# A38 Derby Junctions
# TR010022
# Volume 6
# 6.1 Environmental Statement
# Chapter 5 – Air Quality

Regulation 5(2)(a)

Planning Act 2008

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

April 2019

Infrastructure Planning

Planning Act 2008

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

# A38 Derby Junctions Development Consent Order 202[ ]

## 6.1 Environmental Statement Chapter 5 Air Quality

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# 5. Air Quality

## 5.1 Introduction and competent expert evidence

5.1.1 This chapter assesses the potential air quality impacts associated with the construction and operation of the Scheme, following the methodology set out in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1 Air Quality (Highways Agency, 2007) and associated Interim Advice Notes (IANs). This chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to air quality and describes the existing environment in the area surrounding the Scheme. Following this, the design and mitigation measures proposed to manage and minimise potential impacts are specified, after which residual effects of the Scheme are presented. Details of any assumptions and limitations made during the assessment are provided.

5.1.2 This air quality assessment is supported by Appendices 5.1 to 5.3 [**TR010022/APP/6.3**] which provide the following:

- Appendix 5.1: Air quality monitoring data.
- Appendix 5.2: Air quality methodologies.
- Appendix 5.3: Air quality results.

5.1.3 All figures cited within this chapter are included within Environmental Statement (ES) Volume 2 [**TR010022/APP/6.2**].

5.1.4 This chapter of the ES has been prepared by competent experts with relevant and appropriate experience. The technical lead for the air quality assessment has 30 years of relevant experience and has professional qualifications as summarised in Appendix 1.1 [**TR010022/APP/6.3**].

## 5.2 Legislative and policy framework

**Planning policy**

5.2.1 As discussed in Chapter 1: Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the National Policy Statement for National Networks (NPSNN) (Department for Transport (DfT), 2014) which, at Sections 4 and 5, sets out policies to guide how DCO applications will be decided and how the impacts of national networks infrastructure should be considered. Table 5.1 identifies the NPSNN policies relevant to the air quality assessment and where in this ES chapter information is provided to address these policy requirements.

## Table 5.1: Relevant NPSNN policies for the air quality assessment

| Relevant NPSNN para. ref. | Requirement of the NPSNN | Location where information addresses policy requirements |
|---|---|---|
| 5.6 | Where the impacts of the project (both on and off-scheme) are likely to have significant air quality effects in relation to meeting EIA requirements and/or affect the UKs ability to comply with the Air Quality Directive, the applicant should undertake an assessment of the impacts of the proposed project as part of the environmental statement. | Section 5.10 includes a local air quality assessment for Scheme construction and operation and considers whether the Scheme may cause significant air quality effects. The local air quality compliance risk assessment, also in Section 5.10, considers Scheme compliance risks. |
| 5.7 | The environmental statement should describe:<br>• Existing air quality levels;<br>• Forecasts of air quality at the time of opening, assuming that the scheme is not built (the future baseline) and taking account of the impact of the scheme; and<br>• Any significant air quality effects, their mitigation and any residual effects, distinguishing between the construction and operation stages and taking account of the impact of road traffic generated by the project. | Existing air quality and future baseline air quality is described in Section 5.7 and Appendix 5.1 [**TR010022/APP/6.3**]. The findings of the assessment are reported in Section 5.10 which includes a local air quality assessment covering both Scheme construction and operational phases. |
| 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. Applicant's assessment should be consistent with this but may include more detailed modelling to demonstrate local impacts. | The assessment uses Defra projections (i.e. Emission Factor Toolkit (EFT) with additional speed banding processing) and also Highways England advice on Long Term Trends (LTTE6). Further details are provided in Appendix 5.2 [**TR010022/APP/6.3**]. |
| 5.9 | In addition to information on the likely significant effects of a project in relation to EIA, the Secretary of State must be provided with a judgement on the risk as to whether the project would affect the UK's ability to comply with the Air Quality Directive. | Section 5.10 includes a local air quality assessment for Scheme construction and operation and which considers whether the Scheme may cause significant air quality effects. The local air quality compliance risk assessment, also in Section 5.10, considers Scheme compliance risks. |

5.2.2 The National Planning Policy Framework (NPPF) was updated in February 2019 (Ministry of Housing, Communities and Local Government, 2019). Air quality is considered in paragraphs 103, 170 and 181. Paragraph 181 advises that planning policies and decisions should sustain and contribute towards compliance with relevant limit values and national objectives.

5.2.3 In accordance with the NPPF, the NPSNN policies relating to the applicant's assessment is the primary source of policy guidance regarding this assessment.

5.2.4 The national Planning Policy and Guidance (PPG) was first published in 2014 (Ministry of Housing, Communities and Local Government, 2014) and provides a web-based resource in support of the NPPF. The PPG provides a summary of the air quality issues set out in the NPPF and goes on to note that assessments of the impact of proposed developments on air quality should include the following information:

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

5.2.5 The guidance then advises that a planning application should proceed to decision with appropriate planning conditions or planning obligation, if the proposed development (including mitigation) would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Conservation of Habitats and Species Regulations (2017).

**Strategies and legislation**

***European air quality legislation***

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

***National Air Quality Strategy***

5.2.7 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland was initially published by Defra under the requirements of the Environment Act 1995. The most recent revision of the strategy published in 2007 (Defra, 2007) sets objectives for key pollutants as a tool to help local authorities manage local air quality improvements in accordance with EU legislation. Some of these objectives have been laid out within the Air Quality (England) Regulations 2000 and later amendments in 2002.

5.2.8 The air quality objectives have been set down in regulation solely for the purposes of local air quality management. Under the local air quality management regime, local authorities have a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objectives will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objectives. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. Consequently it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective.

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

5.2.10 The UK's air quality objectives for the pollutants of relevance to this assessment are displayed in Table 5.2 along with the EU limit values. The criteria for nitrogen dioxide ($NO_2$), $PM_{10}$ (particulate matter with an aerodynamic diameter of 10 microns or less) and $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 microns or less) are for the protection of human health and for oxides of nitrogen ($NO_x$) is for the protection of vegetation and ecosystems. The concentration values are the same in the objectives and limit values, but the dates for compliance are different.

**Table 5.2: Air quality objectives and EU limit values (EULV)**

| Pollutant | Averaging Period | Concentration | Date for achievement |
|---|---|---|---|
| Nitrogen dioxide ($NO_2$) | Annual Average | 40µg/$m^3$ | Objective 2010<br>EULV 2010 |
| | 1-hour Average | 200µg/$m^3$ (not to be exceeded more than 19 times a year) | Objective 2010<br>EULV 2010 |
| Particulate matter ($PM_{10}$) | Annual Average | 40µg/$m^3$ | Objective 2010<br>EULV 2005 |
| | 24-hour Average | 50µg/$m^3$ (not to be exceeded more than 35 times a year) | Objective 2010<br>EULV 2005 |
| Particulate matter ($PM_{2.5}$) | Annual Average | 25µg/$m^3$ | Objective 2020<br>EULV 2015 |

| Pollutant | Averaging Period | Concentration | Date for achievement |
|---|---|---|---|
| Nitrogen oxides (NOx) for the protection of vegetation and ecosystems | Annual Average | 30µg/$m^3$ | Objective 2000<br>EULV 2001 |

***UK plan for tackling roadside NO2 concentrations***

5.2.11 In 2017, Defra and DfT released the UK plan for tackling roadside $NO_2$ concentrations (Defra and DfT, 2017) as the UK is not compliant with the EU limit values for $NO_2$. The national plan principally focuses on providing additional funding to local authorities so that local action can be taken to improve air quality in the shortest possible time with measures such as improving bus fleets, support for concessionary travel and sustainable modes of transport and low emission buses. The plan required local authorities to set out initial plans by the end of March 2018, followed by final plans by the end of December 2018. Derby City Council (DCiC) is one of nearly 30 local authorities outside London where $NO_2$ from transport is likely to exceed the limit value in 2020 unless action is taken.

***Highways England air quality strategy***

5.2.12 Highways England published its strategy to improve air quality in 2017 (Highways England, 2017). The strategy is designed to communicate Highway England's approach to improving air quality with a commitment to invest £100 million to improve air quality on the strategic road network between 2015 and 2021. Ten pilot studies are being carried out to identify appropriate new and innovative solutions that can be deployed on the highway network. In addition, Highways England will work with others to develop and deliver policies to improve air quality and will design out or mitigate poor air quality for road schemes.

***Local authority policies***

5.2.13 The City of Derby Local Plan Review 2006 (DCiC, 2006) contains the following policy on pollution relating to development planning that illustrates the Council's concerns:

- Policy E12 Pollution: '*Planning permission will not be granted for development which would generate pollutants that would be unacceptably detrimental to the health and amenity of users of the development, users of adjoining land or the environment; or where the level of existing pollutants would be unacceptably detrimental to the health and amenity of users of the proposed development*.'

5.2.14 Derby City Local Plan – Part 1 Core Strategy 2017 (DCiC, 2017) does not contain any additional policies relevant to this assessment.

5.2.15 Goal 3 of the Derby Local Transport Plan LTP3 (2011 - 2026) (DCiC, 2011) is to '*Contribute to better safety, security and health for all people in Derby by improving road safety, improving security on transport networks and promoting active travel' '* which includes *'addressing issues of air quality where transport is the primary cause of the problem'.* Goal 5 of the LTP3 is to *'Improve the quality of life for all people living, working in or visiting Derby by promoting investment in transport that enhances the urban environment and sense of place'.* Air quality is identified as one of the factors which influence quality of life. The LTP3 identifies a number of specific transport challenges facing Derby, including Challenge 4 to *'Minimise the negative effects of travel and existing and new transport infrastructure on local communities, air quality and the wider environment*'.

5.2.16 Erewash Core Strategy (adopted March 2014) (Erewash Borough Council (EBC), 2014) sets out the strategy for development across the Borough over the period 2011 to 2028. It forms part of the development plan for the Borough, alongside the Erewash Local Plan Saved Policies 2005 (amended 2014), until any such policies are superseded. Policies 1 Climate Change, 2 The Spatial Strategy and 14 Managing Travel Demand, all have a justification aimed at improving air quality. No policies relevant to the Scheme and air quality have been identified in the Erewash Local Plan Saved Policies 2005 (amended 2014).

5.2.17 Derbyshire Local Transport Plan (2011 - 2026) (Derbyshire County Council (DCC), 2011) states that: '*the preferred strategy is to put emphasis on supporting a resilient local economy, contributing to better safety, security and health, and improving quality of life and promoting a healthy natural environment. The preferred strategy would also aim to achieve longer term benefits for climate change, and measures to help people under the equality of opportunity goal*.' Strategic Environmental Assessment objective 11 is to '*Reduce the emissions of air pollutants from transport in declared Air Quality Management Areas which relate to local traffic'*.

***DCiC reducing roadside NO2 emissions - preferred option***

5.2.18 In response to the UK plan for tackling roadside $NO_2$ concentrations (Defra and DfT, 2017), DCiC has been assessing air quality in the city and investigating methods to improve it in areas that are non-compliant with the EU Directive (DCiC, 2018). DCiC identified five areas that were considered to be non-compliant for $NO_2$ in 2020 if no action is taken, namely, Nottingham Road (DT10), Eastgate (DT11), Kingsway/A38 (DT34), St Alkmund's Way (DT57) and Stafford Street (DT59). Three of these areas were not considered to be representative of relevant exposure, whilst one area would have air quality improved due to planned reductions in bus emissions due to the Clean Bus Technology Fund retrofit programme, so these areas were not of concern. Only one of the areas, Stafford Street near to its junction with Friar Gate, was taken forward in the study to identify mitigation measures.

5.2.19 DCiC has undertaken modelling to consider a wide range of potential measures to address this issue. Three options were taken to public consultation from 30 July to 24 September 2018 (DCiC, 2018) as follows:

- Option 1: Traffic management measures near Stafford Street.
- Option 2: Chargeable Clean Air Zone within the Inner Ring Road.
- Option 3: Chargeable Clean Air Zone within the Outer Ring Road.

5.2.20 As a result of consultation, DCiC announced that Option 1 was their preferred solution which comprises a series of traffic management measures to manage the flow of traffic in and around Stafford Street, including the roads closest to the exceedance location. This involves:

- Changes to the junctions at either end of Stafford Street to restrict traffic flow in the most sensitive area.
- Changes to improve capacity at the Ashbourne Road/Uttoxeter Old Road junction to help provide alternative route choices.
- Traffic management measures to support alternative routes such as Uttoxeter Old Road.
- Wider network management measures, including improvements to the network management control system to support the air quality improvements.

