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6.2 ENVIRONMENTAL STATEMENT CHAPTER 5 AIR QUALITY

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6.2 ENVIRONMENTAL STATEMENT

CHAPTER 5 AIR QUALITY

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5 Air Quality

5.1 Introduction

5.1.1 Air quality is a consideration in any development proposal involving significant changes in the nature and location of emissions to air. The Chiverton to Carland Cross scheme would change the flows on the existing A30, and would change traffic flows on other roads in the wider surrounding area. This would result in changes to pollutant emissions from vehicle traffic and changes in ambient air quality at nearby receptors. In addition, the presence of significant ecological sites and the Truro and Kerrier air quality management areas (AQMAs) represent sensitivities which need to be addressed explicitly through detailed assessment.

5.1.2 A detailed DMRB assessment has therefore been undertaken to establish the potential effects of the scheme on local and regional air quality as outlined in the scoping report[1]. A detailed assessment of construction phase impacts has been scoped out of this assessment as set out in the **Scoping Opinion** (Volume 6 Document Ref 6.4 ES Appendix 4.1). However, a review of impacts has been undertaken following guidance in HA207/07 [1] in order to feed into the Outline Construction Environmental Management Plan (CEMP) (**Outline CEMP** (Annex L) Volume 6.4 Appendix 16.1). The CEMP will be submitted as part of the Environmental Statement (ES) with the Development Consent Order (DCO). This chapter describes the assessment of construction and operational effects arising from the scheme.

5.2 Competent expert

5.2.1 The Air Quality Lead expert is an Associate Director and is Arup's UK lead on air quality, has an MA and PhD in Engineering from the University of Cambridge and is a Member of the Institution of Environmental Sciences, a Member of the Institute of Air Quality Management, and an Associate Member of the Institute of Acoustics. Full details are provided in Volume 6 Document Ref 6.4 Appendix 1.1.

5.3 Legislation and policy context and guidance

5.3.1 Details of relevant European, national and local legislation, policy and guidance are provided in **Air Quality – Legislation, Policy and Guidance** (Volume 6 Document Ref 6.4 ES Appendix 5.1).

5.3.2 Potential effects on air quality resulting from the scheme have been assessed following the principles in relevant guidance outlined in DMRB HA207/07 [1], associated Interim Advice Notes (IANs) and the Department for the Environment, Food and Rural Affairs' (Defra's) Local Air Quality Management Technical Guidance (LAQM TG.16) [2]. Relevant guidance documents used for the air quality assessment are listed below:

- HA207/07 Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1, May 2007 [1];
- IAN 170/12 v3 Updated air quality advice on the assessment of future NOx and NO_2 projections for users for the DMRB Volume 11, Section 3, Part 1 Air Quality, November 2013 [3];

[1] https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a30-chiverton-to-carland-cross-scheme/

- IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07), June 2013 [4];
- IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07), June 2013 [5];
- IAN 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, January 2015 [6];
- Note on Highways England's Interim Alternative Long Term Annual Projection Factors (LTTE6) for Annual Mean NO_2 and NOx Concentrations between 2008 and 2030, draft, October 2013 [7];
- MPI-28-082014: Highways England Major Projects' Instructions – Determining the correct base year traffic model to support air quality assessments (August 2014); and
- Defra's Local Air Quality Management Technical Guidance (LAQM TG.16) [2].

5.4 Study area

5.4.1 The air quality assessment comprises three sub-topics:

- Construction dust assessment, which is related to the risk of dust nuisance and dust with potential to affect human health and ecosystems at a local level;
- Local air quality, which relates to pollutants with potential to affect human health and ecosystems at a local level; and
- Regional air quality, which relates to pollutants over a larger area.

5.4.2 The study area for the assessment of local air quality has been defined following guidance contained in HA207/07. It comprises: all receptors within 200m of the centre line of the existing road; receptors within 200m of the centre line of the improvement scheme; and receptors within 200m of any other 'affected roads'.

5.4.3 The Affected Road Network (ARN) for the local assessment was identified by the criteria published in HA207/07, based on changes between Do Minimum (DM) and Do Something (DS) scenarios. A road is in the ARN if one or more of the following criteria are true:

- Road alignment will change by 5m or more;
- Daily traffic flows will change by >=1,000 AADT;
- Heavy Duty Vehicle (HDV) flows will change by >=200 AADT;
- Daily average speed will change by >=10 kph; and
- Peak hour speed will change by >=20 kph.

5.4.4 For the regional air quality assessment, the ARN is defined as those links in the Traffic Reliability Area (TRA) which meet any of the criteria below in the scheme opening year or design year (+15 years):

- Daily traffic flows will change by 10% AADT or more;
- HDV flows will change by 10% AADT or more; and
- Daily average speed will change by 20km/hr or more.

5.4.5 Volume 6 Document Ref 6.3 ES Figure 5.1 shows the local air quality study area.

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

- A30 between Redruth and Victoria (including the scheme area between Chiverton and Carland Cross);
- A and B roads between Redruth, Truro and Newquay.

5.5 Potential impacts

Construction phase

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

5.5.2 There are a number of receptors which could be directly affected by dust nuisance associated with the scheme works or construction vehicle traffic, and there is therefore potential for adverse impacts. Best practice construction dust control measures are therefore recommended and are documented in the Air Quality Management Plan in the **Outline CEMP** (see Volume 6 Document Ref 6.4 Appendix 16.1). It should be noted that any potential impacts would be temporary in nature.

Operational phase

5.5.3 During the operational phase, potential air quality effects arise from emissions from vehicles using the road network. These impacts are assessed in section 5.11.

5.6 Assessment methodology

Construction Dust assessment

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

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

5.6.3 A qualitative assessment of the impacts of nuisance dust arising during construction has been undertaken, using guidance set out in paragraph 3.45 of DMRB HA207/07. Properties within 200m of dust producing activities have been identified and appropriate mitigation recommended where required.

5.6.4 The emissions from heavy goods vehicles (HGVs) associated with the construction of the scheme have been scoped out of the assessment due to the temporary nature of the works and the minimal impact the additional vehicles would have on overall pollutant concentrations.

5.6.5 The emissions from site equipment have been scoped out of the assessment due to the temporary nature of the works and the minimal impact the site equipment would have on overall pollutant concentrations. Best practice measures to minimise emissions from site equipment are included in the **Outline CEMP** (Volume 6 Document Ref 6.4 ES Appendix 16.1).

Local Air Quality assessment

5.6.6 A detailed assessment has been carried out using an air dispersion model ADMS-Roads v.4.1.1.0 to determine the potential effects on annual mean NO_2 concentrations at selected sensitive receptors (locations of relevant human exposure and designated ecological sites), in accordance with HA207/07 guidance. In particular, modelled concentrations have been compared with the EU limit value for annual mean NO_2 following the method detailed in IAN175/13 to provide a clear indication of the scheme's potential to affect the UK's ability to comply with the Air Quality Directive [8].

