland/LWS	1	Broadleaved, mixed and yew woodland	10	32.5
Tiptree Church	LWS	1	Neutral grassland	20	18.3
Pods and Conyfield Woods	LWS	2	Broadleaved, mixed and yew woodland	10	32.5

Site name	Site designation	Number of transects modelled	Priority habitat	Lower critical load (kg N/ha/yr)	Average background deposition rate (kg N/ha/yr
Layer Wood	Ancient woodland/LWS	1	Broadleaved, mixed and yew woodland	10	41.9
Gol Grove/Hanging Wood	Ancient woodland/LWS	1	Broadleaved, mixed and yew woodland	10	32.9
Stanway Pits	LWS	1	Calcareous grassland	15	18.3
Cook's Lane Lexden	LWS	1	Broadleaved, mixed and yew woodland	10	31.6
Spring Lane Meadows	LNR/LWS	1	Broadleaved, mixed and yew woodland	10	31.6
Hilly Fields	LNR/LWS	1	Broadleaved, mixed and yew woodland	10	31.6
Cymbeline Meadows	LWS	1	Neutral grassland	20	17.9
Spring Grove	LWS	1	Broadleaved, mixed and yew woodland	10	31.6
West House Wood	LWS	1	Broadleaved, mixed and yew woodland	10	31.6
Kiln Wood	Ancient woodland/LWS	1	Broadleaved, mixed and yew woodland	10	29.8
Smythe's Green	LWS	1	Neutral grassland	20	23.2
Lower Road, Birch Verges	LWS	1	Neutral grassland	20	18.3
Lower Road, Birch Verges	LWS	1	Broadleaved, mixed and yew woodland	10	32.9
Ram Plantation	LWS	1	Broadleaved, mixed and yew woodland	10	32.9

Future baseline

6.8.29 The opening year (2027) baseline conditions were established by following the methodology outlined in Section 6.5 of this chapter, based on a DM traffic scenario. The DM traffic scenario is representative of the predicted growth in traffic, accounting for local and regional development. Opening year vehicle emission estimates applied fleet proportions for 2027 as per the National

Highways speed-banded emissions (Version 3.1; Highways England, 2020b). Cumulative impacts from road traffic emissions are implicit in the future DM and DS scenarios for the opening year because developments with registered planning applications were included in the traffic model.

6.8.30 For the construction traffic assessment, information was provided based on various sources, including the opening year traffic model, and as such, cumulative effects from other developments were again assumed to be implicit. In other words, the traffic activity in 2025 is likely to be worst case.

6.8.31 As stated in Section 6.8 (under the 'human health receptors' subheading), 25 receptors were modelled to represent 39 consented mixed-use planning applications. The considered planning applications are outlined in Appendix 6.3 of the Environmental Statement [TR010060/APP/6.3].

Value and sensitivity of receptors

6.8.32 In accordance with the DMRB LA 105 all sensitive receptors included in this assessment were considered to be of equal value, with respect to human exposure, effects on ecology or potential nuisance (dust).

6.9 Potential impacts

Construction

Construction dust

6.9.1 Construction activities (i.e. from within the Order Limits and trackout) can give rise to emissions of dust, which could cause damage to vegetation or annoyance associated with the soiling of surfaces. Construction dust emissions can also elevate airborne particulate matter concentrations at off-site locations, which may affect human health if mitigation measures are not implemented. There is potential for adverse impacts to arise from the deposition of construction dust at sensitive receptors. Therefore, a construction dust assessment was undertaken to determine the construction dust risk potential, as per DMRB LA 105.

6.9.2 In the absence of appropriate mitigation, there is the potential for dust effects during the construction phase of the proposed scheme at sensitive receptors within the distance bands outlined in the DMRB LA 105 and displayed on Figure 6.4 [TR010060/APP/6.2]. The level and distribution of construction dust emissions would depend on where within the Order Limits the dust-raising activity takes place, the nature of the activity and controls, and weather conditions. Table 6.13 shows the number of receptors within the distance bands outlined in the DMRB LA 105. Based on the number of receptors within the distance bands and the large potential for dust emissions to occur during the construction activities associated with the proposed scheme, the construction dust risk is considered to be 'high' in accordance with Tables 2.58a and 2.58b of DMRB LA 105.

Table 6.13 Distance-banded receptor counts within 200m of construction activities i.e. the Order Limits

Receptor type	Distance from construction activities		
	0 – 50m	50 – 100m	100 – 200m
Human health	2,697	1,673	2,431
Ecological: Sites of Special Scientific Interest	0	1	0
Ecological: Local Nature Reserve	1	1	0
Ecological: Ancient woodland	1	1	2
Ecological: Local Wildlife Site	5	1	4
Ecological: Veteran trees	65	8	16
Total	2,769	1,685	2,453

Peak construction traffic

6.9.3 The following sections present the predicted impacts of the construction phase of the proposed scheme, at its peak (2025), on local air quality. Two scenarios were modelled: a 2025 DM scenario and a 2025 DS (DM plus peak construction traffic) scenario.