5.2.21 The purpose of these measures is to restrict traffic flows along Stafford Street. DCiC plans to have these measures in place in mid-2019, and thus well in advance of Scheme construction (Scheme preliminary work starting late 2020, with the main works starting in early 2012). Following the announcement of the preferred option, a further three week consultation took place to the end of November 2018. The traffic management measures are expected to reduce $NO_2$ concentrations in Stafford Street from 45.2µg/$m^3$ to 33.9µg/$m^3$ in 2020 (DCiC, 2018). The air quality assessment as presented herein considers how the Scheme could impact upon air quality along Stafford Street during Scheme construction and operation.

## 5.3 Assessment methodology

**General approach**

5.3.1 The methodology for the air quality assessment follows the guidance set out within the DMRB and associated IANs (refer to para. 5.3.2). The assessment includes the following elements:

- Construction dust assessment to identify areas that could be affected.
- Construction phase combined assessment of additional construction traffic trips and traffic management on local air quality.

- Local air quality assessment for the operation of the Scheme.
- DfT web-based Transport Analysis Guidance (TAG) plan level appraisal to assess the overall change in public exposure to $NO_2$ and $PM_{10}$ during the operation of the Scheme.
- Compliance risk assessment for $NO_2$.
- Regional assessment of emissions of $NO_x$, $PM_{10}$ and $CO_2$.

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

- DMRB, Volume 11, Section 3, Part 1 'Air Quality' (HA207/07) (Highways Agency, 2007).
- IAN 170/12: Updated air quality advice on the assessment of future NOx and $NO_2$ projections for users of DMRB Volume 11, Section 3, Part 1 Air Quality (Highways Agency, 2013).
- 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) (Highways Agency, 2013).
- IAN 175/13: Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of proposed Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07) (Highways Agency, 2013).
- 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 Section 3, Part 7 Noise (Highways Agency, 2015).
- Defra Air Quality Management Technical Guidance LAQM.TG(16) (Defra, 2016).

***Local air quality and greenhouse gas emissions***

5.3.3 The overall aim of the methodologies listed above is to identify potential likely significant air quality effects and compliance risks with the Ambient Air Quality Directive.

5.3.4 Emissions from motor vehicle exhausts contain a number of pollutants, including nitrogen oxides ($NO_x$), carbon monoxide, carbon dioxide ($CO_2$), hydrocarbons and particulate matter ($PM_{10}$ and $PM_{2.5}$). Considering the relevant road traffic pollutants and comparing these against national objectives, it is concluded that national assessments have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene, benzene, lead and sulphur dioxide concentrations exceeding the relevant national objectives due to emissions from traffic anywhere in the UK (Defra, 2018). These pollutants have, therefore, not been considered further herein as they are

very unlikely to be present at levels which would represent potential significant impacts due to the Scheme – these pollutant have, therefore, been scoped out of the air quality assessment.

5.3.5 The key pollutants of concern in the context of the assessment of vehicle emissions on local air quality are $NO_2$ and $PM_{10}$, as these could be present at some locations in concentrations close to or above their objectives or limit values. Hence, changes in the concentration of these pollutants from constructing and operating the Scheme are a key focus of the air quality assessment in accordance with DMRB guidance. In addition, predicted $PM_{2.5}$ concentrations have been included in Appendix 5.3 [**TR010022/APP/6.3**] in response to comments received from the Inspectorate and DCiC. The $PM_{2.5}$ results are not discussed in this chapter as concentrations are well below the objective and limit value under all scenarios.

5.3.6 A detailed level assessment involving dispersion modelling has been carried out to assess concentrations of $NO_2$ and particulate matter ($PM_{10}$) due to traffic during Scheme construction and operation. Predictions were made at sensitive receptors near the affected road network. These are locations where members of the public may be based for long or short periods of time. Sensitive receptors are predominantly residential properties, but also include schools, hospitals and community facilities. Locations where members of the public are regularly present are considered to be of high sensitivity. The modelling methodologies applied are described in Appendix 5.2 [**TR010022/APP/6.3**].

5.3.7 Predictions have been made for the following scenarios:

- Baseline year 2015.
- Future baseline construction year 2021[1] without construction (Do-Minimum).
- Construction year 2021 with construction (Do-Something).
- Future baseline opening year 2024 without the Scheme (Do-Minimum).
- Opening year 2024 with the Scheme (Do-Something).

5.3.8 On the basis of these predictions, the change in key pollutant concentrations associated with the Scheme have been established. This information has been used to inform the local air quality assessment for the Scheme construction and operational phases and the compliance risk assessment. The TAG plan level assessment also uses predicted $NO_2$ and $PM_{10}$ concentrations near affected road links to assess the overall change

[1] The air quality assessment considers the baseline construction year as 2021, although some preliminary construction works would be planned for late 2020. The use of 2021 is considered appropriate given that this is the year that the main Scheme construction activities would start.

in concentrations across the study area, although a simple modelling method is used to make these predictions.

5.3.9 A significant air quality effect is defined in IAN 174/13 (Highways Agency, 2013) and this relates to a series of key questions:

- 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?

5.3.10 The questions form the basis for determining likely significant local air quality effects at sensitive receptors. The question of how many people would be affected has been addressed by reference to the number of receptors predicted to experience small, medium and large changes in air quality. Where numbers of affected receptors are above the upper thresholds listed in Table 5.3 for locations above the air quality objective or limit value, this may suggest significant air quality effects are more likely.

**Table 5.3: Guideline for number of properties constituting a significant effect**

| Magnitude of change in $NO_2$ or $PM_{10}$ ($\mu g/m^3$) | No. of receptors with: | |
|---|---|---|
| | Worsening of air quality already above objective or creation of a new exceedance | Improvement of air quality already above objective or the removal of an existing exceedance |
| Large (>4) | 1 to 10 | 1 to 10 |
| Medium (>2 to 4) | 10 to 30 | 10 to 30 |
| Small (>0.4 to 2) | 30 to 60 | 30 to 60 |

5.3.11 The overall significance of predicted effects on local air quality is also evaluated in the context of relevant local air quality planning policy (e.g. NPSNN) and the findings of the compliance risk assessment as described in IAN 175/13 (Highways Agency, 2013).

5.3.12 In addition to the local air quality assessment, a regional assessment has been undertaken that considers the change in pollutant emissions as a result of Scheme operation in the opening (2024) and design years (15 years after Scheme opening). The emissions assessed are $NO_X$ and $PM_{10}$ which both affect local air quality, and $CO_2$ which is a greenhouse gas linked with climate change. The assessment has been undertaken in

accordance with DMRB HA207/07 (Highways Agency, 2007) using vehicle emission factors for speed bands from IAN 185/15 (Highways Agency, 2015). The regional assessment outcomes do not have defined significance criteria, but are presented and described to inform the assessment of overall change.

***Construction dust and emissions***

5.3.13 During construction, dust soiling affecting the amenity of properties and increased $PM_{10}$ concentrations affecting human health are potential issues in the area within 200m of the construction works boundary (Highways Agency, 1993). The Institute of Air Quality Management (IAQM) guidance on the assessment of dust from demolition and construction (IAQM, 2014) advises that the four main dust generating Scheme related activities are: i) track-out from Heavy Goods Vehicles (HGVs), ii) demolition, iii) earthworks, and iv) construction. Dust emissions from such activities are proportional to the number of vehicle movements and quantities of materials involved.

5.3.14 The number and sensitivity of properties near to such dust generating activities have been considered in order to determine whether additional mitigation measures for a high risk site for dust nuisance are required. Appropriate mitigation measures for the Scheme are set out within the Outline Environmental Management Plan (OEMP) (refer to Appendix 2.1 [**TR010022/APP/6.3**] – also refer to Section 5.9).

5.3.15 Consistent with good environmental practice, mitigation measures that aim to control emissions of pollutants from construction machinery are detailed in the OEMP and Section 5.9.

5.3.16 Significant air quality effects are not anticipated to be associated with emissions from construction machinery and have thus been scoped out of the assessment (refer to section below on Scoping).

5.3.17 It is the aim that the Scheme includes appropriate mitigation measures such that dust-related complaints are avoided (i.e. statutory nuisance). UK experience indicates that good site practice is able to mitigate construction and demolition dust effectively, so that in all but the most exceptional circumstances, the significance of effects at receptors can be reduced. As such, the approach presented within the assessment has been to define appropriate dust mitigation measures that can be applied during the Scheme construction phase, that when effectively applied, have the potential to reduce dust effects to non-significant levels (slight adverse at worst).

**Scoping**

5.3.18 The proposed scope of the air quality assessment was detailed in the EIA Scoping Report (Highways England, 2018) submitted to The Inspectorate on 15 March 2018 (refer to para. 1.3.5).

5.3.19 An overview of the Inspectorate's Scoping Opinion (refer to Appendix 4.1 [**TR010022/APP/6.3**]) in relation to the air quality assessment is presented in Table 5.4. Where assessment has been undertaken in accordance with the Scoping Opinion point, the relevant ES section is provided; where an alternative approach has been agreed with the relevant stakeholders, an explanation is provided. With regard to public consultation comments received and the associated responses, these are detailed within the Consultation Report, a copy of which is included with the DCO application [**TR010022/APP/5.1**].

**Table 5.4: Scoping Opinion and response**

| Scoping Opinion | Where addressed within the ES |
|---|---|
| **Planning Inspectorate** | |
| The Inspectorate considers that effects arising from carbon monoxide, 1-3 butadiene, benzene, lead and sulphur dioxide may be scoped out if significant effects are unlikely to occur. However, the ES must contain full justification for the approach taken and include specific references to the information that supports this approach. | Justification for scoping these pollutants out of the assessment is provided in para. 5.3.4. |
| The Inspectorate does not consider that $PM_{10}$ may be scoped out at this time. | Results for $PM_{10}$ are presented in Section 5.10. |
| The Inspectorate does not consider that exceedances of the hourly $NO_2$ objective may be scoped out of the assessment. | Results for hourly $NO_2$ are discussed in Section 5.10. |
| The Inspectorate considers that air quality effects on workers during construction may be scoped out as significant effects are unlikely to arise. | Air quality effects on workers during Scheme construction is scoped out of the assessment and thus is not considered further herein. |
| The 2010 regulations have been replaced by the Conservation of Habitats and Species Regulations 2017. The ES should consider any potential changes to the assessment arising from the revised regulations. | These regulations have been considered. The assessment of European or nationally designated sites has been scoped out due to the distance of the Scheme from affected roads. Further details are provided in Chapter 8: Biodiversity (also refer to Appendix 8.2 [**TR010022/APP/6.3**]. |
| The construction air quality study area is defined with respect to the 'construction boundary'. It is unclear whether this equates directly to the proposed DCO redline boundary. The ES should provide a consistent description of the study area for assessment of construction dust and fixed plant emissions. | The study area is detailed in Section 5.6, whilst the construction boundary is discussed in Appendix 5.2 [**TR010022/APP/6.3**]. |

| Scoping Opinion | Where addressed within the ES |
|---|---|
| Since construction works are predicted to last for more than six months, consistent with DMRB, the construction air quality assessment should include modelling of relevant traffic management scenarios due to vehicular diversions. | Results are presented in Section 5.10. |
| The Inspectorate is aware that the Proposed Development is located in a Clean Air Zone (CAZ) and that relevant authorities are working to design a package of air quality improvement measures. The Applicant should make effort to ensure that the assessment of the Proposed Development incorporates consideration of this work where it is possible to do so. | The traffic management measures being proposed by DCiC (as detailed in paras. 5.2.18 to 5.2.21) have been considered during the assessment as presented in Section 5.10. |
| The Inspectorate considers that the ES should include an assessment of impacts associated with all relevant pollutants under the EU Ambient Air Quality Directive including $PM_{2.5}$. | The results for the relevant pollutants $NO_2$ , $PM_{10}$ and $PM_{2.5}$ are presented in Appendix 5.3 [**TR010022/APP/6.3**]. |
| **DCiC** | |
| Further air quality work is needed for construction impacts in light of the national $NO_2$ requirements and CAZ work. This needs to assess impacts in non-compliant areas in Derby even if the DMRB criteria for assessing the affected road network are not exceeded. | Impacts in Stafford Street and Traffic Street have been assessed and are presented in Section 5.10. |
| The inter-relationship between the Scheme and local improvement measures needs to be assessed. | This has been assessed for the construction phase when the local traffic management measures would be in operation. Results are presented in Section 5.10. |
| The assessment of impacts upon local air quality in the EIA is essential both during construction and post development; of particular concern is the A38 corridor. A larger area than 200m from the construction works needs to be assessed for construction traffic impacts. Impacts upon $PM_{2.5}$ concentrations should also be assessed. | Results are presented in Section 5.10 and Appendix 5.3 [**TR010022/APP/6.3**]. |
| We recommend the use of a 2016 baseline in line with the CAZ feasibility modelling data. | The baseline traffic data is for 2015 and is used throughout the assessment. This is discussed further in the Section 5.4. |
| **Derbyshire County Council (DCC)** | |
| It is welcomed that further air quality work will be undertaken to assess impacts from re-routed traffic during construction and operational impacts. | Results are presented in Section 5.10. |

| Scoping Opinion | Where addressed within the ES |
|---|---|
| **Public Health England** | |
| Comments highlight the need to consider air quality impacts upon human health. | Results from the air quality assessment as reported herein have been taken into account by the human health assessment as presented in Chapter 12: People and Communities. |

## 5.4 Consultation

5.4.1 The Preliminary Environmental Information Report (PEIR) was published in September 2018 (Highways England, 2018) and presented the environmental information collected together with the preliminary findings of the assessment of likely significant environmental effects of the Scheme at the time. Comments regarding air quality received during statutory consultation are detailed in Table 5.5. With regard to public consultation comments received and the associated responses, these are detailed within the Consultation Report, a copy of which is included with the DCO application [**TR010022/APP/5.1**].