5.6.7 HA207/07 provides guidance on whether an assessment should be detailed or simple. A detailed assessment will usually involve dispersion modelling to assess the scheme impacts, whereas a simple approach would usually follow a spreadsheet-based assessment of changes in emissions. At the scoping stage it was identified that a detailed assessment would be carried out. This chapter provides the results of the detailed assessment.

Assessment scenarios

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

- 2016 Baseline scenario;
- 2023 Do-Minimum (DM) scenario: the traffic scenario at the year of opening without the scheme;
- 2023 Do-Something (DS) scenario: the traffic scenario at the year of opening with the scheme;

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

5.6.10 Evidence from monitoring across the UK has indicated concentrations of pollutants are not reducing as quickly as predicted by Defra despite improvements to engine technology. To account for this, the future baseline projections scenarios were also calculated for 2023 following the methodology in IAN 170/12/v3.

5.6.11 The assessment in this chapter uses data provided from the traffic model for the future years which includes a number of future developments (Volume 7 Document Ref 7.5 ComMA Table 13-2 identifies the developments used in the traffic model).

Local Air Quality modelling

5.6.12 The inputs to the modelling process included:

- Traffic data;
- Receptor locations;

- Meteorological data; and
- Background concentrations.

5.6.13 Further details of the dispersion modelling inputs are provided in **Air Quality – Operational Assessment Methodology** (Volume 6 Document Ref 6.4 ES Appendix 5.2.)

Traffic data

5.6.14 Traffic data has been provided for the air quality assessment by the Arup transport team. Traffic data provided represents the average conditions occurring in four specific time periods (morning peak, inter-peak, afternoon peak and off-peak). For the time periods in Table 5-1 the following data parameters were provided:

- Traffic flow, defined as vehicles/hour;
- Percentage heavy duty vehicles (HDV);
- Vehicle speeds, in kilometres per hour (kph); and
- Speed band information for use in calculation of emission factors in accordance with IAN 185/15.

Table 5-1 Traffic time periods

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

5.6.15 Emissions from traffic data were calculated using the emission factors provided in the latest version (version 3) of IAN 185/15. Using this methodology allows the effects of reducing or creating congestion to be more effectively assessed within the air quality study area.

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

Receptors

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

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

5.6.19 A total of 576 human receptors are included in the assessment, and selected using the following criteria and professional judgement:

- Proximity to the affected roads;
- Representativeness of the maximum effects of the scheme in that region; and
- Whether they are at risk of exceeding the annual mean NO_2 Air Quality Objective (AQO).

5.6.20 The list includes dwellings, hospitals, educational establishments; they are shown as dots on the human receptors drawing Volume 6 Document Ref 6.3 ES Figure 5.2. All locations, referred to as 'receptors' are treated as being equally sensitive.

Designated Habitat Sites

5.6.21 To assess the impacts on ecosystems the study area was reviewed to identify Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Sites of Special Scientific interest (SSSI) within 200m of the ARN. Seven designated sites were identified along the A30, B3285 and A390. Details of the designated sites are provided in Table 5.2 (additional information is provided in **Ecology and Nature Conservation** (Volume 6 Document Ref 6.2, Chapter 8)). All seven sites are shown in the ecological receptors drawing, Volume 6 Document Ref 6.3 ES Figure 5.3. Further information on the ecological receptors selected is provided in **Air Quality - Receptors** (Volume 6 Document Ref 6.4 ES Appendix 5.3.)

5.6.22 Effects at ecological receptors have been assessed in accordance with Annex F of DMRB HA207/07.

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

5.6.24 Following guidance in IAN 174/13, in the first instance, the magnitude of change in annual mean NOx concentrations at the designated sites has been determined. The guidance notes that where the magnitude of change is less than 0.4µg/m^3 then the effects are considered to be imperceptible and unlikely to be significant.

Table 5-2 Designated habitats used in the assessment

Site Name	Designation	Habitat
Penhale Dunes	SAC & SSSI	Calcareous grassland
Carrick Heaths	SSSI	Fen, marsh and swamp
Fal & Helford	SAC	Estuaries
Newlyn Downs	SAC	Dwarf shrub heath
Breney Common and Goss and Tregoss Moor	SAC	Transition mires and quaking bog
River Camel	SAC	Old sessile oak woods
Mid Cornwall Moor	SSSI	Transition mires and quaking bog

Meteorological data

5.6.25 The effect of meteorological conditions on dispersion is accounted for in the dispersion model. The most significant factors that affect dispersion are wind speed, wind direction and atmospheric stability. The meteorological data site considered to be most representative of conditions across the study area was Camborne. The site is located 7km east of the scheme. Data from this site was obtained[2] in model-ready format. The wind rose shown in Figure 5.1 of **Air quality – legislation, policy and guidance** (Volume 6 Document Ref 6.4 ES

2 Data provided by ADM Ltd.

Appendix 5.2 derived from this data identified the predominant wind directions as being westerly and south-westerly. Further detail on the meteorological data is provided in **Air quality – operational assessment methodology** (Volume 6 Document Ref 6.4 ES Appendix 5.2.)

Background concentrations

5.6.26 'Background' air quality is a concept used to enable assessment of the effects of all relevant emission sources, without the need for all the sources to be considered explicitly. For the purposes of this assessment, the background air quality represents the contribution of all relevant sources of air pollutants, except those from roads specifically included in the air quality model. The predicted concentration impact due to the modelled roads is added to the background pollutant concentrations.

5.6.27 The Defra air quality website [9] includes estimated background air concentrations for NO_x and NO_2, for each 1km by 1km square covering England.

5.6.28 The 'in-grid square' and 'out-grid square' contribution from motorway, trunk 'A' road and primary 'A' road sectors have been removed from the background annual mean NO_x concentration estimates, and background annual mean NO_2 estimates have been corrected, to account for the change in NOx concentration, using the Defra's Background NO_2 Calculator [10]. This process has been undertaken to avoid double counting of road traffic emissions from those road sources included in the dispersion model.

5.6.29 The Defra background concentrations with major road sector contributions removed have been used in the modelling. A comparison with the local authority monitoring data showed a small percentage change between the Defra background concentrations and the local monitored background data. The Defra mapped concentrations were within ±15% of observed background concentrations. Details of the comparison and details of sites selected are provided in **Air quality – baseline data** (Volume 6 Document Ref 6.4 ES Appendix 5.4.) Details of the sector removed background concentrations at each receptor are provided in **Air Quality – Operational Phase Impacts** (Volume 6, Document Ref 6.4, ES Appendix 5.6).