Human health receptors

6.9.4 In the DM and DS scenarios, two residential dwellings in Colchester R189 (located within the Lucy Lane North AQMA, Stanway) and R193 (located off Halstead Road and within close proximity to the A12) are predicted to exceed the annual mean NO_2 AQO (40µg/m^3), with modelled concentrations of 40.9 and 42.3µg/m^3 respectively in the DM scenario and 41.0 and 42.5µg/m^3 respectively in the DS scenario. This represents an increase of 0.1 and 0.2µg/m^3 respectively as a result of peak construction traffic, which is classed as an imperceptible change in DMRB LA 105 and is a direct result of increases in construction traffic flows i.e. 218 HGV vehicles per day or 2.9% on the adjacent sections of the A12. The modelled peak construction (DS) NO_2 concentrations and the change in concentration between the DM and the DS are shown on Figure 6.5 and Figure 6.6 [TR010060/APP/6.2] respectively. The full set of results is provided in Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3].

6.9.5 Other receptors within and adjacent to the AQMA (i.e. R238 and R187) and in the area off Halstead Road (i.e. R191 and R194) indicated increases of similar magnitudes in modelled annual mean NO_2 concentrations, although resulting concentrations were all below the AQO (the maximum annual mean was at R191 in the DS scenario with 39.6µg/m^3). The elevated modelled concentrations and increases at these receptors are a result of the close proximity of these properties to the existing A12 alignment.

6.9.6 The largest increase in modelled annual mean NO_2 concentration (0.6µg/m^3) occurred at receptor R103 (a residential dwelling in close proximity to the A12 between Rivenhall End and Kelvedon) as a result of increased construction traffic flows, which equated to a change of 1,032 AADT24 and 0.9% HGVs each way. The total DS modelled concentration at this receptor was 37.0µg/m^3, and below the AQO.

6.9.7 All other modelled increases in annual mean NO_2 concentrations associated with peak construction (DS) traffic were below 0.6µg/m^3 and did not occur at locations exceeding the AQO or result in new exceedances of the AQO.

6.9.8 An assessment of the impact of the peak construction traffic on PM_{10} concentrations was undertaken. In both the DM and DS scenarios, the highest predicted concentration was below 21.0µg/m^3 (i.e. well below the AQO of 40µg/m^3), and the largest increase was 0.2µg/m^3 (i.e. imperceptible).

6.9.9 An assessment of the impact of the peak construction traffic on $PM_{2.5}$ concentrations was also undertaken[10]. In both the DM and DS scenarios, the highest predicted concentration was 14.1µg/m^3 (i.e. below the AQO of 20µg/m^3) and the largest increase was 0.2µg/m^3 (i.e. imperceptible).

Nutrient nitrogen deposition

6.9.10 Nitrogen deposition calculations were undertaken for all modelled ecological receptors, in line with DMRB LA 105. Figure 6.7 [TR010060/APP/6.2] shows the locations of all modelled ecological receptors for the construction and operational phase assessments. A summary of the ecological assessment results for these receptors is presented in Table 6.14. The results show that six of the modelled receptor locations had a predicted total deposition rate above the lower critical load, with both a predicted change in N deposition of more than 1% of the lower critical load and of more than 0.4kg N/ha/yr. The background results also indicate that the upper critical load is also exceeded for these trees.

Table 6.14 Summary of ecological receptors with potentially significant effects

Designated Site	Modelled Site ID	Distance to nearest modelled road (m)[a]	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM to DS change in estimated nutrient N deposition (kg N/ha/yr)[b]	Change/ CL (%)
T685 Elm (VV)[c]	ECO_TREE_39	7.7	10	32.9	0.69	6.9
T636 Oak (PV)	ECO_TREE_37	8.7	10	38.2	0.65	6.5

[10] $PM_{2.5}$ was assessed using similar criteria described in Section 2.89 of DMRB LA 105, but with the magnitude thresholds adjusted to represent the difference AQO.

Designated Site	Modelled Site ID	Distance to nearest modelled road (m)[a]	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM to DS change in estimated nutrient N deposition (kg N/ha/yr)[b]	Change/ CL (%)
T439 Lime (PV)	ECO_TREE_26	32.3	10	30.0	0.85	8.5
T441 Lime (PV)	ECO_TREE_27	39.8	10	30.0	0.88	8.8
T443 Horse chestnut (PV)	ECO_TREE_28	44.7	10	30.0	1.04	10.4
T624 Ash (PA)	ECO_TREE_54	18.6	10	38.2	0.65	6.5

[a] The range over which modelled receptors were found to have potentially significant effects. Distances are measured to the nearest road centreline in the ARN.