**Table 5.5: Consultation response**

| Consultation response | Where addressed within the ES |
|---|---|
| **DCiC** | |
| Any significant changes to the road network in and around Derby have the potential to impact upon local air quality and it is therefore essential that the changes to the traffic volumes and routing along the local road network, both during construction and post-development, are considered in detail within the proposed EIA. | Local air quality impacts associated with Scheme construction and operation are presented in Section 5.10. |
| The potential for the A38 Derby Junctions Scheme to create new exposures to the known high concentrations of air pollutants along the A38 corridor due to the expanded highway footprint is of concern. | The air quality assessment has taken into consideration changes to the road alignment in the detailed modelling and the TAG assessment. The results are presented in Section 5.10. |
| The assessment needs to consider the work DCiC is undertaking as required by Defra under the 2017 national air quality plans. | DCiC's preferred option for the local air quality measures has been taken into account in the assessment and has been incorporated into the traffic data produced for the construction phase assessment. This is discussed further in the sections below this table. |

| Consultation response | Where addressed within the ES |
|---|---|
| The assessment of construction air quality impacts should consider a wide area to consider the effects of fleet and traffic volume changes resulting from temporary diversionary routes and how these may impact upon local compliance with national objectives and EU limit values. | Traffic impacts during the construction phase have been assessed across the road network at receptors near road links that are expected to be affected by the Scheme. |
| The proposed baseline modelling scope does not include any of the baseline data which has been produced as part of the local CAZ scoping and feasibility AQ modelling or the Council's Low Emission Strategy. DCiC advises that all local traffic and AQ modelling data will need to be included within the baseline AQ modelling for the A38 scheme. | Information from the Council has been included wherever possible. This is discussed further below. |
| The EIA Scoping report suggests the use of an existing baseline of 2015. DCiC would strongly recommend the use of a 2016 baseline in line with local CAZ feasibility modelling data. | The traffic data produced for the assessment is for a 2015 baseline. This is discussed further below. |
| Potential impacts upon local $PM_{2.5}$ exposure arising from the A38 Derby Junctions Scheme should be considered in full and mitigation proposed where possible. This should be followed by an exposure mitigation programme where necessary (for both construction and post-completion) for $PM_{2.5}$ to be included within the scope of the proposed EIA. | The effect of the Scheme on $PM_{2.5}$ concentrations has been assessed and the results are shown in Appendix 5.3 [**TR010022/APP/6.3**]. The effect of the Scheme on overall exposure to $PM_{10}$ concentrations has been assessed as part of the TAG local air quality assessment. The change in overall exposure to $PM_{2.5}$ would be the same as for $PM_{10}$. The Scheme is shown to reduce overall exposure to $PM_{10}$ (and $PM_{2.5}$). Therefore, no additional mitigation measures are required to reduce exposure to $PM_{2.5}$. |
| **DCC** | |
| A detailed operational and construction phase air quality assessment is required for the ES based on traffic modelling data. | Results for this are presented in Section 5.10. |

5.4.2 Discussions were held with DCiC's Environmental Health Officer in 2018 in relation to the use of the Council's air quality information for the air quality assessment as presented herein. DCiC provided their latest Annual Summary Reports which contained their latest air quality monitoring data. This information was used to inform the baseline assessment as presented in Section 5.7. DCiC's air quality modelling assessment report for non-compliance was not available at the time the modelling for this assessment was underway, although some information in relation to the modelling was provided by the Council.

5.4.3 In addition to the above, a number of discussions were held direct with DCiC during 2018 regarding their traffic management measures to manage air quality within the city centre which is required as part of the national air quality plan. DCiC provided information on their proposed traffic management measures which were then incorporated into the Scheme's traffic model for the construction phase assessment (given that such measures would be operational at the time of Scheme construction). The measures were not incorporated into the Scheme opening year assessment for 2024 as it was understood at the time that the operational phase traffic data was being produced, that the city was likely to be compliant with the EU Directive by that time. Nevertheless, the assessment as presented herein considers the Scheme operational impacts upon key areas of air quality concern, namely Stafford Street.

5.4.4 The air quality modelling methods used for the assessments carried out by DCiC as related to the national air quality plan and those used herein to assess the air quality effects of the Scheme, are different in some aspects as each assessment is conducted in accordance with prescriptive guidance issued either by Highways England for road schemes or the Government's Joint Air Quality Unit in relation to the national air quality plan. However, opportunities to align these methods were taken where appropriate. Some differences remain in the baseline year and methods used to predict future decreases in emissions.

5.4.5 DCiC provided key locations for receptors that are of most concern for local air quality, and thus these locations have been included in the dispersion modelling and impact assessment for the Scheme (even if such roads were not expected to be affected by the Scheme). These receptors were in Stafford Street, Uttoxeter New Road, Ashbourne Road, Friar Gate and Agard Street. It is noted that the modelling methods used herein and by DCiC could not be aligned in terms of the assessment years selected or the baseline year. DCiC used a baseline year of 2016, whereas the air quality assessment reported herein has used 2015 as the baseline year. This is the case given that 2015 is the baseline year for the transport assessments prepared for the Scheme (and which generates data for other topics that rely on traffic data such as noise and air quality). Project specific air quality monitoring has been carried out covering 2015 for model verification purposes, so the 2015 traffic data was used for such verification. These issues have been explained to DCiC who have accepted that the air quality baseline year for this assessment needs to remain as 2015.

## 5.5 Assessment assumptions and limitations

5.5.1 Monitoring data was obtained from local authorities and by undertaking Scheme **s**pecific studies. Monitoring data from 2015 was used for air quality model verification purposes.

5.5.2 The local operational air quality assessment uses a traffic data set, the latest Defra local air quality management tools and guidance, and Highways England tools and guidance, with the predictions having been compared and adjusted to bring it in-line with the 2015 monitoring data. This approach reduces the uncertainty in the predicted air quality concentrations as presented herein. Details regarding the traffic modelling undertaken to support the Scheme are detailed in the Transport Assessment Report [**TR010022/APP/7.3**].

5.5.3 The forecasting method used to predict future $NO_2$ concentrations is the gap analysis methodology as described in IAN 170/12 v3 (Highways Agency, 2013). This prediction methodology is more conservative than the Defra projections.

5.5.4 The dispersion modelling has not considered planned emission reductions from the bus fleet due to the Clean Bus Technology Fund retrofit programme.

5.5.5 The construction air quality assessment is based on the construction information that is currently available, with advice being provided by Highways England's appointed buildability advisors. As with all construction air quality assessments, the exact details of construction activities would not be fully known before a specific contractor is appointed to complete the works who would determine their exact construction methods and programme during the detailed design stage.

5.5.6 It has been assumed, in line with the details as present in Chapter 2: The Scheme, Section 2.6 that there would be eight main scenarios for construction phase traffic management (refer to Illustration 2.1 in Section 2.6). Following a review of the characteristics of these various traffic management phases, the three construction scenarios that have the potential to result in the largest air quality impacts during the construction phase were identified as being scenarios 0, 2 and 4 – these scenarios are discussed in para 5.8.9. These construction phase traffic management scenarios have been subject to traffic modelling, with the results being used to predict potential resultant air quality effects.

5.5.7 The air quality assessment considers the baseline construction year as being 2021, although some preliminary construction works would be planned for late 2020 (refer to Table 2.3). The use of 2021 is considered appropriate given that this is the year that the main Scheme construction activities would start. Emission rates and background concentrations for 2021 have been used for all construction scenarios as a pessimistic assumption given that scenario 2 and 4 are predicted to occur during 2022 and 2023 respectively (refer to Chapter 2: The Scheme, Illustration 2.1 in Section 2.6).

5.5.8 The Scheme is expected to fully open to traffic in late 2024. The air quality assessment has pessimistically assumed that the Scheme would be operational throughout 2024, and thus emission rates and background concentrations for 2024 have been used in the assessment. These rates and concentrations would be lower in later years which would result in lower predicted concentrations.

5.5.9 As detailed in Section 5.3 and 5.4, the traffic management measures for Stafford Street to be implemented by DCiC to bring forward compliance with the EU limit value have been assumed to be operational during the Scheme construction phase (and thus these measures have been integrated into the construction phase traffic model). However, such measures have not been included within the operational phase traffic model given that compliance is expected to be achieved by 2024, thus negating the need for these traffic management measures. The Scheme operational effects upon Stafford Street are detailed in Section 5.10.

## 5.6 Study area

5.6.1 The construction dust risk assessment requires key sensitive receptor locations within 200m of the Scheme construction works to be identified (Highways Agency, 1993). This area is shown on Figures 5.1a to 5.1b [**TR010022/APP/6.2**]. The construction works boundary has been taken to be the same as the boundary of the land required permanently for the Scheme as well as land needed to construct the Scheme. There are no designated ecological sites within the area that has the potential to be affected by construction dust (refer to Chapter 8: Biodiversity).

5.6.2 The assessment of construction and operational phase traffic effects uses a study area of 200m around roads likely to be affected by the Scheme (refer to Figures 5.2a to 5.2c and Figures 5.3a to 5.3c [**TR010022/APP/6.2**]). This is due to the effect of pollutants from road traffic reducing with distance from the point of release, and beyond 200m these are likely to have reduced to a concentration equivalent to background concentrations (Highways Agency, 2007).

5.6.3 Given the above, individual sensitive receptors (within or outside AQMAs) are studied in the local air quality assessment at distances of up to 200m from affected roads. Affected road links (individually modelled sections of road) are identified by comparing modelled traffic data with the Scheme (Do-Something) and without the Scheme (Do-Minimum) against the local air quality screening criteria presented in DMRB (Highways Agency, 2007), which are as follows:

- Road alignment will change by 5m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or

- Heavy duty vehicles (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speeds will change by 10km/hr or more; or
- Peak hour speed will change by 20km/hr or more.

5.6.4 If a road link is considered to be affected, then it is included in the study for further evaluation to understand the potential for significant air quality effects. The affected road network for Scheme construction impacts is shown on Figures 5.2a to 5.2c [**TR010022/APP/6.2**], whilst the affected road network for Scheme operational impacts is shown on Figures 5.3a to 5.3c [**TR010022/APP/6.2**].

5.6.5 The Derby Ring Roads AQMA is expected to be affected by Scheme operational traffic changes, noting that this includes the A516 Uttoxeter New Road, A5111 Kingsway and A601 Stafford Street/Ford Street (refer to Figure 5.4 [**TR010022/APP/6.2**]). Additional links are included in the local operational and construction phase air quality modelling where the additional emissions from these areas or links are required to describe pollutant concentrations at sensitive receptor locations.