Model verification

5.6.30 A comparison of modelled and measured NO_2 concentrations has been undertaken. This process is known as model verification. Verification has been undertaken for the base year, using the principles laid out in Section A3.223 of LAQM TG.16. Additional receptor points have been included in the baseline modelling to represent the location of diffusion tube sites within 200m of the ARN to provide information for the verification exercise. The locations of selected verification points are shown in Volume 6 Document Ref 6.3 ES Figure 5.4.

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

5.6.32 LAQM TG.16 suggests that if modelled annual mean NO_2 concentrations are within ±25% and preferably within ±10% of the monitored concentration and there is no systematic under or over prediction, then model adjustment is not considered necessary to further improve modelled results. IAN 174/13 notes the

desirability of achieving ±10% verification where concentrations are close to or above the air quality threshold.

5.6.33 Modelled and monitored results may not compare well at some locations for a number of reasons including:

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

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

5.6.35 Some monitoring locations are not suitable for model verification purposes as there may be specific local influences or they are located too close to the road, where LAQM TG.16 advises they should not be used. Therefore, each site was examined and it was considered whether it was suitable for use in the verification study. Some locations were then removed from the verification. For those monitoring sites not used, the justification for their removal is provided in **Air Quality – Sites Used for Verification** (Volume 6 Document Ref 6.4 ES Appendix 5.5).

5.6.36 Further detail on the verification process is provided in **Air Quality – Sites Used for Verification** (Volume 6 Document Ref 6.4 ES Appendix 5.5).

NOx to NO_2 conversion

5.6.37 The approach to calculating the conversion of roadside NO_x to NO_2 has followed the guidance in LAQM TG.16. This approach allows the calculation of NO_2 from NO_x concentrations, taking into account the difference between ambient NO_x concentration with and without the development, the concentrations of ozone and the different proportions of primary NO_2 emissions in different years. This approach is available as a spreadsheet calculator [11]; the version released in October 2017 (v6.1) has been used.

5.6.38 Emission controls on vehicles have been introduced as a measure to reduce concentrations of NO_2 in the atmosphere. Levels of atmospheric NO_2 have not reduced as quickly as predicted due to ineffective emission controls on some vehicles in real world conditions. IAN 170/12v3 has been used to carry out sensitivity testing of future NO_x and NO_2 trends. As outlined in the IAN, the projection factors provided on the Defra website [12] may be too optimistic and the long term trend factors provided with the IAN may be too pessimistic resulting in unrealistic projections. Highways England has produced an interim set of factors [7] to take a conservative approach to the anticipated improvements in air quality due to improved emission controls. The interim factors (LTTE6) do not take the most optimistic view of the benefits of Euro 6/VI vehicles. Additionally, they do not include the benefits of Euro6/VI vehicles having an immediate impact upon emissions. Instead a more conservative approach is taken with improvements of NO_2 concentrations starting to be realised from around 2015. Due to this conservative approach taken in the LTTE6 factors, it is the professional opinion of suitably qualified and experienced specialists that the interim factors are the most suitable for this assessment.

Regional air quality assessment

5.6.39 Pollutant emissions have been calculated for the regional assessment study area based on the regional assessment screening criteria outlined in Section 5.4.4. Emissions have been calculated using the traffic characteristics (AADT flows, average vehicle speeds and percentage HDVs) and road length for each affected road in the study area. The emission factors given in IAN 185/15 have been used. Total annual emissions for both the base year (2016), Do-Minimum and Do-Something scenarios (2023) and Design year (2038) have been calculated for the purposes of the regional assessment. As emission factors are not available for 2038, the traffic data for 2038 have been processed using emission factors for the latest year for which factors are available, 2030.

Compliance risk assessment

5.6.40 IAN 175/13 provides guidance in relation to the assessment of the risk of the scheme being non-compliant with the EU Directive on Ambient Air Quality (2008/50/EC). The compliance risk assessment is undertaken using the modelling results from the local air quality assessment. To undertake compliance risk assessment, the following information is required:

- Local air quality modelled results;
- Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network [13]; and
- Defra's zones and agglomerations maps [14].

5.6.41 Defra uses the PCM model to report against compliance with the EU Directive 2008/50/EC. The current PCM model results have concentrations predicted for each year between 2015 and 2030.

5.6.42 To determine the study area for the compliance risk assessment the local air quality study area is compared to the compliance link locations in the PCM model. Where the two networks intersect this is defined as the compliance risk road network (CRRN) and forms the basis of the assessment of compliance risk.

5.6.43 The impacts of the scheme (i.e. the change in concentrations predicted by the ADMS-Roads model) are added to the modelled concentrations from the Defra PCM model for the opening year of the scheme.

5.6.44 To determine the compliance risk of the scheme, the Compliance Risk Flow Chart in Annex A of IAN 175/13 has been followed.

TAG Air quality assessment

5.6.45 DMRB HA207/07 indicates that a Transport Analysis Guidance (TAG) assessment should be undertaken for road schemes. The TAG assessment of air quality is an estimation of the overall change in people's exposure to concentrations of NO_2 and PM_{10}. These pollutants are identified as of particular concern with respect to compliance with the UK AQS objectives and EU limit values.

5.6.46 The assessment involves calculating the relative exposure of sensitive receptors to the predicted change in air quality arising from the scheme.

5.6.47 The study area for the TAG assessment is the same as the study area of the local air quality assessment.

5.6.48 The TAG assessment creates an overall 'score' for the scheme, which is calculated on the basis of the number of residential properties within 200m of affected roads and the overall sum of the changes in NO_2 and PM_{10} at these properties. The spatial distribution of these changes is then assessed against subsets of the population, including subsets based on monetary income and age. As part of the TAG, annual mass emissions of NO_x, PM_{10} and CO_2 will be calculated.

5.6.49 The results of the TAG are available in the TAG worksheets provided for the scheme (Volume 7 Document Ref 7.5 Distributional Impact Assessment).

Operational assessment criteria

5.6.50 Evaluation of the significance of the local air quality findings has been undertaken in accordance with IAN 174/13. The key criteria outlined in IAN 174/13 against which air quality should be considered are:

- Is there a risk that environmental standards will be breached?
- Is there a high probability of the effect occurring?
- Will there be a large change in environmental conditions?
- Will the effect continue for a long time?
- Will many people be affected?
- Is there a risk that protected sites, areas, or features will be affected?
- Will it be difficult to avoid, or reduce or repair or compensate for the effect?