[b] The DM to DS change is also referred to as the process contribution.

[c] VV = verified veteran tree location, PV = potential veteran tree location, PA = potential ancient tree location

6.9.11 As these ecological receptors have the potential to be adversely affected by changes in N deposition, they have been assessed by the competent expert for biodiversity in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1]. The full set of results is provided in Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3]. Nitrogen deposition results are presented in Appendix 6.5 both with and without contributions from road incremental NO_2 and ammonia sources.

Compliance risk assessment

6.9.12 A total of nine receptors (representative of qualifying features in accordance with DMRB LA 105) were modelled 4m from the road edge, at the PCM census ID locations coinciding with the construction ARN. Figure 6.8 [TR010060/APP/6.2] shows the PCM receptor locations modelled for the construction and operational phase assessments. None of these receptors were found to exceed the NO_2 EU Limit Value in the modelled DM and DS 2025 scenarios. It is therefore concluded that construction traffic associated with the proposed scheme is not likely to interfere with the UK's reported ability to meet the EU Air Quality Directive Limit Values in the shortest possible time. The full set of results is provided in Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3].

Operation

6.9.13 There is potential for the proposed scheme to both adversely and positively influence pollutant concentrations at sensitive human health receptors, designated ecological sites and at PCM Census ID locations. This section presents the potential impacts of the operational phase of the proposed scheme upon local air quality.

Human health receptors

6.9.14 Predicted annual mean pollutant concentrations at selected locations with the highest modelled concentrations or with the largest change in pollutant concentrations between the DM and DS scenarios, are included in Table 6.15.

6.9.15 Table 6.15 shows all receptors with an opening year DS NO_2 concentration of over 36µg/m^3 or with an absolute DM to DS change in NO_2 of over 2µg/m^3. The highest annual mean PM_{10} concentrations are well within the AQO and not therefore the focus of the results presented in Table 6.15. All other receptors modelled were below the AQO thresholds for annual mean NO_2 and PM_{10}. A full results dataset is provided in Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3]. The predicted opening year NO_2 concentrations and the change in NO_2 concentration between the DM and the DS are shown for every modelled receptor on Figure 6.9 and Figure 6.10, respectively [TR010060/APP/6.2]. The highest concentration of $PM_{2.5}$ was 14.2µg/m^3 and well below the AQO of 20µg/m^3.

Table 6.15 NO_2 and PM_{10} concentrations at selected human health receptors (base 2019, DM 2027 and DS 2027)

Receptor	Base 2019		DM 2027		DS 2027		Change in concentration (DS – DM)	
	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}
R193	**45.6**	21.5	**41.5**	20.3	**42.4**	20.4	0.9	0.1
R189	**44.3**	20.7	**40.1**	19.4	**41.0**	19.5	0.9	0.1
R225	**41.5**	21.4	36.3	20.2	**40.3**	20.3	4.0	0.1
R191	**42.6**	20.8	38.7	19.6	39.4	19.7	0.7	0.1
R194	**41.5**	20.9	37.7	19.7	38.4	19.8	0.7	0.1
R187	**40.1**	20.2	36.2	19.0	37.0	19.1	0.8	0.1
R30	38.0	21.0	33.1	19.8	36.6	19.9	3.5	0.1
R19	36.5	20.4	32.3	19.1	34.9	19.2	2.6	0.1
R164	34.8	21.1	30.8	19.8	34.7	20.4	3.9	0.6
R167	35.6	21.3	31.6	20	34.2	20.3	2.6	0.3