5.6.6 The TAG plan level study area is the same as the local assessment study area for operational impacts, that is, the area within 200m of affected roads.

5.6.7 There are no internationally or nationally designated ecological sites in the air quality study area for local air quality impacts for the construction or operation phases of the Scheme. The closest designated ecological sites are: Morley Brick Pits Sites of Special Scientific Interest (SSSI), approximately 1.9km east of the Scheme boundary (Little Eaton junction); Breadsall Railway Cutting SSSI, approximately 1.5km south-east of the Scheme boundary (Little Eaton junction); and Kedleston Park SSSI, approximately 1.9km north-west of the Scheme boundary (Markeaton junction)(refer to Chapter 8: Biodiversity).

5.6.8 The regional assessment considers emissions of NOx, $PM_{10}$ and $CO_2$ rather than concentrations of pollutants. The regional air quality study area is based on the regional screening criteria presented in DMRB (Highways Agency, 2007) which identifies affected road links as those with:

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

5.6.9 The emissions presented for $CO_2$ are also presented for the whole traffic model study area for consistency with TAG (DfT, 2015).

## 5.7 Baseline conditions

5.7.1 Baseline air quality data and sensitivity receptor data for the study area have been gathered from the following sources and are included in Appendix 5.1 [**TR010022/APP/6.3**]:

- Boundaries of AQMAs.
- Defra's mapped roadside and background concentration maps.
- Local authority air quality monitoring data.
- Highways England air quality monitoring data.
- Location of human health receptors (residential properties, schools, hospitals and elderly care homes) from Ordnance Survey (OS) base mapping and site knowledge.

5.7.2 There is one AQMA within the local air quality study area, namely the designated 'Derby $NO_2$ AQMA No.1: Ring Roads' (Defra, 2018) (referred to as the Derby Ring Roads AQMA herein). This AQMA encompasses the inner and outer ring-roads in the city, as well as some sections of radial roads and the entire length of Osmaston Road. The Derby Ring Roads AQMA is shown in Figure 5.4 [**TR010022/APP/6.2**].

5.7.3 Information on roadside areas exceeding the EU limit value for $NO_2$ is available from Defra's Pollution Climate Mapping (PCM) Model (Defra, 2018). This illustrates that the A38, St Alkmund's Way, A52 Eastgate/Brian Clough Way and Sir Frank Whittle Road exceeded the limit value in the base year of 2015 based on modelled 2015 roadside $NO_2$ concentrations. By 2017, concentrations have decreased, but the A38 (Kingsway junction to Kedleston Road junction), St Alkmund's Way and the A52 Eastgate/Brian Clough Way still exceeded the EU limit value.

5.7.4 Air quality monitoring site locations in the vicinity of the Scheme are shown in Figure 5.4 [**TR010022/APP/6.2**]. DCiC recorded exceedances of the annual mean $NO_2$ objective and limit value at eight roadside monitoring locations in 2017 (DCiC, 2018). Six of which are located near major roads in the Derby Ring Roads AQMA (i.e. DT10, DT11, DT15, DT31, DT57 and DT59), one is near the A38 (DT34) and one is near the A52 Ashbourne Road (DT60). In the base year of 2015, concentrations were higher than in 2017 and exceedances were measured near major roads within the AQMA (DT25, DT26-28 and DV35) (DCiC, 2016). No other local authorities have reported exceedances at monitoring locations in the local air quality study area.

5.7.5 In addition to local authority data, Highways England commissioned a passive $NO_2$ diffusion tube monitoring survey to support the Scheme air quality assessment – this comprised monitoring in areas in the vicinity of the A38 between mid-August 2013 (at 33 locations, with an additional 6 added in June 2014) until February 2016 (refer to Appendix 5.1 [**TR010022/APP/6.3**]). The $NO_2$ monitoring site locations are shown in Figure 5.4 [**TR010022/APP/6.2**]. Exceedances of the annual mean $NO_2$ objective were recorded at eight Highways England monitoring locations within the study area in 2015. Four of these locations were within the Derby Ring Roads AQMA, with two near the A5111 Kingsway (DJ006 and DJ007), one near the A520 Warwick Avenue (DJ033) and one near A516 Uttoxeter New Road (DJ037). The other four sites that exceeded the objective were near the A38 (DJ003, DJ014, DJ029 and DJ032).

5.7.6 Estimates of background pollutant concentrations in the UK are available for 1km grid squares throughout the UK up to the year 2030, based on baseline data available for 2015 (Defra, 2018). The projected 2015 maximum background concentrations in the study area are 33.2µg/m$^3$ for $NO_2$ and 18.2µg/m$^3$ for $PM_{10}$. All these are within the relevant air quality objectives and limit values.

5.7.7 In addition to the review of measured and mapped concentrations, dispersion modelling was carried out to assess baseline concentrations at the receptors selected for the local air quality assessment. Predicted concentrations in 2015 are presented in Appendix 5.3 [**TR010022/APP/6.3**], whilst receptor locations are illustrated on Figures 5.2a to 5.2c and Figures 5.3a to 5.3c [**TR010022/APP/6.2**].

5.7.8 Modelling indicates that annual mean concentrations of $NO_2$ are predicted to exceed the annual mean objective and limit value of 40µg/m$^3$ at ten receptors in 2015. These are located in Stafford Street (R64 41.6µg/m$^3$, R182 with 41.6µg/m$^3$ and R197 with 53.4µg/m$^3$), near Markeaton junction (R79 with 40.7µg/m$^3$ and R80 with 44.8µg/m$^3$), London Road/Traffic Street (R170 with 43.7µg/m$^3$), Ashbourne Road (R191 with 42.2µg/m$^3$), Friar Gate (R193 with 40.6µg/m$^3$), St Mary's Court near the A601 St Alkmund's Way (R230 with 40.5µg/m$^3$) and on Nottingham Road near the A601 St Alkmund's Way (R231 with 44.3µg/m$^3$). All of these receptors, except for R79 and R80 near Markeaton junction, are within the Derby Ring Roads AQMA. There are no predicted exceedances of the hourly $NO_2$ objective and limit value at any of the receptors, as predicted annual mean $NO_2$ concentrations are well below 60µg/m$^3$, the threshold above which exceedances are more likely to occur.

5.7.9 There are no predicted exceedances of the $PM_{10}$ annual mean or short-term objectives and limit values at any of the receptors. The highest concentration is predicted to occur in Stafford Street (R197) with 20.5µg/m$^3$ for the annual mean, well below the objective and limit value of 40µg/m$^3$. The maximum number of days that 50µg/m$^3$ $PM_{10}$ is predicted to be exceeded is four days in Stafford Street (R197) which is well within the 35 days permitted by the objective and limit value.

**Future baseline**

***Construction year baseline (2021)***

5.7.10 Predicted air quality concentrations in 2021 are presented in Appendix 5.3 [**TR010022/APP/6.3**], with receptor locations illustrated on Figures 5.2a to 5.2c [**TR010022/APP/6.2**].

5.7.11 Annual mean concentrations of $NO_2$ are predicted to exceed the objective and limit value of 40µg/m$^3$ at one receptor in 2021, this is in Stafford Street (R197) and is representative of the ground floor of Burleigh Mews. The highest predicted concentration in Stafford Street is predicted to be 40.6µg/m$^3$. Concentrations at the first floor of Burleigh Mews are predicted to achieve the objective and limit value. The Highways Agency gap analysis method has been used to forecast the reduction in $NO_x$ emissions in future years which is a conservative method. If the Defra forecasts had been used, the predicted concentration at R197 would be 38.6µg/m$^3$ which would be below the objective and limit value. Traffic management measures to improve air quality in Stafford Street will be in operation in 2021.

5.7.12 No other receptors are predicted to have $NO_2$ concentrations above 36µg/m$^3$. There are no anticipated exceedances of the hourly $NO_2$ objective and limit value at any of the receptors, as predicted annual mean $NO_2$ concentrations are well below 60µg/m$^3$, the threshold above which exceedances are more likely to occur.

5.7.13 There are no predicted exceedances of the $PM_{10}$ objectives and limit values for the annual mean or short-term objectives and limit values at any of the receptors. The highest concentration in 2021 is predicted to occur in Stafford Street (R197) with 18.9µg/m$^3$ for the annual mean, well below the objective and limit value of 40µg/m$^3$. The maximum number of days that 50µg/m$^3$ $PM_{10}$ is predicted to be exceeded is 2 days, which is well within the 35 days permitted by the objective and limit value.

*Opening year baseline (2024)*

5.7.14 Predicted concentrations in the year of Scheme opening in 2024 are presented in Appendix 5.3 [**TR010022/APP/6.3**], with receptor locations illustrated on Figure 5.3a to 5.3c [**TR010022/APP/6.2**].

5.7.15 Annual mean concentrations of $NO_2$ are predicted to exceed the objective and limit value of 40µg/$m^3$ at one receptor in 2024, this is in Stafford Street (R197) and is representative of the ground floor of Burleigh Mews. The highest predicted concentration in Stafford Street is predicted to be 42.2µg/$m^3$. Concentrations at first floor level of Burleigh Mews are predicted to achieve the objective and limit value. The Highways Agency gap analysis method has been used to forecast the reduction in $NO_x$ emissions in future years which is a conservative method. If the Defra forecasts had been used, the predicted concentration at R197 would be 35.1µg/$m^3$ which would be below the objective and limit value. DCiC traffic management measures to improve air quality in Stafford Street are assumed not to be in operation in 2024.

5.7.16 No other receptors are predicted to have $NO_2$ concentrations above 36µg/$m^3$. There are no anticipated exceedances of the hourly $NO_2$ objective and limit value at any of the receptors, as predicted annual mean $NO_2$ concentrations are well below 60µg/$m^3$, the threshold above which exceedances are more likely to occur.

5.7.17 There are no predicted exceedances of the $PM_{10}$ objectives and limit values for the annual or daily mean at any of the receptors in 2024. The highest concentration is predicted to occur in Stafford Street (R197), with 19.3µg/$m^3$ for the annual mean, well below the objective and limit value of 40µg/$m^3$. The maximum number of days that 50µg/$m^3$ $PM_{10}$ is predicted to be exceeded for the 24-hour mean is three days, which is well within the 35 days permitted.

5.7.18 Concentrations of all pollutants at each receptor are lower in 2024 than in the base year of 2015. This is due to a cleaner vehicle fleet being used in 2024 than in 2015, which more than outweighs the predicted increase in traffic flows between 2015 and 2024.

## 5.8 Potential impacts

5.8.1 Mitigation measures incorporated into the Scheme design and measures to be taken to manage Scheme construction are set out in Section 5.9. Prior to implementation of defined mitigation measures, the Scheme has the potential to affect air quality (positively or negatively), both during construction and once in operation, in the following ways:

- There could be increased emissions of dust during construction of the Scheme from dust-raising activities on site (especially close to dust generating activities such as track-out from HGVs, demolition, earthworks and construction).
- Local air quality could be affected by changes in traffic flows, speeds or composition during Scheme construction, as a result of temporary traffic management measures and from construction traffic on the road network.

- Once the Scheme is operational, local air quality could be affected by changes in vehicle activity (flows, speeds and composition) and changes in distance between carriageways and sensitive receptors as a result of the Scheme.
- Emissions of greenhouse gases, notably $CO_2$, from traffic across the region could change due to the change in the number and length of road trips undertaken.

5.8.2 These potential impacts are discussed further in the sections below.

**Construction**

5.8.3 There is some potential for adverse effects during the construction of the Scheme in relation to construction dust and emissions from machinery at sensitive receptors within the vicinity of construction activities.

5.8.4 There are numerous sensitive receptors within 200m of the Scheme construction works and thus mitigation measures would need to be implemented in order to reduce the risks of potential dust and machinery exhaust emission impacts from on-site activities (refer to Section 5.9). However, any impacts on human exposure related to air quality and amenity impacts due to dust soiling would be temporary (i.e. during the period of the construction works only) and would be suitably minimised by the application of industry standard mitigation measures (refer to Section 5.9).

5.8.5 During the Scheme construction phase, there is the potential for adverse air quality impacts at sensitive receptors due to changes in traffic flows, as a result of temporary traffic management measures as well as from construction traffic.