5.6.51 The evaluation of the significance of nitrogen deposition results requires advice from an ecologist and therefore the significance of changes in pollutant concentrations and deposition rates at ecological designations is also discussed in Ecology and nature conservation (Volume 6 Document Ref 6.2 ES Chapter 8)

5.6.52 To assess the magnitude of change at receptor locations, including ecological receptors, as a result of the scheme, IAN 174/13 provides the criteria shown in **Table 5-3**. These are based upon the view that while modelled results are considered reasonably accurate, there is still an element of residual uncertainty, hereafter referred to as Measure of Uncertainty (MoU). This is due to inherent uncertainty in air quality monitoring, modelling and the input data used in the assessment.

Table 5-3 Magnitude of change criteria

Magnitude of change in concentration (µg/m^3)	Value of change in annual average NO_2 and PM_{10}
Large (>4)	Greater than full MoU value of 10% of the AQO (4µg/m^3)
Medium (>2 - 4)	Greater than half the MoU (2µg/m^3), but less than the full MoU (4µg/m^3) of 10% of the AQO
Small (>0.4 - 2)	More than 1% of objective (0.4µg/m^3) and less than half of the MoU i.e. 5% (2µg/m^3). The full MoU is 10% of the AQO (4µg/m^3)
Imperceptible (≤ 0.4)	Less than or equal to 1% of AQO (0.4µg/m^3)

5.6.53 Where predicted annual mean NO_2 concentrations are below the AQO or the magnitude of change is ≤0.4µg/m^3, effects are likely to be imperceptible.

5.6.54 IAN 174/13 also provides guidelines to aid the interpretation of significance of public exposure. Table 5-4 shows the guideline criteria used in this assessment.

Table 5-4 Guideline for number of properties constituting a significant effect

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

5.7 Baseline conditions

5.7.1 In order to provide an assessment of the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. This provides a reference level against which any potential changes in air quality can be assessed. Since the baseline air quality is predicted to change in the future (mainly because vehicle emissions are changing), the baseline situation has also been predicted for the opening year (2023). The DM scenario is the predicted baseline for the opening year, and includes any other proposed schemes with a high level of certainty of being built.

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

- Defra Air Quality Management Area (AQMA) website [15];
- PCM modelled data for relevant years [14];
- Data from monitoring surveys carried out by Highways England and from local authority monitoring;
- GIS locations of sensitive receptors (residential properties, schools, hospitals and care homes) from OS Address Base Plus mapping; and
- GIS boundaries of designated ecological sites from Natural England [16].

Local Air Quality Management summary

5.7.3 Comparing baseline conditions for relevant pollutants against the AQOs detailed in the UK Government's Air Quality Strategy (AQS) [17] and the EU limit values, the following has been concluded:

- National assessments [17] have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene or benzene concentrations exceeding relevant UK AQS objective and EU limit value thresholds due to emissions from traffic anywhere in the UK. As such, concentrations of these pollutants have not been modelled as it is unlikely these pollutants will be a cause for concern in terms of potential exceedances as a result of the scheme.
- For particulate matter (PM_{10} and $PM_{2.5}$), there are no AQMAs designated for an exceedance of UK AQS objective and EU limit value thresholds for particulate matter within the study area.
- Exceedances of the annual mean NO_2 AQO and EU limit value threshold of 40µg/m^3 have been identified within the air quality study area. On this basis, NO_2 is the focus of the operational phase air quality assessment for the scheme.

Air Quality Management Areas (AQMA)

5.7.4 There are two AQMAs in the study area. Cornwall Council (CC) declared an AQMA in Truro in 2015 due to exceedances of the annual and 1-hour mean NO_2 objectives; and the Kerrier AQMA, declared in 2005 due to exceedances of the annual mean NO_2 objective.

5.7.5 Truro AQMA is located around Truro town centre and it extends east and west of the town along the A390. The Kerrier AQMA is an area encompassing the Camborne, Redruth and Pool regeneration area. The location of the AQMAs in relation to the scheme is shown in Volume 6 Document Ref 6.3 ES Figure 5.5.

5.7.6 The Clean Air for Cornwall Strategy includes the Air Quality Action Plan (AQAP) for the Truro and Kerrier AQMAs. There are a number of measures included in the AQAP to improve air quality in the Truro and Kerrier AQMAs; these are predominantly transport focussed measures such as extensions of park and ride schemes, signalisation of key junctions and improvements in cycle and pedestrian facilities. This scheme is also listed as an improvement measure as the dualling of the road would help improve traffic flow in the area and discourage vehicles from travelling through Truro.

5.7.7 The Clean Air for Cornwall Strategy also notes that CC is investigating the need for an AQMA in Grampound. The A390, which is the main route through Grampound, is included in the study area of this assessment.

Monitoring data

5.7.8 Monitoring of air quality for (NO_2 and NO_x) has been undertaken across the study area by Highways England and by CC. The location of monitoring across the study area is shown in Volume 6 Document Ref 6.3 ES Figure 5.6. Information from both sets of data have been used to establish baseline air quality conditions.

Local Authority monitoring data

5.7.9 CC operates diffusion tube monitoring at 36 sites across the study area. The monitoring in Truro accounts for over half the monitoring in the study area with 24 sites. There is also monitoring located in Chacewater, Grampound, Newquay and Threemilestone. Concentrations of annual mean NO_2 have been recorded as exceeding the objective in the study area in 2016 at Newquay, Grampound and Truro.

5.7.10 LAQM.TG16 discusses the relationship between annual mean and hourly mean NO_2 concentrations. It is considered that where monitored annual mean NO_2 concentrations are greater than 60µg/m^3, there is the potential for the hourly mean NO_2 objective to be exceeded. There are three locations in Truro where monitored concentrations in recent years have been greater than 60µg/m^3. The locations of the monitoring carried out are shown in Volume 6 Document Ref 6.3 ES Figure 5.6.

5.7.11 The results of local authority monitoring at the 36 sites in the study area are presented in Air quality – baseline data (Volume 6 Document Ref 6.4 ES Appendix 5.4). No monitoring of PM_{10} is undertaken in the study area.

5.7.12 There is no CC monitoring along the A30 in the study area.

Scheme-specific monitoring

5.7.13 Highways England carried out monitoring of NO_2 and NOx using diffusion tubes at 16 monitoring sites. Nine of the sites were at roadside locations or at locations representative of relevant exposure. The other seven sites were at locations where ecological receptors were considered to be potentially sensitive to change.

5.7.14 Monitoring was undertaken for a period of 10 months (August 2016 – May 2017) adjacent to the existing A30 and the scheme. Monitoring was undertaken at the sensitive ecology sites for a period of six months (November 2016 – May 2017).