Receptor	Base 2019		DM 2027		DS 2027		Change in concentration (DS – DM)	
	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}
R26	35.7	20.6	30.9	19.3	34.0	19.4	3.1	0.1
R224	34.8	20.6	30.3	19.3	33.3	19.5	3.0	0.2
R40	33.8	18.0	29.5	16.7	33.0	17.0	3.5	0.3
R35	34.2	19.5	29.3	18.2	32.5	18.4	3.2	0.2
R25	32.8	20.3	28.3	18.9	30.9	19.1	2.6	0.2
R62	31.7	19.9	27.8	18.7	30.6	19.0	2.8	0.3
R22	32.4	19.8	27.9	18.5	30.5	18.6	2.6	0.1
R31	32.0	20.5	28.1	19.4	30.4	19.6	2.3	0.2
R34	31.0	19.2	27.0	17.9	30.1	18.2	3.1	0.3
R59	30.4	19.5	26.4	18.2	29.8	18.5	3.4	0.3
R41	30.5	17.6	26.3	16.3	29.7	16.6	3.4	0.3
P8	30.4	19.1	26.2	17.8	29.5	18.1	3.3	0.3
R60	29.3	19.4	25.5	18.2	28.2	18.4	2.7	0.2
R45	27.4	17.4	24.3	16.3	27.9	17.3	3.6	1.0
R168	28.8	21.2	25.0	20.0	27.5	20.3	2.5	0.3
R44	27.6	17.5	24.3	16.4	27.5	17.1	3.2	0.7
R67	26.6	19.0	23.0	17.7	25.4	18.0	2.4	0.3
R89	22.0	18.4	19.3	17.3	22.5	17.4	3.2	0.1
R161	32.6	20.9	29	19.7	22.5	18.7	-6.5	-1.0
R103	**40.4**	20.5	35.8	19.2	22.2	17.1	-13.6	-2.1
R91	17.6	17.7	15.1	16.5	21.5	17.5	6.4	1.0
P12	21.2	19.5	18.3	18.3	21.1	19.4	2.8	1.1
R86	30.0	18.7	25.7	17.5	19.8	16.8	-5.9	-0.7
R227	38.6	20.1	34.1	18.8	19.8	16.8	-14.3	-2.0
R96	30.0	19.0	26.2	17.8	19.3	16.8	-6.9	-1.0
R95	32.0	19.0	28	17.7	19.1	16.6	-8.9	-1.1
R87	29.2	18.7	25.3	17.4	18.5	16.6	-6.8	-0.8

Receptor	Base 2019		DM 2027		DS 2027		Change in concentration (DS – DM)	
	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}
R155	13.1	18.6	11.0	17.4	18.3	18.6	7.3	1.2
R144	28.4	19.5	24.9	18.3	18.2	17.3	-6.7	-1.0
R93	33.4	19.2	29.4	18.0	18.2	16.4	-11.2	-1.6
R160	18.4	19.2	15.9	18.0	18.1	18.3	2.2	0.3
R159	30.7	20.7	26.8	19.4	18.1	18.1	-8.7	-1.3
R226	34.8	19.4	30.9	18.1	17.9	16.4	-13.0	-1.7
R104	22.9	18.4	20.2	17.2	17.8	16.7	-2.4	-0.5
R153	14.8	18.8	12.5	17.6	17.7	18.4	5.2	0.8
R141	30.4	19.7	26.7	18.4	17.7	17.2	-9.0	-1.2
R157	33.1	20.8	27.7	19.5	16.9	18.0	-10.8	-1.5
R230	21.8	18.2	19.1	17.0	16.7	16.6	-2.4	-0.4
R156	29.8	20.4	25.0	19.1	16.6	17.9	-8.4	-1.2
R158	32.7	20.9	28.1	19.6	16.4	17.8	-11.7	-1.8
R140	25.1	18.3	21.8	17.1	16.0	16.3	-5.8	-0.8
R145	23.4	18.9	20.4	17.7	15.7	17.0	-4.7	-0.7
R154	12.9	18.6	10.9	17.4	14.6	18.0	3.7	0.6
R139	20.0	17.8	17.2	16.6	14.0	16.1	-3.2	-0.5

Note: Values in bold denote exceedances of the level of the annual mean AQO (40µg/m^3)

6.9.16 The maximum predicted NO_2 concentration in the 2027 DS scenario was 42.4µg/m^3 at receptor R193, off Halstead Road, Colchester, near the A12. The NO_2 concentration is modelled to increase by 0.9µg/m^3 in the DS at this receptor, from a DM concentration of 41.5µg/m^3, predominantly as a result of increased traffic flows on nearby roads. For example, AADT flows are projected to increase by approximately 4,400 vehicles on the adjacent A12 carriageways as a result of the proposed scheme.

6.9.17 Nearby receptors were included in the assessment modelling following the identification of this exceedance location, to confirm if other properties were likely to be in exceedance. The next highest DS NO_2 concentrations in this area were modelled at receptors R191 (39.4µg/m^3) and R194 (38.4µg/m^3) which are within 70m of R193. These were not predicted to be in exceedance of the AQO;

therefore, the exceedance was found to be limited to the one receptor location, representing one residential property.

6.9.18 The next highest predicted NO_2 concentration in the 2027 DS scenario was 41.0µg/m^3 at receptor R189, representing one residential property within the Lucy Lane North AQMA, Colchester. The modelled increase in NO_2 owing to the proposed scheme at this receptor was 0.9µg/m^3. The receptor was subject to the same change in AADT flows on the A12 as R191 (approximately 4,400 vehicles), with this being the predominant reason for the increased NO_2 concentration. Other worst-case receptors within the AQMA were included in the modelling and no other receptors within the AQMA were found to be in exceedance of the AQO.