5.8.6 Changes due to temporary traffic management measures are expected to affect small areas near the three junctions. Such traffic management proposals would change the operational performance of the existing junctions and would increase the journey lengths for any diverted trips. However, the overall strategy during Scheme construction is to maintain the existing A38 journey times in order to encourage drivers not to make undesirable route choice changes onto local roads (refer to Chapter 2: The Scheme, Section 2.6). Traffic modelling of the various construction phases has been undertaken which indicates that with the appropriate design of construction phase traffic management systems, existing journey times along the A38 could largely be maintained. However, during the most active Scheme construction phases, traffic management has the potential to increase the A38 journey time through this section of the A38 by approximately 2 minutes. Journeys on some radial routes could be longer. The size of the increase in journey times would depend upon the radial route considered and the specific phase of traffic management being implemented.

5.8.7 Large quantities of materials are expected to be transported to and from the site during the Scheme construction phase which would increase the number of HGV and light vehicle movements on the road network. Advice from Highways England's appointed buildability advisors indicates that HGV movements on the road network may increase by approximately 350 per day during peak activities (refer to Chapter 2: The Scheme, Section 2.6 and Illustration 2.2). HGV deliveries to the Scheme construction sites would be restricted to the following main highway corridors: the existing A38 (north and south), the A61 (south), the A6 (north), the A52 (west) and the A5111 Kingsway. Details regarding traffic movements and restrictions are detailed in the Traffic Management Plan (TMP) provided in Appendix 2.3 [**TR010022/APP/6.3**].

5.8.8 As detailed in Chapter 2: The Scheme, Section 2.6 (refer to Illustration 2.1) and the TMP, construction works at Kingsway junction are expected to occur in three main phases, at Markeaton junction in six main phases and at Little Eaton junction in six main phases. The three traffic management scenarios expected to have the greatest potential to impact upon air quality have been identified and assessed. These traffic management scenarios are representative of the phases with the longest anticipated duration and with construction work underway at all three junctions simultaneously. The construction works are explained in further detail in Chapter 2: The Scheme, Section 2.6 and in the TMP (see Appendix 2.3 [**TR010022/APP/6.3**]).

5.8.9 The three traffic management scenarios selected for assessment herein correspond to the following (refer to Chapter 2: The Scheme, Illustration 2.1 in Section 2.6):

- **Scenario 0:** this traffic management scenario is representative of when Phase 1 construction works are underway at all three junctions. Traffic would continue to use the existing road layout at all three junctions. This traffic management scenario includes the period of maximum import of fill to construct Little Eaton junction.
- **Scenario 2:** this traffic management scenario is representative of when Phase 1 works are underway at Kingsway junction, when Phase 2 works are underway at Markeaton junction and when Phase 2 works are underway at Little Eaton junction. The existing road layout would still be in use at Kingsway junction, but traffic management would be in place at Markeaton junction and Little Eaton junction. The traffic management at Markeaton junction would include temporary junctions controlled by traffic signals and at Little Eaton junction, measures would include temporary traffic signals with some traffic being diverted onto completed sections of the new A38 alignment – this includes southbound mainline traffic at Markeaton junction using the new southbound merge and diverge slip roads, and southbound mainline traffic at Little Eaton junction using the new southbound merge and diverge slip roads.

- **Scenario 4:** this traffic management scenario is representative of when Phase 3 works would be underway at Kingsway junction, with Phase 3 works being undertaken at Markeaton junction and Phase 4 works at Little Eaton junction. The final Scheme road layout would be in use at Kingsway junction (with some localised traffic management to complete off-line works), whilst traffic management measures would be in operation at Markeaton junction and Little Eaton junction. The traffic management measures at Markeaton junction would include temporary diversions and use of some completed Scheme sections, whilst at Little Eaton junction there would be traffic diversions for some turning movements. During this phase, southbound mainline traffic at Markeaton junction would use the new southbound merge and diverge slip roads and the new northbound on slip, whilst at Little Eaton junction northbound and southbound mainline traffic would be using the new merge and diverge slip roads.

5.8.10 These traffic management scenarios have been subject to traffic modelling, including additional construction traffic flows (HGV and light vehicles as indicated in Illustration 2.2 in Chapter 2: The Scheme, Section 2.6). Generated traffic data have been used to assess the potential for adverse air quality due to construction traffic and temporary traffic management measures – results are presented in Section 5.10.

**Operation**

5.8.11 Scheme operation would result in changes in traffic flows on a number of links on and in the vicinity of the Scheme. In addition, due to changes in the Scheme mainline alignment, the distance between adjacent properties and the A38 kerbside would change. Therefore, there exists the potential for adverse effects upon pollutant concentrations where sensitive receptors would be closer to these links, whilst conversely there are potential beneficial effects upon pollutant concentrations where sensitive receptors would be further away from the Scheme alignment. In addition, traffic flows on the new A38 would be higher than those currently using the A38 (refer to the Transport Assessment Report [**TR010022/APP/7.3**]), which thus has the potential to generate adverse impacts upon air quality.

5.8.12 Changes to the annual average and hourly $NO_2$ concentrations and annual average and 24-hour $PM_{10}$ concentrations, represent the focus of the air quality assessment for public exposure as presented in Section 5.10.

5.8.13 On the basis of the available information, including existing monitored concentrations in the study area, exceedances of the annual mean $NO_2$ objective and limit value have the potential to occur in Derby. As detailed in Section 5.2 and Section 5.5, Stafford Street is of particular concern as DCiC is implementing traffic management measures to improve annual mean $NO_2$ concentrations in this area as part of the national air quality plan

(given that Stafford Street has been identified as an area which is likely to exceed the limit value in 2020).

5.8.14 Because of the absence of nationally designated ecological sites near affected roads in the study area, no risks have been identified of exceedances of the critical level for $NO_x$ for the protection of vegetation or baseline critical loads for nitrogen deposition for this Scheme (refer to Chapter 8: Biodiversity).

## 5.9 Design, mitigation and enhancement measures

**Construction**

5.9.1 Subject to securing a DCO, the main construction works are expected to last for approximately 3.5 years, starting in March 2021, with Scheme opening in 2024. Preliminary works are expected to start in November 2020. As indicated in Section 5.8, during the construction phase there is the potential for changes in air quality due to dust emissions from construction activity and emissions from HGVs, site machinery and road traffic.

5.9.2 As detailed in Section Chapter 2: The Scheme, 2.5, construction of the Scheme would be subject to measures and procedures as defined within the OEMP for the Scheme (refer to Appendix 2.1 [**TR010022/APP/6.3**]). The OEMP includes a range of Best Practicable Means (BPM) associated with mitigating potential environmental impacts. The measures detailed within the OEMP would be developed into a Construction Environmental Management Plan (CEMP) by the selected construction contractor which would be implemented for the duration of the Scheme construction phase. The CEMP would include a range of good industry standard practice construction phase dust mitigation measures required during all works undertaken where there is a potential for adverse effects on sensitive receptors (e.g. residential properties, schools and hospitals). These standard mitigation measures are based on IAQM guidance on the assessment of dust during demolition and construction (IAQM, 2014).

5.9.3 As detailed in the OEMP (refer to Appendix 2.1 [**TR010022/APP/6.3**]), standard dust mitigation measures include:

- Develop and implement a series of dust management measures and monitoring measures (e.g. periodic visual inspections within and along site boundaries).
- Fully enclose specific operations where there is a high risk of dust production and the site is active for an extensive period.
- All construction plant would use fuel equivalent to ultra-low sulphur diesel (ULSD) where possible.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site) where reasonably practicable.

5.9.4 Where standard mitigation measures may not be sufficient to minimise emissions of dust alone, further best practice mitigation measures for high risk sites are set out in the OEMP (refer to Appendix 2.1 [**TR010022/APP/6.3**]). Locations considered to be at higher risk, and therefore requiring the application of further standard measures, are those with sensitive receptors (e.g. residential properties, schools and hospitals) close to the works i.e. within 200m.

5.9.5 As there are a large number of residential properties within 200m of the Scheme construction site boundary (refer to Figures 5.1a and 5.1b [**TR010022/APP/6.2**]), additional mitigation measures for high risk sites would be considered across all Scheme construction areas. The only exceptions would be during some preliminary works and for works being undertaken at the isolated construction sites during the main works (e.g. works to reconfigure and signalise the Ford Lane junction with the A6 Duffield Road; minor highway improvement works to the south of Kingsway junction, north of Kedleston Road junction, south of Little Eaton junction, and at two locations to the north of Little Eaton junction which would comprise signage works and associated road restraint systems within the existing highway verges – refer to Figures 5.1a to 5.1b [**TR010022/APP/6.2**]).

5.9.6 As part of best practice measures for locations with higher dust risks, monitoring would be implemented. The final details of any monitoring would be consulted upon between the construction contractor and DCiC/EBC (as applicable), with these details being included within the contractor's CEMP.

5.9.7 Reference should also be made to the TMP provided in Appendix 2.3 [**TR010022/APP/6.3**] which includes details of measures to be taken to minimise the impact of construction traffic on customers and stakeholders, while ensuring work is carried out efficiently. Such measures include restricting HGV movements to the strategic highway network – thus HGVs would be restricted to using the A38 (north and south), the A61 (south), the A6 (north), the A52 (west) and the A5111 Kingsway (refer to Figures 2.11a to 2.11c [**TR010022/APP/6.2**] for details of haulage and construction delivery routes).

**Operation and Scheme design**

5.9.8 Environmental considerations have been taken into account during the development of the Scheme design, to avoid and reduce potential impacts upon nearby sensitive receptors. As detailed in Chapter 3: Scheme History and Assessment of Alternatives, air quality was a consideration in the assessment of alternative routes prior to selection of the preferred route.

5.9.9 Whilst no specific air quality mitigation measures have been incorporated into the Scheme design, the design aims to maintain traffic flows on the A38 and the surrounding road network, thus reducing congestion and the occurrence of idling vehicles with resultant air quality benefits. As is indicated in Section 5.10, operation of the Scheme is predicted to improve air quality in Stafford Street which is in the Derby Ring Roads AQMA and is the focus of DCiC's traffic management measures that are required as part of the national air quality plan.

5.9.10 The Scheme design also aims to maintain or increase the distances between properties and traffic, where possible, thus reducing the risks of air quality impacts.

## 5.10 Assessment of likely significant effects

**Construction phase - dust**

5.10.1 Dust soiling affecting the amenity of properties and increased $PM_{10}$ concentrations affecting human health is a potential issue in areas within 200m of the Scheme construction works boundary (refer to Figures 5.1a to 5.1b [**TR010022/APP/6.2**]).

5.10.2 Section 5.3 indicated that key dust generating activities relate to track-out from HGVs, demolition works, earthworks and construction activities. The Scheme would involve these activities close to sensitive receptors as follows:

- HGVs leaving construction sites could track mud and dirt onto public highways. Areas where HGVs would join the public highway include those leaving the Kingsway Hospital site to join the A38, those leaving Markeaton Park associated with the creation of a species rich grassland (using soils translocated from Kingsway junction), those leaving the floodplain compensation area to the west of Little Eaton junction, those leaving the main construction compound north of Little Eaton junction to join B6179 Alfreton Road, those joining the A61 from works areas to the south of Little Eaton junction, and those joining the highway network from the various satellite compounds (refer to Figures 5.1a to 5.1b [**TR010022/APP/6.2**]). The estimated number of HGV movements per day during the busiest construction period is expected to be around 350 during peak periods (refer to Chapter 2: The Scheme, Illustration 2.1 in Section 2.6).
- The Scheme would require the demolition of a number of existing structures, namely 15 residential properties on Queensway, two residential properties on the A52 Ashbourne Road, a closed toilet block in Markeaton Park and the Markeaton footbridge.

- Earthworks for the Scheme would require excavation to form cuttings for the highway, and material use to form embankments. As indicated in Chapter 2: The Scheme, Section 2.6 (refer to Table 2.6), at Kingsway junction the cut volume is estimated to be approximately 58,143m$^3$, with an estimated fill volume of 66,651m$^3$. At Markeaton junction the estimated cut volume is 73,714m$^3$, with an estimated fill volume of 7,393m$^3$, whilst at Little Eaton junction the estimated cut volume is 43,673m$^3$, with an estimated fill volume of 419,814m$^3$.
- Construction of the Scheme would require the use of dusty materials, including approximately 26,000m$^3$ of cement bound granular material, and approximately 28,000m$^3$ of aggregates (refer to Chapter 2: The Scheme, Section 2.6 and Table 2.7).