5.7.15 The raw monitored results for each period is provided in Air quality – baseline data (Volume 6 Document Ref 6.4 ES Appendix 5.4). If data capture is less than 75% at any location (i.e. 9 months), monitored results have been annualised, to determine a representative annual mean concentration for comparison with the annual mean NO_2 objective. This has been undertaken following the methodology set out in LAQM.TG16.

5.7.16 It is necessary to bias-adjust diffusion tube results as these are not a reference method and therefore generally have lower accuracy. Calculated annual mean NO_2 concentrations have been bias-adjusted using the national spreadsheet method. A bias-adjustment factor of 0.92 has been applied to the annualised NO_2 concentrations.

5.7.17 The monitored concentrations at all monitoring sites are below the annual mean NO_2 objective with a maximum of 37.5µg/m^3 being recorded at the junction of the A30 and the B3824. The full results are presented Air quality – baseline data (Volume 6 Document Ref 6.4 ES Appendix 5.4).

Defra PCM modelling

5.7.18 Predicted roadside NO_2 concentrations were obtained from Defra's PCM model for the years 2016 and 2023. In the study area Defra PCM mapping indicates no exceedances in 2016 at road links in the ARN. In 2023, Defra PCM mapping indicates all links will still comply with EU limit values.

Modelled baseline concentrations

5.7.19 In addition to the air quality monitoring information, baseline concentrations have also been predicted at relevant human and ecological receptor locations across the study area and results of the baseline modelling are included in Section 5.11.

5.8 Consultation

5.8.1 In addition to the scoping report[1] additional consultation has been undertaken in respect of air quality with Cornwall Council.

5.8.2 Discussions with Cornwall Council were held to discuss the methodology and study area and gather the monitoring data for 2016 to be used for model verification.

5.9 Assessment assumptions and limitations

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

- The traffic data used in the model;
- The traffic emissions data;

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

5.9.2 To reduce uncertainty, sensitivity testing of emissions data has been carried out using the most recent guidance from Highways England (IAN 170/12v3). The methodology used in this assessment is designed to provide a robust assessment, reducing uncertainty caused by the above limitations.

5.9.3 Uncertainties or limitations related to transport data are discussed in the Traffic Report (Volume 7 Document Ref 7.5). The Traffic Report outlines the forecasting assumptions and deals with uncertainty in forecasting by discussing low and high growth. The Traffic Report also outlines modelling assumptions for the development of the base model and reports on the data collection for the traffic model. These limitations have been overcome as far as possible by verifying the modelled concentrations against monitoring results in appropriate locations. The traffic data used is appropriate for the purposes of this air quality assessment.

Limits of deviation

5.9.4 An assessment has been conducted within the limits of deviation outlined in Limits of Deviation within **Approach to EIA** (Volume 6 Document Ref 6.2 ES Chapter 4)

5.9.5 For air quality, several pessimistic assumptions have been made in the assessment therefore any small changes to the scheme should not threaten the conclusion of the assessment. These include:

- Use of opening year for modelling future concentrations (para 5.6.9);
- Use of Highways England LTTE6 emission factors (para 5.6.38 and 5.11.51); and
- Assessment at ecological receptors closest to the kerbside (para 5.11.37).

5.9.6 The limits of deviation contained in Section 4.3 of Volume 6 Documents Reference 6.2 Chapter 4 have been considered having regard to the scope for change under the draft DCO. The limits of deviation will not give rise to any materially new or materially worse adverse environmental effects from those already reported.

5.10 Design, mitigation and enhancement measures

Engineering design

5.10.1 The scheme design moves traffic away from local sensitive receptors. By moving traffic away from receptors, it increases the distance from the source over which pollutants can disperse.

Operational mitigation

5.10.2 The scheme design does not contain any specific mitigation or enhancement measures for air quality. The main factors affected by the scheme will be traffic volumes and vehicle operating conditions (i.e. speed and congestion). Changes in these factors will results in changes in vehicle-related pollutant concentrations at nearby sensitive receptors.

Construction mitigation

5.10.3 To minimise any potential emissions of fugitive dust during the construction phase (and hence minimise potential impacts), the Construction Environmental Management Plan (CEMP) would adopt best practice mitigation measures to minimise effects from construction dust will be incorporated into the CEMP.

5.10.4 An Air Quality Management Plan is provided in Annex L of the **Outline CEMP** (Volume 6 Document Ref 6.4 Appendix 16.1). This details a number of measures designed to reduce the generation of dust at source and prevent the spread of dust from the site. Measures include managing construction methods and washing site vehicles and covering loose construction materials to prevent dust being carried off site.

5.10.5 It is considered that with the CEMP implemented, there would be no significant effects on air quality during the construction phase of the scheme.

Enhancement

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

5.11 Assessment of effects

Construction effects

5.11.1 The construction dust assessment has been divided into four geographical sections to help describe the scheme impacts across the whole scheme area. The sections are displayed in Volume 6 Document Ref 6.3 ES Figure 5.7.

5.11.2 The main dust-producing activities can be divided into two types, according to the distinct localised effects from different activities and the similarities between on-site activities and potential mitigation measures. These are:

- Impacts related to compound areas and soil storage areas; and
- Impacts related to the construction and demolition of roads, bridges and other road related infrastructure and trackout.

5.11.3 These areas take into account the localised nature of impacts around specific areas such as compounds and the linear impacts along the scheme.

5.11.4 Following the guidance in DMRB HA207/07, the number of sensitive receptors within 200m of the construction and demolition activities, have been identified for each of the construction sections. This is set out in Table 5-5 and Table 5-6 below.

Table 5-5 Number of receptors within 200m of compound sites and soil storage areas within each of the four construction and demolition sections

Section	Number of receptors within 200m
Section 1 of 4 – Chiverton	14
Section 2 of 4 – Kenwyn	7
Section 3 of 4 – Marazanvose to Zelah	19
Section 4 of 4 – Carland Cross	13

Table 5-6 Number of receptors within 200m of construction and demolition areas within each of the four construction, demolition and trackout sections

Section	Number of receptors within 200m
Section 1 of 4 – Chiverton	53
Section 2 of 4 – Kenwyn	12
Section 3 of 4 – Marazanvose to Zelah	82
Section 4 of 4 – Carland Cross	46

5.11.5 For the first category (compound sites) the section which has the highest number of receptors is section three. Sections one, three and four also have receptors within 200m which could be at risk of being impacted by the activities taking place. With no mitigation in place, receptors could experience nuisance, especially during drier months. Mitigation measures will be required to reduce the impact from dust.

5.11.6 The second category (construction, demolition and trackout) has three sections where there are larger numbers of residential properties within 200m of the activities. These are sections one, three and four which are located in the towns of Chiverton, Marazanvose, Zelah and Carland Cross, where construction activities occur. Section two has fewer receptors within 200m which may be impacted by dust. With no mitigation in place, receptors could experience nuisance, especially during drier months. Mitigation measures will be required to reduce the impact from dust.