6.9.19 The only other predicted exceedance of the AQO for NO_2 in the 2027 DS scenario was 40.3µg/m^3 at R225, located between B1137 Main Road in Boreham and the A12 carriageway. The NO_2 concentration at this receptor increased by 4.0µg/m^3, from a DM concentration of 36.3µg/m^3, owing to the proposed scheme. The modelling of nearby receptors confirmed that the exceedance in the DS was limited to one residential property. The increase is driven by an increase in AADT traffic flow of approximately 7,500 vehicles on the A12 (within 10m of the property) and by approximately 900 vehicles on B1137 Main Road. There is also a change in the modelled speed characteristics of the A12 (from free flow to high speed in the AM, IP and PM periods[11]) between the DM and DS at this location.

6.9.20 No other receptors were found to be in exceedance of the AQO for annual mean NO_2. Of the 260 receptors included in the operational traffic air quality modelling, 147 are predicted to experience an increase (>0.4µg/m^3) in NO_2 concentrations, with 35 receptors predicted to experience a decrease (>0.4µg/m^3). The remaining 78 are predicted to experience changes equal to or less than 0.4µg/m^3, which would be imperceptible.

6.9.21 The greatest increases (>4µg/m^3) in predicted NO_2 concentration with the proposed scheme were modelled at three receptors between junction 22 (Colemans interchange) and junction 25 (R155, R91 and R153), predominantly due to the proposed realignment of the carriageway and therefore increased proximity of these receptors to road traffic emissions. For example, the distance from R155 to the A12 would be decreased by approximately 370m with the proposed scheme in place. Over its length, increases of over 2µg/m^3 were predicted at a further 26 receptors within 50m of the proposed scheme. These increases arise mainly as a result of scheme realignments (north of junction 22) and increases in traffic flows (along the length of the proposed A12 carriageway).

6.9.22 Of the modelled receptors, the greatest benefits (i.e. reduction in NO_2 of >4µg/m^3) were modelled at 17 receptors which are adjacent to the existing A12, where the proposed scheme would realign the A12 carriageway (by over 100m) as offline bypasses. This includes a number of receptors in the vicinity of Rivenhall End and between junctions 24 (Kelvedon North interchange) and 25.

[11] Traffic periods used in the dispersion model. See Table 1.2 in Appendix 6.3 [TR010060/APP/6.3].

Receptors on Old London Road near junction 25 were also predicted to experience decreases in NO_2 concentration due to the realignment of the A12 carriageway by up to approximately 250m. The largest reduction in NO_2 of 14.3µg/m^3 was modelled at R227 in Rivenhall End, where the A12 would be realigned to the east by approximately 150m with the proposed scheme in place.

6.9.23 There are no predicted exceedances of the AQO for PM_{10} or $PM_{2.5}$ in any of the modelled scenarios.

6.9.24 As can be seen in Table 6.16, the results of the local air quality assessment indicate that one property (represented by receptor R225) in exceedance of the AQO in the DS had a magnitude of change deemed to be 'medium' (4µg/m^3 or less). The other two properties (represented by R193 and R189) in exceedance of the NO_2 AQO had a magnitude of change predicted to be 'small' (2µg/m^3 or less). This has been assessed against the guideline number of properties provided in DMRB LA 105 (see Table 6.7 in Section 6.5 of this chapter) to inform the risk of significant effect (see Section 6.11 of this chapter).

Table 6.16 Magnitude of change in modelled annual mean NO_2

Magnitude of change in NO_2 concentration	Total number of properties 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 (>4µg/m^3)	0	0
Medium (>2µg/m^3)	1	0
Small (>0.4µg/m^3)	3	0

Nutrient nitrogen deposition

6.9.25 Nitrogen deposition calculations were undertaken for all modelled ecological receptors, in line with DMRB LA 105. Figure 6.7 [TR010060/APP/6.2] shows the locations of the modelled ecological receptors.

6.9.26 A summary of the ecological assessment results for these receptors is presented in Table 6.17. The results in the 2027 DS scenario show that receptors in nine modelled transects (within eight designated sites) and at 23 veteran tree locations had a predicted total deposition rate above the lower critical load, with both a predicted change in N deposition of more than 1% of the lower critical load and of more than 0.4kg N/ha/yr. The nine transects are located in Boreham Road Gravel Pits LWS/potential ancient woodland, Whetmead LWS/LNR, Braxted Park LWS, Brockwell Meadows LWS, Perry's Wood LWS/ancient woodland, Cook's Lane Lexden LWS, West House Wood LWS and Smythe's Green LWS. As these ecological receptors have the potential to be adversely affected by changes in N deposition, they have been assessed by the competent expert for biodiversity in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1]. The full set of receptor results for these transects are provided in Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3].