5.10.3 Sensitive receptors close to such dust generating activities are as follows (refer to Figures 5.1a to 5.1b [**TR010022/APP/6.2**]):

- There are numerous residential properties within 200m of the Scheme at Kingsway junction, including approximately 100 residential properties to the west of the junction on Greenwich Drive South and Fulham Road, as well as residential properties within the Kingsway hospital site, along Kingsway Park Close, on Brackensdale Avenue, along Kingsway, Cheviot Street, Raleigh Street, Lyttelton Street and Greenwich Drive North.
- There are numerous residential properties within 200m of the Scheme at Markeaton junction, including residential properties to the west on Greenwich Drive North, Enfield Road, and Harringay Gardens, approximately 60 residential properties to the south on Windmill Hill Lane, Radbourne Street, Ashbourne Road and Sutton Close, as well as the Royal School for the Deaf on Ashbourne Road to the east of the junction. There are also residential properties located off Kedleston Road.
- The main residential properties within 200m of the Scheme at Little Eaton junction are those within the Ford Farm Mobile Home Park – this contains approximately 30 residential properties. Other residential properties within 200m of the Scheme works include those on the outskirts of Breadsall to the south, the farm property adjacent to the floodplain compensation area, and residential properties in the south and east of Allestree (e.g. Lambourn Drive, Derwent Avenue, Wharfedale Close, Ford Lane).

5.10.4 All these properties are of high sensitivity to dust soiling. Given that such properties are located in the vicinity of track-out from HGVs, demolition works, earthworks and construction activities, standard mitigation measures for a high risk site should be implemented by the construction contractor - such measures are detailed in Section 5.9 and in the OEMP (refer to Appendix 2.1 [**TR010022/APP/6.3**]).

5.10.5 With the implementation of the mitigation measures proposed (as detailed in Section 5.9 and in the OEMP (refer to Appendix 2.1 [**TR010022/APP/6.3**]) dust impacts during the Scheme construction phase are anticipated to be slight adverse at worst, and thus not significant.

**Construction phase - local air quality effects associated with traffic**

5.10.6 This section provides predictions regarding the effect of both traffic management and construction traffic on sensitive receptors for the three construction scenarios assessed which are expected to have the greatest potential to impact upon air quality (refer to para. 5.8.9).

5.10.7 Predicted $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations and changes in concentrations due to the Scheme are presented in Appendix 5.3 [**TR010022/APP/6.3**]. Receptor locations are illustrated on Figure 5.2a to 5.2c [**TR010022/APP/6.2**].

***Traffic management Scenario 0***

5.10.8 During traffic management Scenario 0, traffic would use the existing A38 alignment, but this would be the period of maximum import of fill to construct Little Eaton junction.

5.10.9 Annual mean concentrations of $NO_2$ are predicted to exceed the objective and limit value in 2021 without any Scheme construction traffic management at one receptor in Stafford Street (R197 with 40.6µg/m$^3$). Construction traffic management is expected to increase concentrations by 0.1µg/m$^3$ at this receptor which is an imperceptible change and is not of concern. These predictions have been made using the conservative Highways Agency gap analysis method for predicting the future change in $NO_x$ emissions. If the Defra forecasting method is used, the predicted concentrations are slightly lower and below the objective and limit value with 38.6µg/m$^3$ for the Do-Minimum and 38.7µg/m$^3$ with the Scheme construction traffic management. Stafford Street is in the Derby Ring Roads AQMA and is the focus of DCiC's traffic management measures that are required as part of the national air quality plan (refer to paras. 5.2.18 – 5.2.21).

5.10.10 All other receptors are expected to achieve the annual mean $NO_2$ limit value and have predicted $NO_2$ concentrations below 36µg/m$^3$. There are no anticipated exceedances of the hourly $NO_2$ objective and limit value as annual mean concentrations are below 60µg/m$^3$ at all receptors.

5.10.11 Annual mean concentrations of $PM_{10}$ are predicted to be within the relevant objectives and limit values at all modelled receptors within the study area, both with and without construction traffic management Scenario 0 in 2021.

5.10.12 Many of the receptors modelled within the study area are predicted to experience an imperceptible change in annual mean concentrations (±≤0.4µg/$m^3$ for $NO_2$ and $PM_{10}$). Specific changes in concentrations are, therefore, only discussed below where more than an imperceptible change is predicted.

5.10.13 Predicted changes in annual mean $NO_2$ concentrations range from -1.3 to +0.9 µg/$m^3$ which are small changes. No receptors are predicted to have large or medium magnitude changes in $NO_2$ concentrations. The largest increase is predicted at receptor R136 in Windmill Hill Lane close to the A38 which is predicted to have a small magnitude increase of 0.9µg/$m^3$ due to an increase in HGV flows on the A38 of 230 AADT. This is the only receptor predicted to have a small magnitude increase. Four receptors are predicted to have small magnitude improvements (R8, R139, R141 and R147), the largest of which is at receptor R8 on Alfreton Road, north of Little Eaton junction, due to a reduction in traffic flow because of traffic management measures.

5.10.14 Given that imperceptible changes in annual mean $NO_2$ concentrations are expected during construction traffic management Scenario 0 in Stafford Street which is at risk of exceeding the objective and limit value, significant effects on air quality are not anticipated with regard to $NO_2$ during Scenario 0.

5.10.15 Predicted changes in annual mean $PM_{10}$ concentrations range from -0.2 to +0.1 µg/$m^3$ which are imperceptible changes. No receptors are predicted to have large, medium or small magnitude changes. As such, all $PM_{10}$ impacts are predicted to be imperceptible.

5.10.16 The maximum predicted annual mean $PM_{10}$ concentration in 2021 both with and without Scheme construction is 18.9µg/$m^3$ in Stafford Street (R197). No change in $PM_{10}$ concentration is expected due to Scheme construction at this location. In addition, the number of days with $PM_{10}$ concentrations exceeding 50µg/$m^3$ is not expected to change at any receptor due to Scheme construction traffic during Scenario 0. The maximum predicted number of days exceeding 50µg/$m^3$ is two days per year both with and without Scheme construction traffic and thus well within the 35 days permitted.

5.10.17 All of the predicted $PM_{10}$ concentrations in 2021 are well within the objectives and limit values, and therefore significant effects on air quality are not anticipated with regard to $PM_{10}$ during Scenario 0.

***Traffic management Scenario 2***

5.10.18 During traffic management Scenario 2, the existing road layout would still be in use at Kingsway junction, but traffic management would be in place at Markeaton junction and Little Eaton junction.

5.10.19 Annual mean concentrations of $NO_2$ are predicted to exceed the objective and limit value in 2021 without any Scheme construction traffic management at one receptor in Stafford Street (R197 with 40.6µg/m$^3$). Construction traffic management Scenario 2 is expected to decrease concentrations by 0.1µg/m$^3$ at this receptor which is an imperceptible change. These predictions have been made using the conservative Highways Agency gap analysis method for predicting the future change in NOx emissions. If the Defra forecasting method is used, the predicted concentrations are slightly lower and below the objective and limit value with 38.6µg/m$^3$ for the Do-Minimum and 38.5µg/m$^3$ with the Scheme construction traffic management. Stafford Street is in the Derby Ring Roads AQMA and is the focus of DCiC's traffic management measures that are required as part of the national air quality plan (refer to paras. 5.2.18 – 5.2.21).

5.10.20 All other receptors are expected to achieve the annual mean $NO_2$ limit value and have predicted $NO_2$ concentrations below 36µg/m$^3$. There are no anticipated exceedances of the hourly $NO_2$ objective and limit value as annual mean concentrations are all below 60µg/m$^3$.

5.10.21 Annual mean concentrations of $PM_{10}$ are predicted to be within the relevant objectives and limit values at all modelled receptors within the study area, both with and without construction traffic management Scenario 2 in 2021.

5.10.22 Many of the receptors modelled within the study area are predicted to experience an imperceptible change in annual mean concentrations (±≤0.4µg/m$^3$ for $NO_2$ and $PM_{10}$). Specific changes in concentrations are, therefore, only discussed below where more than an imperceptible change is predicted.

5.10.23 Predicted changes in annual mean $NO_2$ concentrations range from -2.4 to +4.4 µg/m$^3$ which is a medium decrease to a large increase in concentrations. The largest changes are predicted to occur due to the works at Markeaton junction with the largest increase predicted to occur at receptor R176 which is a residential property within the grounds of the Royal School of the Deaf close to Markeaton junction. The increase is due to traffic management measures and road realignment at Markeaton junction with A38 southbound traffic using the new southbound diverge slip road which would be closer to the school during this construction scenario, however concentrations are still within the objective and limit value. The largest decrease in $NO_2$ concentrations is predicted to occur at receptor R88 which is a public house on Ashbourne Road approximately 200m from Markeaton junction due to a decrease in traffic flow on the A52 Ashbourne Road of approximately 4,000 AADT.

5.10.24 Three receptors at the Royal School for the Deaf are predicted to have large magnitude $NO_2$ increases (R176, R177 and S12) due to traffic management and road realignment at the Markeaton junction, however, concentrations are within the objective and limit value. No receptors are predicted to have large magnitude improvements. Seven receptors are predicted to have medium magnitude increases (R146, R148, R149, R154, R155, R156 and R175), these being located to the east of the A38 between Kingsway junction and Markeaton junction, in the Raleigh Street area due to an increase in traffic of around 3,800 AADT on this road associated with traffic management measures. Two receptors are predicted to have medium magnitude improvements (R88 and C12), R88 being on the A52 Ashbourne Road to the east of Markeaton junction and C12 in Markeaton Park. Small magnitude increases are expected at 28 receptors and small magnitude decreases at 23 receptors. Improvements are expected at the Ford Farm Mobile Home Park, the A52 Ashbourne Road and B6179 Alfreton Road and an increase in concentrations near the A38.

5.10.25 As an imperceptible change in annual mean $NO_2$ concentrations is expected due to the construction traffic management Scenario 2 in Stafford Street which is at risk of exceeding the objective and limit value, significant effects on air quality are not anticipated with regard to $NO_2$ during Scenario 2.

5.10.26 Predicted changes in annual mean $PM_{10}$ concentrations range from -0.4 to +1.4 µg/$m^3$ which is an imperceptible decrease to a small increase in concentrations. No receptors are predicted to have large or medium magnitude changes. Fifteen receptors are predicted to have small magnitude increases in $PM_{10}$ concentrations (receptors R82, R143, R144, R146, R148, R149, R150, R154, R155, R156, R157, R175, R176, R177 and S12). These are all located near Markeaton junction and includes the Royal School for the Deaf or in the Raleigh Street area due to an increase in traffic associated with Scheme traffic management measures. No receptors are predicted to have small magnitude improvements.

5.10.27 The maximum predicted annual mean $PM_{10}$ concentration in 2021 both with and without Scheme construction is 18.9µg/$m^3$ in Stafford Street (R197), this is well below the annual mean objective and limit value at 40µg/$m^3$. No change is expected at R197 due to construction traffic during Scenario 2. The number of days with $PM_{10}$ concentrations exceeding 50µg/$m^3$ is not expected to change at any receptor due to Scheme construction traffic. The maximum predicted number of days exceeding 50µg/$m^3$ is 2 days per year both with and without Scheme construction traffic, and thus well within the 35 days permitted by the objective and limit value.

5.10.28 All of the predicted $PM_{10}$ concentrations in 2021 are well within the objectives and limit values, and therefore significant effects on air quality are not anticipated with regard to $PM_{10}$ during Scenario 2.

***Traffic management Scenario 4***

5.10.29 During traffic management Scenario 4, the final Scheme road layout would be in use at Kingsway junction, whilst traffic management measures would be in operation at Markeaton junction and Little Eaton junction.

5.10.30 Annual mean concentrations of $NO_2$ are predicted to exceed the objective and limit value in 2021 without any Scheme construction traffic management at one receptor in Stafford Street (R197 with 40.6µg/m$^3$). Construction traffic management Scenario 4 is expected to decrease concentrations by 0.5µg/m$^3$ at this receptor which is considered to be a small improvement. These predictions have been made using the conservative Highways Agency gap analysis method for predicting the future change in $NO_x$ emissions. If the Defra forecasting method is used, the predicted concentrations are slightly lower and below the objective and limit value with 38.6µg/m$^3$ for the Do-Minimum and 38.1µg/m$^3$ with the Scheme construction traffic management. Stafford Street is in the Derby Ring Roads AQMA and is the focus of DCiC's traffic management measures that are required as part of the national air quality plan (refer to paras. 5.2.18 – 5.2.21).