5.11.7 In addition to human receptors, there are solar farms along the scheme which could be affected by dust. With no mitigation in place, solar farms could experience dust deposition, especially during drier months. Mitigation measures will be required to reduce the impact from dust.

5.11.8 Overall it is identified that the scheme could impact receptors during the construction phase and mitigation is required to minimise the frequency and intensity of any dust episode.

5.11.9 As noted in section 5.10.3 best practice mitigation measures will be implemented to reduce dust impacts. With best practice measures implemented as set out in the **Outline CEMP** (Volume 6 Document Ref 6.4 Appendix 16.1) it is considered there will be no significant effects from dust.

Operational effects

Affected Road Network

5.11.10 Following the DMRB HA207/07 screening criteria, the ARN has been identified for the area around the scheme for the 2023 opening year scenario. The 2023 ARN is shown in Volume 6, Document Ref 6.3 Figure 5.1.

5.11.11 Roads have been included in the ARN mainly based on changes to the total AADT (where total AADT changes by plus or minus 1,000 vehicles per day). A smaller number of links have been included based on changes to HDV volumes or speeds. A map showing the changes in traffic across the air quality study area as a result of the scheme is provided in Volume 6 Document Ref 6.3 ES Figure 5.8.

Compliance links

5.11.12 Where the ARN overlaps with Defra PCM links, these have been selected and used to determine the Compliance Risk Road Network (CRRN). In this assessment, the CRRN is located where the ARN overlaps with PCM mapping around Truro which make up the CRRN, as shown in the CRRN drawing Volume 6 Document Ref 6.3 ES Figure 5.9.

Model verification

5.11.13 The modelled results at existing monitoring locations were used for model verification based on the method set out in section 5.6.31. Details of the verification process and results are provided in **Air quality – sites used for verification** (Volume 6, Document Ref 6.4, ES Appendix 5.5).

5.11.14 The verification factors used for each receptor are show in Volume 6 Document Ref 6.3 ES Figure 5.10.

Human receptors

5.11.15 This section describes the predicted results at human receptor locations as a result of the scheme in the baseline year (2016) and opening year (2023).

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

- Discussion region 1 – Roads north of the A30
- Discussion region 2 – A30
- Discussion region 3 – Roads south of the A30

5.11.17 The full table of results at all receptors is provided in **Air quality - receptors** (Volume 6 Document Ref 6.4 ES Appendix 5.3).

<u>Discussion Region 1 – Roads north of the A30</u>

5.11.18 In this discussion region three receptors (Table 5-7) have been selected to represent the scale of impacts associated with the scheme. There are only two monitoring sites in this region, which are located on the A392. Diffusion tube NQY8 recorded a marginal exceedance of the air quality objective in 2016 at a kerbside location (40.8µg/m^3). Modelled baseline concentrations at receptor locations have been predicted to all be well below the NO_2 annual mean objective.

Table 5-7 NO_2 concentrations at selected receptors – Discussion region 1

Receptor	Grid reference (m)		Annual mean NO_2 (µg/m^3)			Change (DM - DS) (µg/m^3)	AADT change
	X	Y	2016 Base	2023 DM	2023 DS		
H72	179949	54915	14.1	12.0	11.1	-0.9	-1,398
H148	181440	52526	7.9	6.6	7.3	0.6	813
H190	176842	51047	14.2	12.0	11.0	-1.0	-1,342

5.11.19 There are no predicted exceedances of the annual mean NO_2 objective in 2023 as a result of the scheme.

5.11.20 This region is outside the scheme and traffic flows are predicted to decrease on most roads as traffic is drawn onto the A30. There are only two non-minor roads where there would be an increase in traffic as a result of the scheme and they are:

- The A3058 between Quintrell Downs and the A30 (increase of 1,969 AADT).
- The B3284 between Perranporth and the A3075 (increase of 1,018 AADT).

5.11.21 Total concentrations along both roads remain well below the annual mean NO_2 objective and the predicted increase in NO_2 concentration is considered imperceptible (<0.4µg/m^3).

5.11.22 The receptors in this region experience an increase of between 0.1µg/m^3 and 0.6µg/m^3 and a decrease of between -0.1µg/m^3 and -1.0µg/m^3. These changes do not result in any new exceedances. The point of maximum increase of 0.6µg/m^3 is predicted to occur at receptor H148 east of Zelah where a concentration of 7.3µg/m^3 is predicted in 2023. This is well below the AQO and is therefore not considered to be at risk of exceeding the AQO. The point of maximum reduction is predicted to occur at receptor H190 on the A3075 where a reduction of 1µg/m^3 is predicted.

Discussion Region 2 – A30

5.11.23 In this discussion region five receptors (see table 5-8 below) have been selected to represent the scale of impacts associated with the scheme. Scheme-specific monitoring showed that roadside concentrations of annual mean NO_2 along the A30 were below the air quality objective. A maximum monitored concentration of 37.5µg/m^3 was recorded at the junction of the A30 and B3284. Modelled baseline concentrations at receptor locations have been predicted to all be well below the NO_2 annual mean objective.

Table 5-8 NO_2 concentrations at selected receptors – Discussion region 2

Receptor	Grid reference (m)		Annual mean NO_2 (µg/m^3)			Change (DM - DS) (µg/m^3)	AADT change
	X	Y	2016 Base	2023 DM	2023 DS		
H103	179915	50355	21.1	17.8	11.6	-6.2	-8,905
H142	181845	52690	26.7	22.8	8.6	-14.2	-10,153
H185	181754	52596	22.8	19.4	9.2	-10.2	-10,153
H240	174332	46298	26.1	22.0	23.4	1.3	3,727
H363	181511	52113	8.2	6.7	9.1	2.3	9,298

5.11.24 There are no predicted exceedances of the annual mean NO_2 objective in 2023 as a result of the scheme.

5.11.25 Traffic is predicted to increase along the A30 as it will be made more attractive to road users and will be less congested. In this region there will be a new alignment for the A30, therefore, traffic will move away from some receptors and closer to others. The traffic on the existing A30 will decrease by approximately 20,000 AADT; the traffic flow on the scheme A30 will be approximately 32,000 AADT.

5.11.26 The receptors in this region experience an increase of between 0.1µg/m^3 and 2.4µg/m^3 and a decrease of between -0.1µg/m3 and -14.2µg/m^3.These changes do not result in any new exceedances. The point of maximum increase of 2.4µg/m^3 is predicted to occur at receptor H363 east of Zelah where a concentration of 9.1µg/m^3 is modelled in 2023. This is well below the AQO and is therefore not considered to be at risk of exceeding the AQO. The point of maximum reduction is predicted to occur at receptor H142 on the existing A30 which will be de-trunked where a reduction of -14.2µg/m^3 is predicted.