Table 6.17 Summary of ecological receptors with potentially significant effects

Designated site	Modelled site ID	Distance to nearest modelled road (m)[a]	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM to DS change in estimated nutrient N deposition (kg N/ha/yr)[b]	Change/CL (%)
Boreham Road Gravel Pits LWS/ potential ancient woodland at Porter's Grove	ECO_F1	157.1 - 207.1	10	31.8	0.47 - 0.6	4.74 - 6.03
Whetmead LNR/LWS – Transect 1	ECO_H1	22.5 - 131.2	20	16.9	0.6 – 3.04	2.99 – 15.2
Whetmead LNR/LWS – Transect 2	ECO_H2	12.4 - 142.3	20	16.9	0.61 – 6.49	3.04 – 32.46
Braxted Park LWS	ECO_J3	2.2 - 22.2	10	30.0	0.45 - 1.4	4.53 - 14.01
Brockwell Meadows LWS	ECO_O	11.6 - 50.2	20	18.3	0.47 - 0.72	2.37 - 3.61
Perry's Wood LWS/ancient woodland	ECO_Q	4.9 - 54	10	32.5	0.45 - 2.82	4.45 - 28.15
Cook's Lane Lexden LWS	ECO_X	20.3 - 49.7	10	31.6	0.45 - 0.66	4.45 - 6.62
West House Wood LWS	ECO_AC	11.7 - 31.7	10	31.6	0.45 - 0.65	4.48 - 6.5
Smythe's Green LWS	ECO_AE	3.8 - 13.8	20	23.2	0.59	2.96
Tree 9259 Sessile oak (VV)[c]	ECO_TREE_5	63.2	10	31.8	1.21	12.09
Tree 9238 Pedunculate oak (VV)	ECO_TREE_6	167.1	10	31.8	0.58	5.84
Tree 9346 Wild cherry (VV)	ECO_TREE_7	50.5	10	31.8	1.4	14
T124 Willow (PV)	ECO_TREE_8	50.2	10	31.8	2.14	21.42

Designated site	Modelled site ID	Distance to nearest modelled road (m)[a]	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM to DS change in estimated nutrient N deposition (kg N/ha/yr)[b]	Change/CL (%)
Tree 9226 Pedunculate oak (VV)	ECO_TREE_9	140.7	10	31.8	0.44	4.4
T234 Elm (PV)	ECO_TREE_12	99.8	10	30.0	1.02	10.18
T308 Willow (PV)	ECO_TREE_14	162.3	10	30.0	0.59	5.9
T316 Oak (PV)	ECO_TREE_15	25.8	10	30.0	4.59	45.93
T422 Willow (PV)	ECO_TREE_25	75	10	30.0	4.21	42.1
T494 Alder (PV)	ECO_TREE_29	80.2	10	32.5	1.04	10.36
T506 Elm (PV)	ECO_TREE_30	52	10	32.5	2.54	25.35
T549 Oak (PV)	ECO_TREE_33	148.9	10	32.5	0.47	4.69
T562 Oak (PV)	ECO_TREE_34	163.1	10	32.5	1.17	11.73
T649 Elm (VV)	ECO_TREE_38	53.1	10	38.2	7.26	72.56
T744 Oak (PV)	ECO_TREE_40	128.8	10	32.9	1.87	18.68
T792 Field maple (PV)	ECO_TREE_41	41.5	10	32.9	1.43	14.28
T1013 Oak (VV)	ECO_TREE_43	152	10	31.8	0.44	4.37
T1124 Alder (PV)	ECO_TREE_44	167.7	10	30.0	0.58	5.8
T1131 Ash (PV)	ECO_TREE_45	170	10	30.0	0.58	5.8
G1018 Oak (PV)	ECO_TREE_46	99.2	10	31.8	1.4	14

Designated site	Modelled site ID	Distance to nearest modelled road (m)[a]	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM to DS change in estimated nutrient N deposition (kg N/ha/yr)[b]	Change/CL (%)
G489 Elm, ash, hawthorn, field maple, hornbeam (PV)	ECO_TREE_48	26.6	10	32.5	2.54	25.35
G543 Elm, field maple (PV)	ECO_TREE_50	30.5	10	32.5	2.54	25.35
Tree 9322 Pedunculate oak (VA)	ECO_TREE_53	194.9	10	31.8	0.47	4.74

[a] The range over which modelled receptors were found to have potentially significant effects. Distances are measured to the nearest road centreline in the ARN.

[b] The DM to DS change is also referred to as the process contribution.