5.10.31 All other receptors are expected to achieve the annual mean $NO_2$ limit value and have predicted $NO_2$ concentrations below 36µg/m$^3$. There are no anticipated exceedances of the hourly $NO_2$ objective and limit value as annual mean concentrations are all below 60µg/m$^3$.

5.10.32 Annual mean concentrations of $PM_{10}$ are predicted to be within the relevant objectives and limit values at all modelled receptors within the study area, both with and without construction traffic management Scenario 4 in 2021.

5.10.33 Many of the receptors modelled within the study area are predicted to experience an imperceptible change in annual mean concentrations (±≤0.4µg/m$^3$ for $NO_2$ and $PM_{10}$). Specific changes in concentrations are, therefore, only discussed below where more than an imperceptible change is predicted.

5.10.34 Predicted changes in annual mean $NO_2$ concentrations range from -4.4 to +5.0 µg/m$^3$ which are considered to be large changes. The largest increase is predicted to occur at receptor R176, a residential property within the grounds of the Royal School for the Deaf, close to Markeaton junction. This increase is due to road realignment of the new roundabout and traffic management measures, during this scenario A52 traffic would use the new roundabout. The largest decrease is predicted to occur in Mackworth Park (C14) due to road realignment with the new alignment being used during this scenario which would move traffic further from the park.

5.10.35 Three receptors are predicted to have large magnitude increases, these are all located within the Royal School for the Deaf (R176, R177 and S12) with the increases due to traffic management measures and road realignment. Three receptors are predicted to have medium magnitude increases, these are also located close to and to the east of Markeaton junction on the A52 Ashbourne Road and at the Royal School for the Deaf (R82, R83 and R175). Fifteen receptors near roads that would have increases in traffic are predicted to have small magnitude increases (R16, R17, R18, R84, R86, R87, R99, R209, R210, R211, R213, R214, R229, R250 and S13). Large magnitude decreases are expected at two receptors, namely R146 in Raleigh Street and at Mackworth Park (C14). Medium magnitude decreases are expected at six receptors (R139, R145, R147, R148, R159 and C12), these are located close to the A38 with the majority between Kingsway junction and Markeaton junction. Thirty-nine receptors are predicted to have small magnitude decreases in concentrations (R10, R12 - R15, R45, R48, R53, R88, R89, R91 - R94, R96, R127 - R134, R136, R138, R140 - R142, R144, R149 - R150, R154 - R156, R197, S15, H1, H2 and C13), these are mainly close to the A38 or near the A52 Ashbourne Road.

5.10.36 Due to the short duration of Scenario 4 (approximately six months) and the small area in Stafford Street that is at risk of exceeding the $NO_2$ objective and limit value that would benefit from a small improvement during Scenario 4, significant effects on air quality are not anticipated with regard to $NO_2$ during Scenario 4.

5.10.37 Predicted changes in annual mean $PM_{10}$ concentrations range from -0.5 to +0.7 µg/$m^3$ which are considered to be small changes. No receptors are predicted to have large or medium magnitude changes. Six receptors are predicted to have small magnitude increases in $PM_{10}$ concentrations (receptors R82, R83, R175, R176, R177 and S12). These are all located to the east of Markeaton junction and includes the Royal School for the Deaf. One receptor (R146) on Raleigh Street is predicted to have a small magnitude improvement.

5.10.38 The maximum predicted annual mean $PM_{10}$ concentration in 2021 without Scheme construction traffic is 18.9µg/$m^3$ in Stafford Street (R197). A decrease of 0.1µg/$m^3$ is expected due to the Scheme traffic management measures which is imperceptible. The number of days with $PM_{10}$ concentrations exceeding 50µg/$m^3$ is not expected to change at any receptor due to the Scheme. The maximum predicted number of days exceeding 50µg/$m^3$ is two days per year both with and without the Scheme, and thus well within the 35 days permitted.

5.10.39 All of the predicted $PM_{10}$ concentrations in 2021 with construction traffic management Scenario 4 are well within the objectives and limit values, and therefore significant effects on air quality are not anticipated with regard to $PM_{10}$.

**Construction phase - compliance risk assessment**

5.10.40 The results of the local air quality construction assessments have been used to determine compliance risks with the EU Ambient Air Quality Directive , following guidance set out within IAN 175/13 (Highways Agency, 2013).

5.10.41 A comparison between the outcome of the Scheme construction phase assessments for Scenarios 0, 2 and 4 and those links reported by Defra to the European Commission as being non-compliant has been undertaken. This comparison indicates that there are no links anticipated to be non-compliant with the limit value within the air quality study area for the Scheme in the construction year of 2021. The air quality risk assessment for each construction traffic management scenario is included in Appendix 5.3 [**TR010022/APP/6.3**].

5.10.42 This indicates that there is a low risk of non-compliance with the EU Ambient Air Quality Directive during Scheme construction, and thus an AQAP is not required for the Scheme construction phase.

**Operational phase - local air quality assessment**

5.10.43 This section provides predictions regarding the air quality effects of Scheme operation on sensitive receptors during the opening year of 2024. Predicted air quality concentrations and changes in $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations due to the Scheme are presented in Appendix 5.3 [**TR010022/APP/6.3**] and illustrated in Figures 5.5a to 5.5f [**TR010022/APP/6.2**] for $NO_2$ results.

5.10.44 Annual mean concentrations of $NO_2$ are predicted to exceed the objective and limit value in 2024 without the Scheme at one receptor in Stafford Street (R197 with 42.2µg/m$^3$) which is representative of the ground floor of Burleigh Mews. The Scheme is expected to decrease concentrations by 1.2µg/m$^3$ at this receptor which is a small improvement. Concentrations at first floor level of the flats are predicted to achieve the objective and limit value so the area at risk of exceeding is small. These predictions have been made using the conservative Highways Agency gap analysis method for predicting the future change in $NO_x$ emissions. If the Defra forecasting method is used, the predicted concentrations are lower and below the objective and limit value with 35.1µg/m$^3$ for the Do-Minimum and 34.1µg/m$^3$ with the Scheme. Stafford Street is in the Derby Ring Roads AQMA and is the focus of DCiC's traffic management measures that are required as part of the national air quality plan (refer to paras. 5.2.18 – 5.2.21). The modelling has assumed that the traffic management measures are not in operation in 2024, but if such measures were to be continued, $NO_2$ concentrations would be further reduced in Stafford Street.

5.10.45 All other receptors are expected to achieve the annual mean $NO_2$ limit value and have predicted $NO_2$ concentrations below 36µg/m$^3$. There are no anticipated exceedances of the hourly $NO_2$ objective and limit value as annual mean concentrations are all below 60µg/m$^3$. $PM_{10}$ concentrations are predicted to be within the long term and short term objectives and limit values at all modelled receptors both with and without the Scheme in the Scheme opening year of 2024.

5.10.46 Many of the human receptors modelled within the study area are predicted to experience an imperceptible change in annual mean concentrations (±≤0.4µg/m$^3$ for $NO_2$ and $PM_{10}$). Specific changes in concentrations are, therefore, only discussed below where more than an imperceptible change is predicted.

5.10.47 Predicted changes in annual mean $NO_2$ concentrations range from -3.2 to +1.9 µg/m$^3$. As stated above, all receptors except for R197 in Stafford Street are predicted to achieve the limit value and objective, both with and without the Scheme. The five largest increases and five largest decreases are shown in Table 5.6 together with the main cause of the change. The receptor locations are shown on Figures 5.5a to 5.5f [**TR010022/APP/6.2**].

**Table 5.6: Five largest increases and decreases in $NO_2$ concentrations in Scheme opening year**

| Receptor | Annual mean $NO_2$ concentration (µg/m$^3$) | | Main cause of change |
|---|---|---|---|
| | Do-Something | Change due to Scheme | |
| R48: 4 Abbeycroft Lane near A38 | 26.4 | +1.9 (small) | Increase in traffic flow of approximately 10,580 on A38 |
| R53: Kedleston Old Road near A38 | 27.3 | +1.7 (small) | Increase in traffic flow of approximately 10,580 AADT on A38 |
| R177: Residences in the Royal School for the Deaf | 19.1 | +1.5 (small) | Road realignment and increase in traffic flow of approximately 15,590 AADT on A38 |
| S12: Royal School for the Deaf | 18.9 | +1.4 (small) | Road realignment and increase in traffic flow of approximately 15,590 AADT on A38 |
| R38: Birchover House, Church Lane North near A38 | 22.6 | +1.3 (small) | Increase in traffic flow of approximately 10,580 AADT on A38 |
| R12: Ford Lane Mobile Home Park near A38 | 19.8 | -2.6 (medium) | Realignment of A38 away from Ford Lane |
| R13: Ford Lane Mobile Home Park near A38 | 19.8 | -2.8 (medium) | Realignment of A38 away from Ford Lane |

| Receptor | Annual mean $NO_2$ concentration ($\mu g/m^3$) | | Main cause of change |
|---|---|---|---|
| | Do-Something | Change due to Scheme | |
| C14: Mackworth Park near A38 | 23.5 | -2.9 (medium) | Realignment of A38 away from Park |
| R148: 2 Seymour Close | 18.7 | -3.0 (medium) | Reduction in traffic flow of approximately 4,650 AADT on Raleigh Street |
| R146: 4 Raleigh Street | 19.9 | -3.2 (medium) | Reduction in traffic flow of approximately 4,650 AADT on Raleigh Street |

5.10.48 No receptors are predicted to have large magnitude changes, whilst no receptors are predicted to have medium magnitude increases in $NO_2$ concentrations. Nine receptors are predicted to have medium magnitude improvements in $NO_2$ concentrations - these are located near minor access roads to and from the A38 which would be closed as part of the Scheme (such as Raleigh Street (R139, R145, R146, R148, R149) and Enfield Road (R131)); or due to road realignment such as those near Mackworth Park (C14) near Kingsway junction, and those in the Ford Farm Mobile Home Park (R12 and R13) near Little Eaton junction.

5.10.49 Approximately equal numbers of receptors are predicted to have small magnitude increases or decreases in $NO_2$ concentrations (64 versus 65). Generally, small increases in $NO_2$ concentrations are expected at receptors near the A38, whilst small improvements are predicted at receptors near roads that are currently used by traffic to access the A38.

5.10.50 Predicted $NO_2$ concentrations in the Scheme opening year are within the objectives and limit values at all receptors except for one in Stafford Street where there is a risk of an exceedance at ground floor level. Given that the area at risk is small and the small magnitude of the improvement expected with the Scheme, significant effects on air quality are not anticipated with regard to $NO_2$.

5.10.51 Predicted changes in annual mean $PM_{10}$ concentrations range from -0.3 to +0.7 $\mu g/m^3$. No receptors are predicted to have large or medium magnitude changes, or small magnitude decreases in concentrations. Five receptors are predicted to have small magnitude increases in $PM_{10}$ concentrations (receptors R82, R175, R176, R177 and S12). These are all located close to and to the east of Markeaton junction.

5.10.52 The maximum predicted annual mean $PM_{10}$ concentration in the opening year (2024) without the Scheme is 19.3µg/m$^3$ on Stafford Street (R197), whilst the predicted $PM_{10}$ concentration with the Scheme on Stafford Street is 19.1µg/m$^3$. The decrease of 0.2µg/m$^3$ due to the Scheme is imperceptible. The number of days with $PM_{10}$ concentrations exceeding 50µg/m$^3$ is not expected to change may more than one day due to the Scheme. The maximum predicted number of days exceeding 50µg/m$^3$ is three days per year and thus well within the 35 days permitted.

5.10.53 All of the predicted $PM_{10}$ concentrations in the Scheme opening year are well within the objectives and limit values, and therefore significant effects on air quality are not anticipated with regard to $PM_{10}$.

**Operational phase - compliance risk assessment**

5.10.54 The results of the local air quality operational assessment have been used to determine compliance risks with the EU Ambient Air Quality Directive, following guidance set out within IAN 175/13 (Highways Agency, 2013).

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

5.10.56 This indicates that there is a low risk of non-compliance with the EU Ambient Air Quality Directive for the Scheme, and thus an AQAP is not required for Scheme operation.