Discussion Region 3 – South of the A30

5.11.27 In this discussion region five receptors (Table 5-9) have been selected to represent the scale of impacts associated with the scheme. Monitoring sites have recorded exceedances of the annual mean objective for NO_2 in urban areas south of the A30 in Truro and Grampound. Outside of these areas all concentrations were recorded as being below the air quality objectives. Modelled baseline concentrations at receptor locations have predicted exceedances of the NO_2 annual mean objective in Truro and Grampound.

Table 5-9 NO_2 concentrations at selected receptors – Discussion region 3

Receptor	Grid reference (m)		Annual mean NO_2 (µg/m^3)			Change (DM - DS) (µg/m^3)	AADT change
	X	Y	2016 Base	2023 DM	2023 DS		
H97	193549	48305	45.2	37.0	35.3	-1.7	-436
H425	172534	44123	13.1	10.7	12.3	1.6	4,107
H454	181764	45530	21.2	17.9	21.7	3.8	2,314
H495	180808	47718.7	10.0	8.1	10.4	2.2	5,732
H569	180865	47591	13.7	11.5	14.3	2.9	4,487

5.11.28 There are no predicted exceedances of the annual mean NO_2 objective in 2023 as a result of the scheme.

5.11.29 This region is outside the scheme and traffic flows are predicted to decrease on most roads as traffic is drawn onto the A30. There are only three non-minor roads where there is an increase in traffic as a result of the scheme and they are:

- The B3284 between Truro and the A30 (increase of 4,487 AADT).
- Chasewater Hill between the A390 and the A30 (increase of 1,033 AADT).
- The A393/B3298 between the A39 and the A30 (increase of 2,504 AADT).

5.11.30 Total concentrations along all three roads remain well below the annual mean NO_2 objective. There are increases in concentrations greater than 0.4µg/m^3 along the three roads, however due to the low total concentrations the impact is considered negligible.

5.11.31 The receptors in this region experience an increase of between 0.1µg/m^3 and 3.8µg/m^3 and a decrease of between -0.1µg/m^3 and -1.7µg/m^3. These changes do not result in any new exceedances. The point of maximum increase of 3.8µg/m^3 is predicted to occur at receptor H454 in Truro (at the junction of Compringney Hill and the B3284) where a concentration of 21.7µg/m^3 is modelled

in 2023. This is well below the AQO and is therefore not considered to be at risk of exceeding the AQO. The highest predicted concentration with the scheme in place is predicted to occur in Grampound at receptor H97 where a concentration of 35.3µg/m^3 is predicted. The change in concentration predicted at H97 is -1.7µg/m^3 due to a reduction in traffic using the A390.

Air quality management areas

5.11.32 A summary of the scheme's impact on local AQMAs is provided in Table 5-10.

Table 5-10 Summary of AQMA modelled results

AQMA	2023 modelled results
Kerrier AQMA	The maximum predicted annual mean NO_2 concentration in the DS scenario in this AQMA occurs at receptor H287 (13.3µg/m^3). This is below the AQO. The predicted change as a result of the scheme is imperceptible.
Truro AQMA	The maximum predicted annual mean NO_2 concentration in the DS scenario in this AQMA occurs at receptor H418, located at the Trafalgar roundabout (26.2µg/m3). This is below the AQO. The predicted change as a result of the scheme is an improvement in air quality with a reduction in concentrations of -1.7µg/m^3.

Ecological receptors

5.11.33 The modelled results for the scheme predict a reduction in annual mean NOx concentrations at all ecological sites between the baseline year 2015 and future baseline conditions (DM 2023) due to improvements in emissions from vehicles. Table 5-1 in Air quality – operation phase impacts (Volume 6 Document Ref 6.4 ES Appendix 5.6) show the predicted annual mean NOx concentrations and the magnitude of change in concentrations as a result of the scheme.

5.11.34 The annual mean NOx objective is predicted to be exceeded at Breney Common and Goss and Tregoss Moor SAC and River Camel SAC during the opening year at the kerbside to the A30. The annual mean NOx objective is not predicted to be exceeded at any other sensitive ecological site.

5.11.35 The magnitude of change for all sites is predicted to be imperceptible, with no increase in annual mean NOx concentrations equal to or greater than 0.4µg/m^3, at all sites other than Breney Common and Goss and Tregoss Moor SAC and River Camel SAC. The greatest magnitude of change is predicted at Breney Common and Goss and Tregoss Moor SAC with an increase in annual mean NOx of 1.6µg/m^3 predicted to occur at the kerbside of the A30.

5.11.36 Following guidance in Annex F in DMRB HA207/07 sites at which there is an exceedance of the annual mean NOx objective and a magnitude of change greater than 0.4µg/m^3 should be assessed further.

5.11.37 For the scheme only Breney Common and Goss and Tregoss Moor SAC meet the criteria for further assessment. Therefore, for this site the change in nutrient nitrogen deposition has been predicted. The results in Table 5-2 in **Air quality – operation phase impacts** (Volume 6 Document Ref 6.4 ES Appendix 5.6) show the change in deposition as a result of the scheme is less than 0.13 kg N ha^{-1} yr^{-1} at worst case locations between 0-10m from the kerbside.

5.11.38 These results have been provided to the ecologists to undertake as assessment to determine the significance of these effects in terms of ecological features

present in the affected areas (0-10m of kerbside), as outlined in **Ecology and nature conservation** (Volume 6 Document 6.2 ES Chapter 8).

5.11.39 The **Statement to Inform an Appropriate Assessment (SIAA)** (Volume 6 Document 6.5) concluded that the integrity of Breney Common and Goss and Tregoss Moor SAC would be not be affected by the anticipated increase in nitrogen deposition nor NOx concentrations as a result of the scheme and therefore no further mitigation is required. Results are therefore considered to be not significant for all ecological receptors.

Regional emissions

5.11.40 This section describes the effect of the scheme on regional air quality across the proposed study area. Total CO_2, NO_x and PM_{10} emissions for all assessed scenarios are presented in Table 5-11. The change in emissions as a result of the scheme is presented in Table 5-12

Table 5-11 Total emissions for all assessed scenarios across the regional ARN

Pollutant	Baseline	DM 2023	DS 2023	DM 2038	DS 2038
	Units – tonnes/yr				
CO_2	172,376	211,192	178,952	248,157	219,963
NO_x	473	358	304	252	224
PM_{10}	42	40	40	44	46

Table 5-12 Change in emissions as a result of the proposed scheme

Pollutant	Changes in emissions (tonnes/year)	
	Opening year (2023)	Future year (2038)
CO_2	-32,239	-28,194
NO_x	-54	-28
PM_{10}	1	2

5.11.41 As shown in Table 5-12, the scheme results in a decrease in emissions. One of the objectives of the Scheme is to alleviate congestion along the A30 corridor. Comparisons of the traffic modelling data between the Do Minimum and Do Something scenarios show that congestion is relieved along the A30 as a result of the scheme. The effect of this is to increase the number of vehicles on the new A30, due to the reduced congestion and higher speeds. A proportion of these higher flows on the A30 are reassigned from alternative routes than those used in the Do Minimum scenario.