[c] VV = verified veteran tree location, PV = potential veteran tree location, VA = verified ancient tree location

Compliance risk assessment

6.9.27 A total of 73 PCM receptors were modelled at positions 4m from the road edge at PCM Census ID locations. The PCM receptors that are representative of qualifying features are shown on Figure 6.8 [TR010060/APP/6.2].

6.9.28 None of the PCM receptors were found to exceed the NO_2 EU Limit Value of 40µg/m^3 in the modelled DM or DS opening year. It is therefore concluded that the proposed scheme is not likely to interfere with the UK's reported ability to meet the EU Limit Value for NO_2 in the shortest possible time. The full set of results is provided in Appendix 6.5 of the Environmental Statement [TR010060/APP/6.3].

6.10 Design, mitigation and enhancement measures

Embedded (design) mitigation

6.10.1 The environment team has worked in close collaboration with the infrastructure design team to avoid or reduce environmental impacts through the proposed scheme design. This is referred to as embedded (or design) mitigation. Chapter 3: Assessment of alternatives [TR010060/APP/6.1], details the design alternatives that have been considered, including the environmental factors which have influenced the decision making.

6.10.2 As a consequence of the proposed scheme design, there would be air quality improvement for receptors alongside the existing A12 between junctions 22 and 23 (near Rivenhall End) and junctions 24 to junction 25 (Kelvedon to Marks Tey) due to strategic traffic moving to the new offline bypasses.

Standard mitigation

6.10.3 Standard mitigation would occur as a matter of course due to legislative requirements or standard sector practices.

6.10.4 Standard mitigation is included in the Register of Environmental Actions and Commitments (REAC), within the first iteration of the EMP [TR010060/APP/6.5] which is included as part of the DCO application. Further information is provided in Chapter 5: Environmental assessment methodology [TRO10060/APP/6.1].

6.10.5 The second iteration of the EMP would adopt best practice measures to control fugitive dust (and hence avoid or reduce potential impacts) in compliance with DMRB LA 105. The Principal Contractor would enter into pre-works discussions with affected local authorities to agree appropriate dust mitigation measures outlined in the REAC, within the first iteration of the EMP [TR010060/APP/6.5]. Mitigation measures would include the dampening down of surfaces, planning the site layout so that machinery and dust-causing activities occur as far from receptors as practicable, erecting screens or barriers around the dust-causing activities or the site boundary, and the covering or dampening down of stockpiles to prevent or minimise entrainment by wind.

Additional mitigation

6.10.6 No additional mitigation measures have been integrated into the proposed scheme design on the basis that there would be no likely significant air quality effects, in accordance with the DMRB LA 105.

Enhancement

6.10.7 There are no opportunities for enhancement identified in this assessment.

6.11 Assessment of likely significant effects

Construction

6.11.1 With standard construction phase mitigation measures in place, it is unlikely there would to be significant air quality effects resulting from construction dust.

6.11.2 In Section 6.9 of this chapter, it was shown that two human health receptors (R189 and R193) were found to be at risk of exceeding the annual mean NO_2 AQO (40µg/m^3) in the peak construction year 2025, in both the DM and the DS scenarios. However, the magnitude of change in concentration at these receptors was 0.1 and 0.2µg/m^3 respectively, which is classed as imperceptible in DMRB LA 105. In accordance with the DMRB LA 105 criteria on significance, these effects are likely to be not significant.

6.11.3 The N deposition calculations undertaken showed that six veteran tree locations had a predicted total deposition rate above the lower critical load with a predicted change in N deposition of more than 1% of the lower critical load and of more than 0.4kg N/ha/yr. The significance for biodiversity has been assessed by the competent expert for biodiversity in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1]. The assessment was based on the following:

- The background N deposition already exceeds the upper end of the critical load range for woodland and therefore there could already be effects on tree health.
- The assessment considered construction traffic representative of the peak construction year. This is a worst-case assumption as construction flows are likely to fluctuate over the period.
- None of the veteran trees identified as being potentially significant owing to construction traffic were also considered significant during the operational phase and therefore the duration of impact is a maximum of four years.
- The increase in N deposition is temporary as a result of the construction phase and considered to be a temporary and reversible effect which does not affect the integrity or key characteristics of the individual veteran trees.

6.11.4 As a result, the ecological assessment concluded that the impact level of construction traffic on the veteran trees is negligible, which is **not significant**.

6.11.5 The assessment of construction traffic effects concluded that construction traffic associated with the proposed scheme would be unlikely to interfere with the

UK's reported ability to meet the EU Air Quality Directive Limit Value for NO_2 in the shortest possible time.

6.11.6 As a consequence, in accordance with DMRB LA 105 criteria on significance, the effect of the construction of the proposed scheme on air quality at human health receptors, designated ecological sites and on compliance with EU Limit Values is considered to be **not significant**.