**Operational phase - local air quality plan level TAG appraisal**

5.10.57 A plan level TAG appraisal has been completed in respect of $PM_{10}$ and $NO_2$ exposure. This assessment has been developed using the TAG methodology (DfT, 2015) which considers individual links in isolation. The results of this assessment are provided in Appendix 5.3 [**TR010022/APP/6.3**].

5.10.58 The results of the plan level TAG appraisal show that for $PM_{10}$ in the Scheme opening year, there would be a net benefit with a score of -1,830 (with 4,882 properties having an improvement and 4,105 having a deterioration). By the Scheme design year (2039), the net benefit has reduced to -1,125 (with 6,841 properties having an improvement and 3,520 having a deterioration).

5.10.59 The results of the plan level TAG appraisal show that for $NO_2$ in the Scheme opening year, there would be a net benefit with a score of -1,903 (with 4,492 properties having an improvement and 4,664 having a deterioration). By the Scheme design year (2039), the net benefit has reduced to -1,449 (with 6,504 properties having an improvement and 3,712 having a deterioration).

5.10.60 Given the above, overall the Scheme is predicted to be beneficial for local air quality in the Scheme opening and design years as on balance it reduces human exposure to air pollutants by repositioning roads and traffic emissions further from properties.

**Operational phase - regional assessment**

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

5.10.62 The assessment results indicate that reduced emissions of $NO_x$ and $PM_{10}$ are anticipated between the baseline situation (2015) and the opening year (2024) without the Scheme (see Table 5.7). These reductions are due to projected improvements in vehicle emissions over time. However, increases in $CO_2$ emissions are expected over this period due to increases in traffic flows which are much larger than any benefits from increased fuel efficiency or the electrification of the vehicle fleet.

5.10.63 Increases in emissions are predicted in the opening year with the Scheme (Do-Something) compared to the without Scheme (Do-Minimum) situation. This is primarily because of the increased traffic flows predicted with the operation of the Scheme across the affected road network and the associated increases in vehicle kilometres travelled. However, when the entire modelled road network is considered for $CO_2$ emissions, the increase is smaller than when just the affected road network is considered as there are small decreases in traffic flows that are less than the DMRB criteria for identifying affected links further away from the Scheme.

5.10.64 In comparison to national $CO_2$ emissions targets, increases in $CO_2$ from the whole of the strategic road building programme, as noted in the NPSNN (DfT, 2014), anticipated over the next 10 - 15 years are considered to be small and the increases associated with the Scheme would be part of that small increase. The Scheme opening year of 2024 is within the fourth carbon budget period of 2023 - 2027. Further consideration of the impacts of $CO_2$ emissions associated with the Scheme are provided in Chapter 14: Climate.

**Table 5.7: Opening year regional assessment results**

| Pollutant | Present (2015) (tonnes) | Without Scheme opening year (tonnes) | With Scheme opening year (tonnes) | With Scheme compared with: | |
|---|---|---|---|---|---|
| | | | | Present without Scheme (tonnes) | Future without Scheme (tonnes) |
| **For affected road network** | | | | | |
| $CO_2$ | 112,017 | 118,363 | 121,506 | +9,489 | +3,143 |
| $NO_x$ | 311.13 | 161.96 | 166.10 | -145.03 | +4.14 |
| $PM_{10}$ | 21.35 | 19.91 | 21.26 | -0.09 | +1.35 |
| **For entire modelled road network** | | | | | |
| $CO_2$ | 7,792,023 | 7,933,641 | 7,934,497 | +142,474 | +856 |

5.10.65 In the design year (2039) for the affected road network, increases in pollutant emissions are predicted between the baseline (2015) and future situation (see Table 5.8) for $PM_{10}$ and $CO_2$, with reduced emissions of NOx. Between the future without Scheme (Do-Minimum) and with Scheme (Do-Something) scenarios, an increase in all emissions is predicted as a result of the increased traffic flows predicted with the Scheme. This increase is similarly reflected in the $CO_2$ emissions from traffic on the entire traffic model network.

**Table 5.8: Design year regional assessment results**

| Pollutant | Present (2015) (tonnes) | Without Scheme design year (tonnes) | With Scheme design year (tonnes) | With Scheme compared with: | |
|---|---|---|---|---|---|
| | | | | Present without Scheme (tonnes) | Future without Scheme (tonnes) |
| **For affected road network** | | | | | |
| $CO_2$ | 112,017 | 132,398 | 137,275 | +25,258 | +4,877 |
| $NO_x$ | 311.13 | 119.63 | 122.86 | -188.27 | +3.23 |
| $PM_{10}$ | 21.35 | 22.45 | 24.28 | +2.93 | +1.83 |
| **For entire modelled road network** | | | | | |
| $CO_2$ | 7,792,023 | 8,879,454 | 8,882,177 | +1,087,431 | +2,723 |

### Significance of effects

5.10.66 The significance of the operational air quality effects as a result of the Scheme has been evaluated, with the results presented in Table 5.10. This focuses on key locations where annual average $NO_2$ concentrations are predicted to be greater than the air quality criteria. Table 5.9 presents supporting information concerning the key question of how many people would be affected.

**Table 5.9: Numbers of properties affected, local operational assessment – with the Scheme**

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

Numbers in brackets set out threshold for significant effect as IAN 174/13. No locations are affected by potentially significant changes in $PM_{10}$ or $PM_{2.5}$.

**Table 5.10: Evaluation of local operational air quality significance with the Scheme**

| Key criteria questions | Yes/No | Supporting information |
|---|---|---|
| Is there a risk that environmental standards will be breached? | No | Annual average concentrations of $NO_2$ are not predicted to exceed the objectives or limit values during the operation of the Scheme. |
| Will there be a large change in environmental conditions? | No | No large adverse changes are predicted, above an air quality objective or limit value. |
| Will the effect continue for a long time? | No | As no large adverse changes are predicted, above an air quality objective or limit value, the effect is not considered to last a long time. |
| Will many people be affected? | No | No properties are predicted to be affected by small, medium or large changes in air quality above an air quality objective or limit value for the protection of human health. |
| Is there a risk that designated sites, areas or features will be affected? | No | No international or nationally designated sites would be affected by the Scheme. |

| Key criteria questions | Yes/No | Supporting information |
|---|---|---|
| Will it be difficult to avoid or reduce or repair or compensated for the effect? | No | No predicted significant effects to mitigate. |
| On balance is the overall effect significant | No | See below. |
| Evidence in support of the judgement<br>There are no predicted annual average concentrations of $NO_2$ above the air quality objective or limit value in the first year of Scheme operation in the air quality study area. Therefore, there are no small, medium or large changes in air quality above the air quality objective or limit value.<br>A compliance risk assessment has been undertaken for the air quality study area. This found that there are no links reported by Defra to the European Commission as non-compliant in the first year of Scheme operation (2024) within the air quality study area. This indicates there is no compliance risk for the Scheme.<br>There are no internationally or nationally designated ecosystem sites that are likely to be affected by the Scheme.<br>Temporary construction effects, associated with dust and plant equipment are not considered to be significant with the implementation of mitigation measures as outlined in Section 5.9 and within the OEMP (refer to Appendix 2.1 [**TR010022/APP/6.3**]).<br>Overall, as there are no properties with adverse changes in air quality (small, medium or large) above the objective or limit value, and there is no adverse effect on air quality for compliance links or European and nationally designated habitat sites, an overall evaluation of 'not significant' has been assigned to the Scheme for traffic emissions in the Scheme operational phase for air quality effects. | | |

5.10.67 This air quality assessment has presented the information required within the NPSNN and NPPF. The results of the assessment suggest that the air quality effects of the Scheme are consistent with relevant national, regional and local planning policy, with no significant air quality effects predicted or compliance risks being identified (during Scheme construction and operation).

## 5.11 Monitoring

5.11.1 As no significant effects have been identified for the air quality construction or operation assessments, no monitoring of significant effects is proposed.

5.11.2 However, as detailed in Section 5.9, due to the risks associated with dust impacts during the Scheme construction phase, monitoring would be carried out as outlined in para 5.9.6 (also refer to the OEMP in Appendix 2.1 [**TR010022/APP/6.3**]).

## 5.12 Summary of assessment

5.12.1 Properties within 200m of the Scheme construction site boundary are expected to have a slight adverse impact from dust soiling and increased $PM_{10}$ concentrations due to dust emissions from Scheme construction activities.

5.12.2 Impacts on $NO_2$ and $PM_{10}$ concentrations have been assessed at sensitive properties near roads that are expected to be affected during Scheme construction due to traffic management activities. Annual mean $NO_2$ concentrations are at risk of exceeding the $NO_2$ objective and limit value at one receptor in Stafford Street in the city centre both with and without Scheme construction traffic management. Construction traffic management measures are likely to result in an imperceptible change or a small improvement in $NO_2$ concentrations in Stafford Street depending upon the stage of the works. $NO_2$ concentrations are predicted to achieve the objectives and limit values at all other receptors during Scheme construction. All $PM_{10}$ objectives and limit values are predicted to be achieved in 2021. During Scheme construction, some receptors would experience an increase in concentrations, whilst others would experience a decrease, however, overall, there would be a slight deterioration in local air quality at properties within the study area, but this deterioration would be temporary during the Scheme construction phase.

5.12.3 Impacts on $NO_2$ and $PM_{10}$ concentrations during Scheme operation have been assessed at sensitive properties near roads that are expected to be affected by the Scheme and near the Scheme itself. All air quality objectives and limit values are predicted to be achieved in the Scheme opening year (2024) except for one receptor in Stafford Street which is at risk of exceeding the $NO_2$ objective and limit value (noting that such predictions have been made using a Highways England conservative prediction method – if the Defra forecasting method is used, the predicted concentrations in Stafford Street are lower and below the objective and limit value both with and without the Scheme). The assessment presented herein indicates that the Scheme is expected to result in a small improvement with regard to $NO_2$ concentrations in Stafford Street. With the Scheme in operation, some receptors would experience an increase in $NO_2$ and $PM_{10}$ concentrations, whilst others would experience a decrease, however, overall, there would be a slight improvement in local air quality at properties within the study area. Regional emissions of $NO_x$, $PM_{10}$ and $CO_2$ are expected to increase with the Scheme, due to an increase in vehicle kilometres travelled with the Scheme, however, much of this increase would be on roads outside of densely populated areas.

5.12.4 The Scheme is expected to be compliant with the EU Directive on Ambient Air Quality during the construction and operational years according to Defra's PCM model.

5.12.5 A summary of the air quality impact assessment is provided in Table 5.11.

## Table 5.11: Air quality - summary of effects

| Receptor | Attribute | Receptor sensitivity | Impact description | Design and mitigation measures | Impact magnitude | Residual effect |
|---|---|---|---|---|---|---|
| Within 200m of construction site and construction compound boundary | Dust and emissions during Scheme construction | High | Receptors could be affected by dust soiling and increased $PM_{10}$ concentrations. | Mitigation measures for dust and emissions (implemented through the CEMP - refer to the OEMP (see Appendix 2.1 [**TR010022/APP/6.3**])). | Slight adverse | Not significant |
| Stafford Street (R197) in Derby city centre | $NO_2$ from traffic during Scheme construction | High | Receptor is at risk of exceeding the objective and limit value. | Implement the TMP (see Appendix 2.3 [**TR010022/APP/6.3**]) and the actions detailed in the OEMP. | R197 small improvement to imperceptible | Not significant |
| All construction phase receptors except Stafford Street (R197) | $NO_2$ from traffic during Scheme construction | High | All receptors achieve objectives and limit values. | Implement the TMP and the actions detailed in the OEMP. | Large deterioration to large improvement | Not significant |
| All construction phase receptors | $PM_{10}$ from traffic during Scheme construction | High | All receptors achieve objectives and limit values. | Implement the TMP and the actions detailed in the OEMP. | Small deterioration to small improvement | Not significant |
| Stafford Street (R197) in Derby city centre | $NO_2$ from traffic during Scheme operation | High | Receptor is at risk of exceeding objective and limit value. | - | Small improvement | Not significant |
| All operation phase receptors except Stafford Street (R197) | $NO_2$ from traffic during Scheme operation | High | All receptors achieve objectives and limit values. | - | Small deterioration to medium improvement | Not significant |
| All operation phase receptors | $PM_{10}$ from traffic during Scheme operation | High | All receptors achieve objectives and limit values. | - | Small deterioration to imperceptible | Not significant |

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