5.11.42 The effect of the Scheme is that it allows more free flowing travel to occur across the network in the Do Something scenario. Free flow conditions produce lower emissions of pollutants. The effect of the Scheme on regional emissions is therefore a reduction in total emissions of CO_2 and NOx pollutants across the regional road network.

5.11.43 PM_{10} emissions are predicted to increase. Vehicle engine technology is expected to improve fleet emissions over time. The main focus of engine improvements is to improve fuel consumption and reduce NO_x emissions. This is reflected in the IAN 185/15 emission factors which show greater predicted improvements in CO_2

and NO_x emissions when compared to predicted improvements in PM_{10} emissions. The small increase in PM_{10} occurs as emissions from additional traffic on the regional network outweigh expected improvements in PM_{10} emissions from vehicles.

Compliance with the Air Quality Directive

5.11.44 IAN 175/13 [5] sets the method which has been followed to assess compliance with the air quality directive based on PCM data provided by Defra.

5.11.45 All PCM links in the study area are located around Truro. All changes in concentrations at receptor locations located close to the compliance risk road network (CRRN) are imperceptible (<0.4µg/m^3).

5.11.46 Based on the results of this assessment, the compliance testing indicates that the Proposed Scheme is low risk as defined in IAN 175/13. None of the links are at risk of becoming non-compliant as a result of the scheme, the date for achieving compliance will not be affected, and there will be no increase in the length of roads in exceedance in the zones.

Compliance with local planning policies

5.11.47 The impacts predicted due to the scheme have been considered with respect to the local planning policies listed in **Air quality – legislation, policy and guidance** (Volume 6 Document Ref 6.4 ES Appendix 5.1) and the actions and measures in the councils Air Quality Action Plans.

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

5.11.49 The scheme along the A30 does not result in any exceedances of the air quality objectives, it moves traffic away from the main urban areas and therefore does not act against the objectives of local planning policies. The scheme is one of the measures CC identified as being able to help improve air quality in Truro. The traffic predictions for this scheme show the traffic volumes being reduced in Truro.

Significant effects

5.11.50 IAN 174/13 [4] provides guidance on evaluating overall scheme significance. The overall significance of the scheme is based on all elements of the scheme which have been assessed and the results are discussed in this section.

5.11.51 In 2023 there are no receptors predicted to exceed the annual mean NO_2 AQO in the study area. Therefore, there is no requirement to complete a table showing the number of receptors where there is a worsening or improvement in air quality as a result of the scheme. As noted previously (section 5.6.38), these results are based on LTTE6 emission factors which present the Highways England assessment of a conservative estimate of future vehicle emission improvement.

5.11.52 The questions and answers related to human health from IAN 174/13 are:

- “Is there a risk that environmental standards will be breached?”
  - No, there are no predicted exceedances of the NO_2 AQO in the study area.
- “Will there be a large change in environmental conditions?”

  - Yes, there are receptors which will experience a ‘large’ change in environmental conditions.
- “Will the effect continue for a long time and will many people be affected?”
  - Long duration effects are considered to be an increase in concentration which require more than 6 years to return to the predicted DM concentration; equivalent to an increase of greater than 2 µg/m^3. As noted there are no receptors where the standard is exceeded and a significant change is predicted.
- “Will it be difficult to avoid, or reduce or repair or compensate for the effect?”
  - The scheme will not result in significant changes and the assessment has been based on worst case assumptions for future vehicle emission rates.

5.11.53 The findings for each of the key questions related to human health have provided evidence that the answers will result in a conclusion of **not significant**.

5.11.54 The question and answer related to ecological health from IAN 174/13 is:

- “Is there a risk that designated sites, areas, or features will be affected?”
  - Following DMRB HA207/07 guidance, the effect of the scheme on annual mean NOx at designated sites has been considered. NOx concentrations at Breney Common and Goss and Tregoss Moor SAC exceeded the precautionary annual mean NOx AQO of 30µg/m^3 in 2023 at the kerbside. The increase in deposition as a result of the scheme is less than 0.13 kg N ha^{-1} yr^{-1}. The SIAA concluded that the anticipated increase of nitrogen deposition or NOx concentrations is **not significant**.

5.11.55 Table 5-13 summarises the overall significance taking into account effects on human and ecological receptors and the schemes potential impact upon EU compliance. The findings indicate that overall the scheme will have no significant impact on air quality.

Table 5-13 Operational phase overall significance

Key criteria questions	Yes / no
Is there a risk that environmental standards will be breached?	No
Will there be a large change in environmental conditions?	Yes
Will the effect continue for a long time?	No
Will many people be affected?	No
Is there a risk that designated sites, areas, or features will be affected?	No
Will it be difficult to avoid, or reduce or repair or compensate for the effect?	No
On balance is the overall effect significant?	No

5.12 Monitoring

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

5.13 Summary

5.13.1 The assessment has examined the potential effects of the scheme on local air quality during the opening year 2023.

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

5.13.3 The baseline assessment demonstrates that there are existing air quality issues in the study area, with exceedances of the NO_2 annual mean AQO being observed in urban areas north and south of the A30. No exceedances have been identified in the baseline year along the A30.

5.13.4 Assessment of annual mean NO_2 concentrations in 2023 indicated that the scheme effect is considered to be not significant.

5.13.5 The regional assessment showed a decrease in emissions of NO_2 and CO_2 pollutant on a regional scale, as a result of the scheme.

5.13.6 Assessment of EU compliance concluded that the scheme is not likely to impact the Zone's predicted date for compliance with the EU limit value.

5.13.7 Based on the professional judgement of suitably qualified and experienced specialists, it is concluded that the scheme's impact along the A30 on air quality concentrations is not significant.

Table 5-14 Summary of Likely Environmental Effects on Air Quality

Description of impact	Sensitivity of receptor	Duration of impact (short / medium / long term)	Magnitude of impact (without mitigation)	Magnitude of impact (with mitigation)	Significance of potential impact
Dust soiling from construction and demolition	High	Short term	Adverse	Negligible	Not significant
Local - Emissions from operational phase	High	Long term	Negligible	Negligible	Not significant

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