Operation

6.11.7 In Section 6.9 of this chapter, it was shown that three human health receptors (R193, R189 and R225), representing a total of three residential properties, are at risk of exceeding the threshold of the NO_2 AQO (40µg/m^3) with the proposed scheme in the opening year 2027. Receptors R193 and R189 were in exceedance of the AQO in both the DM and the DS scenarios. In accordance with DMRB LA 105, the magnitude of change in concentration at these two receptors (0.9µg/m^3 increase for both receptors) was deemed to be small. Receptor R225 was in exceedance in only the DS scenario and the magnitude of the change in concentration at this receptor (4.0µg/m^3) was deemed to be medium in accordance with DMRB LA 105. These values are below the guideline number of properties that would constitute a likely significant effect (see Table 6.7 in Section 6.5 of this chapter) according to the significance criteria in DMRB LA 105.

6.11.8 The N deposition calculations undertaken showed that ecological receptors within eight designated site areas (Boreham Road Gravel Pits LWS/potential ancient woodland, Whetmead LWS/LNR, Braxted Park LWS, Brockwell Meadows LWS, Perry's Wood LWS/ancient woodland, Cook's Lane Lexden LWS, West House Wood LWS and Smythe's Green LWS) and at 23 veteran tree locations had a predicted total deposition rate above the lower critical load with a predicted change in N deposition of more than 1% of the lower critical load and of more than 0.4kg N/ha/yr.

6.11.9 An assessment of impact caused by the predicted N deposition levels was undertaken by the competent expert for biodiversity who concluded that the likely effect on all 23 veteran trees would be **not significant**.

6.11.10 Of the eight designated wildlife sites, Perry's Wood was assessed to remain at risk from N deposition owing to the proposed scheme and the impact is likely therefore to be **significant**.

6.11.11 The assessment and conclusions made for the veteran trees and Perry's Wood have been fully reported in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1].

6.11.12 In accordance with DMRB LA 105, conclusions of significant effects trigger the development of a Project Air Quality Action Plan (PAQAP). The PAQAP is included in Appendix 6.6 of the Environmental Statement [TR010060/APP/6.3], and has considered options to reduce the impact of the N deposition at Perry's Wood.

6.11.13 The assessment of operational traffic effects concluded that the proposed scheme would be unlikely to interfere with the UK's reported ability to meet the EU Limit Value for NO_2 in the shortest possible time.

6.11.14 As a consequence, in accordance with DMRB LA 105 criteria on significance, the effect of the proposed scheme on air quality at human health receptors and on compliance with EU Limit Values during operation is considered to be **not significant**. Changes in N deposition as a result of the proposed scheme would have a **significant** effect on ancient woodland habitats within one ecological site (Perry's Wood LWS). The determination of significance is considered within Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1].

6.11.15 The PAQAP considered no mitigation options to be feasible. On this basis, the conclusion from the competent expert for biodiversity is to offset the impact by planting additional trees within the Order Limits, as described in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1].

6.12 Monitoring

6.12.1 The Principal Contractor would be legally obligated to consider dust suppression measures in line with the dust risk potential of the proposed scheme (see Section 6.9 of this chapter). As part of this process, the Principal Contractor would consider the requirements for monitoring the effectiveness of the mitigation measures included in the REAC, within the first iteration of the EMP [TR010060/APP/6.5]. Considerations will include visual monitoring and passive monitoring using dust sensors, the latter only to be deployed where ongoing visual surveillance of dust identifies the need.

6.12.2 Air quality monitoring is not proposed for construction traffic emission sources of air pollution, as this assessment has concluded there would be no significant effects.

6.12.3 Although significant effects were concluded for Perry's Wood owing to operational traffic, further monitoring is not proposed.

6.12.4 On this basis, there is no requirement for developing a forward monitoring and evaluation plan. Local authority monitoring is likely to continue and will provide a reasonable confirmation of the proposed scheme performance across the air quality study area.

6.13 Summary

6.13.1 The assessment identified no likely significant effects on air quality in the construction phase for the proposed scheme.

6.13.2 The assessment identified no likely significant effects on air quality at human health and PCM receptors in the operational phase.

6.13.3 The assessment identified significant effects at ecological receptors owing to an increase in N deposition, as outlined in Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1], where subsequent mitigation has been considered.

6.13.4 The proposed scheme is in line with NNNPS policy (Department for Transport, 2014) set out in paragraph 5.13 of the NNNPS. Whilst a significant effect has been concluded after considering mitigation, the decision-maker will need to weight the findings in terms of the planning balance as outlined in paragraph 5.12 of the NNNPS.

6.14 References

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